WESTERN HEMISPHERE

EASTERN HEMISPHERE

THE NEW INTERNATIONAL ENCYCLOPÆDIA

SECOND EDITION

VOLUME I

NEW YORK
DODD, MEAD AND COMPANY
1926

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Printed in the U. S. A.

2938

The University Press, Cambridge, U.S.A.
Boston Bookbinding Co., Cambridge, U.S.A.

PREFACE TO THE FIRST EDITION

THE work which is now given to the public after years of diligent preparation is not a new edition or revision of the *International Cyclopædia*. It is not based upon that or upon any other publication. The comparatively small portion of text which has been retained unaltered from the *International Cyclopædia* and incorporated in these volumes has been so retained because it has successfully stood the test of searching criticism, and because the Editors regard it as satisfying the most exacting requirements. This, however, is the full extent of the new Encyclopædia's obligation to the old. The present work has been planned and executed as a wholly independent and original undertaking. It represents the practical knowledge gained from an editorial experience of many years. It embodies the results derived from a critical study of all the most famous works of reference which have at any time appeared in Europe or in the United States.

Every encyclopædia which has secured a lasting hold upon the confidence of the reading public has necessarily been distinguished by some especial merit of its own; yet in the case of each existing publication, this peculiar merit has invariably been offset to a greater or less extent by some counterbalancing defect. Hence, there has always been discernible a decided difference of opinion, both among critics, and among readers, as to which one of the standard encyclopædias best fulfils the proper function of such a work. The ideal encyclopædia is one that combines four attributes: first, accuracy of statement; second, comprehensiveness of scope; third, lucidity and attractiveness of presentation; and fourth, convenience of arrangement. Any compilation of this character, which conspicuously fails to embody all of these essential qualities, falls short to that extent of the ideal; and it must be said that no one of the great encyclopædias which are already in existence can fully stand this test. In the course of time there have gradually been developed three distinct and well-known types of encyclopædic publications, each one of which may be regarded as the concrete expression of a single predominating purpose. Thus the great representative work of the British nation, the *Encyclopædia Britannica*, displays in most of its departments accuracy combined with fullness of detail, and in its own especial sphere, which is that of science, it long remained without a rival. Nevertheless, the *Encyclopædia Britannica*, though its authority has been very great, falls short, as many believe, of the third and fourth attributes above mentioned. In the first place, through the massing of its information in extremely long articles which are in themselves treatises, it is ill adapted for popular use, in spite of its excellent index; and the treatment of its most important topics is often extremely technical, and therefore, to the great majority of readers, unsatisfactory for ready reference.

The great French encyclopædia of Larousse is found in every important library throughout the world, and it is in some respects a model work. In it, the different departments are judiciously divided, and they are treated in detail under the separate titles most appropriate to these divisions. The work, moreover, is unusually complete, and the literary treatment of the different topics included in its text is clear and at times vivacious and entertaining. There exists, however, throughout its pages a lack of accuracy which frequently misleads the reader, while the number of the volumes and their excessive bulk render the encyclopædia both inconvenient in use and almost prohibitory in cost.

The famous *Conversations-Lexikon*, completed and first published by Friedrich Arnold Brockhaus in 1812, and continued by him and his successors through many subsequent editions down to the present time, is an approximation to the ideal encyclopædia. Its accuracy has become proverbial. Its selection of topics and its careful division and subdivision of them for treatment in detail have secured both comprehensiveness of scope and convenience of arrangement. Where it falls short of approaching something like perfection is in the dryness of its narration and its thoroughly German

neglect of literary form. Nevertheless, on the continent of Europe it has long been accepted as the standard encyclopædic work of reference, and it has been translated and imitated in almost every country, notably in the valuable and popular encyclopædia of Chambers, of which the edition that appeared at Edinburgh in 1860 was not only based upon the *Conversations-Lexikon*, but was confessedly in part translated from it.

These three types of encyclopædia represent, as it were, the survival of the fittest, and each of them owes something to the others. Historically, all three have been developed out of the ponderous compilations of the eighteenth century, among which Zedler's *Universal-Lexikon*, in sixty-four volumes (1750), d'Alembert and Diderot's famous *Encyclopédie* in twenty-eight (1772), and Ersch and Gruber's *Allgemeine Encyclopädie* in more than one hundred and sixty volumes remain the most remarkable examples. The gradual evolution of the modern encyclopædia forms, indeed, an interesting study. The older works originally grouped their articles under related departments rather than in alphabetical order; and it was only after many years that the alphabetical arrangement came into general use as being infinitely more convenient for the reader, even though theoretically less scientific. The elaborate system of cross-references, which is now a subject of especial study on the part of all encyclopædic editors, was first developed by Ephraim Chambers in the early part of the nineteenth century. The elucidation of the text by means of diagrams, maps, portraits, colored plates, and other illustrations, was at first quite sparingly employed; but it was an interesting feature of the *Encyclopædia Britannica*, and was finally adopted on a very lavish scale by Brockhaus and by Meyer in Germany.

All modern encyclopædias have incorporated these three features as being absolutely essential. Such fundamental differences as are perceptible between them will be found to exist partly in the scope and purpose of each separate publication, and partly in the method by which the original design has been carried out by those to whom the task has been committed. It therefore seems desirable that, in writing these words of introduction, the Editors of the New International Encyclopædia should set forth as briefly, yet as clearly as is possible, the manner in which they have endeavored to insure at least a close approximation to what, in their best judgment, an ideal encyclopædia should be.

Since accuracy is very properly regarded as the most essential of all the attributes of such a publication, the Editors have been at especial pains to make this work in its several departments fitly representative of modern scientific scholarship. There has long prevailed in certain quarters a definite yet quite untenable belief that this result can be most satisfactorily attained by assigning sets of articles to separate contributors of eminence, for them to write what pleases them and then to sign what they have written. The signed article, it has been claimed, is the best possible guarantee of accuracy, since it carries with it the weight and the authority of its author's name. This theory, however, will not bear a close examination. For it is evident that no single specialist, however eminent, can be so thoroughly equipped at every point as to leave in what he writes no room for criticism. He has his individual preferences strongly marked, and necessarily also his individual bias. In treating matters of scientific doctrine, therefore, he will quite unconsciously give to his statements the coloring of his own personal beliefs. In discussing controversial topics, he will with the same unconsciousness lay more stress upon the theories which he holds himself than upon those which are accepted and maintained by other men of equal eminence. Moreover, he is apt to assume upon the reader's part too great a familiarity with the subject, and hence to employ language which is excessively technical and difficult to understand. Finally, when the individual contributor is permitted to treat his chosen topics in his own way and without reference to what other contributors have done, there will necessarily result a lack of symmetry and proportion which will be perceptible to the most casual reader of the completed work. These facts have been so often demonstrated in the past as to have led the editors of the Brockhaus *Conversations-Lexikon* to reject the signed article altogether, and to substitute for the individualistic system another system under which each article, though originally written by a single specialist, is subsequently criticised by other specialists through whose hands it passes and by whom it is so modified as, in its final form, to be no longer the work of one particular individual. It represents instead the collective knowledge and the different view-points of a number of highly trained and able men, while it usually receives, as well, a finishing touch from the general editor, who bears constantly in mind the inestimable value of simplicity, proportion, and clearness. No signed article can ever have the completeness, the authority, and the practical value of an article prepared in such a way as this; and the proof of the assertion is found in the undisputed fact that the encyclopædia of Brockhaus has been universally recognized as the most minutely accurate work of reference that exists to-day. Moreover, as a practical matter, the signed article frequently involves a certain inevitable deception. As new editions of an encyclopædia appear, a multitude of changes in the text are necessarily demanded in order to add new facts and modify old theories; and these changes are often made by other hands than those of the original contributors, so that many articles to which a writer's name is signed are no longer in reality his own. Hence the Editors of the present work

have, after much deliberation, dispensed entirely with the signed article. In its stead, they have arranged that every important contribution to the work, while written by a specialist of acknowledged competence, shall nevertheless pass through other hands and receive its final form upon the basis of mutual discussion, criticism, emendation, and suggestion. It is proper here to acknowledge the great value of the assistance rendered by Mr. Louis Heilprin, who has read all the proofs, and whose minute and varied knowledge and wide experience have assured a very high degree of accuracy.

In the second place, the endeavor has been made to render this Encyclopædia more comprehensive in its scope than any other. The rapid march of science during the past few years, the new inventions and discoveries that have been made, the political and social changes that have been effected, and the multitude of absolutely new interests that have arisen in almost every department of human activity, have added an immense mass of topics to the list with which former encyclopædias have had to deal. It is believed that all these topics have here received adequate and accurate attention; while a much greater completeness than is usual will be found in the treatment of nearly every department. It is desirable to call especial attention to the amount of space that has been given to the subject of Geography, both physical and political, and to the carefully selected information relating to municipal organization and the management of public utilities — information such as has never before been systematically given in any encyclopædia published in the English language. Something also should be said of the fullness and the modern character of the articles bearing upon the several departments of Biology, Botany, Education, and Psychology, the Mechanical Arts, Physics, Military and Naval Science, Sociology, and Biography. As to the last-named subject, it may be said, without fear of contradiction, that no encyclopædic reference-book in England or America contains as titles so many names of men and women; while the information given under these titles is brought down to the very eve of the publication of this work. Another department of great interest and value is that which has to do with what may be called miscellaneous information and which covers a range of topics not heretofore included in a general encyclopædia. Under this head will be found, for instance, the titles of famous books, comprising works of fiction, the names of the important characters in imaginative literature, the explanation of political nicknames and popular allusions, and in fact all that class of subjects which has ordinarily been found only in Readers' Handbooks, and similar special compilations. It should be noted, too, that the pronunciation of all unusual, technical, or foreign words has been carefully figured in accordance with a simple phonetic system, and that their etymology has been systematically traced. This etymological work has been done with careful regard to the conclusions of the newest school of philological research, and the facts are set forth as simply and as clearly as is possible. For the convenience of the general reader, all the words and stem-forms belonging to the Greek or to the Oriental languages have been transliterated. Care has been taken to supply every important article with a well-selected bibliography for the guidance of those who may wish to pursue the subject in all its ramifications; and the bibliographical material will be found to comprise not only the standard works, but also special monographs, pamphlets, and papers published by the various learned societies. The Encyclopædia as a whole, then, is in reality a library whose books are so divided and arranged as to make the information which they afford immediately and conveniently accessible to the reader. It is this completeness which justifies the title "International" in its application to this work. The word is one which possesses a new significance to Americans at the present time, when our country has shaken off its former isolation, and has developed so many points of contact, political and commercial, with the other nations of the earth. Yet while the work is international, it is international from an American point of view, and it very naturally gives the fullest treatment to those topics which are of immediate and vital interest to Americans.

With regard to the third essential — lucidity and attractiveness of presentation — the recognition of its value which has been expressed above, will afford, perhaps, a clue to what the Editors have endeavored to accomplish. There exists a kind of writing which has become so stereotyped as to be well known to every one, and which might be fittingly described as the encyclopædic style. It is in literature what a monotone is in music — utterly devoid of individuality, of variety, and of interest. It sets forth every possible subject in the same dull way and robs the most living themes of their vitality.[1] This style has even acquired, by the influence of tradition, a pseudo-sanctity, until many persons have become convinced that an encyclopædic article must inherently and inevitably be a synonym for dullness. This view the editors are very far from entertaining, or from desiring to perpetuate; and so the principal contributors have been selected not only for their special knowledge, but also for their possession of a clear, attractive style; and in those articles of which the subjects lend themselves to a distinctly literary treatment, the authors have been expected to write with the same freedom and with the same personal touch as would characterize their contributions to any literary publication of a high class. As the Encyclopædia is intended first of all for the general reader, it has been written from the general reader's point of view, and in such a way as to be free from all vexatious technicalities. Regard, moreover, has been had to form, and to a logical order of presen-

tation. In every detail, the endeavor has been made to compact really valuable information instead of loosely assorted and often unrelated facts. Even the statistics, which in many works of this character are thrown together in a mass, have been used in such a way as to exhibit comparisons which are significant and which possess an interest of their own for every person of intelligence. In short, the aim has been consistently to present each subject not only so as to inform, but likewise so as to attract and entertain.

The fourth essential of a useful encyclopædia is found in the practical convenience with which it may be consulted. This practical convenience has been studied very carefully both by the Editors and by the contributors with the object of enabling a reader to find, with the least possible expenditure of time and patience, the information of which he is in need. This end has been attained, first, by giving a conspectus of each topic as a whole; second, by treating the same topic more in detail under all the natural divisions into which it falls; and finally, by working out a system of cross-references which may serve as guides from each topic to the others which supplement it and provide the collateral information necessary to its fullest understanding.

It is thought that the illustrations of every kind will be found superior to anything hitherto attempted in any encyclopædia. These illustrations have not been gathered together in a haphazard fashion and merely for the purpose of providing the volumes with a certain number of attractive pictures; but they were suggested and selected by the various contributors, or prepared with their coöperation. In many cases much assistance was derived from the Governmental Departments in Washington, where all the plates relating to Natural History were examined and verified by experts in the Government's employ.

The Editors are thoroughly aware of the formidable character of their undertaking. No one, in fact, who has not been intimately associated with the making of a great encyclopædia can fully understand the difficulties which are inherent in such a task, involving as it does the coöperation of a large body of highly trained and scientifically qualified experts, and demanding so many and such varied forms of effort — organization, selection, knowledge, literary skill, critical judgment, and a true sense of proportion. Nor has it been forgotten that such a work as this should be something more than a convenient book of reference. Encyclopædias have in the past performed, and they are still performing, a remarkable educational function in disseminating exact knowledge upon an immense variety of subjects. It would be difficult to overestimate the influence which has been exercised by such famous works as those which have been mentioned in the preceding pages; for they have been really libraries, and to thousands upon thousands of families they have been the only libraries available. To prepare a book which shall professedly discharge a function so important is no light undertaking; to obtain even a fair measure of success is a memorable achievement. It is the hope of the Editors of this Encyclopædia that the test of time will show them to have profited alike by the merits and by the defects of the works which have preceded it; and that the result may be approved as embodying the experience of the past with an intelligent conception of the requirements of the present.

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New York, June, 1902.

PREFACE TO THE SECOND EDITION

THE First Edition of the NEW INTERNATIONAL ENCYCLOPÆDIA was published in 1902–4. The progress and changes during the ten years that have since elapsed have necessitated a thorough revision of the entire text, the expansion of many departments, and the inclusion of many new articles. So radical were the necessary changes and so extensive the additions that the publishers decided to reset the entire work instead of merely cutting the plates, and to add three new volumes besides increasing somewhat the size of the page.

In carrying out this work the articles have been classified in departments and the head of each department has examined carefully the text of every article and made such changes as were desirable in view of the later information available, including the expansion of the existing text and the addition of new articles, whenever necessary, subject to the rules of proportionate treatment.

The Second Edition retains the essential features of the First, namely: the placing of the subjects under titles to which the reader would naturally turn first, the use of a single alphabet with so copious a supply of cross-references as to dispense with the necessity of an index, a very inclusive title list, a full and practicable bibliography for all important subjects, the latest valuable authentic information available on each subject, the etymology and pronunciation of all unfamiliar titles, the distribution of subjects under their own titles rather than in groups, and a comprehensive and so far as possible non-technical treatment to meet the needs of the greatest number of users.

FRANK MOORE COLBY.
TALCOTT WILLIAMS.

April, 1914.

KEY TO PRONUNCIATION

ā as in ale, fate. Also see ĕ, below.
ȧ " " senate, chaotic.
â " " glare, care, and as *e* in there. See ĕ, below.
ă " " am, at.
ä " " arm, father.
ȧ " " ant, and final *a* in America, armada, etc. In rapid speech this vowel readily becomes more or less obscured and like the neutral vowel or a short *u* (ŭ).
a " " final, regal, where it is of a neutral or obscure quality.
a̱ " " all, fall.
ē " " eve.
ė̄ " " elate, evade.
ĕ " " end, pet. The characters *ĕ*, *ā*, and *â* are used for *ä*, *ae* in German, as in Baedeker, Gräfe, Händel, to the values of which they are the nearest English vowel sounds. The sound of Swedish *ä* is also sometimes indicated by *ĕ*, sometimes by *â* or *ď*.
ē " " fern, her, and as *i* in sir. Also for *ö*, *oe*, in German, as in Göthe, Goethe, Ortel, Oertel, and for *eu* and *oeu* in French, as in Neufchâtel, Crèvecœur; to which it is the nearest English vowel sound.
e " " agency, judgment, where it is of a neutral or obscure quality.
ī " " ice, quiet.
i̇ " " quiescent.
ĭ " " ill, fit.
ō " " old, sober.
ȯ " " obey, sobriety.
ô " " orb, nor.
ŏ " " odd, forest, not.
o " " atom, carol, where it has a neutral or obscure quality.
oi " " oil, boil, and for *eu* in German, as in Feuerbach.
o͞o " " food, fool, and as *u* in rude, rule.
ou " " house, mouse.
ū " " use, mule.
u̇ " " unite.
ŭ " " cut, but.
u̱ " " full, put, or as *oo* in foot, book. Also for *ü* in German, as in München, Müller, and *u* in French, as in Buchez, Budé; to which it is the nearest English vowel sound.
û " " urn, burn.
y " " yet, yield.
B " " the Spanish Habana, Córdoba, where it is like a *v* made with the lips alone, instead of with the teeth and lips.
ch " chair, cheese.
D as in the Spanish Almodovar, pulgada, where it is nearly like *th* in English then, this.
g " " go, get.
G " " the German Landtag, and *ch* in Feuerbach, buch; where it is a guttural sound made with the back part of the tongue raised toward the soft palate, as in the sound made in clearing the throat.
H " *j* in the Spanish Jijona, *g* in the Spanish gila; where it is a fricative somewhat resembling the sound of *h* in English hue or *y* in yet, but stronger.
hw " *wh* in which.
K " *ch* in the German ich, Albrecht, and *g* in the German Arensberg, Mecklenburg; where it is a fricative sound made between the tongue and the hard palate toward which the tongue is raised. It resembles the sound of *h* in hue, or *y* in yet; or the sound made by beginning to pronounce a *k*, but not completing the stoppage of the breath. The character K is also used to indicate the rough aspirates or fricatives of some of the Oriental languages, as of *kh* in the word Khan.
n̲ " in sinker, longer.
ng " " sing, long.
N " " the French bon, Bourbon, and *m* in the French Étampes; where it is equivalent to a nasalizing of the preceding vowel. This effect is approximately produced by attempting to pronounce "onion" without touching the tip of the tongue to the roof of the mouth. The corresponding nasal of Portuguese is also indicated by N, as in the case of São Antão.
sh " " shine, shut.
th " " thrust, thin.
TH " " then, this.
zh " *z* in azure, and *s* in pleasure.

An apostrophe ['] is sometimes used to denote a glide or neutral connecting vowel, as in tā'b'l (table), kăz''m (chasm).

Otherwise than as noted above, the letters used in the respellings for pronunciation are to receive their ordinary English sounds.

When the pronunciation is sufficiently shown by indicating the accented syllables, this is done without respelling; as in the case of very common English words, and words which are so spelled as to insure their correct pronunciation if they are correctly accented. See the article on PRONUNCIATION.

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THE NEW INTERNATIONAL ENCYCLOPÆDIA

A, a. The initial letter of almost every alphabet. The Runic Futhark is an exception to this rule. In this alphabet *a* stands in the fourth place. The Ethiopic likewise departs from the common arrangement, aleph occupying the thirteenth place instead of the first. As our alphabet directly follows the Latin, which itself is based on the Greek, the form of our letter *A*, *a* agrees with the same character in those languages. The letter was called alpha in Greek. In form it agreed with the first letter of the North Semitic alphabet, which was called aleph, and the name evidently came from the same source, though possibly through an Aramaic channel, if the ending *a* is the sign of the emphatic, and not a Greek addition. In the Semitic languages aleph is a consonant, although it has a' tendency to lose its consonantal force. There being no corresponding sound in Greek, the letter was employed as a vowel. As to the ultimate origin of this letter nothing is yet known with certainty; but in recent years there has been a strong tendency to abandon the assumption of an immediate derivation of the North Semitic alphabet from Egyptian hieroglyphics or hieratic signs, or from Babylonian cuneiform characters, and to look for a solution of the problem to the later Cretan system of writing transferred to Syria by the Philistines, as Evans does in *Scripta Minoa* (1909), or to linear pottery marks found in many Mediterranean countries, as Flinders Petrie has suggested in *The Formation of the Alphabet* (1912), or to the signs of the lunar zodiac, as is done by Stucken in *Das Alphabet und die Mondstationen* (1913). None of these theories, however, can be supported with sufficient evidence. We do not know the meaning of the Cretan characters, whether the pottery marks have any phonetic value at all, or what signs may have been used in Syria at the time of the invention of the alphabet for the stations of the moon. (See ALPHABET.) The small or uncial *a*, used in ordinary print, is only a modification of the capital *A*. This style of writing prevailed from the second to the seventh centuries of the Christian Era, and is due to the law of least effort. When the scribe began to use papyrus instead of tablets of wax, he traced the letter at one stroke, without lifting his pen from the paper, thus ɑ. (Prou, *Manuel de Paléographie*, 3d ed., Paris, 1910, p. 61.)

Phonetic Character. *A* is the vowel sound that is articulated with the least effort. It is the earliest vowel sound uttered by the baby, before it has acquired control over the muscles of the tongue. It is described by phoneticians as a "mid-back-wide" vowel, formed with a wide opening of the jaws, pharynx, and lips. It had what we may term the *ah*-sound, familiarly known as the "Italian," or "Continental" *a*, as in English *father*. (Sweet, *Sounds of English*, Oxford, 1908; Rippmann, *Sounds of Spoken English*, London, 1910.) Such is approximately the original sound of this letter. In English, however, as in other languages, it has undergone many modifications, due mainly to the influence of surrounding consonants. At the present time, instead of calling the letter itself by the name *ah*, as in most Indo-European tongues, we term it *ay*, and write its plural *aes*, *A's*, *As*. (Cf. Tennyson, *The Epic*, ad fin.: "Mouthing out his hollow *oes* and *aes*.") Though somewhat rare in modern English, the *ah*-sound was of quite frequent occurrence in the earliest English or Anglo-Saxon. It was subject, however, to so many modifications and shiftings that it is now difficult to ascertain the number and varieties of the sound. (See PHONETIC LAWS.) In addition to these modifications, other external influences have tended to alter the sound still more. The orthography has failed to keep pace with the changes in pronunciation; hence the anomalous character of *a* as a sound-symbol. Among the numerous sounds that *a* may represent in English, the following are perhaps the most common: *bat*, *bate*, *ball*, *bar*, *bare*, and *what*, or *wash*. To these may be added the sound of *a* in *ask*, *fast*, *ant*, which varies with different speakers, and is probably intermediate between *bat* and *bar*. Furthermore there is the neutral sound of *a*, approaching the *u* in *but* (or the mute *e* of the French *le*), that often occurs in unstressed syllables, like *a*board, *a*bundant, and also the *a* in *any*, *many*, where it approaches a short *e*. Before *l* we find also *au* expressing the same broad sound as *a*, thus *fault* beside *false*. We inappropriately call the *a* in *bate* "long *a*" in contrast with the "short *a*" in *bat*, although the "long *a*" is not strictly one sound, but ends with a glide, like the *e* in *they*.

Indo-European *a*. In the primitive Indo-European, as in most of its descendant dialects,

the *a* (*ah*-sound) had both a short and a long quantity. In the primitive Germanic, however, the long *a* was changed into long *o;* hence it is the short vowel alone that has remained in English. As an example of a primitive short *a*, we may take Indo-European **agro-s*, 'field'; Skr. *ájra-s;* Gk. *ἀγρό-s;* Lat. *ager;* Goth. *akr-s;* Old Eng. *æcer;* Eng. *acre.* As an example of the primitive long *a*, we may take the Indo-European **mātér-*, 'mother'; Skr. *mātā;* Gk. *μᾶτηρ*; *μήτηρ*; Lat. *māter;* Old Eng. *mōdor;* Eng. mother. See PHONETIC LAWS; and cf. Wright, *Historical German Grammar* (London, 1898).

As a Symbol. Inasmuch as *a* stands at the head of the alphabet, it is therefore commonly used to denote the first in an order or series. Thus, in musical notation (q.v.), it denotes the sixth note of the diatonic scale of C major, or the first note of the relative minor scale of C; the *la* of French, Italian, and Spanish musicians. In the mnemonic words of logic (q.v.), it denotes the universal affirmative proposition, such as, "all men are mortal." The letters *a, b, c,* are also used in algebra (q.v.) to denote the known quantities as opposed to *x, y, z,* the unknown quantities. In abstract reasonings, hypotheses, etc., A, B, C, are likewise employed as convenient designations for particular persons and things in relation to the others of a series or group. In writing or printing, the series *a, b, c,* is commonly used, along with or instead of the Arabic numerals, for marking paragraphs or for reference. In nautical matters, the terms A1, A2, A3 are used (in Lloyd's Register, for example) to indicate the character and condition of vessels, and similarly in business matters to denote the commercial standing of a house. This usage has passed over into popular parlance as an adjective of commendation, so that a person is sometimes spoken of as "A1" to indicate that he is a thoroughly reliable, "first-class" man. A stands also as the first of the Dominical Letters (q.v.).

In Grammatical Forms. This same letter is used in a number of phrases and grammatical forms in English. In the first place, it is employed, beside *an*, as an indefinite article; both forms are weakened from the AS. *ān*, 'one, an.' In provincial expressions *a* ('a) appears as a pronominal form for *he*, etc., as in *quotha*, 'quoth he.' It is also used in dialects in place of *have*, as an auxiliary, or even as a principal verb. As a modern provincial corruption, it is used in lieu of the pronoun I. It appears as a preposition for the AS. *an, on*, meaning 'on, in,' with a verbal noun in such ancient phrases as *a-hunting, a-building;* also as a reduced form of the preposition *of*, now generally written *o'*, in *Jack-a-lantern, John a Gaunt, man-o'-war;* for *on* in *asleep* (AS. *on slæpe*), *away* (AS. *on weg*), *twice a day, now a days;* for *off* in *adown* (AS. *of dūne*); for AS. *of-*, intensive, in *athirst.* Sometimes it stands for the Latin preposition *ā*, meaning 'of, off,' as *a priori, Thomas a Becket.* As a verbal prefix, it often stands for AS. *ā-*, equivalent to the modern German *er-*, originally implying 'motion away,' but in earlier English merely intensive, as in *awake* (AS. *āwacen*, Ger. *erwachen*), *arise* (AS. *ārīsan*), and in many other phrases. See ALPHABET and ABBREVIATIONS.

A. 1. A symbol used in the classification of the scale C major or the tonic in the scale of A minor. Before the tenth century A.D. it was actually the first or lowest tone of the fundamental scale, which was A, B, C, D, E, F, G. (See GREEK MUSIC.) 2. As a fixed tone a′ (435 vibrations) is the standard by which all instruments are tuned. 3. In theoretical works A denotes the triad of A major, and a the triad of A minor. 4. In the scores of works requiring more than one performer the letters of the alphabet are used as guides, to enable the performers to find their place readily in case of repetition during rehearsals.

A1. A symbol used in the classification of wooden ships by Lloyds Maritime Insurance Association. The designation follows as a result of examination of a ship by one of the Lloyds surveyors. The symbol A1 denotes that hull and equipment of the ship in question are in good condition; the letter A standing for construction and the numeral 1 for equipment; when the latter is inadequate the figure 2 is used. Should the symbol be preceded by figures, thus, 12A1, it means that the classification is good for 12 years. A1 vessels may receive further extension of classification (1 to 8 years), and the symbol becomes 12A1-Cont. 6A1, which means original 12-year class continued 6 years. If later restored it would still be possible to remain in A1 class with the following symbol: 12A1-Cont.6A1-Rest.6A1. When a vessel has passed the age for the character A, but is still found fit for conveying perishable goods to all parts of the world, it is registered A in red. Ships designated A in black form the third class, and are allowed to carry perishable goods on *shorter voyages.* For further information in regard to the classification of ships for marine insurance, see SHIPS, CLASSIFICATION OF, FOR MARINE INSURANCE.

AA, ä. The name of numerous small rivers in Europe, of which the best known are the Münster Aa and the Westphalian Aa in Germany, and two rivers in the Baltic Provinces, West Russia, both emptying into the Gulf of Riga. Besides these nearly forty others have been enumerated. The word is said to be of Celtic origin, but it is allied to the O. N. *á*, O. Ger. *aha*, Goth. *ahva*, identical with the Lat. *aqua*, 'water.' Ach, Aach, and Aachen (pl.) are other forms of the same word.

AACHEN, äG′en. See AIX-LA-CHAPELLE.

AAHMES, ä′mĕs. See AMASIS.

AALBORG, ąl′bôrK (Eel-town). An ancient episcopal city of Denmark, capital of the Amt of Aalborg, in Jutland, on the south shore of the Limfjord (Map: Denmark, C 1). The town has a cathedral, a museum, a nautical school, and a library. It is situated on one of the branches of the Danish State Railway, which here crosses the Limfjord on an iron bridge 990 feet long and 16 feet wide. The manufactures of the town are considerable, consisting chiefly of brandy and spirits, cotton goods, dyed articles, cement, and lumber. There is an electric lighting plant. There are some shipbuilding and sea trade, the latter with England, Norway, and Sweden, for the most part in vessels owned by citizens of the town. Fish is the leading article of export. The harbor is safe but too shallow for large vessels. Aalborg has long been an important commercial centre. It was plundered by Wallenstein in 1627 and by the Swedes in 1644 and 1657. Pop., 1890, 19,503; 1906, 31,509; 1911, 33,449.

AALEN, ä'len. A town of Württemberg, Germany, 47 miles by rail east of Stuttgart, on the Kocher River, 1420 feet above sea level (Map: German Empire, D 4). There are cloth manufactures and large iron works. The poet Schubert spent his boyhood in this town, and there is a statue erected in his honor. Pop., 1910, 10,400.

AALESUND, ä'le-sŭn. See ALESUND.

AALI, ä'lê, MEHEMET, Pasha (1815–71). A Turkish statesman and diplomat. He entered the public service at 15 years of age; was secretary to the Embassy in Vienna in 1835, and from 1840 to 1844 Minister in London. He then became Minister of Foreign Affairs and several times after 1852 was Grand Vizier. He was also promoted to the rank of Field-Marshal and Pasha. In 1856 he represented the Porte at the Congress of Paris and in 1871 took a prominent part in the London conference for the settlement of the Black Sea question. He was favorable to progress and strove earnestly, though ineffectually, to introduce reforms in the Turkish government.

AALST, älst. See ALOST.

AAR, or **AARE**, är (perhaps connected with Skt. *ara*, swift). The largest tributary of the Rhine in Switzerland. It rises in the glaciers west of the Grimsel Pass in the canton of Bern, at an altitude of 7345 feet (Map: Switzerland, C 1), flows northwest and enters Lake Brienz after forming the famous falls of Handeck, 240 feet high. Issuing from Lake Brienz, it enters Lake Thun, passing the town of Interlaken. On emerging from the latter lake, the Aar becomes navigable and, after a winding course northwestward, reaches the Jura Mountains and flows along their southern slope down to its confluence with the Limmat, where it breaks through the ridge and enters the Rhine near Waldshut. Its entire length is about 180 miles, and among its numerous tributaries the most important are the Saane, Zihl, and Emme. Through its tributaries the Aar is connected with some of the principal lakes in Switzerland. The most important cities on its banks are Bern, Solothurn, Aarau, and Interlaken. There are several small rivers of the same name in Germany.

AARAU, ä'rou (*aar* + Ger. *Aue*, meadow, from *aha*, water). Capital of the canton of Aargau, Switzerland, near the Jura Mountains, on the right bank of the Aar, 41 miles northeast of Bern (Map: Switzerland, C 1). It is 1285 feet above sea level and lies in a fertile plain between the Jura and the Swiss plateau. The town is very picturesque and has several museums and a fine cantonal library. There are silk, cotton, leather, and cutlery factories, an iron foundry famed for its cannon and bells, and other workshops. There are fine vineyards on the lower slopes of the Jura Mountains. The town is famous for producing excellent mathematical instruments. North and northeast of the town are the Wasserfluh, 2850 feet high, and the Gislifluh, 2540 feet high. The river Aar is here crossed by a suspension bridge. Pop., 1900, 7995; 1910, 9536 (commune, 9806).

AARD-VARK, ärd'färk' (Dutch, 'earth-pig'). A burrowing, nocturnal, insect-eating mammal (*Orycteropus capensis*), native and common in South Africa. It is about 5 feet long, including a long, tapering, naked tail. The head is long, thin, and somewhat pig-like, with a tubular snout and high, pointed ears. The body is stout, fat, and thinly covered with bristly, reddish hairs. The limbs are short, strong, and equipped with claws adapted to digging in hard ground. It inhabits open regions, is timid and mainly nocturnal, lives in burrows, and feeds upon insects, mainly ants and termites, breaking into their "hills" and gathering them into its small mouth by means of its long, protrusile tongue, which is coated with glutinous saliva. The flesh is edible, but likely to taste of the formic acid in its food. A closely allied species (*O. æthiopicus*) inhabits northeastern Central Africa. These two animals (with several fossil species) represent the Orycteropodidæ, a family of Edentata differing from the remainder of that order in so many respects, for example in the possession of an interparietal, and in character of brain and placenta, that some naturalists have proposed to establish a separate order for it, Tubulidentata. See Plate of ANT-EATERS.

AARD-WOLF (Dutch, 'earth-wolf'). A nocturnal, carnivorous mammal (*Proteles cristata*) of South Africa, resembling a small striped hyena with a dog-like head. It is closely allied to the hyena, from which it differs mainly in its weak jaws and peculiar dentition, which prevent its overcoming and eating vertebrate prey or large carrion. Hence its food consists of small carrion, of grubs, and largely of termites. Its fur is coarse, and capable of erection along the back; in color it is ashy-gray, irregularly striped up and down and around the legs with black; its muzzle is black and nearly naked; legs and feet dark brown in front and gray behind; ears dark brown outside and gray inside. It goes abroad only in the night, and several are said to live in the same burrow. It is the sole representative of the family Protelidæ. See Plate of HYENAS.

AARESTRUP, ä're-strōōp, EMIL (1800–56). A Danish poet, born at Copenhagen. He was little regarded during his lifetime, but since the publication of his collected poems, with a critical essay by Georg Brandes, he has been deemed one of the first lyrists of Denmark, noted for his combination of passion and tenderness.

AARGAU, är'gou, or **ARGOVIE**, är'gō'vē'. A canton of north Switzerland, with an area of 542 square miles (Map: Switzerland, C 1). Its surface is moderately mountainous, and there are a number of fine valleys. The chief rivers are the Aar, a tributary of the Rhine, and its tributaries, the Reuss and the Limmat. There are a number of mineral springs. The soil is very fertile. The vine is cultivated extensively in the river valleys, and the output of dairy products is considerable. The manufacturing industries are well developed and give occupation to about 18,000 people. The production of textiles is the chief industry. For purposes of administration the canton is divided into 11 districts. The legislative power is vested in the assembly (*Grosse Rat*), elected at the rate of one member for every 1100 inhabitants. The executive power is in the hands of a council (*Regierungsrat*) of five members, chosen by the assembly for a period of four years. The referendum is frequently resorted to, and for private initiative in legislation 5000 votes are required. In the National Council Aargau is represented by 10 members. The population was 206,659 in 1900 and 230,629 in 1910. The inhabitants are mostly of German origin, and

the German language is spoken by almost the entire population. Capital, Aarau (pop. commune, 9806 in 1910). Aargau, in its original extent much larger than the present canton, was a part of ancient Helvetia, and was subdued by the Franks in the fifth century. It was held by the Hapsburgs from 1173 till 1415, when it was taken from them by the Swiss Confederates, who gave parts of it to Bern and Lucerne. In 1798 the district was divided into the cantons of Aargau and Baden, which became members of the Helvetic Confederation. Ruled mainly by the aristocratic party, Aargau gained a liberal constitution in 1831, and since then has been the champion of democracy against the reactionists and the clericals. Consult: *Historische Gesellschaft des Kantons Aargau* (Aarau, 1898), J. Heierli, *Die archäologische Karte des Kantons Aargau* (Aarau, 1899), and E. Zschokke, *Geschichte des Aargaus* (Aarau, 1903).

AARHUS, ar'hōōs. A seaport and episcopal city of Denmark, capital of the amt of Aarhus, Jutland, situated on a bay of the Kattegat, in a fertile plain, 68 miles northeast of Fredericia (Map: Denmark, D 2). There are here the oldest Gothic cathedral in the kingdom, the construction of which was begun in 1201, a museum, an exchange, and several banks. The inhabitants are engaged in agriculture, shipbuilding, and manufacturing. The town is connected with the rest of Jutland by the State Railroad, and there are regular lines of steamers to Copenhagen and England. The harbor is well protected by a breakwater and admits vessels of 6 feet draught. The town ranks among the oldest in Denmark, for it had the first Christian church and has been the residence of a bishop since 948. Aarhus was the scene of a Danish defeat by the Prussians in 1849. Pop., 1890, 33,306; 1906, 55,193; 1911, 61,755.

AARON, ar'un (Hebrew *'Aharon*). The elder brother of Moses (Ex. iv. 14) and first high priest of Israel, according to Ex. xxix. 3, 29; Lev. viii. 12; and Num. xvi. 17. When Moses was sent on his mission of deliverance to Pharaoh, Aaron was appointed his spokesman and performed some miracles, even bringing on some of the plagues. He was always, however, the subordinate of Moses, from whom he received his ordination. While Moses was absent receiving the Ten Commandments, Aaron yielded to the importunities of the people and fashioned for them the golden calf (Ex. xxii. 1–6). Aaron was concerned in two rebellions. In the first, his authority, as well as that of Moses, was called into question by the Korahites (Num. xvi). The miraculous budding of the rod of Aaron settled that dispute. In the other, Aaron, perhaps inspired by Miriam, rebelled against the authority of Moses, but here Miriam was punished. Because of the incident at Meribah (probably the modern 'Ain Kuderat; see KADESH-BARNEA), where Moses and Aaron struck the rock instead of speaking to it (Num. xx. 8–13), Aaron was not allowed to enter Canaan, but died and was buried on Mount Hor (Num. xx. 22–29) or at Moserah (Deut. x. 6), eight stages away from the former place (Num. xxxiii. 31). Eleazar, his son, succeeded to the high priesthood. Modern scholars have called attention to the fact that Aaron appears as a high priest by the side of Moses only in what are regarded as post-exilic additions in the Pentateuch. In the earlier parts of this work, on the other hand, Moses wields the magic rod (Ex. iii. 17), gives oracles (Ex. xviii), sprinkles the blood and brings sacrifices (Ex. xxiv), and Aaron is only an attendant, like Hur and Joshua. From Moses as the founder of the priesthood the priestly families of Dan (Jud. xviii. 30) and Shiloh (1 Sam. ii. 30) claim descent. Ezekiel does not trace the origin of the priesthood at Jerusalem further back than to Zadok, who lived in the time of Solomon. Aaron as the high priest is supposed to be the reflection of the actual head of the State and its religious cult in the Persian period. The figure itself is connected by Redslob, Dozy, Land, and Ed. Meyer with the ark (Hebrew *'aron*), while N. Schmidt looks upon Aaron as originally an Edomitish numen worshiped on Mount Hor in Petra and Moserah (the modern Jebel Madhera) in the Negeb (q.v.) and later remodeled after Jeroboam (q.v.), who also makes a golden calf and has two sons named Nadab and Abihu. The tomb of Aaron at Petra contains a sarcophagus made up of Greek and Hebrew tombstones with inscriptions, showing their modern origin, but the shrine itself was connected with Aaron already in the time of Josephus (Ant. iv, 4. 7) and therefore no doubt also before the Nabatæan period. See Oort, "De Aaronieden" in *Theologisch Tijdschrift* (1884, pp. 289 ff.); Ed. Meyer, *Die Israeliten und ihre Nachbarstamme* (1906, pp. 92 ff.); N. Schmidt, "Jerahmeel and the Negeb" in the *Hibbert Journal* (1908, pp. 339 ff.).

AARON. A villainous Moor in the Shakespearean play of *Titus Andronicus*. The resemblance of Aaron's brazen avowal of his wickedness in the last act of this play to a similar passage in Marlowe's *Jew of Malta* has been cited as an indication that the *Titus Andronicus* may possibly owe its origin to the same author.

AARON BEN ELIJAH. Distinguished Karaite theologian. He was born in Cairo c. 1300, lived for a long time at Nicomedia, in Asia Minor, and died in Constantinople in 1369. He was called Aaron the Younger to distinguish him from Aaron ben Joseph (q.v.). He is perhaps the most profound thinker among the Karaites (q.v.) and has often been compared with Maimonides. He was under the influence of the Mutazilites (q.v.). Like them, he held that all knowledge necessary for salvation emanates from reason and accepted an atomistic theory of the universe which recognized, however, a divine creation of the atoms. He looked upon Abraham as having developed through his own meditation a natural religion, afterwards systematized by Moses. He wrote *'Ez ha-Hayyim*, 'The Tree of Life,' in 1346; *Gan 'Eden*, 'The Garden of Eden,' a Karaite code, in 1354, and *Keter Torah*, 'Crown of the Law,' a commentary on the Pentateuch, in 1362. See Wolf, *Bibliotheca Hebræa* (i, 1715, pp. 114 ff.); Fürst, *Geschichte des Karäertums* (1862–69); Schreiner, *Der Kalam in der jüdischen Literatur* (1895, pp. 57 ff.).

AARON, BEN JOSEPH (c.1260–c.1320). Karaite teacher, physician, and poet. He is often called The Elder to distinguish him from Aaron ben Elijah (q.v.). He was born in Sulchat, Crimea, but lived most of his life at Constantinople. Eager for knowledge, and remarkably free from prejudice, he studied the works of Ibn Ezra and Maimonides and en-

tered into friendly relations with Christians. His best known work is *Mibhar*, 'The Choice,' a commentary on the Pentateuch in which he expressed his philosophical views. He rejects the existence of demons as an absurdity; and he regards the human soul as in its functions dependent upon the brain, the blood, and the spinal cord. His Book of Hymns and Prayers, *Seder Tefillot*, became the standard prayer-book of the Karaites. In this book he introduced also hymns of Ibn Gabirol, Jehudah ha-Levi, and Ibn Ezra. The *Mibhar* was published with a commentary by Joseph Solomon ben Moses Yerushalmi,' Koslov, 1835. See Fürst, *Geschichte des Karäertums*, 1862–69; Schreiner, *Der Kalam in der Jüdischen Literatur*, Berlin, 1895, p. 57.

AARSENS, or **AARSSENS,** är'sens, Frans van (1572–1641). A Dutch diplomat. At 26 years of age he was sent to Paris as the agent of the States-General; later he became Ambassador for the United Provinces, and long represented his country at the French court, where he was highly regarded by Richelïeu. He was also at different periods Ambassador to Venice, Germany, and England. Motley, who considered Aarsens one of the ablest diplomats of Europe, shows that he contributed largely to the unrighteous death of Barneveldt, 1619.

AASEN, ą'sen, Ivar Andreas (1813–96). A Norwegian philologist. He was born at Söndmöre. He at first studied botany, but subsequently turned his attention to researches respecting the native dialects. Assisted by the government, he traversed nearly the whole of Norway, investigating popular speech, upon which he sought to base a national language that should be free from Danish influence. "Landsmaal," the artificial language which he formed, was widely adopted by his countrymen. An effort to have it recognized by the government as the official language of Norway (instead of the "Rigsmaal," or Dano-Norwegian) seemed in 1913 assured of success. (See Norwegian Language.) In 1848 he published *Det Norske Folkesprogs Grammatik*, and in 1850 added *Ordbog over det Norske Folkesprog*, enlarged under the title of *Norsk Ordbog* in 1873, and in 1856 *Norske Ordsprog*, a treatise on Norwegian proverbs (2d ed., 1881). Through his linguistic work he was the originator of the patriotic movement generally known as the "Maalstrœv."

AASVOGEL, äs'fô-gel (South African Dutch for 'carrion-bird'). Any of several South African vultures.

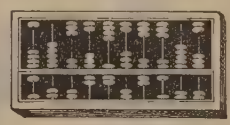
AB, äb. The fifth month of the Jewish religious year, and the eleventh (in intercalary years the twelfth) of the Jewish civil year. The first day of Ab became a fast to commemorate the death of Aaron; but of far greater significance is the ninth, commemorated as a fast to mark the destruction of the first temple by Nebuchadnezzar, 586 B.C., and of the second temple by Titus, 70 A.D., though there is no evidence to show that the latter ever took place on that day of the month. Ab corresponds roughly to July–August of the common year.

ABAB'DE. A Hamitic people west of the Red Sea, below Kosseir. Their habits are those of the desert, the camel being their chief domestic animal.

AB'ACA, ä'ba-kä. A term used in the Philippine Islands to designate the plant which produces manila hemp. See Hemp, Manila.

ABACO, ä'bä-kô, or Lucaya, Great and Little. Two of the Bahama Islands, the former 190 miles east of Florida, lat. 26° 30′ N., long. 77° W. (Map: West Indies, J 1). Together they cover an area of about 879 square miles. Shipbuilding, wrecking, fishing, and the cultivation of sisal-fibre hemp are the chief employments. Many of the inhabitants are said to be descendants of American Tories. Pop., 1911, 4463.

AB'ACUS (Lat., from Gk. ἄβαξ, *abax*). A calculating machine or table occasionally employed in modern primary schools to make the elementary operations of arithmetic palpable. It consists of a frame with a number of parallel wires, on which beads or counters are strung. In ancient times it was used in practical reckoning, and is thus used still in China, Persia, and elsewhere. The ancient Greek abacus consisted of a frame on which grooves were marked denoting the several orders, units, tens, etc. In these grooves counters were set to denote the units of each order. Across the grooves ran another, at right angles to them; counters set below this horizontal groove marked the units up to four, those above it denoted five or more units. Fractions were reckoned on a second set of grooves. In the *Abacus Pythagoricus* each counter bore a number, so that only one was needed in each column, and more complicated operations could be performed. The Roman abacus showed, at the bottom, nine perpendicular grooves. On the grooves to the right (grooves 8 and 9) fractions were reckoned, on the duodecimal system; in the other grooves units up to four were counted. Above the first eight grooves were eight shorter grooves, used for reckoning five or more units. (See Calculating Machines.)



CHINESE ABACUS.

Among the Romans the name *abacus* was given also to a tablet, with a rim about it, covered with sand, on which lines or figures were drawn with the fingers or some pointed instrument. This kind of abacus was used in school, in the study of arithmetic and geometry.

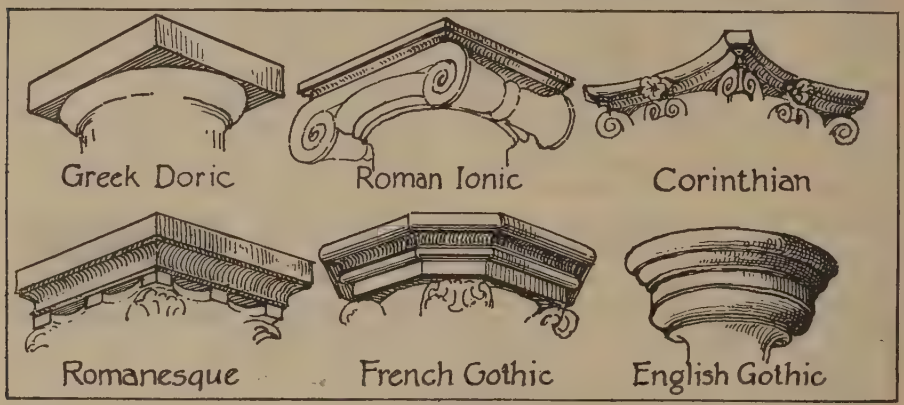
ABACUS. The flat member, usually square or octagonal, which forms the topmost feature of the capital of a pier or column. The edges of the abacus are usually molded, that of the Greek Doric order being the chief exception. In the Corinthian order and some variants of the Roman Ionic the sides are concave in plan and the corners slightly truncated. Gothic abaci are often octagonal; those of the English Gothic are quite as often circular. The term is also (rarely) applied to square tablets or panels in walls or mosaic floors. See Cut, p. 6.

ABAD, ä-bäd' (Pers. and Hind., equivalent to the Engl. 'abode,' for which it is an obsolete form). An affix in the formation of many Oriental geographical names, especially in British India and Persia, as Hyder*abad* (Haidarabad), the 'dwelling' or city of Hyder.

ABADDON (a word peculiar to later Hebrew = 'ruin,' 'destruction'). In the Old Testament one of the names given to Sheol, or rather to the place of the lost in Sheol (Job xxvi. 6; xxviii. 22; xxxi. 12; Prov. xv. 11; Ps. lxxxviii. 11; also Wis. xviii. 22, 25, in some of which passages it is practically personified). Only once used in the New Testament (Rev. ix. 11),

and then as the proper Hebrew name of the King of the Abyss, whose Greek name is Apollyon ('Destroyer'). See APOCALYPTIC NUMBER.

ABAKA KHAN, ä-bä'kà hän' *or* kän'. See MONGOL DYNASTIES.



ABACUS — TYPICAL FORMS.

ABAKANSK, ä'bà-känsk'. A fortified village in the government of Yeniseisk, Siberia, on the Abakan, near its junction with the Yenisei River (Map: Asia, J 3). It was founded by Peter the Great in 1707, and is situated in a very fertile region in the vicinity of coal mines that give employment to many of its inhabitants. Fur trading is also carried on extensively. Pop., about 2000.

AB'ALO'NE (Sp., of unknown origin). A name in California for the several local species of marine gastropods (family Haliotidæ), otherwise known as ear-shells or sea-ears; representatives are numerous throughout the warmer seas of the world, except the western Atlantic. The shell, although having the shape of a shallow oval saucer, is really a widely flattened spiral, the apex of which is near one end, while the turned-over margin is the columella. (See illustrations on Plate of ABALONE, ETC.) The animal creeps about rocks near the shore, spreading a fringed mantle, and extending tentacles through the row of holes in its shell; it feeds upon seaweeds, and when quiet or alarmed withdraws all soft parts beneath the shield-like shell and sits down with great tenacity, after the manner of its near relatives, the limpets. The lining of the shell is a layer of richly colored mother-of-pearl, much used for inlaying and for the manufacture of small ornaments, buttons, etc. The animals are eaten, especially by Orientals, and great quantities of them are collected and dried on the coast of California, not only for consumption by the local Chinese, but for export to China and Japan. A species in the Channel Islands, England, is regularly collected for food and is called *ormer*.

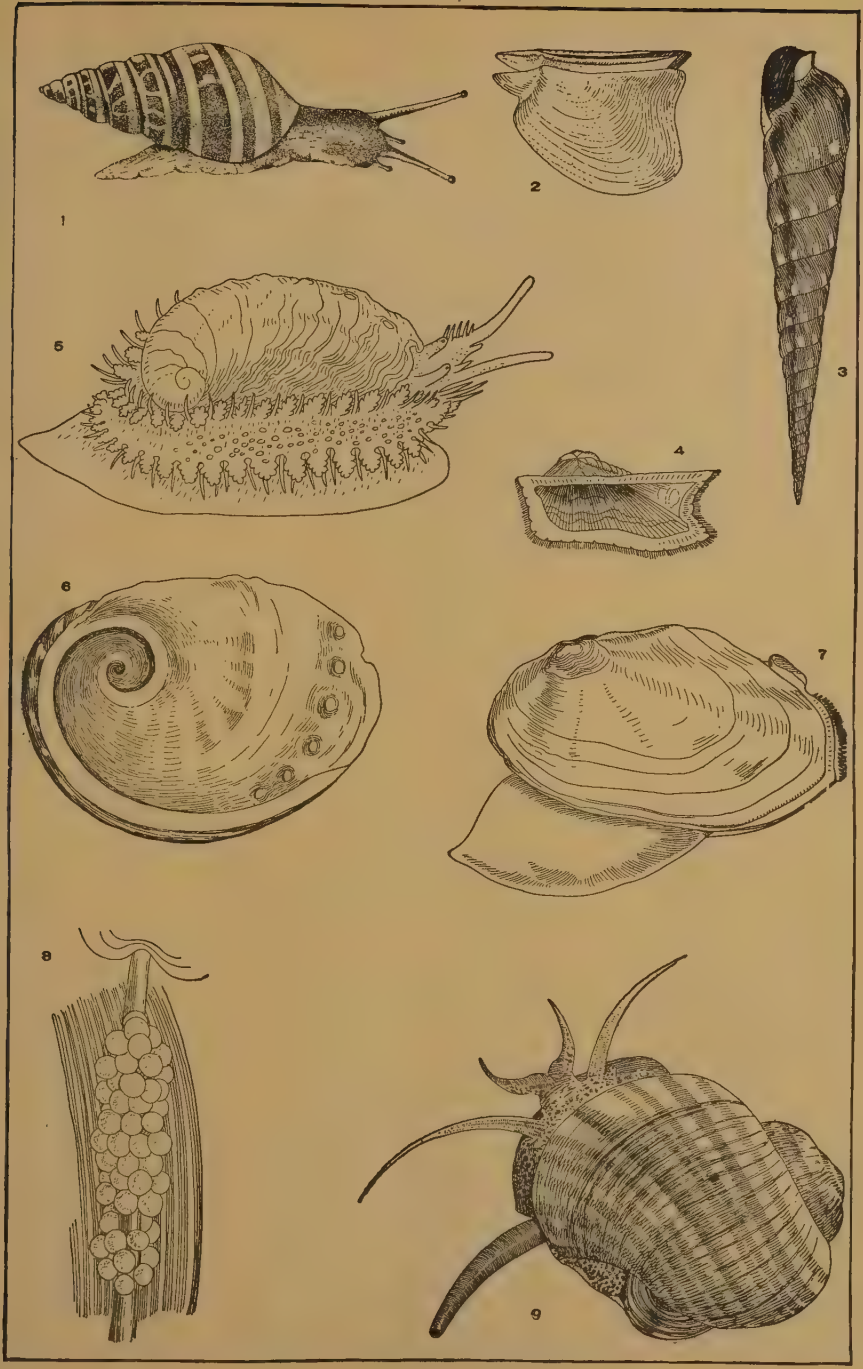
ABANCAY, ä'bän-kī'. The chief city of the department of Apurimac, Peru, 50 miles west-southwest of Cuzco, on the Abancay (Map: Peru, C 6). It possesses extensive sugar refineries and is the centre of the best sugar-growing district in Peru. There are several gold and silver mines in the neighborhood. Pop., 1896, 1200; 1912 estimate, 3000.

ABAN'DONMENT. A legal term comprehending two very different conceptions: (*a*) the relinquishment or surrender of a legal right; (*b*) the willful renunciation of certain classes of legal obligations. Though commonly employed by law writers in the former sense, it is doubtful if there is, strictly speaking, any such thing as the loss of a property right by mere abandonment. The cases which seem to support such a view usually, if not always, involve other considerations, such as a gift, an estoppel, or the operation of the Statute of Limitations. In criminal law abandonment is the intentional exposure or desertion of a dependent person by one who is under a legal duty of protecting and maintaining him. A parent or a guardian of the person of a young child is guilty of a misdemeanor at common law if the child is physically injured in consequence of the abandonment; while, if death results therefrom, the abandoning parent or guardian is guilty of murder. Even where no injury follows, abandonment of an infant is now generally punishable as a misdemeanor by statute. At present the offense is generally defined by statute. In some States it has been extended to the abandonment of a disabled or infirm animal in a public place. Consult: Wharton, *Criminal Law* (Philadelphia, 1896); Bishop, *Commentaries on Criminal Law* (Boston, 1895); Wharton, *A Treatise on Criminal Law* (San Francisco, Cal., 1912). See EASEMENT; ESTOPPEL; GIFT; INSURANCE; LIMITATION OF ACTIONS; PATENTS.

ABANO, ä'bä-nō, PIETRO D', also known as PETRUS DE APONO or APONENIS (1250–1316). An Italian physician and astrologer, professor of medicine in Padua. He became famous through his work, *Conciliator Differentiarum, quæ inter Philosophos et Medicos Versantur* (Mantua, 1472), the object of which was to reconcile the philosophy and medicine of the time. His fame as a scientist and his enormous popularity as a physician aroused the envy of less successful men. Charges of heresy and atheism were brought against him, and he was arraigned before the Inquisition. He was acquitted in the first trial, but died in prison before the end of the second.

ABANO BAGNI, a-bä-nō bä-nyē. A small watering place in the province of Padua, Italy, 29 miles by rail from Venice. It is famous for its hot sulphur springs, the water of which is

ABALONE, ETC.



1. AGATE SHELL (Achatina), with animal extended.
2. WING SHELL (Avicula).
3. AUGER SHELL (Terebra).
4. ARK SHELL (Arca).
5. ABALONE (Haliotis), with animal extended.
6. ABALONE (interior), showing flattened spine.
7. ANODON, a River Mussel, with foot extended.
8. EGGS OF APPLESNAIL.
9. APPLESNAIL (Ampullaria), with animal extended.

cooled in mud basins. They are much resorted to for diseases of the skin. The town was known in Roman times as Fons Aponi or Aquæ Patavinæ. The Monastery of St. Daniel is near by. Pop., 1901, 4550; 1911, 5450.

ABARBANEL, ä-bär'bä-nĕl'. See ABRABANEL.

AB'ARIM. The name signifying 'those on the other side' and applied to a range of mountains in the land of Moab, east of the Jordan and the Dead Sea (Num. xxvii. 12; xxxiii. 44, 47). Among these uplands was Mount Nebo, the place where Moses is said to have died (Deut. xxxii. 49). There are traces of an earlier use of the term to indicate the territory of Gilead as well as Moab, as in Jer. xxii. 20, where it is ranged with Lebanon and Bashan.

AB'ARIS (Gk. *Ἄβαρις*). A legendary hyperborean miracle-worker, possessor of a magic arrow of Apollo, on which he could ride through the air. His story probably originated in the mystical movements of the sixth century B.C., though Abaris is first mentioned by Pindar and Herodotus. The New Platonists elaborated the legend and made Abaris a companion of Pythagoras.

ABASCAL, ä'bäs-käl', JOSÉ FERNANDO (1743–1821). A Spanish statesman and general. He entered the army in 1762; became Governor of Cuba in 1796; was Viceroy of Peru from 1804 to 1816; in 1816 he was made Marqués de la Concordia. He was noted for administrative ability, firmness, and moderation.

ABASIA, ä-bā'sē-ä. See ABKHASIA.

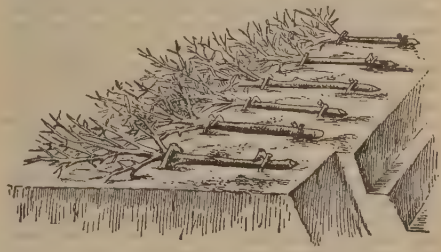
ABASOLO, ä'bä-sō'lō, MARIANO (1780?–1819). A Mexican revolutionist, born at Dolores, Guanajuato. He participated in the revolution started by Hidalgo in 1810 and rose to be a major-general. He fought at Puente de Calderón, was taken prisoner by the Spaniards, was tried at Chihuahua, and was sentenced to ten years' imprisonment at Cadiz, where he died.

ABATE'MENT (OF. lessening, from Lat. *a*, away + *batuere*, to beat). A term used in various senses in the common law of England and the United States, as follows: (1) *Abatement of Freehold.* The unlawful entry upon and taking possession of an estate of inheritance by a stranger after the death of the ancestor and before the heir or devisee has become seized of the estate by entry. (See FREEHOLD; SEISIN.) (2) *Abatement of Nuisances.* A remedy against injury by nuisance by removal of the nuisance. (See NUISANCE.) (3) *Plea in Abatement.* A pleading interposed by the defendant to the plaintiff's complaint or declaration by which the defendant, on some formal and technical ground, seeks to abate or quash the action. If sustained, it does not determine the merits of the controversy, but requires the plaintiff to begin his action anew. (See ACTION; PLEADING.) (4) *Abatement of Legacies.* A reduction of the amount of legacies when the estate of the testator is insufficient to pay debts and legacies in full. (See LEGACY.) (5) *Abatement of Suit.* Suspension of proceedings in a suit in Chancery for want of proper parties to proceed with the suit. Abatement may result from the death, change of interest of a party, or marriage of the plaintiff, if a woman. After abatement the suit may be revived and proceeded with by the legal representative of the deceased party, or by the husband of the plaintiff, if a woman. Action at law when abated could not be revived as in equity. This, however, is now permitted by statute. (See ACTION.) (6) *Abatement* or discount in commercial law. (See DISCOUNT.) (7) *Abatement* or deduction of duties levied by the custom-house. (See CUSTOMS DUTIES; DRAWBACK.) (8) Abatement or reduction of taxes is regulated wholly by statute. See TAX.

ABATEMENT. IN HERALDRY. Any addition to the coat-armor of a knight or gentleman that was made to indicate an unknightly deed on the part of the bearer was termed an abatement, and the arms so altered were said to be abated.

ABATI, ä-bä'tē, NICCOLO DELL'. See ABBATE.

AB'ATIS (Fr. *abatis*, mass of crushed objects). A military defense, used for the purpose of retarding an enemy's advance. It is a device as old as the art of war itself, and still used under certain conditions, or in positions where



ABATIS.

wire entanglements are neither possible nor available. It consists of trees felled and placed side by side, the stronger boughs and branches intertwined, and pointed in the direction of the enemy. Leaves and small twigs should be removed and the stiff ends of branches pointed. In the case of intrenchments of a more permanent character, the abatis is built in a slight depression in front of the trench or ditch, so that it is fairly safe from artillery fire.

ABATTOIR, ä'ba'twär' (Fr. *abattre*, to beat down, this referring to the method of slaughtering cattle). As popularly regarded, the establishments in which animals are slaughtered for food are divided into large abattoirs and local slaughter-houses. The former are usually operated in cities in connection with packing houses, while the latter are chiefly found in country towns, and their products are sold in a fresh condition principally for local consumption.

The abattoir system of the United States is of comparatively recent origin, but with the concentration of the meat industry in large establishments it has developed rapidly and assumed enormous proportions. The packing house, of which the abattoir is an important part, has become the great source of meat for domestic consumption and for the export trade.

As a result of investigations of the methods followed in these establishments in the preparation of fresh meats and canned goods, which revealed unwholesome and unhealthy practices, unsanitary conditions, and the inadequacy of government inspection under existing laws, Congress passed, on June 30, 1906, a comprehensive law for the inspection of all meats intended for interstate or foreign trade and of all establishments producing the same, and providing an appropriation of $3,000,000 per annum to maintain this federal supervision. An additional appropriation of $200,000 was made in 1913 for

the ensuing year. In 1912 federal inspection was conducted at 940 establishments located in 259 cities and towns. It is estimated that this reached about 60 per cent of the total meat supply of the United States, the remainder being under the jurisdiction of state and local officers.

The largest abattoirs and the principal centres for meat packing are at Chicago, Kansas City, Omaha, St. Louis, Cincinnati, Milwaukee, and Fort Worth. The Union Stock Yards in Chicago is the largest meat-packing centre in the world, covering an area of about 500 acres and representing an invested capital of $67,000,000. It is an aggregation of abattoirs, packing houses, and other establishments for handling live stock and utilizing the products. During the year 1912 there were received 7,180,967 hogs, 2,652,342 cattle, 505,401 calves, and 6,055,546 sheep, of which 78 per cent of the hogs, 63 per cent of the cattle, 95.5 per cent of the calves, and 81 per cent of the sheep were slaughtered, the remaining animals having been shipped to other points for Eastern slaughter, export, feeding, or breeding purposes.

At the Chicago Stock Yards the animals are received in cars direct from the feeding country. They are unloaded, fed, watered, and sold to the expert buyers employed by the packing companies. They are then subjected to an ante-mortem examination by the government inspectors, and those showing any diseased or unsound condition are slaughtered separately and rejected if found diseased.

In the slaughtering of animals the division of labor is carried out to a very fine degree, which renders possible the greatest skill and speed in the work. The cattle are driven up to the pens on the killing floor, situated several stories above the ground, and stunned by being "knocked" between and above the eyes with a sledge hammer. The animal then rolls out on the killing bed, is shackled, hoisted on the rails of a suspended tramway, and bled by a "sticker." After bleeding, it is moved along to a place where the "header" skins and removes the head. The animal is now lowered from the tramway and skinned, a constant string of butchers following one after another in completing the work and trimming out the dressed carcass. In the larger abattoirs there are from 16 to 32 beds. These beds are the portions of the killing floor opposite to each knocking pen, on which the animal is bled, eviscerated, and dressed. They are arranged in a continuous series, the first workmen starting out on the first bed and going down to the last, by which time the last workman has completed No. 1 carcass, which is then pushed back on the rail out of the way for the next run. In this manner a force of 50 butchers, 45 washers and trimmers, and 60 miscellaneous workers may kill and dress about 7 runs of cattle in an hour, which means an average of from 1100 to 2000 beef carcasses for a day of 10 hours.

During the slaughtering, the carcasses are inspected by the federal meat inspectors. These latter officials follow the "gutter" and inspect the viscera, carefully examining all suspicious indications of disease and loathsome conditions. In case lesions of a serious disease are found, or if the animals are emaciated, advanced in pregnancy, have recently given birth to young, or are immature, the carcass is marked with a tag bearing the letters "U. S. Inspected and Condemned" and is rendered into fertilizer, thus protecting the public from the danger of ingesting unsound or diseased meat. Those carcasses which fail to reveal conditions which would render the meat unfit for food, are marked "U. S. Inspected and Passed."

With the hogs the process of slaughtering is necessarily somewhat different. In the large packing houses the animals are driven into the catch pens, a chain is passed around the hind leg and attached to one of a series of arms on a constantly moving so-called "Ferris Wheel" which elevates the pig and deposits it on an inclined rail where its weight carries it to the "sticker," who severs the large blood vessel in the neck. As soon as the animal is dead it is placed into the scalding tank, through which it passes by a revolving motion, and at the opposite end is lifted out by a cradle and drawn through the automatic scraping machine, which removes most of the bristles. The scraping is completed by hand on the scraping bench, after which the head is almost completely severed from the body. It is at this point that the first government inspector examines the cervical glands of every animal. The carcass is then hung on the track of a suspended tramway and here eviscerated, during which process it is inspected by a second inspector. The carcasses are then passed along the rail through the shower bath into the cooling room, but in cases where lesions are observed, the viscera together with the carcasses are tagged and switched to a special rail. The ultimate disposition of all carcasses is determined upon a final examination made by a third inspector.

The killing and dressing of the animals, however, is but a small percentage of the work done in the abattoir. There are large cutting rooms where the carcasses go from the cooling room to be cut into the various pieces, also curing and smoking rooms for the treatment of these cuts of meats. The making of leaf and steam lard and sausage manufacturing are large industries of themselves. See MEAT; PACKING INDUSTRY; and SLAUGHTER HOUSES.

ABAUZIT, ȧ′bō′zē′, FIRMIN (1679–1767). A distinguished French archæologist, historian, and theologian, born at Uzès in Languedoc. Being of Huguenot ancestry and himself a Protestant, when the Edict of Nantes was revoked, he repaired to Geneva, which was then one of the great centres of Protestantism, and where he studied assiduously, so that he became one of those encyclopædic scholars who were typical of the seventeenth century before intense specialization was yet known. Eager to see all the Protestant world, in 1698 he visited both Holland and England. In the latter country he was an associate of Sir Isaac Newton, who acknowledged his own indebtedness to Abauzit for his correction of some errors in Newton's most abstruse mathematical work. Although King William III invited him to make his permanent residence in England, he persisted in returning to Geneva (1715), where he helped the translators in their task of rendering the New Testament into French (1726). His best known historical work was local, and consisted of profound research into the early history of Geneva. This led the authorities of that city to confer upon him all the rights of citizenship. During the remainder of his life he busied himself in the production of theological and archæological monographs. Though he passed for an orthodox Protestant, his actual belief was much disputed

after his death; but this question can never be determined, owing to a curious fact. His heirs, without giving any reason, destroyed all his theological papers which would have thrown light upon the inner workings of his mind. It is known, however, that he did deny to the Apocalypse a place among the accepted canonical writings. Abauzit numbered among his friends some very brilliant writers of his time, the list including not only Newton, but Bayle, Basnage, Voltaire, and J. J. Rousseau. This last-named eccentric genius, who was always chary in bestowing praise upon contemporaries, made Abauzit the subject of a fervid eulogy when writing *La Nouvelle Héloïse.* Abauzit died at Geneva.

AB'BA (Gk. *ἀββᾶ*). The Aramaic word for 'father.' It occurs three times in the New Testament as a form of address to the Deity (Mark xiv. 36; Rom. viii. 15; Gal. iv. 6). In all these instances its meaning in Greek is added, for the benefit of readers unfamiliar with Aramaic. In Talmudic literature it occurs frequently as a title of honor addressed to a scholar, and also enters into the composition of proper names. The title Abba is frequently met with in ecclesiastical literature and is applied to the bishops of the Syriac, Coptic, and Ethiopic churches.

ABBA ARIKA, ä-rē'kä. A famous Jewish scholar in Babylonia and founder of the academy of Sura. He is usually called Rab. He was the descendant of a distinguished Babylonian family, studied at Sepphoris, and having been ordinated there, returned to Babylonia, where he settled first at Nekardea, and then at Sura. His general attitude is best expressed in this utterance: "The commandments of the Law were only given to purify men's morals." He exercised a profound influence on Jewish life and thought. See Muhlfelder, *Rabh, ein Lebensbild* (1871); Bacher, *Agada der Babylonischen Amoräer* (1878, p. 1).

ABBADIDES, a-băd'īdz *or* -īdz. An eleventh century Mohammedan dynasty in Spain. The founder was Abd-al-Kasim Mohammed, the very wealthy kadi of Seville, in 1023. Before 1042, when he died, he had made himself recognized as the leader of the Moslems of Arabic or Spanish descent against the Berbers, whose chief was the King of Granada. His son Abbad, surnamed El Motaddid (1042–68), and his grandson, surnamed El Motamid (1068–91), successively held his position and were very remarkable men. Like the later Renaissance tyrants in Italy, they were cruel and licentious, but also noted for their love of literature and culture. Many interesting tales are told of them and their favorites: e.g., of El Motaddid's collection of the skulls of his enemies whom he had killed; or of the caprices of Romaica, the slave girl whom El Motamid married; but especially of the beautiful Zaida, the daughter of El Motamid, whom the latter handed over to Alphonso VI of Castile as a concubine. The misrule and cruelties of the Abbadides led to great dissatisfaction, and the position of El Motamid became so desperate after the capture of Toledo by Alphonso VI, in 1085, that he called in the Almoravides (q.v.). He soon came to open breach with them, but by alternately or simultaneously intriguing with them or with Alphonso he tried to save himself. His efforts failed; Seville was captured in 1091; he was made a prisoner and died in prison in 1095. See Dozy, *Histoire des Musulmans d'Espagne* (Leyden, 1861), and id., *Historia Abbadidarum* (Leyden, 1846).

ABBADIE, dȧ'bȧ'dē', Antoine Thomson d' (1810–97), and Arnaud Michel d' (1815–93). Two French explorers, brothers, born in Dublin. They were known for their researches in Abyssinia from 1837 to 1848. According to their own account, their objects were purely ethnological and geographical; but they were regarded by certain English travelers and missionaries as agents employed by the French government for religious and political purposes. Antoine became involved in controversies, and the accuracy of his facts was disputed, but later his reports of geographical discoveries were proved substantially accurate. Among the results of their travels were a catalogue of Ethiopic MSS., an edition of the Ethiopic version of the *Pastor* of Hermas, and the *Géodésie de la Haute-Ethiopie* (1860–73). The English expedition to Abyssinia led Arnaud to publish, in 1868, his *Douze ans dans la Haute-Ethiopie.* Antoine published a *Dictionnaire de la langue Amarinna* in 1881.

ABBADIE, Jacques (1654?–1727). A French Protestant theologian, who died in London. Of a poor family, he was educated by his friends and advanced so rapidly that at seventeen he was granted the degree of doctor of theology at Sedan. He spent several years in Berlin as minister of the French Protestant church and in 1688 accompanied Marshal Schomberg to England, becoming minister of the French church in London called "La Savoye." He was strongly attached to the cause of William III, who made him dean of Killaloe, Ireland. He wrote a defense of the English revolution of 1688, but was best known by his theological works, the most important of which was *Traité de la vérité de la religion chrétienne* (1684).

ABBAS I, ăb'bȧs (1557–1628). Shah of Persia; known as "the Great." He was the youngest son of Shah Mohammed Khodabendeh. He rose in rebellion against his father and gained possession of the throne at the age of eighteen. In 1597 he defeated the Uzbeks in a great battle near Herat and drove them from the country. During many campaigns against the Turks he added a great deal of territory to his possessions. He overthrew the Turks and Tatars near Sultanieh and extorted an advantageous peace from them (1618). Upon the renewal of hostilities he captured Bagdad after a year's siege, in 1623. In a fit of Oriental jealousy Abbas killed one of his sons and put out the eyes of two others. He did, however, despite his tyrannical nature, introduce many reforms into his country. See Persia.

ABBAS I, PASHA, ăb'bȧs pȧ-shä' (1813–54). Viceroy of Egypt and grandson of Mehemet Ali. He was active but not distinguished in Mehemet's wars in Syria. After Ibrahim's short reign he took the throne (1848) as hereditary successor and proved a cruel and capricious ruler. He dismissed all Europeans from state service and in general was a foe to civilization. In the Crimean War he assisted the Sultan of Turkey with his fleet and 15,000 men. It is supposed that he was murdered.

ABBAS II, Hilmi (1874—). Khedive of Egypt; eldest son of Tewfik Pasha. He was educated at Vienna, and succeeded his father in 1892. Though holding an unfriendly attitude toward English interests in Egypt, he carried on his government under British supervision following an abortive attempt in 1893 to form an anti-British cabinet. He made an official visit to England in 1899. See Egypt.

ABBAS Ibn Abd al Muttalib, ăb'băs 'b'n ăbd' ĕl mŏŏt-tă'lĕb (566–652). Paternal uncle of Mohammed. He was at first a determined opponent of his nephew, but his defeat in battle at Bedr was followed by his conversion, after which he became one of the chief apostles of Islamism. He was the progenitor of the Abbasside caliphs of Bagdad.

ABBASIDES, *a*-băs'ĭdz *or* -ĭdz, The (Ar. al-'Abbasiyah). Caliphs of Bagdad, and the most celebrated Muslim dynasty, although their rule never extended over the whole of Islam, as had that of the Umayyads. In Spain it was acknowledged only for a few years before the establishment of Abd al Rahman's power and nominally by the Almoravides (1086–1149). After 788 in Fez, and 800 in Kairawan, it was chiefly the spiritual authority of the Abbaside caliph that was recognized in N. W. Africa, until even this was refused by the Almohades (1147–1269) who, like the Umayyads in Cordova (756–1031), assumed the title of caliph. The Abbasides claimed descent from Abbas, the uncle and adviser of Mohammed (566–652). The rivalry between the family of Abbas and the Umayyads led to open rebellion in Khorasan in 747. Ibrahim, the head of the Abbaside faction, defeated the Caliph Marwan II in June, 747. He was indeed taken captive by Marwan in 748; but his brother Abu'l Abbas (q.v.) was proclaimed caliph in 749 and in 750 defeated Marwan in a great battle near the river Zab and established his line firmly on the throne. Abu'l Abbas 'mercilessly put to death all whom he could find of the family reigning in Damascus and gave himself the surname *al Saffah*, 'the shedder of blood.' In Spain, however, Abd al Rahman, one of the Umayyads who had escaped, succeeded in establishing the great independent amirate, or kingdom (subsequently caliphate), of Cordova. The successor of Abu'l Abbas (750–754), Almansur (754–775), made Bagdad the capital of his empire. Under his followers the empire enjoyed comparative peace and attained to a splendid development. The caliphs became the patrons of literature, art, and learning, and their courts were the home of the most extreme luxury. The caliphs Harun al Rashid (786–809) and al Mamun (813–833) were famous throughout the world for their wealth, their splendor, and their munificence. But the martial vigor of the Arabs was sapped by the influence of Persian luxury, and they gradually ceased to be relied upon for military service. In Africa and in the northeastern part of Persia amirs seized the opportunity to declare themselves independent; in the West the Greek Empire showed a revival of energy; but the real danger came, as with the Roman Empire, from an alien soldiery. Al Mutasim (833–842) had formed a body-guard of Turks, and these in time seized upon the real powers of government. They assassinated al Mutawakkil, the son of al Mutasim, in 861, and in 908 forced al Muktadir to delegate the chief powers of government to their commander under the title *amir al umara*. In 945 the caliphs came under the power of the Buwayyid dynasty of amirs in Bagdad; and in 1055 these were succeeded by the Seljuks (q.v.). On the decline of their power the caliphs were able for some time to maintain themselves in Bagdad or the surrounding territory. But in 1258 Hulagu Khan, the Mongol ruler of Persia, burned Bagdad and put the ruling caliph al Mustasim to death. Some of the Abbasides fled to Egypt, and one of their number was proclaimed by the Mamluk ruler as caliph in Cairo under the name of al Mustansir. His successors continued to enjoy a kind of priestly dignity, investing the Sultans of Egypt with their power. When Selim I conquered Egypt in 1517, he took with him the last of these caliphs, al Mutawakkil II, and allowed this dignitary to invest him with the spiritual as well as the temporal power of the caliphate. He died in 1538 at Cairo. Consult: Muir, *The Caliphate* (3d ed., 1899); Weil, *Geschichte der Chalifen* (Mannheim and Stuttgart, 1846–62); Müller, *Der Islam im Morgen- und Algadland* (1887); Van Vloten, *De opkomst der Abbasiden in Chorasan* (1888).

ABBAS MIRZA, ăb'bās mĕrzà (1783–1833). A Persian prince who attained considerable prominence by defending his country against Russia. Aided by English officers, he inaugurated, as a young man, many reforms in the Persian army and waged two unsuccessful wars against Russia. As a result of the first, Persia was forced to cede all of her territory in the Caucasus; as a result of the second, although further territory was lost, Abbas Mirza was recognized as the successor to the Persian throne. The Prince traveled in later years to St. Petersburg and was welcomed heartily by the Czar; he won a reputation for moderation and enlightenment and was a patron of literature. In 1834 his eldest son, Mohammed Mirza, became ruler of Persia. See Persia.

ABBATE, ăb-bä'tâ, Niccolo dell' (c.1512–71). The forms Abati, Abbati, and Abbé (French) also occur. An Italian decorative painter and designer. He was born at Modena, studied with his father, a fresco painter, and with the sculptor Begarelli, but was most influenced by the works of Correggio. His early frescoes at Modena are, for the most part, lost, and of those at Bologna but few survive. In 1552 or shortly before, he removed to France, where the remainder of his life was spent. He was Primaticcio's chief assistant in decorating the palace at Fontainebleau, after that master's as well as his own designs. Abbate thus became a follower of Primaticcio (q.v.), whose style he was chiefly instrumental in spreading, particularly through his designs for the decorative arts, which were used as models in other European countries.

ABBAZIA, ä'bà-tsē'ä. An Austrian health resort, charmingly situated at the head of the Gulf of Quarnero (Adriatic Sea), 9 miles west-northwest of Fiume (Map: Austria, D 4). Well sheltered, Abbazia is a favorite summer and winter resort, with a mean temperature of 50° F. in winter and 77° F. in summer. Over 40,000 visitors frequent this retreat annually, among whom are many yachtsmen. It has a new Palast, various bathing institutions, and the Carol Promenade, built in 1896 at the expense of the King of Rumania. The population is about 2500, mostly Croats.

ABBE, à'bâ'. The French name for an abbot (q.v.), but often used in the general sense of an unbeneficed Roman Catholic priest. By the famous Concordat of Bologna between Pope Leo X and Francis I (Aug. 18, 1516), the French King had the right to nominate upward of 200 *abbés commendataires*, who, although without duty, drew an income from the convents. Later it came to be used in France of clerics not in sacred orders, who were tutors or companions in the families of the nobility. In Italy the

same class of unbeneficed clergy are called *abbate*.

AB'BE, Cleveland (1838–1916). An American astronomer, meteorologist, and educator, born in New York City. He graduated in 1857 at the Free Academy (now the College of the City of New York) and studied astronomy with F. Brünnow at Ann Arbor (1858–60) and with B. A. Gould at Cambridge (1860–64). From 1864 to 1866 he resided at the observatory at Pulkova, Russia, and from 1868 to 1873 was director of the Cincinnati Observatory, where he inaugurated a system of daily weather forecasts based upon simultaneous meteorological observations reported by telegraph. This led to the establishment of a similar system by the government. In December, 1870, Professor Abbe was called to Washington to prepare the official weather predictions and storm warnings, and in 1891 he was appointed meteorologist of the Weather Bureau. To him is due the initiation, in May, 1879, of the movement toward the introduction of the now universal systems of standard time and hourly meridians. In January, 1873, he prepared the first official *Monthly Weather Review*, which continued under his editorship until July, 1909, after which he became editor of the *Bulletin* of Mt. Weather Research Observatory. He is lecturer on meteorology in Johns Hopkins University, Baltimore, and a member of the National Academy of Sciences. He received the degree of LL.D. from the University of Michigan in 1887 and from the University of Glasgow in 1896. The Royal Meteorological Society of Great Britain conferred upon him the Symons Gold Medal in January, 1912. Among his publications are: *Annual Summary and Review of Progress in Meteorology* (1873–88); *Treatise on Meteorological Apparatus and Methods* (1887); *Preliminary Studies for Storm and Weather Predictions* (1889); *The Mechanics of the Earth's Atmosphere* (1891); *Physical Basis of Long Range Forecastings* (1902); *Relations between Climates and Crops* (1905); *Mechanics of the Earth's Atmosphere* (3d coll. 1911).

ABBE, Cleveland, Jr. (1872—). An American geographer, son of Cleveland Abbe (q.v.). He was born in Washington, D. C., and graduated from Harvard University in 1894. He took post-graduate studies at Johns Hopkins University, receiving the Ph.D. degree in 1898. From 1901 to 1903 he studied geography at the Imperial University, Vienna. He was appointed instructor in physiography at the Corcoran Scientific School of Columbian (now George Washington) University in 1894 and remained in that position until 1897. In 1896–1901 he was an assistant in the Maryland Geological Survey, part of the time also filling the chair of geology and biology in the Western Maryland College. In 1899 he became acting professor of the natural sciences in the Winthrop Normal and Industrial College in South Carolina. He held this position until 1901. Two years later he was appointed aid in the United States Geological Survey, and in 1906 research observer in the United States Weather Bureau. From 1908 to 1910 he was assistant editor of the *Monthly Weather Review*, and in the latter year became assistant in the library of the United States Weather Bureau.

ABBE, äb'be, Ernst (1840–1905). A German physicist. He was born at Eisenach, Thuringia; studied at Jena and Göttingen; became assistant at the astronomical observatory in Göttingen and lecturer before the Physical Society of Frankfort-on-the-Main. In 1870 he was made professor at Jena; in 1878 became director of the astronomical and meteorological observatories, but resigned his ordinary professorial duties in 1891, when he became sole proprietor of the Carl Zeiss optical works in Jena, with which he had been connected since 1866. This he made a co-operative establishment, in the profits from which the officials, the workmen, and the university share. Abbe is well known for the part he played in the design and perfection of optical instruments. The high degree of excellence of the instruments and lenses manufactured by his firm is largely the result of his experimental work. Especially has the improvement been marked in photographic and microscopic lenses. He invented the Abbe refractometer and wrote many papers on optics and optical instruments. See his *Gesammelte Abhandlungen* (Jena, 1904).

ABBE, CONSTANTIN, L'. A story by Ludovic Halévy dealing with the distresses of the good Abbé Constantin when he learns that a neighboring estate has been bought by an American millionaire. He soon discovers, however, to his great joy, that Americans are not necessarily heathen. The book was first published in 1882, and in the next 30 years passed through more than 150 editions.

ABBE, Truman (1873—). An American surgeon, son of Cleveland Abbe (q.v.), and brother of Cleveland Abbe, Jr. (q.v.). He was born in Washington, D. C., and graduated from Harvard University in 1895. He studied medicine at the College of Physicians and Surgeons (Columbia University), New York, receiving his degree in 1899. After post-graduate studies at the University of Berlin in 1899–1900, he served in several hospitals in New York City. In 1902 he was appointed instructor in physics and physiology at Georgetown University, and in 1903 assumed also the duties of instructor in surgery. In 1905 he was appointed instructor in physiology at George Washington University, and four years later instructor in surgery at that institution. He was surgeon in charge of the Garfield Surgical Dispensary from 1906 to 1910. Important researches into the use of radium as applied to medicine brought him a silver medal at the Jamestown Exposition in 1907. He contributed to vol. iii of Wharton and Stiller's *Medical Jurisprudence* in 1905, collaborated with F. H. Bowlby on *Physical Conditions and Treatment*, and wrote many articles on radium and medical subjects for medical journals.

AB'BESS. The superior of a religious community of women, who corresponds in rank and authority to an abbot (q.v.), except that she is not allowed to exercise the spiritual functions of the priesthood—such as preaching, confession, etc. Nor can she release her nuns from their vows or suspend or dismiss them. Her personal confessor and those for her nunnery must be approved by the bishop. The Council of Trent decreed that her electors must be professed nuns and that she must be at least forty years old and an inmate of the nunnery over which she was to preside for at least the eight previous years. The term was in occasional use from early times, but it became the official title of the superiors of Benedictine nunneries, whence it spread in course of time to other orders.

ABBEVILLE, ăb'vĭl' (Fr., 'city of the Abbey,' of St. Riquier). Capital of the arrondissement of Abbeville, in the department of

Somme, France, 28 miles by rail northwest of Amiens (Map: France, N., G 2). Abbeville is built partly on an island and partly on the banks of the river Somme. It is connected with the sea by means of a canal. The streets are narrow, and the picturesque houses are built mostly of brick and wood. The building most worthy of notice is the church of St. Wolfran, commenced in the reign of Louis XII, a splendid example of the flamboyant style. Its city hall, built in 1209, is a curious medieval structure; the library dates from 1690. The important industries of Abbeville centre around its cloth factories, which make velvets, serges, cottons, linens, sacking, hosiery, etc. It is on the Northern Railway, and is connected by canals with Amiens, Paris, Lille, and Belgium. Vessels of between 150 and 200 tons can sail up the Somme as far as Abbeville, which is 12 miles from that river's mouth in the British Channel. Abbeville is well known in the scientific world from the remarkable fossil remains of extinct mammals, as well as the flint implements of prehistoric man, which have been discovered in its neighborhood. Pop., 1896, 17,781; 1901, 20,388; 1906, 20,704; 1911, 20,373.

ABBEVILLE, ăb'ê-vĭl. A town and the county seat of Vermilion parish, La., 150 miles southwest of New Orleans, on the Inter-Coastal Canal, the Vermilion River, and on the Iberia and Vermilion Railroad (Map: Louisiana, C 4). The town is the seat of the Fenwick Sanitarium, and has rice, sugar, and cotton factories. The Inter-Coastal Canal provides water for extensive irrigation work carried on by three companies. The water works and light plant are owned by the town. Pop., 1890, 637; 1900, 1536; 1910, 2907; 1913 (est.), 3500.

ABBEVILLE. A town and the county seat of Abbeville Co., S. C., 105 miles west of Columbia, on the Southern and Seaboard Air Line railroads (Map: South Carolina, B 2). The town contains railroad repair shops, and includes among its industries cotton-ginning, cotton-seed oil pressing, flour and feed milling, and the manufacture of cotton cloth and bricks. Abbeville owns its water works and electric light plant. Pop., 1900, 3766; 1910, 4459; 1913 (est.), 4700.

AB'BEY. See MONASTERY; SANCTUARY.

ABBEY, ăb'ĭ, EDWIN AUSTIN (1852–1911). The foremost of American illustrators; also a distinguished figure and mural painter. He was born in Philadelphia, April 8, 1852. Descended from an artistic family, the lad grew up with brush and pencil. At the age of sixteen he was placed with a wood engraver and afterwards studied for a year in the Pennsylvania Academy of Fine Arts. In 1871 he entered the employ of Harper Brothers in New York, associated with Charles S. Reinhart, Howard Pyle, Joseph Pennell, and William T. Smedley. In 1878 he was sent by the firm to England to make studies for his illustrations of Herrick's *Poems*. They were followed by illustrations to Goldsmith's *She Stoops to Conquer* (1887), *Old Songs* (1889), *Who is Sylvia*, and the *Comedies* of Shakespeare. From 1881 he resided in Great Britain.

As a painter in water colors and pastel, Abbey has shown great ability. Among his best-known water colors are "The Evil Eye" (1887), "An Old Song" (1886), "Le Jongleur"; among his pastels, "Phyllis," "Two Noble Kinsmen." His first oil painting, "A May Morning," exhibited in 1890, met with immediate success. It was followed by "Fiametta's Song" (1894), "Richard of Gloucester and the Lady Anne" (1896), "King Lear's Daughters" (1898), presented in 1913 to the Metropolitan Museum of Art, New York; "The Penance of Eleanor, Duchess of Gloucester" (1909), now in the Carnegie Institute Museum at Pittsburgh; "The Crusaders" (1901), "Columbus and the New World" (1906), and a reredos for the American church in Paris (1907). In 1901 he was commissioned to paint the "Coronation of Edward VII," which he completed with great success in 1904, but refused the same commission from George V. He was the third Pennsylvanian commissioned to paint a British coronation. The others were Benjamin West for George III and Charles Robert Leslie for Victoria.

But Abbey's greatest paintings were two great decorative series executed for his native land. The earliest of these, fifteen great canvases representing the "Quest of the Holy Grail" (1891–1902), adorns the book delivery room of the Boston Public Library. The effect of the bright and beautiful colors is, unfortunately, impaired by the position of the paintings. The last ten years of his life were devoted to mural paintings in the Pennsylvania State Capitol at Harrisburg, which show great progress over the previous work. The central dome of the building is adorned by four gigantic lunettes and four ceiling panels. Above the speaker's rostrum in the House of Representatives is the "Apotheosis of Pennsylvania," a canvas 34 feet square, representing famous men of that commonwealth, which ranks as his highest achievement in painting. It is flanked by "Penn's Treaty with the Indians" and by the "Reading of the Declaration of Independence," the latter completed by his pupils in 1913. The rotunda of the ceiling is adorned by a mystic and beautiful representation of the "Hours" of day and night. Of his paintings for the Senate Chamber only one, "Von Steuben Training the American Soldiers at Valley Forge," was completed. His unexpected death in London, Aug. 8, 1911, prevented the painter from finishing the rest.

Abbey ranks as one of the world's greatest illustrators. His marked predilection for the costume and life of the past and his historic and topographic accuracy fitted him peculiarly for the period he has chosen. An excellent draughtsman, he preserved a certain romantic attitude towards his subject, which never fails to charm. As a painter he ranks among the most intellectual and able that America has produced, and although his painting is illustrative, he excels especially in color. He received gold medals at Vienna, Paris, Berlin, Philadelphia, etc.; was a member of the National Academy of Design, New York, the Royal Academy, London; an honorary member of several European academies; Chevalier of the Legion of Honor and corresponding member of the Institute de France; and honorary LL.D. of the University of Pennsylvania. Consult: Abbey, *The Quest of the Holy Grail* (Boston, 1909) for the reproductions; a charming interpretation by Greenslet, same title (ib. 1902).

ABBEY, HENRY (1842–1911). An American poet and merchant, born at Rondout, N. Y. He is the author of *May Dreams, Ralph and Other Poems, Stories in Verse, Ballads of Good Deeds, The City of Success,* and *Phaëton.* His works are collected in *Poems of Henry Abbey,* of which there are three editions.

ABBEY, HENRY EUGENE (1848–96). An

American theatrical manager, born at Akron, Ohio. He began as manager of a local theatre, then conducted starring tours for Lotta and others, and in 1876 leased the Academy of Music in Buffalo. Success rapidly followed his removal to New York, where he became manager, first of the Park Theatre, later also of Booth's and the Grand Opera House. Theatres in Boston and Philadelphia, as well, came under his control. Upon his engagement of Sarah Bernhardt and her company in 1880 he became known as the "Napoleon of managers." In 1883–84 Abbey controlled the Metropolitan Opera House, and it was under his management that Adelina Patti, in 1889–90, made a tour of the United States. In 1893 he produced the brilliant spectacular play *America*, built Abbey's Theatre in New York, and resumed control of the Metropolitan.

ABBIATEGRASSO, äb-byä'tä-gräs'sô. A city in north Italy, 394 feet above the sea, on the Grande and Bereguardo canals, 16 miles west of Milan (Map: Italy, C 2). It manufactures fertilizers and markets rice. It was captured in 1167 by Emperor Frederic Barbarossa, and in 1245 by Emperor Frederick II. In 1313 Matteo Visconti vanquished the Guelphs here, and in 1524 Giovanni de' Medici defeated the French. Pop., 1901, 12,270; 1911, 13,168.

ABBITIBBI. See ABITIBI.

AB'BO, or ABBON OF FLEURY, flē'rē (ABBO FLORIACENSIS) (945?–1004). A French theologian. He studied at Rheims and Paris, and at the request of Oswald, Archbishop of York, taught in 985–987 in the English abbey of Ramsey. When he returned to France, he was chosen Abbot of Fleury, whose school he developed. He was sent by King Robert upon a diplomatic mission to Pope Gregory V and was killed at the priory of La Réole, Gascony, in an uprising against his reforms in monastic discipline. He wrote an *Epitome de Vitis Romanorum Pontificum, Desinens in Gregorio I* (printed in 1602). His biography was written by his pupil Aimoin in the *Vita Abbonis abbatis Floriacensis.*

AB'BOT (through Lat. *abbas*, Gk. *ἀββᾶς*, *abbas*, from Syriac *abbā*, father). See ABBE. In the early days of monasteries any monk who won the reverence of the people might be called abba. The term, first used in Syria, spread, and soon was applied to the head of a monastery. Other terms were used—elder, senior, and, in the Greek churches, archimandrite (head of the fold) and hegumenos (leader). The last two terms have survived in the Greek church to the exclusion of abbot. The rule of St. Benedict (c.529) fixed abbot or abbat, as the name of the superior of the monastery. The Benedictine conception is that each house is a home, and abbot is appropriate as the title of the head of the house. The name has been perpetuated by the Benedictines and the orders derived from them, as the Cistercians, Bernhardines, Trappists. Other orders use other terms. In early times the abbot was a layman, as were all monks. Later, convenience led to the ordination of a priest in the monastery, and the abbot was often the priest. In 826 a council decreed that abbots should be ordained, but even in the eleventh century some were only deacons. In the Middle Ages laymen sometimes held the office, often nominally as trustees of the estates of the abbeys; but this custom led to great abuses. The mode of election varied in early times. The earliest and always the most common method was election by the monks. Sometimes the bishop appointed him; occasionally the abbot chose his own successor. The rule of St. Benedict declared that the abbot should be elected by the monks. In the Middle Ages the wealth of the monasteries invited invasion of their rights by the civil authorities, and the prince often usurped the power of appointment. Among the reforms of the Council of Trent (q.v.) was the restoration to the monastery of the right of electing the abbot. The newly elected abbot must be confirmed by the bishop, or, if the house was exempt from his control, by the Pope. Exempt monasteries were rare, there being in England only five or six. The abbots of these had to go to Rome, either in person or by proxy, for confirmation. The cost of travel and fees was enormous, and later the journey to Rome was remitted for a yearly tax of 200 florins to the papal treasury. At present in the United States abbots are confirmed directly by the Pope; in England, by the abbot president, a superior elected by the abbots. The abbot is elected for life. His rule is absolute over the monastery, both as to its temporal estates and its spiritual activities. He himself, however, is under rules which were intended to curb undue ambition and to bind him to his duties in his house. As early as the seventh century certain abbots were granted the right to use pontifical insignia, including the mitre, the crosier, and the ring. There were three classes: mitred abbots; crosiered abbots, allowed by special permission of the Pope to bear a crosier or have it borne before them; œcumenical abbots, ruling the houses of a province or country. Abbots hold a rank immediately after bishops. Their mitres must be less costly than those of bishops, and they are allowed, not a permanent throne, but a temporary one. Abbots have usually sat with bishops in the councils of the Church. They appear in the Council of Constantinople (443), in that of Toledo (653), and in most later councils. In the third Plenary Council at Baltimore (1884) six abbots were present, two of whom had a decisive vote; the rest, a consultative voice. Before the Reformation certain abbots had seats in the English Parliament. In one Parliament in the time of Henry III there were 64 abbots; later Parliaments contained 26. At present there are 17 mitred abbots in the United States, 2 in Canada, 10 in England, 1 in Scotland, 2 in Ireland. See Feasey, *Monasticism* (London, 1898); Gasquet, *English Monastic Life* (London, 1904); Taunton, *The English Black Monks of St. Benedict* (London, 1898).

ABBOT, BENJAMIN, LL.D. (1762–1849). A New England teacher, educated at Phillips Academy and at Harvard College. For nearly 50 years (until 1838) he was at the head of Phillips Academy, Exeter, N. H. Among his pupils were Jared Sparks, Daniel Webster, George Bancroft, Edward Everett, and others who became famous.

ABBOT, CHARLES, first BARON COLCHESTER (1757–1829). A Speaker of the House of Commons. He was born at Abingdon and was educated at Christ Church. After he had occupied numerous positions under the government he became Speaker of the House (1802) and held the office until 1817, when ill health compelled him to retire. He was one of the ablest Speakers that ever occupied the chair, and also

rendered valuable services as a trustee of the British Museum. His valuable *Diary and Correspondence* was published by his son in 1861.

ABBOT, Charles Greeley (1872—). An American astrophysicist, born in Wilton, N. H., and graduated from the Massachusetts Institute of Technology in 1894. In 1895 he was appointed assistant at the Smithsonian Astrophysical Observatory, and in the following year became aid, acting in charge. He was appointed acting director in 1907 and, in March of the same year, director. He devoted himself continuously to researches in solar radiation and with S. P. Langley completed and published the mapping of the infra-red solar spectrum. This is described in vol. i of the *Annals* of the Astrophysical Laboratory. He conducted expeditions to view the total solar eclipses of May 28, 1900, May 18, 1901, and Jan. 3, 1908. His later studies had chiefly to do with the total amount and variability of solar radiation, its absorption in the solar and terrestrial gaseous envelopes, and the effect of its variability on climate. Abbot became a member of many astronomical and other scientific societies. He wrote *The Sun* (1911) and numerous articles on the apparatus, methods, and results of solar research.

ABBOT, Ezra (1819–84). An American biblical scholar. He was born at Jackson, Waldo Co., Maine, and died at Cambridge, Mass. After graduation at Bowdoin College (1840) he taught school in Maine and in Cambridge, Mass., until in 1856 he became assistant librarian of Harvard University. From 1872 till his death he was Bussey Professor of New Testament Criticism and Interpretation in the Divinity School of Harvard University. He received the degrees of LL.D. (Yale, 1869; Bowdoin, 1878); S.T.D. (Harvard, 1872); D.D. (Edinburgh, 1884). His industry, classical scholarship, wide acquaintance with books, and rare capacity for retaining minute information made him a remarkable bibliographer and textual critic. He won fame in the first direction by his valuable *Literature of the Doctrine of the Future Life* (1864), appended to W. R. Alger's book on the subject, and by his bibliographical additions to *Smith's Bible Dictionary* (American ed., Boston, 1867–70, 4 vols.). But much wider was his fame in the second direction, for his acquaintance with the text of the Greek New Testament was recognized throughout the biblical world and placed him beside Lachmann, Tischendorf, Tregelles, Scrivener, Westcott, and Hort. He was therefore an efficient member of the American New Testament Revision Company (1878–81). Into the revision he put the most painstaking and accurate learning. He displayed his attainments in ways which won him the hearty thanks of the authors he aided, but not much public recognition. Thus he was the coadjutor of Caspar René Gregory upon his prolegomena to the eighth major edition of Tischendorf's Greek New Testament (Leipzig, 1884–94, 3 parts); he revised the whole of Schaff's *Companion to the New Testament* (New York, 1883) and greatly enriched E. C. Mitchell's *Critical Handbook of the New Testament* (New York, 1880). His modesty made him indifferent to fame, and he put his strength upon correcting other people's books and upon monographs which the scholarly world appreciated. These latter have been collected by J. H. Thayer, under the title *Critical Essays* (Boston, 1888). Consult Barrows' sketch of *Ezra Abbot* (Boston, 1884).

ABBOT, Francis Ellingwood (1836–1903). An American writer on philosophy. He was born in Boston, Mass., and graduated at Harvard University (1859) and the Meadville Theological School (1863). After having had charge of Unitarian congregations from 1863 to 1868, he turned to journalism, and from 1870 to 1880 edited a weekly journal, the *Index*, devoted to religious topics. He published *Scientific Theism* (1886) and *The Way out of Agnosticism* (1890).

ABBOT, George (1562–1633). Archbishop of Canterbury. He was born at Guildford, Surrey, and was educated at Oxford (B.A. 1582; M.A. 1585; D.D. 1597). He took holy orders in 1585 and rose rapidly. His pronounced Puritanism brought him into conflict with William Laud. In 1609 he was appointed Bishop of Coventry and Lichfield and in 1610 he was translated to the see of London. In 1611 he was enthroned Archbishop of Canterbury. He owed these successive appointments to the marked favor of James I and used his exalted position to advance a narrow Protestantism and to persecute Roman Catholics. He also appeared in political life as the determined foe of Spain and France, largely because they were Roman Catholic countries. His courageous opposition to the King on several momentous occasions cost him after 1613 much of the royal favor. While under a cloud he had the misfortune, when hunting, accidentally to kill a gamekeeper. His enemies used the incident against him. Laud brought about a court of inquiry into the alleged infringement of canon law, and three persons designated to bishoprics refused to be consecrated by him. The inquiry came to nothing, but the stigma remained. The death of James I (1625) was an additional misfortune to Abbot, as Charles I was influenced by Laud. After 1627 he was practically deprived of the rights and privileges of his office. He died at Croydon, then the country residence of the Archbishop of Canterbury, Aug. 4, 1633. Of his writings the most popular was his commentary on the Book of Jonah (1600), which was reprinted with a life by Grace Webster (London, 1845).

ABBOT, Henry Larcom (1831—). An American soldier and engineer. He was born at Beverly, Mass., and graduated at the United States Military Academy, West Point, in 1854, entering the Corps of Engineers, in which he served with distinction until his retirement in 1895. He was engaged in the survey for the Pacific Railroad and the hydrographic survey of the Mississippi River delta. During the Civil War he was engaged in engineering and artillery operations. He was wounded at the battle of Bull Run in 1861. In the operations around Richmond he commanded the siege artillery. At the close of the war he was brevetted Major-General of Volunteers. For many years he was in command of the garrison of the engineer post at Willetts Point, N. Y., and while there developed the torpedo and submarine defense of the Long Island Sound approach to New York City and founded the school for engineers. In this connection he did much important work in military science, devoting himself to the design and construction of submarine mines and mortar batteries, as well as to the development of military engineering equipment and drill, and serving on the Gun Foundry Board, the Board on Fortifications

and Defenses, and numerous other military commissions. He was a member of the board to devise a plan for the protection and reclamation of the Mississippi basin. In 1872 he was elected a member of the National Academy of Sciences. He served as president of a board of consulting engineers to consider the question of a proposed ship canal from Pittsburgh to Lake Erie, and designed the harbor at Manitowoc, Wis. In May, 1897, he was appointed a member of the Technical Committee of the New Panama Canal Company. He is the author of *Siege Artillery in the Campaign against Richmond* (1867); *Experiments and Investigations to Develop a System of Submarine Mines for Defending Harbors of the United States* (1881), and with Gen. A. A. Humphreys, *Physics and Hydraulics of the Mississippi*, in addition to a large number of reports of military and engineering commissions and boards. Among his later writings may be mentioned *Problems of the Panama Canal* (1905–07).

ABBOT, JOSEPH HALE (1802–73). An American educator, born at Wilton, N. H. He graduated in 1822 at Bowdoin College, and from 1827 to 1833 was professor of mathematics and instructor in modern languages at Phillips Academy, Exeter. He contributed numerous valuable papers to the *Transactions* of the American Academy of Arts and Sciences and was an associate editor of Worcester's *Dictionary of the English Language* (1860).

ABBOT, SAMUEL (1732–1812). An American philanthropist. He was born at Andover, Mass., and was one of the founders of the Andover Theological Seminary, to which he gave $20,000 in 1807 and $100,000 more in his will. He was a successful merchant of Boston and a large contributor to charities.

ABBOT, THE. The title of one of Sir Walter Scott's novels, published in 1820. Its incidents form a sequel to *The Monastery*, and are based upon the history of Mary, Queen of Scots, in the years 1567 and 1568, ending with the battle of Langside and her escape to England.

ABBOT, WILLIS JOHN (1863—). An American author and editor, grandson of John S. C. Abbott. He was born at New Haven, Conn., and graduated at the University of Michigan in 1884. He is best known by his *Blue Jackets of '61*, *Blue Jackets of 1812*, and *Blue Jackets of '76*, a series of stories for boys relating to the naval history of the United States, and by his *Battle Fields of 1861*. Mr. Abbot was managing editor of the Chicago *Times* in 1892 and 1893, and from 1896 to 1898 was on the editorial staff of the New York *Journal*. His later writings include: *The American Merchant Ships and Sailors* (1902); *A Story of Our Navy for Young Americans* (1910); *Panama and the Canal in Picture and Prose* (1913).

ABBOT OF JOY (ABBÉ DE LIESSE). The title bestowed upon the chief of a brotherhood founded at Lille. Accompanied by a suite of officers and servants who bore before him a standard of red silk, he presided over the games which were held at Arras and the neighboring towns during the period of the carnival, coming under the general title of "Feast of the Ass" (q.v.). See also MISRULE, LORD OF.

AB'BOT OF MISRULE'. See MISRULE, LORD OF.

ABBOTSFORD, ăb-ots-fērd. The estate of Sir Walter Scott, situated on the south bank of the Tweed, about three miles from Melrose Abbey. Before it became, in 1811, the property of Scott, the site of the house and grounds of Abbotsford formed a small farm known as Clarty Hole. The new name was given it by the poet in remembrance of the days when Melrose abbots passed over the fords of the Tweed. On this spot, a sloping bank overhanging the river, with the Selkirk Hills behind, he built at first a small villa, now the western wing. He added the remaining parts of the building, on no uniform plan, but with the desire of combining some of the features (and even actual remains) of those ancient works of Scottish architecture which he most loved. The result was a picturesque and irregular pile, which has been aptly called "a romance in stone and lime." It remained in Scott's family to the fourth generation, but has lately been leased by rich Americans. See Irving's *Abbotsford* (London, 1850); Lockhart's *Life of Scott* (Edinburgh, 1838); Mary Scott's *Abbotsford* (New York, 1893), and Smith and Crockett's *Abbotsford* (New York, 1905).

AB'BOTT, AUSTIN, LL.D. (1831–96). An American lawyer, born in Boston, Mass., the son of Jacob Abbott. He graduated at the University of the City of New York in 1851 and was admitted to the bar in the following year. He was in partnership with his brothers, Benjamin Vaughan and Lyman (afterward editor of the *Outlook*). He gained a national reputation as counsel for Henry Ward Beecher in Theodore Tilton's suit against him. He aided his brother Benjamin in the preparation of his well-known digests of laws and was himself a prolific legal author. His works, mostly of a practical character, included a comprehensive digest of *New York Statutes and Reports*, a treatise on *Trial Practice*, and a useful collection of legal forms, all of which are still of use to the profession. He also wrote, in collaboration with his two brothers, two novels, *Matthew Caraby* and *Conecut Corners*. He was an able lecturer on law and was Dean of the Law School of the University of the City of New York from 1891 until his death.

ABBOTT, BENJAMIN (1732–96). A Methodist Episcopal minister, born on Long Island, N. Y. He was apprenticed to a hatter in Philadelphia and subsequently to a farmer in New Jersey. He was converted from a dissipated life when about 40 years old, and immediately became an itinerant Methodist preacher. After 16 years' service in New Jersey he was assigned to the Dutchess (N. Y.) circuit in 1789. He was transferred to the Long Island circuit in 1791, to Salem, N. J., in 1792, to the Cecil circuit, Maryland, as presiding elder, in 1793, and died at Salem, N. J., in 1796. He was famous in his day and is still remembered as a "rousing" preacher. His vehemence was such that he frequently fainted and generally strongly moved his hearers.

ABBOTT, BENJAMIN VAUGHAN (1830–90). An American lawyer, the son of Jacob Abbott. He graduated at the University of the City of New York in 1850 and was admitted to the bar in 1852. In legal practice his brothers Austin and Lyman were associated with him. In conjunction with his brother Austin he produced nearly 100 volumes of reports and digests of Federal and State laws and a *Dictionary of Legal Terms and Phrases*. In 1865, as secretary of the New York Code Commission, he drafted a penal code which, when adopted by the Legisla-

ture, became the basis of the present code. In 1870 President Grant appointed him one of three commissioners to revise the statutes of the United States.

ABBOTT, CHARLES CONRAD (1843–1919). An American archæologist and naturalist, born at Trenton, N. J. He studied medicine at the University of Pennsylvania, and served as a surgeon in the Federal Army during the Civil War. From 1876 to 1889 he was assistant curator of the Peabody Museum in Cambridge, Mass., to which he presented a collection of 20,000 archæological specimens; he freely gave also to other archæological collections. His book *Primitive Industry* (1881) detailed the evidences of the presence of pre-glacial man in the Delaware valley, and is a valuable contribution to American archæology. He also published many books on out-door observation, such as *A Naturalist's Rambles about Home* (1884). His other works, besides some fiction, include: *Upland and Meadow* (1886); *Wasteland Wanderings* (1887); *Outings at Odd Times* (1890); *Clear Skies and Cloudy* (1899); *In Nature's Realm* (1900); *Rambles of an Idler* (1906); *Archæologia Nova Cæsarea* (1907–09); *Ten Years' Diggings in Lenâpé Land, 1901–11* (1912). He is well known as a frequent contributor to the *American Naturalist, Science, Nature, Science-News,* and *Popular Science Monthly.*

ABBOTT, EDWARD, D.D. (1841–1908). An American clergyman, journalist, and author, son of Jacob Abbott, born at Farmington, Me. He graduated in 1860 at the University of New York, studied from 1860 to 1862 at the Andover Theological Seminary, and in 1863 served in the United States Sanitary Commission at Washington and with the Army of the Potomac. He was ordained in 1863 to the Congregational ministry, and was pastor of Pilgrim Church, Cambridge, Mass., from 1865 to 1869. From 1869 to 1878 he was associate editor of the *Congregationalist,* and from 1878 to 1888 editor of the *Literary World,* whose direction he again assumed in 1895. In 1879 he was ordained a priest of the Protestant Episcopal Church and appointed rector of St. James's parish, Cambridge. His publications include *The Conversations of Jesus* (1875) and *Phillips Brooks* (1900).

ABBOTT, EDWIN ABBOTT (1838–). An English author, born in London. He graduated at St. John's College, Cambridge, with distinction (B.A. 1861, M.A. 1864); was assistant master in King Edward's School, Birmingham (1862–64), and head-master of the City of London School (1865–89), which he made one of the best day schools in England; retired in 1889, and received a pension the next year. He was twice Select Preacher at Cambridge and once at Oxford. He published *Francis Bacon* (London, 1885); *Cardinal Newman* (1892); *St. Thomas of Canterbury* (1898); *Shakespearian Grammar* (1869; 3d ed. revised and enlarged, 1870), a pioneer work which, though unscientific, has hardly been superseded; *Clue, a Guide through Greek to Hebrew Scripture* (1900); *Corrections of Mark Adopted by Matthew and Luke* (1901); *Comparison of the Words of the Fourth Gospel with those of the Three* (1905); *The Son of Man; or Contributions to the Study of the Thoughts of Jesus* (1910); *Light on the Gospel from an Ancient Poet* (Eng. ed., 1912; Am. ed., 1913); *The Fourfold Gospel,* section i, Introduction (1913). His brother, EVELYN ABBOTT (1843–1901), of Balliol College, Oxford, wrote a *History of Greece* that is a memorial to its author's scholarship.

ABBOTT, EMMA (EMMA ABBOTT WETHERELL) (1849–91). An American soprano, born in Chicago, Ill. She began her musical experience in the choir of Plymouth Church, Brooklyn, N. Y., and afterwards studied in Milan under San Giovanni and in Paris under Delle Sedie. She made her début at Covent Garden, London, as Maria in *La Fille du Régiment.* For three years thereafter she made an operatic and concert tour of England and Ireland under the direction of Colonel Mapleson. Subsequently she returned to the United States, where she sang with the Abbott and Hess Opera Company, and later with the English opera company long known by her name. She sang in *Martha, Faust, Les Huguenots, The Chimes of Normandy,* and the more popular works of Verdi, Bellini, and Donizetti. With the exception of Clara Louise Kellogg, she was perhaps more widely known than any other American singer of her time. Consult H. C. Lahee, *Famous Singers of To-day and Yesterday* (Boston, 1898).

ABBOTT, FRANK FROST (1860—). An American Latinist, born at Redding, Conn. He graduated at Yale in 1882, and in 1891 received there the degree of Ph.D., after study also at Bonn and Rome in 1888–89. From 1885 to 1891 he was tutor at Yale; and in 1891 was appointed professor of Latin in the University of Chicago. He was also annual professor in the American School of Classical Studies at Rome, from 1901 to 1902, and became Associate Chairman of the Managing Committee of the same institution. He went to Princeton as Professor of Classics in 1908. He wrote *A History of Roman Political Institutions* (1901), *The Toledo Manuscript of the Germania of Tacitus* (1903), *A History of Rome* (1906), *Society and Politics in Ancient Rome* (1909), *The Common People of Ancient Rome* (1911), etc. He has contributed to various classical periodicals and became associate editor of *Classical Philology.*

ABBOTT, GEORGE FREDERICK. An English war correspondent and author. He was educated at Emmanuel College, Cambridge, taking the degree of B.A. in 1899. In 1900 he was sent by Cambridge University to Macedonia to make studies in the folk-lore of that country. He acted as special correspondent in southwestern Europe for several London newspapers until 1903. In 1905 he accompanied the Prince of Wales, now George V, on his tour of India. Besides contributing articles to many reviews and magazines, he wrote *Songs of Modern Greece* (1900); *Macedonian Folk-Lore* (1903); *The Tale of a Tour in Macedonia* (1903); *Through India with the Prince* (1906); *Israel in Europe* (editor, 1907); *Greece in Evolution* (1909); *Turkey in Transition* (1909); *The Philosophy of a Don* (1911); *The Holy War in Tripoli* (1912).

ABBOTT, GORHAM DUMMER (1807–74). An American Congregational clergyman and educator, born in Hallowell, Maine. He graduated at Bowdoin in 1826 and at Andover in 1831. With his brothers, Jacob and John S. C. Abbott, he was a pioneer in the higher or collegiate education of young women. In 1847 he founded the Spingler Institute, in New York City. The school maintained a high reputation during its

brief history. He wrote *The Family at Home; Nathan W. Dickerman; Pleasure and Profit.*

ABBOTT, JACOB (1803–79). A popular juvenile and didactic writer. He was born at Hallowell, Maine. He graduated at Bowdoin College in 1820. Like his brother John, he studied for the ministry at Andover, and was ordained to the Congregational ministry. From 1825 to 1829 he was professor of mathematics and natural philosophy at Amherst. He then established a girls' school in Boston, and in 1834 organized the Eliot Church, Roxbury. Five years later he moved to Farmington, Me. He passed the remainder of his life there, in New York, and in foreign travel, devoting himself wholly to literature. He died at Farmington Oct. 31, 1879. Abbott published more than 200 volumes, the most noteworthy of which are *The Rollo Books* (28 vols.), *The Franconia Stories* (10 vols.), *The Rainbow and Lucky Series* (5 vols.), a number of juvenile histories, written in collaboration with his brother, and a series of histories of America. He also edited many school books. His style had a singular fascination for the young, and many of his writings were popular.

ABBOTT, SIR JOHN JOSEPH CALDWELL (1821–93). A Canadian statesman, born at St. Andrew's, Quebec. He was educated at McGill College, Montreal; studied law, and in 1847 was called to the bar. Beginning in 1859, he represented Argenteuil County in the Canadian Assembly until the union in 1867, when he became a member of the Dominion Parliament for the same place. In 1862 he was solicitor-general in the cabinet of John Sandfield Macdonald, but resigned before his chief lost power. In 1887 Sir John A. Macdonald invited him to join the cabinet as a minister without portfolio. In June, 1891, on the death of Sir John A. Macdonald, Abbott was made Premier of the Dominion government, but resigned in November, 1892, because of his ill health. He took a seat in the cabinet of his successor, Sir John Thomson, but without a portfolio. He was Dean of the Faculty of Law of McGill University for ten years, was considered an authority on commercial law, and was knighted in 1892.

ABBOTT, JOHN STEVENS CABOT (1805–77). An American historian, pastor, and pedagogical writer, a brother of the equally prolific Jacob Abbott (q.v.). He was born at Brunswick, Maine, and graduated at Bowdoin College in 1825. He studied for the ministry at Andover and was ordained a Congregational minister in 1830. He held successive pastorates at Worcester, Roxbury, and Nantucket, Mass. His writings were, from the outset, popular. Beginning with semi-religious pedagogy, *The Mother at Home* (1833), *The Child at Home*, etc., he was presently diverted to history, and after 1844 resigned his pastorate, giving himself entirely to literature. He died at Fairhaven, Conn., June 17, 1877. His most noteworthy books are *The French Revolution, The History of Napoleon Bonaparte* (1855), *Napoleon at St. Helena, The History of Napoleon the Third* (1868), *The History of the Civil War in America* (1863–65), and *The History of Frederick II, Called Frederick the Great* (New York). All these are readable, and the books on Napoleon were very popular, but none of them has any critical value. In 1910 a series of twenty short biographies of historical characters by J. S. C. and Jacob Abbott, was published.

ABBOTT, LYMAN, D.D. (1835–1922). An American Congregational clergyman and editor. He was born at Roxbury, Mass., a son of Jacob Abbott. He graduated at the New York University in 1853 and for a time practiced law with his brothers Austin and Benjamin Vaughan Abbott. Afterward he studied theology with his uncle, Rev. John S. C. Abbott, and became pastor of a church at Terre Haute, Ind., in 1860. Five years later he was made secretary of the American Union (Freedman's) Commission and became pastor of the New England Church in New York City. In 1869 he resigned this pastorate and thereafter was successively one of the editors of *Harper's Magazine*, the principal editor of the *Illustrated Christian Weekly*, and, as associate of Henry Ward Beecher, an editor of the *Christian Union* (now the *Outlook*), of which he afterward became editor-in-chief (1882). He succeeded Mr. Beecher as pastor of Plymouth Church, Brooklyn, in 1888, but resigned in May, 1899, and has since devoted himself to editorial and literary work chiefly in connection with the *Outlook*. In collaboration with his brothers Austin and Benjamin he wrote two novels, *Conecut Corners* (1885); and *Matthew Caraby* (1888). Among his other numerous works are commentaries, *Jesus of Nazareth* (1869); *Life of Henry Ward Beecher* (1883); *In Aid of Faith* (1885); *Christianity and Social Problems* (1896); *The Theology of an Evolutionist* (1897); *Life and Letters of Paul* (1898); *Life and Literature of the Ancient Hebrews* (1901); *The Rights of Man* (1901); *The Great Companion* (1904); *Personality of God* (1905); *Industrial Problems* (1905); *The Other Room* (1905); *Christ's Secret of Happiness* (1907); *The Home Builder* (1908); *The Temple* (1909); *The Spirit of Democracy* (1910); *America in the Making* (Yale lectures on the responsibilities of citizenship, 1911); *Letters to Unknown Friends* (1913).

ABBOTT, NATHAN (1854—). An American lawyer and law teacher of distinction, born at Norridgewock, Maine, the son of Abiel Abbott. He was educated at Yale College, graduating in 1877, and studied law in Boston University. After some years of practice in the city of Boston he was invited to become Tappan Professor of Law in the University of Michigan, and from that time on has devoted himself exclusively to legal scholarship and teaching. After a year at the University of Michigan, Professor Abbott was appointed Professor of Law in Northwestern University and two years later, in 1895, he became Professor of Law and Dean of the Law School of Leland Stanford University. This position he held until 1907, since which time he has been a member of the Law Faculty of Columbia University, New York City. He is a legal scholar of wide reputation and is a recognized authority on the English and American Law of Real Property.

ABBOTT, THOMAS KINGSMILL (1829–1913). An Irish scholar and educator. He was born at Dublin and was educated at Trinity College, where he afterward occupied the chair of moral philosophy (1867–72), of biblical Greek (1875–88), and of Hebrew (1879–1900). He wrote the following books: *The Elements of Logic* (3d ed., 1895); *Essays*, chiefly on the original texts of the Old and New Testaments (1892); *A Commentary on Ephesians and Colossians* (1897); a translation of *Kant's Ethics*, with a memoir (6th ed., 1909); Kant's *Introduction*

to Logic (5th ed., 1878); *Elementary Theory of the Tides* (2d ed., 1901); *Catalogue of Fifteenth Century Books in the Library of Trinity College, Dublin, etc.* (1905).

ABBOTT, WILBUR CORTEZ (1868—). An American historian and educator, born at Kokomo, Ind., and graduated from Wabash College in 1892. He was a graduate student at Cornell University from 1892 to 1895, and in 1897 studied at Oxford, where he received the degree of B.Litt. He studied also in several continental universities. In 1892–93 he was a fellow at Cornell; from 1893 to 1895 was instructor in European history, and in 1895–96 was President White traveling fellow in that university. He became successively instructor in history at the University of Michigan (1897), assistant professor of history in Dartmouth College (1899), professor of European history in the University of Kansas (1902), and professor of history at the Sheffield Scientific School, Yale (1908). He contributed to American and English historical reviews and wrote *Colonel Blood, Crown Stealer* (1911).

ABBRE'VIA'TIONS (Lat. *ad,* to + *brevis,* short). Contrivances in writing for saving time and space. They are of two kinds, consisting either in the omission of some letters or words, or in the substitution of some arbitrary sign. In the earliest times, when uncial or lapidary characters were used, abbreviations by omission prevailed, such as we find in the inscriptions on monuments, coins, etc. In these the initial letter is often put for the whole word, as M. for Marcus, F. for Filius. It was after the small Greek and Roman letters had been invented by transcribers for facilitating their work that signs of abbreviation, or characters representing double consonants, syllables, and whole words, came into use. Greek manuscripts abound in such signs, and often only one who has expressly studied Greek paleography can make them out. From the manuscripts they passed into the early printed editions of Greek books, and it is only within the last century that they have quite disappeared. Among the Romans the system was carried to such an extent that L. Annæus Seneca collected and classified 5000 abbreviations. The same practice has prevailed in all languages, but nowhere more than in the rabbinical writings. The abbreviations used by the ancient Romans were continued and increased in the Middle Ages. They occur in inscriptions, manuscripts, and legal documents; and the practice endured in these long after the invention of printing had made it unnecessary in books. An act of Parliament was passed in the reign of George II, forbidding the use of abbreviations in legal documents. Owing to these abbreviations, the deciphering of old writings requires special study and training, and forms a separate science, on which numerous treatises have been written. One of the most exhaustive is Tassin's *Nouveau traité de diplomatique* (6 vols., Paris, 1750–65). See PALEOGRAPHY.

In ordinary writing and printing few abbreviations are now employed. The sign *&*, originally an abbreviation for the Latin *et*, 'and,' is one of the few still to be met with of this arbitrary kind. It does not stand properly for a *word*, for it is used in different languages, but for an idea, and is as much a symbol as +. The abbreviations by using the initials of Latin words that are still in use are chiefly confined to titles, dates, and a few phrases; as M.A. (*magister artium*), Master of Arts; A.D. (*anno Domini*), in the year of our Lord; *e.g.* (*exempli gratia*), for example. Many are now formed from English words in the same way; as F.G.S., Fellow of the Geological Society; B.C., before Christ.

The following table contains many of the more important abbreviations in general use. There are omitted from it many others whose meanings are obvious, and all abbreviations for days, months, countries, States, many proper names, as those of the Scriptures; grammatical, scientific, and other technical terms; familiar titles, as *Mr., Gov.;* and the majority of commercial terms, as B/l, bill of lading. The names of many societies are omitted, especially when their abbreviations, as *Y. M. C. A.*, are well known.

A.B., Bachelor of Arts.
Abp., Archbishop.
A.C. (*ante Christum*), Before Christ.
Accel. (*accelerando*), In music, more quickly.
A.D. (*anno Domini*), In the year of our Lord.
A.D.C., Aide-de-camp.
Ad lib. (*ad libitum*), At pleasure.
Aet. (*ætatis*), Of (his or her) age.
Aevia, Alleluia. In reprints of old music. Consonants are omitted; old *u* written *v*.
A.H. (*anno Hegiræ*), In the year of the Hegira (reckoning from 622 A.D.).
A.M. (*ante meridiem*), Before noon; (*anno mundi*), In the year of the world; (*artium magister*), Master of Arts.
An. (*anno*), In the year.
Anon., Anonymous.
Appettando. In music, hurrying.
A.R.A., Associate of the Royal Academy (London).
A.S.A., American Statistical Association.
A tem. In music, after increasing or retarding the time a return to the prescribed time.
A.T.S., American Tract Society.
A.U.C. (*ab urbe condita*), From the building of the city—that is, Rome.
A.V., Authorized Version.
b., Born.
B.A. or A.B. (*artium baccalaureus*), Bachelor of Arts.
Bart. or Bt., Baronet.
B.C., Before Christ. In music, *basso continuo* (see FIGURED BASS).
B.C.L., Bachelor of Civil Law.
B.D., Bachelor of Divinity.
B.L., Bachelor of Letters.
B.LL., Bachelor of Laws.
B.M., Bachelor of Medicine.
B.Mus., Bachelor of Music.
Bp., Bishop.
B.S. or B.Sc., Bachelor of Science.
B.V.M., Blessed Virgin Mary.
C. (*centum*), a hundred; chapter; c. (*circa*), about; c. century. Also C. = Centigrade.
C.A., In music, *col arco*, with the bow.
Cantab. (*Cantabrigiensis*), Of Cambridge. In music, *cantabile*, with singing tone.
C.B., Companion of the Bath.
C.E., Civil Engineer.
cf. or cp., Confer; compare.
Ch., In music, choir-organ (see ORGAN).
C.I., Order of the Crown of India.
C.I.E., Companion of the Order of the Indian Empire.

C.M.G., Companion of St. Michael and St. George.
Co., County.
c/o., Care of.
C.O.D., Cash, or collect, on delivery.
Cr., Creditor.
Cresc. (*crescendo*), In music, a gradual increase of tone.
C.S.I., Companion of the Star of India.
cwt., Hundred-weight.
d. (*denarius*), Penny; died.
Dal S., In music, *dal segno*, repeat from the sign indicating repetition.
D.C. (*da capo*), From the beginning; District Court; District of Columbia.
D.C.L., Doctor of Civil Law.
Decresc., In music, *decrescendo* = *diminuendo*.
D.D., Doctor of Divinity; *donum dedit*.
D.D.S., Doctor of Dental Surgery.
D.G. (*Dei gratia*), By the grace of God; (*Deo gratias*), thanks be to God.
Dim. (*diminuendo*), In music, a gradual decrease of tone.
Div., In music, *divisi*, strings divided.
D.Lit., Doctor of Literature.
Do. (Ital. *detto*, said), Ditto, the same.
D.O.M. (*Deo optimo maximo*), To God the best and greatest.
Dr., Doctor, debtor.
D.Sc., Doctor of Science.
D.S.O., Companion of the Distinguished Service Order.
D.V. (*Deo volente*), God willing.
dwt., Pennyweight.
e.g. or ex. gr. (*exempli gratia*), For example.
Esp., In music, *espressivo*, with expression.
et al. (*et alii*), And others.
etc. (*et cetera*), And the rest; and so on.
et seq. (*et sequentia*), And the following.
F., Fahrenheit.
f. (*forte*), loudly.
f. or ff., Following.
F. and A. M., Free and Accepted Masons.
F.D. (*fidei defensor*), Defender of the Faith.
ff. (*fortissimo*), Very loud.
fl. (*floruit*), Flourished.
F.M., Field Marshal.
F.O., In music, full organ.
fp., In music, *forte piano* = *sforzato* (see SF).
F.R.C.P., Fellow of the Royal College of Physicians.
F.R.C.S., Fellow of the Royal College of Surgeons.
F.R.G.S., Fellow of the Royal Geographical Society.
F.R.S., Fellow of the Royal Society.
F.S.A., Fellow of the Society of Antiquaries.
G.C.B. (Knight), Grand Cross of the Bath.
G.C.M.G. (Knight), Grand Cross of St. Michael and St. George.
G.C.S.I. (Knight), Grand Commander of the Star of India.
G.O., In music, great organ.
H.B.M., His (or Her) Britannic Majesty.
H.E., His Eminence; His Excellency.
H.I.H., His (or Her) Imperial Highness.
H.M.S., His (or Her) Majesty's Service, or Ship.
H.S.H., His (or Her) Serene Highness.
I. (*imperator* or *imperatrix*), Emperor or Empress.
ib. or ibid. (*ibidem*), In the same place.
Id. (*idem*), The same; (*Idus*), the Ides.
i.e. (*id est*), That is.
I.H.S.* (*Jesus Hominum Salvator*), Jesus the Saviour of men.
Incog. (Ital. *incognito*), Unknown.
Inf. (*infra*), Below.
In loc. (*in loco*), In the place referred to.
I.N.R.I. (*Jesus Nazarenus Rex Iudæorum*), Jesus of Nazareth, the King of the Jews.
Inst. (*instante—mense* understood), In the current (month).
I.O.O.F. Independent Order of Odd Fellows.
J.C.D. (*juris civilis doctor*), Doctor of Civil Law.
J.P., Justice of the Peace.
Jr., Junior.
J.U.D. (*juris utriusque doctor*), Doctor of Laws, i.e., both of civil and canon law.
Kal. (*Kalendæ*), The Kalends.
K.C., King's Counsel.
K.C.B., Knight Commander of the Bath.
K.C.M.G., Knight Commander of St. Michael and St. George.
K.C.S.I., Knight Commander of the Star of India.
K.P., Knight of St. Patrick.
K.T., Knight of the Thistle.
L. (*libra*), Pound (in English money).
℔ (*libra*), Pound (weight).
l.c. (*loco citato*), In the place cited; (lower case) small letters in printing.
leg. (*legato*), Smoothly; in a connected manner.
L.H., In music, *linke Hand*, left hand.
L.H.D., Litt.D. (*litterarum humaniorum doctor*), Doctor of Literature, or Letters.
LL.B. (*legum baccalaureus*), Bachelor of Laws.
LL.D. (*legum doctor*), Doctor of Laws.
L.S. (*locus sigilli*), The place of the seal.
M., Monsieur; MM., Messieurs (plural); (*meridies*) noon.
M.A., Master of Arts.
Manc., In music, *mancando*, dying away.
M.B., Bachelor of Medicine.
M.C., Member of Congress.
M.D. (*medicinæ doctor*), Doctor of Medicine. In music, *main droite*, *mano destra*, right hand.
M.E., Mining or Mechanical Engineer; Methodist Episcopal.
mf. (*mezzo forte*), Moderately loud.
M.F.H., Master of Fox Hounds.
M.G., In music, *main gauche*, left hand.
Mlle., Mademoiselle.
M.M., In music, *Maelzel's Metronome*. (See METRONOME.)
Mme., Madame.
M.P., Member of Parliament; Methodist Protestant.
M.S. or M.Sc., Master of Science.
MS., Manuscript; MSS., manuscripts.
Mov., In music, *movendo* = *mancando* (q.v.).
Mus.B. (*musicæ baccalaureus*), Bachelor of Music.
Mus.D. (*musicæ doctor*), Doctor of Music.
N.B. (*nota bene*), Mark well.
n.d., No date.
nem. con. (*nemine contradicente*), Unanimously.
Non. (*nonæ*), The Nones.
N.S., New style.

* This was originally written IHΣ, the first three Greek letters of the name Jesus; but its origin having been lost sight of, by substituting S for Σ and then mistaking the Greek H (long e) for Latin H, a signification was found for each letter. The symbol was further developed by converting the horizontal stroke, which was the sign of abbreviation, into a cross, in which form it is the recognised device of the Jesuit order.

Ob. (*obiit*), Died.
Op., In music, *opus*, work.
O.P. (*ordinis prædicatorum*), Of the Dominican Order.
O.S., Old style.
O.S.A., Order of St. Augustine.
O.S.F., Order of St. Francis.
Oxon. (*Oxoniensis*), Of Oxford.
p., Page; pp., pages.
p. (*piano*), Softly.
P.C., Privy Councilor.
P.E., Protestant Episcopal.
Pfte., In music, pianoforte.
Ph.B. (*philosophiæ baccalaureus*), Bachelor of Philosophy.
Ph.D. (*philosophiæ doctor*), Doctor of Philosophy.
Ph.G., Graduate Pharmacist.
Pizz., In music, *pizzicato* (q.v.).
P.L., Poet Laureate.
P.M. (*post meridiem*), After noon; postmaster.
pp. (*pianissimo*), Very softly.
P.P., Parish priest.
P.P.C. (Fr. *pour prendre congé*), To take leave.
pro tem. (*pro tempore*), For the time.
prox. (*proximo—mense* understood), In the next (month).
P.S. (*post scriptum*), Postscript.
P.T.O., Please turn over.
Q., Query or question.
Q.C., Queen's Counsel.
Q.E.D. (*quod erat demonstrandum*), Which was to be proved.
Q.E.F. (*quod erat faciendum*), Which was to be done.
Q.S. (*quantum sufficit*), A sufficient quantity.
q.v. (*quod vide*), Which see.
R. (*rex* or *regina*), King or queen. Also, R. = Réaumur.
R. or ℞ (*recipe*), Take.
R.A., Royal Academician; Royal Artillery; Royal Arch.
rall. (*rallentando*), More slowly.
R.A.M., Royal Academy of Music.
R.C., Roman Catholic.
R.E., Royal Engineers.
Recit., In music, recitative (q.v.).
R.H., In music, *rechte Hand*, right hand.
rinf., In music, *rinforzando*, increasing in loudness.
R.I.P. (*requiescat in pace*), May he rest in peace.
rit. (*ritardando*), More slowly.
rit. or riten., In music, *ritenuto*, retarding.
R.M., Royal Marines.
R.N., Royal Navy.
R.S.V.P. (Fr. *répondez s'il vous plaît*), Please reply.
R.V., Revised version.
S., Saint; south; shilling; SS., saints.
sc. (*scilicet*), Namely; understood.
sf. (*sforzando*), With marked emphasis.
S.J., Society of Jesus.
smorz., In music., *smorzando* = *mancando* (q.v.).
Sost. or sosten., In music, *sostenuto*, sustained.
s.p. (*sine prole*), Without issue.
S.P.Q.R. (*senatus populusque Romanus*), The Senate and People of Rome.
sq. (*sequens*), The following; sqq. in the plural.
Sr., Senior.
S.S., Steamship; Sunday school.
St., Saint; street.
S.T., In music, *senza tempo*, without regard to time.
Stacc., In music, *staccato* (q.v.).
S.T.B. (*sanctæ theologiæ baccalaureus*) Bachelor of Sacred Theology.
S.T.D. (*sanctæ theologiæ doctor*), Doctor of Sacred Theology.
S.T.P. (*sanctæ theologiæ professor*), Professor of Sacred Theology.
Str., In music, stringed instruments.
String., In music, *stringendo* (q.v.).
sup. (*supra*), Above.
s.v. (*sub voce*), Under the heading.
Sw., In music, swell-organ (see ORGAN).
T.C., In music, *tre corde*, without soft pedal.
T.C.D., Trinity College, Dublin.
Tempo I, In music, *tempo primo*, the time indicated at the beginning of a composition.
Ten., In music, *tenuto*, held to the full time-value.
Timp., In music, *timpani*, kettle-drums (q.v.).
Tr., In music, *trillo*, trill (q.v.).
trem., In music, *tremolo* (q.v.).
Twp., Township.
U.C., In music, *una corda*, with soft pedal.
ult. (*ultimo—mense* understood), In the last (month).
U.P., United Presbyterian.
U.S., United States.
U.S.A., United States of America; United States Army.
U.S.N., United States Navy.
Var., In music, variation (q.v.).
Vc., In music, violoncello.
V.C., Victoria Cross; Vice Chancellor.
Vl., Vno., In music, violin.
vs. (*versus*), Against.
V.S., In music, *volti subito*, turn quickly.

For a reproduction of 13,000 abbreviations used in old Latin MSS., consult Campelli, *Dizionario di Abbreviature* (Milan, 1899); Dobbs, *Abbreviations British and Foreign* (1911).

ABBRE'VIATIO PLACITORUM, *a*-brē'vī-ā'shī-ō plās'ī-tō'rŭm (Lat. abridgment or abstract of pleas). A record of judicial decisions in the itinerant Court of the King's Bench (*curia regis*, q.v.) in the Norman period of English law. It is one of the earliest collections of judicial precedents in our law, antedating the *Year Books* (q.v.). It was first published in 1811. See articles on NORMAN LAW; PLEA; PLEADING; MASTER OF THE ROLLS; and REPORT.

ABBRE'VIA'TORS. In the Papal Court, a college of eleven prelates to whom the revision of the papal bulls and other similar documents is committed, and who sign them in the name of the Cardinal Vice Chancellor. They date from Pius II (1458–64), and derive their name from the fact that by means of traditional abbreviations they prepared a short minute of the decision, which they subsequently expanded into proper form.

ABBT, äpt, THOMAS (1738–66). A German popular rationalistic philosopher and prosaist. He was born at Ulm and educated at the University of Halle; under the influence of Lessing, Shaftesbury, Hume, and Voltaire; 1760, assistant professor of philosophy at Frankfort-on-the-Oder; 1761, professor of philosophy and mathematics at Rinteln; 1765, disliking academic duties, he refused calls to Marburg and Halle, but went as high ecclesiastical official to the court of William I of Lippe-Schaumburg at Bückeburg, where he died near the close of his

twenty-eighth year. Although the two essays "Vom Tode fürs Vaterland" (1761) and "Vom Verdienste" (1765) made his reputation, his best work was journalistic. His miscellaneous works were published (1768–81) in 6 volumes.

ABCHERON, äb'shē-rōn', or **ABSHERON.** See APSHERON.

ABD, äbd. In Arabic and in the Semitic languages in general, 'slave' or 'servant,' as in Abd-Allah, 'servant of Allah'; Abd-al-Kadir, 'servant of the mighty one,' etc.

ABD ALLAH IBN ABD AL MUTTALIB, äb-dal'lȧ ibn äb'd al mut-tä'lêb. The father of Mohammed. Very little is known concerning his life. Al Kalbi states that he was born in the 24th year of Khosru Nushirwan's reign, consequently in 554, but that may be a mere guess. No value can be attached to the story that Abd al Muttalib vowed to sacrifice a son, if he should have 10 sons, but that he was persuaded to substitute 100 camels for Abd Allah. That 200 maidens of Mecca died of broken hearts from love of the handsome youth on his wedding day is another of these worthless legends. His wife's name was Amina, and we know from the Koran (93, 6) that Mohammed became an orphan at an early age.

ABD ALLAH IBN YASIN AL JUZULI. The founder of the sect of the Almoravides (q.v.). His mother belonged to the tribe of the Juzula; hence his surname. He lived in Nafis, the later Marra'kush (Morocco) in 1037 and studied with Wajjaj, a disciple of Abu Imran of Fez, the Malikite teacher, when he was invited by Yahya b. Ibrahim, a Sanhaja chief, to accompany him as a missionary to his home on the borders of the Sahara. After some time he retired from preaching to an island in the Senegal where he lived with his followers in a *ribat,* at once a hermitage and a fortress, devoting himself to ascetic exercises and preparation for the holy war. He was proclaimed Imam (q.v.) and took an active part in the establishment of the power of the Almoravides in Morocco. He died in 1059. See E. Doutté in *Revue de l'Histoire des religions* (xl and xli, pp. 29 ff.); and A. Müller, *Der Islam im Morgen- und Abendland II* (1887, pp. 611 ff.).

ABD ALLAH IBN ZUBAIR, äb-däl'lȧ 'b'n sōō'bâr' (622–692). Ruler of Mecca, and for some years recognized Caliph of the largest part of the Muslim world. He was the son of Zubair and Asma, the nephew of the prophet and the grandson of Abu Bekr on his mother's side. He believed himself more entitled to the Caliphate than Muawiya, but during his reign concealed his claims. But he refused to recognize Yazid (680) and after Husain's death allowed himself to be proclaimed Caliph by the people of Mecca and took the title *Amir al Muminin* (681). He was recognized everywhere in Hejaz, but soon had to endure a siege of Mecca by Yazid's generals, during which both the city and its famous temple suffered much. Yazid's death, however, in 683, put an end to the siege. Irak, Arabia, and a large part of Syria now recognized him as Caliph; and he sent his governors to the different provinces. But Abd al Malik renewed the war, and his general, Al Hajjaj, besieged Mecca again. After a stubborn resistance it was finally taken, in 692, and Abd Allah, urged into the fight by his proud mother, fell in the battle. See Quatremère, "Notice sur la vie d'Abd Allah b. Zubair," in *Journal Asiatique* (2d series, ix, pp. 299 ff., 385 ff.).

ABD-AL-LATIF, äb-dȧl-lȧ-tēf' (1160–1231). A prolific Arabian writer, physician, and traveler. He was born at Bagdad and died while on the pilgrimage to Mecca. His early training consisted in memorizing not only the Koran, but also works on law, philology, and the standard poets. He then went to Damascus, whither Saladin had assembled the learned men of the Mohammedan world. Thanks to the liberality of Saladin and with letters of introduction from his vizier, Fadhl, Abd-al-Latif was able to travel to Egypt, and in Cairo he sought out the great Jewish doctor and philosopher, Maimonides. At Cairo he taught medicine and philosophy, but his love of travel brought him to Damascus again and to Aleppo. Of the many works of Abd-al-Latif only one, *The Account of Egypt,* is generally known. This was translated into Latin by White (1800) and into French by De Sacy (1810), *Relation de l'Egypte* (Paris, 1810). Consult Brockelmann, *Geschichte der arabischen Litteratur* (Weimar, 1898).

ABDALWADIDS, äb'dȧl-wä'dīdz. A Berber dynasty reigning in Tlemcen (q.v.) from 1239 to 1554. The name of the father of the first independent king was Zayyan; after him this dynasty is also often designated as the Banu Zayyan. Concerning Abd al Wad, or the early history of the family, little is known. But through various ruins, inscriptions, and historical documents the history of the dynasty has been well ascertained. The Abdalwadids maintained a splendid court at Tlemcen and reigned with wisdom and moderation for more than three centuries over the middle Maghrib, or the western part of Algiers. See especially, A. Bel, *Histoire des Beni 'Âbd al Wad, Rois de Tlemcen* (Algiers, 1904).

ABD AL WAHHAB, äbd'el-wäh'häb. See WAHABIS.

ABD-EL-AZIZ, äb'del-ä-zēz', MULAI (1878—). Sultan of Morocco from 1894 to 1908. He was born at Marakesh, and succeeded his father, Sultan Mulai Hassan, in 1894. He was friendly towards Europeans, taking great interest in all kinds of Western inventions. His foreign sympathies offended his subjects, and in 1902 a formidable rebellion broke out under the leadership of a prophet, Bu Hamara. The resulting disorders gave France an opportunity to establish its predominance in the country and led to the Algeciras Conference in 1906, by which France and Spain were commissioned to maintain order on the Moroccan coast. The Sultan, however, was unable to coöperate with them because of his growing unpopularity, and trouble continued. In 1907 Mulai Hafid, elder brother of Abd-el-Aziz, was hailed by southern tribes as Sultan, and the ruler found it necessary to remove his capital from Fez to Rabat. Although the existing government received a loan from France, it was unable to regain its footing. The throne was declared vacant in January, 1908, by the Ulema (religious hierarchy) of Fez, and offered to Mulai Hafid. Abd-el-Aziz, having failed in an attempt to regain his authority by force, came to terms with his brother and retired to private life in Tangier. See MOROCCO.

ABD EL KADER IBN MOUHI AD-DIN, äb'dĕl-kä'dĕr 'b'n mōō'hê ȧd-dēn' (c.1807–83). A celebrated Arabian chief. He was born near Mascara and was educated under the supervision of his father at the Ghetna, an educational institution of the Marabouts. In his eighth year Abd el Kader made a pilgrimage to Mecca with his father; and in 1827 he visited Egypt, where,

in Cairo and Alexandria, he first came in contact with western civilization. He had a gifted mind, and a character marked by religious enthusiasm and a tendency to melancholy. He was free from cruelty and sensuality. He studied in the chief schools of Fez, maintained the faith of his people, and used their fanaticism as one of his most important sources of influence. His public career began at the time of the conquest of Algiers by the French. No sooner was the power of the Turks broken than the Arab tribes of the province of Oran seized the opportunity to make themselves independent. They obtained possession of Mascara and elected Abd el Kadir their emir. He established his authority over a number of the neighboring tribes. He attacked the French, and after two bloody battles, fought on Dec. 3, 1833, and Jan. 6, 1834, against General Desmichels, then commanding in Oran, obliged the latter to enter into a treaty with him. In the interior of the country his power spread rapidly. The cities and tribes of the provinces of Oran and Titeri acknowledged him as their sultan; the more distant tribes sent him ambassadors with presents. Hostilities were soon resumed between him and the French. (See ALGERIA.) Abd el Kader was defeated (1841) and took refuge in Morocco. There he succeeded in organizing a religious war against the enemies of Islam, and the arms of France were now turned against Morocco for the support given to him. After the decisive battle of Isly (1844) the Sultan of Morocco was obliged to give up Abd el Kader's cause, but soon found that the latter was at least his equal in power. The end of Abd el Kader's power, however, had come. On the night of Dec. 11, 1847, he made a bold attack on the Moorish camp, in which he was defeated. He fled with his followers to Algeria, where the greater part surrendered to the French. Dispirited, Abd el Kader surrendered, Dec. 22, 1847, to General Lamoricière and the Duc d'Aumale. Although now given an annual pension of 100,000 francs, he was kept a prisoner with his family at Toulon, Pau, and the Château d'Amboise. Liberated in 1852 by Napoleon III, he lived at Brussa, in Asia Minor, till 1855. He then, for a time, lived in Constantinople, and finally made his home in Damascus. For his services during the Syrian massacres of 1860 he received the Grand Cross of the Legion of Honor from Napoleon III. In 1865 he visited Paris and England, and was present at the Paris Exposition in 1867. In his retirement he wrote a religious work, a translation of which was published at Paris in 1858, under the title, *Rappel à l'intelligent: avis à l'indifférent.* He died in Damascus, May 26, 1883. See ALGERIA. Consult C. H. Churchill, *The Life of Abd-el-Kader* (London, 1867), described as "written from his own dictation and compiled from other authentic sources," highly eulogistic, and in no sense a scientific biography: Laménaire, *Vie, aventures, combats, amours et prise d'Abd-el-Kader* (Paris, 1848); Bellemare, *Abd-el-Kader, sa vie politique et militaire* (Paris, 1863) and the "Life" by Pichon (1899).

ABD-EL-MELEK, äb'dĕl-mā'lĕk. See ASMAI.

ABD EL MUMIN ABU MOHAMMED, äbd ăl mōō'mĕn ä'boo mô-hăm'mĕd (c.1094–1163). The founder of the dynasty of the Almohades (q.v.). He was born at Tajira, in the Province of Tlemcen, north Africa, and was a member of the Kumiya, one of the Berber tribes of the Atlas region. After the death of Ibn Tumart, the founder of the sect of the Almohades, who had shown great favor to Abd el Mumin, he was chosen as his successor. He now assumed the title of Caliph, put the Almoravides to flight, and conquered the cities of Oran, Tlemcen, Fez, Salé, Ceuta, and finally, after a siege of eleven months, Morocco (1140–47). He extended his dominion over Al-Maghrib and the other provinces of north Africa, and passed over into Spain, conquered Cordova (1148), Almeria (1151), and Granada (1154); in short, the greater part of Mohammedan Spain.

AB'DEMON. A Tyrian who distinguished himself by solving the riddles which had been propounded to his master, Hiram, by King Solomon. According to the story, Solomon challenged Hiram and the Tyrians to a contest of wits, each side sending riddles for solution by the other. Solomon had already won in the competition, and the amount agreed upon as a wager had been paid him, when Abdemon entered the lists, and not only found answers to the riddles which had baffled his countrymen, but also invented others. Solomon failed to answer them and returned the forfeit.

ABDE'RA (Gk. Ἄβδηρα). A town on the coast of Thrace between the mouth of the Nestus and Lake Bistonis. It is fabled to have been founded by Hercules on the spot where his favorite, Abderus, was torn to pieces by the steeds of Diomedes. It was colonized 656 B.C. under the leadership of Timesius of Clazomenæ, but soon after was destroyed by the Thracians; in 543 B.C. it was recolonized by the inhabitants of Teos. It was the birthplace of Protagoras, Democritus, Anaxarchus, Hecatæus (the philosopher and grammarian, of the time of Alexander the Great), and other distinguished men. The natives were, however, proverbial for stupidity, and "Abderite" was hence a term of reproach.

ABD ER RAHMAN or **ABDERRAHMAN**, äb'dĕrrä'män. The name of several Arab rulers of Spain. See OMMIADS.

AB'DICA'TION (Lat. *abdicatio*, renunciation, from *ab*, away from + *dicare*, to proclaim). The renunciation of an office, generally the office of ruler or sovereign. It is rarely done out of pure preference of a private station, but is generally the result of vexation and disappointment. The general well-being of a State is sometimes served by the abdication of its ruler. Military reverses, popular disaffections, court scandals, and other causes often render it imperative. History records many abdications of this character. It was perhaps voluntarily and from being wearied with dominion that Diocletian, and along with him Maximian, abdicated (305). Christina of Sweden retired from the throne (1654) out of preference for the freedom of private life, but wished still to exercise the rights of a sovereign. Charles V of Germany laid down the crown (1556) and assumed the humble habit of a monk, because his great schemes had failed. Philip V of Spain laid down the crown in 1724, but resumed it on the death of his son. Amadeus VIII of Savoy abdicated (1449) to become a priest. Victor Amadeus II of Sardinia, who abdicated in 1730, wished to recall the step, but this was not allowed. Louis Bonaparte resigned the crown of Holland in 1810 rather than consent to treat that country as a province of France. Charles Emmanuel II of Sardinia retired from the throne

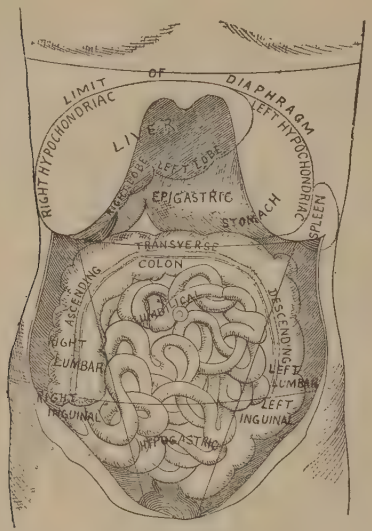
in 1802, not finding himself able to cope with the French. Victor Emmanuel I of Sardinia resigned in 1821 in consequence of a revolutionary movement. William I of the Netherlands resigned (1840) in great measure by reason of his mortification at the disastrous results of his policy regarding Belgium. Foreign force compelled the abdication of Augustus the Strong of Poland (1706), and later, that of Stanislaus Leszczynski (1735) and of Poniatowski (1795), as well as that of Charles IV of Spain (1808), and of Napoleon (1814 and 1815). Insurrections have been the most frequent cause of forced abdications. The early history of the Scandinavian kingdoms abounds in instances. In England the compulsory abdication of Richard II (1399) is an early example. More recent times saw Charles X of France (1830) and Louis Philippe (1848) retire before the storm of revolution. The abdication of Ferdinand of Austria (1848) was a consequence of the events of the year of revolutions; that of Charles Albert of Sardinia (1849) of the battle of Novara. Of several cases among German princes, the chief is that of Ludwig of Bavaria (1848). Amadeus, King of Spain, felt himself obliged to give up his crown on Feb. 11, 1873. Prince Alexander of Bulgaria was compelled in 1886 to relinquish his principality, and three years later King Milan I of Servia, worried by domestic troubles and beset by internal dissensions in his kingdom, left the throne to his son Alexander I. On Feb. 12, 1912, the Emperor Hsuan-Tung was forced by revolution to abdicate the Imperial throne of China. In some countries the king can abdicate whenever he pleases; but in England, the constitutional relation between the crown and the nation being of the nature of a contract, the king or queen, it is considered, cannot abdicate without the consent of Parliament. It is, however, said that the king does abdicate, or, to speak perhaps more correctly, an abdication may be presumed, and acted on by the people, if his conduct politically and overtly is inconsistent with, and subversive of, the system of constitutional government of which the qualified monarchy of his office forms part. At the conference between the two Houses of Parliament previous to the passing of the statute which settled the crown on William III, it would appear that the word "abdicated" with reference to King James II was advisedly used instead of "deserted"—the meaning, it is presumed, being that King James had not only deserted his office, but that by his acts and deeds, of which the said desertion formed part, he had, in view of the Constitution, ceased to have right to the throne. From this it may be inferred that abdication was considered to have a twofold political signification, involving maladministration as well as desertion. The Scottish convention, however, more vigorously and distinctly resolved that King James "had forefaulted [forfeited] the crown, and the throne was become vacant."

ABDI-CHIBA, ăb′dē-chē′bȧ. A governor of Jerusalem in the time of Amenhotep IV (1403–1385 B.C.). If correctly read, his name probably designates him as a "servant of Hadad," the storm-god; but it possibly was pronounced "Arta-hipa," and may have been of Mitanian origin (compare Pu-hipa, Tadu-hipa, Gilu-hipa). Among the letters found at El Amarna, the site of Amenhotep's capital, Akhetaton, in 1888, Abdi-chiba was the author of at least six (179–184, ed. Winckler) and possibly of two more (185, 186). He is also mentioned in a letter of Shuwardata (165). These letters are written in cuneiform characters and in a Babylonian dialect that was no doubt spoken by a part of the population in Syria. Abdi-chiba apparently came from a family that had reigned over Jerusalem before the Egyptian conquest, as he repeatedly reminded Amenhotep of the fact that his father and mother had not made him a ruler, but the strong arm of the great King, probably Amenhotep III, had given him the territory of his ancestors, who may have been Mitanians or Hittites. With his neighbors, Shuwardata at Kilti-Keilah and Milkili at Gath, he was often at war. He was accused by them of having plotted with the Khabiri and taken possession of Kilti, while he charged them with the capture of Bit Ninib, a town belonging to the country of Urusalim, and with betraying the land into the hands of the Khabiri. These were, perhaps, the Hebrews in the widest sense, including Israelitish, Edomitish, Moabitish, and Ammonitish clans. The term Abiru probably means simply a 'nomad,' a 'wanderer.' Neither the Egyptian resident nor the King himself seems to have trusted Abdichiba, and the correspondence leaves it doubtful whether the relief he asked for was finally granted. These Amarna letters have been published by Winckler, in *Der Thontafelfund von El Amarna* (Berlin, 1889–90), and *Keilinschriftliche Bibliothek*, vol. v (1896), and by Knudtzon, "Die el-Amarna Tafeln" in *Vorder-Asiatische Bibliothek* (1908–11). They have also been translated or discussed by Halévy in *Journal Asiatique* (Paris, 1891) and in *Revue Sémitique* (Paris, 1893), by Zimmern in *Zeitschrift für Assyriologie* (Leipzig, 1891, vi, 245–263), by Jastrow in *Journal of Biblical Literature* (Boston, 1892, 95–134) and *Hebraica*, ix, 24–46 (Chicago), by Delattre in *Revue des questions historiques* (Paris, 1896), by Eduard Meyer in *Ægyptiaca* (Berlin, 1897), by Breasted, *History of Egypt* (1905), and by Dhorme in *Revue Biblique* (1908), pp. 500 ff., (1909) pp. 50 ff., 368 ff.

ABDIEL, ăb′dī-ĕl (Heb. *'abd*, servant + *'ēl*, god). In *Paradise Lost*, the faithful angel who opposed the revolt in heaven begun by Satan.

ABDO′MEN. The lower cavity of the human body. The trunk of the human body is divided by the diaphragm into two cavities—the upper being the thorax or chest, and the lower the abdomen or belly. Both the cavity and the viscera it contains are included in the term "abdomen." It contains the liver, pancreas, spleen, and kidneys, as well as the stomach, small and large intestine. The lower bowel, the bladder, and internal organs of generation lie in the lowest part of the cavity, which is called the pelvis. The abdomen is lined by a serous membrane, the peritoneum, which is folded over the viscera, allowing them a certain freedom of motion, but keeping them in their proper relations to each other. For convenience in locating its contained organs, the abdominal cavity is divided into nine regions, by planes, located by imaginary lines drawn on the surface of the body. Two horizontal lines divide it into three segments, and these are each subdivided by two vertical lines into three other segments. The three regions in the median line, from above downward, are named the epigastric, umbilical, and hypogastric. The three regions on each side, named in the same order, are the hypochondriac,

lumbar, and iliac. The abdominal viscera are subject to many acute and chronic affections, to which reference is made under their respective headings.



ABDOMEN

Abdomen. In entomology, the last of the three parts into which the body of an insect is divided. It is composed of a number of rings or segments, frequently nine, more or less distinct from each other. It contains a portion of the intestines and the sexual organs. In the perfect insect its segments bear no legs or wings; but the hind legs of larvæ or caterpillars, which afterward disappear, are attached to them. In many insects its last segments bear appendages of various uses and forms, as pincers, stings, borers, or ovipositors, etc. See ANATOMY and authorities there referred to.

ABDUCTION. In its broadest sense, the unlawful taking or detention by force, fraud or persuasion of a person, as a wife, child or ward, from the custody or control of the person legally entitled thereto. The English common law treated the act as a tort or private wrong to the husband, the parent, the guardian and gave to the injured party an action for damages. The term is, however, generally used, in a more restricted sense to denote the criminal offense of forcibly taking away or detaining a woman for the purpose of marriage or of prostitution. As distinguished from kidnapping (q.v.) the crime has been defined by statute in England for more than 500 years. It is also a matter of statutory definition and regulation in this country. Under these statutes it has been generally held that it is immaterial whether the woman abducted was at the time of chaste character or not. The tendency of our legislation is to extend the scope of the term far beyond its common law limits. For example, many statutes declare that a person receiving or harboring a female under the age of 16 years for the purpose of prostitution is guilty of abduction. Nor is his ignorance of the girl's age any defense to the abduction. Under early English statutes, abduction, as therein defined, was a felony without benefit of clergy (q.v.). In this country it is a crime, punishable by imprisonment for a term of years or by a heavy fine or by both. (See KIDNAPPING; CONSENT, AGE OF; WHITE SLAVERY.) Consult the authorities under CRIMINAL LAW; also Wharton, *A Treatise on Criminal Law* (San Francisco, 1912), and Bishop, *New Criminal Law* (Boston, 1900).

ABD-UL-AZIZ, äb'dụl-ä-zēz' (1830–76). Thirty-second Sultan of the Ottoman Empire. He was the second son of Mahmud II and succeeded his brother Abd-ul-Medjid, June 25, 1861. He placed the government in the hands of two ministers, Fuad and Ali, both of reforming tendencies, largely reduced his own civil list, and aroused hopes of an improvement in the condition of his Empire. But he soon lapsed into reckless extravagance, and the projected reforms proved meaningless and ineffective. In 1867 he made a tour of Europe, visiting the Paris Exposition and several capitals, in which he spent a vast amount of money to little purpose. In 1868 he reorganized the council of state, and promised more reforms in response to the demand of the Powers; but the revolt in Crete took his attention, war with Greece was probable, and the state of the treasury precluded efficient reform. The Greek difficulty was arranged by a conference at Paris. Ismaïl Pasha, Khedive of Egypt, took advantage of the Sultan's financial embarrassment to obtain important concessions, among them a new law of succession for his house, and nearly all the prerogatives of an independent sovereign. The Sultan's affairs grew desperate. The friendship of France had been Turkey's main reliance during the Second Empire. When that fell in 1870, the rival Russian influence became powerful at Constantinople. When the revenues were so low as barely to pay interest on the public debt, a revolt began in Herzegovina (1875) and soon extended to Bosnia. A renewed and more imperative demand of the Powers for radical reforms was embodied in the "Andrássy note" (Dec. 30, 1875), and the progressive constitutional party (Young Turkey) demanded the Sultan's abdication. He was deposed by the council of ministers May 30, 1876, and on June 4 was found dead in his apartments, having presumably cut his own arteries with a pair of scissors.

ABD-UL-HAMID, äb'dụl-hâ-mēd', **I** (1725–89). Sultan of Turkey and son of Ahmed III. He succeeded his brother, Mustapha III, in 1774. He was twice involved in wars with Russia. By the treaty of Kutchuk-Kainardji in 1774 he was compelled to relinquish his suzerainty over the Crimea and other Tatar regions. In 1788 the town of Otchakov was stormed by the Russians, a humiliation which is said to have hastened his death. Consult Assim Tarischi, *History of Abd-ul-Hamid and Selim III* (Constantinople, 1867).

ABD-UL-HAMID II (1842—1918). Thirty-fourth Sultan of the Ottoman Empire; second son of Abd-ul-Medjid. He was born Sept. 22, 1842, and succeeded to the throne Aug. 31, 1876, on the deposition of his elder brother, Murad V. Abd-ul-Hamid came to power at a trying time. The insurrection in Bosnia and Herzegovina was gaining strength, Servia had declared open war upon Turkey, and Russia was fomenting the spirit of dissatisfaction in the Slav states tributary to Turkey. The party of Young Turkey, led by Midhat Pasha, attempted

to establish a parliamentary government and to escape European control just when the aid of Europe was needed against Russia. The savage measures taken to suppress the revolt in Bulgaria and the failure of all Turkish promises of reform quickly alienated the Powers, who gave Russia a free hand. The Czar declared war in April, 1877, a Russian army at once invaded Turkey and advanced almost to Constantinople. Turkey was saved only by European jealousy of Russia. The treaty of San Stefano between the belligerents was materially modified by the Congress of Berlin (q.v.), but even then Turkey lost its remaining claims to suzerainty over Montenegro, Servia, and Rumania, yielded all real sovereignty in Bulgaria, Bosnia, and Hĕrzegovina, and lost some of its territory in Asia Minor. The Sultan was bound by the treaty to introduce reforms in the Christian provinces, but he failed to do this and adopted a distinctly reactionary policy. He took into his own hands the direction of the council of ministers and made his government a personal one. The Armenian outrages from 1895 to 1896 at first aroused the signatory powers of the Berlin treaty to action, but the international relations at the time were complicated, and Abd-ul-Hamid pursued the policy he has always so well understood of eluding all demands for redress or reform by means of promises and excuses, playing off the rival Powers against one another in the meantime. In 1897 a rising in Crete, brought on by Turkish misgovernment, was assisted by Greece and led to war between that country and Turkey. (See GREECE.) European Turkey continued in the meantime in a state of chronic unrest with serious revolts in Macedonia and Albania. Reform plans proposed by Austria and Russia were reluctantly yielded to by the Sultan; they were not executed. A second reform promise was similarly kept. In 1905 Great Britain put forward further proposals. The Sultan reluctantly yielded and in the same year narrowly escaped assassination. Three years later the smoldering forces of discontent broke out in Constantinople itself. The Sultan was forced by the "Young Turk" or reform party to restore the constitution of 1876, and shortly afterwards Abd-ul-Hamid opened the Turkish Parliament. In 1909 a counter-revolution, apparently engineered by the Sultan, proved a failure. A "Young Turk" army marched on Constantinople and deposed him, sending the ex-ruler and his harem to Salonika. Thence on Nov. 2, 1912, he was conveyed back to Constantinople on a German warship and shut up in a palace on the Asiatic side of the Bosphorus. Consult Bérard, *La Turquie et l'Hellénisme contemporain* (Paris, 1893) and *La politique du sultan* (Paris, 1897); McCullagh, *The Fall of Abd-ul-Hamid* (London, 1910).

ABDULLAHI IBN SEYID MOHAMMED, äb'dụl-lä'hê 'b'n sâ-yĕd' mô-hăm'mĕd. See KHALIFA.

ABD-UL-MEDJID, äb'dụl-me-jĕd' (1823–61). Sultan of the Ottoman Empire from 1839 to 1861. He succeeded his father, Mahmud II, at a time when the Turkish Empire was threatened by the ambition of the great Viceroy of Egypt, Mehemet Ali. The army had been defeated and dispersed by the Egyptians in the battle of Nisib, June 24, 1839, and there was nothing to hinder the victorious Ibrahim Pasha from advancing on Constantinople, where a large party was favorable to the elevation of Mehemet Ali to the sultanate. The intervention of the Christian Powers saved the house of Osman. The treaty of July, 1840, from which France kept aloof, rescued the young Sultan from sure destruction. Mehemet Ali had to submit, Nov. 27, 1840, to the restriction of his power to Egypt; and the treaty of July, 1841, to which France subsequently adhered, settled the future dependent relation of Egypt to Turkey. The Sultan, though not very energetic in body or mind, proceeded in the path of reform begun by Selim III and Mahmud II. In this he had for his chief adviser Reshid Pasha, an intelligent and humane Mussulman educated in France. The aim of all his measures was to place the Ottoman population on a footing with the civilized inhabitants of the west. A proclamation of the rights of all subjects, irrespective of creed, was issued in the *hatti-sherif* of November, 1839. This was followed by numerous reforms in all departments, and in 1850 the adherents of all religions were decreed equal in the eye of the law. The good purpose of these decrees was obstructed by the illiberal Moslems, and they remained practically a dead letter. In 1850 the Sultan, in spite of the menaces of Russia and Austria, refused to give up Kossuth and the other Hungarian refugees. The Sultan had a specially difficult part to play during the war with Russia (1853–56) and the diplomatic negotiations consequent to it. Abd-ul-Medjid was the thirty-first sovereign of the race of Osman. He died June 25, 1861, and was succeeded by his brother, Abd-ul-Aziz (q.v.). See OTTOMAN EMPIRE.

ABD UR RAHMAN, äb'dụr-rä'mân (1778–1859). Sultan of Fez and Morocco from 1823 to 1859. He was the rightful heir to the throne when his father died, in 1794, but was superseded by an uncle, after whose death he ascended the throne. The first four years of his reign were occupied in quelling insurrections. Austria refused to pay the tribute for safety against pirates; but the Sultan wisely adjusted the dispute by relinquishing this sort of blackmail, formerly levied on European ships in the Mediterranean. The war waged by Abd el Kader (q.v.) against the French in Algeria involved the Sultan in its events. He was overwhelmed by Bugeaud in the battle of Isly (1844), and forced to turn against Abd el Kader. The Sultan was a zealous Mussulman without the fanaticism common among his countrymen; as a ruler he was strict and often cruel. He was succeeded by his eldest son, Sidi-Mohammed (1803–73).

ABD UR RAHMAN (ABD AL-RAHMAN) KHAN, kän (1830–1901). Ameer of Afghanistan (q.v., paragraph on *History*) from 1880 to 1901. In the confusion succeeding the death of his grandfather, Dost Mohammed (q.v.) (1863), he supported the pretensions of his father, Afzul, against his uncle, Shere Ali, who had been named as his successor by the late ameer. The rebellion was at first successful, and Abd ur Rahman was installed as Governor of Balkh, where he showed himself a wise ruler. In 1868 Shere Ali overthrew his rivals, and Abd ur Rahman took refuge in Russian territory, living at Samarcand upon a liberal Russian pension. In 1879 he returned to his old province of Balkh, which had always been well disposed toward him. Yakub, the son of Shere Ali, who had been set up as ameer by the English and then

left to shift for himself, was unable to maintain order, and a new war with the English was followed by his deposition. Abd ur Rahman, in July, 1880, was recognized as ameer by the leading chiefs and was confirmed by the Anglo-Indian government, from whom he received a subsidy of £160,000 a year and much in the way of military equipment. It had been feared from his previous relations with Russia that he would be favorable to Russian designs; but he at once resumed the pro-English policy of his grandfather, and, by a firm and skillful control of the tribes of his realm, preserved the integrity of Afghanistan and maintained peaceful relations with his powerful neighbors. In 1893 the mountainous district of Kafiristan, in the Hindu Kush, was ceded to him by the Anglo-Indian government, and in 1896 he completed the subjugation of the tribes inhabiting it. He was an intelligent, well-meaning ruler, of a masterly habit, which stood him in good stead in dealing with his half-barbarous people. He was made by the British government a Grand Commander of the Star of India, and also G. C. B. He died October 3, 1901, after a brief illness, and was succeeded by his eldest son, Habib Ullah (q.v.), who for some time had borne an active part in the government and shown much administrative ability. See AFGHANISTAN. Consult: J. A. Gray, *At the Court of the Ameer* (London, 1895); Wheeler, *The Ameer Abdurrahman* (London, 1895); Mohammed Khan (Mir Munshi Sultan), *The Life of Abdur Rahman, Ameer of Afghanistan* (London, 1900).

ABECEDARIANS, ā'bē-sē-dā'rĭ-anz (Lat. *abecedarius*, pertaining to the alphabet, with reference to the first four letters). Followers in 1522 of Nikolaus Storch, a clothmaker of Wittenberg, a disciple of Luther, who imbibed enthusiastic views commonly called Anabaptist. They also believed it was best not to know how to read, since the Holy Spirit would convey knowledge of the Scriptures directly to the understanding, and, as education might be a hindrance to salvation, they encouraged pupils to leave the schools and universities and learn trades.

A'BECE'DARY CIR'CLES. Rings of letters described around magnetized needles, by looking at which friends at a distance were supposed to be able to communicate with each other.

A BECK'ET, THOMAS. See BECKET, THOMAS.

A'BECKETT, ARTHUR WILLIAM (1844–1909), son of Gilbert Abbott A'Beckett. An English journalist, novelist, and dramatist, born in London. In early life he edited the *Glowworm* (1865–68) and the *Britannia Magazine* (1868–70). During the Franco-Prussian War he was special correspondent for the London *Standard* and *Globe*. In 1874 he became a member of the staff of *Punch*, on which he remained until 1902. For the next two years he edited *John Bull*. Among his publications are *Modern Arabian Nights* (1885); *The Modern Adam* (1899); *London at the End of a Century* (1900); *The A'Becketts of Punch* (1903); *Recollections of a Humorist* (1907).

A'BECKETT, GILBERT ABBOTT (1811–56). An English humorous writer, born in London. He became a lawyer and during the last seven years of his life was a metropolitan police magistrate, in which office he displayed marked ability. He also devoted much of his time to literature, was the founder of *Figaro in London*, the precursor of *Punch*, and became one of the original staff of the latter. He wrote more than 60 plays, and with Mark Lemon dramatized *The Chimes* and other works of Charles Dickens at the author's request. He was the author of the *Comic History of England* (new ed., 1907); *Comic History of Rome* (1852); *Comic Blackstone* (1869). Consult *The A'Becketts of Punch* (1903) by his son, Arthur William.

A'BECKETT, GILBERT ARTHUR (1837–91). An English journalist and dramatist, son of Gilbert Abbott A'Beckett (1811–56). He was born in London and studied at Westminster School and Christ Church, Oxford. He wrote many successful songs, and the librettos of *Canterbury Pilgrims* and *Savonarola*, operas by Dr. Villiers Stanford, and was joint author, with Herman Merivale, of the poetic drama entitled *The White Pilgrim*. During the last 12 years of his life A'Beckett was one of the best-known contributors to *Punch*.

ABEDNEGO, a-bĕd'nē-gō. The name given in Babylon to Azariah, one of the companions of Daniel (Dan. i. 7 ff.). It is probably an intentional change from Abd Nebo, 'servant of Nebo,' or Abd Nergal, 'servant of Nergal.'

ABEEL, ā-bēl', DAVID, D.D. (1804–46). An early missionary to China. He was born in New Brunswick, N. J., June 12, 1804; graduated from the theological seminary of the Reformed Dutch Church in his native town, and became pastor in Athens, Greene Co., N. Y., 1826. Failing health compelled his resignation after two years and a half; in 1829 he went to China as chaplain in the employ of the Seamen's Friend Society; in 1830 was transferred to the American Board of Commissioners for Foreign Missions. He traveled extensively through the Far East, and on his way home invalided he went over Europe and excited great interest in missions there, as he did later in America (1833–36). Again thinking himself well enough for service, he returned to China in 1838, but was compelled by his increasing debility to return home (1845) and died in Albany, N. Y., Sept. 4, 1846. As one of the earliest and most devoted of missionaries he is still remembered. His addresses in London led to the formation of the Undenominational Society for Promoting Female Education in the East (1834); in 1844 he founded the Amoy Mission, now under the Reformed Dutch Church Foreign Mission Board. He published *Journal of a Residence in China* (New York, 1834; 2d ed., 1836); *The Missionary Convention at Jerusalem, or An Exhibition of the Claims of the Word of the Gospel* (1838). For his biography, consult G. R. Williamson (New York, 1848).

A'BEL (Heb. *hĕbĕl*, probably akin to Aramaic *habbala*, 'herdman'). According to Gen. v. 2, the name of the second son of Adam and Eve. The first-born, Cain (q.v.), settled down to agricultural life; the younger brother became a shepherd. At the close of the year, Cain offered up of the fruits of the field as a sacrifice to God, but Abel brought the firstlings of his flock. While the latter's gift was accepted by the Deity, not a glance was bestowed on the offering of the former. In consequence of this Cain's jealousy was aroused, and he slew his brother Abel. The story is generally understood by modern scholars as referring to two tribes in the Negeb (q.v.), north of Kadesh-

Barnea (q.v.), and as emphasizing the contrasts, shown in their history, between the nomadic, the pastoral or semi-nomadic, and the agricultural life. The Judæan story-teller looked back on Abel as a lost tribe destroyed by Cain, or the Kenites (q.v.). At his own time the latter were wandering nomads, having no share in the cultivated land and living without the privileges and protection of its sanctuaries. (See ASYLUM.) This condition was felt to be abnormal and therefore a punishment for past crimes. It was inferred that they must once have been tillers of the soil but had been driven out into the wilderness because of their manner of worship and their treatment of Abel. Fruits of the field, cereals and wine, had been their offerings, but these things had not been acceptable, had brought no prosperity. On the other hand, the tribe of Abel had prospered, their animal sacrifices being graciously received. Jealous of this prosperity, the Kenites had finally violated their covenant with Abel and caused this tribe to perish. The *huwe*, or brother-relation, between a pastoral and a farming tribe, still existing between certain tribes of *badwin* (see BEDOUIN) and *fellahin* (see FELLAH), implies the duty of the latter to furnish bread-stuff to the former in lieu of protection against enemies. The extermination of Abel, however, has been sufficiently punished by the hard life the Kenites had to lead in the land of Nod (q.v.), and there should be no feud between them and the Judæans, seeing that they had received a sign (probably circumcision, q.v.) as a protection against further vengeance for Abel. It has been suggested by Winckler that the tribe of Abel once occupied the district around Maon and Carmel (q.v.), that this was appropriated by the Kenites, who laid it under cultivation, and that they were themselves later driven out of it. So far as Abel is concerned this is not improbable. Underlying the story is the conception of the semi-nomadic or pastoral life as intrinsically nobler and more pleasing to God than either the farmer's life or that of the wild nomad. This is reflected in the implied disapproval of vine culture in the tale of Noah's drunkenness (Gen. ix. 20–21), in many utterances of pre-exilic prophets, and in the story of the Rechabites (q.v.) who had followed the commandment of their ancestor not to build or live in houses, not to plant or own vineyards or drink wine, and not to sow seed or possess a field. Even in later thought Abel remained the type of the true worshiper, and his animal sacrifice was regarded as better than Cain's (Heb. xi. 4); he was himself looked upon as the righteous man, the possessor of true faith, in contrast to Cain the wicked (Matt. xxiii. 35; Luke xi. 51; 1 John iii. 12). In the *Testament of Abraham* Abel plays the part of judge of the nether world. Whether this later development of the figure was due to identification with some chthonic deity cannot be determined. The proposed connection with Tammuz as the 'son,' Bab. *aplu*, can scarcely be maintained. There is a manifest relation between Abel and Jabal (q.v.); while the explanation of the name as meaning 'breath,' 'vanity,' has no value. See the important article by B. Stade, "Das Kainszeichen" in *Zeitschrift für Alt-testamentliche Wissenschaft* (1894, pp. 250 ff.); H. Winckler, *Geschichte Israels* II (1900, pp. 189 ff.); Ed. Meyer, *Die Israeliten und ihre Nachbarstämme* (1905, pp. 393 ff.); N. Schmidt, *The Messages of the Poets* (1911, pp. 291 f.).

ABEL, CARL, Ph.D. (1837–1906). A German philologist. He was born in Berlin, and after studying at the universities of Berlin, Munich, and Tübingen, acquired familiarity with all European and several Oriental tongues. He was at one time a lecturer at Oxford, taught philosophical and comparative linguistics at the Humboldt Academy of Science at Berlin, and was linguistic assistant in the German Foreign Office. His publications in German, French, and English are numerous. The works include *Linguistic Essays* (1880), *Slavic and Latin*, the Ilchester lectures on comparative lexicography delivered at Oxford (1883), *Russland und die Lage* (1888), and *Letters on International Relations before and during the War of 1870* (London, 1871), which created some attention at the time.

ABEL, Sir FREDERIC AUGUSTUS (1827–1902). An English chemist. He was born in London and devoted himself chiefly to the science of explosives. He was consulting chemist to the British War Department from 1854 to 1888. Abel introduced important improvements in the manufacture of gun-cotton and of blasting gelatine, and with James Dewar invented cordite, the standard explosive of the British War Department. He published *Gun-cotton* (1866); *The Modern History of Gunpowder* (1866); *On Explosive Agents* (1872); *Researches in Explosives* (1875), and *Electricity Applied to Explosive Purposes* (1884). He wrote also, in conjunction with Colonel Blexam, a *Handbook of Chemistry* (1854).

ABEL, JOHN JACOB (1857—). An American physiological chemist. He was born in Cleveland, Ohio, received his education at the University of Michigan, and studied medicine in Germany. On his return to this country he became connected with the Johns Hopkins University, where he was made professor of pharmacology in the medical school and head professor of physiological chemistry. Dr. Abel's researches have formed valuable contributions to our knowledge of the fluids and tissues of the animal body.

ABEL, ä'bĕl, KARL FRIEDRICH (1725–87). A German musician and composer, celebrated as the last virtuoso on the viola da gamba. He was born at Cöthen, became a pupil of Sebastian Bach, and was a member of the Royal Polish Orchestra at Dresden. He went to England in 1759 and six years later became chamber musician to Queen Charlotte. Together with John Christian Bach (the London Bach), a son of Sebastian, he directed the subscription concerts, known as the Bach-Abel Concerts, from 1765 to 1782. His works comprise 37 symphonies, string quartets, trios and sonatas for piano.

ABEL, ä'bĕl, NIELS HENRIK (1802–29). One of the most brilliant mathematicians of the first part of the nineteenth century. He was born at Findöe, Norway. After a course of study at the University of Christiania, he spent two years in Paris and Berlin and in 1828 was made instructor at the university and at the military school in Christiania. He was the first to demonstrate with rigor the impossibility of solving by the elementary processes of algebra general equations of any degree higher than the fourth. His chief contributions were made to the theory of functions, of which he was one of the

founders. An important class of transcendental functions (see FUNCTIONS) are known as Abelian, from their discoverer. There are also Abelian equations, groups and bodies. The binomial theorem (q.v.), proved by Newton and Euler, received at the hands of Abel a wider generalization, including the cases of irrational and imaginary exponents. Abel's works, in two vols., were published by the Norwegian government (Christiania, 1st ed., 1839; 2d ed., 1881).

ABÉLARD (Engl. ăb'ĕ-lärd; Fr. ä'bä'lär'), PIERRE (1079–1142). A scholastic philosopher and theologian, the boldest thinker of the twelfth century. His name is commonly given in the French form, Abélard or Abailard; in Latin, Abailardus or Bajolardus. But these are epithets of uncertain meaning, the latter form perhaps from *bajulus*, 'teacher,' the former from *abeille*, 'a bee.' He had properly the single name Peter, *Petrus*, to which was added *de Palais*, from the place of his birth, Le Pallet, or in Latin form Palatinus, a village 8 miles southeast of Nantes, Brittany, western France. He was born in 1079. His father was the knight Berengar, lord of the village; his mother was Lucia, and they both later on entered monastic orders. An irrepressible thirst for knowledge and a special pleasure in scholastic logic moved Abélard to resign his rights of primogeniture in favor of his younger brothers. His first teacher was Roscellin, the Nominalist, during the latter's stay at Vannes. He wandered about in search of knowledge until he arrived in Paris, where he became a pupil of William of Champeaux, the Realist, the head of the cathedral school of Notre Dame there, but soon incurred the hatred of his master, whom he puzzled by his wonderful subtlety. He fled to Melun, where he started a school of his own, and afterward to Corbeil, admired, yet persecuted, wherever he went. He then returned home for the restoration of his health. With renewed strength, he returned to Paris, reconciled himself with his opponents, and molded, by his influence as a lecturer, some of the most distinguished men of his age, among whom were the future Pope Celestine II, Peter Lombard, Berengar, his future apologist, and Arnold of Brescia.

At this time, however, there also lived in Paris with her uncle, the canon Fulbert, Héloïse, the 18-year-old natural daughter of a certain canon John, of Paris, already remarkable for her beauty, talents, and attainments. At Fulbert's invitation Abélard made his home with him and instructed Héloïse. She soon kindled in the breast of Abélard, then 38 years old, a violent and overwhelming passion, which was returned by Héloïse with no less fervor. The lovers were happy together until Abélard's ardent poetical effusions reached the ears of the canon. He sought to separate the lovers, but it was too late. They fled together to Abélard's home, where, in his sister Dionysia's house Héloïse gave birth to a son and was privately married to Abélard with the consent of her uncle. Not long after, Héloïse returned to Fulbert's house and denied the marriage, that her love might be no hindrance to Abélard's advancement in the church. Enraged at this, and at a second flight which she took with Abélard to the Benedictine nunnery at Argenteuil, where she had been educated, a flight which Fulbert interpreted as showing Abélard's desire to rid himself of his wife, Fulbert, in order to make him canonically incapable of ecclesiastical preferment, caused Abélard to be emasculated. In deep humiliation Abélard entered as a monk the abbey of St. Denis, in Paris, and induced Héloïse to take the veil at Argenteuil.

But the lectures which he began to give soon after exposed him to new persecutions. The synod of Soissons (1121) declared his opinions on the Trinity to be heretical. In punishment he had to throw the offending treatise into the fire, to read publicly the Athanasian Creed, and to endure a brief imprisonment. The charge seems to have been that he declared God the Father alone omnipotent. But what cost him more was his declaration that St. Dionysius, the patron saint of France, had been bishop of Corinth, and not of Athens, for this stirred up court opposition. He fled from St. Denis to the monastery of St. Aigulph, near Provins, but was brought back and compelled to retract his opinions concerning St. Dionysius. He was then allowed to go, and went to Nogent-sur-Seine, and there built of reeds and rushes a little chapel to the Trinity, and later, on account of the press of hearers, who planted their huts about him, a structure of wood and stone, which he called the Paraclete, the ruins of which exist to this day. But as everything he did caused adverse criticism, so the name that he gave the building—because it brought into unusual prominence the Holy Spirit—involved him in fresh trouble, and he left the Paraclete and accepted the abbotship of St. Gildas de Rhuys, on the coast of Lower Brittany. It was a sore trial for him to contend with the unruly monks. Meanwhile, the convent at Argenteuil, where Héloïse was prioress, had been broken up. Abélard transferred Héloïse and her nuns to the Paraclete and made her abbess of the nunnery he established. It was a long distance from St. Gildas, but, as spiritual director, he frequently went thither. Naturally, he fell under suspicion of renewing his intimacy with Héloïse, and so the lovers finally restricted themselves to writing. The correspondence has been preserved. On his part it was sternly repressive, to the point of coldness; on her part the heart expressed its love, which was an inextinguishable passion, both of body and soul, and tyrannical in its demands upon the monk who had ceased to share it.

After ten more years, Abélard, fearing an attack upon his life, left his monks and became a wandering teacher again. Two men, Norbert and the much more famous Bernard of Clairvaux, were always on his track. The Council of Sens, held in 1141, under the influence of Bernard, condemned his teachings. Abélard appealed to the Pope, Innocent II, and the latter confirmed the finding of the council and ordered his imprisonment and the burning of his writings. Abélard submitted, reconciled himself with Bernard, and was on his way to Rome to undergo his punishment, when he came, worn out, to the great monastery of Cluny. Through the friendly offices of Peter the Venerable, its noble abbot, he received permission to retire thither and a release from the order of imprisonment. He had not long to live, but the time was well spent in religious exercises and in occasional teaching. He had the scurvy, and when his ills increased he was removed to the priory of St. Marcel at Chalon-sur-Saône, where the air was better, it was thought. There he

died, on April 21, 1142. His body was brought to the Paraclete. Héloïse died there May 16, 1164, and was laid beside him. In the cemetery of Père-la-Chaise in Paris their bones are now united in one tomb, erected in 1817.

The loves of Abélard and Héloïse have made them immortal, but Abélard also has importance as a philosopher. He followed John Scotus Erigena, the ninth century philosopher, in his rationalism. He planted himself on Aristotelian ground (although all he knew of Aristotle was derived from Latin quotations) and did much to overthrow the prevalent realism. He stated the theory later known as conceptualism, rejecting both nominalism and realism. He held that we come to the conception of the general by thought upon the particular. General ideas are the creation of the intellect and in so far have reality. His great service in the development of ethics was in his treatment of conscience by dwelling upon the subjective aspect. He also has great importance as the virtual founder of the University of Paris, in a sense the mother of mediæval, and so of all modern, universities. This claim may be made for him because he first established schools independent of the monastic and episcopal schools. In Melun, in Corbeil, and then in Paris, at Nogent-sur-Seine, he had thousands of pupils and gave an extraordinary impetus to learning and speculation. His example as an independent teacher was followed. Out of such gatherings of students at a later date the universities were evolved. By his appeal to reason instead of authority, he showed the path to intellectual freedom and thus became the prophet of the freedom of speech and research for which the universities properly stand. In both these respects his pedagogical importance is great, and so his particular opinions and errors are of comparatively small moment.

His works, all written in Latin, first printed at Paris, 1616, are in Migne, *Patrol. Lat.*, clxxviii (Paris, 1855); also as edited by Victor Cousin: *Ouvrâges inédits d'Abélard* (Paris, 1836); *Opera* (1849–59, 2 vols.); to which should be added his *Sic et Non*, editors, E. L. T. Henke and G. L. Lindenkohl (Marburg, 1851); *Planctus Virginum Israel super filia Jeptæ Galaditæ*, editors, W. Meyer and W. Brambach (Munich, 1886); *Tractatus de Unitate et Trinitate* [discovered, edited, and published by R. Stölzle under title: *Abélards 1121 zu Soissons verurtheilter Tractatus, etc.*] (Freiburg-im-Breisgau, 1891); his *Hymnarius Paraclitensius*, editor G. M. Dreves (Paris, 1891). The letters of Abélard and Héloïse have very often been published and translated, e.g., the Latin text and the French translation by Gréard (Paris, 1885); complete English translation by J. Berington, with the Latin text, *The History of the Lives of Abeillard and Héloïse* (Birmingham, 1788), edited by H. Mills (London, 1850); O. W. Wight, *Lives and Letters of Abélard and Héloïse* (New York, 1861). Consult: A. S. Richardson, *Abélard and Héloïse* (New York, 1884), with selections from their letters; H. Morton, *Love Letters of Abélard and Héloïse* (New York, 1901), and the standard biography of Abélard by C. de Rémusat (Paris, 1855). For recent literature concerning him, consult: H. Hayd, *Abälard und seine Lehre im Verhältniss zur Kirche und ihrem Dogma* (Ratisbon, 1863); H. V. Sauerland, *Abälard und Héloïse* (Frankfort, 1879); P. Tiby, *Deux couvens au moyen âge, ou l'abbaye de Saint Gildas et le Paraclet au temps d'Abélard et d'Héloïse* (Paris, 1851); C. A. Wilkens, *Peter Abälard* (Bremen, 1851); C. de Rémusat, *Abélard*, a drama (Paris, 1877); S. M. Deutsch, *Abälards Verurtheilung zu Sens, 1141, nach den Quellen kritisch dargestellt* (Berlin, 1880); E. Vacandard, *Abélard, sa lutte avec Saint Bernard, sa doctrine, sa méthode* (Paris, 1881); S. M. Deutsch, *Peter Abälard, ein kritischer Theologe des zwölften Jahrhunderts* (Leipzig, 1883); A. Hausrath, *Peter Abälard* (Leipzig, 1893); G. Compayré, *Abélard and the Origin and Early History of Universities* (New York, 1893); F. Thaner, *Abälard und das canonische Recht* (Gratz, 1900); J. McCabe, *Peter Abélard* (New York, 1901). See also R. L. Poole, *Illustrations of the History of Mediæval Thought* (London, 1884); Rashdall, *Universities in the Middle Ages* (Oxford, 1895).

ABELE, ä-bēl′. See POPLAR.

ABELIN, ä′be-lēn, JOHANN PHILIPP (?–c.1635). A German historian. He wrote under the names Philipp Arlanibäus, Abeleus, and Johann Ludwig Gottfried, or Gothofredus. He produced a number of works still consulted, including the *Arma Suecica* (1631–34), and the *Inventarium Sueciæ* (1632), descriptions of military events of the time. He also founded the *Theatrum Europæum* (1635–1738), an illustrated serial work on contemporary history, for which he compiled the first two volumes. Others of his publications are a *Historische Chronika* (1633) and an *Historia Antipodum* (1655). See Droysen, *Arlanibäus, Godofredus, Abelinus* (1864).

ABELITES, ā′bĕl-īts, or **ABELONIANS,** ăb′ē-lō′nī-anz. A very small Christian sect of the fourth and fifth centuries, found in the neighborhood of Hippo, in north Africa. Their chief distinction consisted in marrying but abstaining from matrimonial intercourse, in order not to propagate original sin. They kept up their numbers by adopting children. They held that Abel so lived, because the Bible mentions no children of his. They are noticed by Augustine, *De Hœrisibus Liber*, and in an anonymous work, *Prædestinatus*.

ABEN, ä′bĕn. A form used in the transliteration of Oriental names instead of the more correct *Ibn* ('son').

ABENCERRAGES, ä-bĕn′se-rā′jez; *Sp. pron.* ä-bān′sä-rä′hās. According to legend, a noble Moorish race whose struggles with the family of the Zegris and tragical destruction furnish the material for the historical romance *Las guerras civiles de Granada*, by Gines Perez de Hita (Saragossa, 1595). From this Chateaubriand composed the novel *Le dernier des Abencérages*. There was actually a family of Abencerrages, powerful in the first quarter of the fifteenth century, but their history has been so embellished by legend that it is difficult to say what is true and what is imaginary.

ABEN-ESRA, ä′bĕn ĕz′rä, or **IBN EZRA,** properly ABRAHAM-BEN-MEIR-IBN-ESRA (1092–1167). One of the most learned Jews of his time. He was born in Toledo, Spain. He died Jan. 23, 1167. He was master of the Hebrew, Arabic, and Aramaic languages; had considerable knowledge of mathematics, astronomy, and medicine; was a scientific observer and a poet and generally distinguished himself as a sagacious thinker. He visited Lombardy, Provence, France, Egypt, and England, and passed the later years of his life in Rome, everywhere

teaching grammar, theology, astronomy, etc., besides writing works on Hebrew grammar and composing numerous poems. His *Commentaries on the Old Testament* are the most important of his works, though his scientific method occasioned opposition upon the part of the Talmudists. He also produced some treatises on astrology, since published in Latin. The scholastic writers mention Aben-Esra as ABENARE or AVENARD. An English translation of his *Isaiah* has been made by M. Friedländer (London, 1873), of his *Canticles* by H. J. Mathews, with original text in Friedländer, *Miscellany of Hebrew Literature*, vol. ii (London, 1877).

ABENSBERG, ä'bĕns-bĕrK. A town in Lower Bavaria, Germany, situated 18 miles southwest of Ratisbon and 1200 feet above sea level. It has warm springs and ruins of a castle. On April 20, 1809, Napoleon here defeated the Austrians and opened the way for the victory of Eckmühl. Pop., 2300.

ABEOKUTA, ä'bâ-ō-kōō'tâ. A city in Egbaland, a division of Yoruba, on the Slave Coast, north of Lagos, with which it is connected by rail. It is situated on an elevated plain, on the banks of the Ogun River, and is surrounded by a high mud wall. It occupies an extensive area, but its general appearance is that of a very large village. Abeokuta was founded about 1825 as a result of the slave-hunting expeditions of the natives of Dahomey and Ibadan. It was founded primarily on the lines of a confederation for mutual protection, each tribe, however, preserving its individual rights and customs. The population has been variously estimated, but British figures, returned in 1911, show 51,000 inhabitants, most of whom are artisans and traders and show much skill in their buildings and textiles. There is considerable commerce in manufactured goods from Europe which are exchanged for products of the surrounding region, cotton being the most important.

ABERAVON, ăb'ĕr-ā'von. A seaport on Glamorgan county, Wales, 11 miles by rail southeast of Swansea, on the river Avon (Map: England and Wales, C 5). In the Vale of Avon are found coal, iron, and copper, and the principal industry of the town and immediate district is metal working. There is here a Cistercian monastery of the thirteenth century. Pop., 1901, 7553; 1911, 10,505.

ABERBROTHWICK, ăb'ĕr-brŏth'ĭk. See ARBROATH.

AB'ERCARN (Celtic *aber*, confluence of rivers + Gael. *carn*, a conical heap of stones). A town in Monmouthshire, England, 5½ miles southwest of Pontypool. It is a progressive municipality, owning waterworks and cemeteries. Pop., mostly engaged in coal mining and metal working, 1891, 10,400; 1901, 12,607; 1911, 16,445.

ABERBROTHWICK, ăb'ĕr-brŏth'ĭk. See ABERCROMBY, JAMES.

ABERCROMBIE, JOHN (1780–1844). An eminent Scotch physician. He was born at Aberdeen and graduated in medicine at Edinburgh in 1803. He practiced his profession in the Scottish capital and soon became recognized as the first consulting physician in Scotland. Among the honors bestowed upon him were the degree of M.D. from Oxford, the rectorship of Marischal College, the vice-presidency of the Royal Society of Edinburgh, and the office of physician in ordinary to His Majesty for Scotland. Besides his professional writings he published *Inquiries concerning the Intellectual Powers* (Edinburgh, 1830), and *Philosophy of the Moral Feelings* (London, 1833), both of which attained a remarkable popularity. They championed the views of the Scotch school as represented by Dugald Stewart, but had no originality and therefore have now little philosophical value.

ABERCROMBIE, JOHN WILLIAM (1866—). An American educator, born at Kelly's Creek, Ala., and graduated from Oxford College (1886) and the law school of the University of Alabama (1888). Immediately following his college course he served as President of Ashland College and at the close of his legal studies as principal of Cleburne Institute, both in his native State. A period of two years (1890–91) as president of Bowdon College, Ga., was succeeded by six years as superintendent of schools in Anniston, Ala. In 1897 he was appointed president of the Southern Female Seminary (now the Anniston College for Young Ladies); in 1898, Alabama State superintendent of education; and in 1902, president of the University of Alabama. His interest in politics resulted in his election (1896 and 1898) to the State Senate, where he was made chairman of the committee on education. Of the National Education Association Abercrombie was a director (1900–04) and vice president (1903–04); and of the Southern Educational Association president (1905–06). He became, also, a member and officer in several other national and State educational associations and commissions. The *Biennial Report* of the Department of Education of Alabama, for 1899–1900, and several articles and pamphlets on educational subjects, were prepared by him. He received the degree of LL.D. from the University of Alabama in 1904 and the University of South Carolina in 1905. He was elected to the Sixty-third Congress in 1912.

ABERCROMBY, ăb'ĕr-krŭm'bĭ, or ABERCROMBIE, JAMES (1706–81). A British soldier, born at Glassbaugh, Scotland. He entered the army as colonel in 1746, and was raised to the rank of major-general and sent to America in 1756, where in 1757 he replaced Loudon as commander-in-chief of the British and colonial forces. On July 8, 1758, at the head of 15,000 men, he attacked Ticonderoga (q.v.), but was repulsed with a loss of fully 2000 men. This attack was the culmination of a career of incapacity, and in September he was superseded by Sir Jeffrey Amherst. Returning (1759) to England, he became a member of Parliament, and was conspicuous as an upholder of George III's colonial policy. For his record as an officer in America, consult Parkman, *Montcalm and Wolfe* (Boston, 1884).

ABERCROMBY, Sir RALPH (1734–1801). A distinguished British general. He was born at Menstry, near Tullibody, Scotland, October, 1734. He was educated at Rugby and studied for the legal profession at Edinburgh and Leipzig, but preferred the army, and a cornet's commission was obtained for him in 1756. In 1758 he accompanied his regiment to Germany, where he saw active warfare and gained experience in army management. At the conclusion of peace he was stationed in Ireland for several years. He married in 1767 and by 1773 had risen to the rank of lieutenant-colonel. He entered Parliament and strongly opposed the American war, a course particularly honorable, as he desired active service. The war with France gave him

his opportunity. Family influence and his reputation procured his promotion to be major-general of a brigade ordered to Flanders, where he distinguished himself so highly as to be publicly thanked by the Duke of York. Under him the Duke of Wellington, then Lieutenant-Colonel Wellesley, commanding the Thirty-third Regiment, received his baptism of fire. Abercromby was knighted on his return to England in 1795, and was surprised to find himself famous as his country's greatest general. The disastrous campaign, however, had shown him the deterioration in army discipline, and his energies were devoted to the reorganization of the whole army system. In 1796 he conducted a successful expedition to the West Indies. In 1797 he went to Ireland as commander of the forces. He strongly condemned the governmental policy toward that country, however, and this caused his resignation; but he was at once given a similar appointment in Scotland. In 1799 he was placed in command of the expedition to Holland and began it brilliantly; but he was superseded by the Duke of York, and the campaign ended ignominiously. Abercromby alone acquitted himself with credit, and the ministry wished to make him a peer, but he refused to have his name associated with a failure. In 1800 he commanded the expedition to the Mediterranean and after some brilliant operations defeated the French in the battle of Alexandria, March 21, 1801. During the action he was struck by a musket-ball in the thigh; but not until the battle was won and he saw the enemy retreating did he show any sign of pain. The ball could not be extracted; mortification ensued, and seven days later, on March 28, 1801, he died. Abercromby was at once gentle and brave, clear-sighted and cool in deliberation; in action, prompt and daring. Apart from his qualities as a soldier, he was a man of liberal accomplishments, free from prejudices, and of sound practical judgment. The national gratitude to this eminent man took the form of a peerage conferred on his widow, afterward enjoyed by his eldest son, with the title of Baron Abercromby. Consult: J. Abercromby, *Memoir of the Life of Sir R. Abercromby* (Dublin, 1801); J. Abercromby, Baron Dunfermline, *Memoir of Lieutenant-General Sir Ralph Abercromby* (London, 1861).

ABERDARE, ăb'ĕr-dâr'. A town in Glamorganshire, Wales, on the right bank of the Cynon, 4 miles southwest of Merthyr-Tydfil (Map: Wales, C 5). It is situated in a rich mineral district, having extensive coal, iron, and tin works. Aberdare has canal and railway connection with the coast; much coal is exported, and its growth has been remarkable. From an unimportant village of 6500 inhabitants in 1841 it has developed into a thriving town of 38,431 in 1891, 43,365 in 1901, and 50,844 in 1911.

AB'ERDEEN' (Celtic *aber*, confluence of waters, i.e., of the Don and Dee). The fourth largest city of Scotland, and the county town of Aberdeenshire. It is situated in the southeastern part of the county, on the North Sea, about 130 miles by rail north of Edinburgh (Map: Scotland, F 2). It forms the chief part of a parliamentary burgh of the same name and comprises the territory between the rivers Dee and Don, thus including what was formerly known as Old Aberdeen; the district of Torry in Kincardineshire, south of the Dee, was incorporated with the city in 1891. Aberdeen has a mean temperature of about 46° F. and is about 66 feet above sea level. It is a handsome city, largely built of granite quarried in the neighborhood, and is therefore known as the "Granite City." The streets are mostly regular and well paved. Union Street, its principal thoroughfare, has been described as one of the handsomest streets in Europe and contains many notable buildings, including the Town and County Bank and the Palace Hotel. Of first importance are the Municipal and County Buildings (in Castle Street, a short easterly extension of Union), an imposing structure in the Scotch baronial style, built in 1867–78. Near by is "The Cross," a curious monument adorned with medallions of Scottish monarchs. At the western end of Union Street are the Music Hall buildings, particularly notable in point of architecture, and the Trades' Hall, in which are kept the shields of the different incorporated trades. Several of the bank buildings are tasteful edifices. Notable in architectural merit are the new buildings of Marischal College in Broad Street, opened in 1906. The East and West churches, although comparatively modern, are interesting from the fact that they are built on the site of the ancient church of St. Nicholas and are connected by an old wooden tower. Among the many other churches of Aberdeen the Roman Catholic church is notable for its beautiful spire, 200 feet high, and the cathedral of St. Machar, begun in 1357, for its severe simplicity of style. The river Dee is crossed by four bridges, one of which, a stone bridge, dates from 1527.

The city has an excellent harbor with immense floating docks and a breakwater, enabling it to carry on a large maritime trade in textile goods, agricultural products, and granite. It is a large manufacturing centre, the chief industries including cotton spinning, manufacture of cotton, woolen, and linen goods, iron founding, and paper making. Granite cutting and shipbuilding are also quite important, although the latter industry has diminished since the days of wooden vessels, when the Aberdeen clippers were famous. The deep-sea fisheries are important. Aberdeen's means of communication are excellent. It is at the junction of three railway lines, and is connected by steamer with Leith, Newcastle, Hull, and London. Its own shipping comprises about 180 steam and 40 sailing vessels, tonnage about 100,000. In 1911 the net tonnage entered at the port was 201,508, and cleared 32,194; while the net tonnage of vessels *arriving* was 1,041,424, and *departing*, 1,020,498. The chief exports are fish, spirits, cloth manufactures, coal products, stone, etc., and the chief imports barley, wheat meal, maize, oats, flaxseed, sugar, timber, paper-making materials, etc. In 1911 imports were valued at £1,163,618, and exports at £1,496,670. Aberdeen is the fifth port of importance in Scotland. The United States is represented there by a consular agent.

Aberdeen sends two members to Parliament and is one of the most progressive of municipalities. It has the usual authorities, consisting of a lord provost, bailies, councilors, etc. (See GREAT BRITAIN, paragraph on *Government*.) The city owns and operates its water and gas works and an electric light plant, as well as its electric tramways, and maintains public baths, markets, and two cemeteries. It has taken up the question of the proper housing of the working people, and as a result has established a lodging house and erected several

workingmen's dwellings. Aberdeen's educational institutions are numerous, and include the University of Aberdeen (q.v.); among the other colleges and schools are Robert Gordon's College, which receives a yearly grant from the city; an art school; a navigation school; an ancient grammar school dating from 1263, the United Free Church College, a divinity school with a library of 30,000 volumes; the Mechanics' Institute; and the Aberdeen and North of Scotland College of Agriculture, which was founded in 1904 and had in 1913 an enrollment of about 600. Among the benevolent and charitable institutions are the Royal Infirmary, an epidemic hospital and one for incurables, a large lunatic asylum, and a poorhouse. The city has two fine public parks. Aberdeen appears in the twelfth century as a populous town. William the Lion granted it a charter in 1179, and Robert Bruce extended its privileges. The English burned the town in 1336, but it was rebuilt as New Aberdeen. It suffered severely during the civil wars of the seventeenth century. A period of great prosperity began in 1818, with the rediscovery of the art of granite polishing. Aberdeen is a royal, parliamentary, and municipal burgh; pop. of the municipal burgh in 1891, 121,905; 1901, 153,503; 1911, 163,891.

ABERDEEN. A city and the county-seat of Monroe Co., Miss., about 141 miles by rail southeast of Memphis, Tenn., on the Frisco Lines, the Illinois Central, and the Mobile and Ohio railroads, and on the Tombigbee River (Map: Mississippi, J 3). It has an oil mill, grist mill, cotton gins, and manufactures clothing, cotton-seed oil, wagon spokes, and barrel staves, and buttons. It is an important cotton market. The city owns the waterworks and electric light plant. Pop., 1900, 3434; 1910, 3708; 1913 (est.), 4500.

ABERDEEN. A city and the county-seat of Brown Co., S. D., 280 miles west of Minneapolis, Minn., on the Chicago, Milwaukee, and St. Paul, the Chicago and Northwestern, the Minneapolis and St. Louis, and the Great Northern railroads (Map: South Dakota, F 2). It has a public library, a fine municipal building, two daily newspapers, a court house, an opera house, a Federal building, five inside rest parks, and is the seat of a state normal and industrial school. The city has important commercial interests, and manufactures flour, soft and pressed brick, chemicals, candies, grain bins, clothing, and artesian well supplies; there are also several grain elevators and creameries. Settled in 1880, Aberdeen was incorporated in 1882, and has since adopted the commission form of government. The waterworks are the property of the municipality. Pop., 1890, 3182; 1900, 4087; 1910, 10,753; 1913 (est.), 14,500; 1920, 14,537.

ABERDEEN. A city in Chehalis Co., Wash., 50 miles (direct) west of Olympia, at the head of Grays Harbor; on the Chehalis River; on the Northern Pacific and Chicago, Milwaukee, and St. Paul railroads; and on the line of the Oregon and Washington Railway and Navigation Company; two steamship lines connect it with Californian ports (Map: Washington, B 4). The city is rapidly growing on account of its extensive lumber industry and abundant natural resources. The surrounding region is rich in dairying products. Among the city's industries are logging, lumber, and shingle mills, cooperages, shipyards, and fish and clam packing-houses. Aberdeen owns and operates its waterworks. Pop., 1890, 1638; 1900, 3747; 1910, 13,660; 1913 (est.), 17,500; 1920, 15,337.

ABERDEEN, fourth EARL OF, GEORGE HAMILTON GORDON (1784–1860). A British statesman, born at Edinburgh. He was educated at Harrow, and in 1804 took the M.A. degree at St. John's College, Cambridge. In 1801 he had succeeded to the earldom and made a journey through Greece, which is perpetuated by Byron's satirical distich,

> "First in the oat-fed phalanx shall be seen
> The traveled thane, Athenian Aberdeen."

He was elected a Scotch representative peer and took his seat as a Tory in December, 1806. In 1813 he was appointed Ambassador Extraordinary to Austria, where he gained the friendship of Metternich, whom he considered a pattern of diplomacy. He signed the Treaty of Paris as one of England's representatives. He was raised to the peerage as Viscount Gordon. He was Foreign Secretary under Wellington, 1828 and 1830, and under Peel, 1841 to 1846, in 1834 and 1835 acting as Peel's War Secretary. The general principle which guided his policy as Secretary of State and Foreign Affairs was that of non-interference in the internal affairs of foreign states, which, joined to his well-known sympathy with such statesmen as Metternich, exposed him—not always justly—to the suspicion of being inimical to the cause of popular liberty. His gradual abandonment of high Tory principles was evinced by his support of the bill for the repeal of the test and corporation acts and of the Roman Catholic Emancipation Act. The conclusion of the Chinese War, the Ashburton Treaty, and the Oregon Treaty were the principal services rendered to the country during his administration. In 1852, on the resignation of Lord Derby, the extraordinary state of parties necessitated a coalition, and Lord Aberdeen was selected as Prime Minister. The ministry which he headed was composed of many of the most brilliant men in England, among them Russell, Palmerston, and Gladstone; but the feeble and vacillating policy displayed in the conduct of the war with Russia gradually undermined its stability, and the disastrous mismanagement brought to light in the winter of 1854, in all departments of the public business connected with the war, filled up the measure of popular discontent and led to his resignation in 1855. He died in London. Consult Gordon, *Earl of Aberdeen* (London, 1893).

ABERDEEN, GEORGE GORDON, EARL OF (1637–1720). A Lord Chancellor of Scotland. He was educated at King's College in Aberdeen and was professor there in 1658. He became an advocate in 1668 and entered the Scottish Parliament in the following year. From 1682 to 1684 he was Lord Chancellor, and later was an active leader in Parliament (1685–86). The revolution that placed William on the throne aroused his opposition, but he finally submitted after the accession of Anne.

ABERDEEN, ISABEL MARIA, COUNTESS OF (1857—). A British social worker and author. She is the youngest daughter of Dudley Coutts Majoribanks, first Baron Tweedmouth, an eminent banker, and was born at "Guisachan," Inverness-shire, Scotland. In 1877 she was married to the seventh Earl of Aberdeen (q.v.). She early became interested in social and philanthropic work, especially in behalf of her own sex, and before 1893 was elected president of

several women's associations in Great Britain, including the Scottish Mother's Union, the Women's Local Government Society, the Women's Liberal Federations of England and Scotland. She founded the Onward and Upward Association, an organization for promoting a more sisterly interest among women of every station in life, and especially between mistresses and their female servants. In 1886, during her husband's first term as Lord Lieutenant of Ireland, she founded the Irish Industries Association. During 1893–98, when her husband was Governor-General of Canada, she founded the National Council of Women and the Victorian Order of Nurses. During 1893–99 she was president of the International Council of Women and was reëlected in 1904. In 1913 she visited the United States, and while here studied American methods of social work. She is the author of *Through Canada with a Kodak; Our Lady of the Sunshine* (1910), and edited the proceedings of *The International Congress of Women* (1900) and *Ireland's Crusade against Tuberculosis* (3 vols., 1908).

ABERDEEN, JOHN CAMPBELL GORDON, first MARQUIS OF (1847—). A British statesman. Educated at St. Andrews and Oxford; in 1880 was appointed Lord Lieutenant of Aberdeenshire, and from 1881 to 1885 was Lord High Commissioner to the General Assembly of the Church of Scotland. From January to July, 1886, he was Lord Lieutenant of Ireland, from 1893 to 1898 Governor-General of Canada, and in 1905 became Lord Lieutenant of Ireland on the accession of the Liberals to power, resigning in December, 1914. Consult Justin McCarthy, *British Political Portraits* (1903).

ABERDEEN, UNIVERSITY OF. A university at Aberdeen, Scotland, consisting of two colleges, King's and Marischal. The first of these, known at one time as the College of St. Mary and later as King's College, was founded by the Bishop of Aberdeen, William Elphinstone, as early as 1494; the second, always known as Marischal College, was founded by Earl Marischal of Scotland, George Keith, in 1593. The two colleges led a separate existence up to 1858, when, by an act of Parliament, they were united into the University of Aberdeen. It is a coeducational institution, having between 1200 and 1300 students, and still retains some of the traditions of the mediæval university. There are the customary five faculties of arts, science, law, theology, and medicine, taught by some 30 professors and many assistants. At present the Faculty of Arts, which includes courses for teachers, has the largest number of students (over 450), with the Faculty of Science ranking second in popularity. The work of the university is carried on in two different centres, its buildings being located in separate sections of the city. Besides enjoying State and private endowments, the University of Aberdeen is a beneficiary of the Carnegie Trust Fund. Thanks to these heavy endowments, it has several important museums and a library of over 140,000 volumes.

AB'ERDEEN'SHIRE. That county of Scotland which projects farthest northeast into the North Sea (lat. 57° 40′ N.). It comprises the drainage basins of the rivers Don and Ythan, and the greater part of the Dee basin (Map: Scotland, F 2). It is popularly divided into five districts, Mar, Strathbogie, Garioch, Formartine, and Buchan, and has an area of 1971 square miles. Among the principal towns are Aberdeen, the capital, Peterhead, and Fraserburgh. The chief industries are connected with agriculture and sea fisheries. Most of the manufactures, among which may be mentioned paper milling, centre about Aberdeen. Fine granite is quarried. Pop., 1801, 121,100; 1901, 304,439; 1911, 312,177. Consult A. Smith, *History of Aberdeenshire* (Aberdeen, 1875).

ABERDOUR. A village in Fifeshire, Scotland, 18 miles by rail northwest of Edinburgh. Its pleasant situation on the shore of the Firth of Forth has made it a favorite sea-bathing resort. It has ruins of a Norman church and of an old castle. About a mile off shore is the island of Inchcolm (q.v.). Pop., 1901, 1997; 1911, 2147.

ABERGAVENNY, ăb'ĕr-găn'nĭ, *or* ăb'ĕr-gă-vĕn'nĭ (the Roman *Gobannium*). A market town of Monmouthshire, England, 13 miles by rail west of Monmouth, beautifully situated in the valley of the Usk, where it joins with the Gavenny (Map: England, D 5). The town is regularly and compactly built, and many improvements have of late years been made. It was incorporated in 1899. St. Mary's Church, which was once a fine cruciform structure containing many interesting monuments, has been spoiled by restorations. The castle, built by Hammeline de Baladun, soon after the Conquest, is now a ruin. There are quarries, collieries, and iron works in the neighborhood, and it is also a fishing centre. Pop., 1891, 7700; 1901, 7795; 1911, 8511.

AB'ERNE'THY. A village in Perthshire, Scotland, on the Tay, about 6 miles southeast of Perth (Map: Scotland, E 3). It is believed to have been the metropolis of the Picts, and for many years in the ninth century was the seat of the only bishopric in Scotland. The principal object of interest is an ancient round tower in the churchyard, like which there is only one other in Scotland. Pop., 1901, 1276; 1911, 1267.

ABERNETHY, JAMES (1815–96). A Scotch civil engineer. He was born at Aberdeen. In 1841 he was resident engineer of the Aberdeen harbor works, and from 1842 to 1852 was surveying officer for the Admiralty. He was the first to apply hydraulic power to the working of lock-gates and constructed such important works as the Birkenhead docks, the Hull Alexandra docks, and the Turin and Savona Railway (Italy). He was also the director of the works for the draining of Lake Abukir, Egypt, by which 20,000 acres were reclaimed. In 1881 he was elected President of the Institute of Civil Engineers.

ABERNETHY, JOHN (1680–1740). An Irish dissenting minister. He was born at Colerain, Ireland, the son of a dissenting Presbyterian minister; was educated at Glasgow and Edinburgh, and was licensed to preach before he was 21 years old. He was ordained at Antrim in 1703; in 1717 he was invited to a congregation in Dublin and another in Belfast, while Antrim desired him to remain. The synod was appealed to and decided that he should go to Dublin, but he declined and remained at Antrim. This refusal to obey the synod was unheard of and was considered ecclesiastical rebellion, and a fierce controversy ensued, the parties dividing into "subscribers" and "non-subscribers." Though himself strictly evangelical, Abernethy and his associates were

remotely the occasion of the contest which ended in eliminating Arian and Socinian elements from the Irish Presbyterian Church. In 1726 Abernethy and all the "non-subscribers" were turned out with due ban and solemnity, but only four years afterward he was called to a "regular" congregation in Dublin. In 1731, in the controversy regarding the test act, Abernethy took broad ground "against all laws that, upon account of mere differences of religious opinions and forms of worship, excluded men of integrity and ability from serving their country." He was a century ahead of the time and had to argue against those who denied that a Roman Catholic or a dissenter could be a "man of integrity and ability." Abernethy was foremost where unpopular truth and right were to be maintained, and his *Tracts*, collected after his death, did good service for generations. He died in Dublin, December, 1740. Consult Drechal, *Sermons of John Abernethy, with his Life* (London, 1748–51).

ABERNETHY, John (1764–1831). An eminent English surgeon. He was born in London. He was a pupil of John Hunter; in 1787 was appointed assistant surgeon of St. Bartholomew's Hospital, and in 1815 chief surgeon. Soon after his appointment he began to lecture in the hospital on anatomy and surgery and may be said to have laid the foundation of its character as a school of surgery. His clear, simple, and positive style, illustrated by an inexhaustible variety of apt anecdotes, made him the most popular medical teacher of his day. In 1813 he was appointed surgeon to Christ's Hospital, and in 1814 professor of anatomy and surgery to the Royal College of Surgeons. His practice increased with his celebrity, which the singular eccentricity and occasional rudeness of his manners contributed to heighten. He made a great improvement on John Hunter's operation for the cure of aneurism by tying the external iliac artery. Of his works, the most important are his *Observations on the Constitutional Origin and Treatment of Local Diseases* (1806) and his *Lectures on the Theory and Practice of Surgery* (1830).

AB'ERRA'TION, Chromatic (from Lat. *ab*, away + *errare*, to wander, and Gk. Χρῶμα, *chrōma*, color; literally, colored deviation). A phenomenon observed when images of an object emitting white light are formed by a lens or a prism, it being observed that there is then not one white image, but many colored ones, which do not occupy the same position and which are of different sizes, thus producing a blurred image with a colored border. It is explained in the article Light that the sensations of different colors are due to waves in the ether of different wave-number or wave-length, and that these waves, in passing through portions of transparent matter, such as glass, travel with different velocities, depending upon their wave-number. As a consequence of this, in passing through lenses or prisms, waves of different wave-number have different paths. White light is shown to be due to the reception by the eye of waves of different wave-number; or, in other words, from a "white object," or an object "emitting white light," waves of different wave-numbers proceed outward. These waves are such that each train of waves of a definite wave-number would produce in the eye a definite color-sensation, e.g., blue, green, etc. In this sense we may speak of "blue-waves," "green-waves," etc.; and in general white light is due to the reception by the eye of waves which correspond to the "colors of the spectrum"—violet, blue, green, yellow, orange, red, and all the intermediate shades. Therefore, owing to this difference in path in a lens or prism of waves of different color, if an image of a white object is formed there will be a series of images corresponding to the different colors, these images differing in position and size as well as in color. This result is said to be due to the "chromatic aberration" of the lens or prism. (There are, of course, ether-waves which do not affect the sense of sight; and any prism or lens

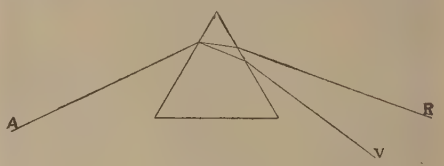


Fig. 1.

which is transparent to them will in general deviate waves of different wave-number differently, and so have this same kind of aberration, as ordinary glass lenses have for visible waves.) Mirrors do not have chromatic aberration, as there is no refraction of the rays. Moreover, it is possible, by combining two or more prisms or lenses, to diminish greatly the aberration. (See Achromatism.) The colors which are not thus brought to the same focus form the "secondary spectrum."

Reference to the diagrams will possibly serve to explain the matter more fully. Fig. 1 shows the dispersion (q.v.) of a beam of white light on passing through a prism, or, in other words, its separation into its constituent colors.

In fig. 2 let *MN* represent a convex lens, which may be considered as consisting of a num-

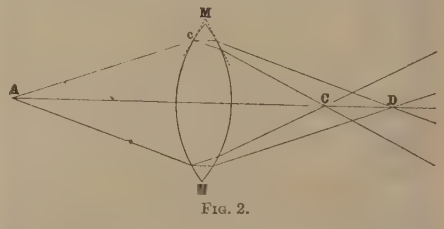


Fig. 2.

ber of prisms and having the same dispersive effect. Let *A* represent a source of white light. Considering a pencil which falls on the lens at *c*, where it is refracted, it is found that dispersion takes place, and the red rays after being deviated proceed to *D*, where an image of the object *A* is formed, while the violet rays which undergo greater refraction proceed to *C* and there form an image of the object *A*. Consequently, if the image at *C* is examined with an eye-piece, or allowed to fall on a screen, it will be found to have a red border, while that at *D* will be seen surrounded by violet. When correction is made for chromatic aberration, the purpose for which the lens is designed must be considered. (See Telescope.) For photographic work the violet rays are required, and any correction (see Achromatism) should aim to bring them to the desired focus. For a visual telescope

or microscope the yellow rays must be considered, and such a combination of lenses made that they are brought to the same focal plane. The chapters on optics in Müller-Pouillet's *Lehrbuch der Physik* (Brunswick, 1897) treat the subject most fully, as does Glazebrook's *Physical Optics* (London, 1898). The correction of this evil in photographic lenses is extensively treated from the theoretical standpoint in S. P. Thompson's translation of Lummer's *Photographic Optics* (London, 1900). See also Wood's *Physical Optics* (New York, 1905); Blein, *Optique geometrique* (Paris, 1913); Percival, *Geometrical Optics* (New York, 1913); Nutting, *Outlines of Applied Optics* (Philadelphia, 1912).

ABERRATION, Spherical. A term used in geometrical optics (see Light) to express the difference in path and effect of rays of light incident perpendicularly and obliquely upon a mirror or upon a surface separating two portions of transparent matter, e.g., upon a surface of water. If a source of light is very small, it can be called a "point-source" and can be considered as sending out "rays of light" in all directions, like the radii of a sphere. If one of these rays is perpendicular to the surface of the mirror or to the surface of separation of the two media, the rays near this will form a small cone or "pencil of rays"; and in optics it is shown that such a perpendicular pencil of rays always gives rise by reflection or refraction to another pencil of rays which meet in a point called the "image" or "focus" of the point-source. If, however, a small cone or pencil of rays be chosen around a ray which falls obliquely on the mirror or separating surface, it will give rise by reflection or refraction to rays which do not form a cone and therefore do not have a point as a focus, except in the case of a plain mirror, such as an ordinary looking-glass. If the incident pencil is narrow, the reflected or refracted rays will have two foci, in the form of two short, straight lines, some distance apart and perpendicular to each other. These are called "focal lines"; and in between them the rays come the closest to forming a point focus, producing what is called the "circle of least confusion." If, instead of considering a narrow pencil of rays, we study the whole bundle of rays falling on the entire reflecting or refracting surface, it is evident that the rays have a real or virtual focus on a surface which can be thought of as due to the combined effect of the short focal lines produced by the individual pencils of which the bundle of rays is composed, and which has a cusp or projecting point ending at the point-focus due to the perpendicular pencil. A section of this "caustic surface" is often seen on looking down on a cup of coffee or a glass of milk, if there is a lighted lamp near; because the projecting sides of the cup or glass act as a curved mirror. An immediate consequence of spherical aberration is that the image formed of any object by a curved mirror or by a lens or prism is not "sharp," but blurred, unless care be taken to exclude the oblique rays. This is done ordinarily by the use of diaphragms, such as are seen in opera-glasses, photographic lenses, etc. The smaller the opening in the diaphragm, so much the sharper is the image. See Caustic.

The accompanying diagrams will show the effect of spherical aberration in the case of spherical and parabolic mirrors and convex lenses. In Fig. 1 parallel rays are incident on a spherical mirror. Those falling perpendicularly, i.e., near the centre of the mirror, *O*, are reflected to the point *Q*, which is termed the principal focus of the mirror. The rays which strike the surface more obliquely do not meet at *Q* after reflection, but at points which lie on the caustic surface whose section is represented by the heavy line with a cusp at *Q*. In Fig. 2 the elimination of spherical aberration by the use of a parabolic mirror is shown, as here, by the peculiar property of a parabola (q.v.), all rays parallel to the axis are brought to a point at *F*, called the focus. For this reason the parabolic mirror is theoretically the most available for telescopes (q.v.), but in practice the construction of such mirrors presents great difficulties, which are but rarely effectually surmounted. The effect of spherical aberration in the case of a lens is indicated in fig. 3, where the rays passing

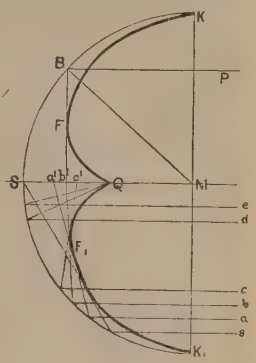


Fig. 1.

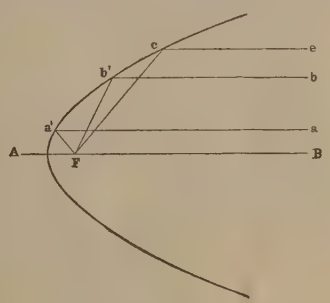


Fig. 2.

through the lens near its circumference are brought to a focus at *C*, while those lying nearer the axis *AB* meet at or near *F*. The foci for intermediate rays lie between that point and *C*. From these diagrams the advantages obtained by the use of diaphragms will be seen. The oblique rays, or those which strike the mirror or

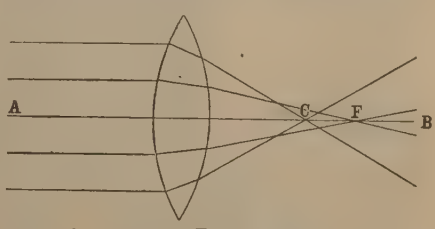
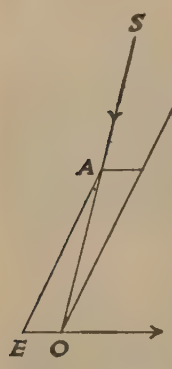


Fig. 3.

lens at a distance from its centre and which do not come to a focus at the same point as those passing through the central portion, are accordingly cut off and the image rendered more

distinct. The spherical aberration of lenses can be reduced by using two or more lenses in combination, as is done in the case of most photographic objectives. Two lenses with equal focal lengths can be combined, and their effect is the same as a lens with one-half the focal length, while the spherical aberration is greatly diminished. The books of reference mentioned under ABERRATION, CHROMATIC, will also supply ample information on this subject.

ABERRATION OF LIGHT. The displacement of the apparent direction of a heavenly body, due to the effect of the earth's motion on the direction of the relative velocity with which the light of the heavenly body approaches the earth. The phenomenon of aberration arises from the fact that light requires appreciable time for its transmission through space. The motion of light traveling from a star or a planet toward the earth, combined with the earth's own motion, causes an apparent displacement of the stars on the sky; they all appear to occupy positions a little different from their true ones. In explaining this phenomenon, we often use the analogy of a man running in a rain-storm. Though the raindrops may be falling straight down, they will seem to the running man to descend on his face in a slanting direction. Light, too, may be coming down, as it were, vertically, but as the earth, with the observer on it, is hurrying through space, there will be produced a similar apparent slanting of the light. The accompanying diagram will serve to make this clear: Suppose the light to be traveling from a distant star *S* in the direction *SO;* let the velocity of light be *V*, and let it be represented in magnitude and direction by the length *AO*. Suppose also that the earth is moving in the direction *EO* with velocity *v* represented by the length *EO*. Then, if we consider *O* as a fixed point, the light is approaching *O* with velocity represented by *AO*. Also, since the earth is approaching *O* with velocity represented by *EO*, the point *O* may be regarded as approaching the earth with an equal and opposite velocity which will therefore be represented by *OE*. Hence the relative velocity with which the light is approaching the earth is the resultant of the two velocities represented by *AO* and *OE*. By the principle of mechanics known as the triangle of velocities, this resultant is represented in magnitude and direction by *AE*. Now the apparent direction of an object is determined by the direction in which the light from the object is moving at the instant it enters the eye of the observer. When therefore the earth has reached *O*, the star is seen in the direction *OS′* drawn parallel to *EA*, although its true direction is *OS*. Hence the star will be seen on the sky displaced in the direction of the terrestrial motion. But since the motion of our planet takes place in a closed, oval curve, the apparent displacement of the star is now in one direction, and now in another, corresponding to the directions in which the earth is moving at different points of its oval path. The result is that the star itself seems to move each year through a small curve; and this is a sort of miniature reproduction of the earth's orbit around the sun.



In the explanation just given, we have considered the heavenly body to be one of the fixed stars, and therefore so far distant from the earth that its annual motion relative to that body is inappreciable. When, however, the body under observation is itself in motion with respect to our earth, as is the case with the sun and the other planets of the solar system, a further somewhat analogous displacement is produced. Astronomers therefore need to correct all their observations by a process of calculation, so as to reduce them to what they would be if no such thing as aberration existed.

The Constant of Aberration. The displacement angle *SOS′* is called the aberration error of the star. The maximum aberration will be observed, in general, twice a year, namely, when the line joining the earth and the star is at right angles to the earth's line of motion, and the angle *SOS′* in this case is called the *constant of aberration*. It may be shown by trigonometry that the constant of aberration measured in seconds is 206,265 times the ratio of the velocities *v* and *V*. The value of this constant, as adopted by the Astronomical Congress at Paris in 1896, is 20″.47, which is probably correct to within two-hundredths of a second. At any other time the aberration error is found by multiplying the constant of aberration by the sine of the earth's way, the earth's way being the angle *OEA*, or the angle between the direction of the star and that of the earth's motion. It follows therefore that a star situated at the pole of the ecliptic will appear to describe a small circle of diameter 41″ on the celestial sphere, since the line joining it to the earth is always at right angles to the direction of the earth's motion, while stars in the ecliptic will oscillate to and fro in straight lines 41″ long. A star lying between the ecliptic and its pole will appear to describe an ellipse, the longer of whose axes is equal to twice the aberration constant, and the shorter to twice the constant multiplied by the sine of the star's latitude (q.v.).

The particular importance of the constant of aberration is due to the computations rendered possible by a knowledge of its exact value. Its measurement with the utmost possible precision has long been the object of very earnest efforts; and few other astronomical problems have received so much attention in recent years. Combined with the known velocity of light, it gives us the earth's orbital velocity in miles per second. From this we get the length of the annual terrestrial orbit in miles, and then by a simple calculation we find its semi-diameter, or the distance from the earth to the sun. This last is the fundamental unit for astronomical measures of distance, and its exact evaluation is considered the most important of all astronomical problems.

Aberration was discovered by James Bradley (q.v.) in 1725. Hooke had reported the discovery of large parallax in the case of the star γ Draconis, and accordingly, in 1725, Bradley undertook a series of measurements on the star

with a zenith sector for the purpose of verifying Hooke's observation. He found that the latitude of the star underwent small periodic variations during the course of the year, and, moreover, that the displacement was greatest when the parallactic displacement should have been zero. He therefore abandoned all attempts to explain the phenomenon as due to parallax, although its annual recurrence led him to infer that it was in some way connected with the motion of the earth about the sun. It is said that the true explanation was suggested to him in 1728 while sailing on the Thames. He observed that the wind seemed to shift whenever the boat was put about, and was told, on questioning the boatman, that the direction of the wind vane at the head of the mast was due to the motion of the boat as well as to the direction of the wind. This gave him the desired clue, and shortly after, in 1729, he announced his discovery to the Royal Society.

The aberration discussed above may be termed the annual aberration. Besides this, a star suffers diurnal aberration, due to the effect of the earth's diurnal rotation about its axis on the relative velocity of light. The displacement due to this cause diminishes from a maximum of about 0″.32 for stations situated on the equator to zero at the north and south poles. There is, moreover, a secular aberration, caused by the translation of the solar system as a whole through space, but since, so far as our present knowledge extends, this motion is in a straight line and its rate is constant, it affects all stars equally, so that their relative positions remain unaltered. All that can be said is that the right ascension and declination of each star are different by constant amounts from what they would be if this aberration were absent. See PARALLAX, section *Solar Parallax;* SUN.

ABERSYCHAN, ăb′ĕr-sŭk′an. A town in Monmouthshire, England, about 11 miles by rail north of Newport, in a wild mountainous region, and on the edge of the coal district. Numerous collieries and iron foundries are located here. Pop., 1891, 15,300; 1901, 17,768; 1911, 24,661.

ABERT, HERMAN (1871—). A German writer on music. He was born in Stuttgart and received his first musical education from his father, who was first conductor at the court opera. Later he became a pupil of the Stuttgart conservatory. After graduation from the gymnasium he devoted himself from 1890 to 1895 to the study of classical philology at the University of Tübingen, where he received the degree of Ph.D. From 1897 to 1901 he spent at the University of Berlin in research work relating to the history of music. From 1902 to 1909 he was lecturer on music at the University of Halle; since 1909 he has been professor. Besides numerous special studies relating to the history of music contributed to the volumes of the *Internationale Musikgesellschaft* he published: *Die Lehre vom Ethos in der griechischen Musik* (1899); an excellent biography of Schumann in Reimann's series *Berühmte Musiker* (1903); *Die Musikanschauung des Mittelalters und ihre Grundlagen* (1905); *Jommelli als Opernkomponist* (1908).

ABERT, JOHN JAMES (1788–1863). An American military engineer. He was born in Shepherdstown, Va., and graduated at West Point in 1811, but resigned from the army and practiced law in Washington. He served as a private in the battle of Bladensburg, Aug. 24, 1814. Later in the same year he joined the corps of engineers and in 1838 had become colonel in command of the topographical bureau. He was retired in 1861. Colonel Abert exercised an important influence in the development of the earlier engineering works of the government.

ABERTILLERY. A town in Monmouthshire, England, 4½ miles northwest of Pontypool. It is in the heart of the coal fields, and mining is the occupation of most of the inhabitants. Pop., 1891, 10,850; 1901, 21,945; 1911, 35,425.

ABERYSTWITH, ăb′ĕr-ĭst′wĭth. A favorite watering-place, summer resort, and educational centre in Cardiganshire, Wales, on Cardigan Bay, about 50 miles north-northeast of Swansea (Map: Wales, B 4). On a hill above the town stand the ruins of an old castle erected by Gilbert de Strongbow. Adjoining it is the University College of Wales, established in 1872. Pop., 1891, 6700; 1901, 8014; 1911, 8412.

ABERYSTWITH, UNIVERSITY COLLEGE OF. See WALES, UNIVERSITY OF.

ABESHR, ä-bĕsh″r. The capital of the state of Wadai, in Nigeria, West Africa, about lat. 14° N., long. 21° E. (Map: Africa, G 3). It was once the centre for richly laden caravans from Tripoli, Kano, and the east. Its importance has greatly decreased because of pillage by the inhabitants. Pop., about 10,000.

ABET, ABETTOR (Lat. *a* + *beter*, to bait or urge on). In criminal law to abet is to encourage, incite, or instigate the commission of a crime. An abettor is an accessory (q.v.) and, by the better opinion, an accessory before the fact.

ABEYANCE (OF. *abeiance*, from *a*, Lat. *ad*, at + OF. *beer*, Fr. *bayer*, Middle Lat. *badare*, to gape, to expect). A legal term importing that the title to real or personal property, a dignity, or office is not vested in any one, but is suspended until the true owner appears or the right thereto is determined. Strictly speaking, there could be no abeyance of a freehold at common law. In legal contemplation, there must always be some one in whom a present estate or interest in the land is vested. This, however, did not apply to future estates which might be in abeyance. Thus, when one holds land for life, with remainder to the heir of a living person other than himself, the remainder is in abeyance, since the heirs of that other remain undetermined while he is alive. Titles of honor are said to be in abeyance when it is uncertain who shall enjoy them. Thus, under the English law, when a nobleman leaving a title descendible to his heirs general dies, leaving daughters and no male issue, the King, by his prerogative, may grant the title to any one of the daughters. Until the King exercises his prerogative, the title, which is thus suspended, is said to be in abeyance. See the authorities referred to under the article on PROPERTY.

ABGAR. A common name or title of several kings of Edessa in northwestern Mesopotamia. One of them is known from an alleged correspondence with Christ. The account given by Eusebius (*Ecclesiastical History*, xiii, i.) states that he sent a letter to Christ requesting him to come to Mesopotamia and heal him. To this Christ made a reply that, although unable himself to come, he would, after his ascension, send

a disciple. Both of these letters Eusebius claims to have found in the archives of Edessa and believes to be genuine. Other versions add that Christ sent to the King a portrait, now displayed at both Rome and Genoa. Consult R. A. Lipsius, *Die Edessenische Abgar Sage* (Brunswick, 1880).

ABHEDĀNANDA, ŭb'-hā-dā'nan-dā, SWAMI (1866—). A Hindu lecturer and author, born in Calcutta, India, and educated at Calcutta University. He was a disciple of Sri Râmakrishna Paramahansa, and became a member of the Order of Sanyāsins, said to be one of the oldest orders of priesthood in the world. In 1897 he removed to the United States, where he delivered lectures on the Vedanta philosophy, organizing and becoming head of the Vedanta Society of New York. He delivered many lectures on Hindu philosophy before educational institutions, societies, etc., and came to be considered one of the leading exponents of Monistic Vedanta in America. Among his published writings are *Reincarnation* (1899); *Spiritual Unfoldment* (1901); *Philosophy of Work* (1902); *How to be a Yogi* (1902); *Divine Heritage of Man* (1903); *Self-Knowledge* (1905); *India and her People* (1906); *Human Affection and Divine Love* (1911); *Great Saviors of the World*, vol. i (1911); and many pamphlets on philosophical subjects.

ABHORRERS. In English history, the name given to the Tory element that expressed abhorrence of the petitions presented to Charles II for the reassembling of Parliament (1679) and that upheld the King in his efforts to control public opinion. Their opponents were called Petitioners.

ABI'ATHAR (Heb. 'the excellent one is father'). The high priest whose father, Ahimelech (1 Sam. xxii. 20), or Ahijah, was slain at the command of Saul for having received and helped the fugitive David (1 Sam. xxii. 9–10). In 2 Sam. viii. 17 we should read with the Syriac version "Abiathar, son of Ahimelech," and not, as the Masoretic text, "Ahimelech, son of Abiathar." Abiathar also was a strong adherent of David, and showed his friendship especially during Absalom's rebellion (2 Sam. xv. 29). At a later time Abiathar favored Adonijah (1 Chron. i. 7), and for this Solomon deprived him of his priesthood and banished him to Anathoth (1 Kings ii. 26–33). With his deposition the direct line of Eleazar comes to an end, and the place is taken by Zadok and his descendants (1 Kings ii. 35. See Ezek. xl. 46; xliii. 19; xliv. 15). In our Greek text of Mark ii. 26 Abiathar is given as the name of the priest at Nob who gave David the showbread. But the words "under Abiathar the high-priest" are not found in the Sinaitic Syriac and are probably a later gloss of a reader whose memory failed him. See AHIMELECH.

A'BIB. The older biblical name for the first month of the Jewish ecclesiastical, and the seventh of the civil, year. In this month the feast of Passover is celebrated (Ex. xiii. 4; xxxiv. 18). In the later books of the Bible representing the period when the Babylonian names, together with the Babylonian calendar, were adopted by the Hebrews (Neh. ii. 1; Esther iii. 7), the month is called Nisan, and this name is used at the present time in the official calendar of the Jewish church.

ABICH, ä'bĭk, WILHELM HERMANN (1806–86). A German geologist and traveler. He was born in Berlin. He studied at the university there, in 1842 became professor of mineralogy in Dorpat, and in 1853 member of the St. Petersburg Academy of Sciences. He explored the Caucasus, Russian Armenia, northern Persia and Daghestan, and published several important works on the geology and mineralogy of those regions, among which may be mentioned: *Ueber die Natronseen auf der Araxesebene* (1846 and 1849); *Sur la structure et la géologie du Daghestan* (1862); and *Geologische Forschungen in den kaukasischten Ländern* (3 vols., 1878–87).

ABIES, ā'bī-ēz. See FIR.

AB'IGAIL or **ABIGAL** (Heb. 'father is joy,' or 'father has rejoiced'). The wife of King David, famed for her beauty and discretion. Abigail was originally the wife of Nabal, and gave food to David during his flight from Saul after her husband had refused to do so. "About ten days later" Nabal died, and David took Abigail to wife (1 Sam. xxv. 2–42). The Amalekites captured Abigail during a raid on Ziklag (1 Sam. xxx. 5), but David recovered her (1 Sam. xxx. 18), and she bore him a son, Chileab (2 Sam. iii. 3), or Daniel (1 Chron. iii. 1). Another Abigail was daughter of Nahash, sister of Zemiah, Joab's mother, wife of Ithro, the Ishmaelite, mother of Amasa (2 Sam. xvii. 25, the less probable statement in 1 Chron. ii. 16 makes her a sister of David). In modern usage, derived from 1 Sam. xxv. 25, Abigail is employed as a general name for a waiting-maid or a lady's-maid.

ABI'JAH (Heb. 'Yahweh is father'), or **ABI'JAM.** The name of several persons mentioned in the Bible. The most important are: 1. Abijah, King of Judah, a son of Rehoboam and Maacah, the daughter of Abishalom (1 Kings xv. 2). He succeeded his father and reigned about three years (c.937–934 B.C.), during which time there was war between him and Jeroboam I (1 Kings xv. 7). Abijah probably gained a victory over Jeroboam near Zemaraim (2 Chron. xiii), but the number of combatants, 1,200,000, is greatly exaggerated. 2. A son of Jeroboam I, King of Israel (c.935–932 B.C.), who died in his childhood (1 Kings xiv. 1–18). The Vatican MS. and Lucianic recension of the Greek version bring in the story of his illness and his mother's visit to the prophet Abijah immediately after the death of Solomon, consequently before Jeroboam ascended the throne.

ABILA, ab'ila. An ancient city in Syria, capital of the tetrarchy of Abilene (q.v.), generally called Abila of Lysanias (q.v.). The modern site is Sūk Wādy Baradā, 20 miles N.W. of Damascus. Mediæval Arab geographers called this place Abil al Suk. There are still ruins of a temple, aqueducts, and tombs on the banks of the Barada where the city once stood; and there is a Roman mile-stone with the inscription *mil. pass. II* exactly two miles from Suk.

ABILDGAARD, ä-bĭl'gȧr, NIKOLAI ABRAHAM (1743–1809). A Danish historical painter. He was born at Copenhagen, studied at the Academy there and in Rome and Naples. In 1778 he was appointed professor of the Academy at Copenhagen and, in 1789, its director. His most important work, a series of ten pictures in the castle of Christiansborg, was burned with the castle in 1794. The best paintings of his latest period were four scenes from Terence's *Andria* and others after Apuleius' *Golden Ass*, all in the Gallery of Copenhagen. Abildgaard

was the chief representative of the classic painting in Denmark and exercised a wide influence through his pupils, like Thorwaldsen.

AB'ILE'NE. A district referred to in Luke iii. 1, as well as in Josephus (*Ant.* xix, 5, 1; xx, 7, 1) as the tetrarchy of Lysanias. It was a fragment of the earlier kingdom of Iturea, the capital of which was Chalcis in the plain of Massyas, between the Lebanon and Anti-Lebanon Mountains. When the Romans took possession of this region, the Iturean kingdom became broken up into four tetrarchies, of which Abilene was one. This took place, probably, between 36 and 23 B.C. The Lysanias referred to by Luke was the second of that name, the first Lysanias having been ruler of the still undivided territory. The district of Abilene was so named from its chief town, Abila, on the Abanah, or Barada, the stream on which Damascus is situated. Abila, which has been identified with the ruins at Sūk Wādy Baradā, was on the eastern slope of the Anti-Lebanon range, just where the Abanah breaks through the mountains. In 37 A.D., Caligula gave Abilene to Agrippa I, who died in 44. In 53 it was given by Claudius to Agrippa II, who ruled it until his death in 100, when it became a part of the Roman province of Syria. Consult Schürer, *History of the Jewish People*, i, ii. 325–344.

ABILENE, ab'ē-lēn. A city and the county-seat of Dickinson Co., Kan., 163 miles west of Kansas City, on the Union Pacific, the Chicago, Rock Island, and Pacific, and the Atchison, Topeka, and Santa Fe railroads, and on the Smoky Hill River (Map: Kansas, E 5). The surrounding region is agricultural—alfalfa, corn, and wheat being the principal crops. Abilene is primarily residential, having many fine homes, but the city is the commercial centre for the district, and grain milling and the manufacture of merry-go-rounds and dairy products are among the industries. The city owns its water works, and an excellent supply is obtained from the celebrated Sand Springs, four miles from Abilene. Settled about 1860, Abilene was incorporated in 1869, the charter of that date continuing in operation until the commission form of government was adopted in 1911. During the early days of the beef industry Abilene and Dodge City (q.v.) were the greatest shipping points for cattle in the United States, being at the end of the long trail up which came practically all the beef cattle raised in the southwest. Pop., 1900, 3507; 1910, 4118; 1913 (est.), 4547.

ABILENE. A city and the county-seat of Taylor Co., Texas, 160 miles west by south of Fort Worth, on the Texas and Pacific, Wichita Valley, and Abilene Southern railroads (Map: Texas, E 3). It has a State Epileptic Colony. The industrial establishments include flour, grist, and planing mills, cotton gins, a cotton oil mill, a cotton compress, etc., a sanitarium, a Federal Court House, and a Carnegie Library. The commission form of government has been adopted. Pop., 1900, 3411; 1910, 9204; 1913 (est.), 12,000; 1920, 10,274.

ABIMELECH, ȧ-bĭm'ē-lĕk (Heb. 'my father is king,' or 'Melek is father'). The name of two kings mentioned in the Old Testament.

1. A son of Gideon (Judges viii. 31), reckoned as one of the judges (Judges x. 1). Upon the death of his father, who refused to take the title of king, Abimelech set out to claim the sovereignty. He is said to have slain 70 of his brothers and to have been declared king (Judges ix. 1–6). One of his brothers, Jotham, who escaped Shem, taunts the Shechemites with a fable whose point is that the nobler trees do not wish to rule over others, only the bramble is self-confident. In this fable it is possible to see a feeling antagonistic to monarchy. Three years afterward the Shechemites under the leadership of Gaal made an unsuccessful attempt to throw off his rule (Judges ix. 22–41). After capturing Shechem and burning the temple of Baal-berith, Abimelech went against Thebez, and here, while besieging the place, he was struck on the head by a piece of millstone thrown from the wall by a woman. To avoid an ignominious death, he ordered his armor-bearer to run him through (Judges ix. 43–57). His reign is the first attempt to establish a monarchy in Israel.

2. A King of Gerar mentioned both in the biblical narrative about Abraham (Gen. xx. and xxi. 22–32), and about Isaac (Gen. xxvi. 7–11, 26–33). The story in both cases is substantially the same. Abimelech takes Sarah into his harem, after Abraham, for fear that he should be killed, had declared her to be his sister. In a dream the true relation between Abraham and Sarah is revealed to Abimelech, who forthwith returns Sarah to her husband and loads the latter with presents of cattle and servants. Similarly Isaac declares to the men of Gerar, among whom he has settled, that Rebekah is his sister. Abimelech, however, discovers the true relationship and reproaches Isaac for having almost been the cause of bringing a "great sin" upon Abimelech and the men of Gerar. In view of this similarity, it is generally supposed by modern critics that the two stories are but different versions of one and the same tale. By an error the name Abimelech has been introduced instead of Achish (1 Sam. xxi. 2) in the title of Ps. xxxiv. In 1 Chron. xviii. 16 the text erroneously reads Abimelech instead of Ahimelech (q.v.).

AB'INGDON. A city in Knox Co., Ill., 50 miles west of Peoria, and 85 miles northeast of Quincy, on the Chicago, Burlington, and Quincy and the Minneapolis and St. Louis railroads (Map: Illinois, B 3). It is the seat of Hedding College, a Methodist Episcopal institution, opened in 1853. Abingdon has wagon works, an animal-trap factory, said to be the largest in the world, and manufactures shirts and overalls, cement, paving brick, and tile. It is an agricultural region and has a few coal mines. The city was first settled in 1828 and was incorporated in 1857. It is governed by the charter of 1859. The mayor's term is one year, and the city council is composed of five members. The city owns its water works. Pop., 1890, 1321; 1900, 2022; 1910, 2464; 1913 (est.), 3000.

ABINGDON. A town and the county-seat of Washington Co., Va., 189 miles west by south of Lynchburg, on the Norfolk and Western and Virginia-Carolina railroads and the Holston River (Map: Virginia, C 5). It is the seat of Martha Washington College (Methodist Episcopal, South), established in 1858, Stonewall Jackson Institute (Presbyterian), opened in 1869 (both for young ladies), and Abingdon Academy. It also has a U. S. court house and county court house. There are canning, brick, cigar, column, and wagon factories, and flour, lumber, and planing mills. Abingdon was settled about 1770 and was incorporated in 1778.

The town has furnished the State with three governors, Floyd, Robertson, and Campbell. Pop., 1910, 1757; 1913 (est.), 1760; with suburbs, 3000.

AB'INGTON. A manufacturing town in Plymouth Co., Mass., 20 miles southeast of Boston, on the New York, New Haven, and Hartford Railroad and Old Colony Electric (Map: Massachusetts, F 3). It was settled about 1680 and incorporated as a colonial town in 1712. The town's affairs are administered by town meetings. The leading industry of Abington is the manufacture of boots and shoes. The town owns and operates its water works. It has a fine park in which a memorial arch to Civil War veterans was dedicated in 1912. Pop., 1890, 4260; 1900, 4489; 1910, 5455; 1913 (est.), 5500. Consult B. Hobart, *History of the Town of Abington* (Boston, 1866).

ABINGTON, Frances (1737–1815). A famous English actress. She was the daughter of Barton, a common soldier. As an errand-girl, she acquired French from a milliner. She became a flower-girl at the theatres, and made her first appearance at the Haymarket in London (1775) as Miranda, in *The Busybody*. She was married to Abington, her music teacher, from whom she soon separated. The headdress she wore was adopted by the women of fashion, and the "Abington cap" became famous. Returning to England in 1765, at the invitation of Garrick, she played at Drury Lane for 18 years, and later at Covent Garden. She was the original representative of Lady Teazle in 1777, and played many Shakespearean parts. After the retirement of Mrs. Pritchard and Kitty Clive, she had no rivals on the London stage and became the first comic actress of the period. Her last appearance was on April 12, 1799.

AB'IOGEN'ESIS. See Biogenesis.

ABIPONE, ä'bē-pō'nā. A South American Indian tribe of Guaycuruan stock, which formerly wandered over the Gran Chaco region, west of the Paraguay River, from the headwaters of the Rio Grande in Bolivia southward to the Vermejo in Argentina. Their traditions pointed to a more northern origin. They obtained horses about the year 1640 and soon developed into bold riders and implacable foes of the Spaniards. They were of splendid physique and lived entirely by hunting. The women tattooed, and the men practiced the couvade. Their weapons were the bow, the lance, and the shield. The Jesuits established missions among them, but, owing to constant wars with the Spaniards and with other tribes, and also to the custom among the women of killing all but two children born to a family, the tribe, which about 1780 was estimated at 5000, dwindled rapidly and is now extinct. See Dobrizhoffer, *An Account of the Abipones* (3 vols., London, 1822), Church, *Aborigines of South America*, pp. 262–268 (London, 1912), and Kersten in *Intern. Arch. f. Ethnogr.*, vol. xvii, pp. 1–75 (1904).

ABITIBI, ăb'ĭ-tĭb'ĭ. A Canadian river and lake. The river flows northward to James Bay in Hudson Bay, and is the outlet of the lake which is situated in lat. 48° 24′ N. at an elevation of 830 feet, with a Hudson Bay Co. trading station of the same name upon its shores.

ABJURATION (Lat. *ab-jurare*, to deny upon oath, to forswear). The act of dissolving by an oath the allegiance due to a temporal or spiritual ruler. It is in this sense that the term is employed in the Oath of Abjuration by which in England all subjects bound themselves not to acknowledge any right in the Pretender to the crown. To abjure the realm is to renounce one's citizenship and go into voluntary exile. Formerly in England any felon who had taken sanctuary (q.v.), except those guilty of treason or sacrilege, might claim immunity by abjuring the realm. This privilege was abolished by Act of Parliament in the first year of James I (1603). In the United States an alien applying for citizenship is required under oath "to renounce and abjure all allegiance and fidelity which he owes to any foreign prince." See Oath.

ABKHASIA, åb-kä'sē-å, or **ABASIA.** A district of European Russia in the government of Kutais, Trans-Caucasia. It comprises the southern slope of the Caucasus Mountains extending to the Black Sea, in lat. 44° 15′ N. It derives its name from the Abkhasians. Its mountainous surface is covered with rich woods of oak, walnut, etc. Area coincident with that of the military district of Sukhum, 2545 square miles; pop. (1911), 136,500. Its population, mainly Mingrelians and Abkhasians, is engaged in agriculture, cattle-raising, and trade in lumber. The soil is fertile, and grain and fruit are grown. After the Emperor Justinian introduced the Christian religion, Persia, Georgia, and Turkey ruled in succession, the latter suppressing Christianity and establishing Moslemism. The Russians began to establish themselves after the Treaty of Adrianople in 1829, but the conquest was not completed till 1864. The chief town in this region is Sukhum Kale. The people speak a Circassian dialect, and are physically akin to that stock, although typically ruder and less graceful. Their folk-life is also more primitive. As a result of the Russian occupation, 20,000 natives emigrated into Turkish territory. See Circassians.

AB'LATIVE CASE. A form of grammatical inflection, found in many Indo-European languages, expressing ablative relations which are usually denoted in English by means of the prepositions *in, with, by, from,* etc.

ABLAUT, ăb'lout; *Ger. pron.* äp'lout, or Vowel Gradation. The name given by German scholars, and in common use in English, to a change in the root vowel in different forms of the same word. It appears throughout the Indo-Germanic languages, and is frequent in nouns, although it is most obvious in the so-called "strong verbs" of the Germanic group (e.g., *sing, sang, sung*). It is divided into quantitative (varying between vowels of different length) and qualitative (as between *e* and *o*). Both forms depend originally on accent, as Sanskrit *sētu*, 'binding,' but *sitá*, 'bound.' or Greek *πατήρ*, 'father,' but *εὐπάτωρ*, 'of noble descent.' The full application of ablaut has conclusively shown the existence of dissyllabic and even trisyllabic roots in Indo-Germanic. Consult: Hirt, *Der indo-germanische Ablaut* (Strassburg, 1900); Wood, *Indo-European ax; aiw; aux* (ib., 1905). See Phonetic Laws.

AB'LEGATE (Lat. *ab*, away, from, off + *legare*, to send with a commission). A papal envoy or emissary, a special commissioner, deputed by the papal court at Rome to carry the hat and red biretta to a newly appointed cardinal. His official duties are completed when the latter has received the insignia of his office. The

so-called *apostolic* ablegates are of higher rank than those termed *pontifical*.

ABLU'TION. See PURIFICATION.

ABNAKI, ăb-nä'kê ('Easterners'). A confederacy of Algonquian tribes, including the Passamaquoddies, Penobscots, Norridgewocks, and others, formerly occupying what is now Maine and southern New Brunswick. On the northeast their territory adjoined that of the Micmacs, while on the southwest it merged into that of the Pennacooks. In consequence of King Philip's War (see WAMPANOAG), they attached themselves to the French side and maintained unceasing hostility against the encroachment of the English, until the destruction of their principal town at Norridgewock and the killing of their missionary Rasle in 1724, after which the greater portion removed to Saint Francis, Canada, whither other refugees from the New England tribes had already preceded them. Those who remained afterward entered into an arrangement with the English by which they were confirmed in possession of a small part of their ancient inheritance. They are now represented by the Malecites on Saint John River, New Brunswick, and Quebec, the Passamaquoddies on the bay of that name in Maine, the Penobscots at Oldtown, Maine, and the Abnakis at Saint Francis and Bécancour, Quebec. Their language is preserved in the monumental dictionary of Rasle.

ABNER (Heb. 'Father of light'). The son of Ner, and cousin of Saul, and commander of his army (1 Sam. xiv. 50). After Saul's death the tribe of Judah recognized David, while Abner prevailed upon the other tribes to recognize Saul's son, Ishbaal (2 Sam. ii. 8–11). (See ISHBOSHETH.) David sent his army, under Joab, into the field, and at the pool of Gibeon they met. Abner resorted to a ruse to terrify Joab's men. He proposed an athletic contest for amusement between twelve of his men and twelve of Joab's. The former were Benjaminites and probably, like Ehud, left-handed so that they could conceal a short sword on their right side. The result was that by a trick the Judæans were all slain. The indignant army of Joab then fell upon Abner's host and inflicted upon it a crushing defeat (ib., verses 12–16). In his flight Abner, being hotly pursued by Asahel, turned and reluctantly slew him (ib., verses 19–23). Afterward Abner had a quarrel with Ishbaal and went over to David (2 Sam. iii. 7–11, 17–21); but the death of Asahel produced a blood feud between Joab (Asahel's brother) and Abner, which ultimately led to Abner's death. In consequence of a quarrel between Abner and his master, Ishbaal, who accused him of having designs upon the throne, Abner espoused David's cause. While being hospitably entertained by David at Hebron, Abner was treacherously killed by Joab with the connivance of his brother Abishai (2 Sam. iii. 22–27). The murder called forth general indignation, and the King himself acted as chief mourner. He ordered a public mourning, and an elegy is preserved (2 Sam. iii. 33–34), composed by David in memory of Abner, which reads:

> "Has Abner died as Nabal died?
> Thy hands are not in fetters bound,
> Thy feet are not in brazen chains;
> Through sons of violence thou hast fallen!"

The plural, vouched for by the Greek version, was purposely used. David probably knew that Joab had murdered his guest, but it was not politic to point to his great general as the assassin. See Batten in *Zeitschrift für die alttestamentliche Wissenschaft* (1906, pp. 90 ff.) and N. Schmidt, *The Messages of the Poets* (1911, pp. 367 ff.).

AB'NEY, Sir WILLIAM DE WIVELESLIE (1843–1920). An English astronomer and physicist. He was born at Derby, educated at the Royal Military Academy, Woolwich, became a lieutenant in the Royal Engineers in 1861 and a captain in 1871. He was president of the Royal Astronomical Society, 1893–95, and president of the Physical Society of London, 1895–97. He became adviser to the Science and Art Department of the Board of Education in 1903, having been principal assistant secretary since 1899. In the same year he became a member of the Advisory Council for Education to the War Office. He is well known for his researches in photography and spectroscopy, and has published a number of important books on these subjects, including *Instruction in Photography* (1870); *Treatise on Photography* (1875); *Colour Vision, Colour Measurement and Mixture* (1893); *The Pioneers of the Alps,* with C. D. Cunningham (1888). He was knighted in 1900.

ABNORMAL PSYCHOLOGY. See MENTAL PATHOLOGY; PSYCHOLOGY.

ÅBO, ô'boo *or* ą'boo. The most ancient city and former capital of Finland, now the chief town of the Russian government of Åbo-Björneborg, situated on the river Aurayoki, near its embouchure in the Gulf of Bothnia, 128 miles west by north from Helsingfors, and nearly 400 miles by rail from St. Petersburg (Map: Russia, B 2). Its streets are broad and lined with rather low stone buildings. Owing to its antiquity, Åbo has a number of buildings of historical interest, among them the cathedral, which is dedicated to St. Henry, the patron saint of Finland. It contains a magnificent sarcophagus erected in 1865 for the unfortunate Queen, Catharine Monsdotter, who died in 1512. In one of the suburbs is the spring of St. Henry, in which, according to tradition, the first Finns embracing Christianity were baptized. It is in regular steamship communication with St. Petersburg, Copenhagen, Stockholm, and other ports on the Baltic. As its harbor does not admit vessels of more than 10 feet draught, large ships dock at Bornholm, which is visited annually by some 700 vessels, whose aggregate tonnage reaches about 200,000 tons. Shipbuilding is an important industry, many Russian warships having been constructed in this city. The great Crayton works supply the Russian fleet with torpedo boats. It has a number of cotton mills, tobacco factories, sugar refineries, and machine shops, and exports lumber and dairy products. Of its educational institutions, the School of Navigation and the School for Deaf Mutes deserve special attention. In addition to these it has a number of gymnasiums, a technical institute, a commercial school, and a normal training school. The United States is represented by a consular agent. Pop., 1897, 34,964; 1910, 49,691. The inhabitants are largely Finns and Swedes, the former predominating. The town grew up around a castle (which is still in existence and is used as a prison at present) founded in 1156 by Eric IX, and became an important place in the following century. It was repeatedly attacked and destroyed by the Rus-

sians in their many wars with the Swedes and finally fell into their hands in 1808; since then it has remained a Russian possession. It was the capital of Finland until 1819. In the year 1827 a great part of the town, including the university buildings, was destroyed by fire, and the university was removed to Helsingfors, now the capital. The Peace of Åbo (1743), between Sweden and Russia, gave Russia control of the southern part of Finland as far as the Kymen River and put an end to the war commenced by Sweden, under French instigation, in 1741.

ÅBO-BJÖRNEBORG, ō'boo- *or* ą'boo-byĕr'-nē-bôrg. A government in southwest Finland. Area, 9333 square miles. Its topography is like that of the rest of Finland. Interspersed among the granitic ridges are many lakes and marshes. The southern section is more hilly than the northern, and along the seashore has many safe havens for sea-going vessels. Except the Kumo, Åbo-Björneborg has no navigable rivers. It has a temperate and healthful climate, and the principal industries are agriculture, cattle-raising, and fishing. There is a flourishing mining industry, the chief products being granite, black marble, iron, and clay. Åbo-Björneborg is, moreover, the foremost manufacturing province of Finland, the chief branches of industry being wood and metal working, distilling, brewing, and the manufacture of sugar, leather, paper, and tobacco. Pop., 1897, 425,026; 1904, 470,077; 1910, 499,332. About one-fifth are Swedes.

AB'OLI'TIONISTS (Lat. *abolitio*, an annulling, from *abolere*, to check the growth). The term used in the United States, after 1835 and until the Civil War, for those opponents of slavery who were the most intense in their desire to secure the immediate emancipation of the blacks. Others avowed their "anti-slavery" opinions, but these advocated, by all the means they could command, immediate "abolition." Their position was weakened, and their reputation for sobriety was damaged, by their steadfast refusal to recognize the binding force of any human laws which recognized human slavery, and even of the constitution; and their extreme demands and radical methods repelled the sympathy of many conservative men who desired that the abolition of slavery should be secured by expedient and legal means. Although discredited in many quarters, the abolitionists were in the end successful, from one point of view, in making slavery a national issue and in hastening the time of final decision as to its continuance. Among the most conspicuous leaders of the abolitionists were William Lloyd Garrison, a vigorous and fearless writer, Wendell Phillips, Gerrit Smith, a generous philanthropist, Theodore Parker, Arthur Tappan, William Goodell, and Lucretia Mott. The lives of most of these leaders have been written. Consult Garrison, *William Lloyd Garrison* (New York, 1885–89) and Hume, *The Abolitionists* (New York, 1905); Herbert, *Abolition Crusade and Its Consequences* (New York, 1912). See ANTI-SLAVERY SOCIETY; GARRISON, WILLIAM LLOYD; GIDDINGS, JOSHUA R.; and PARKER, THEODORE.

ABOLITION OF SLAVERY. See SLAVERY.

ABO'MA (Portug.). A boa. The term is widespread in tropical America, but lately has been more especially applied to the Central American thick-headed rainbow or singed boa (*Epicrates oenchris*), which is of great size and is dark yellowish-gray, having a row of dark brown rings along the back, and the sides marked with dark blotches, each inclosing a lighter crescent. In the sunlight the pattern disappears under a blaze of peacock green, merging into red and violet, the scales fairly glowing with iridescence. See BOA and Plate of BOAS.

ABOMEY, ä'bō-mā'. A former capital of the kingdom of Dahomey, West Africa, situated about 60 miles inland, in 7° N. lat. and 2° 4′ E. long. It is situated in a plateau and is surrounded by a wall built of mud and thorns, and a deep trench. The houses, also built of mud, are unpretentious in appearance. There are several royal palaces, once the scenes of religious rites and barbaric orgies. Before the French occupation Abomey was an important slave market, but at present the traffic is confined to ivory, palm oil, and gold. The town was captured by the French in 1892. Pop., 10,732.

ABORIGINES, ăb'ō-rĭj'ĭ-nēz. Properly, the earliest inhabitants of a country. The Roman and Greek historians, however, apply the name to a mythical people, brought by story in connection with Latinus, Evander and Æneas (q.v.). According to tradition, they had their original seats in the mountains about Reate, now Rieti; later they descended into Latium, and subdued or expelled the Siculi (according to another story, they combined with the Siculi) and occupied the country. The Aborigines then disappeared as a distinct people, they and their subjects (or allies) having taken the name of the Latini. The Romans derived the name from *ab*, from + *origo*, origin, and so used the name *aborigines* as exactly equivalent to the Greek *Autochthones* (q.v.). This etymology, however, modern scholars will not accept; it has been recently suggested that *Aborigines* is a mutilated form of the true name of this early people.

ABOR'TION (Lat. *abortio*, from *ab*, away + *oriri*, to rise). The expulsion of the offspring from the womb of its mother before it is capable of living independently. Abortion occurring in a woman before the sixth month of pregnancy is generally called a miscarriage. If the fœtus leaves the womb after it is viable and before the proper end of pregnancy, the occurrence is termed a premature delivery. Hegar considers that there is, in women, one abortion to every 10 normal pregnancies; Devilliers states the ratio as one in three or four. Whitehead states that 80 per cent of all abortions take place between the second and fourth months of pregnancy. It is therefore important that a mother should have special care during the early months of gestation. Microscopical examination is required to determine the fact of an abortion occurring within four weeks of conception. After the first month the fœtus commences to assume a recognizable shape.

Causes of Abortion. Abortion may be due to disease of the father, to morbid changes in the ovum, to morbid changes in the placenta, or to maternal causes. 1. Of the diseases of the father that may cause abortion, syphilis is the most important. Habitual abortion leads to the suspicion of syphilitic taint, although other causes may bring about this condition. Old age, tuberculosis, or kidney disease of the father may so affect the vitality of the germ at

conception that, although pregnancy may occur, there is not enough strength to complete the development. 2. Causes due to disease or death of the ovum itself, apart from other causes, are rare. They are usually associated with some defect in the formation of the young embryo. 3. Placental causes are frequent. If the placenta does not have a sufficient area from which to draw a blood supply for the fœtus, the latter may die; or if the placenta is fastened low in the uterus, hemorrhage and abortion are very liable to occur. 4. The causes which are due to disease or injury of the mother are the most frequent. Diseases of the decidua of the uterus and of the other generative organs, such as tumor of the ovary, distention of the Fallopian tubes, inflammatory adhesions about the uterus, and badly formed pelvic organs, are among the local causes. Certain constitutional diseases may also cause abortion, as syphilis. Alcoholic excesses are almost as pernicious. Poisoning with metals, as lead or mercury, with phosphorus and other poisons, as coal gas and many volatile oils, and some of the acute diseases, pneumonia, yellow fever, smallpox, and peritonitis, have brought about abortion. Shock and injury are very important causes. Excessive muscular fatigue, bicycle riding, horseback riding, lawn tennis, use of the sewing-machine, and swimming are especially to be avoided. Lack of hygiene is also responsible for numerous cases. Insufficient food, contaminated air, change in climate, and tightly laced corsets, all interfere with the proper nourishment of the fœtus and thus induce abortion. After abortion has once taken place, others are very likely to occur, even in comparatively healthy women. A normal healthy mental attitude is a saving grace from this accident.

Symptoms. The cardinal symptoms are pain and hemorrhage from the uterus, these varying greatly, according to the completeness of the process. Early symptoms may be a sensation of weight, with distress or slight pain in the back, increased by standing or walking, followed by oozing or a menstrual flow, or a sudden large hemorrhage. This may occur intermittently, sometimes lasting several days, with small discharges of blood, with pain, and then a cessation of all the symptoms for a few hours or more. In later abortions, the *liquor amnii*, in which the fœtus is suspended, may either ooze away or come away in a gush.

The pain is rarely continuous; at times it resembles the intermittent pains of a colicky diarrhœa. It is caused by the contraction of the uterine muscle trying to eject a foreign body. With each muscular contraction there is oozing, or more copious bleeding, or the expulsion of the product of conception. If the pains are comparatively weak and occur at long intervals, it may be possible to prevent the abortion. If they are strong and come closely one after the other, the chances of stopping the process are less.

Treatment. Healthy physical and mental exercise is one of the best preventives of this accident. In families where the mother or grandmother aborted frequently, special care of diet, exercise, and clothing should be taken. Constipation should be avoided by the use of water and the green vegetables. Should the symptoms mentioned occur, the woman should lie down, absolutely quiet, on her back and call her regular medical attendant.

There are occasional cases (as where the outlet of the pelvis is very contracted) in which it is necessary for physicians to induce abortion. It cannot be too generally known that all attempts at procuring criminal abortion, either by the administration of powerful drugs or the application of instruments, are accompanied with extreme danger to the pregnant woman. It cannot be too earnestly impressed upon the mind of those who are tempted to procure a criminal abortion by means of drugs that the danger of causing death is very serious. Many so-called emmenagogues (q.v.), which induce the menstrual flow in a woman who is not pregnant, but is merely suffering from amenorrhœa, or suppression of the menses, are abortifacients only when given in such doses as to endanger life, or to set up violent internal inflammations. Among these are the various preparations of ergot of rye (q.v.), savin (the most powerful of all emmenagogues), borax, rue, tansy, cantharides, etc. In the South, among the ignorant negroes, concoctions of pennyroyal and cotton-root bark are used for the same purpose. The milder emmenagogues, such as iron, aloes, etc., have no abortive tendency, except in the case of those women who are predisposed to abort. Violent purgatives, in cases where they have caused abortion, have not done so because they directly exercise an ecbolic effect on the uterus, but only as a secondary consequence of the excessive intestinal irritation which they cause.

Abortion, in Law. The criminal act of causing the premature bringing forth of the human fœtus. Under modern statutes the crime may be committed at any stage of the development of the fœtus, but it would seem that by the common law of England the act of relieving the pregnant woman of the fœtus before it had given any signs of life was not a criminal offense if done with her consent; if committed without her consent, it was punishable only as an assault. In this country divergent views have been held by the courts. In a number of States there are decisions or dicta to the effect that "to produce an abortion on a woman, before she is quick with child, and with her consent," is not to commit the common-law crime of abortion. On the other hand, it has been judicially declared in Pennsylvania that "it is not the murder of a living child which constitutes the offense of abortion, but the destruction of gestation by wicked means and against nature," and, consequently, that one who intentionally causes the miscarriage of a woman, even with her consent and before the fœtus has quickened, is indictable at common law. At present the crime is generally defined, with much particularity, by statute, and may be committed by one of three classes of persons. First, by the pregnant woman who takes any drugs or submits to any treatment with intent to produce her miscarriage, unless that is necessary to save her life or the life of the child. Second, by a person prescribing, supplying or administering any substance to a woman, or treating her, with intent to cause her miscarriage, unless that is necessary to save her life or the life of the child. Under some statutes, such a person may be guilty of the offense, whether the woman is pregnant or not, or whether the fœtus is alive or not, or even whether the attempt to procure miscarriage succeeds or not; the gist of the crime consisting in the intention with which the act was done. Third, by a person manufacturing, giving, or selling an instrument or substance with intent that

it may be unlawfully used in procuring the miscarriage of a woman. Acts done in procuring an abortion may subject the wrongdoer to punishment for another crime also, as assault (q.v.), or homicide (q.v.). Consult: Wharton, *Criminal Law* (San Francisco, 1912); Clark and Marshall, *Treatise on the Law of Crimes* (St. Paul, 1905).

Abortion in Animals. See CONTAGIOUS ABORTION.

Abortion in Plants. That kind of arrest in development by which an organ appears in its early stages, but fails to develop to its normal form or size. For example, in many flowers certain stamens are aborted, their primordia having appeared, but having failed to develop into functioning stamens. The abortion may be of any degree between the first appearance of the organ and its complete maturity. A very closely related term is "suppression," in which not even the beginning of an expected organ appears. The phenomenon is chiefly observable in connection with the flower (q.v.).

ABORTION, CONTAGIOUS. See CONTAGIOUS ABORTION.

ABOU BEN ADHEM (ä'bo͞o bĕn ăd'hĕm) **AND THE ANGEL.** A short narrative poem by Leigh Hunt, the significance of which appears in the line,

"Write me as one that loves his fellow men."

ABOUKIR, ä'bo͞o-kēr'. See ABUKIR.

ABOULIA, â-bo͞o'lī-â. See under INSANITY.

ABOUT'. See TACKING.

ABOUT, â'bo͞o', EDMOND FRANÇOIS (1828–85). A brilliant, witty, but uneven French journalist, novelist, and writer of social and political essays. He was born at Dieuze, completed his studies in Paris with Francisque Sarcey, won honors, and was sent in 1851 to the French School at Athens, where he studied little, but observed much in a desultory way. The literary result of his two years' stay in Greece is *La Grèce contemporaine* (1854), and *Le roi des montagnes* (1856), both full of humor and irony. They were popular, often translated, and had influence on what passed for political thought. In 1855 he published *Tolla*, a story of Italy, borrowed in part, and without due acknowledgment, from an Italian novel, *Vittoria Savorelli* (1841). In 1856 he essayed the stage without success, but won popularity by short stories collected under the titles *Les mariages de Paris* (1856) and *Les mariages de province* (1868). His most popular stories are *Trente et quarante* (1858), *L'homme à l'oreille cassée* (1861), and *Le nez du notaire* (1861), often translated. More serious novels are *Madelon* (1863), *L'infâme* (1867), and *Le Roman d'un brave homme* (1880). He had a gift of facile narration, but he did not take his talent seriously and ceased writing fiction with the fall of the Second Empire, of which he was a spoiled child. To politics during these years he had contributed *La question romaine* (1859), *Rome contemporaine* (1861), *La Prusse en 1860*, *La nouvelle carte de l'Europe* (1860), and *Le progrès* (1864). After the fall of the Empire he became editor of *Le XIX Siècle*, and published a bitter book on Alsace (1872). He was made an academician in 1884, but died before his admission. The general characteristics of his work are a kindly humor, a keen irony, a cleanly taste, and a rather shallow skepticism. Consult Wells, *A Century of French Fiction*, s.v. About.

ABOVILLE, â'bô'vêl'y' *or* â'bô'vêl', FRANÇOIS MARIE (1730–1817). A French general of artillery and peer of France. He was born at Brest. During the war of the American Revolution he commanded Rochambeau's artillery at Yorktown (1781). In 1792 he commanded the armies of the North and of Ardennes, and in 1809 was appointed Governor of Brest.

ABOX'. See BOX HAULING.

A'BRA. 1. A character in Prior's poem "Solomon on the Vanity of the World." She appears in the second part of the poem as an obedient concubine of the King and finally captivates him. 2. A character in the mediæval romance of "Amadis of Greece." She is a sister of the Sultan of Babylon and secures his throne after he is killed by her lover, Lisnarte.

ABRABANEL, â-brä'bä-nĕl', **ABARBANEL,** â-bär'bâ-nĕl', or **ABRAVANEL,** â-brä'vâ-nĕl', ISAAC BEN JEHUDA (1437–1508). A Jewish scholar and statesman. He was born in Lisbon and claimed descent from King David. He was treasurer of Alfonso V, but after that King's death was banished from Portugal and his property confiscated. In Spain he made a fortune as a merchant, and was in high favor with Ferdinand and Isabella in 1487; but the decree of 1492 banished all Jews from Spain, and Abrabanel fled to Naples, where he found royal favor, but was again obliged to fly when Naples surrendered to the French in 1495. He settled last at Venice. He was one of the ablest men of his time and was learned in biblical exegesis and philosophy. He presented the Jewish doctrine of the Messiah in *Sources of Salvation* (1496), *Salvation of his Anointed* (1497), and *Proclaiming Salvation* (1498).

AB'RACADAB'RA. A magical term, according to some authorities derived from Abraxas (q.v.), but more probably mere jargon. It was supposed efficacious against various ailments. The earliest mention of the term is in a poem "Precepta de Medicina," by Q. Serenus Scammonicus, a Gnostic physician of the second century, who considered it efficacious against fevers and agues. The word had to be written in a manner similar to the diagram, then folded in the form of a cross, worn as an amulet for nine days, and finally thrown backward before sunrise into a stream flowing eastward. The use of this formula spread throughout the Empire and was handed down through the Middle Ages. A comparatively modern manuscript in the British Museum relates that a Mr. Banester, by the use of abracadabra, cured over two hundred cases of ague in a year. The term is also applied to any word charm or magical jingle. See ABRAXAS; AMULET; TALISMAN.

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ABRADA'TAS. A King of Susa, who at first fought against Cyrus the Great, but who afterward, in consequence of the latter's kindness to Panthea, his wife, when she had been captured by the Persians, yielded to Cyrus and became his ally. Abradatas perished in the war against Crœsus the Lydian. The story of his romantic affection for Panthea and her suicide after his death is told in the fifth book of Xenophon's *Cyropædia*.

A'BRAHAM. The patriarch whose story is given in Gen. xi–xxv. It consists of a series of incidents in his life, put together in a consecu-

tive narrative and emanating from different literary sources. In Gen. xi. 10 the genealogy of the Semites (or sons of Shem) is given, leading up to Terah, the father of Abram, Nahor, and Haran. The home of Terah and his sons is Ur of the Chaldees—a place commonly identified with the site of the mound Mukayyar, in southern Babylonia—but after the death of Haran the Terahites journey northward to Haran and take up their settlements at that place. Terah dies in Haran, and Abram, accompanied by his wife Sarai and his nephew Lot (the son of Haran), quits Babylonia by divine command and proceeds by a circuitous northern route via Damascus to Canaan. He halts at various places, notably Shechem and Bethel, where he erects altars to Yahweh (chap. xii). Leading a pastoral life, we next find him in Egypt, whither he has been driven in consequence of a famine in Palestine. Sarai's beauty attracts the attention of Pharaoh, and but for Yahwe's intervention Abram would have been obliged to give up his wife, whom he had represented to be his sister. Pharaoh obliges Abram to leave Egypt, and he accordingly returns to Bethel with Lot. At this juncture the separation between Abram and Lot takes place in consequence of quarrels between the followers of the two chiefs. Lot chooses for himself the rich pasture-land of the Jordan valley, while Abram remains in Canaan proper, though removing to Hebron. He pursues Chedorlaomer (q.v.) and the kings who were with him in the raid they had made on Palestine as far as Dan, near the sources of the Jordan, and rescues Lot, who had been taken captive. He not only succeeds in this enterprise, but aids in restoring the kings of Sodom and Gomorrah to power, and magnanimously refuses any compensation for his services (chap. xiv). At the time that Abram left Haran he was 75 years old. At Damascus he had been joined by Eliezer, who became his trusted servant, and on whom the succession to Abram's property would fall in the event of Abram remaining childless. This contingency is eliminated by the birth of Ishmael, a son by Hagar, a concubine of Abram, and an Egyptian maid-servant of Sarai. Subsequently, however, when Abram is 99 years old and Sarai 90, a son, who is called Isaac, is born to them (chap. xvii). He becomes the heir of Abram in preference to Ishmael. At the time that this son is promised to Abram and Sarai, through the appearance of Yahwe himself to Abram, the names of the patriarch and his wife are changed by the Lord to Abraham and Sarah, respectively, the former being interpreted as embodying the promise that the patriarch shall become "the father of a multitude of nations." The promise of a son to be born to Sarah is confirmed by a visit of Yahwe accompanied by two angels, all three in human form, who partake of Abraham's hospitality and make a similar announcement. The two angels proceed to Sodom and Gomorrah, while Yahwe remains behind and reveals to Abraham the intended destruction of the cities of the plain because of the wickedness and corruption prevailing there. Abraham pleads with Yahwe to save the cities for the sake of the righteous, and Yahwe agrees to do so provided only ten righteous men are found in the district. As a matter of fact, the cities are destroyed, and only Lot and his family are permitted to escape (chap. xvii), though his wife is turned into a pillar of salt because of her disobedience.

Before Isaac is actually born, Abraham is represented as proceeding to the extreme south of Palestine, known as the *Negeb*, and at Gerar encounters Abimelech. This King takes into his harem Sarah, whom Abraham again passes off as his sister. But Yahwe warns Abimelech, and Sarah is released (chap. xx). The birth of the promised son, who is called Isaac, is then related (chap. xxi). Eight days after his birth he is circumcised—an act which is regarded as symbolizing the covenant established between Yahwe and those descended from Abraham (Gen. xvii. 23–27). Some years later the faith of Abraham is put to a severe trial by the divine command to sacrifice his beloved son (chap. xxii). Abraham proceeds to carry out the decree, but is withheld from doing so by Yahwe himself, who, satisfied with the test, accepts a ram which providentially makes its appearance. The last three chapters of the narrative are taken up with the account of Sarah's death, her burial in the cave of Machpelah at Hebron, purchased by Abraham from Ephron the Hittite, the marriage of Isaac and Rebekah, and the death of Abraham, which, however, does not take place until his marriage to Keturah, by whom two sons are born to him. The death of Abraham takes place when he has reached the age of 175 years, and he is interred by the side of Sarah at Machpelah.

Many modern Bible critics regard this cycle of Abrahamic stories as embodying a mixture of early and late traditions, a recast with a view of presenting Abraham as a type of the pious worshiper of Yahwe. Besides the biblical stories, other tales were current, or became current among the Jews of post-exile days, many of which were taken up into that portion of rabbinical literature known as the Midrash. In this way the biblical narrative was supplemented by incidents in the early career of Abraham, on which Genesis has nothing to say. These stories bring Abraham into association with Nimrod. The historical kernel in the Genesis chapters is regarded by these critics as quite insignificant. The genealogical lists seem to them fictitious, the names representing in most cases not individuals but clans, of whom some faint traditions have survived. The name of Abram, however, or Abraham (a dialectical variation), is not that of an eponymous hero, there being no reference to any "Abramites." It is therefore considered to be either the name of a god (*ab ram*, 'exalted Father'), or of the mythical ancestor of a number of tribes, or of an historical personage concerning whom little else can be affirmed with certainty. The home of this figure seems to be in Hebron. If, as many scholars think, Gen. xiv is in part at least drawn from an old cuneiform source, the episode with which Abram's name is connected would fall in the reign of Hammurapi, c.2124–2081 B.C. (see AMRAPHEL). The wanderings of the Terahites, among whom Abram is reckoned, reflect the faint recollection of the origin of the Hebrews, or of some of the clans who subsequently formed part of the coalition known as Hebrews. The story of the wanderings of the Terahites along the Euphrates and thence into Palestine is typical of the manner in which nomadic bands in the early and the late days of Babylonian history proceeded from the Arabian desert and, attracted by Babylonian culture, skirted the western borders of the country; some making more or less permanent

settlements, while others passed on to the north. A significant passage in Deuteronomy (xxvi. 5) designates the ancestors of the Hebrews as "Nomadic Aramæans." Aram here is a designation for Mesopotamia, and the chief value of the story of Abraham's wanderings lies accordingly in thus preserving a picture of conditions prevailing at the earliest period of which any recollection survived among the people.

Bibliography. For the rabbinical legends and traditions about Abraham, consult: Beer, "Das Leben Abrahams" in *Lebensgemälden biblischer Personen nach Auffassung der jüdischen Sage* (Leipzig, 1859); Grünbaum, *Neue Beiträge zur semitischen Sagenkunde* (Leipzig, 1893), which also contains the Mohammedan legends about Abraham. For archæological aspects, see Tomkins's *Studies on the Times of Abraham* (London, 1878); Procksch, *Das nordhebräische Sagenbuch* (1906); Wilke, *War Abraham eine historische Persönlichkei* (1907); Dhorme, in *Revue Biblique* (1908); Winckler, *Abraham als Babylonier, Joseph als Aegypter* (1903); Nöldeke, in *Im neuen Reich* (1871, 508 pp.); Ed. Meyer, *Die Israeliten und ihre Nachbarstämme* (1906); Gunkel, art. "Abraham," in *Die Religion in Geschichte und Gegenwart* (1909), as well as the histories of the Hebrews by Stade, Kittel, Guthe, Piepenbring; and the commentaries on Genesis by Gunkel, Dillmann, Delitzsch, Strack, Holzinger, Skinner, and Driver.

ABRAHAM, PHINEAS S. A celebrated English pathologist and dermatologist. He was born in Falmouth, Jamaica, and received his education at University College, London, and the Royal College of Science and Trinity College, Dublin. At all these institutions he received high honors. With the degrees of chemical and mining engineer, on the conclusion of his collegiate education, he entered St. Bartholomew's Hospital, London, in 1876. He also studied medicine at the Ecole de Medicine, Paris, and at Clausthal, Germany. In 1879 he was appointed curator of the museums of the Royal College of Surgeons in Dublin and was subsequently elected a member of the Court of Examiners. He was lecturer on physiology and histology at the Westminster Hospital Medical School in 1885 and in 1889 became medical secretary of the National Leprosy Fund. In 1897 he represented the United Kingdom at the International Leper Conference at Berlin. He was one of the founders of the Royal Academy of Medicine of Ireland and of the Dermatological Society of Great Britain and Ireland. Among other important official positions he was chosen to be surgeon-in-charge of the skin department at the West London Hospital, lecturer on dermatology at the West London Post-Graduate College, and, in 1910–11, president of the West London Medico-Chirurgical Society. He became known as one of the most eminent authorities of his day on diseases of the skin. His published writings include *The Journal of the Leprosy Investigation Committee; Skin Affections in Syphilis;* articles on leprosy and other diseases of the skin in Allbutt's *System of Medicine,* and many papers on pathological and dermatological subjects in the transactions of medical societies.

ABRAHAM A SANTA CLARA, ä'brâ-häm ä sänk'tä *or* ä'brâ-häm (1644–1709). A popular German preacher and writer, whose real name was Ulrich Megerle. He was provincial prior of the Augustinians and court preacher at Vienna. Uncouth puns, coarse expressions, an original and genuine humor marked his numerous and successful sermons and other religious works. He lashed the follies of all classes of society and in particular exposed the vices of courtiers and court life. He was an honest, faithful, and devoted priest, as was proved, among other things, by his self-sacrificing conduct during the plague in 1679. His collected works aggregate 21 vols. (1835–54). Of these the best known is *Judas der Erzschelm* (1686–95) in 4 vols.

ABRAHAMITES, ā'brâ-häm-īts, or **BOHEMIAN DEISTS.** The name under which a number of Bohemians, trusting to the edict of toleration issued by Joseph II, avowed themselves (1782) as believers of the doctrine alleged to have been held by Abraham before his circumcision. As early as the ninth century a sect of the same name had arisen in Syria and had denied the divinity of Christ. But the Bohemian deists professed to be followers of John Huss, though they held no Christian doctrine beyond that of the unity of God and accepted nothing of the Bible save the Ten Commandments and the Lord's Prayer. As they would join neither Jewish nor Christian sects, the Emperor refused to tolerate them and in 1783 expelled them from their native land and scattered them in various parts of Hungary, Transylvania, and Slavonia, where many were made converts to the Roman Catholic church, while others died clinging to their simple creed.

A'BRAHAM-MEN'. A class of sturdy beggars in England who feigned lunacy and wandered about the country in a disorderly manner. They were common in Shakespeare's time and, it would seem, existed even as late as the period of the Civil Wars. The term is used rather loosely. "An Abram cove," as Decker, in his *English Villanies,* calls one of those mendicants, meant one who personated a "Tom o' Bedlam." He would "disguise himself in grotesque rags, with knotted hair, long staff, and with many more disgusting contrivances to excite pity," but did not hesitate to live by thieving, too; when detected in pilfering or in any species of depredation, he pleaded the immunities of a Bedlamite. This word originally connoted an inmate of the lunacy ward of Bethlehem Hospital, London, under the patronage of the patriarch Abraham. Wearing a badge for identification, such a person when discharged was formally permitted to roam about the country and solicit alms. Many mendicants took wrongful advantage of this privilege and preyed upon the charitable. The meaning of this term is still preserved in the slang phrase "to sham Abraham."

ABRAHAM, PLAINS OF. A part of the elevated plateau on which stands the city of Quebec, and practically forming the west and southwest boundary of the city. It took its name from a St. Lawrence pilot. It was the scene of the battle on September 13, 1759, in which the English, under Gen. James Wolfe, defeated the French under Marquis de Montcalm, thereby bringing about the capitulation of the city on September 18, and the transfer to Britain of French sovereignty in North America. Both Wolfe and Montcalm were killed in the battle. A monument 40 feet high, erected in 1849, marks the spot where Wolfe expired. Not far distant a monument 60 feet high was erected in 1828 to the memory of Wolfe and Montcalm. In 1908 the jail and rifle factory which stood on the

Plains were removed and the battleground was made a public park. For details of the battle and the surrender of Quebec, see WOLFE, JAMES.

A'BRAHAM'S BOS'OM. A term used to designate the abode of bliss of the blessed, not only among Jews but among Christians. Lazarus reclining in Abraham's bosom was a figurative expression. In Byzantine and mediæval art the souls of the blessed are represented as being taken into Abraham's bosom in the form of little children. Abraham is the central figure in the fore-court of heaven.

ABRAHAMS, ISRAEL (1858—). An English (Jewish) author and lecturer, born in London and educated at Jews' College, London, and the University of London. For a time he was senior tutor at Jews' College, and was then appointed reader in Talmudic and Rabbinic Literature in Cambridge University. He was president of the Jewish Historical Society of England in 1905, and was first president of the Union of Jewish Literary Societies. In 1907 he was honorary president of the University of Glasgow Theological Society. Throughout a period of 19 years (1889–1908), he edited the *Jewish Quarterly Review*. His published writings include *Aspects of Judaism* (1895); *Jewish Life in the Middle Ages* (1896); *Chapters on Jewish Literature* (1899); *Maimonides* (1903); *Festival Studies* (1905); *A Short History of Jewish Literature* (1906); *Judaism* (1907); *Rabbinic Aids to Exegesis* (1910); *The Book of Delight, and Other Papers* (1912). He contributed to Jewish periodicals and became widely known as a lecturer on Jewish subjects.

A'BRAHAM THE JEW AND THE MERCHANT THE'ODORE. A mediæval tale of the conversion of a Jewish money-lender, after occurrences in which figures prominently the miracle-working power of the great image of Christ in the copper market at Constantinople. Theodore, in financial straits, twice borrows money of Abraham on the security of his oath before the statue, and only after repeated losses does he find, while on a foreign shore, means to repay the loan. For lack of other mode of transmission the merchant trusts his box of money to the sea. It is carried by the waves safely home to the Jew, who denies, however, after the return of Theodore, that he has received it. The Christian's prayer before the image, where he has brought Abraham to take oath, leads the Jew to confession of the Christian faith.

ABRAMS, ALBERT (1863—). An American physician, born in San Francisco. He studied medicine at the University of Heidelberg and, after taking the degree of M.D. in 1882, did postgraduate work in London, Berlin, Vienna, and Paris. In 1893 he was appointed professor of pathology in the Cooper Medical College, a chair which he held for five years. The Emmanuel Polyclinic in San Francisco made him its president in 1904. He wrote much on medical subjects, among his published volumes being *Synopsis of Morbid Renal Secretions* (1892); *Manual of Clinical Diagnosis* (1894); *Consumption—its Causes and Prevention* (1895); *Scattered Leaves of a Physician's Diary* (1900); *Diseases of the Heart* (1901); *Nervous Breakdown* (1901); *Hygiene, in a System of Physiologic Therapeutics* (1901); *The Blues* (1904; 4th ed., 1911); *Diseases of the Lungs* (1905); *Self-Poisoning; Diagnostic Therapeutics* (1909); *Spinal Therapeutics* (1909); *Spondylotherapy* (1910; 3d ed., 1912).

ABRANTES, ä-brän'tĕsh. An ancient town in Estremadura, Portugal, situated on the north bank of the Tagus, 70 miles northeast of Lisbon (Map: Portugal, A 3). It is strongly fortified, is surrounded by walls, and is protected by a castle. It is remarkable for the architectural features of its monastery. By way of the Tagus, Abrantes has a brisk trade with Lisbon in grain, olive oil, wine, and fruit. Pottery and spirits are manufactured, and there are iron foundries. Fairs are celebrated in February and May. From this town Marshal Junot took the title of Duke of Abrantes. Pop., 1900, 6500.

ABRA'SIVES (Lat. *ab*, away + *radere*, to scrape, scratch). The natural and artificial substances used in the arts for scraping, grinding, and polishing. The principal abrasives now used are corundum, emery, garnet, quartz, carborundum, diatomaceous earth, tripoli, pumice, rouge, crushed steel, abrasive stones, powdered glass, and sand.

Corundum (q.v.) is a crystalline mineral substance, large deposits of which are mined in North Carolina. The process of manufacturing corundum ore into an abrasive powder consists in crushing and grinding it to a powder, which is mixed with water and fed onto sieves or screens; the properly ground material passes through the screens, and the coarser powder remains on top and is reground. The remainder of the process consists in refining and sizing the powder into eight or ten grades for the market.

Emery is an impure grade of corundum, and is prepared for the market by crushing, screening, and sizing, like corundum proper. Emery is used in the form of powder for grinding metal surfaces to intimate contact, for polishing plate glass and stones, and also as emery paper and as emery wheels. Emery paper or emery cloth is paper or cloth covered with hot glue and dusted with powdered emery. Emery wheels are disks of emery particles cemented by an adhesive cement and compressed under heavy pressure. Powdered emery is used also in the lapping process of grinding cylinders to size and producing a smooth surface. A disk or cylinder of soft metal is made to revolve rapidly and the powder with oil or water fed to the area in contact with the work. The particles embed themselves in the soft metal and abrade effectively. Valves are ground to their seats with powdered emery, to make them air- or gas-tight.

Garnet (q.v.) occurs in segregated masses scattered through other rocks. Formerly the process of production was to separate the garnet masses from the barren rock by hand after the rock had been broken down by picks or by blasting. This method of separation resulted in the loss of a considerable portion of the garnet in the rock, and a process has recently been perfected by which the rock is crushed by machinery and the garnet separated from the barren rock by water. Garnet is harder than quartz, and, unlike quartz, does not wear smooth, but by its cleavage presents new cutting edges. It is used chiefly in the form of garnet paper or as a facing for cylinders, disks, belts, etc., for smoothing and finishing wagons, cars, carriages, wooden parts of bicycles, furniture, etc., and in boot and shoe manufacture for smoothing and polishing the heels and soles.

Carborundum is an artificial product manufactured by a single American company whose works are at Niagara Falls, N. Y. The raw material for carborundum manufacture consists

of 34.2 parts coke, 54.2 parts sand, 9.9 parts sawdust, and 1.7 parts salt. This mixture is smelted by electricity in special furnaces of fire-brick 16 feet long, 5 feet high, and 5 feet wide. In the centre of the end walls are the terminals or electrodes, each of which consists of 60 carbon rods 30 inches long and 3 inches in diameter, into the outer ends of which small pieces of ⅜-inch copper rods are fixed. A square copper plate bored with 60 holes holds the carbon electrodes in place. The carbons having been put in place from the inside of the furnace, the spaces between them are tightly packed with graphite, which prevents the oxidation of the carbons and adds materially to their durability. The charge is next thrown into the furnace until it is a little more than half full, when a semicircular trench about 21 inches in diameter is made the full length of the furnace. Into this trench the core of coke is placed and built up to form a cylinder 21 inches in diameter. Around this core more material is packed to the full height of the side walls, and heaped above their tops, the furnace then being ready for operation. This consists of passing an electric current through the charge between the two terminals, which is maintained for 36 hours, after which the furnace is allowed to cool slowly for 24 hours, when the side walls are torn down and the charge removed. The carborundum forms a layer about 10 or 12 inches thick around the coke core. This is crushed and treated with dilute sulphuric acid for three days at a temperature of 100° C. to remove the iron and alumina. The clean material is then washed with water, dried, and graded according to fineness. Carborundum is used like emery and garnet in the manufacture of abrading cloth, cylinders, wheels, etc., and in the form of powder for polishing stones, steel balls, etc.

Diatomaceous or *infusorial earth* (q.v.) is a natural product consisting of the siliceous framework of diatoms which is ground and used principally in polishing metals and finishing wood.

Tripoli is distinguished from infusorial earth by the mode of origin, it being the porous silica left from a siliceous limestone from which the lime has been leached, leaving the silica. The natural product is ground in a mill and sifted for use in polishing metals, horn, shell, etc., and is also cut out into the form of disks and used in household filters for filtering water.

Rouge as usually sold is made by dissolving iron in sulphuric acid so as to form iron sulphate; this salt is heated and the sulphur driven off, leaving a residue of sesquioxide of iron, which after washing is known as rouge. Rouge is used for polishing plate glass.

Crushed steel and *steel emery* are manufactured preferably from pieces of high-grade crucible steel heated to a temperature of about 2500° F. and then quenched in a bath of cold water or other suitable hardening solution which gives the steel a granular structure. The pieces are then reduced to powder by powerful hammers or crushing machines, after which the steel particles are tempered in the following manner: they are placed in a steel pan or cylinder and heated to a temperature of 450° F., and then cooled by being subjected to cold air in various ways. The final process is the grinding and sizing of the powder. Steel emery is made exactly like crushed steel, but is given an intensely hard temper. Crushed steel ranks close to the diamond in hardness. Crushed steel and steel emery are extensively used in stone sawing and polishing, in lens grinding, glass beveling, brick grinding, and by lithographers, engineers, and plate glass manufacturers.

Grindstones are cut from a hard sandstone of a peculiar quality, and *whetstones*, *scythestones*, and *oilstones* are quarried and cut from similar natural rocks. *Millstones* or *buhrstones* are cut down or built up from various kinds of rock; the American buhrstone is a quartz conglomerate which is known under various local names; the German buhrstone is a basaltic lava, and that which comes from France and Belgium is a hard, porous material consisting of small particles of silica in a calcareous cement. The foreign stone is brought into the United States in small pieces, which are cut and built up into wheels with cement, but the domestic stone is worked down from quarry blocks into a solid wheel of the required size. Millstones are used for grinding grains, cement, pigments, etc. *Sand* is extensively used as an abrasive in the form of sandpaper and in the sandblast for cleaning castings, structural iron-work, etc. *Powdered glass* or sand is used in sawing stone to size and in surfacing it. *Pumice* (q.v.) is a volcanic ash or tufa which may be ground into powder for scouring and polishing or sold in lumps for similar purposes. For a detailed description of the occurrence and preparation of abrasives, reference should be made to the *Annual Reports of the United States Geological Survey, Mineral Resources of the United States*, which also include statistics of production and importation. See SANDBLAST; SANDPAPER.

ABRAVANEL, ȧ-brä′vȧ-nĕl′. See ABRABANEL.

ABRAX′AS, or **ABRAXAX**. A term used by the Gnostic sect of Basilides to designate the multiform manifestation of the Supreme Deity in the universe, because when the word is written with Greek letters, these letters, computed numerically, have the value of 365, which equals the solar year and the number of *eons* or worlds that formed the total Gnostic universe. The word, in harmony with the magical tendencies of the East in the second century, was engraved on precious stones and used as an amulet. These gems often bore strange figures of Gnostic deities, sometimes part lion, or serpent, or cock, some connected with Jewish, some with Egyptian, and some with Græco-Roman worship. They are characteristic of the hybrid religious movement that fought for supremacy with Christianity. In many cases the figure represented has the head of a cock, the body of a man, and two serpents instead of legs, and is armed with a whip and shield, with the inscription ΙΑΩ (*iaō*), derived from the Hebrew name for God. Other divine manifestations inscribed or represented on the gems are Sabaoth, Adonai, Eloï—Hebrew names for God—Astaphaios, Ialdabaoth, Chnouphis. Others have names or figures of Jewish angels (Michael, Gabriel, Uriel, Onoel); others those of Egyptian gods (Isis, Osiris, Phtah, Neith, Hathor, etc.); others those of Greek gods and heroes (Zeus, Hecate, Aphrodite, Hercules). It is a fact that the Christian Church and the Christian emperors of the fourth and fifth centuries found it far more difficult to stamp out

ABRAXAS STONE.

magical beliefs and practices than those of official paganism, and of this these stones are the clearest proofs. See ABRACADABRA and AMULET. Consult Barzilai, *Gli Abraxas* (Trieste, 1873); King, *The Gnostics and their Remains* (London, 1887); Kraus, *Real Encyklopädie der christlichen Altertümer* (Freiburg, 1882–86); Dieterich, *Abraxas, Studien* (Leipzig, 1891); Schultz, *Documente der Gnosis* (Jena, 1910).

ABREAST'. See BEARING.

ABRIDG'MENT (OF. *abrigier*, Lat. *abbreviare*, to shorten). A condensation or abbreviation of a book or treatise. In the law of copyright an abridgment, when fairly made, is deemed a new work, and consequently its publication is not an infringement of the copyright. An abridgment is to be distinguished in the law of copyright from a compilation. The former is a condensation of the substance of the copyrighted article, while the latter is a reproduction in part, at least, of the language of the copyrighted article and is held to be an infringement. Abridgments of the rules of law by various writers have been of great importance in the development of the English common law. Before our modern methods of reporting decided cases, the abridgments of Comyn, Viner, Bacon, and others were highly valued as text-books and were the chief repositories of legal learning. They are still valuable as authorities as to the rules of the early law.

ABROC'OMAS AND ANTHI'A. One of the oldest works of Greek prose fiction; also known as *Ephesiaca, or the Loves of Anthia and Abrocomas*. It was by an otherwise unknown writer named Xenophon of Ephesus, of uncertain date, supposed to have lived about the time of the Antonines. It is in simple narrative style, but abounds in improbable incidents. The story is the ultimate source of *Romeo and Juliet*.

AB'ROGA'TION (Lat. *abrogatio*, from *ab*, away + *rogare*, to ask, propose a law). In law, the annulling or repealing of a former law by an act of the legislative body. Abrogation may be accomplished by express provision of the later act, which in general terms abrogates all laws inconsistent with the new one, or names specifically the laws to be abrogated, in which case the abrogation is said to be *express*. Abrogation may also be *implied*, as where the new law is necessarily inconsistent with earlier laws. In Scotland, also, though not in England or the United States, when a statute by lapse of time has ceased to be suitable to the times and conditions, it is impliedly abrogated. The repeal of a statute revives any provision of the common law which such statute had abrogated or amended, but does not restore to life a previous statute which it had abrogated. See REPEAL; STATUTE.

ABROLHOS, ȧ-brōl'yôs. A group of islands and shoals, 50 miles off the east coast of Brazil and 50 miles east of Caravellas, belonging to the State of Bahia. The largest island of the group, Santa Barbara, in lat. 18° S., 50 miles from Caravellas, is the site of a lighthouse (Map: Brazil).

A'BRUS (Gk. *ἁβρός, habros*, graceful, pretty). A genus of Leguminosæ, the best-known species, *Abrus precatorius*, being a shrubby climber of the tropics. The seeds, often called "crab's eyes," are bright scarlet with a black spot, and their use for rosaries by Buddhists suggested the specific name. In India the seeds are also used as standards of weight. The roots have the properties of licorice. This species has also been called "weather-plant," from its imagined power to prophesy the weather, but this property has proved to be a superstition rather than a fact. The seeds are poisonous.

ABRUZZI, ȧ-brōōt'sē, **E MOLISE,** mą'lē-zā. A division (*compartimento*) of Central Italy, situated between the Apennines and the Adriatic Sea, and comprising the provinces of Teramo (Abruzzo Ulteriore I), Chieti (Abruzzo Citeriore), Aquila (Abruzzo Ulteriore II), and Campobasso (Molise) (Map: Italy, H 5). The area is 6380 square miles. It comprises the wildest and loftiest portion of the Apennines. The rent and jagged mountain groups are very picturesque and reach in Il Gran Sasso d' Italia, or 'the great rock of Italy,' the highest of the chain, the elevation of 9584 feet. The highlands are clothed with luxuriant forests and slope precipitously on all sides, but especially toward the northeast shore. The rivers are numerous, but mostly very short, and, with the sole exception of the Pescara, are of little importance. The climate of the Abruzzi is raw in the higher regions; snow rests on the mountains from October to April, and on some of the peaks all the year round. While the mountain slopes provide ample pasture for numerous herds of cattle and swine, fertile valleys yield olives, rice, saffron, wine, and grain in abundance. Animal products form the chief article of export. Silk is produced to some extent, and cutlery is manufactured, but the industries are of little importance. In former times the district was considered of much strategical importance, owing to its inaccessibility, which rendered it especially fit as a protection for Naples. Pop., 1881, 1,317,215; 1901, 1,441,551; 1911, 1,575,084. Consult A. de Nino, *Usi e costumi abruzzesi* (Florence, 1879–91).

ABRUZZI, Prince LUIGI AMEDEO of Savoy-Aosta, Duke of the (1873–--). An Italian traveler and Arctic explorer. The son of ex-King Amadeus of Spain, he was born in Madrid, and studied at the naval college in Leghorn. In 1897 he attracted much attention by making the first ascent of Mt. St. Elias. On June 12, 1899, he set out on his voyage toward the North Pole, his plan being to leave his ship, the *Stella Polare*, in harbor, and send northward a series of sledge expeditions. He spent one winter in the Bay of Teplitz, and would have remained a second had not a serious injury to the vessel compelled his return. One of his sledge parties, under Captain Umberto Cagni, attained the latitude of 86° 33′, 239.15 statute miles from the Pole. On Sept. 6, 1900, he returned to Christiania. His explorations determined the northern coast of Franz-Josef Land and the non-existence of Petermann Land. The story of this expedition is told in his book, *On the "Polar Star" in the Arctic Sea* (1903). He also wrote *The Ascent of Mt. St. Elias* (1900). He established a new record in mountain climbing in 1909 by ascending Mt. Austen in India to a height of 24,600 feet. It was several times reported and denied in 1908 that he was engaged to Miss Katherine Elkins, daughter of Senator Stephen B. Elkins, of West Virginia.

AB'SALOM (Heb., 'father of peace'). The third son of King David (2 Sam. iii. 3; 1 Chron. iii. 2), whose romantic career makes him a prominent figure in Old Testament history. His mother was Maacah, the daughter of Talmai, King of Geshur (see ARAMÆANS). Encoun-

tering the ill-will of David through slaying Amnon, the oldest son of the King, in revenge for an outrage committed by Amnon upon his sister Tamar (2 Sam. xiii), Absalom was banished from his father's court, and more than five years elapsed before he was again admitted into the presence of his father (2 Sam. xiii. 38; xiv. 28). A complete reconciliation, however, appeared out of the question, and Absalom shrewdly laid his plans to ingratiate himself in the hearts of the people (2 Sam. xv. 1–6). When the moment appeared ripe, he organized a rebellion against David, which soon assumed such dimensions as to force the King and his court to leave Jerusalem and fly for refuge to the east of the Jordan. Absalom entered Jerusalem, and the rebellion would probably have been successful but for the crafty intrigues of Hushai, who, while pretending to espouse the cause of Absalom, gave counsel which enabled David and his adherents to obtain time for gathering a following (2 Sam. xv. 17). A decisive battle was then fought "in the wood of Ephraim" (2 Sam. xviii. 6), in which Absalom lost his life. According to the narrative, Joab, chief counselor of David, sent three darts into Absalom's heart while he was hanging from an oak, in the branches of which his flowing locks, while he was riding, became entangled. With Absalom's death the rebellion came to an end (2 Sam. xviii. 7–17). David is represented as having been profoundly grieved at the death of his son; and the author of 2 Sam. ix–xx, probably a contemporary, tells the story in a manner calculated to arouse at least partial sympathy for Absalom, who is described as a youth of extraordinary beauty and attractiveness (2 Sam. xiv. 25–27). The date of Absalom's death may be fixed approximately at 1000 B.C. He was buried near the spot where he died, and the grave was marked by a great heap of stones (2 Sam. xviii. 17). He had set up for himself a pillar in the King's dale near Jerusalem during his lifetime (2 Sam. xviii. 18), like the Phœnician 'Abd Osir (Cooke, *North Semitic Inscriptions*, xvi, 1), and this pillar was shown in the time of Josephus (*Ant.* vii, 10, 3). The remarkable monument in the Kidron valley, now called Absalom's tomb, was assigned to Hezekiah by the Bordeaux pilgrim (333 A.D.), and apparently not before the fourteenth century, in the sources of *The Travels of Sir John Maundeville*, to Absalom. Thrupp supposed that Jesus, in Matt. xxii. 29, refers to this and its companion structures as tombs of the prophets built and garnished by the Pharisees (*Ancient Jerusalem*, 1855, pp. 230). Spiers, in Wilson's *Recovery of Jerusalem*, 1871, called attention to the confused style, the Egyptian cavetto cornice mounted on a Doric entablature, carried by Ionic semi-detached columns, with corner pilasters of the Græco-Syrian type, as indication of late Jewish but pre-Christian origin. Clermont Ganneau has plausibly suggested that the monument is the tomb of Alexander Jannæus, mentioned by Josephus, *Bell. Jud.* v, 7, 3 (*Survey of Western Palestine: Jerusalem*, 1884).

ABSALOM AND ACHITOPHEL, ă-kĭt'ō-fĕl. The title of a poetical satire by John Dryden, published in 1681. Absalom represented the Duke of Monmouth, illegitimate son of Charles II, whose character is said to have resembled that of the rebellious son of King David. Achitophel, David's disloyal adviser, stood for the Earl of Shaftesbury, against whom the satire was directed. It was intended to justify King Charles II as against the Whig party. As a political document it was extremely effective, and it has been highly praised for its vigorous literary qualities. The second part, published in 1682, was added by Nahum Tate.

ABSALON, äb'sä-lon (1128–1201). A Danish ecclesiastic, statesman, and general. He was educated at Paris and during the reigns of Valdemar I and Canute VI served as minister and general. In 1158 he was chosen bishop of Roeskilde and in 1178 became archbishop of Lund. His highest position was that of papal legate. Absalom aided in the formulation of the code of Valdemar, and to his influence is due the *Historia Danica* of Saxo Grammaticus.

ABSAROKA, ăb'sä-rō'kä. See CROW INDIANS.

AB'SCESS (Lat. *ab*, *abs*, away + *cedere*, to go, Gk. *ἀπόστημα*, *apostēma*, distance). A circumscribed cavity, newly formed in the body tissues, containing pus, and due generally to an injury, followed by the invasion of the micro-organisms of suppuration. An abscess is thus formed: first, the capillary vessels become overcharged with blood, in consequence of inflammation. The blood current is slowed, and an escape of serum and white blood corpuscles takes place through the thin vessel walls. The white corpuscles endeavor to destroy the invading bacteria by eating them (this process being known as *phagocytosis* and the defending cells as *phagocytes*), while the serum furnishes certain chemical substances which are at once stimulating to phagocytic activity and inimical to the bacteria. Many white cells perish in the combat, and these, together with many still active phagocytes, bacteria, and altered serum (*liquor puris*), are seen, under the microscope, to compose pus. By gradual dissolution of the surrounding tissues, the cavity is enlarged and the pus makes its way ("points") in the direction of least resistance either to the skin surface or to an adjoining natural cavity. A tubercular abscess is called a "cold abscess" because it presents no symptoms of inflammation. Its contents are not true pus, since the tubercle bacillus is not a pus-producing organism. Cold abscesses frequently make their way to regions far removed from their point of origin. In local infections superficially seated—either in or close under the skin—the early treatment consists chiefly in promoting the formation of pus by the application of moist, warm poultices, or limiting the process by the application of ice. The next step is the removal of the pus and provision of drainage. When this is too long delayed, "blood poisoning" or pyæmia may follow. An abscess must be regarded not as a disease in itself, but as the result of disease, or as an effort of nature to remove injurious matters from the system. See BACTERIA; SUPPURATION.

ABSCHATZ, äp'shâts, HANS ASSMANN, Freiherr von (1646–99). A German poet of the second Silesian School. He was born at Würbitz, and studied at Strassburg and Leyden. He was appointed life deputy from the principality of Liegnitz to the Silesian Diet at Breslau in 1679. Patriotic in tone and simple in style, he was well known in his day. He translated the *Pastor Fido* from the Italian of Guarini. His *Poetische Uebersetzungen und Gedichte* were published after his death (edited by Christian Gryphius, 1704). Selections also appear in vol. vi of W. Müller's *Bibliothek deutscher Klassiker*

des siebzehnten Jahrhunderts (1824). Consult C. H. Wegener, *Biographie Assmans von Abschatz* (Berlin, 1910).

ABSCHIEDS-SYMPHONIE, äp'shêts-zêm-fô-nē' (Ger. 'Farewell Symphony'). A symphony composed by Haydn, dated 1772 on the autograph score. It was written as an appeal to the Prince Eszterházy to allow the musicians leave of absence. One after another stopped playing and left the orchestra, and Haydn's object was attained through this delicate hint. See HAYDN.

ABSCIS'SA. See ANALYTIC GEOMETRY.

ABSCOND'ING (Lat. *abs*, away + *condere*, to put up). In law, the act of leaving the state or concealing oneself therein for a fraudulent purpose, such as hindering, delaying, or defrauding one's creditors. It is not a common-law offense for one to go beyond the boundaries of his country, nor to treat his house as his castle, that is, as a place into which an officer has no right to break in order to serve civil process. But if a debtor goes abroad or conceals himself to avoid the service of legal process, the creditor, being unable to employ the usual methods, is entitled, upon resorting to the proper proceedings, to seize the defaulting debtor's property. The rights of creditors against absconding debtors are now generally regulated by statute. See ARREST; ATTACHMENT; BANKRUPTCY; INSOLVENCY; LIMITATION OF ACTIONS.

ABSECON, ab-sē'kŏn. A bay just north of Atlantic City, N. J. It has a circumference of about 5 miles and has as its principal entrance Absecon Inlet. At the mouth of this inlet, in lat. 39° 22′ N. and long. 74° 25′ W., is a lighthouse of the first class, 165 feet above sea level.

AB'SENTEE'. A capitalist, especially a landowner, who derives his income from one country and spends it in another. Ireland offers the classic example of absenteeism and its attendant economic and social evils. A large part of the land is owned by members of the aristocracy, who administer their affairs by agents and rarely visit their possessions. This state of affairs dates in the main from the union with Great Britain and the transfer of Parliament from Dublin to London. Under the various land purchase acts, since 1885, many of the estates of absentees, as well as of other large holders, have been broken up and sold to the actual occupiers. See IRISH LAND LAWS.

There is a general consensus of opinion that absenteeism is hurtful to the economic interests of a region. It removes from the country its natural leaders, those whose personal concern in the upbuilding of the country is essential to public welfare. It intensifies the struggle between classes and makes coöperation difficult. It is likely to result in misuse of the land by owners more bent upon securing maximum financial returns than upon maintaining and increasing its earning capacity, while the management of the paid overseer is not tempered by the spirit of *noblesse oblige* which generally prevails when the landlord is a resident.

ABSENTEE, THE. A story by Maria Edgeworth (q.v.), published in 1812. It was one of the series called *Tales of Fashionable Life*, or *Fashionable Tales*.

ABSHERON, ab'sheron. See APSHERON.

ABSINTHE, ăb'sinth (Fr., from the Gk. *ἀψίνθιον, apsinthion*, wormwood). A bitter liquor, the base of which is an alcoholic solution of certain essential oils derived from a number of plants. The chief source is a form of wormwood, or absinthium (*Artemisia absinthium*). (For illustration, see Plate of ACANTHUS.) The leaves and tops of this plant, together with portions of angelica root (*Archangelica officinalis*), sweet-flag root (*Acorus calamus*), dittany (*Cunila mariana*), star-anise seeds (*Illicium cerum*), and other aromatics, are macerated in alcohol for eight days and then distilled. The product is an emerald-colored liquor, to which anise oil is added, and which constitutes the genuine French *extrait d'absinthe*. Other absinthe of inferior quality is made from various herbs and essential oils, and adulterations are numerous. Two kinds of absinthe are known in commerce, French and Swiss; the latter, prepared from highly concentrated spirits, being the more trustworthy. The chief places of manufacture are Neuchâtel in Switzerland and Bordeaux in France. The product is consumed mostly in France, though large quantities are exported to the United States. Absinthe was first used by the French soldiers in the Algerian War (1844–47), who mixed it with their liquor as a febrifuge, and who later introduced the habit in France.

Absinthe when excessively used gives at first a feeling of exhilarated intoxication. Later the digestive organs are deranged, the appetite destroyed, then thirst, giddiness, ringing in the ears, hallucinations of sight, heavy mental oppression, anxiety, loss of brain power, and idiocy may succeed each other. It induces a condition of alcoholic intoxication plus the poisoning by the essential oils, notably by that known as absinthol, contained in the wormwood. See ARTEMISIA; LIQUEUR; WORMWOOD.

AB'SOLON. A character in Chaucer's *Miller's Tale*. He was a parish clerk, who fell in love with the jealous carpenter's wife, but ludicrously failed in his suit.

AB'SOLUTE (Lat. *absolutus*, brought to a conclusion, final, complete, from *absolvere*, to loosen from, bring to a close, complete). A term employed in philosophy and theology with various meanings, but in every case in direct antithesis to the term *relative*. In logic, absolute terms are (*a*) those that do not connote (see CONNOTATION) and at the same time do not imply attributes, and (*b*) those which do not imply the existence of some other term, as, for instance, "buyer" implies seller, such terms being known as relative. It is seen, however, that relativity is almost universal, as it is impossible to define any term without showing it to be relative to some other term. Many theological philosophers speak of God as absolute, meaning thereby that He *need* stand in no relation to anything distinct from Himself. Absolute means here independent of essential relations to other objects. Herbert Spencer speaks of absolute ethics, meaning ethics dealing with a standard that is unchanging, as opposed to the relative ethics of any particular place or time. With the Hegelians absolute means all-inclusive; essential relation is included in such a conception, but merely external relation is excluded: the universe, in the sense of all existence, including all the relations binding everything to everything else, is absolute in this meaning of the word; and the universe alone is absolute. Much of the discussion about the possibility of the absolute has turned upon the ambiguity of the word. So also with the question whether there can be knowledge of the absolute. If by the absolute is

meant something that exists in itself apart from all knowledge, and if knowledge is considered as a relation between two independent things, the knower and the known, then knowledge of the absolute is impossible. This is Sir William Hamilton's (q.v.) contention, and also Spencer's (q.v.). If knowledge means exhaustive comprehension of every objective detail within the unity of a single consciousness, and yet if consciousness and its object are not looked on as independent of each other, then absolute knowledge would be possible on the supposition of the existence of a being that sustains all reality within its unchanging consciousness (T. H. Green). If knowledge is not synonymous with exhaustive knowledge, and yet if the object of knowledge is regarded as essentially related to the consciousness that knows, and if such an object also stands in essential relation to every other object, then all knowledge is partial knowledge of the absolute. Consult W. H. Moberly, *Foundations, a Statement of Christian Belief* (London, 1912), and Roulleaux Dugage, *Théorie des principes de l'absolu* (Paris, 1909). See KOWLEDGE, THEORY OF; LOGIC.

ABSOLUTE, CAPTAIN. A leading character in Sheridan's *The Rivals,* the son of Sir Anthony Absolute. He is a young soldier, and the lover of Lydia Languish, to gratify whose unpractical and romantic temperament he makes his suit in the assumed guise of a penniless adventurer, Ensign Beverley. He thus wins her heart and proves himself his own successful rival.

ABSOLUTE, Sir ANTHONY. A celebrated character in Sheridan's comedy of *The Rivals.* He is a choleric and apparently obstinate old gentleman, who is, however, at bottom entirely kind-hearted. He avows his excessive irritability in the first act: "No, no, Mrs. Malaprop. Jack knows that the least demur puts me in a frenzy." But when finally the lovers in the play are united, he shows himself most jovial and sympathetic.

ABSOLUTE MUSIC. A term denoting music written for its own sake, without encroaching upon the domain of any other art, appealing directly to the emotion without intervention of the intellect. The term came into general use about the middle of the last century, when the adherents of the new school of program music began their propaganda for the symphonies of Berlioz (q.v.) and the symphonic poems of Liszt (q.v.), which at that time were regarded by the more conservative musicians as a spurious form of art. To-day the claims of program music are fully recognized, and the expressions "Absolute" and "Program music" are only generic titles. See INSTRUMENTAL MUSIC; PROGRAM MUSIC.

ABSOLUTE VAL'UE. In the development of mathematics several artificial number systems have been formed, which are used in connection with the primitive system of natural numbers, e.g., negative numbers, $-1, -2, -3, \ldots$ imaginary numbers, $\sqrt{-1}, \sqrt{-2}, \ldots$ and complex numbers, $3 + \sqrt{-1}, 2 - \sqrt{-3}, \ldots$ The natural number which, multiplied by (-1), equals a given negative number, is called the absolute value of the negative number; thus, the absolute value of -2, expressed $|-2|$, is 2. Similarly, the positive value of the coefficient of $\sqrt{-1}$ in an imaginary number is called the absolute value of the imaginary number; thus, the absolute value of $\sqrt{-3}$ (or $\sqrt{3}\sqrt{-1}$), expressed $|\sqrt{-3}|$, is $\sqrt{3}$. The modulus of a complex number (q.v.) is called its absolute value; thus, the absolute value of $3 + \sqrt{-2}$, expressed $|3 + \sqrt{-2}|$, is $\sqrt{3^2 + (\sqrt{2})^2}$. The name "absolute value" and the vertical rules to denote it are due to Weierstrass.

ABSOLU'TION. The remission of sin, or of the punishment due to sin, by the Church. The remission of sin and its penalties may be divided into sacramental and canonical—one relating to the *forum internum,* the proclamation of pardon to the sinner, and constituting the most important part of the sacrament of penance; the other to the *forum externum* and devoted especially to the remission of ecclesiastical censure. Censure is expressed in spiritual punishments imposed by the Church, by which a person is deprived of the use of certain spiritual goods, as the sacraments, until penitent for his sins. Their early history is closely connected, as in the first ages of the Church all grievous public sins incurred the penalty of absolute separation from the assembly of the faithful, and reconciliation could be obtained only by undergoing the penance imposed by the Church. The bishops were the chief ministers of absolution; but the whole body of the faithful were consulted as to the term of the public penance, since they, as well as God, were injured by the sin. With the gradual decrease of severity and of public penances, absolution was pronounced by the priest immediately after confession, if he judged the repentance sincere. Formal excommunication, however, could even in later days be remitted only by public absolution by the bishop or his deputy, and certain sins are still "reserved" to the same authority for judgment. The power of judicial absolution in the name of God is attributed by Roman Catholics to all priests, on the basis of the commission in John xx. 23; the Protestant churches generally ascribe only a declarative power to their ministers, though the Church of England retains the absolute form in the Order for the Visitation of the Sick. The *form* of absolution, since none was given by Christ, has varied considerably; the Western Church down to the twelfth century, with rare exceptions, and the Eastern churches to the present time employing a deprecatory form ("May Christ absolve thee," etc.), for which the indicative form, *Ego absolvo te,* was definitely substituted by the Council of Trent. The difference in form, however, has implied no change in doctrine. For the Catholic doctrine, see Taunton, *The Law of the Church* (London, 1906). See CONFESSION; DISCIPLINE, ECCLESIASTICAL; PENANCE.

ABSOLUTION, DAY OF. See GOOD FRIDAY (so called from the ancient practice of emphasizing forgiveness upon that day).

AB'SOLUTISM (Lat. *absolutus,* complete, unrestricted, from *ab,* away + *solvere,* to loosen, free). That system of government in which the supreme power is vested in a ruler unchecked by any constitution or laws. It characterized all the ancient monarchies (a brief period in the case of the Roman Empire excepted), and has prevailed in all Oriental monarchies, down to Japan of a few years ago. The barbarian invasions replaced the absolute monarchy by feudalism in Western Europe, but with the growth of towns and the rise of the commercial classes came the necessity for a strong central

government to protect the nation against the feudal barons, and the absolute king once more arose, master of a regular army, uniting in himself the different functions of the national life, religious as well as political. A mild form of absolute monarchy is familiar to the student of English history in the House of Tudor, with its strong-willed monarchs; but a representative absolute monarch of modern times is better seen in Louis XIV of France with his famous assertion, *L'état c'est moi* ('I am the state'). There are now no absolute monarchies in Europe. The revolution of 1908 in Turkey and the resultant constitution make the term no longer applicable, even to the Ottoman Empire.

ABSOR'BENTS. See LACTEALS; LYMPHATICS.

ABSORP'TION (Lat. *ab*, away + *sorbere*, to swallow). When certain fluids are brought together, the molecules of one mix intimately with those of the other, and *diffusion* takes place. If certain solids containing fluids are brought in contact with other liquids, some of the liquid passes into the solid, and *absorption* takes place. Gases may also be absorbed similarly. Diffusion acting through an animal or vegetable membrane is called *osmosis*. Much of what is termed absorption in physiology is really osmosis. It is by this process of absorption that the elements of nutrition are taken from the intestines and conveyed to the tissues they are to nourish; the bones absorb much calcareous matter from the blood, cartilages less, and muscles less still; the brain takes more water than does muscle, and muscle more than bone. Most of the tissues of living bodies have the power of absorbing fluids—a property that often continues after death and until decomposition begins. Animal substances differ in absorbing power according to differences in the liquid, notably if they differ in specific gravity and if the fluids in the substances brought in contact are miscible. The following table from Chevreul shows the amounts of liquid absorbed by various tissues in twenty-four hours:

100 Parts of	Parts of Water	Saline Solution	Oil
Cartilage	231	125	
Tendon	178	114	8.6
Elastic ligament	148	30	7.2
Cartilaginous ligament.	319		3.2
Cornea	461	370	9.1
Dried fibrin	301	154	

Absorption of oxygen by the blood in the lungs is apparently instantaneous, the change in color from dark red to bright red as soon as it arrives at the pulmonary vessels showing the action of the gas it has taken from the atmosphere. This rapidity of absorption is due to the fact that in the circulation of the lungs the blood is spread out in the fine capillaries over a very large area, and to the incessant motion of the blood in the capillaries. See LACTEALS; LYMPHATICS.

ABSORPTION, ELECTRICAL. A phenomenon observed in electrical condensers (q.v.), in which the dielectric or insulating material between the conductors is non-homogeneous, e.g., a piece of glass. It is noted that if such a condenser is charged, then discharged and allowed to stand for a short time, there will appear another charge. If this is discharged, another charge will soon appear. These secondary charges are said to be due to electrical absorption. See ELECTRICITY.

ABSORPTION, IN PLANTS. The process by which substances are taken into the body. A few plants only, being devoid of any external cover to the protoplasm, are able to engulf particles of food, which may then be digested. The most prominent of these are the Myxomycetes (q.v.), or slime molds, which in the period of their vegetative activity consist of a mass of naked protoplasm (called a plasmodium), sometimes as large as one's two hands. These plasmodia, like huge Amœbæ (q.v.), creep about and envelop particles of decaying organic matter, etc., on which they feed. The zoöspores, or reproductive bodies, of some Algæ and Fungi are also microscopic bits of naked protoplasm, but they probably do not ingest solid food during this period. Inasmuch as the protoplasm of most plants forms on its surface, as the first step of development, a thin jacket of cellulose or some similar material, the taking up of solid substances is thereby absolutely prevented. Whether the body consist of one cell or many, it presents to the surrounding medium a continuous membrane with no visible openings. Through these cell walls, therefore, neither solid nor gaseous substances can pass without previously undergoing solution. The organs of absorption are all surface cells in the simpler plants. In larger land plants they include the moist cells bordering the intercellular spaces and the surface cells of the younger roots including the root hairs. (See AERATION and ROOTS.) The materials whose absorption is to be explained are (1) dissolved substances or solutes, and (2) the solvent, water.

1. **Solutes.** Although the protoplasm itself and its surrounding membrane (the cell wall) contain a large amount of water (50–98 per cent), as yet it is not known to what extent the water lies between the particles of the substances named and to what extent it is held as water of hydration or even dissolved in the medium itself. Since a water film wets the outer face of the walls and perhaps even pervades the wall and certain layers of the protoplasm, the solutes must go into solution in the water in order to enter the cell. Two factors are most important in determining the entrance or rate of entrance of solutes; permeable characters of the walls and protoplasm and the steepness of the concentration gradient of the solutes. In multicellular plants the action of these two factors is probably supplemented by circulation of the protoplasm and by the transpiration stream. The former aids diffusion in distributing the solutes, and the latter concentrates the solutes in the leaves or other transpiring parts. Both make the gradient more steep at important regions. The unsuberized walls of absorbing cells generally offer little resistance to the movement of solutes. (See PERMEABILITY.) The protoplasm, or certain layers of it, on the other hand, determines in the main what enters the plant and the rate of the entrance. It entirely prevents the passage of some solutes, permits others to enter only slowly and still others readily. The permeability of different cells of the same plants or of cells of different plants varies greatly; also the permeability of the same cells under different conditions varies considerably with

conditions (temperature, light intensity, presence or absence of anæsthetics, etc.). If any substances be removed from solution through use or storage, they will continue to be supplied from the regions of greater abundance, and consequently of greater pressure, to the regions of lesser pressure, i.e., where they are being used. The fact that different amounts of a given compound enter plants growing in the same soil is explicable in part on this basis and in part on permeability. Thus, wheat and clover may grow side by side; the ash of the wheat will contain 67.5 per cent of silica, while that of the clover contains only 2.5 per cent.

2. Water. The plant absorbs and holds water by two main processes: imbibition (q.v.) and osmosis (q.v.). The structures of the plant taking up water by imbibition are wood, cell walls, starch, and protoplasm and its constituents. (See COLLOIDS.) The force involved in imbibition is often enormous. The desiccated starch grain swells in water with a pressure of more than 5000 atmospheres, while air-dry seeds swell with a pressure of about 1000 atmospheres. The force of imbibition falls rather rapidly as the imbibed water increases. It was thought formerly that imbibition is due to the attraction of the surfaces of the composing particles. Now it seems probable that the water may be loosely tied up chemically with the swelling material as water of hydration. The mature living plant cell is a typical osmotic machine. First, there is the surrounding cell wall, which in general permits the free passage of solutes and acts as a bracing apparatus for the protoplasm. Next is the thin layer of protoplasm lining the wall. This is in part a semipermeable membrane permitting the rather free passage of water, but entirely prohibiting the outward diffusion of many solutes of the vacuole and greatly restricting the movement of others. Finally, the vacuole, filled with water bearing various solutes, occupies the central region of the cell. (See GROWTH.) The solution of the vacuole takes up water by osmosis (q.v.), thus stretching the protoplasm and wall and producing turgidity (q.v.) of the cell. The amount of osmotic pressure exhibited by plant cells varies greatly. In many it varies from 3 to 10 atmospheres, in some from 15 to 40 atmospheres, and in a few (leaves of certain desert plants, pollen grains, etc.) it is more than 100 atmospheres. When the cell does not contain enough water to use the total osmotic pressure of the vacuole for stretching the protoplasm and wall, it is said to have a saturation deficit. In such condition it will absorb water from regions where it is held less tenaciously (adjoining cells, soil water, or bathing solution). If the saturation deficit becomes great enough, the protoplasm is drawn from the wall and plasmolysis (q.v.) results. The joint action of imbibition and osmosis accounts for the absorption of water by all parts of the plants, as well as the movement from one region to another. The movement is always from regions where the water is held with less force (imbibition or osmotic) to regions where it is held with greater force. Transpiration, therefore, in any region causes a movement in that direction. The absorption of water by swelling seeds is largely a matter of imbibition, for they bear little soluble material. The absorption of water by roots or an algal filament from its bathing solution is largely a matter of osmosis, though of course involving imbibition by such structures as walls, protoplasm, and starch grains.

ABSORPTION OF GASES. The phenomenon of the taking up or absorbing of gases by liquids and solids. The number of cubic centimeters of a gas which can be absorbed by one cubic centimeter of a given liquid at 15° C. is called the "absorption coefficient" of the liquid for the gas. The absorption coefficient of water for ammonia is 756; for carbon dioxide, 1.0; for chlorine, 2.4. The mass of the gas absorbed varies directly as the pressure; so, if a gas is forced into a liquid under high pressure, and if the pressure is afterward released, the gas will be evolved. This is what happens in the case of beer and aerated waters. The absorption of gases by solids is called *occlusion*. The most conspicuous illustration of this is the power of palladium to occlude 900 times its own volume of hydrogen.

ABSORPTION OF WAVES. Waves of any kind in any medium carry energy with them; and if the energy decreases, the medium is said to absorb it or to exhibit "absorption." Thus, if white light falls upon red glass, i.e., if ether waves which affect the normal human eye with the sensation "white" are incident upon glass which appears red to the same eye, all the waves except those which produce the sensation red are absorbed by the glass, while the others are transmitted. Bodies differ greatly in the quality and quantity of their absorptive power; but it is a general law that the absorptive power of a body equals its emissive power under the same conditions. (See RADIATION.) Absorption is due to the presence in the pure medium carrying the waves of some portions of matter whose own natural period of vibration is the same as that of the period of the waves, and therefore these portions of matter are set in vibration by "resonance" (q.v.). Thus, if a person sings a pure note near a piano, it may be observed that the particular string of the piano which of itself gives the same note is set in vibration by the air waves sent out by the singer.

If air waves of any length fall upon a soft body, such as a cushion or a curtain, there is absorption, as is shown by the fact that the reflected waves are much less intense than the incident waves. (See ACOUSTICS.) The energy thus absorbed is not spent in emitting other waves, but is dissipated throughout the body producing heat effects. Similarly, if ether waves fall upon an absorbing body, the energy absorbed is dissipated in general throughout the smallest particles of the body producing heat effects. See, however, FLUORESCENCE.

AB'STINENCE. See FAST.

AB'STINENCE SOCI'ETIES. Associations to promote total abstinence from alcoholic liquors as beverages. See TEMPERANCE.

ABSTRAC'TION (Lat. *abs*, away + *trahere*, to draw). In logic, the process by which the mind separates out marks or characteristics which are similar in various objects and disregards the marks or characteristics by which the objects differ. It also occurs where characteristics of particular objects, or classes of objects, are replaced by a more general characteristic. The result of this process is also called an abstraction, or, if it appears as a word, a concept. In psychology, the term "abstraction" means the emphasis of certain contents of consciousness and the suppression of others. The abstraction may be the result of frequent and regular associa-

tions (Associative Abstraction). For example, the word "gas," for some persons, habitually means "illuminating gas." The reason is that in past experience this particular kind of gas has been the most frequent and regular associate of the word "gas." Doubtless there have been occasional associations with other forms of gas, but these, in accordance with the law of frequency, are less likely to appear upon the presentation of a stimulus. (See ASSOCIATION OF IDEAS.) The result is that, in the formation of meanings, the frequent associations are unconsciously separated—*abstracted* from those which are merely accidental. The abstraction may also be the result of a determination (Determined Abstraction), as when we pick out only those features in a situation to which our attention has been directed, or to which we are otherwise predisposed, and reject the other features. (See DETERMINING TENDENCY.) The determined abstraction may be either simultaneous or successive. An example of the latter is seen in reaction experiments where the observer, who has perhaps been instructed to react as quickly as possible upon the appearance of a *white card*, gradually and unconsciously changes his instruction so that he reacts to *something white*. In most if not in all determined abstractions two kinds of determination may be observed. The determination may be positive, an instruction to act in a certain way, or a direction of attention to certain aspects of a situation; or it may be a negative determination, which results from a predisposition on the part of the observer to follow the course offering the least resistance. A combination of the associative abstraction and the determined abstraction has also been distinguished. Consult: R. H. Lotze, *Logic* (Oxford, 1888); N. Ach, *Ueber die Willenstätigkeit und das Denken* (Göttingen, 1905); E. B. Titchener, *A Text-book of Psychology* (New York, 1910).

AB'STRACT OF TI'TLE. A brief and orderly statement in writing of the successive conveyances and other events through which a person claiming to own a parcel of land derives his title. A purchaser or mortgagee of real property is entitled—by law in England, by custom in the United States—to receive such an abstract from the vendor or mortgagor in advance of the consummation of the transaction, and it thereupon becomes the basis of the examination of title (q.v.), which it is the duty of the solicitor or attorney of the purchaser to make. A perfect abstract should furnish a complete history of the title sought to be transferred, showing not only the origin and nature of the vendor's interest, but also all incumbrances and other interests—such as mortgages, easements, recorded judgments, trusts, etc.—which affect his title. In England, where the practice of recording deeds does not generally obtain, the abstract is based upon the title deeds (q.v.), which are carefully preserved and transmitted with each transfer of the estate; while in the United States the public records of conveyances are the principal, but not the exclusive, source of the information upon which the maker of the abstract proceeds. Consult: Warvelle, *A Practical Treatise on Abstracts and Examinations of Titles to Real Property* (Chicago, 1892); Warvelle, *A Treatise on the American Law of Vendor and Purchaser of Real Property* (Chicago, 1902); Comyns, *On Abstracts of Title* (London, 1895). See RECORDING OF DEEDS.

ABSUR'DUM, REDUCTIO AD (Lat., a reducing to an absurdity). The method of proving a truth by showing that to suppose the proposition untrue would lead to a contradiction or absurdity.

ABYSR'TUS, ăb-sĭr'tŭs (Gk. *Ἄψυρτος, Apsyrtos*). In the legend of the Argonautic expedition (see ARGONAUTS), the younger brother of Medea. She carried him off with her when she fled with Jason from Colchis, and, according to the common version of the story, deterred her pursuing parent, Æetes, by cutting the boy in pieces and scattering his body on the sea for his father to gather up.

ABT, äpt, FRANZ (1819–85). A German song writer and musical conductor. He was born at Eilenburg and sent to the Thomasschule at Leipzig to be educated. Here he met Mendelssohn, who is said to have persuaded him to follow a musical career. He was appointed kapellmeister at the court theatre of Bernburg in 1841, but soon relinquished this position for a similar one at Zürich, where he remained for 11 years, obtaining great popularity as a teacher, composer, and leader of singing societies. He was called to Brunswick in 1852 as second musical director at the court theatre, was appointed court kapellmeister in 1855, and pensioned in 1881. He came to the United States in 1872 at the invitation of several choral societies, and everywhere met with a cordial reception. Abt was a prolific composer, and at the time of his death had published nearly 600 books (Hefte), some of them containing from 20 to 30 numbers. He belongs to that group of composers which includes Truhn, Kücken, and Gumbert. His vocal compositions are remarkable for their simplicity and clearness of melodic construction. Some of these, as *Wenn die Schwalben heimwärts zieh'n* ('When the Swallows Homeward Fly'); *Gute Nacht, du mein herziges Kind* ('Good Night, My Child'); *Schlaf' wohl, du süsser Engel* ('Sleep Well, Sweet Angel') have become real folk-songs.

ABU, ä'bo͞o. One of the Aravalli Mountains (q.v.), India, 5653 feet high. It is held in high esteem by the Jainas and is celebrated for its two magnificent temples of white marble, supposed to have been built in the twelfth and thirteenth centuries, and considered the finest specimens of Indian architecture.

ABU, ä'bo͞o. The Arabic word for 'father,' occasionally abbreviated to *Bu.* A man is sometimes known as the father of his son, e.g., Abu Yusuf, Abu Dawud; or he is described as being a father, i.e., acting as one, in his relation to animals, e.g., Abu Bekr, 'the father of a camel's-foal,' nicknamed by his enemies Abu Fasil, 'the father of the weaned calf,' Abu Huraira, 'father of kittens'; or he may be characterized as the father, i.e., the possessor of some quality, e.g., Abu'l Fadl, 'father of grace,' 'the graceful one,' Abu'l Fida, 'father of devotion,' 'the devout one.' In all such instances this is not the real name of the person but a kunya, surname or nickname, which, however, may be so commonly used as to cause the real name to fall into oblivion. Such a *kunya* may also be applied to an object or a place, e.g., *Abu'l hawl,* 'father of terror,' the sphinx at Gizeh, *Abu'l fulus,* 'father of money,' frequently used as the name of a place where treasures are supposed to be hidden.

ABU-BEKR, ä'bo͞o-bĕk'r (his original name was 'Abd al-Ka'bah ibn Abi Kuhafah al Atik)

(570–634). When converted to Islam, he took the name Abd Allah; the origin of his *kunya*, or surname, Abu-Bekr, is not known. That it meant 'father of the camel's foal' seems clear from the nickname Abul Fasil, 'father of the weaned calf,' which his enemies gave him. The first Caliph, father-in-law of Mohammed. He was a man of great influence in the Kuraish tribe. In 632, when Mohammed died, he was chosen as the successor of the Prophet with the title *chalifa rasu 'l allahi*, or representative of, substitute for, the messenger of Allah. After defeating his enemies in Arabia and warring successfully against Persia and the Byzantine Emperor Heraclius, Abu-bekr died (634 A.D.) and was buried at Medina, near the remains of Mohammed and the Prophet's wife Ayeshah (q.v.).

ABU-BEKR MOHAMMED AL-RAZI, ä'bōō rä'zē. See RHAZES.

ABU-BEKR MOHAMMED IBN TOPHAIL, ä'bōō-bĕk"r mō-hăm'mĕd 'b'n tō'fā-ēl (1100–85). A famous Arabic physician, mathematician, poet, and philosopher. He was born in Andalusia and died in Morocco. His chief extant philosophical work is entitled *Hai ibn* Yakzān, 'the Living, the Son of the Awake.' It depicts the natural progressive development of the human faculties in a Robinson Crusoe born on an island till nature and God are known. To secure this communion, positive religion is valuable for the vulgar, but religious doctrines are only exoteric presentations of the mystic truth. The name of the hero and the subject are borrowed from Ibn Sina (Avicenna), with this difference, that while Ibn Sina's hero possesses a supernatural intellect, that of Ibn Tophail personifies a man of ordinary faculties. Later translations: Francisco Pons y Boigues (Saragossa, 1900), and Léon Gautier (Paris, 1909); also P. Brönnle, *The Awakening of the Soul* (London, 1905).

ABU HANIFA, ä'bōō hā-nē'fā, AL NU'MAN IBN THABIT IBN ZUTA (699–767 A.D.). Moslem jurist, and founder of the school of the Hanafites. (See MOHAMMEDAN SECTS.) He was born in Kufa. His grandfather was brought to this city as a slave from Persia. His vast erudition in canon law drew large numbers of hearers to his lectures. To maintain his independence he earned his living as a clothier, and was averse to holding any public office. As an adherent of the cause of Ali he at first sympathized with the Abassids, but later became opposed to them, and may have suffered at the hands of the authorities. It is impossible to determine how much of truth there is in the story that he was scourged by al Mansur for refusing to accept a judgeship, and died in prison from the consequences. His decisions and sayings were recorded by his disciples. See Snouck Hurgronje in *Revue de l'histoire des Religions*, xxxvii, 186; Sprenger in *Zeitschrift für vergleichende Rechtswissenschaft* (x, pp. 15 ff.); Brockelmann, *Geschichte der arabischen Literatur*, vol. i (1898, pp. 169 ff.).

ABU-HASSAN, ä'bōō-häs'ăn, surnamed THE WAG. The hero of *The Sleeper Awakened*, one of the stories of the *Arabian Nights*. He was a citizen of Bagdad who entertained the Caliph unawares and as a result met with several interesting experiences, finally becoming the trusted friend and favorite of the Caliph.

ABUKIR, ä'bōō-kēr'. An insignificant village on the coast of Egypt, about 13 miles northeast of Alexandria, probably the ancient Bukiris. The important city of Canopus was situated in the near vicinity. The castle of Abukir stands on the west side of the bay of the same name, which is west of the Rosetta branch of the Nile. This bay is celebrated on account of Nelson's victory here gained over the French fleet, Aug. 1–2, 1798, the engagement being frequently called the Battle of the Nile. The French fleet was stationed in a curved line near a small island guarded by a battery; but Nelson, with his usual intrepidity, forced a passage with half of his fleet of fifteen vessels between the island and the French line of battle, while the other half attacked the enemy in front. The French admiral De Bruyes was killed by a cannon-ball, and his flag-ship, *l'Orient*, was destroyed. The French fleet was completely defeated, and only two vessels escaped. Napoleon defeated the Arabs here on July 25, 1799, and Sir Ralph Abercromby (q.v.) repulsed the French near this point in 1801 (the engagement being known as the battle of Alexandria).

ABU KLEA, ä'bōō klā'ā. A place in the Sudan situated on the route between Korti and Metemme, both of which are on the great bend of the Nile below Khartum. It was the scene of a battle fought on Jan. 17, 1885, in which the Mahdi's forces were defeated by the English troops under Sir Herbert Stewart. See MAHDI.

ABU'L ABBAS, ä'bool ă-bäs'. The name of the first Abbasid Caliph was Abd Allah, but he was generally called Abu'l Abbas, and gave himself the *kunya*, or surname, Al Saffah, 'the bloodshedder.' His father, Mohammed ibn Ali, was great-grandson of the uncle of the Prophet. On this relation to the Prophet the Abbasids based their claim to the Caliphate. The black flag was unfurled in Khorasan in 747. Kufa was captured, and Abu'l Abbas proclaimed himself there as Caliph in 749. Marwan II was defeated in 750 and soon after killed; and Abu'l Abbas massacred all whom he could find of the family of the Banu Umayya. He died in 754, leaving the caliphate to his brother Abu Ja 'far al Mansur. See Muir, *The Caliphate* (3d ed., 1899, pp. 426 ff.); Wellhausen, *Das arabische Reich* (1902, pp. 338 ff.).

ABU'L ALA, AL MA'ARRI, ä'bōōl ä'lä ăl mä-ä'rē (973–1058). One of the greatest of Arabic poets and a profound thinker. He was born at Ma'arrat al Nu'man, a little city in northern Syria, between Aleppo and Emesa. When he was four years of age, he became almost totally blind. He was educated at Aleppo, Tripoli, and Antioch. At first he was strongly under the influence of Mutanabbi (q.v.), but his independent mind did not fit him for a court poet. In the preface to Sikt al Zand he says: "I have never tickled the ears of princes with songs of praise nor praised any one of them in the hope of being rewarded." Abu'l Ala lived in Ma'arra until 1010. Then he went to Bagdad, where he apparently met with little success. He returned with his mother to Ma'arra and resided there until his death. He was a vegetarian and an ascetic. The purity and disinterestedness that characterized him, added to his fame as a poet, attracted many earnest persons to his little town. His earliest work was a collection of songs, *Sikt al Zand*, written in the style of Mutinabbi. In his collection, the *Lazumiyat*, he reveals that trenchant criticism of popular religious ideas which marks his maturer years. He deals not only with re-

ABU-SIMBEL

STONE RELIEFS AT ENTRANCE OF ROCK TEMPLE

ligious, but also with social and political questions, always seeking for fundamental truths. In his *Risalat al Ghufran*, or 'Letters of the Forgiven,' he produced an extraordinary satirical sketch of the life of the forgiven heretics of the past in the other world. Abu'l Ala was neither a Moslem nor a Christian, but a believer in the absolute sovereignty of ethics. See Kremer, *Ueber die philosophischen Gedichte des Abu'l Ala al Maarri* (1888); Nicholson, *A Literary History of the Arabs* (1907, pp. 313); Margoliouth, *The Letters of Abu'l Ala* (1906).

ABU'L ATAHIYA, ä'bo͞ol à-tä'hī-yà. One of the greatest Arabic poets in the Abbasid period. Ismail ibn al Kasim, with the surname Abu'l Atahiya, was born at Anbar, on the Euphrates, in 748 A.D. He lived in Kufa, Hira, and Bagdad, and died in 825 A.D. A simple life, leading to asceticism, moral earnestness, and radicalism, characterizes him as a man. He is the first poet-philosopher among the Arabs and was looked upon as a free-thinker and an atheist. The popularity of his poetry was due to its great simplicity and brevity. A good edition of his poems in Arabic was published in Beirut in 1887. See Brockelmann, *Geschichte der arabischen Literatur*, vol. i (1898, p. 78).

ABU'L FARAJ, ä'bo͞ol-fà-räj', Ali ibn al Husain ibn Mohammed ibn Ahmed al Kurashi al Isfahani (897–967). A famous Arabic historian. He was a descendant of the Umayyads, but born in Ispahan, Persia. He traveled extensively, and found eminent patrons such as Saif al Daula (q.v.) and the Buwaihid wazirs Isma'il ibn Abbad and al Muhallabi. His chief work is *Kitab al aghani*, 'The Book of Songs,' the most extensive source of our knowledge of early Arabic literature. It gives a large collection of songs, and in addition to each its melody, according to the musical terminology of Al Mausili, and notices concerning the author and often an anecdote concerning some famous male or female singer. The latest edition of the text appeared in Cairo in 21 vols., 1905–06. See Brockelmann in *Enzyklopaedie des Islam* (1908, p. 90).

ABULFARAJ, ä'bool-färâj *or* fà-räj'. See Bar Hebræus.

ABULFAZL, ä'bo͞ol-fä'z'l, **MUBARAK-I ALLAMI** (1551–1602). Vizier and historiographer of Akbar (q.v.), the great Mongol Emperor. His chief work is in two parts: the first part (*Akbar Nāmah*, or 'Book of Akbar') is a complete history of Akbar's reign, and the second half (*Ayīn-i-Akbar*, or 'Institute of Akbar') gives an account of the religious and political constitution and administration of the Empire. The style is excellent, and the second part is of unique and enduring interest. The Persian text of the *Akbar Nāmah* is edited in the *Bibliotheca Indica* (1873–87), and a translation has been issued by Beveridge in the same collection. The *Ayin-i-Akbari* edited in the *Bibliotheca Indica* (1867–77), and translated by Blochmann and Jarett (1873–94) in the same series. Abulfazl was at the head of the great literary movement to which we owe the Persian translations of numerous Sanskrit, Arabic, and Hindu works. He died by the hand of an assassin while returning from a mission to the Deccan in 1602.

ABULFIDA, ä'bo͞ol-fē-dä', Arabic Abu Al Fida Ismail Ibn 'Ali 'Imad Al-Din (1273–1331). A Moslem prince and historian. He was born at Damascus and belonged to a side branch of the Ayyubid family. His father, Al Malik al Afdal, brother of Al Malik al Mansur, the reigning prince of Hama (the ancient Hamath, q.v.), had fled to this city before the Mongolians. During his youth he distinguished himself in several campaigns against the Crusaders, serving under his uncle. But when the principality was not given to him on the death of his cousin, Mahmud II, but to Emir Sankar, he transferred his allegiance to Sultan al Malik al Nasir. In 1310 he bestowed upon Abulfida the principality of Hama for distinguished military services. He was given practically sovereign powers. From 1310 to the time of his death he ruled over the principality and in 1320 was given the dignity of a Sultan and the right to transmit his title to his descendants. He visited Egypt and Arabia and patronized literature and science. Among his important writings were *An Abridgment of the History of the Human Race*, in the form of annals, from the creation to 1328. The work is partly a compilation and partly original. It deals first with pre-Islamic history and then with the history of the world since the prophet down to the year 1329. The text has been published at Constantinople, 1870, and there are several translations. For the period of the Crusades it is particularly important. A part is contained in the first volume of Muratori, *Scriptores Rerum Italicarum*. The part preceding the Mohammedan era was rendered into Latin by Fleischer as *Abulfedae Historia ante-Islamitica* (Leipzig, 1831); the part on the life of Mohammedan into English by W. Murray (London); and the later part by Reiske and Adler (*Annales Moslemici*, 5 vols., Copenhagen, 1789–94). The *Geography* of Abulfida is chiefly valuable for the history and description of the Mohammedan world. A complete edition was published by Reinaud and de Slane in Paris (1840); and a French translation was published by Reinaud (first part) in 1845 and Guyaud (second part) in 1883. See Brockelmann, *Geschichte der arabischen Literatur*, vol. ii (1902, p. 44).

ABUL-HASSAN, ä'bo͞ol-häs'sân. See Judah, Ben Samuel.

ABULIA, à-bo͞o'lī-à. See Psychiatry.

ABU'L KASIM, ä bo͞ol-kä'sim. Halaf ibn Abbas Abu'l Kasim al Zahrawi, commonly called by earlier writers Abulcasis, or Alsaharavius, a distinguished Arab physician, was born at al Zahra, near Cordova, in the first half of the tenth century. He flourished under the Caliph Abd al Rahman III (912–961) and died in 1009. His great work, *al tasrif*, an encyclopædia of medicine, is of much interest. The treatise on surgery contained in it is the best that has come down from antiquity and is of importance for the history of medical science. A partial Latin translation of *al tasrif* was published in Augsburg in 1529, and a Hebrew translation exists in manuscript. The treatise on gynæcology was published by Caspar Wolf in his *Gynæcia*, 1566, and the section on surgery in Arabic and English by Channing, 1778. See E. Dognée, "Abulcasis, sa vie, son œuvre" in *Etudes dédiées à C. Leemans* (1885, pp. 304 f.); H. Frölich, "Abul Kasem als Kriegschirurg" in *Archiv für klinische Chirurgie* (1884, pp. 364–376).

ABUL KASIM MANSUR, ä'bo͞ol kä'sêm mân-so͞or'. See Firdausi.

ABULUG, ä'bu-loog'. A town in the prov-

ince of Cagayan, in the island of Luzon, Philippines. It is situated on the Abulug River in a fertile valley which produces rice, tobacco, and grain. It is 14 miles northwest of Aparri, with which it carries on considerable trade. Pop., about 9000.

ABUL WEFA, ä'bo͞ol wā'fà. See MOHAMMED BEN MOHAMMED BEN YAHAYA.

ABUMESACKA, àbo͞o'mà-sä'kà (native name). A large catfish of the Nile (*Charotes laticeps*).

ABUNDA, à-bo͞on'dà. A Bantu people of Angola, living partly on the low-lying coastlands and partly on the terraced escarpments, and hence divided into "highlanders" and "lowlanders." They have long been in contact with Europeans, and there is a considerable admixture of white blood, largely accounting for their enterprise, which travelers praise highly. Most of them speak both Portuguese and Umbunda, a trade language which is current over vast areas. It is said that, with a knowledge of Umbunda and Ki-Swahili, also a Bantu dialect, a traveler can make his way across the continent from Benguela to Zanzibar.

ABUNLON, ä-bo͞on'lŏn. A name applied to the Negrito mixed-bloods of Zambales province, Luzon. See PHILIPPINES.

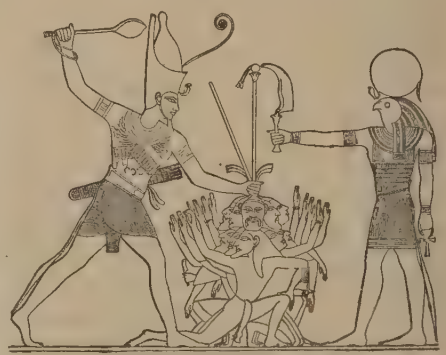
ABU NUWAS, ä'bo͞o no͞o'wâs, AL-HASAN IBN HĀNI AL-HAKAMI (756–810). One of the most celebrated Arabic lyric poets; born in al-Ahwaz; lived a riotous life in Basra, Kufah, and Bagdad, though under the special favor of Harun al Rashid and al-Amin. His collected poems contain 4900 verses. Those which celebrate wine are best known; but he also wrote love poems, satires (one of which was the cause of his death), poems on the chase and on asceticism, for he became an ascetic before his death. He has been called the Heine of Arabic literature. His *Diwan* has been edited and partly translated by von Kremer (Vienna, 1855) and Ahlwardt (Greifswald, 1861). Compare Brockelmann, *Geschichte der arabischen Literatur*, vol. i (1898, p. 75).

ABU SAID KHAN, ä'bo͞o sä'id kän. See MONGOL DYNASTIES.

ABUSE' OF PROC'ESS. The wrongful employment of a regular judicial proceeding. Courts of justice, quite as much for their own protection as for that of the party injured thereby, refuse to lend themselves to the abuse of their procedure, and may, accordingly, stay or dismiss actions and strike out defenses which are manifestly frivolous or vexatious. The jurisdiction to prevent or redress such abuse may be exercised on the motion of the party aggrieved or at the instance of the court itself. While an action will lie at the instance of the aggrieved party for the wrongful use of criminal process, a person wrongfully sued in a civil action has no legal redress, however unfounded, vexatious or malicious the suit may have been, unless it involves arrest or seizure of property. (See MALICIOUS PROSECUTION.) Consult Newell, *Law of Malicious Prosecution, False Imprisonment, and Abuse of Legal Process* (Chicago, 1892).

ABUSHEHR, ä'bo͞o-shĕr', or **BUSHIRE,** bo͞o-shĕr' (Pers. *Bendershehr*). A Persian seaport town on the east coast of the Persian Gulf, about 130 miles by caravan southwest of Shiraz (Map: Persia, D 6). It is situated at the extremity of a peninsula and has an extremely hot and unhealthful climate. Owing to its advantageous position as a terminal of one of the most important caravan routes of Persia, Abushehr formerly had a very considerable trade, in spite of the fact that its harbor is neither safe nor deep enough for heavy vessels, which are compelled to anchor outside. The exports consist of opium, raw cotton and silk, mother of pearl, carpets, tobacco, and hides, while the imports include cotton goods, tea, metals, sugar, and spices. Abushehr is the seat of several European consuls, as well as of a Persian governor, but its importance has very much diminished, and its population has shrunk from about 15,000 to about 2000.

ABU-SIMBEL, ä'bo͞o-sĭm'bĕl (IBSAMBUL or IPSAMBUL). A place on the left bank of the Nile in Nubia, lat. 22° 22′ N., the site of two very remarkable rock-cut temples. Both were constructed by Rameses II, who dedicated the larger to the gods Ammon of Thebes, Harmachis of Heliopolis, and Ptah of Memphis; the smaller to the goddess Hathor. The larger temple has a façade 119 feet broad and more than 100 feet high, adorned with four sitting colossi, each



SCULPTURE FROM ABU-SIMBEL.
Rameses II slaying his enemies.

more than 65 feet in height, representing the King. Upon these are carved inscriptions commemorating the visit of Phœnician and Greek mercenaries in the service of King Psammetichus II (594–589 B.C.). The interior of this temple, which is 180 feet in depth, contains two large halls and 12 smaller chambers and corridors, all decorated with sculptures and paintings. The great outer hall, 58 by 54 feet, is supported by two rows of square pillars, four in each row, 30 feet high; and to each of these pillars is attached a standing figure of the King, reaching to the roof. The walls of this hall are decorated with representations, in color, of victories over the Hittites and other enemies of Egypt. In front of the smaller temple are six statues, each 3 feet high, representing King Rameses and his Queen. These temples were discovered by Burckhardt. In front of the temple is a wide terrace with a small temple. Across the whole front of the terrace is a row of statues—figures of the Pharaoh alternating with those of the sacred hawk of the sun. In 1892 Captain Johnston, R.E., repaired the front of the larger temple, and built two walls to protect the entrance against the drifting sand. In 1912 the great colossi of the temple façade were repaired by filling the cracks with liquid cement.

ABU TAMMAM, ä'bo͞o tăm-mäm', HABIB IBN AUS (probably 807–846). An Arabic poet,

ABUTILON

1. FLOWERING MAPLE (Abutilon venosum).
2. APRICOT (Prunus armeniaca).
3. ALLSPICE (Pimenta officinalis).
4. BELLADONNA LILY (Amaryllis Belladonna).
5. AVOCADO PEAR (Persea gratissima).

and collector of poems, the exact dates of whose birth and death are uncertain. He was born in a village northeast of the Lake of Galilee in Syria, and his father is said to have been a Christian by the name of Tadus, which Abu Tammam, after he had embraced Islam, represented as having been Aus. At an early age he came to Egypt, where he first became known as a poet. After a vain attempt to gain the favor of Al Mamun (813–833), he went to Mosul, where he spent many years. Al Mutasim (833–842) rewarded him openly for his praise-songs, and the poet accompanied him in his campaign against Amorium (838). He was a great traveler, and many anecdotes are told of his visits to prominent persons in different provinces. Once he was the guest of Ibn Raja in Fars. Accused of having neglected some of the religious practices of Islam, he expressed grave doubts as to the value of these customs, which almost cost him his life. He visited Armenia and Khorasan. On his return he was forced by a snowstorm to seek refuge with Abu'l Wafa ibn Salama in Hamadan, whose rich library was placed at his disposal. He there compiled four collections of Arabic poems. The most famous of these is known as the *Hamasa*—i.e., 'heroic' anthology. Though Abu Tammam achieved high renown as a poet, his reputation rests chiefly upon this anthology. The Arabic text of the *Hamasa* was published by G. W. Freytag in two volumes (Bonn, 1828–47), and an edition has also been published in Bulak (1869) and Calcutta (1856). The German poet Friedrich Rückert published a German translation of the *Hamasa* (Stuttgart, 1846). Consult Brockelmann, *Geschichte der arabischen Literatur*, vol. i (1898, pp. 84 ff.).

ABU'TILON (Ar. *aubūtilūn*), or INDIAN MALLOW. A genus of mostly shrubby tropical or semi-tropical plants of the natural order Malvaceæ, including about 70 species. A number of species, known as flowering maples, are grown like geraniums or fuchsias in pots in greenhouses and in summer planted out in borders. The leaves are long-stalked, often maple-like or vine-like, and generally edged or mottled with white; the flowers are pendant, one, two, or more inches long, varying in color from red to yellow and white and intermediate shades. The more commonly cultivated species are *Abutilon striatum*, *Abutilon Thompsoni*, *Abutilon venosum*, *Abutilon insigne*, etc. *Abutilon avicennæ*, known as velvet-leaf, is a common weed in different parts of the United States. See Plate of ABUTILON.

ABUT'MENT (Fr. *aboutir*, to end in, to touch by the extremity, from *bout*, end, compare Engl. *butt*). In architecture, that part of a wall or pier which takes the thrust of the construction above it, as of an arch, vault, or truss; the terminal piers or supports of an arcade or bridge. An abutment arch is the land arch of a bridge, or one of the terminal arches of an arcade.

ABU UBAIDA, ōō-bī'dâ, MA'MAR IBN AL MUTHANNA (728–825 A.D.). An eminent Arabian philologist. He is said to have been of Jewish descent and was certainly not a member of the Taimite tribe. He defended bravely the rights of Moslems who were not Arabs. It is possible that he was a Kharijite (see MOHAMMEDAN SECTS), and was regarded as holding heretical views. Abu Ubaida was one of the ablest philologists of his time and knew intimately the Arabic traditions and stories. See Goldziher, *Muhammedanische Studien*, vol. i (1889, pp. 194 ff.).

ABŪ-YŪSŪF YAKUB, ä'bōō-yōō'sụf yä'kōōb, called AL-MANSŪR or 'The Victorious' (1160–98). The fourth Sultan of the Almohade dynasty in Africa and Spain. His father was killed at the siege of Santarem, 1184, and as soon as he had quelled certain insurrections in Morocco, Abû-Yûsûf Yakûb turned his arms against the Christians and carried off to Africa 40,000 captives. In subsequent expeditions he captured Torres and Silves, in Portugal, and defeated the Christians under Alfonso III, near Valencia. He died in Morocco. See ALMOHADES.

Ä'BY, ĕ'bụ, CHRISTOPH THEODOR. See AEBY.

ABY'DOS (Gk. *Ἄβυδος*). 1. In ancient geography, a town of Asia Minor, situated at the narrowest part of the Hellespont, opposite Sestos. It is celebrated as the place near which Xerxes and his vast army passed into Europe in 480 B.C.; also as the scene of the story of Hero (q.v.) and Leander. The people of Abydos were proverbial for their effeminate and dissolute manners. 2. A city in Upper Egypt (Thebaïs), on the left bank of the Nile, on the main route of commerce with Libya. It is mentioned in the earliest Egyptian inscriptions, and, especially under the nineteenth dynasty, was a city of considerable extent and importance. Later it declined, and in the time of Strabo (q.v.), about the beginning of the Christian era, it was in ruins. This Abydos was celebrated as the burial place of Osiris (q.v.), and the bodies of pious Egyptians were brought thither for interment from all parts of Egypt. Magnificent temples, dedicated to Osiris, were built in this Abydos by Seti I and by his son Rameses II. In the temple built by the latter was found, in 1818, the first of the two famous tablets of Abydos, containing a list of Egyptian kings. The second and more important tablet was found in 1864 in the temple built by Seti I. The tablets are now in the British Museum. In recent years excavations conducted at Abydos by Amélineau and Flinders Petrie have brought to light important remains of the first Egyptian dynasty. See PETRIE, F., and also EGYPT.

AB'YDOS, BRIDE OF. A narrative poem in two cantos, by Lord Byron (published 1813). The heroine, Zuleika, is an Oriental character of ideal purity and beauty.

AB'YLA AND CAL'PE. See HERCULES, PILLARS OF.

ABYS'MAL ACCU'MULA'TIONS. Deposits which gather upon the bottom of the abysmal depths of the ocean. They consist chiefly of red and gray clays and the so-called oozes, which latter are combinations of the clays with the shells of minute organisms such as Radiolarians, Foraminifera, and Diatoms. For a more detailed description of these abysmal accumulations and other forms of deep-sea deposits the reader is referred to the article on OCEANIC DEPOSIT.

ABYSS' (Gk. *ἄβυσσος*, *abyssos*, bottomless, from *ἀ*, *a*, priv. + *βυσσός*, *byssos*, depth, bottom). A designation applied in the Greek translation of the Old Testament to the primitive "chaos" as described in Gen. i. 2. The Hebrew term—*tehôm*—occurs some 30 times, and was modified in the course of time to convey the notion of the "watery deep" in general surrounding the earth, on which, according to what ap-

pears to be a later conception, the earth was supposed to rest, and from which springs and rivers were fed. The situation of Sheol being, according to primitive Semitic ideas, in the depths of the earth, the term "abyss" is used in the New Testament (Rom. x. 7) as the designation for the abode of the dead, and then more specifically for the prison in which evil powers are confined (so in seven passages of Revelation, ix. 1, xi. 7, etc. See also Luke viii. 31). In the Revised Version of the New Testament the Greek term is rendered by "abyss," but in the Authorized Version and in both the Authorized and Revised Versions of the Old Testament expressions like "deep" and "bottomless pit" are employed.

ABYS'SAL FAU'NA. See DISTRIBUTION OF ANIMALS.

AB'YSSIN'IA. A country in East Africa, situated between the Red Sea and the Anglo-Egyptian Sudan, and extending from about 3° to 15° N. lat., and 35° to 43° E. long. (Map: Africa, H 4). It is bounded by the Italian colony of Eritrea on the north, French, British, and Italian Somaliland on the east and southeast, British East Africa on the south, and the Anglo-Egyptian Sudan on the west; but its boundaries heretofore could hardly be drawn with precision on account of the changes caused by foreign treaties and frequent wars. Since 1908, however, there has been an agreement between England, France, and Italy to preserve, so far as possible, the boundaries existing at that date in this territory, which they designate as "Ethiopia," the ancient title. It comprises the kingdoms of Tigré, Amhara, Gojam, and Shoa, with Kaffa, and Galla land, and Central Somaliland and Harrar as territorial dependencies. Its area is approximately 432,600 square miles. The western half of Abyssinia is a plateau region with ranges of mountains rising from it, and it is in this part that the controlling kingdoms lie. The altitude averages from 7000 to 7500 feet, with a deep central depression at Lake Tsana (q.v.).

Of the numerous mountain chains in this region only a few can be clearly traced. The Simen group, situated at the northern end of the country, and inclosed by the bend of the Takazzé, has an average altitude of about 10,000 feet and rises in Ras Dashan (Dajan), over 15,000 feet above the sea. South of the Simen group is another chain, the Talba Wakha, surrounded by the upper course of the Atbara (q.v.) on its emerging from Lake Tsana. This chain is inferior in height to the Simen, its greatest elevation being only about 9000 feet above the sea. The southern part of the plateau is less mountainous, but abounds in so-called "ambas," isolated rocky hillocks, most of them very precipitous and difficult of ascent. Although at present it includes no active volcanoes, the country in its entire aspect bears evidence of violent volcanic eruptions in some remote age. Even to-day numerous extinct volcanoes are to be found, with their craters half obliterated, and there are several hot springs in the vicinity of Mount Entoto, some of them with a temperature of 170°.

Among the rivers the most important are the Abai, or Blue Nile (q.v.), the Atbara, or Black Nile, the Takazzé, the main head-stream of the latter, and the Hawash. With the exception of the Abai, none of these rivers is navigable, and all are liable to sudden rises, often accompanied by great disasters. The largest lake is Tsana, called also Dembea.

In regard to climate and flora, the country may be divided into three zones. The first, embracing all the districts lying below the altitude of 4800 feet above the sea, and called Kollas, has an annual temperature ranging from 70° to 100° F., and an exceedingly luxuriant vegetation, including cotton, indigo, bananas, sugarcane, coffee, date palms, and ebony. The second zone, Woina Dega, includes all the country between 4800 and 9000 feet above the sea. It is characterized by a moderate temperature, ranging from 60° to 80° F., and its vegetation includes many of the grasses and cereals which flourish in Europe, besides oranges, lemons, olives, tobacco, potatoes, onions, the bamboo, the turpentine tree, etc. The third zone, Dega, which comprises all of the country situated above 9000 feet, has a temperature of 45° to 50°. It affords excellent grazing grounds, and its soil is well adapted for the cultivation of the hardier cereals.

The rainy season on the coast lands lasts from December to May. In the interior of the country there are generally two rainy seasons, one from April to June and the other from July to October. The climate is generally healthful.

The fauna is not inferior in variety to the flora. It includes, among other animals, the lion, the elephant, the rhinoceros, the giraffe, the leopard, a species of wolf (the kaberu), the hyena, hippopotamus, zebra, and several forms of antelopes. Consult Blanford, *Geology and Zoölogy of Abyssinia* (London, 1870). Among the domestic animals may be mentioned the horse, mule, donkey, camel, ox, sheep, and goat.

Geologically the surface of Abyssinia is composed mainly of sandstone, together with granite, basalt, trachyte, and other varieties of igneous rocks. The minerals include gold, which is found mostly in the streams, and also iron, coal, silver, and rock salt. For further information about the geology of Abyssinia, see AFRICA and GREAT RIFT VALLEY.

Industries. The soil of Abyssinia is very fertile, yielding two and sometimes three crops a year, and agriculture, especially in the north and among the Gallas, is the leading industry. The land is divided, not among individuals, but among families, and is subject to imperial or ecclesiastical control. The agricultural methods employed are of the most primitive kind. Various cereals are produced, the most important being barley, teff, and wheat. Numerous vegetables are raised, and coffee is a valuable crop, the fine Harrar-Mocha variety coming from the Harrar highlands. Different kinds of fruit, such as oranges, lemons, bananas, etc., are found in abundance. The raising of live stock, including sheep, goats, horned cattle, horses, and mules, is a very important industry. Most of the sheep are not wool-bearing. There are no manufacturing industries.

Trade. Foreign trade is entirely in the hands of foreign merchants, and is not considerable, as, until recently, the buying was done almost exclusively by the Emperor and his court. The increased security of life and property, however, which the Abyssinians enjoyed under Emperor Menelek, prompted an increasing number of them to part with their buried treasures of gold and silver in exchange for all kinds of goods. The value of the foreign trade is unknown, but is variously estimated at between $5,000,000 and

$10,000,000 a year; imports and exports about balancing each other. Jibuti forms the chief avenue of trade. Great Britain and the United States are the two leading sources of imports. France and Germany come next. The leading articles of import are cotton, silk, and arms. The chief articles of export are coffee, gold, ivory, skins, wax, and butter. Coffee is exported chiefly to Arabia, gold to India. The chief obstacles to trade are the primitive means of communication, resulting in slow and expensive transportation. A railway from Jibuti to Dire Dawa, 187 miles (of which 111 miles are in Abyssinia) was opened in 1902. Dire Dawa is about 25 miles from Harrar. The line is to be extended to Addis Abeba, and reached the Hawash River in 1912. It is constructed entirely by French capital. There are more than 1000 miles of telegraph line, connecting Addis Abeba and other towns with Jibuti, Massaua, and Harrar. The capital is also connected with Harrar by telephone.

The chief medium of exchange until about the beginning of the present century was the Maria Theresa dollar. Salt bars of uniform size and cartridges also circulate. A new currency introduced by the Emperor in 1894, with the Menelek dollar, or tabari, worth about 50 cents, as the standard, has gradually come into use. The Bank of Abyssinia, which was chartered in 1905 and has a capital of £500,000, was granted the privilege of minting the Abyssinian coinage, of issuing legal tender bank notes, and of engaging in all commercial, industrial, and financial transactions. The capital of the bank was mainly provided by the Egyptian National Bank, and it was expected to offset the influence acquired by France through the construction of the railway from Jibuti.

Government. In its form of government Abyssinia may be considered a sort of feudal monarchy. Menelek, the Emperor, or *negus negusti* ('king of kings'), was undoubtedly the real ruler of Abyssinia; but this position he owed more to his personal qualities than to any traditional rights. In 1907 a ministerial cabinet was established. Certain parts of the country are ruled by princes, or *rases*, some of them appointed by the Emperor, while others are sufficiently strong to defy his authority and may throw the country into a state of disorder at his death. The *rases* have retinues of supporters. This class of professional warriors, whose usefulness lasts as long as there are any insubordinate tribes to pacify, is a great hindrance to the development of the country. The revenue is derived from import duties, tithes paid in kind, and taxes on commodities, especially gold and ivory sold in the market. The collection of taxes is intrusted to the governors of the villages or *shums*, who are practically unrestricted as to the methods used or amounts collected. The legal system is supposed to be based on the Justinian code. Punishments are of barbaric severity. Blood feud still prevails. The Abyssinian army, numbering about 150,000, is largely composed of cavalry and is very well adapted for swift movements, as it is not encumbered by any commissariat, its maintenance being obtained from inhabitants of regions through which it passes. This system naturally makes for abuses. The regular army may be supplemented by irregular and provincial troops in case of need.

The political divisions of the empire, which are subject to alteration, consist of provinces, or kingdoms, and dependencies; the following are the most important: (1) The kingdom of Tigré, occupying the northern part of the country north of the river Takazzé or Bahr-el-Aswad ('Black River'). Its chief towns are Antalo and Adowa. (2) The kingdom of Amhara, extending on the west of the Takazzé and including Gojam, which lies within the great curve of the Abai (upper course of the Blue Nile). The capital, Gondar, is situated in the northeast of the plain of Dembea or Gondar, at an elevation of about 7500 feet. (3) The kingdom of Shoa (including Efat), lying southeast of Amhara and separated from the Galla tribes by the Hawash. This is, by all accounts, the best organized and most powerful state now existing in Abyssinia.

Addis Abeba, founded by Menelek in 1892 as the capital of the country, has 60,000 to 80,000 inhabitants. The residence of Menelek was at Addis Alam, 20 miles west of Addis Abeba.

Population. The population is unknown; the estimates ranging from 3,500,000 as high as 8,000,000. The location of the people between the Nile and the Red Sea permitted the commingling of Hamites from the north, Himyaritic Semites from Asia, and negroes from the south. The Abyssinians are of medium stature; in color they vary from brunette to translucent black. The principal language of the upper classes is the Amharic, closely allied to the ancient Geez (still used in ritual), and is written in a syllabary resembling that of the old inscriptions in Yemen, Arabia. The Amharic is the language of the court. (See AMHARIC LANGUAGE.) Of the same stock are the Tigré and Tigriña tongues. The language of the common people throughout a great part of the country is the Agao, or Agau, a Hamitic tongue. The Gallas, who form an important element in the population, likewise speak a Hamitic language. The Abyssinians are in the hand epoch of the iron age. Polygamy prevails extensively. They have little that deserves the name of literature. Education is in the hands of the clergy. The national religion is a perverted Christianity, introduced into the country in the fourth century. The tribe of the Falashas profess Judaism. The Gallas are Mohammedans.

History. Approximately the northern half of modern Abyssinia is a part of the ancient and vaguely defined Ethiopia. (For its ancient history, see the article on ETHIOPIA.) The people still call themselves Ethiopians, the name Abyssinians, by which they are generally known outside their own borders, being a Portuguese form of the Arabic *Habsh* or *Habesh*, signifying 'mixture,' and referring to the diverse tribes which compose the population. The traditions, customs, and language point to an early and intimate intercourse with the Jews; and the Book of Kings professes to record the rulers down from the Queen of Sheba and her son Menelek by Solomon, King of Israel; but this book is not to be depended upon unless corroborated by independent evidence. Greek influence was introduced through an invasion by Ptolemy Euergetes (247–221 B.C.). In the fourth century Christianity was introduced, and Frumentius, who had been instrumental in its introduction, was consecrated as a bishop by Athanasius, patriarch of Alexandria, about 341, and became, as Abuna Salamah ('our father of peace'), the head of the Abyssinian church, with his seat at

Axum, then the capital. The Coptic rite, older than that of Rome or Moscow, has prevailed in Abyssinia to the present day, in spite of efforts to introduce other forms of Christianity made by the Jesuits in the sixteenth century and by representatives of Protestant churches in later years. The head of the church is still the abuna, who is sent from Alexandria; but he shares his ecclesiastical authority with the native Echegheh, or head of the monastic bodies. Monasticism of the Oriental type was introduced about the year 470, and became a permanent feature of the life of the country. The monks number about 12,000. In the sixth century the King of the Homerites, an Arab convert to Judaism, began a persecution of the Christians, and King Elesbaas, or Caleb of Axum, invaded Arabia, and conquered Yemen, which was ruled as a province of Abyssinia for 67 years.

This was the most flourishing period of Abyssinia; its influence then reached farthest and it was most in touch with the outside world. In 590 the overthrow of Abrahah, the last Abyssinian ruler of Yemen, left Arabia open for the spread of Mohammedanism, which soon isolated Abyssinia from the outside world and from the influences that had been urging it forward. Its civilization was thus left in a primitive, half-barbarous condition. A line of usurpers took the place of the ancient sovereigns in the tenth century and reigned until about 1300. In the reign of Naakweto Laab, the last of this line, Tekla Haimanot, an ardent patriot, who possessed great influence because of the dignity of his character and the unselfishness of his life, succeeded in negotiating a treaty between the King and the representative of the old line, which still held the government of Shoa, by which Naakweto Laab agreed to abdicate, receiving in return a certain mountainous province as a hereditary possession and the right of sitting on the same kind of chair as that used by the sovereign. By the same treaty one-third of the kingdom was granted to the clergy, and it was provided that no native should ever be abuna, but that the office should be filled by appointees of the Patriarch of Alexandria. This was an attempt to renew some connection with the outer world and shows that the more intelligent Abyssinians keenly felt their isolation. The rise of the Mohammedan power cut Abyssinia off from the coast; the invasion of the rude Gallas from the south in the sixteenth century introduced an alien race into the country, which has always been a disturbing element. The true Abyssinian type was produced probably by a mingling of the African Hamitic and the Asiatic Semitic stocks, which here came into contact.

Portuguese Jesuit missionaries came into the country in the sixteenth and seventeenth centuries, and Portugal took much interest in Abyssinian affairs, assisting the negus against his enemies, the Turks. The attempt of the Jesuits to supplant the old faith with that of Rome was intensely displeasing to the Abyssinians, who have always clung loyally to their national church. The Jesuits were expelled in 1633, and Abyssinia relapsed again into practical isolation until the nineteenth century. Occasional African explorers entered Abyssinia from the fifteenth to the nineteenth century (see BRUCE, JAMES), and some remained, voluntarily or constrained by the laws of the country, which at times were hospitable to the admission of travelers, but did not allow their departure. In the middle of the nineteenth century the power was in the hands of Ali, a *ras* or prince of the barbarous Gallas, when it was seized by Lij ('Mr.') Kasa, an adventurer who was crowned as negus with the name of Theodore in 1854. He was at first very friendly to the English, and acted to a great extent under the advice of the English consul, Mr. Plowden; but meeting difficulties in his task of imposing unity upon the disorganized country, he became morose, and taking offense at the neglect by the British government of a letter sent by him to Queen Victoria, he imprisoned Mr. Cameron, then British consul, and his suite, and followed this by seizing and holding the members of the mission sent by the British government under Mr. Rassam to negotiate for freeing the consul. After prolonged and useless attempts at negotiation, an army of English and Indian troops, under Sir Robert Napier, invaded the country and, in a vigorous campaign, captured Magdala, Theodore's chief stronghold, and released the prisoners (April 13, 1868). Theodore at once committed suicide. He was succeeded by John, ras of Tigré, who proved unequal to the task of quelling rebellion. He fell in 1889 in battle with the dervishes of the Sudan, his body was captured, his head was cut off and raised on a spear and with the heads of his generals and ministers was sent to the Kalifa. Menelek II, ras of Shoa, who claims to represent the old line of kings, obtained the crown.

Italy, eager for lands, began to look in this direction as early as 1870 and, having occupied several hundred miles of the Red Sea littoral about Massawa (1881–85), commenced aggressions upon Abyssinian territory, which would have resulted in open war but for the intervention of England, through the friendly mission of Sir Gerald Portal. The Italians claimed a protectorate over Abyssinia by virtue of a clause in the treaty of Uchali (1889), which read differently in the Amharic and Italian versions. Menelek denounced this treaty in 1893, and when the Italians occupied Kassala in the following year, as an outcome of the Anglo-Italian agreement of 1891, defining the spheres of influence of the two nations, Abyssinia renewed hostilities (1895). After sustaining a terrible defeat at Adowa, March 1, 1896, Italy was compelled, in the treaty of Addis Abeba (Oct. 26, 1896), to recognize fully the independence of Abyssinia. In 1897 Great Britain ceded a portion of Somaliland to the Abyssinian government, and in the following year the equatorial province of Kaffa was erected. The boundary towards Eritrea on the north and northeast was fixed by agreement with Italy in 1900, 1902, and 1908, and in May of the latter year the boundary between Abyssinia and the Sudan, down to about 6° north latitude, was regulated by agreement with Great Britain, the Emperor agreeing at the same time to permit the construction of a railway through his territories connecting the Sudan and Uganda, a valuable concession in view of the difficulties that would be connected with an attempt to carry the Cape-to-Cairo Railway through the swamp lands of the Upper Nile. A treaty of commerce was concluded with the United States in December, 1903 (negotiated by Robert P. Skinner, U. S. Consul at Marseilles), and with Germany in March, 1905. In order to end the rivalry between claimants to the succession, Menelek in 1908 proclaimed as

ACACIA, ETC.

1. ALOE (Aloe vera).
2. ACONITE (Aconitum napellus).
3. ACACIA (Acacia arabica; var. niliotica).
4. ARNICA (Arnica montana).

his heir his grandson, Lij Yasu (born 1897), who soon thereafter, on account of the Emperor's illness, assumed direction of the government.

Consult: Wylde, *Modern Abyssinia* (London, 1891); Vivian, *Abyssinia* (New York, 1901); Portal, *My Mission to Abyssinia* (London, 1892); Rassam, *Narrative of the British Mission to Abyssinia* (London, 1869); Markham, *A History of the Abyssinian Expedition* (London, 1869), containing an excellent summary of Abyssinian history; Vignéras, *Une mission française en Abyssinie* (Paris, 1897); Rohlfs, *Meine Mission nach Abyssinien* (Leipzig, 1883); Stanford's *Compendium of Geography and Travel*, vol. i (London, 1899); J. T. Bent, *The Sacred City of the Ethiopians* (London, 1893); Welby, *'Twixt Sirdar and Menelek* (London, 1901); "Consul Skinner's Mission to Abyssinia" in *National Geographical Magazine*, vol. xv (1904); Morié, *Histoire de l'Ethiopie* (Paris, 1904). See AFRICA, *History;* ITALY.

AB'YSSIN'IAN CHURCH, THE. The church founded about the middle of the fourth century by Frumentius (q.v.), whose titles Abuna ('our father') and Abba Salamah ('father of peace') are still used by his successors. The abuna, the head of the church, is never an Abyssinian, and is appointed by the Coptic patriarch of Alexandria, now resident at Cairo. He is bishop of Axum. In Christology the church is separated into three divisions, one of which is monophysite, while the others hold that Christ's divinity was a special gift of God to the man Jesus. The secular priests are allowed to marry once; circumcision, the Sabbath, and the Levirate law are adhered to. Baptism (of adults by trine immersion, infants by aspersion) and the Eucharist (in which grape juice is exclusively used) are accepted; but confirmation, transubstantiation, extreme unction, purgatory, crucifixes, and image worship are all forbidden. There are 180 festivals and 200 fast days. The Scriptures are read in Geez or Ethiopic, which is now a dead language. The church contains a very large amount of pagan survivals, in the cult of spirits and of the dead, and in magical practices. Its Christianity is perhaps the most corrupt of that of any existing church. See the *Publications of the Princeton Expedition to Abyssinia*, edited by Enno Littmann (Leyden, 1910); Dowling, *The Abyssinian Church* (London, 1909).

ABYSSINIAN MEAD'OW GRASS. See MEADOW GRASS.

ACACIA, â-kā'shâ (literally, thorny, Gk. *ἀκίς, akis*, point, splinter, thorn). A genus of plants of the family Leguminosæ, by some referred to the family Mimosaceæ, differing from Mimosa in the greater number of stamens (10 to 200) and the absence of transverse partitions in the pods. There are about 450 species of acacia, 300 of which are indigenous to Australia and Polynesia. The others are found in all tropical and sub-tropical countries except Europe. The flowers are small and are arranged in globular or elongated clusters. The leaves are usually bipinnately compound; but in many of the Australian species the leaflets are greatly reduced and the leaf blades correspondingly enlarged and flattened into what are termed phyllodia. Most of the species having phyllodia inhabit hot, arid regions, and this modification prevents too rapid evaporation of moisture from the leaves. Many of the species are of great economic importance; some yield gums, others valuable timber, and still others food products. The African species, *Acacia gummifera*, *Acacia seyal*, *Acacia ehrenbergiana*, *Acacia tortilis*, and *Acacia arabica*, yield gum arabic, as do the Asiatic species, *Acacia arabica* and the related *Albizzia lebbek*. A somewhat similar gum is produced by *Acacia decurrens* and *Acacia dealbata* of Australia and *Acacia horrida* of South Africa. Gum senegal is the product of *Acacia verek*, sometimes called *Acacia senegal*. The drug "catechu" is prepared from *Acacia catechu*. The astringent bark of a number of species is extensively used in tanning, especially the bark of those known in Australia as wattles. For this purpose *Acacia decurrens*, the black wattle, is one of the best, the air-dried bark of this plant containing about four times as much tanning extract as good oak bark. The cooba (*Acacia saligna*) is another of the important wattle trees. The most valuable timber tree of the genus is probably the blackwood (*Acacia melanoxylon*) of Australia. The tree attains a large size, and the wood is easily worked and takes a high polish. The koa (*Acacia koa*) is one of the important timber trees of Hawaii and is highly prized for cabinet work. A number of the acacias have been introduced into cultivation in Europe and America, where they thrive. The California experiment station recommends planting several species for tanning extract and for timber. A number of species are grown in mild climates and in greenhouses as ornamentals, partly because of the fragrance of their flowers. The common American Robinia or locust (*Robinia pseudacacia*) and the *Robinia hispida* are known as acacia and rose acacia in Europe and elsewhere. Fossil forms of acacia are abundant in the Tertiary beds of Aix in France, and an allied genus, Acaciæphyllum, has been described from the cretaceous beds of North America. Consult: F. von Mueller, *Iconography of Australian Acacias* (Melbourne); L. H. Bailey, *Cyclopædia of American Horticulture* (New York, 1900–01); G. Nicholson, *Illustrated Dictionary of Gardening* (London, 1884–89).

ACACIANS, â-kā'shĭ-ənz *or* â-ka'shənz. See ACACIUS.

ACACIUS, â-kā'shĭ-ŭs, Bishop of Cæsarea (340–365). He founded a sect, named after him, which maintained that the Son was *like* the Father; not of the same or of similar substance, but that this likeness was in the will alone. Thus he differed from the general Arian party. His doctrine was actually accepted by a synod at Constantinople, which he manipulated (359), which gave rise to Jerome's famous saying: "The whole world groaned and wondered to find itself Arian." Yet in the end, as formerly, it was condemned, and he was exiled. See Gwatkin, *Studies in Arianism* (Cambridge, 1900).

AC'ADE'MIA (Gk. *Ἀκαδήμεια* or *Ἀκαδημία, Akadēmia*). See ACADEMUS.

AC'ADEM'IC LE'GION. A name applied particularly to an armed body of students who participated in the uprising of 1848 in Vienna; also more generally to similar student companies elsewhere in the revolutionary disturbances of that year.

ACADEMIE DES BEAUX ARTS, â'kâ'dâ'mê' dâ bō'zär'. See ECOLE DES BEAUX ARTS.

AC'ADE'MUS (Gk. *Ἀκάδημος, Akadēmos*). A mythical hero of Attica. When the Tyndaridæ invaded the Attic land to rescue Helen (q.v.) from the hands of Theseus, Academus revealed to them the place where their sister was hidden.

In return for this act the Lacedæmonians then and thereafter showed the hero great honor. The Academia was thought to have received its name from Academus, though the earlier form of its name, Hecademia, seems to point to an original Hecademus. The Academia was in early times a sacred precinct of Athena, 6 stades northwest of the Dipylon gate of Athens (q.v.), itself on the northwest side of the city. Later, a gymnasium was built in the precinct, and still later the spot was made a public park, being planted with many kinds of trees, adorned with statues, watered by the Cephissus, and laid out in walks and lawns. Here, in the gymnasium and the neighboring walks, Plato conversed with his pupils and held his first formal lectures in philosophy. Later, having purchased in the neighborhood a piece of land and built thereon a temple to the Muses and a lecture hall, he transferred his school thither. This spot was also called Academia and gave its name to Plato's school. See ACADEMY.

ACAD'EMY (Gk. *ἀκαδήμεια, akadēmeia,* or *ἀκαδημία, akadēmia*). Originally the name of a public garden outside of Athens, dedicated to Athene and other deities and containing a grove and a gymnasium. It was popularly believed to have derived its name from its early owner, a certain Academus, an eponymous hero of the Trojan War. It was in these gardens that Plato met and taught his followers, and from their place of meeting his school came to be known as the Academy. The later schools of philosophy which developed from the teachings of Plato down to the time of Cicero were also known as academies. Cicero himself and many of the best authorities following him reckoned but two Academies—the Old, founded by Plato (428–348 B.C.), and including Speusippus, Xenocrates of Chalcedon, Polemo, Crates, and Crantor; and the New, founded by Arcesilaus (241 or 240 B.C.). Others have, however, reckoned the latter as the Middle Academy and added a third, the New Academy, founded by Carneades (214–129? B.C.). Others again have counted no fewer than five, adding to the three just mentioned a fourth—that of Philo, and a fifth—that of Antiochus. (See PLATO; ARCESILAUS; CARNEADES; PHILOSOPHY; and references under the last.) From its use in the sense of a school the word "academy" has come to be applied to certain kinds of institutions of learning; from its use in the sense of a body of learned men it has come to be applied to various associations of scholars, artists, literary men, and scientists organized for the promotion of general or special intellectual or artistic interests. Not only was the name applied particularly to the followers of Plato, but it soon came to be given also to general societies of learned men unconnected with a philosophical school. In the Middle Ages the name and institution survived not merely among the Arabs, particularly in Spain, but, passing over the fable of Alfred's foundation of an academy at Oxford, we find such an institution under the name of academy among the group of scholars whom Charlemagne gathered around him.

At the Renaissance the academy sprang into sudden prominence as a favorite form of intellectual organization, taking its place as an intellectual force beside the universities. From these it differed, however, as it still does, in being not a teaching body but a group of investigators, who, generally under royal or state patronage, encouraged learning, literature, and art by research and publication. Laying aside the claims of Alost to a society of scholars in 1107 and that of Diest to a society of poets in 1302, academies of this type seem to have first appeared in Italy and to have been devoted to literature, art, and architecture. The Academy of Fine Arts, founded at Florence about 1270 by Brunetto Latini; that of Palermo, about 1300, by Frederick II; and the Academy of Architecture of Milan (1380?), were among the first of these. Language and literature were not far behind. The so-called Academy of Floral Games (Académie des Jeux Floraux), founded at Toulouse about 1325 by one Clemens Isaurus as a part of the great Troubadour movement, was probably the earliest of these literary academies and has had an almost continuous history till the present day. With this exception the earliest academies rose in Italy, and found their prototype in that brilliant group of scholars, critics, and literati gathered at the court of Lorenzo de' Medici, the Magnificent, and Cosmo de' Medici in Florence, the so-called Platonic Academy which, founded about 1474, was dissolved in 1521. It was succeeded in Florence by the Academy of Florence, formed in 1540 especially for the study of Tuscan, particularly Petrarch. Before the Platonic Academy of the Medici only Naples boasts an earlier academy—that founded by Alfonso V about 1440. But the sixteenth century was rich in academies devoted to literature. The Intronati of Siena, 1525; the Infiammati of Padua, 1534; the Rozzi of Siena, later suppressed by Cosmo de' Medici, 1568; and the Accademia della Crusca or Furfuratorum, founded at Florence in 1582 and still in existence, the most famous of them all, are perhaps the best known of that astonishing burst of academic vigor which produced in the sixteenth century in Italy a number variously estimated from 170 to 700 of this form of organization. In these, under curious names but with a common purpose, the Italian aristocracy especially, barred from political interests by tyrants and republics alike, found vent for their activity.

One academy of distinction alone devoted to science appears in this period, the Academia Secretorum Naturæ, founded at Naples in 1560, but after a short existence suppressed by the Church. It was succeeded by the Accademia de' Lincei, founded by Prince Chesi in 1603, counting Galileo among its members and still existing in Rome after many changes. The foundation of this society heralded that great burst of interest in sciences of the seventeenth and eighteenth centuries which to some extent replaced the purely literary activity of the sixteenth. The Reformation had destroyed or altered much of the ecclesiastical power which had served to check investigation earlier, and the foundation of several societies indicated a new interest in science. Of these the Academia Naturæ Curiosorum, Leipzig, established by Dr. J. L. Bausch in 1651–52, still exists under the name of Cæsareo-Leopoldinia, in honor of the Emperor Leopold I, who patronized it liberally. Since 1808 it has had its headquarters at Bonn. The Royal Society (q.v.) in England, the Academy of Sciences in Paris, the Academy or Collegium Curiosum established by Professor Sturm of the University of Altdorf, and similar institutions brought about an astonishing increase of interest and consequent advance in scientific pursuits and methods. Indeed the importance

of these academies to science can hardly be overestimated.

This was maintained in the eighteenth century, when the establishment of academies was further stimulated by the influence of Louis XIV, as important in this as in so many other intellectual and political interests throughout Europe. In this, however, as in so many other ways, he and his ministers but carried further the plans of their predecessors. In 1635 Richelieu established the most famous of all such organizations, the old French Academy, which had its inception six years before in the minds of eight men of letters. It consisted of 40 members, with a director, a chancellor, and a secretary, and its avowed purpose was to control the French language and regulate literary taste. Its constitution provided for the publication of a grammar, a treatise on rhetoric, and one on poetry, besides a dictionary of the French language. Though its condition has been somewhat changed, it is the same in all essentials to-day as it was at its foundation. In this plan Richelieu was copied, as usual, by his successor, Mazarin, who established the Academy of Painting and Sculpture (the present Academy of Fine Arts) in 1648. It was opened in 1664 by Colbert, who in 1671 founded the Academy of Architecture, later merged into the Academy of Fine Arts. Colbert founded also the Academy of Inscriptions and Belles Lettres in 1663, as a committee of the old academy to draw up inscriptions for monuments and medals to commemorate the victories and glories of Louis XIV, the Academy of Sciences and the Academy of France at Rome in 1666. The Academy of Inscriptions was remodeled in 1706. All these, save the last, together with the Academy of Moral and Political Science, founded in 1832, came to form the Institute of France (q.v.). To Louis XIV other cities in France, notably Montpellier in 1706, owed the charters of their academies.

Owing largely to these two causes, that is to say, the interest in science and the fashion of royal patronage set by Louis XIV, the foundation of academies reached its height in the eighteenth century, especially in Germany and the north and east of Europe. Frederick I of Prussia founded the Royal Academy of Sciences in Berlin in 1700 on a plan drawn up by Leibnitz, its first president. That savant, too (together with Wolff, his great German contemporary), aided in drawing up the scheme adopted by Peter the Great and carried out by Catharine I in the foundation of the Imperial Academy of Sciences at St. Petersburg in 1725. In 1739 the Academy of Sciences of Stockholm was established, with Linnæus as a most distinguished member, and was incorporated in 1741 as the Royal Swedish Academy. In 1742 Christian VI founded the Royal Academy of Copenhagen. In 1750–51 the Göttingen Academy of Sciences was established; in 1754 came the Electoral Academy at Erfurt; in 1755 the Academy of Sciences of Mannheim was founded by the Elector Palatine, Karl Theodor, and in 1759 the Electoral Bavarian Academy of Sciences was founded at Munich. In Italy the Royal Academy of Sciences of Turin originated in 1757 as a private society, receiving royal recognition in 1783. Not merely were academies founded in the broad field of science, embracing in its earlier sense all human knowledge, but they were established for all imaginable special purposes. In surgery the Surgical Academy of Paris, 1731, and the so-called Academy of Surgery at Vienna, 1784, more properly a college, are the most prominent examples. In archæology and history we find the Royal Academy of History established at Madrid in 1738, the Archæological Academy of Upsala founded in 1710, that of Cortona in 1727, and that of Herculaneum at Naples in 1755. In literature the Royal Spanish Academy, founded by the exertions of the Duke d'Escalona in 1713 or 1714, and the Royal Academy of Savoy, founded by Charles Felix in 1719, are the most prominent of numerous similar institutions, including those of St. Petersburg of 1783 (later a part of the Imperial Academy) and Stockholm in 1786. In music and the fine arts, the departments to which the name has been especially applied in England, the Royal Academy of Arts was founded in 1768, with Sir Joshua Reynolds as its first president, the Academy of Arts at Milan, that of painting and sculpture and architecture at Madrid by Philip V, the Swedish Academy of Fine Arts by Count Tessin in 1733, and the Academy of Painting and Sculpture at Turin in 1778.

During the nineteenth century a smaller number of such organizations were founded, partly because the field was already well covered, partly because other forms of activity or the same form of institution under a different name took their place. (See SOCIETIES; ADVANCEMENT OF SCIENCE, ASSOCIATIONS FOR THE.) The Royal Hibernian Academy, founded in 1803, the English Royal Academy of Music, founded in 1822 and incorporated in 1830, and the Royal Scottish Academy, founded in 1826 and chartered in 1838, represent the English activities in this field. The Philadelphia Academy of Sciences, founded in 1812 and incorporated in 1817, and the Vienna Academy of Sciences, founded in 1846, are among the most important scientific foundations of the last century. The Celtic Academy of Paris, founded 1800 to 1805 and merged in 1813 into the Society of Antiquaries of France, and the Academy of History and Antiquities of Naples, founded by Joseph Bonaparte, represent the Napoleonic period. The Academy of Medicine of Paris, founded in 1820 for research into matters affecting public health, has rendered excellent service to the community generally. But the most important event in academic organization of that century was the reorganization of the French Academy into the Institute of France (q.v.). The French Academy, as now constituted, represents the old academy of Richelieu, though it is reckoned officially as the highest of the five divisions of the Institute. Its membership in 1914 was as follows, in order of seniority:

Alfred Mézières	Alexandre Ribot
Comte Othénin d'Haussonville	Maurice Barrès
Charles de Freycinet	Maurice Donnay
Julien Viaud (Pierre Loti)	M'is de Ségur
Ernest Lavisse	Francis Charmes
Paul Bourget	Jean Richepin
Jules Lemaître	Raymond Poincaré
Anatole France	Eugène Brieux
Comte Albert de Mun	Jean Aicard
Gabriel Hanotaux	René Doumic
H. E. L. Lavedan	Marcel Prévost
P. E. L. Deschanel	Mgr. L. Duchesne
Paul Hervieu	Henri de Regnier
Emile Faguet	Henry Roujon
Marquis C. J. Melchior de Vogüé	H. R. D. Cochin
	Hubert Lyautey
Edmond Rostand	Emile Boutroux
Frédéric Masson	Henri Bergson
René Bazin	Alfred Vincent Capus
Etienne Lamy	Pierre de la Gorce

It remains to notice in detail some of the other more important existing academies. The Royal Academy, Burlington House, London, the association of English artists, founded in 1768, holds an exhibition each year open to all artists of distinction and corresponding to the French Salon. It consisted in 1912 of 40 Academicians (R.A.) and 30 Associates (A.R.A.), the prescribed number. Sir Edward John Poynter has been its president since 1896. In 1902 the British Academy for the promotion of historical, philosophical, and philological studies was founded at London. Its maximum membership is 100, and it is divided into four sections—history and archæology, philology, philosophy, jurisprudence and economics. The Royal Academy of Sciences at Berlin, founded under another name by Frederick I in 1700, owes its present statutes to the year 1881. It consists of two sections—physics-mathematics and philosophy-history. It has 67 regular, 20 foreign, 200 corresponding, and a number of honorary members. Its publications have appeared since its foundation. The Imperial Academy of St. Petersburg, founded in 1725, has three divisions—physics-mathematics, Russian language and literature, history-philology. It is richly endowed and offers yearly prizes for contributions to learning. It has a very large library and controls a number of museums. The Royal Swedish Academy of Sciences, founded in 1739 and incorporated under its present name five years later, has 100 native and 75 foreign members, and its work is divided into nine classes. The Royal Bavarian Academy includes theology, law, finance, and medicine among its activities, and has three classes—philosophy-philology, mathematics-physics, and history. The Imperial Academy of Sciences of Vienna, founded in 1847, comprises two classes—philosophy-history and mathematics-science—with frequent meetings and especially numerous and important publications. It is well endowed by private and State benefaction and is enabled to send out many scientific expeditions. The Kaiser Wilhelm Society for the Promotion of Science, founded by Kaiser Wilhelm II at Berlin in 1911, is the newest addition to the long list of scientific societies having governmental sanction and support.

In the United States there are fewer such societies. The earliest founded was the American Philosophical Society, organized in 1743 through the efforts of Benjamin Franklin, who was its first secretary and later, until his death, its president. The interests and the activities of this society covered the whole range of pure and applied science and of philosophy. The publication of its *Transactions* began in 1771 and of its *Proceedings* in 1838. At present the society has 200 resident and 300 non-resident members. The American Academy of Arts and Sciences was chartered by the Legislature of Massachusetts in 1780, largely through the influence of John Adams. Its attention was devoted to the study of the antiquities and the natural history of America. It has published a series of memoirs since 1785 and *Proceedings* since 1846. The Connecticut Academy of Arts and Sciences was founded in 1799 and the Philadelphia Academy of Natural Science in 1812. The latter has a very valuable library and museum, especially rich in conchology and ornithology, and has published *Journals* since 1817 and *Proceedings* since 1841, besides the *American Journal of Conchology*. The New York Academy of Science was founded in 1818 as the Lyceum of Natural History, receiving its present title in 1875. It is organized into the following four sections: Astronomy and physics, geology and mineralogy, biology and anthropology, psychology and philology. These sections hold monthly meetings, while the Academy holds general meetings and gives an annual exhibit of scientific progress that is of great value. Similar scientific academies have been organized in most of the large cities in the United States, but their influence is chiefly local. Such societies usually cover the entire field of the exact and the natural sciences, while special societies for particular sciences are now commonly formed. In recent years Washington has become the centre of scientific interest in this country. In 1898 its various scientific societies combined into the Washington Academy of Science. Other national scientific associations have been formed. In 1863 Congress chartered the National Academy of Sciences, which was designed to investigate scientific questions and to report thereon to the government. As a matter of fact, however, the Academy has not been frequently employed by the government. It holds two meetings annually and issues reports and memoirs. The membership of the Academy originally was limited to 50 members, but in 1870 this limitation was removed. In 1907 its resident membership was limited to 150, not more than 10 to be elected in a single year, and the number of foreign associates to 50. In 1912 the Academy had 124 regular and 42 associate members. The American Association for the Advancement of Science was organized in 1848 and is the most active and the largest of such associations. It now has 8100 members. In fine arts both Philadelphia and New York possess institutions under the name of academies, founded in 1805 and 1828 respectively, having schools of design and annual exhibitions. Many other such associations, under various names, exist in this country for the promotion of research and publication along literary and scientific lines. Of these the American Academy of Political and Social Science, of Philadelphia, is perhaps the most important. It was founded in 1889 and incorporated in 1891. It has a membership of over 6100, and its publications, under the title of *Annals*, are of unusual importance. See SMITHSONIAN INSTITUTION.

In the sense of a school or an institution of learning, the term "academy" has come to be applied particularly in the eastern part of the United States, to an educational institution ranking between the elementary school and the college. But the term is occasionally used elsewhere. John Milton, for instance, in his *Tractate on Education*, calls his ideal educational institution an academy. In England the term is applied to those institutions of secondary rank established by the dissenting religious bodies during the latter part of the seventeenth and in the eighteenth centuries to provide for the general education of their youth, especially those intended for the ministry, since such education could not be obtained in the existing public schools. In the United States the term was first applied to the institution founded in Philadelphia in 1749 under the leadership of Benjamin Franklin. This Academy and College of Philadelphia was chartered in 1753 and in 1779 became the University of Pennsylvania. The typical academies were those founded during the Revolutionary War period at Exeter, N. H., and

Andover, Mass., largely through the generosity of John Phillips, after whom they are named. Such academies became very numerous and took the place of the old Latin grammar schools, which had lost their popularity and serviceableness on account of the economic and political changes of the eighteenth century. They are controlled by trustees, usually of some one religious denomination, and are not dependent upon state support. Their place has been largely taken up by the modern high school; such as still exist have for the most part become college preparatory schools.

The term is also used much more widely in a looser sense, to indicate places where special accomplishments such as riding, dancing, or fencing are taught. A more restricted use is that in connection with schools preparing for particular professions, as the United States Military Academy at West Point. In France and the United States it is occasionally applied also to buildings devoted to particular arts, especially music (hence an opera house is often called an academy of music), and occasionally, by analogy, even to theatres.

Consult: D. M. Robertson, *The French Academy* (New York, 1910); *Minerva; Official Year-Book of Scientific and Learned Societies of Great Britain and Ireland; Whitaker's Almanack; Almanach National;* Steeves, *Learned Societies and English Literary Scholarship in Great Britain and the United States* (New York, 1913); Ornstrin, *The Rôle of the Scientific Societies in the Seventeenth Century* (New York, 1913); Mahaffy, J. P., "On the Origin of Learned Academies in Modern Europe" (Royal Irish Academy, *Proceedings*, Dublin, 1913, vol. xxx, Sec. C, pp. 429–444).

ACADEMY OF ARTS AND LETTERS, AMERICAN. A body founded in 1898 by the action of the American Social Science Association, which, at its annual meeting in that year, nominated a small group of authors and artists to constitute a National Institute of Arts and Letters. The qualification for membership in this body was to be a notable achievement in art, music, or literature. The membership was at first limited to 150, but was afterwards increased to 250. When the institute had included in its membership a large proportion of the most notable artists and writers of the United States, it proceeded to organize an Academy of Arts and Letters, the members of which should be chosen from the membership of the Institute. In 1904 the first seven members were chosen, and provision was made for the progressive responsibility of the choice of those elected later. The first seven were William Dean Howells, Augustus Saint Gaudens, Edmund Clarence Stedman, John La Farge, Samuel Langhorne Clemens, John Hay, and Edward A. MacDowell. These were empowered to elect more members, and the 15 thus chosen five more. This method of election continued until the entire membership of 50 was completed.

The constitution of the Academy declares that its aim is to further and represent the interests of fine arts and literature. In 1909 was held the first of a series of public meetings to be held annually in different cities.

The living members of the Academy in 1913 were as follows:

William Dean Howells	Theodore Roosevelt
Henry James	John Singer Sargent
Henry Adams	Alfred Thayer Mahan
Thomas Raynesford Lounsbury	Daniel Chester French
John Burroughs	Elihu Vedder
James Ford Rhodes	George Edward Woodberry
Horatio William Parker	Kenyon Cox
William Milligan Sloane	George Whitefield Chadwick
Robert Underwood Johnson	Abbott Handerson Thayer
George Washington Cable	John Muir
Andrew Dickson White	Charles Francis Adams
Henry van Dyke	Henry Mills Alden
William Crary Brownell	George deForest Brush
Basil Lanneau Gildersleeve	William Rutherford Mead
Woodrow Wilson	John W. Alexander
Arthur Twining Hadley	Bliss Perry
Henry Cabot Lodge	Abbott Lawrence Lowell
Francis Hopkinson Smith	James Whitcomb Riley
Edwin Howland Blashfield	Nicholas Murray Butler
William Merritt Chase	Paul Wayland Bartlett
Thomas Hastings	George Brown Post
Hamilton Wright Mabie	Owen Wister
Brander Matthews	Herbert Adams
Thomas Nelson Page	Augustus Thomas

The following, now deceased, were members of the American Academy of Arts and Letters: Augustus Saint Gaudens, Edmund Clarence Stedman, John La Farge, Samuel L. Clemens, John Hay, Edward MacDowell, Charles Follen McKim, Charles Eliot Norton, John Quincy Adams Ward, Thomas Bailey Aldrich, Joseph Jefferson, Richard Watson Gilder, Winslow Homer, Carl Schurz, Joel Chandler Harris, Daniel Coit Gilman, Donald Grant Mitchell, Julia Ward Howe, Francis Marion Crawford, Henry Charles Lea, Bronson Howard, Edwin Austin Abbey, Thomas Wentworth Higginson, William Vaughn Moody, Frank Davis Millet, Horace Howard Furness, John Bigelow, and Edward Everett Hale.

Two vacancies existed. The officers were William Dean Howells, president; William Milligan Sloane, chancellor; Robert Underwood Johnson, permanent secretary.

ACAD'EMY OF DESIGN', NATIONAL. See NATIONAL ACADEMY OF DESIGN.

ACA'DIA (Fr. *Acadie, L'Acadie,* or *La Cadie,* from the Micmac Indian word *ākāde,* abundance). See NOVA SCOTIA.

ACA'DIAN SE'RIES. See CAMBRIAN SYSTEM.

ACAJUTLA, ä'kä-hōōt'lä. A seaport in the department of Sansonate, Republic of Salvador, Central America, situated on the Pacific Ocean, 10 miles south of Sansonate and about 1000 miles from Panama (Map: Central America, C 4). It is the second port of Salvador in importance and is the outlet for most of the coffee and sugar export trade of Santa Ana. It is the seat of a consular agent of the United States.

ACALEPHÆ, ăk'ä-lē'fē (pl. of Gk. *ἀκαλήφη, akalēphē,* a nettle, a kind of jellyfish). A group of free-swimming, discoidal, or bell-shaped medusæ, the lobed jellyfishes, with downwardly directed mouth, gastro-vascular pouches, and numerous radial canals, and having, as a rule, the margin of the umbrella lobed; called Discophora by Huxley. See JELLYFISH.

AC'ANTHA'CEÆ (for derivation see ACANTHUS). A family of dicotyledonous plants embracing about 130 genera and 1600 species. It is found chiefly in the tropics, but also occurs in the south of Europe and the United States. The species are mostly herbs and shrubs, although a few become trees. Plants of this family frequent almost every situation, from marshes to the driest of conditions where plants are able to survive. The leaves are usually thin and entire, the flower parts in fours or fives, stamens often two, and styles two. The fruit is a two-celled capsule, upon the explosion of which the seeds are thrown out, aided by peculiar outgrowths from the base of their stalks. The chief genera are Nelsonia, Thunbergia, Strobilanthus, Ruellia, Blepharis, Acanthus, and Justicia.

ACAN'THITE (Gk. *ἄκανθα, akantha,* thorn). A silver sulphide that crystallizes in the orthorhombic system. It is iron-black in color and has a metallic lustre. It occurs with argentite and stephanite at various localities

near Freiberg in Saxony and is named from the peculiar shape of its crystals.

ACAN'THOCEPH'ALA (Gk. *ἄκανθα, akantha*, thorn, prickle + *κεφαλή, kephalē*, head). A class of parasitic roundworms belonging to the phylum *Nemathelminthes* and distinguished by an elongated cylindrical body and a proboscis armed with horny hooks. The class contains three families, viz., Gigantorhynchidæ, Neorhynchidæ, and Echinorhynchidæ. (*Echinorhynchus*) *Gigantorhynchus gigas* is parasitic in the small intestine of swine, and is said to be common in man along the banks of the Volga. Other species are found in ducks, aquatic birds, fish, etc.

ACANTHOPTERYGII, ăk'ăn-thŏp-tĕr-ĭj'ĭ-ī (Gk. *ἄκανθα, akantha*, thorn + *πτερύγιον, pterygion*, wing; pl., fins). One of the primary divisions of the osseous fishes (Teleostei). It includes many families, among which are largely the most specialized forms of fishes. They are characterized by the possession of spines in the anterior portion of the dorsal fin or in the first dorsal when two are present, and by the usual absence of a pneumatic duct connecting the air-bladder with the œsophagus. The ventral fins are generally thoracic, i.e., fastened to the shoulder. The acanthopterygian fishes include the perch, bass, mackerel, and similar forms.

ACAN'THUS (Lat., from Gk. *ἄκανθος, akanthos*, bear's breech). A genus that gives name to the family Acanthaceæ, and whose 25 or more species are found in southern Europe, tropical and subtropical Asia, Africa, and Australia. *Acanthus spinosus*, of southern Europe, is the species whose leaf is said to have suggested the ornamentation of the Corinthian column. In cultivation the acanthus is only semi-hardy and needs protection in England and in the United States north of Virginia.

In Architecture. The Greeks early applied the conventionalized *Acanthus spinosus* to decorative use, at first merely to mask the branch-

ACANTHUS.

a. Acanthus mollis. b. Acanthus spinosus. c. Greek acanthus architectural. *d.* Roman acanthus architectural. *e.* Acanthus scroll-nest or caulicolus.

ing of carved anthemion-scrolls, later to form highly decorative nests from which sprang the scrolls and anthemions on carved stele-heads (fourth century); and finally, as upright leaves with a slight outward curl, to decorate the bell of the Corinthian capital. The early examples resemble a thistle or cactus as much as a true acanthus. The Romans adopted the acanthus and Corinthian capital, and developed both into splendid types which have influenced nearly all subsequent styles. They greatly extended the applications and varied the forms of the acanthus, which in their hands resembles rather the *Acanthus mollis* than the *Acanthus spinosus*. It is thinner, more flexible, and more elaborately detailed than the Greek type, with more strongly accented ribs, "pipes," and "eyes," and with leaflets less acutely pointed. It became in Roman hands a purely conventional type, to whose variations the names "olive," "palm," etc. have been fancifully applied. The Romans of the Empire elaborated the Corinthian capital and the combination of the acanthus with branching scrolls which the French call the *rinceau;* they applied the leaf to countless uses, including the decoration of friezes, pilasters, and moldings, fresco painting, the ornamentation of table feet, of vases, candelabra, furniture, goldsmith work, and embroideries. It naturally passed into post-classical ornament, together with the Corinthian capital, and we find it in early Christian, Byzantine, and Romanesque art. In certain parts of Italy it preserved its purity until the Renaissance—especially in central and southern Italy—and in southern and central France it was superseded only by Gothic foliage, in which its influence is, however, often traceable. It was revived by the artists of the Renaissance, treated with remarkable richness of fancy, and has ever since been one of the most prolific and acceptable of ornament motives. See COLUMN; RINCEAU.

A CAPELLA, ä kä-pĕl'lä (It., in the church style). Music for voices without accompaniment, like the early Church compositions. The term is also used when the accompaniment is octaves or unison. As an indication of time it is equivalent to *alla breve* (q.v.).

A CAPRICCIO, ä kä-prēt'chō (It.). At the caprice or pleasure of the performer, regarding both time and expression. A musical term.

ACAPULCO, ä'kä-pōōl'kō (a corrupted abbreviation of the Latin name [*Portus*] *Acquæ Pulchræ* [Port of], beautiful water). A town on the Pacific coast, in Guerrero, Mexico, 231 miles southwest of the City of Mexico, of which it was formerly the Pacific port, on account of the excellence of its harbor (Map: Mexico, J 9). A remarkable engineering feat, the cut known as the Alera de San Nicolas, forms a passage-way through the nearby mountains. It was the chief centre of commerce with the Philippine Islands, as well as China and India, until the railroad between the City of Mexico and San Blas robbed it of most of its trade. It exports copper, fruit, and hides. Acapulco is 1437 miles from Panama. Pop., 1900, 4932; 1910, 5900.

ACARIASIS, ăk'ä-rī'ä-sĭs. See MANGE.

ACARINA, ăk'ä-rī'nä. See MITES.

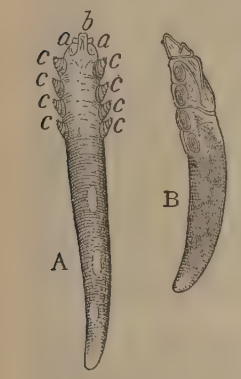
AC'ARNA'NIA (Gk. *Ἀκαρνανία, Akarnania*). A mountainous, wooded country of ancient Greece, separated from Epirus on the north by the Ambracian Gulf, now the Gulf of Arta, from Ætolia on the east by the river Acheloüs, and washed south and west by the outer Corinthian Gulf and the Ionian Sea. Its oldest inhabitants were of Illyrian stock. In the seventh century B.C. the Corinthians established colonies in Acarnania, at Leucas, Anactorium, and Ambracia. Thenceforth the civilization of Acarnania was Dorian in character. In the early years of the Peloponnesian War the Acarnanians sided with Athens; later they fa-

ACANTHUS, ETC.

1. ACANTHUS (Acanthus mollis, var. latifolius).
2. AFRICAN LILY (Agapantus umbellatus).
3. LOVE-LIES-BLEEDING (Amaranthus caudatus).
4. ALMOND (Prunus Persica).
5. WORMWOOD (Artemisia Absinthium).
6. ROCKY MOUNTAIN ADDER'S TONGUE (Erythronium grandiflorum).
7. PHEASANT'S EYE (Adonis autumnalis).

vored the Macedonians. They were naturally hunters and herdsmen and long remained behind the rest of the Greeks in culture. Along with Ætolia, Acarnania now forms one of the nomes or departments of the modern kingdom of Greece, with an area of 3013 square miles and a population of 141,405 in 1907. The western part of Acarnania—from the mouth of the Acheloüs or Aspropotamo to Cape Actium in the northwest—is occupied by a mass of rocky and thickly wooded mountains, rising abruptly from the indented coast and culminating in the summit of Berganti. A considerable part of Acarnania is overgrown with wood—a rare feature in modern Greece. It has no town of importance, though naturally the territory is not destitute of resources. Consult Oberhummer, *Akarnanien, Ambrakia, Amphilochien, Leukas im Altertum* (Munich, 1887); Swoboda, *Zur Geschichte von Akarnanien* (*Klio*, Leipzig, 1910, vol. x). See the first ALCMÆON.

AC'ARUS FOLLIC'ULO'RUM, or *Demodex*, or *Steatozoön folliculorum*, the comedo mite. A microscopic parasite residing in the sebaceous glands and hair follicles of the human skin. It was first described by Dr. Simon of Berlin in 1842. The title *Acarus folliculorum* was suggested by the zoölogist, Erichson of Berlin. According to Professor Owen, who gave it the name of Demodex, it represents the lowest form of the class Arachnida, and represents a transitional stage between the Annelids and the higher Articulata. They are met with in almost every person in varying numbers in the skin follicles of the nose, face, and less often in those of the back, breast, and abdomen. They vary in length from 1/50th to 1/100th of an inch. The accompanying figure represents the magnified parasite. The head is always directed inward. The animal possesses eight rudimentary thoracic appendages (*c*, *c*) each terminating in three short setæ. The integument of the abdomen is finely annulated. The mouth is suctorial or proboscidiform, consisting of two small spine-shaped maxillæ (*b*), and an extensive labium capable of being elongated or retracted; it is provided on each side with a short, thick, maxillary palp (*a*, *a*), consisting of two joints with a narrow, triangular labrum above. The sexes are distinct, but the differences between the male and female are ill defined. Ova are frequently seen in the body of the female or in detached masses. Acari may be examined by collecting between two pieces of thin glass the expressed fatty matter from a follicle and moistening it with a drop of olive oil before placing under a microscope. Identical animals have been found in the skin of dogs, hogs, and cattle. They damage cowhides in some instances. No treatment is requisite since no causative relation exists between them and human skin diseases.



(A) ACARUS FOLLICULORUM.
(B) DEMODEX MORNINIS.

ACASTE, ȧ'kȧst'. One of the characters in Molière's *Misanthrope* (q.v.); a self-satisfied young marquis who easily consoles himself when scorned as a suitor by Célimène.

ACASTO, ȧ-käs'tō. In Otway's tragedy of *The Orphan* (q.v.), a nobleman retired from the court who is the guardian of Monimia, the heroine, and father of Castalio and Polydore.

ACAS'TUS (Gk. *Ἄκαστος*, *Akastos*). A son of Pelias, King of Iolcus; one of the Argonauts and of the Calydonian hunters. He avenged the murder of his father (killed by his daughters at the instigation of Medea) by driving Jason and Medea out of Iolcus. See ARGONAUTS; JASON; MEDEA.

AC'ATHIS'TUS (Gk. *ȧ*, *a* priv. + *καθίζειν*, *kathizein*, to sit down). A hymn in honor of the Virgin, sung standing in the Greek church on Saturday of the fifth week in Lent, when the repulse of the Avars from Constantinople is celebrated.

AC'CAD (Hebrew 'Akkad'). One of the cities in the land of Shinar (q.v.), or Babylonia, mentioned in Gen. x. 10. It is identical with the city of Agade, or Akkad, the capital of Sargon (q.v.) and Naram Sin (q.v.), which was still in existence in the days of Nebuchadnezzar I (c.1130 B.C.). The modern site has not yet been found. Bereshith Rabba, Jerome, and Ephraem placed it at Nisibis. But it is more likely to have been located opposite Sippar (the modern Abu Habba). Among the titles of the kings of Babylonia and Assyria "king of the land of Shumer and Akkad" frequently occurs. It implies rule over all of Babylonia with its Sumerian and Akkadian inhabitants. The Akkadians were the earliest Semitic settlers in Babylonia. As the city of Agade, which may be the earlier Sumerian name, became their first great centre, they became known as Akkadians, and the name Akkad was extended to the northern part of Babylonia, while the south was called Sumer. Ethnically and linguistically they are distinct from the Sumerians who spoke the *lishan Sumeri*, or 'Sumerian language,' referred to in an inscription published by Bezold. It is generally supposed that they came into Babylonia from East Arabia, that they found the Sumerians already in possession of the land, and that the district they first occupied was called Akkad like the city. See Weissbach, in *Zeitschrift der deutschen Morgenl. Ges.* (1889, p. 661); C. F. Lehmann, *Shamash-shum-ukin* (1892); Louis Ginzburg in *Monatschrift für jüd. Wissenschaft* (vol. xliii, p. 468); R. W. Rogers, *History of Babylonia and Assyria* (1900); Ed. Meyer, *Geschichte des Altertums* (3d ed., I, 2, Stuttgart, 1913); King, *A History of Sumer and Akkad* (1910).

ACCA LARENTIA, ăk'ȧ lȧ-rĕn'shĭ-ȧ, **ACCA LARENTINA.** In the story of primitive Rome, the wife of Faustulus, shepherd of Amulius, King of Alba Longa, who found the twin infants, Romulus (q.v.) and Remus, and carried them to her to be nursed and brought up. But this is a later legend. In the primitive Latin mythology Acca Larentia was the cultus-heroine of the festival Larentalia, held in honor of the spirits of the dead —perhaps of the dead of the original Rome on the Palatine—on December 23, in which the pontifices and the flamen Quirinalis took part. The name of the festival, Larentalia, points to a goddess Larenta, perhaps identical with a Sabine goddess Larunda. Beside the Romulus-

Remus tale various other stories were attached to the name of Acca Larentia; one made her the beloved of Hercules, another described her as a *lupa*, or 'prostitute,' who bequeathed her profits to the people for the establishment of *ludi*, or 'public games.' It has been thought that to a confusion of *lupa*, 'harlot,' with *lupa*, 'she-wolf,' the story that Romulus and Remus were brought up by Acca Larentia was due. See Theodor Mommsen, *Römische Forschungen* (vol. ii); G. Wissowa in Müller's *Handbuch* (vol. v); W. W. Fowler, *Roman Festivals* (1899) and the "Year's Work" in *Classical Studies* (1907).

ACCAULT, ȧ'kō', MICHEL. A French explorer. He was a lieutenant of La Salle, at whose request he accompanied Louis Hennepin in the exploration of the upper part of the Mississippi in 1679. See HENNEPIN.

ACCELERANDO, *It. pron.* ät'châ-lâ-rän'dô. In music, with gradually increasing velocity of movement.

ACCEL'ERA'TION (from Lat. *ad*, to + *celerare*, to hasten). In theoretical mechanics, a term which denotes the rate of change of velocity at any instant with respect to the time, that is, the change of velocity in the next second of time if the rate of change is uniform; in other words, the change which would take place in the velocity in the next second if during that time the change were to continue at the same rate as at the instant considered. An example of acceleration is furnished by a body falling freely toward the earth. Its numerical value is about 981 centimeters, or 32.2 feet, per second in one second. Hence a body freely falling from a position of rest will, at the end of the first second, be moving with a velocity of 32 feet per second, at the end of the second second with a velocity of 64, at the end of the third second with a velocity of 96, and so on, provided, of course, it is falling in a vacuum, so that the presence of the air causes no retardation. In mathematical language, the acceleration is the limiting value of the ratio $\Delta v/\Delta t$, where Δv is the actual change in the velocity in the interval of time Δt seconds, as this interval is taken shorter and shorter. There are two kinds of acceleration, linear and angular, corresponding to the two kinds of motion, translation and rotation, and there are two types of each of these. See MECHANICS.

AC'CENT (Lat. *accentus*, from *ad*, to + *cantus*, singing, chant). A special stress laid upon one syllable of a word, by which it is made more prominent than the rest. In the Indo-European languages two kinds of accent are found, varying in quality—the musical, or pitch, and the expiratory, or stress. The first is found in Sanskrit and Greek (though in modern Greek it has changed to a stress accent), the second in Teutonic. In literary Latin, according to M. Vendryes (*Recherches sur l'histoire et les effets de l'intensité initiale en Latin*, Paris, 1902), there were both pitch and stress accents. The stress accent, to which is ascribed the elision of final syllables in Latin scansion, finally prevailed and became the accent of the vulgar tongue. It is thus that the loss of unaccented syllables and endings is explained in the transformation of Latin into French (Lat. *liberare* > Fr. *livrer*). In the modern Romance tongues (French, Spanish, Italian, etc.), the stress accent of vulgar Latin has changed again into a pitch accent. In the Celtic, Germanic, and Slavic languages the accent is, and probably always has been, a stress accent, which accounts for the numerous contractions common to those tongues (Ger. *pferd*, borr. fr. Low Lat. *paraveredus*). In the modern Scandinavian languages, especially Swedish, the tendency is toward a pitch accent. The accent may also be distinguished by its position, as free in Greek and primitive Teutonic and fixed in later Teutonic. In English the general tendency is to throw the accent back. In compound words the accent is usually on the first part, as in *courtyard*, *highway*. When the first part is a prefix, it receives the accent if the word be a noun or adjective; the root is accented if the word be a verb. This rule applies also to some other words, as *pres'ent* and *present'*. Borrowed words usually adopt the English accent, as *orator*, *presence;* but some recently borrowed French words retain the original accentuation, as *parole*, *caprice*. The absence of stress on final inflectional syllables has played an important part in the leveling of inflections. (See ENGLISH LANGUAGE.) Besides word accents, there is a sentence accent, by which some word in the sentence is given greater stress than the others. This is always a free accent, the position of the accent depending upon the meaning. In the sentence, "Where is he?" three different meanings can be given by shifting the position of the accent. The effect of sentence accent is often seen in the development of doublets, or words with a common origin, but a different form and meaning, as *to—too*, *of—off*. (See PHONETIC LAWS.) Accent is also the essential principle of modern verse. (See VERSIFICATION.) For the primitive Indo-European accent and its effect in connection with conjugation, see PHILOLOGY. Consult: Rippman, *The Elements of Phonetics* (London, 1910); Hirt, *Der indogermanische Akzent* (Strassburg, 1895); De la Grasserie, *De l'accent comparé dans les diverses langues* (Paris, 1909).

In Music, the term is analogous to accent in language, the stress or emphasis given to certain notes or parts of bars in a composition. It may be of three kinds: grammatical, rhythmical, and rhetorical or æsthetic. The first always falls on the first note of a bar, long or compound measures of time having secondary accents—only slightly marked. The rhythmical accent is applied to the larger component parts of a composition, such as phrases, themes, motives, etc., and marks their entrance, climax, end. The rhetorical accent is irregular, and is marked by the composer by special signs (*sf*, <, ∧) over notes which otherwise would bear no accent. In vocal music well adapted to words, the words serve as a guide to the right use of the rhetorical accent. See SYNCOPATION; RAGTIME.

ACCEN'TOR (Lat., one who sings with another, from *ad*, to + *cantor*, singer). A book name for a group of European warblers, of which the misnamed British hedge-sparrow (*Accentor*, or *Prunella*, *modularis*) is a type; and also for the American water-thrushes, wood-warblers of the genus *Seiurus*.

ACCEPT'ANCE. The act whereby a party assumes a legal obligation tendered to him or takes title to real or personal property. Every contract involves an offer and its acceptance by the one to whom the offer is made. Every transfer of title involves a delivery of a deed, a bill of sale or a chattel, and no delivery is complete

without acceptance of the thing offered. See CONTRACT; DEED; GIFT.

This acceptance is sometimes implied where the delivery is made to some one else for the benefit of the grantee or donee, but the presumption of acceptance in such case may be rebutted. Thus an heir or devisee under a will is presumed to accept the inheritance or devise, but he may reject it, and his rejection nullifies the transaction and leaves him as though it had never taken place.

Specifically in the law of negotiable paper, acceptance signifies the assent of the drawee of a bill of exchange to the order drawn upon him and binds him to its payment. It is usually effected by writing the word "accepted" across the bill, with the signature of the drawee, who is then known as the "acceptor" of the instrument. An accepted bill is also commonly known as an acceptance. See BILL OF EXCHANGE.

ACCEPT'ANTS, APPEL'LANTS. The names given, respectively, to those among the French clergy who accepted the bull *Unigenitus* condemning Jansenism (1713), and to those who did not, but appealed to a general council to settle the controversy.

ACCEP'TILA'TION. In the Roman law, a release of a debt made by a creditor to his debtor without receiving consideration therefor. As distinguished from the release (q.v.) of English and American law it could be made informally. See ACCORD and SATISFACTION.

AC'CESS, RIGHT OF. A legal incident of the ownership of property abutting on the sea or other navigable waters or on a highway or other public lands. In addition to the general right to the use of such waters and lands, which he shares with the public at large, the adjacent owner has a right of free access which is considered a special property right, and of which, in this country, he cannot be deprived, even by the State, without due process of law and compensation. The existence of such a right as against the State was long disputed, but is now, as the result of recent decisions, firmly established. Peculiar applications of this right are to be found in the common-law rights of mooring vessels and of wharfing out in navigable waters. Its infringement has usually taken the form of a grant of the shore or of land under water for railroad or wharfing purposes, whereby the access of the riparian owner was cut off. The right is not to be confused with that of the abutting owner in a highway or private stream subject to a public use where the fee of the highway or stream is vested in such owner. See HIGHWAY; RIVERS; RIPARIAN RIGHTS; WATER RIGHTS. Consult Gould, *Treatise on the Law of Waters* (Chicago, 1900); Farnham, *Waters and Water Rights* (Rochester, 1904).

ACCES'SION (Lat. *ad*, to + *cedere*, to go, move). In the law of property, a mode of acquiring title to land or goods by their annexation to the real or personal property of another, whereby the thing annexed loses its separate identity. It occurs where land is gradually increased by *accretion* (q.v.) or *alluvion* (q.v.), where a tenant or stranger erects a building or attaches a fixture (q.v.) to land, and where a chattel belonging to one is improved by the addition of materials or labor of another, as in the repair of a wagon by adding a wheel or by painting it, or in the conversion of leather into shoes. The legal effect of the annexation is to transfer the title of the thing annexed to the owner of the property so improved or increased, the identity of the former having been merged in the latter; the wheel, the paint, and the labor, in the examples given above, having disappeared as separate articles and being now inseparable parts of the wagon and the leather. The rule governing accessions is that the ownership of the principal thing carries with it that of the inferior thing. But, as the question of superiority or inferiority is not always one of price or value, the rule is sometimes difficult of application. Thus, additions and improvements to land, however extensive and valuable they may be, always accrue to the owner of the soil, and a chattel may be doubled or trebled in value by the expenditure of skill and labor without changing its ownership. But where the identity of a chattel is completely changed by the labor expended upon it, as by the conversion of malt into beer, or where it is enormously increased in value, as by the manufacture of pig iron into watch-springs, the product belongs to the person whose money and labor have effected the transformation. Of course the owner of anything which has by wrongful accession become the property of another is entitled to recover its value from the wrongdoer, whether the taking and accession were innocent or willful. See CONFUSION; and consult Schouler, *Treatise on the Law of Personal Property* (Boston, 1896).

ACCES'SORY. At common law, a person who was not the chief actor in a crime, nor present at its performance, but was concerned in its commission, was an accessory. Treason and misdemeanors, however, did not admit of the distinction between principal and accessory, all parties to the crime being in these cases treated as principals; the former, Blackstone says, because of the heinousness of the crime, and the latter because the law does not descend to distinguish the different shades of guilt in petty offenses. An accessory before the fact is one who counsels or procures the commission of a crime, but who is neither present nor engaged in furthering the transaction when the crime is committed. An accessory after the fact is one who, knowing a felony has been committed, receives, relieves, comforts, or assists the felon. At common law an accessory before the fact could not without his consent be tried and convicted before the trial and conviction of his principal, and the acquittal of the principal operated as a bar to the trial and conviction of the accessory. The tendency of modern legislation is to convert accessories before the fact into principals, and to permit the trial and conviction of an accessory, whether the principal has been tried and convicted or not. Consult the authorities referred to under the title CRIMINAL LAW.

AC'CHO. See ACRE.

AC'CIDENT (Lat. *ad*, to + *cadere*, to fall, happen, occur). In the law of torts, a transaction in which one is harmed by another while the latter is acting lawfully and in the exercise of due care adapted to the exigency of the case. For example, A's and B's dogs are fighting; A beats them in order to separate them, and, as he raises his cane, unintentionally and without negligence hits B, who is standing behind him. B has no cause of action against A, as the injury was accidental. This is now the undisputed law both in England and in the United States, although formerly there was much apparent

authority in England for A's liability in such a case. See the authorities referred to under the title TORT.

In insurance law the term is defined in the more popular sense as an event happening by chance and not according to the usual course of things. See ACCIDENT INSURANCE.

In equity *accident* denotes an unforeseen event, loss, act, or omission, not the result of negligence or misbehavior in any of the parties; such as the loss of negotiable or other papers, or the accidental omission of some part of a document. In the latter case the court can require its insertion. In penalties and forfeitures, where the injury caused by omission of duty can be reasonably compensated, as in case of failure to pay rent on a given day, the court may relieve the offending party against the penalty of forfeiture. Where there has been neglect or omission through want of information or through negligence to defend a suit, the court may permit the proper steps to be taken. But as a rule, a court of equity will interfere only in favor of persons paying a consideration; so if a seal should be omitted from a conveyance made without consideration, or a clause should be left out of a will, no relief would be extended. It is also ruled that no relief will be granted against a purchaser who has acquired legal rights in good faith for a consideration of value. Consult Bispham, *Principles of Equity* (7th ed., New York, 1907). See TORT; CRIME; CONTRACT.

ACCIDENT (in insurance and philosophy). See ACCIDENT INSURANCE; PREDICABLE.

AC'CIDEN'TAL. In music, any sign outside of the regular signature calling for the chromatic alteration of any note in a composition. See FLAT; NATURAL; SHARP; MUSICAL NOTATION; KEY.

ACCIDENT INSURANCE. A form of insurance which indemnifies the insured in case of disablement or death as the result of bodily accident. Under the usual contract of accident insurance the only injuries insured against are those caused by violent, accidental, external, and visible means. It does not therefore cover cases of intentional injuries, whether self-inflicted or not, nor cases of injury or death resulting from surgical operations, where the operations were themselves rendered necessary by natural disease or weakness and not by external accident. The fact that the accident was incurred through the misconduct or negligence of the insured will not, in general, affect his rights under the policy, though some companies seek to protect themselves by stipulations that they shall not be liable in cases where the accident was due to the intoxication of the insured, or was incurred while willfully exposing himself to unnecessary danger. The number of companies that write accident insurance reporting to the New York Department of Insurance in 1911 was 45. Of these only 9 restricted themselves to accident insurance. The aggregate premiums on accident business for the year were $20,982,099; the aggregate losses paid were $8,876,006. Where employer's liability has been extended to cover most industrial accidents, the employer may insure his employees against accident. This is in some jurisdictions compulsory. See EMPLOYER'S LIABILITY; WORKINGMEN'S COMPENSATION; INSURANCE; ACCIDENTS, INDUSTRIAL, *Bibliography*.

ACCIDENTS, INDUSTRIAL. One of the most serious problems of modern industry, especially in the United States, arises from the wide prevalence of accidents. The railway industry has long been noted for its heavy accident rate. In the year 1912, 3625 railway employees were killed, or about 3 per thousand employed in positions exposing them to risks, and 142,442 were injured. In coal mining the fatal accident rate is even higher, 3⅓ per thousand. There are no statistics for the United States as a whole giving the death rate from accident in other industries. The mortality statistics based on the census of 1910 throw some light, however, upon the problem. In the registration area, representing 56.1 per cent of the population of the United States, 22,652 males 10 years of age and over, classified by 148 groups of occupations, met death through accident; 881 females of the same age grouped in 140 occupations perished through accident. Among male deaths in the occupations studied, 1 out of 10 was accidental; of female deaths, 1 out of 30. The ratio of accidental to total deaths in the general occupations varied widely. Among teachers there was 1 death by accident to 31 by all causes; among clergymen, 1 to 30; among lawyers, 1 to 23; among salesmen, 1 to 18; in agricultural pursuits, 1 to 15.5; among carpenters, 1 to 10.8; among manufacturing laborers, 1 to 8.4; among street railway employees, 1 to 3.2; miners and quarrymen, 1 to 2.5; steam railway employees, 1 to 1.9. Over half the deaths in the last-named occupation are by accident. The ratio of deaths by accidents to total deaths was even more striking in the case of the lower age groups of railway labor. For the age group 20–24 it was 1 to 1.33; for the group 25–34 it was 1 to 1.47.

A computation of the excess of mortality in the various industries over the rate of deaths by accident in the safe trades indicates that the total number of deaths through industrial accident in the United States must be somewhat in excess of 35,000. Exact comparison with statistics of foreign countries is impossible, but it is commonly agreed that the American accident rate is far heavier than the various European rates, if number of persons engaged in an industry serves as the basis of comparison. In coal mining the American figure of 3⅓ fatal accidents per thousand may be compared with the Prussian rate of 2 per thousand, the British rate of 1¼ and the Belgian rate of 1. If output serve as a basis, the comparison is not so unfavorable to the United States. There are more men killed in the United States per 100,000 tons of coal mined than in Great Britain, but not so many as in Prussia or Belgium. In consequence of wide differences in conditions, however, such comparisons are of little value, and the same thing is true of comparisons of accident rates on the railways.

Statistics of non-fatal accidents are even less complete than statistics of fatal accidents. The number of railway employees in the United States injured through accidents is very near 150,000 per annum. In round numbers, 40 are injured to 1 killed; of those injured, it is estimated that 1 out of 10 is either partly or wholly disabled for life. Similar proportions seem to obtain in industry: In New York 2.4 per cent, in Wisconsin 2.1 per cent, in Massachusetts 2.46 per cent of industrial accidents are fatal, according to F. L. Hoffman's calculations. Assuming these ratios to hold for the general industry of the United States, it appears

that industrial accidents cost annually, besides 35,000 lives, 1,400,000 injuries sufficiently severe to deserve reporting, 140,000 of which represent permanent disabilities.

That a large proportion of industrial accidents is preventable is generally recognized. All modern States have enacted statutes requiring the employer to fence dangerous machinery and to introduce other measures for the protection of employees. Such laws are enforced through factory inspection, which, however, in many American States is so inadequate that the laws are practically without effect. In the Wisconsin law creating an industrial commission, it is provided that the employer shall take reasonable precautions against risk, and it is left to the industrial commission to determine what safety devices the employer shall be required to install. It is the duty of the commission to keep itself informed as to all improvements in safety devices and to secure their adoption by employers so far as may be practicable.

The effectiveness of safety devices is conclusively established by a report published in 1913 by the Department of Labor on *Accidents and Accident Prevention in the Iron and Steel Industry*. In 155 steel plants, with 158,604 employees, which were studied, the accident rate for all the plants was, per thousand, 1.86 fatal accidents, 2.72 permanent disabilities, and 240.6 temporary disabilities. A number of the plants were grouped into three classes, according to the comprehensiveness of their systems of accident prevention. In the first class the general accident rate was 167.1 per thousand; in the second, 272.4; in the third, 507.9. The records of one of the best mills (employing about 8000 men) show a decline in the accident rate from 370 per thousand in 1900 to 109 in 1911.

The late development of safety devices in industry is explainable partly by the conservatism of employers, but chiefly by the cost. In the period 1906 to 1912 the United States Steel Corporation expended over $4,000,000 in installing safety devices, and its annual expense for maintaining its safety system amounts to three-quarters of a million. The results of the system have been a reduction of nearly 45 per cent in fatal and disabling accidents, and a still greater reduction in less serious accidents.

A great impetus has been given to the invention and installation of safety devices by the extension of the principle of employer's liability. Where employers are forced to insure themselves against the liability for injuries to their employees, differential insurance rates place the employer with inadequate safety devices at a serious competitive disadvantage. Consult: Adams and Sumner, *Labor Problems*, with bibliography at end of chap. 12 (New York, London, 1905); Seager, *Social Insurance* (New York, 1910); L. D. Clark, *The Law of the Employment of Labor* (New York, 1911); *Report of the Commission (New York) on Employers' Liability and Other Matters* (1910); Frankel and Dawson, *Workingmen's Insurance in Europe* (New York, 1910); *American Labor Legislation Review*, vol. ii, no. i, part i; Henderson, *Industrial Insurance in the United States* (Chicago, 1909); Commons (editor) *Trade Unionism and Labor Problems* (Boston, 1905) and Tolman and Kendall, *Safety: Methods for Preventing Occupational and Other Accidents and Diseases* (New York, 1913). See EMPLOYER'S LIABILITY; WORKINGMEN'S INSURANCE; WORKINGMEN'S COMPENSATION; INSURANCE, *Employer's Liability Insurance;* RAILWAYS, *Accidents*.

ACCIPI'TRES (Lat. pl. of *accipiter*, the common hawk), or RAPACES, or RAPTORES. See BIRD OF PREY.

ACCIUS, ăk'shĭ-ŭs. See ATTIUS.

AC'CLAMA'TION (Lat. *acclamatio*, a calling to, from *ad*, to + *clamare*, to shout, call). An expression of opinion, favorable or unfavorable, by any assembly by means of the voice. Among the Romans acclamation was varied in both form and purpose. At marriages the spectators would shout "Io Hymen," "Hymenæe," or "Talassio." A victorious army or leader was greeted with "Io triumphe" or "Imperator." In the theatre approbation for the play was asked for by the actor who spoke the closing words and added "Plaudite." In the senate opinions were expressed and votes passed in such forms as "Omnes, omnes," "Æquum est," "Iustum est," etc.; and the praises of the Emperor were celebrated in certain prearranged sentences which seem to have been chanted by the whole body of senators. When a Roman died, his eyes were closed by one of those present; all then raised a cry (*acclamatio*, or, more properly, *conclamatio*): his name was called three times, perhaps to recall him to life if possible, perhaps, rather, in lamentation. Authors who recited their works in advance of publication were greeted by various cries, such as *bene, sophos, rursus*. At first the acclamation at recitations was genuine; but the modern *claque* was early introduced by rich pretenders to literary ability, who kept paid applauders not only for themselves, but lent them to their friends (indeed there had been a claque in the theatre as early as the second century B.C.: there was a claque, too, in the courts). Nero caused 5000 chosen knights and commoners at a given signal to chant his praises in the theatre; they were called "Augustani" and were conducted by a regular music-master. In the early times of the Christian Church it was not uncommon for a congregation to express its approbation of a favorite preacher during the course of his sermon, and in this manner Chrysostom was frequently interrupted. In ecclesiastical councils voting by acclamation is very common, usually with the formula "placet" or "non placet."

ACCLI'MATIZA'TION. The adaptation of a species or race to a climate different from that to which it has previously been accustomed. Acclimatization is often confused with naturalization (q.v.), but naturalization is rather the establishment of a species in a new country, and does not necessarily imply a slow adjustment to conditions that are at first injurious, as is the case in acclimatization. Naturalization may take place without any real acclimatization, as when the new country is climatically like the old. This case is illustrated by the large number of plants which have spread eastward or westward along parallels of latitude. Again, acclimatization may occur without naturalization. This is well illustrated by the large number of plants that are hardy and yet rarely, if ever, run wild; probably the struggle for existence is so keen that such plants fail to establish themselves spontaneously. Still again, naturalization may accompany acclimatization, as in the case of plants that migrate along meridians.

The term "acclimatization" is employed by the zoölogists in a somewhat broader sense, especially when referring to the adaptation of

marine organisms to new conditions of existence. In the latter case climatic changes are relatively unimportant factors. The changes in the character of the water, as respects temperature, contained food supply, marine currents, and pressure as determined by depth, are the influential factors.

In Plants. The most obvious examples of acclimatization are found in cultivated plants. While the original stock as well as the home of most cereals is not definitely known, it is believed that most of them have come from warm, temperate, or semi-tropical countries. They have now become fully acclimatized in far northern regions; indeed, some varieties of wheat, barley, etc., flourish even better in cold, temperate districts than in their original home. The peach is believed to grow farther north now than in the days of the ancient Greeks. Evidences of acclimatization apart from man's influence are not wanting; for example, it has been shown that plants grown from seeds that mature at high altitudes are hardier than those grown from seeds that mature at low altitudes.

One of the most interesting results of acclimatization is the change of the plant periods. In Finland and northern Norway barley ripens in 89 days, while 100 days are required in southern Sweden. Varieties of corn which ripen in New York in 93 days require 105 days in Texas. Interesting but not altogether harmonious results have been obtained from deciduous plants taken from temperate into tropical evergreen regions. In most plants the leafless period is shortened, and in some cases (notoriously in the peach tree) it is eliminated altogether, the plant becoming an evergreen. Schimper has observed another change, viz., the gradual loss of rhythmic growth; trees of temperate climes becoming in this respect more and more similar to native tropical trees.

In some cases the capacity for acclimatization is incomplete, i.e., plants are unable to adjust all of their structures and functions to a new climate. This lack of adjustment is seen in some plants of warm regions which, when transported to cool regions, vegetate well but fail to ripen wood. Many plants that can perform all their vegetative functions may still be unable to mature seeds; this is true not only of plants taken into cooler climates, but also in some cases of plants transported into warmer climates. Some species occurring naturally in Spitzbergen are said never to ripen seed; since their reproduction is now wholly vegetative, their original appearance in that region probably was at a period when the climate was much warmer than at present.

Darwin and others have discussed the influence of individual variation as compared with variation through offspring on the acclimatization of a species. There can be but little doubt of the gradual adaptation of a race through the natural selection of the hardiest individuals of each generation. Darwin also believed in the power of an individual to become acclimatized. The Wyoming experiment station reports that potatoes from the same stock endure in the uplands frosts that would destroy them in the lowlands. This favors the idea of individual acclimatization. Oranges, however, propagate hardier forms by seeds than by grafts, which shows that gradual acclimatization through offspring may be more important. Northern-grown seeds are preferred by farmers, partly because plants grown from them mature sooner than from home-grown seeds. In a few generations, however, this hereditary peculiarity is lost, and a new supply becomes necessary. It should be borne in mind that many of the above statements are based on imperfect observations, and that there is the greatest need for careful experiment in this field.

In Animals. The capacity of adapting themselves to changed environment is not possessed to the same degree by different species of one genus or by the individuals of any species. It varies with the hardihood, with the capacity for resistance, both of the individual and of the species. Just what the changes are, whether chemical or physical, that go on in the protoplasm of the body during the period of acclimatization, we do not, in many cases, know. In the acclimatization of fishes to denser media it is apparent that some solids are taken into the body, for the fishes sink when transferred again to fresh water. Some organisms possess a remarkably high degree of acclimatization. Thus, few animals can resist a temperature of over 115° F., while 105° F. is the death-point of whole groups. Yet certain organisms live in hot springs in water of much higher temperature, although they may be similar in kind to, or even identical with, those that live in cooler waters outside, and probably were acclimated to the high temperature by slow degrees as they made their way up the outlets into the springs. We know from experimentation that organisms can resist an amount of heat, of density, or of poison when accustomed to it by slow degrees, that would have been fatal had they been subjected to it suddenly. We owe the fact that certain domestic animals, such as the horse, cattle, dog, cat, fowls, rats, and mice, have spread with mankind over nearly all the world to the great capacity for acclimatization of these forms, most of which have originated in warm climates. Likewise the ubiquity of such food-plants as the potato and cereals, as well as certain weeds, is due to their great capacity of adaptation; for those plants and animals that have a limited amount of adaptation have likewise a limited range of distribution. The quality and the strength of some animals seem actually to improve in a new climate. Thus the merino sheep imported into Silesia and Pomerania from Spain seem to be superior in those lands to their Spanish ancestors, while the fleece of the Syrian sheep becomes finer in Spain; but in such cases it is difficult to say just how much is due to climate and how much to the breeder's skill and care. Many of our domestic animals have been so long in the countries in which we now find them that we can never hope to know anything about the history of their importations; but the silkworm is comparatively so late an importation into Europe that we can follow its progress. It was brought from China first into Italy, and now it is acclimated not only to southern France but even to the coast of the Baltic Sea, and it is able to live in some parts of the United States.

Of late years numerous acclimatization societies have been formed (the best known of which is the Société d'Acclimatation of Paris), having as their object the transference of seemingly desirable animals from their native lands to other parts of the world where they may thrive to human advantage. This has been found feasible in many instances, so far as the

ability to become acclimated is concerned, but in many cases the expected benefits have turned to evils through overmultiplication or other means of becoming a local pest, and such experiments are now rarely attempted. The introduction of salmonoid fishes from the Pacific to the Atlantic side of the United States, and from Europe to New Zealand, of bumble-bees into New Zealand, and of several insects, such as ladybirds, as enemies of agricultural pests, are instances of the more beneficial sort. The European house-sparrow in North America, the mungoos and agua-toad in the West Indies, the rabbit in Australia, and a great host of more or less accidentally introduced insects destructive of plants, etc., are cases of an opposite character. For particulars in respect to these, see accounts of the respective animals.

In People. This treats of the ability of men to maintain themselves in a country with radically different climatic conditions from those from which they migrate. At present the inevitable tendency of European and American peoples to spread over the major part of the earth gives the question many practical bearings. Can a race and a civilization from the temperate zone be transplanted to the tropics? The question is a double one: (1) Can individuals from the temperate zone live in the tropics for a few years and maintain their health and vigor? (2) can they work at their usual occupations, maintain their customary vigor, energy, and ability, rear families and propagate their kind for several generations? On the first point most authorities agree in the affirmative, provided reasonable provision for sanitation is made, and temperance and thrift prevail among such emigrants. On the second point authorities differ, with the balance in the negative. Races differ in their ability to adjust themselves to new climatic conditions. The individual or the race may not succumb at once when transferred to a very different climate, and yet the acclimatization may be only partial. Certain organs only of the body may be affected by the changes, so that "diseases of acclimatization" may be induced. Thus Europeans are liable in tropical countries to suffer from diseases of the liver, while natives of the tropics are subjected to pulmonary troubles in temperate zones. The African in the United States has a high death rate from lung affections. On the other hand, loss of hardihood induced by climate may express itself mainly in deterioration in size, as is the case with the Shetland pony. So far as the human races are concerned there seems to be a direct ratio between intelligence and capacity for acclimatization. The Anglo-German race is able to endure climatic changes with less loss of vigor than any other European race, and for this reason has been able to surpass all the others as colonizers. High moral qualities are needed. Homesickness is a frequent cause of failure. Temperance and thrift are excellent qualities for success, as evidenced in the history of Jewish and Chinese emigration. Mankind is tolerant of great extremes of climate, —97° F. to 154° F. being the greatest extremes recorded as having been endured by human beings, though no such range of variation has ever been endured by one people or in any one place. Not only temperature but also meteorological conditions have an effect, and moisture is, next to temperature, the most important element.

Bibliography. The best general treatment of acclimatization may be found in Semple, *Influences of Geographic Environment* (New York, 1911); J. Hann, *Handbuch der Klimatologie* (Stuttgart, 1897); Darwin, *The Variations of Animals and Plants under Domestication*, revised ed. (London, 1875); Pavillard, *Eléments de biologie végétale* (Paris, 1901); Schimper, *Pflanzengeographie auf physiologischer Grundlage* (Jena, 1898); Hollick, "Relation between Forestry and Geology in New Jersey," *Geological Survey of New Jersey, Annual Report* (Trenton, 1899); Wallace, *Island Life* (London, 1880); Heilprin, *The Geographical and Geological Distribution of Animals* (New York, 1887); Wallace, *The Geographical Distribution of Animals* (2 vols., London, 1896). A popular treatment of acclimatization of peoples is given in Ripley, *Racial Geography of Europe* (Boston, 1899), in which book there are also excellent bibliographical references; also A. Ireland, *Tropical Colonization* (New York, 1899); Peschel, *The Races of Man and their Geographical Distribution* (London, 1878); Ward, *Climate Considered Especially in Relation to Man* (New York, 1908); and Heilpach, *Die geopsychischen Erscheinungen Wetter, Klima und Landschaft in ihrem Einfluss auf das Seelenleben dargestellt* (Leipzig, 1911).

ACCO, or ACCHO, ăk'kō. See ACRE.

ACCOLADE, ăk'kō-lād' (Fr. an embrace, kiss, from Lat. *ad*, to + *collum*, neck). A part of the ceremonies of conferring knighthood in the Middle Ages. The sovereign or other superior embraced the aspirant around the neck (*ad collum*). The term is sometimes applied to the later ceremony of giving a slight blow on the shoulder with the flat of the sword.

AC'COLON. In Sir Thomas Malory's *Morte d'Arthur*, a knight of Gaul, who obtained possession of King Arthur's sword Excalibur through the treachery of Morgan le Fay. He died after his fight with the King (book iv), which had led to the discovery of the trick and the recovery of the sword.

ACCOLTI, ăk-kōl'tē, BENEDETTO (1415–66), called the Elder. An Italian jurist. He was born at Arezzo, Italy, and died at Florence. At first a professor of law at Florence, he afterward became chancellor of the Republic, and occupied this position until his death. He was gifted with a marvelous memory, and is said on one occasion to have repeated word for word a Latin discourse which the Hungarian Ambassador had addressed to the magistracy of Florence. His historical attainments were considered inferior to his knowledge of law. Accolti's principal publications are *De Bello a Christianis contra Barbaros Gesto pro Christi Sepulchro et Iudæa Recuperandis Libri Quatuor* (Venice, 1572; Florence, 1623, with a commentary by Scoto), which furnished the material for Tasso's *Jerusalem Delivered;* and *Præstantia Virorum sui Ævi* (first published at Parma in 1689 and frequently reprinted). Consult Potthast, *Bibliotheca Historica Medii Ævi*, vol. i (Berlin, 1896).

ACCOLTI, BERNARDO (1465–1536). An Italian poet, a son of Benedetto Accolti (q.v.). He was born at Arezzo and is said to have enjoyed so much popularity as a poet that the shops were closed and multitudes (composed of the most learned statesmen and divines, as well as of the unlettered masses) flocked to hear him recite his verses. But although styled by his

contemporaries "The Unique," such portions of his works as have come down to us scarcely justify so high an estimate of his ability, although as an improvisator he may have excelled. His poems were first published at Florence in 1513 under the title: *Virginia, commedia, capitoli, e strambotti di Messer Bernardo Accolti Aretino.* They were republished at Venice in 1519 and have since been frequently reprinted.

ACCOM'MODA'TION (Lat. *ad,* to + *commodus,* fit, suitable). The power of altering the focus of the eye so that rays coming from an object nearer than 20 feet are brought together on the retina. This is brought about by changes in the convexity of the crystalline lens (q.v.). The latter possesses a degree of elasticity which tends to make it assume a spherical form. The lens being suspended by a ligament extending around its periphery, the ciliary muscle is so attached that when it contracts it causes a relaxation of the suspensory ligament. This diminishes the tension upon the latter and allows the lens to become more spherical, chiefly on its anterior surface. At the same time the pupil contracts, and the visual lines of the two eyes converge. The *range of accommodation* is the distance between the "far point" (*punctum remotum*) or the farthest point of distinct vision and the "near point" (*punctum proximum*), or nearest point at which the eye can distinctly see objects. As age increases, the power of accommodation gradually diminishes and the near point recedes. At 10 years the mean or average range of accommodation is 14.2 inches; at 20, it is 11.6 inches; at 30, 8.6 inches; and after 45 it diminishes rapidly (the onset of *presbyopia*) until at 70 its range is only 1.1 inch. At 75, accommodation is practically lost.

Paralysis of Accommodation may accompany diphtheria, syphilis, gout, brain tumor, locomotor ataxia, and poisoning from alcohol or tobacco. Complete and permanent loss of accommodation occurs after the removal of the crystalline lens for cataract. **Spasm of accommodation** follows excessive use of the eyes, particularly far-sighted or astigmatic eyes, for near work. See VISION.

ACCOMMODATION (IN THEOLOGY). 1. The adaptation of Scripture texts to other than their original meanings. 2. The theory that Jesus Christ, while possessing complete knowledge, did not correct the errors of his time, e.g., belief in demon possession, and so *accommodated* himself to the limitations of his contemporaries in scientific and historical knowledge.

ACCOMMODATION BILL OR NOTE. A draft, bill of exchange or promissory note, one or more of the parties to which has signed it without receiving value therefor, and for the purpose of lending his credit to some other party thereto. Such a bill is a valid, negotiable instrument, and the accommodation party, whether known to be such or not, is liable thereon to a holder for value. But, as between himself and the party accommodated, he is only a surety, and is, as such, exonerated by the giving of time to the principal debtor without his assent. See PRINCIPAL AND SURETY; BILL OF EXCHANGE; NEGOTIABLE INSTRUMENTS, and the authorities therein referred to.

ACCOM'PANIMENT. The additional instrumental part which, in music written for a solo voice or instrument, gives harmonic and rhythmic support to the solo part or melody; as the pianoforte part in a song, the orchestral part in a concerto, etc. An *ad libitum* accompaniment is one that is not a part of the structure of the composition, and may therefore be performed or omitted at pleasure. An *obligato* accompaniment, on the contrary, forms an integral part of the music and is indispensable. In the scores of the old masters, especially those of Handel and Bach, the accompaniments were not written out in full. A single bass part was given, and the accompanying harmonies were indicated by figures over the notes. This species of musical shorthand became known as figured or thorough bass, and also *basso continuo.* (See FIGURED BASS.) The accompanist at the organ or harpsichord translated these figures at sight into their equivalent harmonies, and with them improvised, with runs, trills, and various ornaments, the sort of accompaniment that the music needed. The musicians of the time became very expert at this difficult accomplishment, both Handel and Bach being renowned for their wonderful polyphonic accompaniments. Many of these old scores have been worked out by skilled musicians, who have filled out the missing parts and arranged the accompaniment for the modern orchestra. Among the scores to which "additional accompaniments" have been written are those of Handel's *Messiah,* by Mozart; *Israel in Egypt,* by Mendelssohn; and the great edition of Bach's works, by Franz. Beginning with Schumann, the accompaniment of songs has steadily become more elaborate and expressive, until in the songs of Richard Strauss and Hugo Wolf the instrumentalist is now the real interpreter, since the most important themes are frequently allotted to the piano. The relation is very much the same as that between conductor and singer in Wagner's music-drama. Consult Apthorp, *Musicians and Music Lovers* (New York, 1894).

ACCOM'PLICE (through confusion with *accomplish,* for earlier *complice,* companion, especially in crime, from Lat. *complex,* closely connected, confederate). One whose participation in a crime renders him liable to punishment, either as a principal or as an accessory. Hence a person who acts only the part of a detective is not an accomplice, although he may pretend to be the criminal's confederate, for his act, not being done with criminal intent, is not punishable. The term is most frequently used in cases where one of several criminals has turned state's evidence. As his testimony against his fellows is apt to be given in the hope of securing immunity for himself, the court usually charges the jury that it is open to suspicion, and many modern statutes declare that a conviction cannot be had upon the testimony of an accomplice, unless he be corroborated by such other evidence as tends to connect the defendant with the commission of the crime. Consult the authorities mentioned under the title CRIMINAL LAW.

ACCORAMBONI, åk'kô-râm-bō'nê, VITTORIA (?–1585). An Italian woman remarkable for her beauty and her tragic history. She was sought in marriage by Paolo Giordano Orsini, Duke of Bracciano, who was supposed to have murdered his wife, Isabella de' Medici, but her father gave her to Francesco Peretti, nephew of Cardinal Montalto, afterward Pope Sixtus V. The husband was assassinated in 1581, and the widow fled from her father-in-law's house to that of the Duke of Bracciano, the supposed murderer. Pope Gregory XIII opposed her marriage to the Duke so far as to keep her a prisoner in

the castle of Sant' Angelo nearly a year, but that did not prevent their union. Not long afterward the Duke died, leaving nearly the whole of his fortune to the widow. This so incensed Ludovico Orsini, a relative, that he caused the widow to be murdered in her home in Padua, Dec. 22, 1585. Her history has been made the subject of novels and plays, among others, of Webster's tragedy, *The White Devil.* Consult Gnoli, *Vittoria Accoramboni* (Florence, 1870).

ACCORD' AND SAT'ISFAC'TION. In the law of contracts, a mutual agreement entered into by the parties to a contract by which one party agrees to discharge the other from his obligation under the contract, in return for the other party's promise to do or give something. The satisfaction is the performance of the promise to do or give something. At common law it was early held that an accord with satisfaction was a good defense to an action founded upon simple contract, but that a mutual agreement to discharge a pre-existing contract, being mere promise given for promise, was an accord only and not a valid defense at law. This was either because mutual promises, not being good consideration for each other, were not regarded as binding, or because the law would not enforce an agreement which merely substituted one cause of action for another, or for both reasons. The first, owing to the changed conception of consideration, has ceased to exist, and the second is now generally disregarded, most jurisdictions holding that a mere accord without satisfaction is a valid discharge of a simple contract, though the decided cases are not altogether harmonious on this point. Agreements never to sue on the earlier contract were regarded as a good accord or accord and satisfaction and a valid defense, but agreements not to sue for a limited time were not admitted as a defense at common law; but equity might enforce them by enjoining action on the earlier contract. In the case of contracts under seal, before breach, accord, and accord and satisfaction were not admitted as valid defenses at common law, but after breach of the obligation under seal, it was regarded as a mere right of action for damages, of no higher nature than a simple contract and subject to the same defenses. Equity under proper conditions would enforce the accord even when entered into before breach of the contract under seal by enjoining all action upon the latter; and in most jurisdictions where equitable defenses may be pleaded at law, accord or accord and satisfaction may now be set up as a defense to an action on the instrument under seal. An accord must always be an agreement founded on good consideration. Thus, a mere agreement founded upon a promise to do or give something which the promisee was already bound to do (for example, an agreement to pay a lesser sum in lieu of a debt for a greater) is not valid as an accord. An apparent exception to this rule exists in cases where the precise amount or character of the obligation under the earlier contract was uncertain, in which case an accord by way of a compromise agreement is regarded as made upon valid consideration. A real exception to the rule was allowed in case of compromise agreements in which a debtor agreed to pay a smaller sum in lieu of a greater to his creditors in return for their promise to release him from his debts to them. In a number of the States, notably New York, a written receipt given by the creditor to a debtor without consideration and with intent to release the debts is allowed to be a valid discharge of the debts. This is anomalous. See the authorities referred to under CONTRACT.

ACCOR'DION (Fr. *accorder*, to accord, be in harmony). A musical instrument which produces its tones by the vibration of metallic tongues of various sizes, while wind is supplied by the action of a hand bellows. Two sets of tongues make it possible to produce the same tones either by pressing or pulling the bellows. It was invented by Damian of Vienna in 1829. See CONCERTINA.

ACCORSO, âk-kôr'sô, MARIANGELO (c.1490–1544). Italian critic, born at Aquila, in the kingdom of Naples. He is perhaps better known by his Latin name Accursius. Charles V, at whose court he lived for 33 years, employed him on various foreign missions. In his extensive travels he discovered and collated important manuscripts. He published *Diatribæ in Ausonium, Solinum, et Ovidium,* and brought out the first edition of the *Variæ Epistulæ* of Cassiodorus (q.v.). He edited also, better and more fully than had been done before, Ammianus Marcellinus. See Sandys, *A History of Classical Scholarship,* vol. i (Cambridge, 1911).

ACCOUNT' (Lat. *ad,* to + *computare,* to sum up, reckon, compute). In its broadest sense, a catalogue of items, debit or credit, arising out of contracts, as in the case of merchants; or out of a fiduciary relation, as in the case of principal and agent; or from a duty imposed by law, as in the case of an administrator or public officer. A mutual account is one containing reciprocal demands or charges against the parties; as the account between two merchants, or between a merchant and a customer, each of whom has sold goods to the other. Before an account is rendered or adjusted, it is spoken of as "open" or "current." A *stated account* is one which has been accepted as correct by the party against whom it states a balance. The debtor's assent to the correctness of the account as stated may be implied from his retention of an account rendered without an objection to it within a reasonable time. The acceptance of an account stated, or, to use the ordinary legal phrase, the stating of an account, is said to be in the nature of a new promise; and the creditor suing upon such an account need not set forth the subject matter of the original debt. Originally an account stated was confined to transactions between merchants; but in England and in most of our jurisdictions its scope has been extended to accounts between all creditors and debtors. In some States, however, stating an account between others than merchants does not create a new cause of action, but is available to the creditor only as an admission by the debtor. Even after an account has been stated it may be corrected for fraud or mutual mistake.

The action of account at common law has fallen into disuse, partly because it was difficult, dilatory, and expensive, but chiefly because a court of equity possessed more extended authority and better machinery in cases involving an account. Equity will entertain an action for an accounting where a fiduciary relation exists between the parties, such as that of principal and agent (q.v.), trustee and *cestui que trust,* guardian (q.v.) and ward; or where there

is a mutual account between plaintiff and defendant; or where there are circumstances of complication, as in partnership (q.v.) accounts. So an accounting may be had as incidental to the exercise of other equity jurisdiction, as in mortgage foreclosures.

ACCOUNTING. In consequence of the increasing magnitude of business operations, both private and public, accounting, or the art of exhibiting such operations in their true financial significance, has undergone a notable development in the last half-century. In the small individual or partnership enterprise, especially in the field of commerce, the accounting function is represented by book-keeping (q.v.); and the modern art or science of accounting is sometimes described as merely a broad application of the principles of book-keeping. Book-keeping, however, is a mechanical function, requiring only accuracy and observance of the rules of a clearly defined system. Accounting, while employing book-keeping methods, is concerned, above all, with problems of classification of uncertain items and with problems of valuation. The accountant is expected to command a wide knowledge of business in general, as well as special knowledge of the particular field of business in which his services are employed. Accounting and book-keeping have become differentiated, in practice, as profession and trade. The profession of accounting is comparatively new, but it has already developed an extensive literature, a specialized form of training, and a vigorous professional organization.

The profession of accounting, as more or less distinct from book-keeping, was given its first impetus by the extension of joint stock or corporate enterprise. To protect the interests of the various classes of security holders, as well as those of new investors, it was necessary to make public from time to time statements showing the true condition of each important enterprise. In the case of trading companies this is a comparatively simple matter, assuming absence of fraud, since the assets of such companies consist chiefly in cash, bills and accounts and mercantile stocks that may properly be entered at cost price, and since the liabilities consist of items readily reducible to money terms. The problem is far more difficult in the case of companies engaged in manufacture, mining, and transportation. In these fields a relatively large part of the assets of the company consists in lands, buildings, machinery, etc., which are subject to depreciation or appreciation. The true net profit of the company is determined only after allowance has been made for changes in valuation.

In Germany, Austria, France, Switzerland, and Belgium all corporations are required by law to set apart a special account to cover depreciation of plant or to deduct an amount representing depreciation from the book value of the depreciating asset. In England and the United States there are no legal regulations requiring this, but the rule is observed by many corporations and is imposed by law upon certain classes of public service corporations. The observance of the rule is gradually extending through the influence exerted by professional accountants.

It is a general rule of accounting that the land used in a business shall be kept on the books at its original cost price, since increase or decrease in its selling price can be of no interest to the company as a going concern. Buildings and machinery inevitably deteriorate or become obsolete; but the rate of depreciation differs widely in different enterprises, and can in no case be determined accurately. Accordingly even the best accounting practice is more or less arbitrary in its disposition of such value changes. The rule is to overestimate rather than underestimate depreciation. Changes in value of stocks of finished goods or materials in store or in process of manufacture are commonly ignored, if in the direction of appreciation; but allowance is made for them if they represent depreciation. This is the rule followed in the main by the German law; Austrian law requires both appreciation and depreciation to be taken into account. Securities held for investment are commonly kept on the books at their original cost, unless market quotations indicate depreciation, in which case the market price is substituted. This also is the rule of German law, while Austrian law requires the book values to follow the market value in case of either appreciation or depreciation. As the foregoing instances indicate, it is a general principle of accounting, both in America and England, where it is free from legal regulation, and in Germany, where it is strictly regulated by law, to err, if at all, on the conservative side.

A closely related problem of accounting is the treatment of good-will. A successful business enterprise develops a clientèle which enables it to dispose of its goods at better prices or with lower selling expenses than can its competitors. Such a standing with its customers is a valuable asset and upon the winding up of the company would command a price. It is the best accounting practice, however, to make no allowance, or merely a nominal allowance, for good-will, except in cases where it has been acquired at a definite outlay. In such cases good-will is entered at cost. Accounting practice in this respect is explained by the fact that good-will, as an asset, is more or less evanescent, and its inclusion in the capital account opens the way to excessive inflation.

The replacement of buildings, machinery, etc., that have become worn out or obsolete presents no serious accounting problem when the new buildings or machinery are essentially of the same cost and technical efficiency as the old. Such replacement, in a properly constructed system of accounts, is treated as a revenue expense. When old plant is replaced by plant of a superior order and at an advance in expense, the problem arises whether the expense should be charged to revenue or should be met out of the capital account. This problem has assumed serious proportions in American railway accounting. It has been the practice of some roads to charge to revenue not merely improved rolling stock and betterments in track, such as reduction in grades and substitution of iron for wooden bridges, but also extension of main line and construction of branches. The practice has been defended on the ground that under conditions of railway competition the railroad which does not steadily improve its equipment will lose business; hence a normal degree of improvement must be regarded as a current expense, essential to the protection of the current revenue. This view is not, however, accepted by the Interstate Commerce Commission, which is authorized by the law of 1906 to prescribe a uniform set of accounts for rail-

ways engaged in interstate commerce. In the view of the Commission, all improvements that increase the value of the plant should be charged to capital.

In the case of ordinary business enterprises the chief public function of accounting is to aid creditors in determining the probable value of its securities. In the case of public service corporations accounting assumes an additional function. Where the public authority regulates the charges of such corporations, it is of the utmost importance to determine the actual magnitude of the capital upon which interest and dividends may be paid. It is equally important to determine the true net profits, since the relation between capital and profits indicates whether charges fixed by the corporation are excessive, or whether charges fixed by the public authority are confiscatory. In this field there is a strong tendency in American state legislation to regulate narrowly the form of accounts, to prescribe rules for allowances for depreciation and for the disposition of betterment and extension charges.

The accounts of States, municipalities, and counties in the United States are as yet almost universally in a primitive condition. Account is kept of revenue and appropriations, but as a rule only with a view to checking peculation. There is no uniformity among the several States and cities in the classification of either revenues or expenditures; the same State or city is likely to make frequent changes in its system of accounts. As a result comparative study of costs with a view to throwing light upon the problem of administrative efficiency is almost impossible. In consequence of the growing public interest in municipal affairs a number of cities, among them New York, have recently introduced scientific systems of accounting.

Cost Accounting. Since 1885 the principles of accounting have found increasing application to the control of production. The manufacturer of an earlier period reckoned his profits or losses upon an enterprise as a whole; whether particular operations were profitable or not seemed to admit of no exact determination. This still remains true in a wide field of industry. Recent studies in agricultural economics have shown that on many farms which are on the whole profitable, certain crops or certain classes of live-stock are produced at a loss. It is the object of cost accounting to assign to each article produced or to each operation performed its proper share in the costs of the enterprise as a whole, in order to direct the labor and capital of the enterprise to the most productive channels. In some fields, as in agriculture, the problem presents no serious difficulties, as the value of the labor, materials, and use of land make up practically the whole cost and are determinable with fair accuracy. In the case of a factory or machine shop general costs, such as charges for power, light, depreciation, expenses of supervision and management, are not strictly assignable to the several units of product. In practice cost accountants distribute such charges according to somewhat arbitrary bases, such as the amount of wages paid on the several pieces of work, the number of hours of labor required by it, the cost of labor together with the cost of material entering into the product, etc. One authority on cost accounting assigns to each unit of product not only the estimated labor and material charges it occasions, but also a machine charge, representing the interest and depreciation on the machine used, power required by the machine when in operation, lighting, rent and taxes on the building assigned to each machine in proportion to floor space occupied. Some general charges remain unassigned, but these make an inconsiderable addition to unit costs. The system is in practice extremely cumbersome, and, in spite of its appearance of accuracy, is hardly less arbitrary than the simpler systems. No scheme of cost accounting succeeds in determining exactly what margin of profit a given price represents. It does, however, frequently indicate what one among several lines of production is the more profitable. Comparison of cost accounts through a period of time often serves to detect wastes that would otherwise have remained unnoticed. In the case of a corporation controlling several factories producing the same commodity, comparative cost accounts serve as an effective check upon careless or wasteful management, or indicate when it would be profitable to dismantle one factory and concentrate business in another. Cost accounting has been widely advocated as a principle of control in business undertaken directly by the public authorities, such as street cleaning and garbage disposal, as a means of indicating changes in administrative efficiency.

Consult: Hatfield, H. R., *Modern Accounting* (New York, 1909); Cole, W. M., *Accounts* (Boston, 1908); Dicksee, L. R., *Advanced Accounting* (London, 1903); Bentley, H. C., *The Science of Accounts* (New York, 1911); Rehm, H., *Die Bilanzen der Aktiengesellschaften* (Munich, 1903); Sprague, C. E., *The Philosophy of Accounts* (New York, 1908); Dawson, S. S., *Accountant's Compendium* (London, 1908); Lisle, G., *Encyclopædia of Accounting* (8 vols., Edinburgh, 1903–08); Day, C. M., *Accounting Practice* (New York, 1908); Mitchell, G. A., *Single Cost Accounts* (London, 1907); Garry, H. S., *Multiple Cost Accounts* (London, 1906); Burnell, S. H., *Cost-keeping for Manufacturing Plants* (New York, 1911); Webner, F. E., *Factory Costs* (New York, 1911); Bureau of Municipal Research, *Handbook of Municipal Accounting* (New York, 1913). See BOOK-KEEPING; SCIENTIFIC MANAGEMENT.

AC'CRA. See AKKRA.

ACCRE'TION (Lat. *accretio*, an increase, from *ad*, to + *crescere*, to grow). In law, the gradual extension of the boundaries of land at the expense of the sea, or of a neighboring owner, by the imperceptible action of natural forces, as by the recession of the ocean, the deposit of silt and earth by a stream, the drying up of a pond, etc. The word is sometimes, though improperly, used to include the various kinds of accession (q.v.) and as the equivalent of that term; but it is in its legal sense properly applicable only to that form of accession in which land is added to other land by the process above described. Where the land so gained is washed up by the sea, or deposited by a running stream, or left bare by the gradual drying up or retirement of the water boundary, it is known as alluvion (q.v.). As above indicated, the process must, in order to result in an accretion, be so slow as to be imperceptible in its progress. If sudden, no change of ownership results, the land so exposed remaining the property of the sovereign or of the neighboring pro-

prietor affected thereby. Thus a boundary stream may, by changing its course gradually, little by little transfer the ownership of the land on one side to the opposite proprietor, whereas a sudden change of course would not affect the boundaries of the two parcels of land in the slightest degree. Consult: Gould, *Treatise on the Law of Waters* (Chicago, 1900); Angell, *Treatise on the Law of Watercourses* (Boston, 1877).

AC'CRINGTON. A manufacturing town in Lancashire, England, situated in a deep valley, surrounded by hills, 23 miles by rail north of Manchester and 5 miles east of Blackburn, on the banks of the Hindburn (Map: England, D 3). Among its notable buildings are Christ Church, a fine Gothic edifice, erected in 1838, and the town hall, a handsome building in the Italian style. The town was incorporated in 1878. The inhabitants are mostly employed in cotton factories, dye-works, chemical works, weaving, and calico-printing. Accrington is considered the centre of the cotton-printing industry. There are coal mines in the neighborhood, in which many of the people find employment. Accrington is advantageously situated in regard to communications, being a station on the Lancashire and Yorkshire Railway. To this last it owes much of its growth, which has been very rapid. With a population of less than 9000 in 1841, it rose to 38,603 in 1891, and in 1901 to 43,122. The 1911 census returned 45,031.

AC'CUBA'TION (Lat. *ad*, to + *cubare*, to lie down). The reclining posture of the Greeks and the Romans at table. Among the Greeks a low table was placed beside each couch; on each couch usually two persons reclined, resting on the left arm, which was supported by cushions. Among the Romans three couches were placed about a table, so as to form three sides of a square, and three persons reclined on each couch. The middle couch was the most honorable. In later times, especially under the Empire, round tables were used, and the couches were arranged in crescent form, and were then known as *sigma* (one form of the Greek letter sigma was **C**). Respectable women, however, did not recline at table until the time of the Roman Empire.

ACCUM, äk'kụm, Friedrich (1769–1838). A German chemist. He was born in Westphalia, went to London in 1793, and became professor of chemistry there in 1802. He was known chiefly on account of his work, *A Practical Treatise on Gaslight* (1815), which had the effect of introducing the illuminant in England. The book was translated into several languages. In 1822 he became professor in a technical institute in Berlin. He is also author of *Chemical Amusement* (1818) and *Culinary Chemistry* (1821).

ACCU'MULA'TIONS (Lat. *ad*, to + *cumulare*, to pile, heap). In law, the accumulated interest and income of property held in trust upon a trust created for the purpose of effecting such accumulation for the benefit of the *cestui que trust* (q.v.). The law relating to accumulation is closely related to the rule against perpetuities (q.v.) as now defined by modern statute. It was the common law rule that any disposition of real estate which postponed a vesting of any interest in the estate for longer than a life or lives in being and 21 years additional thereafter was absolutely void. This rule was deemed to be violated by the creation of a trust for accumulation for any greater period. This continued to be a rule of decision until the passage by the English Parliament of the so-called Thellusson Act. (See Thellusson *v.* Woodford, 4 Ver. p. 227.) This act placed several limitations on the common law rule as to accumulation. The rule relating to accumulation is now regulated wholly by statute in most jurisdictions, and generally the power to create trusts for accumulation is limited to the creation of a trust for the life of the grantor only or for 21 years or during the minority of the beneficiary. See the authorities referred to under Trust and Perpetuity.

ACCU'MULA'TORS. Apparatus for equalizing pressure or for the storage and accumulation of energy for intermittent use. The storage battery and the Leyden jar and all forms of condensers in coil or other shapes are electrical accumulators. (See Storage Battery; Condenser.) Hydraulic accumulators are extensively used in connection with hydraulic machinery for operating cranes, punching and riveting machines, presses, etc. As water is practically incompressible, no volume of it can be drawn from a pressure system for the use of any machine without an instant fall of the pressure, unless an equal volume is supplied from somewhere else in the system. The simplest way of storing up water for pressure purposes is to erect a tank at a sufficient height to give the required pressure by the weight or head of the water column alone. This arrangement is generally adopted for hydraulic elevators in warehouses and lofty buildings. (See Elevators.) Where very high pressures are required, however, it becomes impracticable to adopt a tank or water tower, since the elevation required to give the necessary pressure would be impracticable; to obtain 700 pounds pressure, for instance, requires a tank 1610 feet high. Hence a pump capable of giving the required pressure and of maintaining it is required; but its capacity would have to be that of the maximum demand for water. This would keep it idle when the machines were not at work, and to secure economy in such cases accumulators are employed. They generally assume the form of a vertical cylinder resting on a firm base and having a plunger working through a stuffing-box at the top. This plunger has at its upper end a yoke which carries by means of suspension rods a heavy weight of cast iron or other heavy material. The power pump forces water into the cylinder at a pressure a little above that desired in the system, which is therefore sufficient to lift the weighted plunger to the top of the cylinder, but as the cylinder fills, the power is gradually shut off from the pump, until the pressure of water just balances and supports the weighted plunger on its top. As water is drawn off from the cylinder to supply the crane, press, riveter, or other machinery, the weighted plunger descends, always keeping a pressure on the top of the water column equal to the pressure per square inch required to balance the combined weight of the plunger and its load and supplying a mass of water greater than the capacity of the pump in the time consumed in the descent of the plunger. As soon as the plunger descends the pump resumes work and raises it again. By this combination of operations the water pressure is always kept constant for supplying the hydraulic machinery. Sometimes steam or air pressure acting on the outer end of the plunger is substituted for the more common suspended

weights, and if more convenient such plungers may be then arranged to work horizontally. Hydraulic accumulators are built to give pressures ranging from five pounds to ten tons per square inch. Consult: Lyndon, *Storage Battery Engineering* (New York, 1911); and Morse, *Storage Batteries: The Chemistry and Physics of the Lead Accumulators* (New York, 1912).

ACCURSIUS, *a*-kŭr′shĭ-ŭs. See Accorso.

AC′CUSA′TION. A legal term which signifies either the act of charging one with a crime or the charge itself. When the charge is made outside of a judicial proceeding, it may subject the accuser to an action for defamation (q.v.), while if made in the course of a judicial proceeding it is generally not actionable. A threat or a conspiracy to accuse another of a crime is an indictable offense. See Blackmail; Extortion; Malicious Prosecution.

ACCU′SATIVE CASE. See Declension.

ACELDAMA, ȧ-sĕl′dȧ-mȧ, or **AKELDAMA,** ȧ-kĕl′dȧ-mȧ (R. V.). According to Acts i. 19, "the field of blood." The evidence of the manuscripts is decidedly in favor of the form *Akeldamach* in the Greek text. This may indeed represent Akeldama in Aramaic, as Σειραχ (Seirach) represents Sira. But it has been suggested by August Klostermann (*Probleme im Apostteltexte*, pp. 1–8) that the second element, *damach*, is the Aramaic word "to sleep," so that the real meaning of the term is "field of sleep." The same word is used, in the Syriac version of Dan. xii. 2, of those who sleep in the dust, i.e., the dead. Such a name would have been appropriate for a field which, according to Matt. xxvii. 8, was bought by the priests of Jerusalem for a cemetery in which to bury strangers, with 30 pieces of silver which Judas Iscariot received as a reward for betraying Jesus, but which in the hour of his repentance he returned to the priests. In Acts i. 18 f. we are told that Judas obtained this field with the reward of his iniquity and, falling headlong, he burst asunder in the midst. Different traditions seem to have developed in Aramaic-speaking Christian circles, attaching themselves to Zech. xi. 13 and the existence of this cemetery in the potter's field. The designation of Aceldama as a "potter's field" in both of the passages of the New Testament referred to connects the place with the "potter's house" mentioned by Jer. xviii. 2; xix. 2. It would appear, therefore, that Aceldama is older than the story told of it in the New Testament, and its designation as a "field of blood" is but a play upon the word, introduced to add color to the narrative of Judas Iscariot. Consult Tobler, *Topographie von Jerusalem* (1854, pp. 260 ff.); Schick in the Quarterly Statement of the *Palestine Exploration Fund* (1892, pp. 288 f.); Melander, *Jerusalems dolda tempelskatter* (1907). See Hinnom, Valley of.

ACEPH′ALI (Gk. *ȧ*, *a*, priv. + κεφαλή, *kephalē*, head; i.e., headless). A name given (1) To metropolitans and bishops who have no ecclesiastical head over them. (2) To certain ecclesiastical parties: (*a*) those bishops at the ecumenical council of Ephesus in 431 who refused to join either the party of Cyril or of John of Antioch; (*b*) those who rejected the doctrinal decision of the ecumenical council held at Chalcedon in 451 upon the nature of Christ (see Christology); (*c*) the Eutychian adherents of Peter Mongus, who refused to subscribe to the Henoticon in 482, designed to end the Monophysite controversy. (3) To clergy belonging to no diocese. (4) To the Flagellants (q.v.).

ACEPH′ALOCYST (literally, a cyst without a head; Gk. *ȧ*, *a*, priv. + κεφαλή, *kephalē*, head + κύστις, *kystis*, a bladder, bag). An encysted larval tapeworm (*Tænia echinococcus*). See Hydatid Cyst.

A′CER. See Maple.

ACERACEÆ, ăs′ē-rā′sē-ē. A family of dicotyledonous plants embracing the genera Dipteronia and Acer, with one species of the first genus in Asia and about 120 species of Acer in the northern hemisphere. See Maple.

ACERBI, ȧ-chĕr′bē, Giuseppe (1773–1846). An Italian naturalist, born at Castel Goffredo. He studied at Mantua and became proficient in natural science. He was the first Italian to reach North Cape (1798). In 1816 he founded the *Biblioteca Italiana*, a literary review published at Milan, and from 1826 to 1836 was Austrian consul-general in Egypt, where he made important archæological collections for the museums of Vienna, Padua, Milan, and Pavia. He published (in English) *Travels through Sweden, Finland, Lapland* (2 vols., London, 1802).

ACERENZA, ȧ′chȧ-rān′tsȧ. A town in the province of Potenza, Italy, 16 miles northeast of the city of the same name. It is situated on the Bradaceo River, 2730 feet above sea level and is the seat of a bishop. The principal building is a cathedral dating from the thirteenth century, on the gable of which is a bust, supposedly of Julian the Apostate, but which is more probably a likeness of one of the Hohenstaufen. Acerenza is the Aceruntia, or Acherontia, of the late Republic and is mentioned by Horace in his poems. It was regarded as a post of great strength. The surrounding region is noted for its excellent wine. Pop., 1901, 4499; 1911, 4757.

ACERRA, ȧ-chĕr′rȧ, the ancient Acerræ. An episcopal city in Caserta, a province of south Italy, 9 miles northeast of Naples and opposite Mount Somma, from which there is an excellent view of Vesuvius (Map: Italy, J 7). It has a cathedral and a seminary. The country is fertile, and there are sulphur and mineral springs in the vicinity. Until recently, when the marshes were drained, it was extremely unhealthful, owing to the inundations of the Agno, which is the *Clanius non æquus Acerris* of Vergil. Pop., 1901, 16,443; 1911, 16,939.

ACER′RA. An incense box used by the Romans in sacrifices; the incense, taken from the *acerra*, was burnt on the altar. More often, however, the incense was burnt in the *turibulum*, the thurible. The word *acerra* was also applied to a small altar on which incense was burnt before the dead. See Incense.

ACET. A combining form used in various chemical terms, and ultimately derived from Lat. *acetum*, vinegar; as in *acet*al, *acet*anilid, etc.

ACETAB′ULUM. Among the Greeks and the Romans a small, shallow vessel, properly used for holding vinegar (called, in Latin, *acetum*) or other condiments, but employed also for holding other things, such as salads, wine, or honey.

ACETAL, ăs′ē-tăl, $CH_3CH(OC_2H_5)_2$. A colorless liquid of agreeable odor and taste. It is readily obtained by heating a mixture of aldehyde and ordinary alcohol. It has been used to improve the flavor of wine. See Aldehydes.

ACETAMIDE, as′ĕt-ăm′īd *or* -id. See AMIDES.

ACETANILID, ăs′ĕt-ăn′ĭ-lĭd. A crystalline powder made by the action of acetic acid on aniline. It is odorless, slightly bitter, sparingly soluble in water, but freely so in alcohol, ether, and chloroform. Chemically, it is phenylacetamide, $CH_3CONHC_6H_5$. It is known also by the trade name antifebrin. Its action and uses are similar to those of antipyrine (q.v.), but the dose required is much smaller. Acetanilid is a common ingredient of "headache powders," and when taken habitually it is apt to cause serious cardiac symptoms, cyanosis of the mucous membranes, albuminuria, anæmia, œdema of the feet and ankles, heart failure, and death.

ACETATES, ăs′ê-tāts. The salts of acetic acid, which are generally prepared by the action of acetic acid on metallic carbonates or hydroxides. Most acetates are soluble in water. To prove the presence of an acetate in a solution, the analytical chemist adds to the solution some strong sulphuric acid and a little alcohol and heats the mixture for a few seconds; by this treatment of an acetate solution ethyl acetic ester is produced, which is readily recognized by its pleasant and characteristic odor. Some of the acetates are: (1) *Aluminium acetate.* This has been obtained only in its aqueous solution, which is used as a mordant under the name of "red liquor." (2) The *acetate of iron,* known as "black liquor," is likewise used as a mordant in dyeing and printing cotton. The acetates of (3) lead, (4) ammonium, and (5) potassium are much used in medicine. *Lead acetate,* commonly known as "sugar of lead," is used for external applications as an astringent. *Ammonium acetate* is used to promote perspiration; it is prepared best by passing an excess of gaseous ammonia into strong acetic acid. *Potassium acetate* is very largely used as a diuretic. Other metallic acetates are mentioned under the names of the metals (q.v.).

ACETIC, ACID, CH_3COOH. The sour principle of vinegar, an acid composed chemically of carbon, hydrogen, and oxygen. The commercial acid is largely used in the manufacture of acetates, dye-stuffs, etc. Concentrated acetic acid burns the skin, and is therefore applied as a caustic to remove small warts and corns. Like any other acid, if taken internally for any length of time, dilute acetic acid impairs the digestion and absorption of food.

Acetic acid occurs here and there in the organic world. It is found ready formed in sweat and other animal secretions, as well as in the juices of various plants. It is manufactured either by the oxidation of ordinary alcohol through fermentation (see VINEGAR), or by the destructive distillation of wood. The aqueous product obtained in the latter process is subjected to fractional distillation, and the fraction constituting impure acetic acid (called *pyroligneous acid*) is neutralized with soda or lime. In this manner a solution of sodium or calcium acetate is obtained; this solution is evaporated to dryness, and the remaining salt is freed from water and organic impurities by heating above 400° F. Pure acetic acid is prepared by distilling the acetates thus obtained with strong sulphuric acid. The pure anhydrous acid is known as glacial acetic acid; at temperatures below 62° F. it is solid and crystalline; above that temperature it forms a colorless liquid readily known by its pungent, penetrating odor. Since carbon is one of its constituent elements, it is, of course, classed with the compounds of organic chemistry. It is comparatively weak acid. (See ACIDS.) Besides the methods just mentioned, acetic acid can be made by synthesis from the constituent elements. When electric sparks are passed between carbon poles in an atmosphere of hydrogen, acetylene gas is produced; and when oxygen (furnished, say, by chromic acid) is made to act upon acetylene in the presence of water, the acetylene combines with oxygen and water, forming acetic acid.

ACETO-ACETIC (ăs′ē-tō-ă-sē′tĭk) **ES′TER,** $CH_3COCH_2COOC_2H_5$. A colorless liquid organic substance obtained by the action of metallic sodium on the ester formed by the union of acetic acid and ordinary alcohol (i.e., ethyl acetic ester). Aceto-acetic ester mixes in all proportions with alcohol or with ether, but is only sparingly soluble in water. It boils at 180° C. One of the two hydrogen atoms of its CH_2 group is readily replaced by sodium, and the resulting compound, in turn, readily reacts with the hălogen substitution products of the fatty hydrocarbons, such as CH_3I, C_2H_5I, etc. The result is the production of such derivations of aceto-acetic ester as $CH_3COCH(CH_3)COOC_2H_5$, $CH_3CO\text{-}CH(C_2H_5)COOC_2H_5$, etc. In these, the hydrogen of the CH group can again be replaced by sodium, and the resulting compounds can again react with CH_3I, C_2H_5I, and similar substances. This time the result is a series of *di*-substitution derivatives of aceto-acetic ester. Now, aceto-acetic ester itself and its *mono-* and *di*-substitution products are split by the action of potassium hydroxide, and that in two distinct ways, depending on the strength of the alkali used: aceto-acetic ester will yield either acetic acid or acetone and, similarly, the *mono-* and *di*-substitution products of aceto-acetic ester will yield *mono-* and *di*-substitution products of either acetic acid or acetone. In this manner a great number of acids and ketones have been synthesized with the aid of aceto-acetic ester, whence the great importance of this substance in organic chemistry. Aceto-acetic ester further reacts with aldehydes, with aldehyde-ammonia, phenyl-hydrazine, aniline, and other substances, the result being a further series of valuable syntheses. See MALONIC ESTER.

ACETONE, ăs′ê-tōn, or DIMETHYL KETONE, CH_3COCH_3. A colorless organic liquid boiling at 56°.3 C., and having at 20° a specific gravity of 0.792. It is volatile and inflammable, has a pleasant ethereal odor, dissolves various organic substances such as fats and resins, and mixes in all proportions with water, alcohol, and ether. It is separated from its aqueous solutions by calcium chloride. It dissolves considerable quantities of acetylene gas (q.v.), and absorbs a very large amount of sulphurous anhydride. It is used as a solvent as well as for the manufacture of chloroform, iodoform, etc. Acetone is produced when various organic substances are subjected to destructive distillation; it is thus found in pyroligneous spirit (see METHYL ALCOHOL) obtained by the dry distillation of wood. It is separated from wood spirit by distilling over calcium chloride. It is usually prepared by distilling barium acetate at a moderate heat, according to the following chemical equation:

$$(CH_3COO)Ba_2 = C_3H_6O + BaCO_3$$

Barium acetate — Acetone

The somewhat impure product obtained either from wood spirit or from barium acetate may be readily purified and dehydrated by the use of the acid sulphite of sodium, with which it combines to form a crystalline solid compound. Pure acetone is obtained from the latter by distilling with sodium carbonate. When acted on by chlorine in the presence of alkali, acetone is converted into chloroform. Iodoform is similarly produced by the action of iodine (in ammonium iodide solution) and ammonia upon acetone, the reaction forming the most sensitive test for acetone that is known to chemists. The action of acids transforms acetone into mesityl oxide $CH_3COCH{:}C(CH_3)_2$, phorone, and isophorone, by "condensation," or dehydration. When acetone is distilled with strong sulphuric acid, mesitylene is produced; this reaction has been of great value in determining the chemical constitution of a vast number of benzene derivatives allied to mesitylene. Acetone occurs in small quantities in the blood, and is present in the liquid passing over when urine is distilled. It has long been known to chemists as a product of distillation of acetates; its composition was first determined by Liebig and Dumas in 1832. See KETONES.

ACETYL, ăs′ē-tĭl, CH_3CO. A univalent atomic group or radicle in organic chemistry. See CARBON COMPOUNDS.

ACET′YLENE (from *acetyl*), $HC{\equiv}CH$. A colorless gas composed chemically of carbon and hydrogen. It is present in small quantities in ordinary illuminating gas and has a characteristic disagreeable odor somewhat resembling that of garlic. Its "critical temperature" is 37° C. (about 98°.6 F.); that is to say, no matter how great the pressure to which it may be subjected above 37° it will remain gaseous, while at 37° a certain pressure, called the "critical pressure," is necessary and sufficient to liquefy it; the critical pressure of acetylene is 68 atmospheres. Acetylene burns with a brilliant flame and is used as an illuminant. It is best made for scientific as well as for industrial purposes by the action of water on the carbide of calcium (q.v.). It is thus produced, for instance, in automobile lamps. The various apparatus devised for the manufacture of acetylene produces it either in the gaseous state or, by immediate compression, in the liquefied state. We will distinguish two types of apparatus. In the first the *carbide is contained in an appropriate reservoir, into which water is introduced* at a required rate. Such apparatus is rather inconvenient and somewhat dangerous, for the reason that in the mass of carbide considerable rise of temperature may occur at the point immediately attacked by water; besides, a crust of lime may form on the surface of a lump of carbide, and when the water at last penetrates to the core of the lump a sudden and more or less violent reaction may ensue; all of which would naturally result in uneven generation of gas, variations of pressure, and, perhaps, the explosive inflammation of the gas. In the second type of apparatus, on the contrary, the *carbide is thrown into a considerable mass of water*, whereby undue elevations of temperature and irregularity of action are completely avoided. As the presence of impurities in acetylene adds considerably to the danger of using the gas, various methods of purification have been proposed. Now, the nature and quantity of impurity in acetylene depend entirely on the composition of the carbide used in its manufacture, and a very pure acetylene has been produced on quite a large scale simply by employing a pure carbide. With air or oxygen acetylene forms extremely explosive mixtures; mere external friction of a vessel in which such a mixture is contained may cause an explosion. But acetylene is explosive even when isolated and pure, if kept *under pressure of more than two atmospheres;* and it is very dangerous indeed when preserved in liquid form. It has, instead, been stored in solution in ordinary acetone, which absorbs considerable quantities of it. If the pressure under which the gas is dissolved in acetone is not very great, explosion can occur only in the gaseous volume above the surface of the liquid; the dissolved portion of the gas does not take part in the explosion. Under any circumstances, sudden compression of a volume of acetylene may cause an explosion. Acetylene is slightly, if at all, poisonous; it is certainly much less poisonous than ordinary illuminating gas.

Acetylene contains a high percentage of carbon, and the amount of heat generated in its combustion is very large. These are the causes to which its high illuminating power is due; for, in order that a flame may be luminous, it must contain a large amount of carbon particles, and its temperature must be high enough to keep those particles in a state of incandescence. In order that acetylene may yield a large amount of light, it must be properly burned. The numerous burners devised for this purpose are constructed with a view to burning either pure acetylene or mixtures of acetylene and other gases, such as nitrogen, carbonic acid gas, and especially marsh gas. We reproduce here the Perrodil burner, which, while adapted for use with pure acetylene, allows it to be sufficiently mixed with air before it reaches the point *a*, where it begins to burn.

Acetylene is one of the cheapest illuminants. It has, besides, the important advantage over other illuminants of being easily produced and requiring no special establishment for its manufacture. In the opinion of eminent experts, the danger connected with storing it even in large quantities is not great enough to justify a verdict against its introduction into common use.

We will mention a few other uses to which acetylene may be applied:

1. If calcium carbide were cheaper, acetylene might be used as an enricher; i.e., to increase the illuminating power of coal gas and of other combustible gases.

2. When acetylene is passed into an alkaline solution of iodine, the substance *di-iodoform* (C_2I_4) is produced. This substance possesses the antiseptic properties of ordinary iodoform without having the strong and annoying odor of that substance. Di-iodoform has been manufactured on an industrial scale.

3. Under the influence of electric sparks acetylene combines directly with nitrogen to form *prussic* (hydrocyanic) *acid*. It might, therefore, be used in the cyanide industry.

4. A process has been patented in Germany for the manufacture of *sugar* from acetylene.

5. When heated with hydrogen, acetylene is converted into ethylene, and by the action of sulphuric acid and water the latter yields ordinary *alcohol*. It has been argued that if pure alcohol, manufactured by this method, could be substituted as an article of commerce for the highly toxic liquors so freely sold at the present day, a great deal would be accomplished toward diminishing the evil of alcoholism. Under the present conditions, however, the process would be too expensive.

Chemically, acetylene is an unsaturated compound, the first of an important series of hydrocarbons. It is said to be "unsaturated" because it combines with bromine and the other halogens without at the same time losing any of its own elements. It combines in a similar manner with hydrogen. By heating a mixture of acetylene and hydrogen, ethylene gas may be obtained, and this can be further transformed into ethane gas by the action of hydrogen in the presence of "platinum black" (finely divided platinum). Berthelot effected the interesting synthesis of acetylene by passing electric sparks between carbon poles placed in a vessel filled with hydrogen. Under such conditions the carbon of the poles combines directly with hydrogen to form acetylene.

In conclusion, another important property of acetylene may be mentioned. When acetylene is passed into a solution of a cuprous salt (say, cuprous chloride), containing some ammonia, a curious and characteristic compound of acetylene and copper is obtained, called *copper acetylide*. When a chemist is called upon to determine whether acetylene is present or absent in a given mixture, he tests it with a solution of cuprous chloride containing some ammonia; the formation of copper acetylide proves the presence of acetylene. It is currently believed that the explosive compound of copper and acetylene will form whenever acetylene comes in contact with metallic copper or its alloys. This idea has, however, been proved positively false; there is no danger whatever in storing acetylene in metallic vessels of any kind.

Consult: V. B. Lewes, *Acetylene: a Handbook for the Student and Manufacturer* (New York, 1900); Caro, Ludwig, and Vogel, *Handbuch für Azetylen in technische und wissenschaftlicher Hinsicht* (Braunschweig, 1904); Scheel, *Das Azetylen* (Hanover, 1907); Holbeger, Betke, and Nolte, *Azetylen und seine technische Verwendung* (Berlin, 1909); Leeds and Butterfield, *Acetylene* (Philadelphia, 1910); Vogel, *Das Azetylen* (Leipzig, 1911). A technical journal devoted to the acetylene industry (*Zeitschrift für Calciumcarbid-Fabrikation und Azetylen-Beleuchtung*) was established at Suhl in 1897 and has, since 1900, been published at Berlin.

ACHÆA, ȧ-kē'ȧ (Gk. 'Αχαία). 1. The southeast part of Thessaly, the legendary home of Achilles (q.v.). 2. The northern part of Peloponnesus, bordering on the Corinthian Gulf. The land, which rises gradually from the coast to the hills of the interior, was famed in ancient times for fertility in production of oil, wine, and fruits; the wooded mountains contained much game. In the modern kingdom of Greece Achæa forms a nome, or department, in the extreme northwest of the Morea, and its chief town is Patras (ancient Patræ). Except the west coast, the land is fertile and produces grain, wine, and oil.

In early times the Achæans (q.v.) held more or less aloof from participation in the affairs of the rest of Greece. There were 12 principal towns, the names of which, according to Herodotus, were Pellene, Ægeira, Ægæ, Bura, Helice, Ægium, Rhypes, Patræ, Pharæ, Olenus, Dyme, and Tritæa; they formed a confederacy, with Helice at the head. After the destruction of Helice by an earthquake in 373 B.C., Ægium took its place as the chief city of the confederacy. The wars and rivalries which prevailed after the death of Alexander the Great brought about the complete dissolution of the ancient bond, but a new union was formed in 280 B.C., which gradually extended itself, and in a few years comprised 10 cities, Patræ, Dyme, Pharæ, Tritæa, Leontium, Ægeira, Pellene, Ægium, Bura, and Ceryneia. This second confederacy was known as the Achæan League. It first came into prominence as an important factor in Greek and Hellenic politics in 249 B.C., when Aratus (q.v.) joined thereto his native city, Sicyon. The aim of the league from this time was to free the Greek peninsula from Macedonian rule. In 242 B.C. the Macedonian garrison was driven from Corinth, and this city was brought into the confederacy. Before the last quarter of that century the league had reached its most flourishing period of development. It included the whole of northern and middle Peloponnesus except Sparta, and many cities in other parts of Greece.

The government of the league affords perhaps the best example in antiquity of the federal system. In foreign affairs the league acted as a whole, but in internal affairs each city was a unit, and had equal rights with every other city. Also, each state still preserved its entire independence. There was a public assembly which met regularly twice every year, in spring and in autumn, and was attended, not by deputies, but in person by all male citizens of thirty years of age or over. The vote was by states, each state having voting strength according to its population. The meeting-place of the assembly was at first a grove near Ægium, but later Philopœmen (q.v.) instituted a change, whereby meetings were to be held in rotation at the various cities belonging to the league. In this council the affairs of the league were brought up to be discussed and passed upon, and a record was kept of the proceedings. The chief officer of the league was the *strategos*, who had as subordinates a *hipparchos*, the commander of the cavalry, and a *nauarchos*, the admiral. There was also a secretary. The *strategos* was commander-in-chief of the army and general executive officer. He was assisted in the duty of calling together the assembly and presiding thereat by a board of ten *demiurgi*. For some years the league maintained its independence against all enemies. Something of the old power of Greece seemed to return, and there was a promise of permanent union; but it soon appeared that the league was bent on its own destruction. Instead of presenting a firm front against the common foes of Greece, its members were divided by continual discords. The Ætolian League was a formidable rival (see ÆTOLIA), and the Spartans, led by King Cleomenes III, pressed the confederacy so hard that Aratus was finally compelled to seek the alliance of the Macedonian King, Antigonus Doson.

This act was nothing less than the beginning of the dependency of the Achæan League on the Macedonian power. Another dangerous enemy was Rome. Led by the wise and energetic policy of Philopœmen, the Achæans held out against enemies at home and abroad for a number of years, but in 198 B.C. they were induced to ally themselves with the Romans. In 192 B.C. Philopœmen appeared at Sparta and compelled that city to join the league, and by the following year the whole of Peloponnesus had come over to the union. This situation, however, lasted but a short time. The hostilities of Sparta, the intrigues of the Romans, and internal dissensions combined to bring about the fall of the confederacy. In 167 B.C. a wholesale deportation of leading Achæans to Rome as hostages took place. In 146 B.C. the Achæans were defeated at Corinth by the Roman general Mummius (q.v.). This defeat not only dissolved the league, but destroyed the political independence of Greece. Southern and central Greece, under the name of Achæa, became a Roman province. Polybius (q.v.), who was one of the Achæans taken to Rome as hostages in 167 B.C., has given an extended account of the league in his history of the period between 220 B.C. and 146 B.C. Consult: Schorn, *Geschichte Griechenlands von der Entstehung aetolischen und achäischen Bundes* (Bonn, 1833); Drumann, *Ideen zur Geschichte des Verfalls der griechischen Staaten* (Berlin, 1811); Hertzberg, *Geschichte Griechenlands unter den Römern* (Halle, 1875); and Freeman, *History of Federal Government* (2d ed., London, 1893).

3. Under the Romans the province containing all Greece except Thessaly and Macedonia.

ACHÆAN LEAGUE. See ACHÆA.

ACHÆANS, ȧ-kē′anz (Gk. *Ἀχαιοί, Achaioi*). One of the races of ancient Greece. In Homer the name sometimes includes all the Greeks. The Achæans inhabited the southeastern part of Thessaly and much of the Peloponnesus. By the Dorian invasion they were crowded into the northwestern corner of the Peloponnesus, where they later formed the Achæan League. (See ACHÆA.) In mythology their ancestor was Achæus, son of Xuthus and grandson of Hellen (q.v.).

ACHÆMENES, ȧ-kĕm′ē-nēz (Gk. *Ἀχαιμένης, Achaimenēs*), **ACH′ÆMEN′IDÆ.** The names respectively of the progenitor and of the dynasty of ancient Persian kings, Cyrus, Cambyses, Darius, Xerxes, Artaxerxes, and their successors. The rule of the Achæmenidæ over Iran lasted 558–330 B.C. In the old Persian inscriptions Darius proudly traces his lineage back to *Haxāmanisiya* (in Greek, *Ἀχαιμένης*), as the founder of the royal line, and states that from him the family received the name Achæmenidæ.

ACHAGUA, ȧ-chä′gwȧ. An Indian tribe of Arawakan stock, which formerly inhabited the forests of the upper Orinoco region in northeastern Colombia. They were prominently mentioned in the last century, but were entirely uncivilized, practicing tattooing, polyandry, and the destruction of female infants. About 500 were said still to exist on the Rio Muco about the year 1850.

ACHAIA, ȧ-kā′yȧ, mod. Gr. pron. ȧ-kā′a. See ACHÆA.

ACHAMOTH, ăk′ȧ-mŏth. In the theological system of Valentinus (q.v.) the Gnostic, a personification of a form of wisdom inferior to the pure *sophia*. She is the mother of the world-maker, Demiurgus. See DEMIURGE.

ACHARD, äk′ärt, FRANZ KARL (1753–1821). A German physicist and chemist, born in Berlin. He is remembered chiefly as the founder of the beet-sugar industry. He devoted several years to investigating the best methods of raising sugar-beets and of producing sugar on an industrial scale. Finally, at the instance of the King of Prussia, experiments were successfully carried out in Berlin about 1800, and as a result Achard was enabled to establish near Kunern in 1801 the first sugar manufactory. He wrote *Die europäische Zuckerfabrikation aus Runkelrüben in Verbindung mit der Bereitung des Branntweins* (1812). Achard was for a time director of the class of physics in the Berlin Academy of Sciences, and published four volumes of *Vorlesungen über Experimentalphysik* (1790–92).

ACHARD, ȧ′shär′, LOUIS AMÉDÉE EUGÈNE (1814–75). A French novelist, born in Marseilles, where he was at first a merchant. He entered newspaper work in his native city, continued it in Paris, went as a reporter to Spain with the Duc de Montpensier in 1846, and followed the French armies in 1870. He is chiefly known as a novelist, his romances being numerous. Among them are *La belle rose* (1847); *Les misères d'un millionnaire* (1861); and *Histoire d'un homme* (1863). He also wrote several plays, among them *Histoire de mes amis* (1874).

ACHARNIANS, ȧ-kär′nĭ-anz, THE (Gk. *Ἀχαρνεῖς, Acharneis*). A comedy of Aristophanes (q.v.) produced in Athens at the festival of the Lenæa, 425 B.C., under the name of *Callistratus*. The title comes from the fact that the chorus is composed of men of Acharnæ, an Attic deme near Mount Parnes. The play is in opposition to the democratic policy of war with Sparta. Dicæopolis, the hero, is an honest farmer who is tired of the fighting and his losses thereby and finally makes a private treaty with the Lacedæmonians. This leads to a farcical but brilliant display of the contrasts between the discomforts of war and the joys of peace. The play has been well edited, with translation, by Starkie (London, 1909); there is an admirable translation by John Hookham Frere.

ACHATES, ȧ-kā′tēz (modern Dirillo). 1. A river in southern Sicily that gave its name to the agate (*achates*) which was found there, according to Pliny (37, 139). 2. A faithful companion of Æneas in his wanderings (Vergil, *Æneid*, i, 188, etc.), called by Vergil *fidus Achates*. The name *fidus Achates* has long been applied to any faithful friend.

ACHELOUS, ăk′ē-lō′ŭs (Gk. *Ἀχελῷος, Achelōos*, now called Aspropotamos, i.e., White River, from the cream color of its waters). The largest river in Greece (Map: Greece, C 5). It rises in Mount Peristeri of the Pindus range, flows southward, separating the modern *eparchiæ* Arta and Báltos on the west from Trîkala and Evrytania on the east, and falls into the Ionian Sea. It is over 100 miles long and unnavigable.

ACHENBACH, äk′en-bak. The name of the two most celebrated landscape painters of the Düsseldorf School (q.v.).—ANDREAS (1815–1910), the elder, was born at Cassel and studied at Düsseldorf with Schadow and Schirmer. His art represents a realistic reaction upon the romanticism of the Romantic School and was influenced

by the Dutch. Although he traveled much and painted every variety of landscape, he is particularly known as the painter of the northern ocean. His vision was clear and sober, but he lacked appreciation of the sentiment in nature. His principal works include "The Sinking of the President" (Karlsruhe), "Hardanger Fjord" (Düsseldorf), "The Pontine Marshes" (Munich), and "The Fish Market at Ostend" (1866, Berlin). His works are numerous in all important German and many American galleries, such as the Metropolitan Museum, New York, and in the Pennsylvania Academy at Philadelphia.—OSWALD (1827–1905) was born at Düsseldorf. His journey to Italy in 1850–51 determined the character of his subjects, which are Roman and south Italian, representing some folk scene as part of a brilliantly colored landscape. His style is more romantic than his brother's, but less powerful. His principal works include "A Funeral at Night in Palestrina" (1859, Düsseldorf), the "Gulf of Naples," and other subjects (1880, Dresden). His paintings are also numerous in the United States, and he was represented at the World's Fair in St. Louis by "Sea at Sunrise," "The Arch of Constantine," and "Lake Nemi." Consult C. Achenbach, *Andreas Achenbach in Kunst und Leben* (Cologne, 1912).

ACHENE, ā-kēn′, also ACHENIUM and AKENE (Gk. *ἀ, a*, priv. + *χαίνειν, chainein*, to gape). A seed-like fruit such as is characteristic of the great family of Compositæ, to which belong sunflowers, thistles, dandelions, etc. The pits of the strawberry and the small fruits forming a head in the centre of a buttercup are also achenes. The seed-like appearance arises from the fact that the wall of the seed-vessel hardens and invests the solitary seed so closely as to seem like an outer coat. See FRUIT.

ACHENSEE, äg′en-zā. A lake in north Tyrol, Austria, 20 miles northeast of Innsbruck. It is 5½ miles long and half a mile broad and is 3018 feet above sea level. Its picturesque shores dotted with hotels and villas are much frequented as summer resorts. Steamers ply on its waters.

ACHENWALL, äk′en-väl, GOTTFRIED (1719–72). One of the most influential German economic and political scientists of the eighteenth century. Besides works on natural law, history, and political science, he was author of an important treatise entitled *Staatsverfassung der heutigen vornehmsten Europäischen Reiche* (1752), in which he treated not only the political constitutions, but the economic and social condition of the principal nations. His method was statistical, and the effect of his work was to popularize the use of statistics in Germany. Certain of his disciples claimed for him the title of founder of statistical science; but such a claim cannot be defended in view of the priority of Petty, Conring, and other writers in the use of this method.

ACHERON, äk′ē-rŏn (Gk. *Ἀχέρων, Acherōn*). The name given by the ancients to several rivers. The best known is the Acheron in Thesprotis, in Epirus, which flows through the lake Acherusia and pours itself into the Ionian Sea. According to Pausanias (q.v.), Homer borrowed from this river the name of the river Acheron in the underworld. In the later poets and mythographers Acheron is the name of a river or lake in the lower world across which the souls of the dead were obliged to pass. (See STYX.) The lake Acherusia in Thesprotis was regarded as an entrance to the lower world, and the name was also applied to a walled inclosure near a temple at Hermione in Argolis, in the Peloponnesus, and a promontory near Heracleia in Pontus, Asia Minor.

ACHESON, ăch′e-son, EDWARD GOODRICH (1856–). An American chemical inventor. He was born at Washington, Pa., and received only an elementary education. At the age of sixteen he was compelled to seek employment as time-keeper at a blast furnace; yet the very next year he invented a usable drilling machine. Subsequently he found routine employment in the petroleum industry and in ore mining. In 1880 he became Thomas A. Edison's assistant, taking part in the development of the incandescent lamp, and in 1881–82 installed the first lamp plants in Europe. In 1891 he invented the now widely used abrasive *carborundum*, a carbide of silicon, and between 1895 and 1899 he worked out a process for making artificially a graphite ("Acheson-graphite") that far surpasses the natural product in purity and industrial usefulness. In 1906 and 1907 he succeeded in reducing his graphite to an exceedingly fine state of subdivision ("deflocculating" it), in which state it remains permanently suspended in water ("Aquadag") or in oil ("Oildag"). These suspensions possess great practical value as lubricants. The honors bestowed upon Acheson in recognition of his services to art and industry include the Rumford Medal of the American Academy and the Perkin Medal for the most valuable work in applied chemistry. In 1909 the University of Pittsburgh conferred upon him the honorary degree of Doctor of Science, and in 1913 he was made an honorary member of the Imperial Technological Society of Russia.

A CHEVAL (ä′she-väl′) **POSITION** (Fr. *à cheval*, on horseback). A military term to denote the position of an army astride a river or other obstacle preventing effective coöperation of the wings of the army. When the perpendicular to the front is formed by a river, possession of bridges is necessary in order to provide communication for supporting troops.

ACHIKAR, ä-chē′kär. The hero of a romance widely read in antiquity. He is represented as a wise wazir of the Assyrian kings Sennacherib and Esarhaddon. Through the intrigues of his ungrateful nephew Nadan, whom he has brought up, he is condemned to death, but is saved by the executioner, who substitutes for him a eunuch, and after some time, when Nadan's crime is found out, restored to his position. The culprit is left to the mercies of Achikar, who only keeps him in confinement, treating him daily to wise counsels until he dies. The sayings of Achikar occupy a large part of the work. The earliest form of the story is found in papyrus fragments coming from the archives of the Jewish military colony in Elephantine. (See ELEPHANTINE PAPYRI.) This copy of the text was written about 407 B.C. in Aramaic, which probably was the original language. It is very defective. When the story was first written is not known; but it is supposed to go back to the beginning of the fifth century. It is of great interest in showing how early stories of this kind began to cluster about the later monarchs of Assyria and how gnomic literature in such a fictitious setting of pagan origin was cherished among the Jews. Before this remarkable discovery the story was generally thought to have been written either about 200 B.C. just before the

Book of Tobit, in which Achikar, or Achiacarus, is mentioned (i. 21, 22; ii. 10; xi. 18; xiv. 10, 11), or some time later to satisfy curiosity in regard to this personage. The Arabic version, which was first made known through a translation in Chavis-Cazotte, *La suite des mille et une nuits*, ii, 1788, was derived from the Syriac, and this, like the Ethiopic, Armenian, Slavonic, and Rumanian, from the Greek, of which some parts remain. A Greek translation may have been known already to Theophrastus (300 B.C.), who, according to Diogenes Laertius (v, 50) wrote a book called *Axikaros*, and to Posidonius (c.100 B.C.) in Strabo, xvi, 2, 39. A pictorial representation of Achikar is found in a mosaic at Treves. Consult: Sachau, *Aramäische Papyri und Ostraka* (1911, pp. 146 ff.); Conybeare, R. Harris, and Agnes Lewis, *The Story of Ahikar* (1898); Smend, *Alter und Herkunft des Achikar-Romans* (1908); F. Nau, *Histoire et Sagesse d'Ahikar l'Assyrien* (1909); Ed. Meyer, *Der Papyrusfund von Elephantine* (1912).

ACHILL, ăk'il, or **EAGLE ISLE.** An island off the west coast of Ireland, in the county of Mayo. It is about 20 miles long and has a mean breadth of about 4 miles. It has several mountains composed of mica slate, about 2000 feet high. There are several villages. Pop., 1911, 1721.

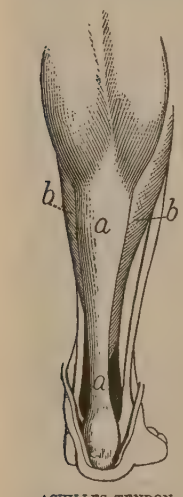
ACHILLEA, ăk'il-lē'ȧ (Lat. *achillēos*, milfoil, yarrow, whose "virtues" are said to have been discovered by Achilles). A genus of over 100 species belonging to the family Compositæ. Most of the species belong to the Old World, only four or five species occurring in North America. The common yarrow or milfoil (*Achillea millefolium*) is a very cosmopolitan species, occurring throughout the northern hemisphere. The flat-topped cluster of white flowers with stiff branches, the finely dissected leaves, and the bitterish aromatic taste and odor make this species easily recognizable. Both leaves and flowers are used in medicine as a powerful stimulant and tonic. The leaves were formerly much used for healing wounds, and are still so employed by the common people in the Highlands of Scotland and in some parts of the Continent of Europe. Such old names as "sanguinary," "nosebleed," and "soldier's-woundwort," suggest the uses to which the plant was put. The expressed juice is a popular spring medicine in Germany. *Achillea moschata*, called musk milfoil, is cultivated as food for cattle in Switzerland. *Achillea moschata*, *atrata*, and *nana*—all natives of the Alps—are very aromatic, and bear the name of genipi or genip. The inhabitants of the Alps value them very highly, and use them for making what is called Swiss tea. *Achillea nana* is said to be used in making chartreuse. Sneezewort (*Achillea ptarmica*) is a native of Europe, and somewhat introduced into the United States, with lanceolate leaves and much larger flowers than the common milfoil. The root, which is aromatic, is used as a substitute for pellitory of Spain, and is often called European pellitory.

ACHILLES, ȧ-kil'lēz (Gk. Ἀχιλλεύς, *Achillcus*). The hero of Homer's *Iliad*, and the type of glorious youth. In the Homeric poems his story is simple. The son of King Peleus and the sea-goddess Thetis, he was brought up at his father's court in Phthia, in Thessaly, Greece, until he was induced to take part in the Trojan War; when he learned that he could have either a long but inglorious life or a short and famous career, he preferred an early death with fame. This fate gives Achilles a tinge of melancholy characteristic of the Greek mind. While the Greeks were in camp before Troy, Achilles plundered the surrounding country and secured as his booty the beautiful maiden Briseïs. The *Iliad* narrates the wrath of Achilles because Agamemnon deprived him of Briseïs, whom he had come to love, to replace Chryseïs, whom Agamemnon had been forced to restore to her father Chryses, priest of Apollo, to avert the wrath of Apollo from the Greeks. In the absence of Achilles, who in his rage refuses to fight longer for the Greeks, the Trojans drive the Greeks to their ships; the complete destruction of the Greeks is averted only when Achilles allows his friend Patroclus to lead his Myrmidons to the rescue. Pursuing the Trojans to their walls, Patroclus is slain by Hector, and Achilles, overwhelmed with grief, becomes reconciled with Agamemnon, that he may hasten to obtain revenge. He returns to the fight, and after driving the Trojans within the city, slays Hector and drags his body to the ships. After celebrating the funeral of Patroclus with great pomp, he yields to the command of Zeus and allows Priam to ransom the body of his son Hector. In the *Odyssey* we have allusions to the death of Achilles, his splendid burial, and the renown of his son Neoptolemus. Later epic poems and other compositions add many details. According to some, his mother renders him invulnerable by dipping him in the river Styx; but his heel, by which she held him, was not immersed, and here he received his death wound from an arrow. He was educated by the centaur Chiron, and was afterward hidden, robed as a girl, by his mother at Scyros, among the daughters of Lycomedes, that he might escape the temptation to join the expedition against Troy. He was needed, however, in the expedition, and was detected by the craft of Odysseus, who, disguised as a peddler, offered a sword, as well as trinkets, for sale to the maidens. When a trumpet suddenly sounded a call to arms, Achilles at once seized the sword and, being recognized, was then easily induced to join the Greeks (Ovid, *Metamorphoses*, vol. xiii, 162 ff.; Statius, *Achilleis*, vol. i, 207 ff.). His combats with Penthesilea, Queen of the Amazons, and with Memnon (q.v.), who came to aid Priam after the death of Hector, were favorite subjects with Greek artists. He met his death at the hands of Apollo and Paris before the Scæan gate, or in the temple of Apollo, whither he had gone to meet Polyxena, daughter of Priam, whom he was to wed. To appease his spirit she was slaughtered on his grave after the capture of Troy. After his death he was transported to the Islands of the Blessed, where he was united with Medea. Achilles was worshiped in Laconia and other parts of Greece, and it is probable that, like other Greek heroes, he was originally a god, honored especially by the Achæans of Phthiotis. See HOMER; TROJAN WAR.

ACHILLES TATIUS, tā'shī-ŭs (Gk. Ἀχιλλεὺς Τάτιος, *Achilleus Tatios*). A Greek writer, a native of Alexandria, who lived probably in the fifth or sixth century A.D. He was the author of a romance in eight books, entitled *The History of Leucippe and Clitophon*, in which he borrowed freely from the work of his predecessor Heliodorus (q.v.), by whom alone he

was surpassed in popularity. While his work is graceful in style, it is inferior to that of his model; for us it is marred in passages by the grossest pagan immorality. It was, however, freely imitated by later writers, especially by Eustathius and Nicetes Eugenianus in the Byzantine period. Suidas says that the author became a Christian and gained the office of bishop, but this is doubtful. The work has been edited with commentary by Jacobs (Leipzig, 1821); Hirschig, in Didot's *Scriptores Erotici* (Paris, 1856); Hercher (Leipzig, 1858). Consult Salverte, *Le Roman dans la Grèce ancienne* (Paris, 1894); Rohde, *Der griechische Roman und seine Vorläufer* (Leipzig, 1900) and Wolff, *The Greek Romances in English Prose Fiction* (New York, 1912).

ACHILLES TEN'DON (Lat. *Tendo Achillis*). A tendon (*a*) which attaches the soleus (*b*) and gastrocnemius muscles of the calf of the leg to the heel bone. It is estimated to be capable of resisting a force equal to 1000 pounds weight, and yet is occasionally ruptured by the sudden and violent contraction of these muscles. The name was given with reference to the death of Achilles by a wound in the heel.



ACHILLES TENDON.

ACHIMENES, ă-kĭm'ē-nēz (probably from Lat. *Achæmenis*, Gk. *ἀχαιμενίς, achaimenis*, an amber-colored plant in India used in magical arts). A genus of plants of the family Gesneraceæ (q.v.), much grown in pots in greenhouses. The species are numerous—natives of tropical America. Achimenes is propagated either by the natural increase of the rhizome or by cuttings. If the rhizomes are potted by April 1, the drooping plant comes into blossom by the last of May and continues to bloom without cessation for four or five months. After growth starts the soil should never be allowed to become dry. The corolla tube is cylindrical, and the limbs are spreading. The blossoms are red, blue, and white, with all intermediate shades.

ACHIN, ä-chēn', or **ATCHEEN.** The Dutch Atjeh, a dependency at the north end of Sumatra, about 20,000 square miles in area, with a population which numbered approximately 580,000 in 1905. The country is mountainous, being intersected by the northwest-southeast trending ranges which form the axis of Sumatra, some peaks attaining 12,000 feet. The famous Gold Mountain, 5660 feet high, is at the extreme northern point, overtowering the city of Kotaraja or Achin, the seat of the Dutch government. For the geography of the southern part of the dependency, consult W. Volz, *Nord-Sumatra* (vol. ii); *Die Gajoländer* (Berlin, 1912).

The shorter stature, darker color, etc. of the aborigines of Achin has led some authorities to separate them from the Sumatrans in general, and their language is by others held to be at bottom Polynesian rather than Malay. While undoubtedly Malays, the Achinese, like several other peoples of the East Indies, may have a strain of Arab blood. In the seventh century the Hindu missionaries introduced civilization, and many emigrants from India settled here. In the thirteenth century the people were converted to the faith of Islam, the sultans of Achin claiming descent from the first Mohammedan missionary. When in the sixteenth century Europeans reached Achin, they found astonishing wealth. The Achinese sent an embassy to the powerful Dutch republic, and the envoys had audience of Prince Maurice in his camp before Grave in 1602. The Dutch kept up intermittent trade intercourse with them. In 1819 they concluded with the government of India a treaty which excluded from residence in Achin Europeans other than British. When in 1824 the British settlements in Sumatra were ceded to the Dutch, Great Britain stipulated that the Dutch should not conquer the little kingdom. The piratical instincts of the Achinese, however, led them into conflicts with the Dutch, who found it necessary to chastise them. In 1871, by the Hague Treaty, the British withdrew their reservation, and the Dutch sent an expedition in 1873 to capture the chief city and invade the country. They were beaten in this, as well as in other expeditions, and the country was not pacified until 1880, when a civil government was instituted. Outbreaks resulting in serious fighting occurred in 1896, 1898, and 1901–04. The Achin wars have cost the Netherlands 12,000 lives and nearly $100,000,000 for blockade and naval and military operations, and the country is yet practically unsubdued in the interior. There are numerous works in Dutch treating of Achin, and there are in Holland many monuments and trophies of the war. Besides the historical work of Veth, *Atchin* (Leyden, 1873), the standard treatise on the Achinese is that of Christiaan Snouck-Hurgronje, *De Atjehers* (2 vols., Batavia, 1893–95).

ACHISH, ā'kĭsh. A Philistine king of Gath, son of Maoch (1 Sam. xxvii. 2). When David fled from Saul, he took his refuge with Achish and became his vassal, receiving from him Ziklag in fief. Unwilling to fight against Judæans, Jerahmeelites, and Kenites, David made raids upon the Geshurites, Girzites, and Amalekites, while persuading Achish that he had been fighting the former tribes. Achish stood by his vassal when the Philistine confederacy began the war against Saul which ended with the battle of Mount Gilboa; but the other princes distrusted David and refused to have him take part in the expedition. The story in 1 Sam. xxi. 10–15 that David feigned madness when he first appeared before Achish is evidently out of place in the present context, but such a ruse is not impossible. The editor of Ps. xxiv. believed the story, but, thinking of Gen. xx. 2, wrote by mistake Abimelech for Achish. The name itself is of interest, as it is one of the few non-Semitic Philistine names that have been preserved.

ACHMET, ăk'mĕt. See AHMED.

ACHMET, ăk'mĕt, or **AHMED,** ä'mĕd. The name of three sultans of Turkey, of whom Achmet III (reigned 1703–30) was the most famous. It was this sovereign who sheltered Charles XII after his defeat at Pultowa in 1709. He wrested the Morea from the Venetians in 1715. Having invaded Hungary, he was de-

feated by Prince Eugene at Peterwardein in 1716, and later near Belgrade, and compelled to cede to Austria, by the treaty of Passarovitz, 1718, Belgrade, the Banat, and other territories. The soldiers drove him from the throne in 1730, and he died in prison in 1736.

ACHOMAWI, ä'chō-mä'wē. A Shastan tribe in California. See SHASTA INDIANS.

ACHOR, ā'kôr. A valley which forms the northern boundary of Judah (Josh. xv. 7) near Jericho. Its identification is uncertain, though Wady-el-Kelt has been suggested, which, however, is not broad enough to become "a place for the herds to lie down in" (Isa. lxv. 10).

ACHORION, ȧ-kō'rī-ŏn. See FAVUS.

ACHRAS, ăk'răs. See BLACK BULLY.

ACHROMATIC, ăk'rō-măt'ĭk. See TELESCOPE.

ACHRO'MATISM (colorlessness, from Gk. *ȧ, a,* priv. + *χρῶμα, chrōma,* color). The property by virtue of which certain combinations of lenses and prisms refract a beam of white light without producing dispersion of certain colors. (See DISPERSION.) Newton, misled by imperfect experiments, concluded that dispersion could not be annulled without annulling refraction. Hall, in 1733, and later, Dollond (independently), found that certain media have large powers of refraction with small dispersion, while others give small refraction with large dispersion; so that the dispersion of two colors produced by one medium can be corrected by that due to another, while the deviation of the light from its original direction is not entirely annulled. For example, by properly combining a convex lens of crown-glass with a concave one of flint-glass an "achromatic lens" can be produced which will have the same focus for the two selected colors, while the foci for the other colors are at neighboring points along the axis of the lens. It is thus seen that the achromatism in the above arrangement is not perfect.

FIG. 1.
ACHROMATIC PRISM.

In Fig. 1 a beam of white light having the direction *c d* meets the crown-glass prism and is refracted. Dispersion also takes place, and the beam as it emerges is separated into its component colors. Adjacent to the prism of crown-glass is one of flint-glass, whose action is to bring together the rays so that they emerge parallel, with the desired deviation. The reason is that prisms of different media do not give exactly similar spectra, the colors being dispersed according to different laws for different media. Fig. 2 shows achromatic combinations of lenses where the flint and crown glasses are combined with the same effect as in the achromatic prism illustrated. A combination of three lenses, or prisms, gives a better approximation to absolute achromatism than a combination of two.

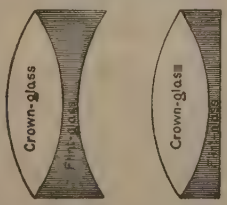


FIG. 2.
ACHROMATIC LENSES.

If a lens is to be used for visual observations, it is "corrected" generally for a definite wave-length in the yellow and one in the bluish green, i.e., these two colors are brought to the same focus; but if it is to be used for photographic purposes, it is "corrected" for two wave-lengths, which include those radiations possessing the greatest photographic action. There are two defects which a lens may have, owing to chromatic aberration (q.v.), in that the colored images may be at different distances from the lens and that they may be of different sizes. The second of these defects is insignificant if the lens is thin; and the first may be "corrected," as just described, by combining two thin lenses. If the lens is thick, or if the lenses of the lens system are some distance apart, the second of the above-mentioned errors becomes serious. It may, however, be corrected.

A CHULA, ä-shōō'lä (Portug.). A dance similar to the fandango (q.v.).

ACHURCH', JANET (1864–1916). The stage name of Janet Achurch Sharp, an English actress, the wife of Mr. Charles Charrington. She was born in Lancashire, Jan. 17, 1864, and first appeared in London at the Olympic Theatre in January, 1883. In 1887 she joined Beerbohm Tree's company, and June 7, 1889, she took the management of the Novelty Theatre and created in English the part of Nora Helmer in *A Doll's House.* This was the first presentation of an Ibsen play to the English public. She has since toured with a company in India and Australia and appeared in the United States with Richard Mansfield (1895) and independently. In June, 1897, at the Olympic Theatre, London, she took the Shakespearean part of Cleopatra, and she appeared later in some of Bernard Shaw's plays. She appeared in the parts of Hermione in *Andromache* at the Garrick, February, 1901, and of Queen Katharine in *King Henry VIII.* In January, 1911, she played at court as Merete Beyer in *The Witch.*

ACHZIB, ăk'zĭb. 1. A Phœnician city claimed by Asher (Josh. xix. 29), but not conquered (Judg. i. 31); the modern Ez-Zib on the promontory of Ras-en-Nakurah, 9 miles north of Accho. Achzib is mentioned by Sennacherib. 2. A town in the Shephelah of Judah (Josh. xv. 44). Possibly the modern 'Ain-el-Kezbeh.

ACIDASPIS, ăs'ĭ-dăs'pĭs (Gk. *ȧκίς, akis,* spine + *ȧσπίς, aspis,* shield). A peculiar genus of trilobites found in rocks of Silurian and Devonian age in nearly all parts of the world. The individuals are, as a rule, small and are remarkable because of the spiny ornamentation of the dorsal shield or carapace. The lobation of the head shield is rather peculiar and quite unlike that seen in any other genus of trilobites, the trilobite division being obscured by a number of supplementary furrows and by the strong development of two longitudinal false furrows between the normal dorsal furrows. The thorax contains nine or ten segments, and the tail shield is of rather small size. In some species a row of slender spines is developed upon the sides of the head shield and a long spine projects from each posterior angle. Besides these there are often two long straight or curved spines directed upward and backward from the middle posterior edge of the head. Each segment of the thorax is produced laterally into long spines, and there are also two short spines on the raised median portion of each segment. The tail shield is in nearly all species likewise furnished with spines, so that on the whole these animals must, though of small size, have presented a rather formidable aspect to

larger animals which sought to prey upon them. A few species of the genus are of particular interest on account of the abnormal development of the eyes, which are placed at the summits of highly elevated, slender, though immovable, stalks, which arrangement enabled the animal to command a view in all directions. This elevation of the eye recalls the stalk-eyes of some modern crabs and lobsters. For illustration, see Plate of TRILOBITES.

AC'IDIM'ETRY AND AL'KALIM'ETRY. Terms applied in analytical chemistry to the determination of the amount of acid or of alkali, respectively, contained in a given solution, or to the volumetric determination of the relative strengths of acid and alkaline solutions.

ACIDS, ăs'ĭdz (Lat. *acidus,* sour). A large and important class of chemical substances. They all contain hydrogen, part or all of which is replaced when the acids are brought in contact with a metal as a base. (See BASE.) The compounds formed by substituting metals for the hydrogen of acids are termed the salts of those metals, and therefore the acids themselves may be regarded as salts of hydrogen.

Most acids have a sour taste and change the blue color of litmus to red. These properties, however, are not strictly characteristic of acids, silicic acid, for instance, possessing neither, though—like a true acid—it combines with metallic hydroxides to form salts.

According to the maximum number of their hydrogen atoms replaceable by metals acids are termed mono-basic, di-basic, tri-basic, etc. No matter how great the excess of potassium hydroxide employed, only one hydrogen atom of acetic acid, $C_2H_4O_2$, can be replaced by potassium, the only resulting salt having the formula $C_2H_3KO_2$. Acetic acid is, therefore, said to be a mono-basic acid. By the action of a limited amount of potassium hydroxide on sulphuric acid (H_2SO_4) a salt called the acid sulphate of potassium ($HKSO_4$) may be obtained; this salt is formed by substituting the metal potassium for one of the hydrogen atoms of sulphuric acid. But if an excess of potassium hydroxide is used, both of the hydrogen atoms of sulphuric acid are replaced by potassium, and the salt known as the neutral sulphate of potassium (K_2SO_4) is produced. Sulphuric acid is therefore said to be a di-basic acid.

Acids containing carbon among their constituent elements are called organic acids, because some of them were originally found in the organic world. Most organic acids are found to contain one or more carboxyl groups (COOH); it is the hydrogen of these groups that is replaceable by metals. These acids are called carboxylic acids, and their basicity is determined by the number of carboxyl groups they contain. The carboxylic acids are subdivided into carbocyclic and fatty acids, according as their molecules do or do not contain those rings of which the so-called aromatic benzene-nucleus is the most important. Thus benzoic acid, C_6H_5COOH, is a carbocyclic acid; acetic acid, CH_3COOH, is a fatty acid. An interesting group of substances belonging to the aromatic series and, like acids, combining with metallic hydroxides, are not included among the true aromatic acids because they do not contain the carboxyl group. These substances, called phenols (q.v.), are found to be weaker than the weakest carboxylic acid known, viz., carbonic acid.

The specific strength of an acid depends, naturally, on its composition and chemical constitution. But the precise nature of that relation is as yet unknown. The correctness of the very methods of measuring the strength of acids is, according to some eminent authors, still subject to doubt. It is, however, remarkable and cannot be denied, that the different methods employed yield very nearly coincident results.

One of those methods consists in determining the avidity of acids for a metallic hydroxide, as shown by the proportion in which the latter is distributed between two acids when brought in contact with a mixture of the two, the amount of metallic hydroxide employed being insufficient to saturate both acids completely. For example: sodium hydroxide, sulphuric acid, and nitric acid are weighed out in such quantities that the sodium hydroxide is just sufficient to neutralize either one of the two acids. When the three substances are now mixed together in aqueous solution, it is found that two-thirds of the sodium hydroxide have been taken up by the nitric acid and only one-third by the sulphuric acid. The conclusion is drawn that nitric acid is twice as strong an acid as sulphuric acid. It is similarly found that hydrochloric acid, too, is twice as strong as sulphuric acid, and hence possesses the same strength as nitric acid. Acetic acid is found to be very weak.

Another interesting method of determining the relative strength of acids consists in measuring the rapidity with which various acids are capable of effecting the inversion of sugar; that is to say, the decomposition of sugar into dextrose and levulose. For example, if equivalent quantities of nitric and hydrochloric acids are added to two equal portions of a solution of cane-sugar, it is found that, under the same conditions of temperature and concentration, the inversion takes place with equal rapidity in both cases; the conclusion is drawn that nitric and hydrochloric acids are equally strong acids. It is similarly found that these acids are about twice as strong as sulphuric acid, while acetic acid is found to be very weak.

When an acid is dissolved in water, its molecules are assumed to become dissociated into ions, some of which are charged with positive, some with negative, electricity. Thus acetic acid is supposed to break up according to the following equation:

$$\underset{\text{Acetic acid}}{CH_3COOH} = H^+ + CH_3COO^-$$

The dissociation is usually incomplete; that is to say, only a fraction of the amount of acid in solution is dissociated into ions, the rest remaining undissociated. So that a solution of acetic acid, for instance, contains three kinds of particles, viz., (1) positive hydrogen ions, H^+; (2) negative ions, CH_3COO^-; and (3) electrically neutral (undissociated) acetic acid molecules, CH_3COOH. The magnitude of the fraction dissociated, or, as it is called, the degree of dissociation of an acid, depends (*a*) upon the amount of acid in solution; (*b*) upon the temperature; and (*c*) upon the nature of the acid. Under the same conditions of concentration and temperature the number of free ions in solutions of different acids depends upon nothing but the nature of the acids. And as according to the electrolytic theory the capacity of an acid for conducting electricity depends upon nothing but

the presence of free ions in its solution, the electrical conductivity of the solution may be taken as a measure, so to speak, of the nature of the acid.

Now, when the acids are tabularly arranged in the order of their electrical conductivity, it is found that the order is the same as when they are arranged according to their avidity for metallic hydroxides, or when they are arranged in the order of the rapidity with which they can effect the inversion of cane-sugar.

A remarkable relation is thus seen to exist between three phenomena having apparently no connection with one another. The common cause of these phenomena is assumed to be the presence of free hydrogen ions in an acid solution. Furthermore, on this assumption the neutralization of acids by metallic hydroxides is explained in the following manner. The fact that pure water is a non-conductor of electricity proves that its molecules are not dissociated into ions. If ions formed by the elements of water meet in a solution, they must immediately combine to form undissociated molecules of water. Now, while the solution of an acid contains electro-positive hydrogen ions, H^+, the solution of a metallic hydroxide contains electro-negative hydroxyl ions, OH^-. When the solutions are mixed, these ions combine into neutral molecules of water, according to the following equation:

$$H^+ + OH^- = H_2O$$

The disappearance of free hydroxyl and hydrogen ions as such causes the simultaneous disappearance of the properties both of the basic hydroxide and of the acid; and the acid and base are said to have neutralized each other.

ACINE'TA. A genus of protozoans, more particularly suctorial infusorians, with cilia only in the young state, lacking mouth and arms and absorbing food through tentacles. The body is fixed and stalked, and the tentacles are knobbed and retractile.

ACIREALE, ä'chê-rā-ä'lā (Sicil. *Iaci*). A city in Catania, Sicily, 530 feet above the sea, at the mouth of the river Acis, which descends from Mount Etna to form a small harbor here, 9 miles northeast of the city of Catania (Map: Italy, K 10). The broad streets, spacious houses, and high towers rest on beds of lava, from which many of them were constructed after the earthquake of 1693. The climate is considered very healthful, and in summer the Terme di Santa Venere offers baths of tepid mineral water containing sulphur, salt, and iodine. There are pleasant walks and drives to neighboring villages on the slopes of Mount Etna, and the grotto of Galatea and the cave of Polyphemus are in the neighborhood. The coast south of Acireale is steep, and has risen more than 40 feet during the historical period. In the sea nearby rise the Scogli de' Ciclopi, the rocks which according to tradition were hurled after the wily Ulysses by the blinded Polyphemus. The most beautiful of them is about 230 feet high and 2300 feet in circumference, and consists of basalt containing wonderful crystals and covered with hard limestone with imbedded fossil shells. The city has a gymnasium and a technical school, and one of the old families possesses a splendid collection of Sicilian coins. The manufactures are silk, linen, and cotton goods, knives and shears, and there is an important commerce in flax and grain. Pop., 1901, 35,203; 1911, 35,587.

A'CIS (Gk. Ἄκις, *Akis*). A small stream flowing from the foot of Mount Etna in Sicily, famous for its cold waters. Legend derived the name from Acis, son of Faunus and Symæthis, beloved by the nymph Galatea. The Cyclops Polyphemus, jealous of the boy, crushed him under a rock, and his blood, gushing forth, was changed into the river. See GALATEA.

ACK'ER, CHARLES ERNEST (1868—). An American inventor and manufacturer, born in Bourbon, Ind. After receiving a baccalaureate degree at Cornell University in 1888, he began the practice of electrical engineering in Chicago, where he remained until 1893. He originated the Acker process of manufacturing caustic soda by the electrolysis of molten salt and was the first in America to manufacture carbon tetrachloride. Works were built by him at Niagara Falls for the preparation of these and other products. He was granted many patents for inventions pertaining to chemical and electrochemical processes and was awarded the Cresson gold medal by the Franklin Institute. He became a member of many chemical and other scientific societies.

ACKERMANN, äk'ĕr-mân, JOHANN CHRISTIAN GOTTLIEB (1756–1801). A German physician, born at Zeulenroda in Saxony. He began the study of medicine in 1771 at the University of Jena under Baldinger, and was professor of medicine at the University of Altdorf from 1786 until his death. He is the author of *Institutiones Historiæ Medicinæ* (1792); *Institutiones Therapiæ Generalis* (1784–95); *Bemerkungen über die Kenntniss und Kur einiger Krankheiten* (1794–1800).

ACKERMANN, KONRAD ERNST (1712–71). One of the founders of German dramatic art. He began his career as an actor with the famous Schönemann company at Lüneburg in January, 1740. Upon the outbreak of the disastrous Seven Years' War he sold a theatre he had erected in Königsberg, and the loss thus entailed compelled him thenceforth to lead a wandering life with his troupe. On July 31, 1765, he opened a new theatre at Hamburg, which, according to Lessing, eventually set the standard for theatrical performances in Germany. Besides the members of his own family, the companies organized by Ackermann included some of the ablest talent in Germany. The theatre was conducted by him until 1767, when it passed into the hands of twelve citizens of Hamburg, and was thereafter known as the *Deutsches Nationaltheater*. Ackermann's representations were models of freshness and vigor, and although he lacked qualifications requisite for heroic and emotional parts, his acting of many character rôles was remarkable.

ACKERMANN, LOUISE VICTORINE CHOQUET (1813–90). A modern writer of French poetry, who was born in Paris. In 1838, while studying German in Berlin, she met the linguist Paul Ackermann, whom she married (1843) and with whom she lived happily for some two years, when he died. Retiring to Nice, she published a number of charming and light-hearted poems under the title of *Contes en vers*. Seven years later, a morbid introspection at the thought of human suffering seemed to grow upon her, and she began to write poems that were remarkably

forceful in their thought, but gloomy and with a depth of despair which excited the attention of many readers. These were put forth under the titles *Poésies, Poésies premières,* and *Poésies philosophiques.* For a long time she wrote no more verses, but removed to Paris, where she became known for the distinguished people who frequented her salon. Her last book is *Pensées d'une solitaire* (Paris, 1874), containing a short autobiography. She died at Nice in 1890, having made a reputation that is likely to be lasting and that has been the theme of many criticisms. Consult the appreciation of Madame Ackermann written by the Comte d'Haussonville (1882), and Citoteux, *Mme. Ackermann d'après de nombreux documents inédits* (Paris, 1906). Anatole France has written of her in the fourth series of his *Vie littéraire* (1892).

ACKERMANN, Rudolph (1764–1834). A German-English inventor and publisher. He was born at Schneeberg, Saxony, and followed the occupation of coach builder and saddler in various German cities, as well as in Paris and London. He established an art school in London in 1795. In 1801 he patented a method of rendering paper, cloth, and other fabrics waterproof, and for this purpose erected a factory at Chelsea, England. He also contributed greatly to the development of lithography. It is, however, as a publisher of fine-art subjects that Ackermann is best known. His greatest achievement in this field was the *Repository of Arts, Literature, Fashions, Manufactures, etc.,* a publication which was continued regularly until 1828, when 40 volumes had appeared. Many of the plates were supplied by Rowlandson and other eminent artists. Among his other numerous illustrative works is *The World in Miniature* (43 vols., 1821–26).

ACKNOWL'EDGMENT. 1. An admission by a person that he owes a debt or is subject to a liability which, but for such acknowledgment, would be barred by the statute of limitations. It need not be in any set form of words, but it must be a clear admission of an identified liability, and modern statutes often require it to be in writing. (See Limitation of Actions.) 2. The term is also applied to the formal act of declaring, before a notary public or other proper officer, that a written instrument executed by the declarant is his act and deed. It is applied also to the certificate of the officer setting forth the facts connected with such declaration. An acknowledgment is not essential to the validity of an instrument, unless made so by statute, although by recording acts (q.v.) it is generally required in order that the instrument may be lawfully recorded. In England and in many of our States a deed of conveyance or release of dower by a married woman is declared invalid by statute, unless, upon an examination apart from her husband, she acknowledges that she executed the deed of her own free will. Such a conveyance has taken the place of the conveyance by fictitious suit, known as a fine (q.v.). The object of this legislation has been declared by the United States Supreme Court to be twofold: not only to protect the wife by making it the duty of the officer taking the acknowledgment to certify that she has not acted under compulsion of her husband or in ignorance of the contents of the deed, but also to facilitate the conveyance of the estates of married women, and to secure and perpetuate evidence upon which innocent grantees as well as subsequent purchasers may rely that the requirements of the statute necessary to give validity to the deed have been complied with. Such an examination and certificate is a *quasi*-judicial act, and can be impeached and invalidated only for fraud. Judges, clerks of courts, mayors, notaries public, commissioners of deeds, and justices of the peace are authorized in most States to take acknowledgments. The laws of the State in which the acknowledgment is to be used determine its sufficiency. For forms of acknowledgments consult Hubbell, *Legal Directory for Lawyers and Business Men* (New York, revised annually); Abbott's *Forms* (New York). See Deed and the authorities referred to.

AC'LAND, Christian Henrietta Caroline (1750–1815). Commonly known as Lady Harriet Acland, the wife of John Dyke Acland, an English officer in the American Revolution. She was married in 1770, and in 1776 accompanied her husband, then commander of grenadiers, to America, and with him endured most of the hardships of the Burgoyne campaign. Major Acland became dangerously ill in Canada, but was nursed back to health by her, and was again tenderly cared for by her after being wounded in the battle of Hubbardton (July 7, 1777). In the second battle of Saratoga (Oct. 7, 1777) he was severely wounded and became a prisoner in the hands of the Americans. Lady Acland, hearing of this, bravely entered the American camp, where she was received with the utmost courtesy. She rejoined her husband at Albany, and nursed him until his wounds had healed, when she returned with him to England. Major Acland died in 1778, as the result of a cold contracted while fighting a duel, and Lady Harriet, contrary to the usual accounts, did not marry again. Consult Stone, "Sketch of Lady Harriet Acland," in *Ballads and Poems Relating to the Burgoyne Campaign* (Albany, 1893).

ACLAND, Sir Henry Wentworth Dyke (1815–1900). An English physician. He was born at Exeter and was educated at Oxford. He was one of the founders of the Oxford University Museum, and in 1859 published, with Ruskin, an account of the aims of that institution. He accompanied the Prince of Wales to America in 1860. He was knighted in 1890. In 1894 he tendered his resignation as regius professor of medicine at Oxford, which position he had occupied since 1858. His more important publications include the *Memoir on the Visitation of the Cholera in Oxford in 1854,* and *Village Health* (1884).

ACLAND, John Dyke. See Acland, Christian Henrietta Caroline.

ACLIN'IC LINE (not inclining, from Gk. *ἀ, a,* priv. + *κλίνειν, klinein,* to incline). This is an imaginary line around the earth between the tropics where the magnetic needle has no inclination; that is, where, when balanced free to turn in any direction, it places itself horizontal. It is called the magnetic equator, and is about 90° from the magnetic poles. The line is variable and irregular. In 1913, in the Western Hemisphere, it was south, and, in the eastern, north, of the geographical equator. Consult charts giving isoclinal lines for the world, published from time to time by the British Admiralty and for the United States by the Coast and Geodetic Survey. See Magnetism, Terrestrial.

AC'MITE (Gk. *ἀκμή, akmē,* point, edge). A sodium-iron silicate of the pyroxine (q.v.) group

that crystallizes in the monoclinic system, has a vitreous to resinous lustre, and is red to brown and green in color. It occurs in the older rocks in Sweden and Greenland, and in the United States minute crystals have been found in northwestern New Jersey, while fine prismatic crystals, frequently 8 inches in length, occur at Hot Springs and Magnet Cove, Ark. It is called acmite from the sharp-pointed extremities of its crystals.

ACLINIC LINE.

ACNE: ACNE VULGARIS. Pimples (probably from Gk. *ἀκμή, akmē*, a point). An inflammatory disorder of the sebaceous glands of the skin (q.v.), characterized by the formation of papules, pustules, or tubercles, and running a chronic course. An acne lesion is a folliculitis due to the retention and decomposition of the sebaceous secretion, set up primarily by the acne bacillus, and later invaded by the pus-producing organism, *Staphylococcus pyogenes*. Predisposing causes of acne are puberty, a period of great and often perverted glandular activity; chronic indigestion and constipation, anæmia, uterine disorders, and general debility from whatever cause. Certain drugs, notably the iodides and bromides, produce the eruption. Pimples are most frequently found on the face, particularly about the nose, chin, and forehead, but also occur on the chest, shoulders, and back. Comedones, or blackheads, are usually associated with, and may produce, acne pustules. They arise from the sealing of the mouths of the follicles by dust or sebaceous matter, and when squeezed out appear as a spiral, white mass with a black point, resembling a worm, for which they have been mistaken. In the expressed matter a parasite, *Acarus folliculorum* (q.v.), may be found. *Acne indurata* is a pustular form of the disease, resulting in the production of large, irregular, deep-seated lesions, tender to the touch and exceedingly resistant to remedial measures. Treatment must include the correction of the underlying causes above enumerated, and the administration of tonics, of which arsenic, iron, sulphur, and calcium sulphide are most beneficial. A diet free from highly seasoned foods, alcoholic beverages, tea and coffee, is a necessary adjunct to the cure, together with hygienic measures such as outdoor exercise and cold baths. Locally, hot bathing with soap and water, followed by a cold douche, cleanses and tones up the skin. Mild antiseptic lotions containing sulphur, mercury, salicylic acid or ichthyol are useful in freeing the skin from germs and reducing inflammation. Of late years light therapy (see PHOTOTHERAPY) has been employed with success, especially the Roentgen ray; and vaccines, prepared from the acne bacillus and various strains of staphylococcus (see SERUM THERAPY; VACCINE THERAPY), have given brilliant results in many cases.

Acne rosacea is a chronic hyperæmic disease of the face, more especially of the nose, characterized by hypertrophy, redness, dilatation of the blood vessels, and acne. In one form acne papules and pustules are abundant, and appear on a background of bright red, infiltrated skin. In another form of acne rosacea there is in addition a hypertrophy of the nose or chin. If the hypertrophy becomes excessive, the term acne hypertrophica or rhinophyma is applied. The causes of rosacea are in the main similar to those of acne vulgaris, but the disease appears late in life, and is often due to the excessive use of alcohol in men, and tea in women.

ACOCK'BILL. See ANCHOR.

ACŒMETÆ, ās'ē-mē'tē (Gk. *ἀ, a*, priv. + *κοιμᾶσθαι, koimasthai*, to sleep). A class of Greek monks called watchers, who chanted service continuously day and night, dividing, like sailors, into three watches. They originated about 400 A.D. on the Euphrates, later appeared in Constantinople, and established many monasteries, the chief one being the Studium in Constantinople itself, erected by the consul Studius in 471. They were excommunicated in 534 by Pope John II for opposing the formula, "One of the Trinity suffered," and thus placing themselves on the Nestorian side.

ACOIN, ā-kō'ĭn. A white crystalline substance, soluble in water, derived from guanin, and closely related to caffeine and theobromine. Chemically, it is di-para-anisyl-mono-phen-ethyl-guanidin-chlor-hydrate. Experiments have shown that it is less toxic than cocaine (q.v.), and it was formerly employed as a substitute for that drug to produce local anæsthesia in the eye.

ACOLLAS, ā'kō'lā', EMILE (1826–91). A French jurist and publicist. He was born at La Châtre and was educated at Bourges and Paris. He was one of the most conspicuous representatives at the Congress at Geneva in 1867, when the formation of a general European democratic confederation was advocated and upon his return to France was condemned to one year's imprisonment for his active participation in the deliberations of that party. In 1871 the Paris Commune nominated him, during his absence in Switzerland, president of the legal faculty, and in 1880 he was appointed inspector-general of the penitentiaries. Among his numerous publications, all of which emphasize the principles "Droit et Liberté," the most important is *Cours élémentaire de droit*, a work consisting of seven volumes, published in the form of manuals.

ACOLYTES, āk'ō-līts (Gk. *ἀκόλουθος, akolouthos*, a follower). A name occurring first about the third century, and applied to functionaries who assisted the bishops and priests in the performance of religious rites, lighting the candles, presenting the wine and water at the communion, etc. They were considered as in holy orders and ranked next to sub-deacons.

These services have since the seventh century been performed by laymen and boys, who are improperly called acolytes; but in the Roman church aspirants to the priesthood are still at one stage consecrated as acolytes and receive candles and cups as the symbols of the office. See ORDERS, HOLY.

ACOMA, ä'kō-mä. An Indian pueblo in Valencia Co., New Mexico, about 70 miles west of Albuquerque (Map: New Mexico, E 2). Pop., 1900, 492; 1902, 650; 1910, 828. With Isleta it has the distinction of occupying its sixteenth-century site, and is the oldest continuously occupied town in the United States. It was visited (1540) by members of Coronado's expedition, by Espejo (1583) and Juan de Oñate (1598). Espejo named it Acoma; previously it was known as Acus, Acuco, and Coco. In December, 1598, Juan de Zaldivar, of Oñate's force, visited Acoma and, with half his party of 30, was killed by the natives. In the next month his brother Vicente killed half the Acoma population of 3000 and partly burned the pueblo. Franciscans labored here before 1629 and later established the San Estevan Mission. The Acomas successively occupied many village sites in prehistoric times, the last before Acoma being Katzimo, the enchanted mesa, 3 miles distant. Water in the Acoma mesa is obtained from natural cavities in the rocky summit (357 feet high). The Acoma reservation comprises 95,792 acres. Consult: H. H. Bancroft, *History of Arizona and New Mexico* (San Francisco, 1889); Lummis, *Land of Poco Tiempo* (New York, 1893); and Hodge, "The Enchanted Mesa," in *National Geographic Magazine*, vol. viii (Washington, 1897).

ACONCAGUA, ä'kôn-kä'gwä; Span.-Amer. pron. kä'wä. An extinct volcano in the southern part of the Andes, situated in lat. 32° 39′ S., long. 70° W., on the boundary line between Chile and Argentina, and belonging to the latter (Map: Chile, C 10). It is usually considered the loftiest mountain in America, its estimated height being about 23,000 feet. A river of the same name rises on the south slope of the mountain and enters the Pacific after a course of over 200 miles. Consult: E. Fitzgerald, "The First Ascent of Aconcagua," in *McClure's Magazine*, vol. xi (New York, 1898); Sir M. Conway, "Aconcagua and the Volcanic Andes," *Harper's Magazine*, vol. c (New York, 1899).

ACONCAGUA. A central province of Chile, lying to the west of Mt. Aconcagua (q.v.) about in lat. 32° S. Its most fertile part is the valley of the Aconcagua River, after which it is named (Map: Chile, C 10). It covers an area of 5487 square miles. The mountainous regions which occupy the larger part are mostly barren, while the valleys have rich soil and produce different kinds of fruit, hemp, grain, and wine. The province contains considerable deposits of copper, silver, iron, lead, etc., and mining is the principal industry. Pop., 1895, 113,165; 1903, 132,670; 1910, 132,730. Capital, San Felipe (q.v.).

AC'ONITE, ACONITUM (Lat. *aconitum*, Gk. ἀκόνιτον, *akoniton*, wolf's-bane). A genus of about 70 species belonging to the family Ranunculaceæ, and mostly found in mountainous regions of northern latitudes. The large, showy flowers (usually blue), with their large and hooded or helmet-shaped sepal, have made them common ornamental plants. The characteristic hood of the flower is responsible for the common name "Monk's-hood." The roots, and sometimes the flowers, are very poisonous, containing a number of alkaloids. The best known and most poisonous species is *Aconitum napellus*, which yields the officinal aconite. A number of species are cultivated for ornament, some of them having white or yellow flowers. There are comparatively few native species of aconite in the United States, three belonging to the eastern United States and several others in the Rocky Mountains and on the Pacific coast.

ACONITINE, *a*-kŏn'ĭ-tĭn *or* -tēn. See ALKALOIDS.

ACONTIUS, ă-kŏn'shĭ-ŭs (Gk. Ἀκόντιος, *Akontios*). The hero of a classic love story contained in a lost poem of Callimachus (q.v.) and also given by Ovid (*Heroides* xx, 21). He is a youth from Ceos, who, being at Delos and in love with Cydippe (q.v.), throws at her feet an apple on which he has written, "I swear by the sanctuary of Artemis to marry Acontius." Inadvertently she reads the words aloud, and in spite of her inclination to have nothing to do with the youth, is held by the goddess to her vow thus made. Consult Morris, "The Story of Acontius and Cydippe," in *The Earthly Paradise*, part iii (London, 1872).

ACORN, ā'kôrn *or* ā'kērn (properly, fruit of the field, AS. *æcer*, a field). The nut-like fruit of different species of oak. It consists of the nut proper and the cupule, or saucer or cup. The acorns from different species differ much in size, form, color, and taste. A few kinds of acorns are sweet and not unlike chestnuts in flavor, but most are bitter and more or less astringent in taste, owing to the presence of quercin, or some similar bitter principle, and tannin. On an average, the flesh of fresh acorns has the following percentage composition: water, 34.7; protein, 4.4; fat, 4.7; nitrogen, free extract, 50.4; crude fibre, 4.2; and ash, 1.6. The shell makes up 18 per cent of the total fruit, the flesh 82 per cent. Acorns are a favorite food of wild hogs and have been used since earliest times as feeding stuff for domestic animals, especially pigs. It is customary to let the pigs gather this food. Acorns and beechnuts are commonly spoken of as mast. The agreeable flavor of the pork, ham, and bacon of the razor-back hog of the southern United States is attributed in no small degree to its being fed on acorns. On the other hand, an excess of acorns may produce a soft, spongy flesh and an oily lard. This, however, is usually obviated by feeding corn for two or three weeks before slaughtering. Acorns have been successfully fed to milch cows and to poultry, but numerous cases of acorn poisoning in cattle are on record. In the United States acorns are not much eaten by men. Under the name "Biotes," the fruit of *Quercus emoryii* is used as food in the southwest. Sweet acorns are eaten occasionally in different regions, mainly by children. The Indians of the Pacific coast region from northern California to Mexico use acorns in considerable quantities. Dried and pounded, they are made into a sort of mush and also into bread. The acorn meal is usually leached to free it from tannin and whatever bitter principle is present. When the meal is used for bread, a kind of clay is sometimes mixed with it. In several regions of Italy, notably Umbria, Tuscany, Emilia, and the Marches, acorn meal made into a sort of bread with the addition of two-thirds ground grain is a common article of diet. The bread is black and heavy and not readily digestible.

Dried acorns ground are sometimes used as a substitute for coffee. See OAK.

ACORN-SHELL. A sessile barnacle of the family Balanidæ. See BARNACLE.

AC'ORUS (Gk. *ἄκορος, akoros*, sweet-flag). A genus of two species belonging to the family Araceæ. (See ARUM.) One of the species, *Acorus calamus*, is widely distributed in the north temperate regions, while the other species is restricted to China and Japan. The range of the species is in swamps or along streams from Nova Scotia to Minnesota and southward to Louisiana and Texas. The very long horizontal rootstock sends up sword-shaped leaves and also a leaf-like stem which bears on one side a cylindrical cluster of small greenish-yellow flowers. It is the long aromatic rootstock (an underground stem) that is used and is called "calamus root." It is a powerful medicine of transient tonic effect, occasionally used, especially in cases of weak digestion. In many places on the Continent of Europe it is found in confectionery shops sliced and prepared with sugar. It is also used to correct the empyreumatic odor of spirits and to give them a peculiar flavor. In Great Britain it is chiefly employed by perfumers in the manufacture of hair powder.

ACOSTA, ä-kōs'tä, GABRIEL, later URIEL (1594?–1647). A Portuguese philosopher, descended from a Jewish family. He was born at Oporto. After being educated in the doctrines of the Roman Catholic church, when 25 years of age he became skeptical, and then adopted the Jewish faith; but as the profession of such was not allowed him in his own country, he fled to Amsterdam, where he was formally received into the Jewish community, and changed his name, which had been Gabriel, to Uriel. But what he conceived to be the Pharisaism and spiritual pride of the Amsterdam Jews disgusted him, and he opposed many of their ideas and especially denied that the doctrine of immortality had any Mosaic sanction. Hence he became involved in a controversy with his rabbinical teachers. On account of his work, entitled *Examen dos tradiçoens Phariseas conferidas con a ley escrita* ('Examination of Pharisaic Traditions Compared with the Scripture'), 1624, he was charged with atheism by the Jews before the city magistracy and fined. He was also excommunicated and so remained for seven years, when he recanted after ignominious treatment. He died in 1647 by suicide. His autobiography was first published by P. Limborch in Latin, 1687; English translation, London, 1740; Latin and German edition, H. Jellinek, Leipzig, 1847. He is the hero of an effective tragedy, *Uriel Acosta*, by Gutzkow, and of a sketch by Zangwill in *Dreamers of the Ghetto* (Philadelphia, 1898). Consult: Klaas, *Uriel Acosta. Leben und Bekenntnis eines Freidenkers vor 300 Jahren* (Berlin, 1909).

ACOSTA, JOAQUIN (1799–1852). A South American geographer. He was born at Guaduas, Colombia. In 1834 he made a tour with the botanist Céspedes through the valley of the Socorro as far as the Magdalena, and seven years afterward traveled from Antioquia to Anserma for the purpose of studying the history and customs of the native tribes. Besides an excellent map of New Granada, Acosta published the following interesting and valuable works: *Compendio histórico del descubrimiento y colonización de la Nueva Granada en el siglo décimo sexto* (1848); *Semenario de la Nueva Granada, Miscellánea de ciencias, literatura, artes e industria*, with portraits and map, published in conjunction with Laserre under the direction of Francisco José de Caldas (1849).

ACOSTA, JOSÉ DE (1539–1600). A Spanish Jesuit. He was born at Medina del Campo, Spain. He entered the Society of Jesus and went as missionary to Peru, where he labored for many years. Upon his return home he became superior of the Jesuit Seminary of Valladolid, and afterward rector of the University of Salamanca, where he died. His fame rests upon his work on the natural history of the New World and the efforts put forth for its evangelization, published in Latin at Salamanca in 1589 and in Spanish (Seville, 1590). The last-named publication was under the caption *Historia natural y moral de las Indias*, and was several times reprinted and translated into French, Dutch, and English (*The Naturale and Morale Historie of the East and West Indies*, London, 1604).

ACOUCHY, ä-kōō'shē, or **ACUCHI.** See AGOUTI.

ACOUMETER, ä-kōō'mē-tẽr *or* ä-kou'-, or **AC'OUSIM'ETER** (Gk. *ἀκούειν, akouein*, to hear + *μέτρον, metron*, measure). An instrument used to determine the acuteness of hearing. It is a small steel bar which, when struck by a hammer, gives a uniform sound.

ACOUSTICS, ä-kou'stĭks *or* ä-kōō'- (Gk. *ἀκουστικός, akoustikos*, relating to hearing, from *ἀκούειν, akouein*, to hear). The name applied to the science of the phenomena of sound. The name "sound" is given to the sensation perceived by the auditory nerves, and it is a matter of everyday experience that the immediate cause of the sensation is some vibrating body, e.g., a violin string, a drum-head, a hammer when striking a nail. This was early recognized, and, so far as acoustics is considered as a science dealing with the vibrations of matter and with the waves produced in the air by this motion, the history of its development is identical with the progress of mathematics and dynamics from the time of Galileo and Newton to the present. Few dates can be assigned to definite discoveries. The laws of vibrations of a stretched string were first deduced mathematically by Brook Taylor in 1715 and by Daniel Bernoulli in 1755, although they had been discovered experimentally by Mersenne in 1636. Longitudinal and torsional vibrations of bars were first investigated by Chladni (1756–1827). Daniel Bernoulli was the first to attack the problem of the lateral vibrations of bars; but the mathematical treatment of the question is still of interest. Poisson (1829) was the first to give a correct mathematical solution of the free vibrations of a membrane, and good experimental work on the subject has been done by Savart, Bourget, and Elsas. The vibrations of plates have been studied mathematically by Poisson, Kirchhoff, and more recent writers, and experimentally by Chladni, Savart, and Wheatstone. A full account of the history of the mathematical side of acoustics will be found in Rayleigh's great work on the *Theory of Sound*.

The history of that portion of acoustics which considers the phenomena of the sense of hearing, harmony, discord, pitch, etc., begins undoubtedly with the earliest days of civilization. It was known to Pythagoras (sixth century B.C.) —and to whom before him no one can tell—that sounds were in harmony when produced by two

stretched strings of the same material, cross-section and tension, provided their lengths were in the ratio of 1 : 2, 2 : 3, or 3 : 4. Mersenne discovered in 1636 that the frequencies of such vibrating strings varied inversely as their lengths, and so proved that for two notes to be in harmony it was necessary for their frequencies to bear simple numerical relations to each other. No explanation of this fact was given until the great research of Helmholtz, begun in 1854, the results of which were published in 1862 in his classical work on the *Sensations of Tone*. Helmholtz was the first to discover the existence of summational tones, although the differential tones were discovered probably by Romieu in 1743, and certainly by Sorge, the court organist at Lobenstein, in 1745. Helmholtz's theory of vowel sounds is still under discussion. Most interesting work on audition has been done in recent years by Rudolf König of Paris and Professor Bevier of Rutgers College.

Many of the physical properties of sound are matters of common experience and can readily be appreciated. In the first place, it is well known that an interval of time elapses between the vibration of the body and the perception of the resulting sound if the vibrating body is at a considerable distance; thus the flash of a gun is seen before the sound is heard. It was shown by Otto von Guericke that if a bell is set ringing in a glass jar from which the air has been exhausted no sound is heard; so that the presence of some material medium between the vibrating body and the ear is essential for the production of sound. This medium need not be air, but may be water, or, in fact, any gas, liquid, or solid which can carry waves. The whole mechanism is, then, as follows: The vibrations of the body, e.g., a drum-head, produce waves in the medium in contact with it, e.g., the air; these waves spread out through the medium and, after a certain interval of time, reach the ear; in the ear the waves produce motions of the ear-drum and corresponding effects in the internal ear where the auditory nerves have their endings. It should be noted that not every vibration will produce waves in a fluid medium; because if the number of vibrations per second is too small, the fluid will simply flow around the body as it vibrates, and so will not be compressed; consequently, in order to produce waves in a fluid, the frequency of the vibrations of the body must exceed a certain number, which depends upon the viscosity and density of the fluid. Further, it is evident that, since fluids can carry only compressional (i.e., longitudinal) waves, the production of the sound-sensation is due to waves of this kind. The difference between the longitudinal and the transverse wave can be appreci-

Fig. 1.

ated by reference to the accompanying diagram, Fig. 1. In this illustration 1 represents a row of particles at rest; these particles displaced to form a simple transverse wave are shown in 2, while a longitudinal wave is shown in 3. Here each particle moves to and fro in the direction of the line of propagation of the wave, and the amplitude of the wave is the distance that each particle moves from its position of rest, while the wave-length is the distance between similar points of condensation and rarefaction, as from 4 to 4. Although sound is produced by longitudinal waves, there is no reason for believing that all compressional waves will produce sounds; some may be too long or too short to affect the nerves of the ear.

Our sense of hearing distinguishes between two great classes of sounds: noises and musical notes. A noise is recognized as being abrupt, discontinuous, and exceedingly complex; a musical note is smooth, continuous, and with a definite, regular character. We distinguish, further, between different musical notes as being simple or complex, meaning, by the latter, a note in which we can recognize the presence of several simple tones. Thus, if a piece of paper is torn, or two blocks of wood struck together, we call the resulting sound a noise. The vibrations of a tuning-fork cause a simple musical note; while if a banjo string is plucked we hear a complex note. Complex notes differ greatly in their character. They are said to have "quality" or "timbre"; thus, a sound produced by an organ-pipe has a quality entirely different from one produced by a piano or by a drum. Simple notes may differ in loudness and in shrillness or "pitch"; thus, a note of a definite pitch may be loud or feeble, and the pitch of a piccolo note is quite different from that of a note produced by a flute.

Waves and Vibrations. Since the direct cause of a sound is the reception into the ear of waves in the air, it is necessary to analyze the nature of these waves. We may have an irregular, isolated disturbance, which is analogous to a "hump" passing along a stretched rope, or to the effect of dropping several stones at random intervals into a pool of water; or we may have a regular continuous succession of waves identical in all respects, which is called a "train of waves." The simplest kind of train of waves is what is called a "simple harmonic" train, such as is produced in any medium by a simple harmonic vibration of the body which is causing the waves. (Vibrations of a pendulum are simple harmonic.) Such a train of waves is characterized by its "wave-number" and "amplitude"; the wave-number being the number of individual waves which pass a given fixed point in one second, while the amplitude is the extent of the path of vibration of any particle of the medium through which the waves are passing. The velocity of waves of a definite character, e.g., compressional ones, in any definite homogeneous medium depends upon the properties of the medium itself, not on the wave-number or amplitude of the waves. So, if λ is the wave-length, i.e., the distance from one point in the medium to the next point, measured in the direction of advance of the waves, where the conditions are identical with those at the first point, and if N is the wave-number, the velocity of the waves V is given by the formula

$$V = N \lambda$$

Consequently, if N is known, λ can be calculated, and vice versa; and the characteristics of the simple harmonic train of waves may be said to be its wave-length and its amplitude. If several

trains of waves are passing through the same medium at the same time, the resulting waves—called a "complex" train—is simply the sum of the individual waves, the motion of any particle of the medium being the geometrical sum of the motions which it would have, owing to each of the separate trains of waves. (This is rigidly true only if the amplitudes of these separate trains are very small compared with their wave-lengths, as in general they are.) This is shown

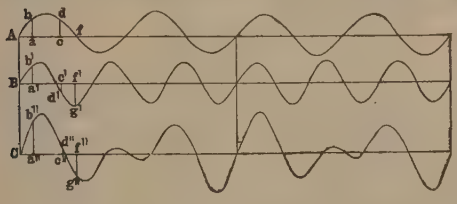


Fig. 2.

in Fig. 2, where A and B are two sets of simple harmonic waves which form the resultant wave C. This wave is obtained by taking the algebraic sum of the motion of the particles. The point b'' is obtained by taking $a''b''$, equal to the sum of $a\ b$ and $a'b'$, $c''\ d''$ is the sum of $c\ d$ and $c'd'$, the latter, as it occurs below the axis, considered as having a negative sign. Conversely, it may be shown that any complex train of waves may be analyzed into simple harmonic trains. Therefore complex trains of waves may differ in several ways: 1. The number of the component simple harmonic trains. 2. Their wave-numbers and amplitudes. 3. Their relative "phases," for two waves are in different phase if the maximum displacement due to one train does not coincide in position with that due to the other; or, looked at in another way, the component trains may have been started at irregular intervals. Since waves are due to the vibrations of some elastic body (e.g., a tuning-fork, the air in an organ-pipe or horn), it is necessary next to analyze the nature of vibrations. We may have an irregular vibration, consisting of only a few to and fro motions, then a sudden change into another vibration of a different character, the whole motion lasting only a short time, e.g., when a piece of stiff paper is torn or when a scratching pen is used in writing; or we may have a regular continuous periodic vibration. The simplest possible periodic vibration is like that of a simple pendulum, and it is called "simple harmonic." It is characterized by a definite number of vibrations per second, i.e., its "frequency," and by the extent of the swing, i.e., its "amplitude." If a second pendulum is suspended from the bob of the first, and a third from the bob of the second, the vibration of the third and lowest bob is no longer simple harmonic in general. Its vibration is called "complex," and it is evident that it is the sum of the vibrations of the separate pendulums. Complex vibrations may, therefore, differ in the number of the component vibrations and in their frequencies, amplitudes, and relative phases.

Sound Sensation. It would be expected that there should be some connection between the nature of the vibrations of the vibrating body, that of the waves produced, and that of the sound heard. Such is the case. A noise is always produced by an irregular, disconnected disturbance in the air; and this in turn is due to an irregular succession of vibrations, each lasting for a brief interval. A simple musical note is always due to a simple harmonic train of waves, and this to a simple harmonic vibration. The loudness of the note varies directly with the amplitude of the waves; whatever increases the amplitude of the waves increases the loudness of the sound, and vice versa. It is increased, therefore, by an increased amplitude of the vibration; and it decreases as the distance from the ear to the vibrating body is increased. (It should not be thought, however, that numerical values can be given the loudness of a sound, or that there is any fixed numerical relation between the amplitude of the waves and the intensity of the sensation.) The pitch of the note depends upon the wave-number of the waves entering the ear; whatever increases the wave-number "raises" the pitch, and vice versa. Therefore, if the ear and the vibrating body are at a fixed distance apart, and at rest with reference to their positions in space, the pitch will vary directly with the frequency of the vibrating body; thus we often use the expression, "a pitch of 300," meaning the pitch of a sound produced by a vibrating body which makes 300 complete vibrations in one second. If, however, the vibrating body is approaching the ear, or if the ear is approaching the vibrating body, the number of waves entering the ear is greater than it would be if there were no such motion; and so the wave-number is greater than the frequency of the vibrating body, and the pitch of the sound is raised. Similarly, if the distance between the ear and the vibrating body is increasing, the wave-number is less than the frequency of the vibration, and the pitch is lowered. This change of pitch, due to the relative motions of the ear and the vibrating body in the surrounding medium, is known as Doppler's Principle (q.v.), and is illustrated by the sudden drop in pitch if one stands on the platform of a railway station and listens to the whistle of a locomotive passing at a high speed.

A complex musical note is always due to a complex train of waves, and this, in turn, to a complex vibration, if there is only one vibrating body. Further, two notes which differ in quality may be shown to be due to complex trains of waves which differ in complexity. But it should be noted that all experimental evidence points to the idea that differences in relative phases of the component trains of waves do not cause differences in the quality of the sound heard. In other words, two complex trains of waves made up of the same simple waves will produce the same sound, regardless of the phases in the two trains. This may be explained by saying that the ear automatically resolves a complex train of waves into its simple harmonic component trains, hears the simple tones due to each of these, and therefore has a complex sensation. This statement is called "Ohm's law for sound-sensation."

Fundamental, Partial, and Combinational Vibrations. Musical instruments may be divided roughly into two classes, wind and string instruments. In the former class are included organ-pipes, horns, flutes, etc.; in the latter, pianos, violins, harps, etc. In all wind instruments a column of air inclosed in a metal or wooden tube is set in vibration by suitable means, and this vibrating mass produces the waves in the surrounding air. In string instru-

ments flexible strings are stretched between pegs fastened to a solid frame—in general a wooden board—and they are set in transverse vibration by bowing, plucking, or striking. As a result of the vibration of the string, the frame holding the pegs is itself set in vibrations of the same frequency, and it, as well as the string itself, produces the waves. The importance of the so-called sounding-board is at once evident. A

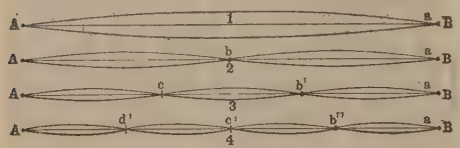


Fig. 3.

stretched flexible string, *A B*, can vibrate in many waves: as a whole, with its middle point its point of greatest amplitude, as in 1 (Fig. 3); in two parts, with its middle point, *b*, at rest, and the two halves vibrating like separate strings in opposite phases, as in 2 (Fig. 3); in three parts, with two points, *c* and *b*, at rest, dividing the string into three equal vibrating segments, as in 3 (Fig. 3), etc. The frequencies of these different modes of vibration are in the ratios of 1 : 2 : 3 : 4, etc. The vibration of the string as a whole is called the "fundamental"; the others, the "upper partials." The frequency of the transverse vibrations of a stretched flexible string is given by the formula

$$N=\frac{1}{2L}\sqrt{\frac{T}{m}}$$

where T is the stretching force or tension, m is the mass of each unit length of the string, L is the length of the vibrating segment. Thus, in the fundamental, L is the length of the string; in the first upper partial it is one-half the length of the string, etc. When the string is set vibrating by a random blow or bowing, it will make complex vibrations, resulting from the combination of the fundamental and some of the upper partials, the number and relative intensities of these depending largely on the point where the blow is struck, or the bow applied, and on the character of the impulse. So, whenever a musical tone is produced by a string instrument, the ear can recognize in the complex sound simple tones due to the fundamental and the upper partials; and differences in the quality of sounds caused by different string instruments, which have fundamentals of the same frequency, are due to differences in the number and character of the upper partials, which depend in turn on the material of the string, the point where the impulse is applied to set the string in motion, and the character of this impulse. Similarly, the vibrating column of air in organ-pipes, horns, etc., can vibrate in different ways; and in a complex vibration there is a fundamental and upper partials whose frequencies are in the ratios of 1 : 2 : 3 : 4, etc. The frequency of the vibrations of the fundamental in an open organ-pipe is given by the formula:

$$N=\frac{V}{2L}$$

where V is the velocity of waves in the gas which fills the pipe, and L is the length of the pipe approximately. The similar formula for a "stopped" pipe is:

$$N=\frac{V}{4L}.$$

(In stopped organ-pipes the vibrations are in the ratios 1 : 3 : 5 : 7, etc.) In other instruments than wind and string ones, such as drums, cymbals, etc., there are upper partials besides the fundamental; but there is no simple mathematical relation between their frequencies. When two organ-pipes on the same wind-chest are "sounded" loudly, the resulting waves in the air are not due simply to each fundamental and its upper partials, but also to certain extra vibrations due to the combined action of the two vibrating columns of air on the surrounding air. Thus, if the fundamentals of the two pipes have frequencies 1000 and 600, there will be present waves showing the existence of vibrations whose frequencies are 1000 + 600 and 1000 — 600. The sounds heard owing to these vibrations are called "summational" and "differential" tones, or, in general, "combinational" tones; they are often difficult to hear. The existence of both partial and combinational vibrations may, however, be established by means of resonators (q.v.).

Harmony and Discord. If two organ-pipes whose frequencies do not differ much are sounded together, the ear observes a fluctuation in the loudness of the resulting sound. It is first loud, then weak, loud and weak, etc., giving rise to what are called "beats," the number of beats per second being equal to the difference in the frequencies of the pipes. Thus, two pipes of frequencies 280 and 285 produce 5 beats per second. The explanation of the phenomenon lies in the superposition of the two resulting trains of waves; for, if the wave-number of one train exceeds that of the other by five, it will happen five times in the course of a second that when one train of waves reaches the ear in a certain phase, the other train will reach the ear in an exactly opposite phase; and so the two waves will tend to neutralize each other's action and thus make the sound weak; whereas, in between these instants of weakness there will be

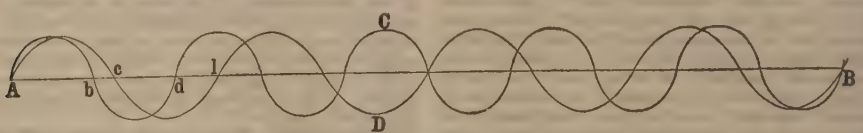


Fig. 4.

others when the two waves reach the ear in the some phase, and so reinforce each other and thus make the sound loud. This is shown diagrammatically in Fig. 4, where there are two trains of waves of unequal wave-number which interfere and produce beats. The wave-length of one set is *A d*, which is four-fifths of *A l*, the wave-length of the other. The two waves at *A* are in

the same phase, and there is increased sound; but as the motion progresses, one train loses with respect to the other, until they are in opposite phase, as at *C* and *D*, where silence ensues. Beats are disagreeable to hear, for the same reason that a flashing light is unpleasant to see, or a tickling feather to feel, namely, the nerves being first stimulated, then allowed to recover partially, then again stimulated, etc., are disagreeably affected. The degree of unpleasantness depends in part on the number of beats, but also on the pitch of the note, whose intensity is fluctuating. Beats can be formed by the interference of the upper partials as well as by the fundamentals, and by the combinational vibrations also. Thus, if two organ-pipes of frequencies 500 and 252 are sounded together, the first upper partial of the pipe whose fundamental is 252, i.e., a note of frequency 504, will beat with the other fundamental whose frequency is 500. If, however, two organ-pipes are sounded whose fundamentals are such that there are no beats except between the upper partials of high orders, the sensation should be a pleasant one; and such is observed. To secure such a condition it is evident that the ratios of the frequencies of the fundamentals must be simple fractions, 1 : 1, 1 : 2, 1 : 3, 2 : 3, 1 : 4, 3 : 4, etc. Such combinations of two notes produce what is called "harmony." On the other hand, whenever beats can be expected between two notes or their partials, or their combinational notes, an unpleasant sensation called "discord" is observed, it being possible to predict the degree of the discord from the number of beats which most occur. This explanation of harmony and discord is due to Helmholtz. The explanation of "melody," that is, the pleasant sensation perceived when notes, suitably chosen, are sounded consecutively, is not known definitely. (See, however, a paper by Sabine, American Association for the Advancement of Science, 1907.) For the discussion of the formation of musical scales based on these simple harmonies, see MAJOR; MINOR.

Limits of Hearing. Aerial waves of all wave-numbers do not affect the auditory nerves of the normal human ear, it being found by trial that wave-numbers less than 30 do not produce a musical tone, and wave-numbers exceeding about 20,000 do not produce sound at all. For musical purposes the extremes are about 40 and 4000. To study waves whose wave-numbers exceed 10,000 (and in fact for those of much less number) the best instrument is the "sensitive flame," which consists ordinarily of an ignited jet of gas escaping from a small circular orifice under high pressure, thus giving a more or less cylindrical flame about a foot high. When waves of a great wave-number fall upon such a flame, they break through the inclosing envelope separating the gas from the air, thus causing the jet to "flare" out like a fan.

Velocity of Sound. The waves produced in the air by vibrating bodies are often called "sound waves," although the name is not a good one. Similarly, compressional waves in any medium, solid, liquid, or gas, are called "sound waves" in these media. These waves spread out from the vibrating body into the surrounding medium with a velocity called the "velocity of sound," which depends alone upon the elasticity of the medium with respect to a compression and upon its density, if the medium is homogeneous. Like all waves, they may experience reflection, e.g., echoes; refraction, as when passing from cold air to hot air, or dense air to rare; dispersion; interference. Reference should be made to a paper by Prof. R. W. Wood in the *Philosophical Magazine*, vol. xlviii, p. 218, 1899, for a description of a most interesting series of experiments on these properties of aerial waves.

The best determinations of the velocity of these waves are given in the following table:

Gases at 0° C.		
Air (dry)	331.36	meters per second
Hydrogen	1286.	" " "
Oxygen	317.	" " "
Carbon dioxide	262.	" " "
Solids and Liquids.		
Aluminium ..	5104.	" " "
Steel	4990.	" " "
Glass, about ..	5500.	" " "
Water	1435.	" " "

The velocity of compressional waves varies greatly with the temperature. For a gas the velocity at $t°$ C. equals that at 0° C. multiplied by

$$\sqrt{\frac{273 + t}{273}}$$

When waves pass from a region where the air is cold into one where it is warm, reflection takes place at the bounding surface, and thus the entering waves are not only refracted but also weakened in intensity. The presence of fog by itself in the air has very little effect upon the waves, unless there are currents or layers of hot or cold air. The velocity of waves in air is practically independent of the intensity of the vibration, although the waves produced by a sudden explosion travel at first slightly faster than do ordinary waves.

Acoustic Properties of Halls. When an organ-pipe or any elastic body is sounded in a room and then suddenly stopped, it is noticed that the sound does not instantly cease, but continues for several seconds. This is called reverberation; and the acoustic success of a room depends largely upon its duration. It should not exceed two seconds by more than a few tenths of a second if the room is to be used as a music hall or opera house. It is found that the reverberation in a given room is practically independent of the place where the vibrating body is situated, or of the position of the hearer; it depends upon the volume of the room, upon the material of the walls and floors, upon the cushions, the audience, etc., and to a certain extent upon the intensity of the sound. The following approximate formula has been developed by Professor Sabine of Harvard University:

$$(a + b_1 x_1 + b_2 x_2 + \text{etc.})\ t = 0.164\ V$$

Where a is a constant depending upon the absorbing power of the walls of the room.
b is a coefficient of "absorption" for one square meter of a definite material put anywhere in the room, the standard of comparison being the absorption of one square meter of open window.
x is the number of square meters of the material.
t is the duration of reverberation.
V is the volume of the room in cubic meters.

The absorption coefficients for some substances are as follows:

Hard pine wood sheathing	0.061
Plaster on wood lath	0.034
Plaster on wire lath	0.033
Audience (per square meter)	0.96
Isolated woman	0.54
Isolated man	0.48
Carpet rugs	0.20
House plants	0.11
Upholstered chairs	0.30
Hair cushions (per seat)	0.21

The duration of reverberation in certain music halls and auditoriums is as follows:

Old Music Hall, Boston, Mass.	2.44
Symphony Hall, Boston, Mass	2.31
Gewandhaus, Leipzig, Germany	2.30
Sanders Theatre, Cambridge, Mass.	3.42

Bibliography. Rayleigh, *Theory of Sound*, 2 vols. (London, 1896), a mathematical treatment, but with several descriptive chapters; Helmholtz, *Sensations of Tone*, translated by Ellis (London, 1895), the standard authority on harmony and music; Sabine, *Architectural Acoustics* (Boston, 1900), which contains the only satisfactory treatment of this important question; Thompson and Poynting, *Sound* (London, 1900), a text-book for schools and colleges and a storehouse of accurate information; Barton, *A Text-Book on Sound* (London, 1908); Sabine, *Architectural Acoustics* (Boston, 1906); Saeltzer, *Treatise on Acoustics in Connection with Ventilation* (New York, 1908), and Hamilton, *Sound and Its Relation to Music* (Boston, 1911).

ACQUI, ä'kwē (ancient *Aquæ Statiellæ*). An episcopal city of Piedmont, in north Italy, on the left bank of the Bormida, 37 miles northwest of Genoa (Map: Italy, C 3). Every winter more than 6000 persons take the cure at the hot and cold sulphur springs that gave it its name and for which it has been famous since ancient times. It has a Gothic cathedral of the twelfth century, a seminary, a college, and the ruins of a Roman aqueduct. The chief trade is in silk, lace, rope, and wine. Pop., 1901, 13,786; 1911, 17,000.

AC'QUISI'TION. In law, a term which has the double meaning of the acquirement of territory by the state, and of title to real or personal property by the individual. In the case of the state it is effected in three ways: (1) By occupation, (2) by treaty and convention, and (3) by conquest (q.v.). As referring to the origin of title to lands or goods, acquisition is either original or derivative. The former comprehends occupation, accession, and prescription or limitation (qq.v.); the latter, the more usual modes of acquiring title, as alienation by gift or sale, exchange, inheritance, and transfer by will (qq.v.). In the English and American law of real property the whole subject is dealt with under the head of TITLE. Consult Blackstone, *Commentaries on the Laws of England;* Kent, *Commentaries on American Law.*

ACQUIT'TAL (OF. *aquiter*, from Lat. *ad*, to + *quietare*, to quiet). In criminal law, the judicial discharge of the accused. It may result from some technical defect in the proceedings, or from a verdict in the accused's favor on the merits. In the former case it is not a bar to a second prosecution for the same offense; in the latter case it is a bar, as well by common law as, in this country, by constitutional provision. See AUTREFOIS ACQUIT and JEOPARDY.

ACRA'NIA (Gk. *ά, a*, priv. + *κρανίον, kranion*, skull). A group of vertebrates having no skull or heart and represented only by the lancelets. See AMPHIOXUS.

ACRA'SIA (Gk. *ἀκρασία, akrasia*, intemperance). A beautiful enchantress in Spenser's *Faerie Queen*. Her name denotes her character. She dwells in a "Bower of Bliss," on a floating island of sensuous delight, and the fairy queen sends Sir Guyon to make an end of her seductive abode.

ACRA'TES (Gk. *ἀκρατής, akratēs*, intemperate). A male character in Spenser's *Faerie Queen*, typifying intemperance in the pursuit of pleasure.

ACRE, ā'kẽr *or* ā'kẽr. A word identical with Lat. *ager*, Gk. *ἀγρός, agros*, a field, and the Ger. *Acker*, which means both a field and a measure of land. Most nations have some measure nearly corresponding; originally, perhaps, the quantity a yoke of oxen could plow in a day; hence the word has a variable meaning.

The English statute acre consists of 4840 square yards. The chain with which land is measured is 22 yards long, and a square chain contains 22×22, or 484 yards; so that 10 square chains make an acre. The acre is divided into 4 roods, a rood into 40 perches, and a perch contains 30¼ square yards. The Scotch acre is larger than the English, and the Irish than the Scotch. One hundred and twenty-one Irish acres = nearly 196 English; 48 Scotch acres = 61 English. The following table shows the values of the more important corresponding measures compared with the English acre. The German *Morgen* below are becoming obsolete. The German Empire, Austria-Hungary, Spain, and Portugal have adopted the French metrical system.

English acre	1.00
Scotch "	1.27
Irish "	1.62
Austria, joch	1.42
Baden, morgen	0.89
Belgium, hectare (French)	2.47
Denmark, tönde land	5.05
France, hectare (= 100 ares)	2.47
France, arpent (common)	0.99
Holland, "	2.10
Naples, moggia	0.83
Portugal, geira	1.43
Prussia, little morgen	0.63
Prussia, great morgen	1.40
Russia, desiatina	2.70
Saxony, morgen	1.36
Spain, fanegada	1.06
Sweden, tunne land	1.13
Switzerland, faux	1.62
" Geneva, arpent	1.27
Tuscany, saccata	1.22
United States, English acre	1.00
Württemberg, morgen	2.40
Roman jugerum (ancient)	0.66
Greek plethron (ancient)	0.23

ACRE, ä'ker *or* ā'ker, or ST. JEAN D'ACRE. A seaport on the coast of Syria, a few miles north of Mount Carmel (Map: Turkey in Asia, F 6). It has about 11,000 inhabitants. The harbor is partly choked with sand, yet is one of the best on this coast. Acre is the Accho of the Bible, and has been known at

different periods as *Acco, Akka, Acon, Accaron*, and in Roman times *Ptolemaïs*. The town is of great antiquity; there is mention of it in hieroglyphic inscriptions as early as 1500 B.C. It was taken by the Assyrians under Sennacherib and given by Esarhaddon to the King of Tyre, with which it came subsequently into the possession of the Seleucid kings of Syria. The Romans made it a colony. In 638 the town was captured by the Arabs. In 1104 it was taken by the Crusaders; in 1187 it was recaptured by the Sultan Saladin, and in 1191 fell once more into the hands of the Crusaders, and became the seat of a bishop and of the Order of St. John. It was the last stronghold of the Crusaders in Palestine, being surrendered to the Saracens in 1291, after an obstinate defense by the crusading orders. In 1517 it was captured by the Turks. In 1799 it was besieged by the French under Napoleon Bonaparte for 61 days, but was successfully defended by the garrison, aided by a body of English sailors and marines under Sir Sidney Smith. In 1832 it was stormed by Ibrahim Pasha, son of the Viceroy of Egypt, and continued in his possession till it was bombarded and taken in 1840 by a combined English, Austrian, and Turkish fleet. See EGYPT; SELEUCIDÆ.

ACRE, ä′krā. A territory of Brazil, formerly belonging to Bolivia. See BOLIVIA; BRAZIL.

ACRES, ā′kẽrz, BOB. A character in Sheridan's *Rivals*. He appears as a somewhat rustic gentleman, of bombastic manners and ludicrous cowardice, noted particularly for what he calls his "oath referential" or "sentimental swearing."

ACRI, ä′krē. A city in Calabria, south Italy, 13 miles northeast of Cosenza (Map: Italy, L 8). The neighboring country is beautiful, healthful, and fertile, and produces olives, fruit, and cotton. Pop., 1901, 13,132; 1911, 13,306.

ACRIDʹIDÆ. See GRASSHOPPER.

ACRISIUS, ȧ-krĭshʹĭ-ŭs. See DANAE.

ACRO. See HELENIUS ACRO.

AC′ROBAT (Gk. one walking on tiptoe, from *ἄκρος, akros*, highest + *βαίνειν, bainein*, to go). Originally it was doubtless used to denote the acrobatic feats of the rope-dancers, but in the course of centuries its meaning has extended so that it includes many things which were unknown to the Greeks and Romans as familiarly as were the rope-dancers, who, as Terence in his prologue to *Hecyra* complains, distracted the attention of the republic from his play; and so does history repeat itself, a writer in the *Tatler* expresses his surprise at finding so small an audience at the opera, because the rope-dancer was not in the bill that night. The most recent celebrated exponent of the original art was Blondin (q.v.), who crossed Niagara Falls on a rope, carrying a man on his back. But this was no unheard-of feat, for when Isabel of Bavaria, Queen to Charles VI of France, made her entry into Paris, says Froissart, who was an eyewitness, a cord was stretched from the highest house on the bridge of St. Michael to the topmost gallery of the Church of Our Lady and an acrobat carried two boys holding lighted candles over it. From being a rope-dancer, or rather balancer only, the acrobat gradually added to his exhibits other balancing and tumbling acts. Vaulting and juggling and contortions became part of the entertainments of the Middle Ages. Edward III paid jugglers handsomely for exhibiting their acrobatic skill and the flexibility of their bodies. The austere Queen Mary even relaxed at their pranks; and when Queen Elizabeth attended the revels at Kenilworth Castle, which Sir Walter Scott has immortalized, she was vastly entertained by acrobatic tumblers. Even the wonderful balancing feats of the Japanese with ladders at right angles, up and down which a second man climbs in apparent defiance of the laws of equilibrium, had their prototypes, if not equals, among the European acrobats of 200 years ago, while modern somersault-throwing and leaping through hoops are illustrated in manuscripts as far back as the fourteenth century. The more liberal interpretation of the word now includes performances on the trapeze, the horizontal bar, and the other pieces of apparatus usually found in gymnasiums for the development of the suppleness of the body. Consult Le Roux and Garnier, *Acrobats and Mountebanks*, translated by A. P. Morton, illustrated (London, 1890); Lamb, *Hand Balancing and Tumbling* (Springfield, Mass., 1912); *Tumbling for Amateurs*, "Spalding Athletic Library" (New York, published annually).

AC′ROCERAU′NIA (literally, 'Thunder-Heights,' from Gk. *ἄκρος, akros*, highest + *κεραυνός, keraunos*, thunderbolt). The northwestern promontory of Epirus, which forms the termination of the Ceraunian, or Acroceraunian, Mountains. It was a dangerous point for sailors, on the regular route from Brundusium to Dyrachium (Horace, *Odes*, i. 3. 20), and was named from the frequent thunderstorms that occurred there. It is the modern Cape Glossa.

AC′ROCORIN′THUS (Gk. *Ἀκροκόρινθος, Akrokorinthos*). A steep hill about 1900 feet in height which was the citadel of ancient Corinth, and is still crowned by ruined Byzantine fortifications. The hill commands a superb view, famous even in ancient times, of the mountainous districts on both sides of the Corinthian Gulf. See ACROPOLIS; CORINTH.

ACROLEIN, ȧ-krōʹlē-ĭn (Lat. *acer*, sharp + *olere*, to smell), C_2H_3CHO. A colorless liquid having an extremely irritating odor. It is produced in the incomplete combustion or fats and when ordinary glycerin is distilled with sulphuric acid or other dehydrating agents. Some acrolein is produced when fats are overheated in cooking, and when the wick of a candle just blown out is left smoldering. Its reactions show that it contains the atomic group CHO; it is, therefore, classed with the aldehydes. Bromine adds itself directly to acrolein, forming an "additive product" of the composition, $C_2H_3Br_2CHO$; which shows that acrolein must be classed with the *unsaturated* organic compounds. By the action of barium hydroxide solution upon this acrolein dibromide, Emil Fischer (q.v.) and Tafel obtained glycerose (glyceraldehyde with some dioxy-acetone), and the latter in turn was changed by lime-water into a mixture of sugars. From this mixture Fischer and Tafel were able to obtain inactive fructose (*a*-acrose), one-half of which is identical with ordinary fructose or fruit-sugar. This is celebrated as one of the earliest cases of the synthetic reproduction of a natural sugar.

AC′ROLITHS (Gk. *ἄκρον, akron*, extremity + *λίθος, lithos*, stone). Greek statues, of which the head and extremities were of stone and the draperies of wood, either gilded or otherwise adorned. They did not belong exclusively to the earliest period of Greek sculpture, as has

been supposed, but were also made during the best periods of the art. They were a less expensive substitute for chryselephantine (q.v.) sculpture.

AC'ROMEG'ALY (Gk. *ἄκρος, akros,* highest, extreme + *μέγας, megas,* great). A rare chronic disease, characterized by a gradual and permanent enlargement of the head, hands, and feet associated with disordered function of the pituitary gland. It was first described in 1886 by Marie. It occurs in both men and women, beginning generally in the third decade of life. Some pains and functional disturbances, as well as anæmia, accompany its onset. Both soft tissues and bones are enlarged, the lower jaw, tongue, lips, and nose being very greatly hypertrophied. The hand sometimes reaches 8 inches in length, the foot 12 inches, while the circumference of the head may reach 26 inches. Acromegaly is now known to be due to overgrowth of the hypophysis or pituitary gland. In autopsies the gland is found either merely hypertrophied, or the seat of a malignant tumor, or a cyst. The disease has an interesting association with gigantism. According to Sternberg 40 per cent of giants are victims of acromegaly, and 20 per cent of acromegalics are over 6 feet in height when the symptoms begin. See article by Dock, in Osler's *Modern Medicine,* vol. vi (New York, 1910).

A'CRON (Gk. *Ἄκρων, Akrōn*). A physician of the fifth century B.C., native of Agrigentum in Sicily. Tradition says that he successfully combated the great plague in Athens in 430 B.C. by building large fires to purify the air. The Empiricists claimed him as the father of their school. His medical works are wholly lost.

ACROP'OLIS (Gk. *ἄκρος, akros,* highest + *πόλις, polis,* city). Originally the fortified refuge of a district, usually containing the palace of the chief. For this purpose a natural stronghold was selected and strengthened by artificial defenses. Around the acropolis a city frequently arose. When this was defended by a wall, the acropolis sometimes lost its military character and was given over to temples, as having been the centre of the oldest cults. The acropolis of Athens is the best example of this change and is also the most celebrated. (See ATHENS.) Other noteworthy acropolises were the Larissa at Argos, Acrocorinthus at Corinth, Mount Ithome in Messene, and the Cadmea at Thebes. In the older sense the name was frequently applied to any fortified hill commanding an ancient site, as at Troy, Mycenæ, Tiryns, Pergamum, Priene, etc.

AC'ROPOL'ITA, GEORGIUS (1217–82). A Byzantine historian and statesman, born at Constantinople. He was trusted with important diplomatic missions at an early age, and in 1244 he was made great *logothete* ('chancellor'). Having been sent to Pope Gregory X in 1282, he brought about the reconciliation of the Greek and Latin churches. His principal work is his *Annales,* comprising a history of the period from the capture of Constantinople in 1204 to its recovery by Palæologus in 1261. A complete edition of his works was published in 1903. Consult Karl Praechter, "Antikes in der Grabrede des Georgios Akropolita," in *Byzantinische Zeitschrift,* vol. x (1905).

ACROS'TIC (Gk. *ἄκρον, akron,* extremity, end + *στίχος, stichos,* line, verse). A Greek term for a number of verses, the first letters of which follow some predetermined order, usually forming a word—most commonly a name—or a phrase or sentence. Sometimes the final letters spell words as well as the initial, and the peculiarity will even run down the middle of the poem like a seam. Sir John Davies composed 26 *Hymns to Astrea* (Queen Elizabeth), in every one of which the initial letters of the lines form the words Elisabetha Regina.

In the acrostic poetry of the Hebrews the initial letters of the lines or of the stanzas were made to run over the letters of the alphabet in their order. Twelve of the psalms of the Old Testament are written on this plan. The 119th Psalm is the most remarkable. It is composed of 22 divisions or stanzas (corresponding to the 22 letters of the Hebrew alphabet), each stanza consisting of eight couplets, and the first line of each couplet in the first stanza beginning in the original Hebrew with the letter *aleph,* in the second stanza with *beth,* etc. The divisions of the psalm are named each after the letter that begins the couplets, and these names have been retained in the English translation. With a view to aiding the memory, it was customary at one time to compose verses on sacred subjects after the fashion of those Hebrew acrostics, the successive verses or lines beginning with the letters of the alphabet in their order. Such pieces were called *Abecedarian Hymns.* Acrostic verse, however, has never been highly regarded by the great men of letters, many of whom actually despised it.

AC'ROTE'RIUM (Gk. *ἀκρωτήριον, akrōtērion,* the summit or extremity). A plinth or base

ACROTERIUM.

for an ornamental appendage above any one of the three angles of a classic pediment or gable; also the ornament or appendage with its base. The most common form of ornament for acroteria was the anthemion; in early Greek and Etruscan examples painted on terra cotta or marble, in later and more perfect buildings carved in relief in marble, a full anthemion at the apex of the gable, a half-anthemion at its extremities. Occasionally figure-subjects in relief and even groups of figures, and symbolic forms like griffins, occur in place of the anthemion ornaments. See ANTHEMION.

ACT (Lat. *actus,* the doing or performing of a thing; *actum,* a public transaction, record). A term of law applied to the written expression of the will of the legislature formally declared. As commonly employed, it is synonymous with statute (q.v.). The term is derived from the *acta* of Roman public life, which comprehended all public official procedure as well as the official record thereof. An act of one legislature cannot tie the hands of its successors, unless it amounts to a contract, so that its repeal would come

within the constitutional prohibition of legislative acts which impair the obligation of contracts. In England even this exception does not exist, each Parliament being an absolutely sovereign legislature. Still, certain acts of Parliament have been passed in the hope, if not with the intention, of arresting "the possible course of future legislation"; and some of them have commanded a respect almost equal to that accorded in this country to written constitutions. To this class belong the Bill of Rights (q.v.); the Act of Settlement (12 and 13 Will. III, c. 2) fixing the descent of the crown; the Acts of habeas corpus (q.v.); the Acts of Union with Scotland (1 James I, c. 1), and with Ireland (39 and 40 Geo. III, c. 67); and the Septennial Act of 1716 limiting the life of a Parliament to seven years. "Act" is used in connection with other words in a number of familiar phrases. For example, *act of honor*, the acceptance by a stranger of protested paper for the honor of some party thereto; *act of God*, an inevitable accident resulting from superhuman causes, such as lightning, tempest, or floods; *act of state*, act done or commanded by the government of a foreign state, for which the person injured has no redress in the courts of his own country, but must seek redress through the diplomatic agencies of his government.

ACT. In the drama, the name for one of the principal parts of a play. In performance the acts are commonly separated by intervals, during which the dropped curtain conceals the stage. An act which may in turn be subdivided into scenes should be in a certain sense complete in itself, and at the same time should form an essential part of the whole drama. As every dramatic plot naturally divides itself into three parts—the exposition, the development, and the conclusion or catastrophe—a division into three acts seems most natural; but practically this would often require undue condensation, and the well-known classic custom defined by Horace in his *Ars Poetica* is that a play should be in five acts. Normally, the first act indicates the general nature of the drama, introduces the characters, and begins the action. The second act leads up to the third, which develops the crisis of the plot. In the fourth the conclusion or catastrophe is prepared, but should by no means be anticipated so as to weaken the effect of the *dénouement*, which is reserved for the fifth act. The Greeks, who always strictly observed the unities, did not make the formal distinction of acts in their drama, but their tragedies are subjectively capable of division into parts or episodes, which are practically separated by the lyrical parts of the performance. (See CHORUS.) In modern drama the requirement for five acts began early to be neglected, especially in comedy. (See MOLIÈRE.) On the present stage plays are common in any number of acts below five. The four-act play is most common. Consult: Archer, *Play-Making: A Manual of Craftsmanship* (London, 1912), and Matthews, *A Study of the Drama* (Boston, 1910).

ACT, or CEREMONY OF "INCEPTION." The commencement or degree-taking exercises generally carried on in mediæval universities and, in modern times, in most German universities and at Oxford and Cambridge. The ceremony was completely abolished at Oxford in 1856, while Cambridge still retains a much modified form of it. In both, however, various phrases associated with this mediæval custom—such as "Act Sunday" and "Act Term"—are still in use. In America *the Act* was practiced in colonial days. The student or "respondent" who "keeps the act" reads a thesis in Latin which he defends against three "opponents" named by the proctors. In a quaint pamphlet on *New England's First Fruits*, published in 1643, there is an account of the late commencement at Harvard in which the word "acts" is familiarly employed, as one may see from the following extract: "The Students of the first Classis that have beene these foure yeeres trained up in University-Learning for their ripening in the knowledge of the Tongues and Arts, and are approved for their manners, as they have kept their publick Acts in former yeares, our selves being present at them, so have they lately kept two solemne Acts for their Commencement, when the Governour, Magistrates, and the Ministers from all parts, with all sorts of Schollars, and others in great numbers were present, and did heare their Exercises."

All that now survives of this complex ceremony in American educational institutions is but the faintest suggestion in our commencement exercises, held by secondary and even elementary schools as well as by colleges and universities. See COMMENCEMENT.

ACTA. Among the Romans the public acts or orders of a magistrate, as distinct from the doings of a general, which were called *gesta* or *res gestæ*. (See ACT.) At the close of a magistrate's term, his *acta* were submitted to the Senate for approval or rejection. After the death of Julius Cæsar the triumvirs swore, and compelled all other magistrates to swear, to maintain all his *acta*. Each new Emperor swore to respect the *acta* of his predecessor, unless the latter had been branded with infamy after death. On January 1st each magistrate, on taking office, swore to maintain the *acta* of the reigning Emperor. The term *acta* came in time to be synonymous, in effect, with the English "Records"; for the word in this sense, see ACTA DIURNA; ACTA MILITARIA; ACTA SENATUS. The various *acta* were much used by the Roman historians.

AC'TA DIURNA, POPULI, URBANA, URBIS, or PUBLICA (acts daily, popular, municipal, or public). A sort of daily chronicle of events published in ancient Rome, giving summaries of the principal legal and political orations, the decisions of the courts, news from the army, and the latest official gossip of the town. They seem also to have contained extracts from the *Acta Senatus*, accounts of the transactions of the assemblies of the people, news of all sorts relating to the Imperial family, accounts of births, deaths, marriages, and divorces, accidents, prodigies, and the like, all of which were preserved as sources of future history. When Antony offered Cæsar a crown on the feast of the Lupercalia, Cæsar ordered it to be noted in the *Acta Diurna*. The *Acta* are frequently said to have been introduced by Julius Cæsar (Suetonius, *Cæsar*, 20), but others believe them to have existed long before Cæsar's time, and to have supplanted the *Annales* (see ANNALS), which fell into disuse about the year 131 B.C. The Latin scholar Hübner advanced strong arguments in support of the former view, although it was the practice before Cæsar's time for scribes to compile a manuscript chronicle of public events in the city of Rome, which was often forwarded with private letters to absent friends. In any case, Cæsar gave added importance to the *Acta*

Diurna; they were thenceforth published more or less under the authority of the government and with its aid: in imperial times they were under the control of a bureau directed by a *procurator*, or imperial agent. The *Annales* took note only of the most important events, whereas matters of far less importance were included in the *Acta Diurna*. The material for the *Acta* was gathered by reporters called *actuarii*, and the *Acta* were exposed in public places to be read or copied by any who chose to do so. (See ALBUM.) After a reasonable period of time they were taken down and preserved with other public documents. Persons in Rome were accustomed to keep their friends who were sojourning out of town informed of the progress of events and of the news generally, as gathered from the *Acta Diurna*. A passage in Petronius (cap. 53) gives an imitation of the *Acta*. From this it would appear that the style was very simple and that only the bare facts were stated. Consult Le Clerc, *Des journaux chez les Romains* (Paris, 1838), a treatise to be read with caution, and Hübner, *De Senatus Populique Romani Actis* (Leipzig, 1860). See also ACTA; ACTA MILITARIA; ACTA SENATUS.

ACTÆ'A (Gk. *ἀκτέα, aktea*, elder tree). A genus of six species belonging to the family Ranunculaceæ, three of them occurring in the United States. *Actæa rubra* is the "red baneberry" or "black cohosh," while *Actæa alba* is the "white baneberry." They are perennial herbs, with large compound leaves, small white flowers in terminal racemes, and red or white berries. *Actæa spicata* of Europe has purplish-black berries and is often called "herb-Christopher."

ACTÆ'ON (Gk. *Ἀκταίων, Aktaiōn*). A mythical personage, a grandson of Cadmus, trained as a hunter by Chiron. Having offended Artemis, he was changed by her into a stag and torn in pieces by his own dogs. The sin by which Actæon offended Artemis is variously stated. According to Euripides, in the *Bacchæ*, Artemis was jealous because Actæon had boasted that he excelled her in hunting. The most popular version in later times was that he had come upon the virgin goddess while she was bathing.

ACTA ERUDITORUM (Lat. Proceedings of the Learned). A Latin monthly and the first German literary serial (117 vols., 1682–1782). It was founded by Prof. Otto Mencke of Leipzig, and was owned by his family till 1754, after which it rapidly deteriorated. The series contains a record of the progress of science to 1776. Consult Sandys, *A History of Classical Scholarship*, vol. ii (Oxford, 1906), and Ornstein, *The Rôle of the Scientific Societies in the Seventeenth Century* (New York, 1913).

ACTA MARTYRUM (Lat. Acts of the Martyrs). A name given by the ancient Church to the records of the trials and deaths of the martyrs which were kept for the edification of the faithful. The oldest extant refer to the death of St. Ignatius of Antioch, who died about the year 107. St. Augustine (fifth century) speaks of these records as being read to the people on their festival days. Eusebius, the Church historian (died about 340), collected the *Acta Martyrum* in his two works, *De Martyribus Palæstinæ* and *Synagoge Martyrum*, the latter of which has perished, but the former is the appendix to the eighth book of his *Church History*. See McGiffert's trans. (New York, 1890); Delehaye, *Legends of the Saints* (English trans., London, 1907).

ACTA MILITARIA. A record of the duties, numbers, and expenses of each legion and of the property owned by each soldier, kept by soldiers, who are mentioned in inscriptions as *librarii legionis, actuarii legionis*, or *tabularii legionis*.

ACTA PILATI (Lat. Acts of Pilate). An account of the trial and death of Jesus Christ, purporting to have been written by Pontius Pilate or under his direction. Although Justin Martyr (Apol., i, 76–86), Tertullian (Apol., v, 21), and Eusebius (ii, 2) allude to some account rendered by Pilate to the Emperor Tiberius, the *Acta* now extant in the Vatican library, as well as the so-called *Report* of Pilate to the Emperor and the alleged *Epistolæ Pilati* describing the resurrection, are admittedly spurious. Consult Lipsius, *Die Pilatusacten* (Kiel, 1871). Various English translations have been published, e.g., *Acta Pilati* (Shelbyville, Ind., 1879), and also one in the Ante-Nicene library.

ACTA SANCTORUM, or **MARTYRUM** (Lat. Acts of the Saints or Martyrs). The collective title given to several old writings respecting saints and martyrs in the Greek and Roman Catholic churches, but now applied especially to one extensive collection begun by the Jesuits in the seventeenth century, and intended to serve as a better arrangement of the materials found in ancient works. This great undertaking, which was commenced by the Jesuit Heribert Rosweyde, of Antwerp, has considerable importance, not only in a religious and ecclesiastical point of view, but also with regard to history and archæology. After Rosweyde's death in 1629, Johannes Bolland was commissioned by the order of the Jesuits to continue the work, and with the assistance of Godfried Henschen he prepared two volumes, which appeared in 1643. After the death of this editor (1665) the work was carried on by a society of learned Jesuits, who were styled "Bollandists," until 1794, when its further progress was prevented through the invasion of Holland by the French. In recent times the undertaking has been resumed, and in 1845 the fifty-fourth volume was published at Brussels. Many additional volumes have appeared since. The lives are arranged in the order of the calendar. A new edition of the first fifty-four volumes appeared in 1863–69. The sixty-fifth volume appeared in 1892. For notices of other and similar collections, see SAINTS; MARTYR; MARTYROLOGY.

ACTA SENATUS, or **COMMENTARII, SENATUS.** A record of the transactions of the Roman senate, including the opinions of the chief speakers, and the final decision of the senate. From an early time the proceedings of the senate had been written out by a committee of senators, under the direction of the magistrate who had presided; these records were deposited in the *Ærarium* (q.v.). They were regularly published after 59 B.C., every day, under governmental authority, from notes of short-hand writers. Augustus forbade their publication, but the records were, of course, still kept by one of the senators selected by the Emperor.

ACTIAN, GAMES. See ACTIUM.

ACTINIARIA (Gk. *ἀκτίς, aktis*, ray). A group of anthozoan cœlenterates comprising the sea-anemones. They differ from all other anthozoans in the complete absence of a skeleton

and in the large size of the individuals, which rarely form a colony. See ANTHOZOA and SEA-ANEMONE.

FIG. 1.

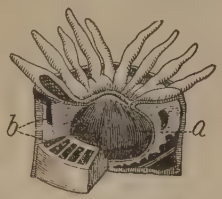


FIG. 2.

ACTINIARIA.

1. Vertical aspect of an Actiniarian, showing mouth and tentacles. 2. Sectional view: *a*, simple digestive sac; *b*, structure of the body-wall, showing septa.

ACTIN'IUM. A radioactive element discovered by Debierne in 1899. It occurs along with other radioactive substances in pitchblende and is chemically very similar to thorium, but is characterized by its high power of emanation. In 1902 Giesel discovered another substance, likewise possessing a high power of emanation, but chemically similar to lanthanum; he called it *emanium*. The question has since arisen whether actinium and emanium are not identical. Investigations carried out by Debierne, Miss Brooks, and Hahn and Sackur seemed to indicate that the two substances are identical. But a careful study led Marckwald, in 1905, to the remarkable conclusion that actinium and emanium are not identical, but are closely related to each other, inasmuch as *actinium is being continually produced from emanium*. Perhaps the most interesting fact about actinium is that, like radium, it is decomposing with the *formation of the element helium*, although actinium and radium are chemically very different substances. See RADIOACTIVITY.

ACTIN'OGRAPH (Gk. *ἀκτίς, aktis*, ray + *γράφειν, graphein*, to write). An instrument for recording automatically the chemical effects of radiations from any source, especially the sun. The simplest forms of actinograph are those that expose standard photographic plates or films (iodides, chlorides, or bromides of silver) to the sun's action for short, definite periods of time. Those that utilize the union of chlorine and hydrogen under the influence of light, or the precipitation of gold from a solution of gold chloride and oxalic acid on exposure to light, cannot be readily employed for automatic registration. See SUNSHINE RECORDER.

ACTIN'OLITE (Gk. *ἀκτίς, aktis*, ray + *λίθος, lithos*, stone). A calcium-magnesium-iron amphibole (q.v.) that includes the varieties nephrite, asbestos (q.v.), smaragdite, and uralite. Actinolite varies in color from a bright green to a grayish green, and usually occurs in the form of long, slender crystals in metamorphic rocks, commonly in talc.

ACTINOLITE-SCHIST. See AMPHIBOLITE.

AC'TINOM'ETER (Gk. *ἀκτίς, aktis*, ray + *μέτρον, metron*, measure). An instrument for measuring the effect of the sun's rays in producing chemical, i.e., actinic effects. As originally devised by Sir John Herschel, this title was applied by him to a thermometer whose bulb was filled with a blue solution of ammonia and sulphate of copper; the expansion of this solution by absorbing the sun's rays was supposed to measure the quantity of blue light or chemical rays in the beam of sunshine. The name has since been loosely applied to two distinct types of apparatus. In one of these the sensitive element acts like a black body and absorbs practically *all* the radiation of whatever wave-length; in the other type selective absorption takes place, and therefore partial effects due to radiation of only certain particular wave-lengths are measured. It is desirable that instruments of the first class, measuring the gross radiation of all wave-lengths, be called pyrheliometers. Instruments sensitive to certain selected radiations, such as cause photographic, chemical, and other like changes, should be called actinometers, since these changes are commonly designated as actinic effects. In this case the radiation selectively absorbed does molecular work of a chemical nature and is measured by these effects, as when a mixture of chlorine and hydrogen is converted into hydrochloric acid and the quantity of acid that is formed in years of time is the measure of the intensity. This includes the basis of the methods of Draper and Bunsen and Roscoe. When a mixture of ferric-oxalate and chloride of iron dissolved in water is exposed to sunshine, it gives out carbonic acid gas; this is the basis of Marchand's apparatus. A photographic plate exposed for a short time receives an impression whose intensity may be measured on a scale of tints or shades and made the basis of a determination of the intensity of the sunshine. This method has been worked out by Bigelow and others. In general, any apparatus for measuring the chemical effects of radiation from any source constitutes an actinometer, properly so called. See PYRHELIOMETER.

ACTINOM'ETRY. The general subject of the measurement of either the relative or the absolute effect of solar or other radiation. A consistent usage would restrict the word to measurements of only actinic effects, i.e., chemical, photographic, and other like reactions. Nevertheless both thermal and visual phenomena are sometimes comprised under this title. See ACTINOMETER.

AC'TINOMOR'PHY (Gk. *ἀκτίς, aktis*, ray + *μορφή, morphē*, form, shape). In botany, a term of symmetry used chiefly in connection with flowers. In an actinomorphic flower the members of each set are similar and arranged about a common centre, as are the parts of a radiate animal. If there are five petals, they are alike and are evenly distributed about the centre of the flower, as are the spokes of a wheel about the hub. Technically defined, an actinomorphic flower is said to have as many planes of symmetry as there are members in a cycle. This means that if an imaginary plane be run through each sepal or petal or stamen and the common centre, the two resulting halves of the flower will be similar. More commonly such flowers are spoken of as "regular." See FLOWER.

AC'TINOMYCO'SIS (Gk. *ἀκτίς, aktis*, ray, beam + *μύκης, mykēs*, mushroom, fungus, excrescence), LUMPY JAW or BIG JAW. A specific, infectious disease produced by a parasitic micro-organism known as the ray fungus (*Actinomyces bovis*). The micro-organism causes the formation of deep subcutaneous tumors or swellings, which break down and suppurate. The disease is usually of sporadic occurrence, but sometimes becomes epidemic. It is most

frequently found in cattle, but affects also horses, pigs, sheep, deer, llama, guanaco, and man. Actinomycotic tumors in cattle have been recognized since 1825, although they have frequently been mistaken for cancerous, tuberculous, or syphilitic tumors. The disease was first definitely described in cattle by Böllinger in 1877, and in man by James Israel. It occurs in all parts of Europe and North and South America. The ray fungus is found in all tumors and abscesses of this disease, wherever situated, and its presence may be detected by examining the small yellow masses discharged in the pus. These consist of aggregations of the ray fungus, readily detected under the microscope. In cattle the seat of the disease is usually in the inferior maxillary bones, submaxillary salivary glands, in the tongue, pharynx, and œsophagus. The common names, Big Jaw, Lumpy Jaw, Big Head, and Wooden Tongue, are descriptive of the most frequent forms of actinomycosis in cattle and horses. In hogs actinomycosis is found in 80 per cent of cases in the udder. In a small percentage of cases the lungs and intestines are affected. Maxillary tumors in cattle are almost invariably due to the ray fungus, and therefore actinomycosis may be readily diagnosed.

Considerable difference of opinion prevails regarding the systematic position of the ray fungus. It has been supposed that the organism has a plant host on which it passes part of its life cycle. The agency of various grasses (especially such as have sharp-pointed awns) in transmitting actinomycosis can hardly be questioned. Many cases of this disease in man have been reported, the greater number having occurred as a result of eating raw meat.

The most effective treatment is the internal administration of potassium iodide, advocated by Thomassen in 1885. Abscesses, where accessible, must be opened and drained, and treated with antiseptics. Actinomycosis follows a slow, chronic course.

The relationship of the disease to the public health has been much discussed. Apparently infection most frequently takes place in man and cattle through diseased teeth or abrasions of the mucuous membrane of the mouth. The identity of actinomycosis in man and cattle is admitted, but most authorities hold that its direct transmission to man through eating the meat of affected animals is of rare occurrence. Whether an animal affected with actinomycosis should be used for human food is a question. It may be safely asserted that animals in which the disease has become generalized should be condemned. For details concerning actinomycosis, consult D. E. Salmon, "Investigations Relating to the Treatment of Lumpy Jaw, or Actinomycosis, in Cattle," *U. S. Department of Agriculture, Bureau of Animal Industry, Bulletin 2* (Washington, 1893); D. E. Salmon and others, "Special Report on Diseases of Cattle and on Cattle Feeding," *Report of U. S. Department of Agriculture for 1904, Bureau of Animal Industry* (Washington, 1904); "Tumeurs des mâchoires observées dans l'espèce bovine," *Journal de Médecine Vétérinaire* (Paris, 1826). A full description of human actinomycosis is found in Osler's *Modern Medicine*, vol. i (New York and Philadelphia, 1910).

AC'TINOTHER'APY. The treatment of disease by means of actinic or chemical rays. It is now known that the entire spectrum, from the long wave-length and slow frequency of the infra red to the short wave-length and high frequency of the rays beyond the violet, produces chemical changes. The action on the organism varies with the wave-length and the frequency of the ray employed, but the short high frequencies beyond the violet are the ones most active therapeutically. See PHOTOTHERAPY.

AC'TINOZO'A. Same as ANTHOZOA (q.v.).

AC'TION (Lat. *actio*, a doing, performing, an action, suit, process). A term which, in its broadest sense, includes every lawful proceeding in a court of justice for the enforcement or protection of a right, the redress or prevention of a wrong, or the punishment of a public offense. Formerly the term was confined, in English law, to an ordinary proceeding in a common law court, while the word "suit" was applied to a proceeding in equity. By the reformed procedure in many of our States, all distinction between actions at common law and suits in equity, as well as between the different forms of common law actions, have been abolished, and only a single civil action is recognized. The earliest classification of common law actions was: (1) real actions, or those based on the plaintiff's right of property in specified lands, so called because the *res*, or property itself, was sought to be recovered; (2) mixed actions, such as those in ejectment or for waste, in which not only the possession of the land but damages also for its wrongful use or abuse are sought; (3) personal actions, or those against a particular person for a money judgment. The distinction between real and personal actions is the foundation of the classification of property as real and personal. (See PROPERTY.) This third class was subdivided into actions *ex contractu*, such as debt (q.v.) and covenant (q.v.), and actions *ex delicto*, such as trespass (q.v.) and detinue (q.v.). Again, actions are divided into local and transitory, according as they must be brought in a certain county or State, or as they may be brought wherever the defendant is found. An action for trespass to land is local, and it must be brought in the State where the land is situated; while an action for slander of title (q.v.) to that land is transitory. (See the authorities referred to under the various titles above named.)

ACTION. In psychology, a term used broadly to cover all forms of muscular movement. We speak, e.g., of the action of the heart, or reflex action, etc., as well as of impulsive or voluntary action. There is, however, a growing tendency to reserve the word "action" for such bodily movements as have conscious antecedents and concomitants (movements for which there are conscious motives, and of which we are conscious, as they run their course in time), and to employ the general term "movement" for movements which are of an unconscious, purely physiological, character. We shall therefore speak in this article of impulsive and voluntary *action*, but of reflex *movement*.

The problem which action sets to psychology is twofold. We have, in the first place, to trace the genesis and development of action; and in the second to analyze the active consciousness, to determine the constituent processes in the various forms of motive.

1. There are two opposed theories of the genesis of action. The first asserts that all conscious actions have developed from reflex movements. The reflex movement is the direct

and definite response of the organism to a particular stimulus. A frog whose brain and medulla have been removed will draw up its leg if the foot be pinched; the pupil of the human eye contracts under the influence of light, and expands again as the light is diminished. Mechanical and unconscious movements of this kind are, the theory holds, older than consciousness. When mind appears, it finds such movements ready to its hand; it avails itself of them for conscious purposes. So the animal's movements, at first automatic and simple, grow more and more complex, and have more and more of the element of consciousness imported into them. The main arguments for the position are as follows: (*a*) Spontaneous movements are to be observed in children and young animals: movements that are neither reflex movements nor voluntary actions, but random discharges of the excess of energy stored in the healthy organism. These movements furnish a varied supply of active experience, certain items of which must, by the law of chance, prove to be positively pleasurable, while others will at least be less unpleasant than the experiences preceding them. Whenever active experience and pleasure are thus coincident, attention is drawn to the movement, which is elaborated into voluntary action. (*b*) From the physiological point of view, the movements of the lowest organisms, as well as the movements carried out by means of the lower nerve-centres of higher organisms, are of the reflex type. And even the most complex of voluntary actions can be assimilated to this type on the neural side; for the physical correlate of such action is simply the reflex arc, with its central portion made longer and more circuitous.

Neither of these arguments is, however, free from objections. In the first place, different observers differ as to the range and scope of the spontaneous movements of infancy. Some restrict them within very narrow limits, where the play of chance coincidence would be inconsiderable; others assert that they can, one and all, be reduced to incipient voluntary actions and imperfect hereditary reflexes. Moreover, the theory presupposes that the sensations and perceptions aroused by moving appear, in point of time, before the pleasure achieved by the movement or the voluntary impulse toward it. But this means that mind is built up piecemeal, whereas there is reason to think that consciousness is a single tissue, every strand of which is given with every other. Again, it is difficult to understand the mechanism by which pleasurable movements are selected. Granted that a movement chances to bring pleasure, how is its repetition brought about? Can we form any clear idea of the way in which a motive is prefixed to the sensation series? Against the second argument, it is asserted as evident that the simplest form of sensory-motor coördination need not be the earliest. There is a primitive simplicity, but there is also a simplicity of reduction and refinement. Again, the statement that the movements of the lowest organisms are reflex in character is said to beg the question: the original theory assumes outright that there is a strict parallel between the growth of the race and the growth of the individual, between phylogeny and ontogeny, and does not take into account the fact that the individual comes into the world endowed with a rich inheritance of neuro-muscular coördinations. And, lastly, even if the neural substrate of voluntary action be in structure no more than a highly complex reflex arc, still the opponents of the theory point out functional differences: the reflex is unconscious, while the functioning of the central cells of the voluntary arc is accompanied by consciousness. So we come face to face once more with our original problem.

The alternative theory, which we may now examine, affirms that the earliest organic movements are, in principle, voluntary actions. Mind, according to this theory, is as old as life, and the first movements of living matter are impulsive actions, i.e., actions prompted by a single determining motive. The arguments which this position brings into the field are as follows: (*a*) All reflex and instinctive movements show signs of adaptation; they subserve a particular end or purpose; they are definite and appropriate responses to certain circumstances of the animal's environment. Now, in the first place, primitive movements should be vague and purposeless; it is not easy to conceive of a movement that should be at once rudimentary and economical. And, in the second place, it has been argued that the presence of mind in a living creature is the creature's capacity of adaptation, of learning. The reflex, pointing as it does to a process of adaptation in the past, points also to the existence of a past mind. In a word, reflex movements appear to be degenerate, mechanized impulsive actions. (*b*) There can be no doubt that such mechanization is possible. We are constantly in the course of our every-day life reducing voluntary actions to "secondary reflexes": our pen dips itself in the accustomed inkstand, our coat buttons itself, our bicycle balances itself, without any of the conscious attention that we gave them when the movements were new. Further, what we see happening here in the course of a few days or weeks has happened also in the life of the race. We wince when we are ashamed, and jump when we are startled; and the jump and wince are inexplicable unless they are the degenerate descendants of voluntary actions, the last reflex remnants of the cowering and shrinking and leaping aside of the frightened animal.

The only question which this second point of view leaves unanswered is the mode of origin of the first impulse. How and under what conditions the primeval organism became conscious of the impulse to move, and organic movement appeared in the natural world, we cannot say. But neither is psychology called upon to say. No science explains its own data; it takes them for granted. As, therefore, the physicist assumes the mechanical universe, and the biologist the phenomena of life, so may the psychologist assume without cavil the existence of mind. A theory, however, has recently been proposed which not only resolves this difficulty, but also affords a possible reconciliation of the two opposed theories outlined above. Both of these presuppose, at least by implication, that the organism had no past. In fact, while we must believe that life is derived from the non-living, organic from inorganic, we are yet not bound to believe that the transition was abrupt. On the contrary, it is probable that nature made many essays at life before a stable, self-sustaining life was struck out; that there were many intermediate stages between the vital and non-vital, many imperfect modes of half-life or part-life which were in-

stable and therefore transient, but which none the less bridged the gulf between the inanimate and the animate worlds. Hence the first living thing may have had a past, a half-vital ancestry; and this past would have done for it, in a crude way, precisely what our ancestry does, in an infinitely more complicated way, for ourselves. In other words, when life was finally achieved, the organism had a background of "experience" *both* for the reflex movement (tropism) *and* for the conscious impulse, and the first movements were therefore both tropic and conscious. This theory does not conflict with the general doctrine of organic evolution; it avoids the postulation of an abrupt break between organic and inorganic life; and, finally, it allows the advocates of the first theory a tropic explanation of many primitive movements and, at the same time, admits of the presence of consciousness at the first moment of what we now know as life.

Whatever be the truth in these speculations, the psychologist has the right to his conscious starting-point, from which the rest follows easily enough. For psychology the first organic movement is an "action upon presentation," an action whose motive (the impulse) is given with the presentation to the animal of a pleasantly or unpleasantly toned stimulus. Out of this grows impulsive action proper, an action whose motive is blended of three ideas: that of the stimulus, the original motive-idea; that of the result of movement, of pleasurable accomplishment; and that of the moving itself, the "active experience" of the first theory. The course of development beyond impulsive action takes two directions. Upward, toward greater mentality, it rises to the more complex forms of voluntary action: to selective action, in which there is a conflict of impulses, a period of deliberation, resulting in the victory of some one (the actual) motive over other less strong (potential) motives; and to volitional action in which the conflict is not between impulse and impulse, but between an impulse to movement on the one hand and a group of ideas prompting to no-action on the other. Downward, toward less mentality, the impulsive action degenerates into the reflex movement. Selective and volitional action, as we have seen, may also degenerate; choice and resolve become automatic; the complex action slips back, first of all into an impulsive act, and finally into a secondary reflex. Note the light which this view of the development of action throws upon the problems of animal psychology (q.v.). Bethe thinks that ants and bees are automata, while popular psychology dowers them with all sorts of conscious motives and purposes. Now, ants and bees prove, on trial, to be unintelligent; they cannot learn to make new adaptations. On the other hand, the adaptations which they have already learned are of an extremely complicated character. It has been assumed, therefore, by certain authorities that these creatures represent the final stage in a retrogressive development from a fairly high level of mentality. According to this theory popular psychology is right, in that ants and bees once possessed a good deal of mind; it is wrong in interpreting their present movements as voluntary actions. If it be objected that the unicellular organisms, the most primitive forms of life, should (on the present theory) show signs of rudimentary impulsive action, and that they prove, on trial, to be as automatic as Bethe's ants, the reply may be that these protozoa, simple as they are, have as long a line of ancestry as we have ourselves; and that the less mind there is to start with, the less will be the fall from impulse to the reflex. But many qualified observers deny this total absence of mind. In general, then, it is asserted by the supporters of this hypothesis that if a sound view of mental evolution is to be attained, the investigator must accept the idea that all animals have had mind. Whether or not they have it now depends upon the direction which their development has taken—upward, toward physiological adaptability and elaboration of mental process, or downward, toward specific adaptation and the lapse of consciousness.

2. We have already said something by way of analysis of the "typical" motive to action, the impulse. The essential thing, however, in every action-consciousness is its predetermination in the sense of an idea of end. (See DETERMINING TENDENCY.) If, now, we attempt a further analysis of the impulse, we get something like this: a preliminary phase in which the prominent things are kinæsthesis and the idea of end or result—either of which may carry, in consciousness, the determination; a central phase in which some object is apprehended in relation to, or in the sense of, the idea of end, i.e., the apprehension of the object releases the determining tendency and the movement occurs; and a final phase in which the perception of result is set on a background of kinæsthesis, of the sensations aroused by the actual movement. The affective accompaniment of all this group of ideas may be pleasurable or unpleasurable, but must always be the one or the other; we may jump for joy or from fright, but we do not jump when our mood is that of indifference. The essential thing in the active consciousness, however, is an apperception of (attention to) some one of the ideas contained in the motive. (See APPERCEPTION; ATTENTION.) (*a*) In the case of primitive action (action upon presentation) we must suppose that the idea of object is the idea that stands in the focus of attention; the impulsive action is indistinguishable from the movement that expresses emotion. (See EXPRESSION; EXPRESSIVE MOVEMENTS.) "The universal animal impulses—the impulses of nutrition, of revenge, of sex, of protection, etc.—are indubitably the earliest forms of emotion" (Wundt). The hungry animal perceives food: its attention is held by this perception; it is pleasurably moved by the perception; and bodily movement toward the food-supply results. (*b*) As the organism grows in experience of movement, the impulse becomes more complex, and the focus of attention shifts to the idea of our own movement (action upon representation); so that we may lay it down as a law of analytical psychology that the condition of voluntary action is an apperception of the movement-idea. We think of ourselves as moving, and find that we have moved. (*c*) At a still later stage, when the voluntary action is taking the downward path toward the secondary reflex, the idea of movement fuses with the idea of result into an indissoluble whole. It is now the idea of result that holds the attention. We feel a draught, and rise at once to close the window, thinking neither of the object of movement, the window, nor of the muscular move-

ments that take us to it, but simply of the result of the action, the avoidance of a cold. So the emphasis shifts from term to term of the threefold complex; from idea of object to idea of movement, and from that again to idea of result. But the motive remains in principle the same thing: an affectively toned group of sense-material, given in the state of attention.

The conscious antecedents of the higher forms of voluntary action are naturally more complicated. In place of the triad of simple ideas we have, in the conflict of impulses that precedes volitional and selective action, elaborate systems or constellations of ideas, representations of the total "situation" in which we find ourselves. In place of the simple pleasantness or unpleasantness of the impulse, we have equally elaborate affective formations—emotions and sentiments; the feelings of obscurity, of contradiction, of resolve, of decision; the characteristic oscillatory emotion of doubt; the emotions of relief, of satisfaction or dissatisfaction, of hope, of disappointment; the sentiments of power, of pride, of æsthetic fitness, of moral rightness. (See EMOTION.) And in place of the passive attention which the single impulse-motive commands, we have an active, effortful attention divided among the various potential motives contained in the "situation." It is the business of descriptive psychology to unravel the processes of these motive-consciousnesses, and to trace the single pattern (the impulse pattern) that runs through them all. It is the business of experimental psychology to examine the impulse under standard conditions; to build it up from the given elements, and to construct artificial, selective and volitional actions from a number of simple impulses. This task it accomplishes by aid of the reaction experiment. Consult: A. Bain, *The Emotions and the Will* (London, 1899); H. Spencer, *Principles of Psychology* (New York, 1890); W. Wundt, *Vorlesungen über die Menschen- und Tierseele* (5th ed., Leipzig, 1911; trans. as *Human and Animal Psychology*, London, 1901); id., *Grundzüge der physiologischen Psychologie* (6th ed., Leipzig, 1910–11); N. Ach, *Ueber die Willenstätigkeit und das Denken* (Göttingen, 1905).

ACTIUM, ăk'shĭ-ŭm, now AKRI. A town and promontory on the west coast of Greece at the entrance of the Ambracian Gulf, now the Gulf of Arta. It is memorable for the sea fight which took place near it Sept. 2, 31 B.C., between Octavius (afterward the Emperor Augustus) and Marcus Antonius. These two had for some time ruled the Roman world jointly, the former in the west, the latter in the east. It now came to a struggle for the sole sovereignty. The two armies were encamped on the opposite shores of the gulf. Octavius had 80,000 infantry, 12,000 cavalry, and 260 ships of war; Antony, 100,000 infantry, 12,000 cavalry, and 220 ships. Antony's ships were large and well provided with engines for throwing missiles, but clumsy in their movements; Octavius's were smaller and more agile. Antony was supported by Cleopatra (q.v.), Queen of Egypt, with 60 vessels, who induced him, against the opinion of his most experienced generals, to risk a naval engagement. The battle continued for some hours undecided; at last Agrippa, who commanded Octavius's fleet, succeeded by a skillful manœuvre in compelling Antony to extend his line of battle, the compactness of which had hitherto resisted all attempts of the enemy to break through. Cleopatra, whose ships were stationed behind Antony's line, apprehensive that his line would be broken, took to flight with her auxiliary fleet, and Antony recklessly followed her with a few of his ships. The deserted fleet continued to resist bravely for some time, but was finally vanquished; the land army, after waiting in vain seven days for Antony's return, surrendered to Octavius. As a memorial of the victory that had given him the empire of the world, and out of gratitude to the gods, Octavius enlarged the temple of Apollo of Actium, dedicated there the trophies he had taken, and instituted games (Ludi Actiaci) to be celebrated there every five years. He also built on the spot where his army had been encamped the town of Nicopolis ('City of Victory'), near where Prevesa now stands. The battle of Actium is described in Greek by Plutarch (*Life of Antony*) and by Dion Cassius (book i). See ANTONIUS, MARCUS; AUGUSTUS; CLEOPATRA.

ACT OF FAITH. See AUTO-DA-FÉ.

ACT OF PARLIAMENT, pär'lĭ-mĕnt. A resolution or law passed by all the three branches of the English legislature, the King (or Queen), lords, and commons; or, as it is formally expressed, "by the King's Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in Parliament assembled, and by the authority of the same." An act of Parliament thus made is the highest legal authority acknowledged by the constitution. It binds every subject, and, with a few exceptions, every alien in the land, and even the sovereign himself, if named therein. And in England it cannot be altered, amended, dispensed with, suspended, or repealed but in the same forms and by the same authority of Parliament. In Scotland, however, a long course of contrary usage or of disuse may have the effect of depriving a statute of its obligation; for by the Scotch law a statute may become obsolete by disuse and cease to be legally binding. It was formerly held in England that the King might in many cases dispense with statutes, especially such as were of a penal character; but by the statute 1 W. and M., st. 2, c. 2, it is declared that the suspending or dispensing with laws by royal authority without consent of Parliament is illegal.

An act of Parliament is either public or private. A public act regards the whole Empire or one of its main subdivisions, in which case it is *general;* or a subordinate part, in which case it is *local;* but the operation of a private act is confined to particular persons and private concerns. As the law till lately stood, the courts of law were bound *ex officio* to take judicial notice, as it is called, of public acts, i.e., to recognize these acts as known and published law, without the necessity of their being specially pleaded and proved; but it was otherwise in regard to private acts, so that in order to claim any advantage under a private act it was necessary to plead it and set it forth particularly. But now, by the 13 and 14 Vict. c. 21, s. 7, every act of Parliament is to be taken to be a public one, and judicially noticed as such unless the contrary be expressly declared.

An act of Parliament begins to operate from the time when it receives the royal assent, unless some other time be fixed for the purpose by the act itself. The rule on this subject in Eng-

land was formerly different, for at common law every act of Parliament which had no provision to the contrary was considered as soon as it passed (i.e., received the royal assent) as having been in force retrospectively from the first day of the session of Parliament in which it passed, though in fact it might not have received the royal assent, or even been introduced into Parliament, until long after that day; and this strange principle was rigidly observed for centuries. The ancient acts of the Scotch Parliament were proclaimed in all the county towns, burghs, and even in the baron courts. This mode of promulgation was, however, gradually dropped as the use of printing became common, and in 1581 an act was passed declaring publication at the Market Cross of Edinburgh to be sufficient. British statutes require no formal promulgation, and in order to fix the time from which they shall become binding it was enacted by 33 Geo. III, c. 13, that every act of Parliament to be passed after April 8, 1793, shall commence from the date of the indorsement by the clerk of Parliament stating the day, month, and year when the act was passed and received the royal assent, unless the commencement shall in the act itself be otherwise provided for.

Acts of Parliament are referred to by the year of the sovereign's reign, and the chapter of the statutes for that year. They were first printed in the reign of Richard III, originally in Latin, but since the fourth year of Henry VII in English. The collective body of such acts constitute the Statutes of the Realm. See STATUTE; PARLIAMENT, and the authorities there referred to.

ACT OF SET'TLEMENT. The second chapter of statute 12 and 13 William III of Great Britain (1701), which provided that the crown, in default of issue to Anne Stuart, William's presumptive successor, should descend to the House of Hanover, and which excluded Roman Catholics from the throne. See ELIZABETH STUART (Queen of Bohemia).

ACT OF U'NIFOR'MITY. The English statute of 13 and 14 Car. II, c. 4 (1662) which provides that the Book of Common Prayer, as then recently revised, should be used in every parish church and other place of public worship in England, and that every school-master and person instructing youth should subscribe a declaration of conformity to the liturgy, and also to the effect of the oath and declaration mentioned in the act of 13 Car. II, st. 2, c. 1. It further enacted that no person should thenceforth be capable of holding any ecclesiastical promotion or dignity, or of consecrating or administering the sacrament, till he should be ordained priest according to Episcopal ordination, and with respect to all ministers who then enjoyed any ecclesiastical benefice it directed that they should, within a certain period, openly read morning and evening service according to the Book of Common Prayer, and declare before the congregation their unfeigned assent and consent to the use of all things therein contained, upon the pain of being deprived of their spiritual promotions. Two thousand of the clergy who refused to comply were deprived of their preferments. Acts to secure uniformity were passed under Edward VI (1549) and Elizabeth (1559). See PRAYER-BOOK, COMMON.

ACTON, ăk'ton. A residential suburb of London, England. During the civil wars it was one of the strongholds of Puritanism, and has been at various times the place of residence of many famous personages, such as King Henry III, the great jurist Sir Matthew Hale, the novelist Henry Fielding, and the actress Mrs. Barry. Pop., 1891, 24,200; 1901, 37,744; 1911, 57,523.

ACTON, JOHN EMERICH EDWARD DALBERG, first BARON (1834–1902). A distinguished historian and the foremost Roman Catholic layman of the nineteenth century in England. Acton was born in Naples—his father an English baronet, his mother a German heiress, his maternal grandfather a prominent French diplomat. He was educated under Dr. (afterward Cardinal) Wiseman at St. Mary's Oscott and, since Cambridge as yet refused degrees to Roman Catholics, at the University of Munich. Here Acton, escaping the deadening influence of English classicism, steeped himself in French, German, Italian, and Spanish literature and history; here also he formed a lifelong friendship with Dr. Döllinger, the distinguished leader of the liberal Catholic party in Germany. The first of these circumstances made Acton a great modern historian; the second caused him to become the head of the Liberal Catholic movement in England. Acton now traveled; visited America, France, and Russia; returned home; entered Parliament, and represented Carlow in the House of Commons for six years.

It was, however, as an editor and historian that Acton became distinguished. In 1858 he succeeded Newman as editor of *The Rambler*, a brilliant Catholic review. Written by laymen for laymen, the journal was both bold and critical. "I am sick of men who are afraid of a scandal," wrote Acton at one time, and *The Rambler* under his direction developed a fearlessness that was highly displeasing to many of the English Roman Catholic clergy. Acton was an enemy of ultramontanism, a foe to papal infallibility, an enthusiastic supporter of Döllinger and the Old Catholic movement in Europe; and in history he found his armory for the conflict. Book reviews and contributed articles poured forth from his pen, scientific, scholarly, truthful. In 1862 *The Rambler* was changed into *The Home and Foreign Review*, a quarterly. Two years later it was discontinued —the reason, a papal rescript aimed at Döllinger and the German Liberals. This pronunciamento of the Pope Acton could not approve. "If it is accepted by *The Home and Foreign*," he wrote, "the review loses its identity and the very breath of its nostrils." On the other hand, he would not oppose the edict of the Holy See. The journal, therefore, abruptly ended. Acton, like Erasmus, whom he resembled in many ways, preferred to work from within the church. He retained his independence, refused to bow the knee to Cardinal Manning, and in 1874, in a series of letters to *The London Times*, contended vigorously against papal infallibility.

As he grew older, he turned more and more toward the study of history. Here he was indefatigable, as upward of 500 book reviews, 50 special articles and essays, and numerous published lectures bear ample witness. From 1895 to his death he was regius professor of modern history at Cambridge and while there planned the well-known *Cambridge Modern History*. "Our scheme," he wrote in regard to this work, "requires that nothing shall reveal the country, the religion, or the party to which the writer belongs." And this advice to others was exemplified in the impartiality and fairness of

his own writings. Among them, published since his death, are *Lectures in Modern History* (1906); *The History of Freedom and other Essays* (1907); *Historical Essays and Studies* (1907); *Lectures on the French Revolution* (1910). A complete list of his writings may be found in a bibliography edited by W. A. Shaw for the Royal Historical Society (1903).

Consult *Letters of Lord Acton to Mary Gladstone* (1904); James Bryce, *Studies in Contemporary Biography* (1903).

ACTON, Sir JOHN FRANCIS EDWARD (1737–1811). Prime Minister of Naples under Ferdinand IV. He was born at Besançon, France, the son of an English physician. He served in the Tuscan navy, commanding a frigate in the expedition against Algiers in 1775. He showed such ability that he was invited to reorganize the Neapolitan navy, and soon became commander-in-chief of the sea and land forces, then minister of finance, and finally prime minister. His measures were intolerant, and ultimately caused a reaction against the royal family of Naples and in favor of the French party and the Carbonari. When the French entered Naples in 1806, he fled to Sicily, where he died.

ACTON, THOMAS COXON (1823–98). An American financier and administrator. He was born in New York City and served as assistant deputy county clerk (1850–53) and as deputy register. He was a police commissioner of the New York metropolitan police in 1860–69, and during the last seven years was president of the board. His most valuable service while in that office was during the draft riots in 1863, when for a week he personally commanded the entire police force of the city.

ACTORS' CHURCH ALLIANCE OF AMERICA. An organization founded in 1899 by Walter E. Bentley, a Protestant Episcopal clergyman who had been an actor. Its purpose is the establishment of closer relations between the church and the theatre. It provides chaplains of all denominations to minister to the needs of the dramatic profession, and agitates against Sunday performances and other evils of the stage. The Alliance is affiliated with the Actors' Church Union of England, an organization with similar purposes. The membership of the Alliance is about 5000. It has on its rolls about 1500 chaplains in over 400 cities.

ACTS, SPURIOUS OR APOCRYPHAL. See APOCRYPHA, *New Testament.*

ACTS OF HOSTIL'ITY. Acts which may involve nations in war. In international law the term is also applied to the acts of force, authorized by the laws of war, employed by one belligerant against another, during the continuance of war. Acts of hostility may be of a diplomatic, commercial, civil, or military character. The angry nature of the French Ambassador's (Count Benedetti, q.v.) interview with the King of Prussia at Ems in 1870 is an example of a hostile diplomatic act. The French embargo on British ships after the Peace of Amiens (q.v.) is an example of the commercial phase; the firing at an armed vessel of a friendly nation, or the invasion of territory, is a military example; and the detention of non-belligerents, citizens of a friendly nation, as in the case of France and England (1803), is an example of a civil act of hostility. See INTERNATIONAL LAW.

ACTS OF PI'LATE. See ACTA PILATI.

ACTS OF THE APOS'TLES (Gk. Πράξεις τῶν Ἀποστόλων, *Praxeis tōn Apostolōn*). The fifth book of the New Testament, the composition of which is ascribed by tradition and by the general consent of critics to the same author as that of the Third Gospel, to which book it forms a sequel. As the Gospel was written after the destruction of Jerusalem (70 A.D.), the date of Acts is still later, being not before 75 A.D., and possibly not after 95 A.D., though, if the author of the Gospel was acquainted with the *Antiquities* of Josephus (written 93–94 A.D.), the composition of Acts must be dated somewhat after 95 A.D. In view, however, of the rather doubtful argument for such acquaintance, a date for Acts in the neighborhood of 80 A.D. is not unlikely. Its place of composition is not possible to determine. Its purpose is apparent from the plan on which its material is selected and arranged, when compared with the declared purpose and evident plan of its antecedent book. (See LUKE, GOSPEL OF.) It is to place before Theophilus, who was either a convert from paganism, or, if yet a pagan, well on the way toward an acceptance of Christianity (see THEOPHILUS), the successful extension of the religion of Jesus from its old life in Judaism to its new life in Gentilism as providentially directed and so originally intended by its divine founder. Six stages in the Church's life and work are disclosed, each marked by a summarizing statement (vi. 7; ix. 31; xii. 24; xvi. 5; xix. 20; xxviii. 31). There may have been a secondary purpose, to show, by the favorable reception and treatment which this religion received from Roman officials, that there was no disposition on the part of the government to consider Christianity in a hostile light. Such a secondary purpose would be the more likely if Theophilus were yet himself a pagan and the book were composed in the early Flavian period, when Christianity was under imperial suspicion (see PERSECUTIONS OF THE CHRISTIANS), and would serve an additional purpose by placing in strong contrast the blind hostility of Judaism against the Church.

The abrupt ending of the narrative (xxviii. 30, 31) would seem to imply that it was in the author's mind to write a third book, describing Paul's release and subsequent labors until his death, or perhaps the fortunes of the other apostles.

The material of the book is derived partially from outside sources, both oral (e.g., the information derived from Philip, at Cæsarea) and written (e.g., the speech of Stephen), the presence of which is specially evident in the first twelve chapters, which treat of the experience of the early Church in Jerusalem and Judæa, and partially from personal notes of the missionary experiences of Paul and his companions (e.g., as given in the diary sections xvi. 10–17; xx. 5–15; xxi. 1–18; xxvii. 1–xxviii. 16). These notes were taken, as the critical facts in the case would seem to make clear, by the author himself, who thus becomes a companion of Paul. As to the identity of this companion there would seem to be no valid reason against the uniform tradition from Irenæus downward that he was Luke, mentioned in Paul's Epistles as standing in close relationship to the apostle. (See Col. iv. 14; 2 Tim. iv. 11; Philem. verse 24.) This is the opinion of Harnack in his recent work, *Luke the Physician*, Eng. trans. (London, 1907) and is coming to be more generally the judgment of modern

scholars. From the New Testament references it is apparent that Luke was a Gentile, though not a Roman citizen, of probable Macedonian origin and Antiochian residence and a physician by profession.

Two schools of criticism have attempted to disparage the credibility of Acts—the Tübingen School (1845), which held it to be a tendency writing, so manipulating the narrative in the interests of the union movement of the Church in the second century as to destroy all accuracy of facts, and the Documentary School (1890), which held it to be a complex composite writing, made up of such variant documents, of such varied origins, and of such differing degrees of reliability as hopelessly to obscure the actual facts of the history. Neither of these attempts has proved successful. Later there has been an effort among critics to subject it to the same process of literary criticism as has been so largely employed in the Old Testament. This presents it as a writing which not only gives us a history of the early times of which it tells, but in the way in which it gives that history so reflects the later times in which it was written as to give us a picture of its own age. By these critics it is held to be a composite writing of not earlier origin than the reign of Domitian (81–96 A.D.), compiled by a Gentile Christian, not Luke nor any companion of Paul, and, outside of the personal diary sections in the latter half of the book, which may have come from Luke, of no necessary historical accuracy.

Present criticism, however, is disposed to assign a higher historical value to the narrative of the book. The peculiar accuracy with which the author uses his political terms, especially in view of the frequent changes which took place in the political relations of the provinces to the Emperor and the senate, the preciseness of his knowledge of localities, his intimate acquaintance with the development of the early Church, both internal and external, and his apparent familiarity with the life and work of Peter and Paul, as disclosed in the undesigned agreement in his narrative with the Epistles—all these contribute to the conclusion that the author was writing in first-hand contact with the events which he records, and more than offset the difficulties which arise from the uncertainty of his reference to Theudas (v. 34–39) and from the confusion as to his statement of the terms of the decree of the Apostolic Council (xv. 28–29).

Professor Blass of Halle has suggested that it was written originally in two texts—a longer and a shorter one, the former being the earlier and represented in the text of the peculiar Codex Bezae (D), the shorter being the later and represented in the canonical text of the Testament. But the smoothness of the Bezan text of Acts would suggest that it represents a later (second century) revision of the original text by one who was intimately acquainted with the Asia Minor localities described.

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AC'TUA'RIAL SOCI'ETY OF AMER'ICA. An organization for the promotion of actuarial science. It was founded in 1889 and in 1912 had 140 fellows and 110 associates.

AC'TUARY (*Actuarius*, in ancient Rome, meant a clerk who recorded the *acta* (q.v.) of the senate and other public bodies, and also an accountant). In recent times, a term applied to officers of life insurance companies and cognate enterprises who supply the calculations as to the probable duration of life upon which insurance contracts, annuities, etc. are based. See INSURANCE; PROBABILITIES.

ACUNA DE FIGUEROA, FRANCISCO. See FIGUEROA, FRANCISCO ACUNA DE.

AC'UPRES'SURE (Lat. *acus*, needle + *pressura*, pressure). A mode of arresting hemorrhage from bleeding vessels, now obsolete. A

needle is passed through the tissues on either side of the vessel, so as to cross over and compress it, just as in putting a flower in the lapel of one's coat one crosses over and compresses the flower-stalk with a pin pushed twice through the lapel.

AC'UPUNC'TURE (Lat. *acus*, needle + *punctura*, a pricking). A very ancient remedy, practiced extensively in the east, for the relief of pain, swelling, or dropsy. Steel needles about 3 inches long, set in handles, are used. The surgeon passes one or more to the desired depth in the tissues, and leaves them there from a few minutes to an hour. The relief from pain afforded by this simple operation is sometimes astonishing, and the wounds are so minute as to be perfectly harmless if the needles are aseptic. The needles are sometimes used as conductors of the galvanic current for the destruction of moles, birthmarks, etc., and are sometimes made hollow to permit the injection of a small quantity of some sedative solution into the tissues, by which pain may be almost immediately relieved. See NEURALGIA.

ADA. A city and the county-seat of Pontotoc Co., Okla., about 75 miles (direct) southeast of Oklahoma City, on the St. Louis and San Francisco, the Missouri, Kansas, and Texas, and the Oklahoma Central railroads (Map: Oklahoma, E 4). It is the seat of the State normal school. Its principal industries include the manufacture of cement and asphalt, and cotton raising. Ada is situated in an agricultural and mineral region and produces a large amount of hardwood timber. The municipality owns its water works and has adopted the commission form of government. Pop., 1900, 3257; 1910, 4349; 1913 (est.), 6000.

ADA, ŏd'ŏ. A town of Bacs-Bodrog, a county of the Kingdom of Hungary, situated on the Theiss, about 30 miles south of Szegedin (Map: Hungary, G 4). The inhabitants are engaged chiefly in the cultivation of grain and in raising cattle. Pop., 1900, 12,112; 1910, 12,500.

ADAD. See HADAD.

ADAGIETTO, ä'dà-jĕt'tō. See ADAGIO.

ADAGIO, à-dä'jō (It. slowly, leisurely, from *ad agio*, at ease). In music, primarily a slow tempo intermediate between *largo* or *grave* and *andante*. The term is further applied to the slow movement (usually the second) of a musical composition, as, e.g., of a symphony, sonata, concerto, or overture. It serves as a contrast with the rapid and energetic preceding (*allegro*) and following (*scherzo*) movements of the work and affords scope for a flowing and expressive slow melody with a gracefully varied accompaniment, which breaks up the monotony of the adagio and heightens its effect. A clear and expressive execution of an adagio is an unfailing test of the artistic standing of a performer, as it demands a pure and beautiful tone and calls for variety of tonal color. The diminutive *adagietto* is no longer used as denoting a tempo slightly more animated than adagio, but as a generic title for a short adagio movement.

ADAIR, à-dâr', JAMES (1735–75). An Indian trader and author. He lived for almost 40 years among the southern Indians, chiefly among the Chickasaws, and in 1775 published a valuable work entitled *The History of the American Indians, Particularly Those Nations Adjoining the Mississippi, East and West Florida, Georgia, South and North Carolina, and Virginia.* Though impaired in value by the author's zealous advocacy of the Jewish origin of the Indian race, this book gives one of the best first-hand accounts ever written of the habits and character of the native tribes, besides containing an incomplete but valuable vocabulary of various Indian dialects. Adair's theory of the origin of the Indians was adopted and elaborated by Dr. Elias Boudinot in his *Star of the West, or An Attempt to Discover the Long-Lost Tribes of Israel* (1816).

ADAIR, JOHN (1759–1840). An American soldier. He was born in Chester Co., S. C., but removed to Kentucky in 1787. He served as major in General St. Clair's Indian expedition of 1791 and was defeated by "Little Turtle" in November. He was a member of the Kentucky Constitutional Convention (1792) and was a United States Senator from 1805 to 1806. He served as volunteer aid to General Shelby in the battle of the Thames (Oct. 5, 1813) and, as brigadier-general of militia, commanded the Kentucky troops at New Orleans in 1815. He was Governor of Kentucky (1820–24) and a member of Congress (1831–33).

ADAIR, ROBIN. See ROBIN ADAIR.

ADAL, à-däl'. A narrow tract of land in East Africa extending along the Red Sea from the Gulf of Tajura to Massawa. The larger part is included in the present Italian colony of Eritrea (q.v.), while the southern end, bordering on the Gulf of Tajura, is under the protectorate of France. Its inhabitants are the Danakil, a warlike people of dusky complexion, crisped hair, and professing Mohammedanism.

AD'ALBERT (?–1072). A German prelate. He was made Archbishop of Bremen in 1043 by Henry III, whom he accompanied to Rome, where he declined the proposed candidacy for the papacy when he might have been elected. Leo IX made him his legate in the North. During the minority of Henry IV Adalbert and Archbishop Hanno, of Cologne, usurped the administration of the Empire; but he became obnoxious to the princes, and they succeeded in separating him from the Emperor. He soon after regained his influence, however, and kept it as long as he lived. His dream was to unite Germany, England, and Scandinavia into a patriarchate independent of Rome.

ADALBERT (?–997), SAINT. A Bohemian prelate improperly styled "the apostle of the Prussians," whose original Bohemian name was Voitech ('comfort of the host'). He was educated at Magdeburg, and in 983 was chosen Bishop of Prague, but soon wearied of the perpetual strife with the essentially heathen Bohemians and retired to a monastery near Rome. He went back to Prague in 992, but again retired in discouragement and finally went as a missionary to the Poles and Prussians and was murdered by a heathen priest April 23, 997. He was first buried at Gnesen and then transferred to Prague and put in a vault, where his bones were discovered in 1880 and deposited in the cathedral. For his life, consult C. Heger (Königsberg, 1897), H. G. Voigt (Berlin, 1898).

ADALIA, à-dä'lē-à (ancient Attalia). The chief seaport of the Turkish vilayet of Konieh, situated on the southern coast of Asia Minor, in lat. 36° 52′ N., long. 30° 45′ E., about 200 miles southeast of Smyrna (Map: Turkey in Asia, D 4). The streets rise like the seats of a theatre up the slope of the hill and are studded with beautiful gardens of orange, fig, and mul-

berry trees. It has a considerable trade in timber, wheat, and other agricultural products. Modern steamers cannot enter the harbor, and for this reason its importance has been greatly lessened. Pop., about 30,000, including about 7000 Greeks.

AD'AM. The name given in the Book of Genesis to the first man. The word *Adam* is originally a common noun applied both to a single human being and to mankind in general; hence, as a designation for the first man the Old Testament almost invariably attaches the article to *adam*, which thus becomes *ha-adam;* that is, 'the man.' There are two accounts in Genesis of the creation of man—one in i. 20–30, and another in ii. 5–24. According to the former, male and female are created at the same time (i. 27). The passage is somewhat ambiguous, so that it is not certain whether only a single human pair is referred to or mankind in general, just as according to this version the animal world in general is created at the beginning. In the second version, however, a single male individual alone is formed by God, who molds a man out of the "dust of the ground" and breathes into the mass the "breath of life" (ii. 7). The word used for "ground" is *adamah*, and in the mind of the writer there is evidently a close connection between this word and *Adam*. A common meaning for the Hebrew root *adam*, from which *adamah* is derived, is 'red'; but while this furnishes a satisfactory explanation for the word "ground," it does not follow that the implied etymology for *adam* as man is correct. The root *adam* occurs in several Semitic languages and exhibits a variety of meanings, such as 'pleasant,' 'to make,' 'to attach one's self' (hence, 'to be sociable'), and scholarly opinion vacillates between assuming one or the other of these significations as furnishing the explanation of the name "Adam." If any conclusion may be drawn from *ben* or *ibn*, which is the common Semitic word for 'son' and 'child,' and which is derived from a root signifying 'build,' the weight of evidence would be in favor of connecting *adam* with 'to make.' In Assyrian we have a word *admu* (the equivalent of the Hebrew *Adam*), which actually occurs as one of the synonyms of 'child' (see Delitzsch, *Assyriches Wörterbuch*, p. 25). Of more importance, however, is the similarity of the name to that of the Babylonian hero Adapa. It is possible that the last sign *pa* also had the value *ma*, or that Adama was a Palestinian variant of Adapa. (See ADAPA.) The two stories of creation in Genesis differ in many respects (see CREATION), but it is by the combination of the two that we obtain the views held by the Hebrews regarding the first man. In the first version, where the work of creation is distributed among six days, humanity is created on the last day. Man is made in the image of God, and given dominion over all the animals and, indeed, the entire earth. In the second version it is stated that man was placed in a garden situated in Eden (Gen. ii. 8), known as the "Garden of Eden," in which all manner of trees were planted. (See EDEN.) Man is put there to till the ground and to keep guard over it. He is permitted to eat of the fruit of all the trees with the exception of one, known as the "tree of knowledge of good and evil," which he is not to touch under penalty of death. A woman is created as a helpmate to Adam out of one of his ribs. She is called Eve, a name subsequently explained as "the mother of all living." The close attachment between Adam and Eve (see EVE) is emphasized, and, although not distinctly stated, the narrative implies that she is included in the prohibition not to eat of the one tree singled out. Through the serpent, who assures the woman that she and Adam will not die, the woman is beguiled into eating of the fruit and gives of it to Adam. The first consequence of the act is that the pair recognize their naked state and make loin coverings of fig leaves. Adam pleads in extenuation that the woman gave him of the fruit, and the woman pleads that the serpent beguiled her. All three are punished, the serpent by becoming the cursed one among the animals, the woman by increase of her troubles and pain, particularly in childbearing, and the man by being obliged henceforth to secure his sustenance by the sweat of his brow in tilling the ground. God makes garments of skin for the pair, and in fear lest they eat also of the "tree of life" which is in the garden and whose fruit imparts immortality, he drives Adam and Eve out of their first habitation and places cherubim (q.v.) with flaming swords to guard the way to the tree of life.

In the continuation of the narrative (chap. iv, 1–2), the birth of two sons, Cain and Abel, is recounted; but beyond that we learn nothing further of Adam and Eve until we reach a passage inserted in chap. v from a work called *Sefer Toledoth Adam*, or 'The Book of the Generations (or History) of Mankind.' It contains a genealogical list in which, after a restatement of the creation of humanity and the assigning of the name Adam (Gen. v. 2) to *mankind in general*, the birth of Seth, in the 130th year of Adam's life, is recounted, no mention being made of Cain or Abel. Adam is said to have died at the age of 930 years, after having begotten sons and daughters. This genealogical list appears to be in reality a list of dynasties, drawn up on the basis of a tradition which belongs to the same category of semi-legendary lore as the lists preserved by Eusebius and Syncellus of early Babylonian rulers who lived before the Flood (see Rogers' *History of Babylonia and Assyria*, vol. i, p. 328), and one of Sumerian origin that has recently been discovered among the tablets from Nippur in the museum of the University of Pennsylvania by Dr. Arno Poebel. On the other hand, the story of Adam and Eve in the first three chapters of Genesis is a composite production embodying various popular tales or myths, some elements of which probably go back to Babylonia. Having passed through an independent development among the Hebrews, they have been interpreted in the light of the monotheistic conception of the universe and preserved as an effective means of explaining the toil and ills with which human existence is filled, by the manner of man's creation, his first disobedience, and his failure to attain immortality. It is this distinctly theological conception of Adam which becomes uppermost as the religious ideas of the Old Testament spread beyond the boundaries of Israel. The story of Adam becomes, with the growth of Christian theology, the most important source for the doctrine of the origin of sin, and over against him is put the second Adam—the first being the fountain of sin, the second the source of salvation. This conception is fully brought out in the teachings of Paul (see especially Rom. v. 12–21; 1 Cor. xv. 22 and 45–49). The perfection of Adam, the protoplast, in wisdom,

goodness, and power, is increasingly emphasized, but also the exceeding heinousness of his sin, involving all the race in its guilt and baneful consequences. Both find perhaps their fullest and most impressive expression in Milton's *Paradise Lost*. In Jewish theology the doctrinal development in general is arrested after the separation from Judaism of the new sect made up of the followers of Jesus. The predominant position henceforth occupied in Judaism by obedience to the Law brings about a concentration of Jewish thought on its various requirements. In place of doctrinal elaboration we have the homiletical interpretation of the narrative in Genesis, which leads to numerous additions in rabbinical literature to the biblical narrative of Adam and of the creation in general. These stories about Adam are collected in the so-called Midrash Rabba to Genesis, a German translation of which was published by Wünsche (*Der Midrasch Rabba zu Genesis*, 1882). (For further legends, telling of the repentance and death of Adam and Eve, see ADAM, BOOK OF.) From the Jews the stories made their way to the Arabs, and snatches of them are embodied in the Koran. Consult Sale's translation of the Koran and notes (London, 1877), especially to suras 15 and 17. The relations to Babylonian thought may be seen in Zimmern's edition of Schrader, *Die Keilinschriften und das Alte Testament* (1902); Jeremias, *Das Alte Testament im Lichte des alten Orients* (1906).

ADAM. In Shakespeare's *As You Like It* (q.v.), an old servant who follows the fortunes of Orlando. His age, he apologetically says, "is as a lusty winter, frosty but kindly" (Act II, Scene 3). The part is one which Shakespeare himself is traditionally said to have played.

ADAM. A family of important Bavarian battle and animal painters.—ALBRECHT (1786–1872), the ancestor of the family, was born at Nordlingen and studied at Nuremburg and Munich. From 1809 to 1812 he resided at Milan as court painter to Eugene Beauharnais, Viceroy of Italy. In this capacity he took part in many of the Napoleonic wars, of which he painted many well-known pictures. His representations of the Russian campaign, not only in paintings, but also in an interesting series of 100 lithographic plates (1827–33), are graphic and interesting. After the downfall of Napoleon he was active in the service of Kings Maximilian I and Ludwig I of Bavaria, William of Württemberg, and the Emperor of Austria. In 1848 he took part in the Italian campaign, on the staff of General Radetzky. He was an excellent soldier, sharing in all the hardships of the service. His battle pieces are painted with objectivity and with the fidelity of a historian, but the color is hard and lacks harmony. They are chiefly in the possession of royal and imperial families of Bavaria, Württemberg, Austria, etc., and in the public collections of Germany.—His eldest son, BENNO (1812–92), is known chiefly as a painter of animals, both wild and domestic, and especially by his hunting pieces. Like the rest of his family, he resided in Munich, the gallery of which is rich in his works.—His younger brother, FRANZ (1815–86), assisted his father in all his later works and is especially known by his pictures of the Franco-Prussian War of 1870. The galleries of Berlin, Munich, Frankfort, and other cities are rich in his works, which excel in color those of all other German battle painters of his day.—EUGEN (1817–80), the third son of Albrecht, likewise accompanied and assisted his father. His best independent works are the battles of the Italian campaign of 1859 and the Franco-Prussian War of 1870, in both of which he took part. He is also known as an illustrator.—EMIL (1843—), the eldest son of Benno Adam, was a pupil of his father and his uncle Franz, and is known especially as a painter of thoroughbred horses. His pictures are much prized by the titled sportsmen of England, France, Germany, and other countries. Consult the Autobiography of Albrecht Adam (Stuttgart, 1886), and for reproductions *Das Werk die Münchener Künstlerfamilie Adam*, with text by Holland (Nuremburg, 1890).

ADAM, ä'dăN', ADOLPHE CHARLES (1803–56). A French composer of operas. He was born and died in Paris. Though originally intended for a scientific career, he entered the conservatory in 1817 and studied composition under Boieldieu, mainly writing transcriptions for the piano. In 1829 his one-act opera, *Pierre et Catherine*, was produced with success, and 52 more followed, of which *Le châlet* and *Le postillon de Longjumeau* (1836) are the most famous. His chief merits are the characteristic French daintiness and finish. He was made professor of composition at the conservatory in 1849. His autobiography and souvenirs were published (Paris, 1860). Consult A. Pougin, *Adolphe Adam, sa vie, etc.* (Paris, 1876).

AD'AM, ALEXANDER. A Scotch classical scholar, born near Forres, in Morayshire. In 1757 he entered the University of Edinburgh. Later he held various posts as a teacher of the classics with great success. He published *Principles of Latin and English Grammar* (1772), *Roman Antiquities* (1791), *A Summary of Geography and History* (1794), and *A Compendious Dictionary of the Latin Tongue* (1805). His *Roman Antiquities* passed through many editions and was translated into German.

ADAM, BOOK OF. More or less extensive recensions of works dealing with Adam and Eve are extant. One of them is of Jewish origin, the other two are clearly Christian. Of the first, which was probably called *The Life of Adam and Eve*, we possess a Greek text published by Tischendorf in *Apocalypses Apocryphæ* (1866) under the misleading title "Apocalypses of Moses" because in the introduction the story is said to be recorded to Moses and later by Ceriani in his *Monumenta sacra et profana*, v (1868). An Armenian version of this work has been made known in an English translation by Conybeare in *Jewish Quarterly Review* (1895), and an Old Slavonic version has been published with a Latin translation by Jagič in *Denkschriften der Wiener Akademie der Wissenschaften* (1893). We also have a Latin *Vita Adæ et Evæ*, of which the best text is that published by Meyer in *Abhandlungen der Bayrischen Akademie der Wissenschaften* (1878). This work tells the story of the creation of Adam and Eve, their fall, penitence, restoration to divine favor, death, and burial. It seems to have been written originally in Hebrew or Aramaic and may come from the first century B.C. The original form is difficult to recover, and the present texts have here and there suffered in transmission, but there are very few Christian interpolations.

The Conflict of Adam and Eve is a Christian

work. It has been preserved in an Ethiopic version made from the Arabic. The Ethiopic text has been published by Trumpp in *Abhandlungen der Münchener Akademie der Wissenschaften* (1881). Translations were published by Dillmann, *Das Christliche Adamsbuch des Orients* (1853); Migne in *Dictionnaire des apocryphes* (1856); Malan, *Book of Adam and Eve* (1882). Of the Arabic text there is a manuscript at Munich. An earlier form of this work is *The Treasure Cave*, published by Sachau first in German, *Die Schatzhöhle* (1883), then in Syriac, 1888. The Arabic text was published by Mrs. Gibson in *Studia Sinaitica* (1901). Another Christian work is *The Testament of Adam* in Syriac, published with a French translation by Renan in *Journal Asiatique* (1853). Of this book Bezold published Arabic and Ethiopic versions in *Orientalische Studien Nöldeke gewidmet*, ii (1906, pp. 893 ff.). Renan proved that the original was written in Greek. See Fuchs, in Hennecke, *Neutestamentliche Apokryphen* (1904); Ginzburg in *Jewish Encyclopædia*, art. "Adam, Book of"; Schürer, *Geschichte des jüdischen Volkes* (1901, pp. 396 ff.).

ADAM, Sir Frederick (1781–1853). An English general. He was educated at Woolwich Military Academy and greatly distinguished himself in the Peninsular campaign. Although severely wounded at the battle of Alicante, he reentered the service upon his recovery. He repelled the last charge of the French guards at Waterloo.

ADAM, Graeme Mercer (1839—). A Canadian author and editor. He was born at Loanhead, Midlothian, Scotland. After some experience with the Blackwoods, he emigrated to Toronto, where he became a partner in a successful publishing house. In 1876 he opened, in conjunction with John Lovell of Montreal, a branch house in New York. Returning to Toronto in 1878, he subsequently edited the *Canadian Bookseller;* founded, in conjunction with Goldwin Smith, the *Canadian Monthly* (1872); started the *Canadian Educational Monthly* (1879); and was for several years connected with the *Bystander* as assistant to Goldwin Smith, and contributed extensively to other periodicals. Coming again to New York (1892), he became identified with several publishing houses as "reader," wrote reviews, and compiled several books. In 1896 he removed to Chicago to become editor of *Self-Culture.* Among Adam's numerous separate publications are *The Canadian North-West* (1895); *Outline History of Canadian Literature* (1886); topographical and descriptive books of Canada, encyclopædias, and school books. In collaboration with Ethelwyn Wetherald, he wrote a successful historical romance entitled *An Algonquin Maiden* (1886). See MacMurchy's *Handbook of Canadian Literature* (1906); and Burpee, "Recent Canadian Fiction" in the *Forum,* August, 1899.

ADAM, James (1860–1907). A Scotch classical scholar and educator, born in Aberdeenshire and educated at the University of Aberdeen and at Caius College, Cambridge. In 1885 and after, while classical lecturer at Emmanuel and Girton colleges, Cambridge, he was engaged in preparing an edition of Plato's *Apology* (published in 1887). Made classical tutor in Emmanuel College in 1890, Adam began work on his most important undertaking, an edition of Plato's *Republic.* In the same year that this was published (1902), the author was chosen to deliver the Gifford Lectures at Aberdeen University. His subject, "The Religious Teachers of Greece," remained as the title of the lectures in book form, printed after his death. In 1903 he received the degree of Litt.D. from Cambridge University, where he was one of the most popular of lecturers during his service at Emmanuel College.

ADAM, Jean (1710–65). A Scotch poet. She was born near Greenock. In her earlier life she was a teacher, but, compelled to give up her school, she became a street vendor. She lived a joyless life and died in the Glasgow poorhouse. She published a volume of religious poems in 1734. By some she is believed to be the author of *There's nae Luck aboot the House,* a beautiful lyric. (See Mickle, William Julius.) Consult *Ward's English Poets* (London, 1880).

ADAM, à'dän', Juliette (1836—). A Parisian writer making use of the pseudonyms Juliette Lamber and Comte Paul Vasili. She was born at Verberie, Oct. 4, 1836. One of her first books, *Le siège de Paris, journal d'une Parisienne* (1873), is an account of her experiences in 1870–71, when her husband was prefect of police. Her *Nouvelle Revue,* founded in 1879, and her salon have both been politically influential. She has written much for periodicals on politics, literature, education, and the position of women, as to which she agrees with George Sand and Madame d'Agoult. Her fiction, e.g., *Laide* (1876), *Grecque* (1877), *Païenne* (1883), is militantly hedonistic, a passionate protest against the antinatural, or supernatural, in Christianity. She published volumes of reminiscences, as *Le roman de mon enfance et de ma jeunesse* (1902) and *Mes premières armes littéraires et politiques* (1904); also: *Mes sentiments et nos idées* (1905); *Mes illusions et nos souffrances durant le siège de Paris* (1906); *Mes angoisses et nos luttes* (1907); *Nos amitiés politiques avant l'abandon de la revanche* (1908); *Après l'abandon de la revanche* (1910); *Impressions françaises en Russie* (1912).

ADAM, ad'am, Lambert Sigisbert (1700–59). The principal representative of a well-known family of French sculptors. He was born at Nancy, studied there with his father, a mediocre sculptor, and under unknown masters at Paris, and won the *Prix de Rome* in 1723. At Rome he received commissions from Cardinal de Polignac, whose antiques he restored, and from Pope Clement XII. He modeled his work after Bernini. In 1733 he returned to Paris. His works include the colossal figures of the Seine and the Marne upon the cascade of St. Cloud; two marble groups, "La Chasse" and "La Pêche" at Potsdam (Prussia); and the colossal fountain of Neptune at Versailles (1740), his masterpiece. In this work he was assisted by his brother, Nicholas Sébastien (1705–78), a pupil of his father and himself, whom he joined in Rome. His works are in Paris and at Nancy, the best being the tomb of Queen Catherine Opalinska in the latter city. Frederick the Great summoned him to Berlin as court sculptor, at the princely salary of 4000 livres, but, through the mistake of the Prussian servitor, he obtained instead the youngest and least important of the brothers, François Gaston (1710–61). During an activity of 13 years the latter adorned the gardens of Potsdam and Sans Souci with numerous sculptures. Consult Thirion, *Les Adams et Clodion* (1885); Lady Dilke,

French Architects and Sculptors of the Nineteenth Century (London, 1900).

ADAM, à'dăN', PAUL (1862–1920). A French author born in Paris. He participated in the Boulangist movement (1889); and was an unsuccessful candidate for a seat in the Chamber of Deputies. His earliest appearance in literature was made with *Chair molle* (1885), which shows the influence of the realist Zola. Five years later, however, the author signed the *Manifeste des cinq*, which favored a return to the idealistic novel; and thereupon began historical investigations and a study of contemporary French society. His novels dealing with present-day life are collected under the title *L'époque*, while those having an earlier time as background the author has grouped as *Le temps et la vie: histoire d'un idéal à travers les siècles*. His stories, chiefly in the manner of the symbolist school, include: *Robes rouges* (1891); *Le mystère des foules* (2 vols., 1895), and *La Bataille d'Uhde* (1897). He also published a cycle of four romances dealing with the period from 1792 to 1830: *La force* (1898; new ed., 1910); *L'enfant d'Austerlitz* (1902), *La ruse* (1903); *Au soleil de juillet* (1903). With J. Moréas he wrote *Le thé chez Miranda* (1887). He wrote the dramas *L'Automne* (1893, with G. Mowrey), and *Le cuivre* (1896). The tenth edition of *La ville inconnue* was printed in 1911. His problem novel *Stéphanie* (1913) upholds the "arranged" marriage.

ADAM, QUIBIN FRANÇOIS LUCIEN (1833–1900). A French magistrate and philologist. He was born at Nancy. Among his numerous works on philology, some of which deal with the languages of the native tribes of America and the dialects of Lorraine, the following are the most important: *Grammaire de la langue mandchoue* (1873); *Esquisse d'une grammaire comparée du Crée et du Chippéway* (2d ed., 1876); *Etudes sur six langues américaines* (1878); *Les patois lorrains* (1881); *Les idiomes négro-aryens et maléo-aryens* (1883). His *Langue mosquito*, a work on a language little studied at that time, won the Loubat prize in 1891.

ADAM, ROBERT. See FURNITURE.

AD'AM, TESTAMENT OF. See APOCRYPHA, *Old Testament*.

ADAM, WILLIAM (1751–1839). A British lawyer. He was born in Scotland and in 1774 entered Parliament, where he attached himself to the party of Lord North. Four years afterward he fought a duel with Fox (1778), in which Fox was wounded. He took an important part, however, in effecting the coalition between Fox and North and Shelburne and was one of the few to maintain his allegiance to his former adversary at the time of the French Revolution. He was one of the managers appointed by the Commons to conduct the impeachment of Warren Hastings (1788). He presided over the Civil Jury Court in Scotland from the time of its establishment (1816) until his death. Consult his *Life*, by G. L. Craik, in the *Dictionary of the Society for the Diffusion of Useful Knowledge*.

AD'AMANT (Gk. *á, a*, priv. + *δαμᾶν, daman*, to tame). The name of any substance of extraordinary hardness. The name was applied to a supposed stone or mineral, the properties of which were long unknown. It was confounded by early writers with the lodestone or magnet. This confusion ceased with the seventeenth century, but the word for a long time had currency among scientific writers as a synonym for diamond. The use of the term to denote the lodestone seems to have been due to the early Latin medical writers, who erroneously derived the word from the Latin *adamare*, 'to have an attraction for.'

AD'AMAN'TINE SPAR. See CORUNDUM.

ADAMAWA, ä'dà-mä'wà, or FUMBINA. A former native African state, mainly in what is now German Kamerun. It extended from about 9° to 4° N. lat. The name is generally applied to the region which lies between the Upper Benue and Logone rivers (Map: Africa, F 4). The country is elevated in its southern part, where some of the mountains reach an altitude of about 8000 feet. Its soil is very fertile, and climate, flora, and fauna are tropical. Politically, Adamawa is more or less autonomous and is ruled by a native sultan. The principal settlements are Yola, with a population estimated at from 12,000 to 20,000; Banjo, the centre of the ivory trade; and Nganudere. Cereals, vegetables, and cotton are grown, and there is considerable trade in ivory and rubber. Silk, sulphur, salt, and cloth are imported. The population is estimated to be over three million. The predominant part consists of Fulbe. (See FULAHS.) The first European to visit Adamawa was Dr. Barth in 1851. Consult Passarge, *Adamaua* (Berlin, 1895).

AD'AM BEDE. The title of a novel by George Eliot (see ELIOT, GEORGE), first published in 1859. The name is that of its principal character, a young English workingman of intellectual tastes and a keen conscience. He is the lover of Hetty Sorrel, but in the end marries Dinah Morris.

AD'AM CU'PID. A name applied to Cupid in Shakespeare's *Romeo and Juliet*, Act II, Scene 1. According to Upton there was an archer named Adam, whose skill was famous in Shakespeare's time, so that the significance of the epithet is evident. Upton cites in confirmation, *Much Ado About Nothing*, Act I, Scene 1: "And he that hits me let him be clapped on the shoulder and called Adam." Other critics maintain that the original was "Abram," a corruption from *Auburn*, since the early folios and quartos give "Abraham" in the passage.

ADAM DE LA HALLE, à'dăN' de là àl' (c.1240–87). One of the early founders of the French drama. His *Play of Adam*, or *Le jeu de la feuille*, as it was also called, written for citizens of his native Arras for popular performance, is the earliest French comedy. Adam de la Halle was also a musician, and his *Robin et Marion* is the first European comic opera. His musical compositions, chiefly songs and motets, form a connecting link between the work of the French *déchanteurs* and the Flemish contrapuntists. His works are edited by Coussemaker (Paris, 1872). Consult: Ambros, *Geschichte der Musik*, vol. ii (Leipzig, 1892); H. Guy, *Essay sur la vie et les œuvres littéraires de Adam de la Halle* (Paris, 1898); E. Langlois, *Le jeu de Robin et de Marion* (Paris, 1896); F. Helfenbein, *Die Sprache des Trouvère Adam de la Halle aus Arras* (Strassburg, 1911).

ADAMI, ä-dä'me, FRIEDRICH WILHELM (1816–93). A German author, critic, and publicist. He was born at Suhl, studied medicine, then philosophy and history, in Berlin. He was a regular contributor to the *Kreuzzeitung*, translated, recast, and reviewed plays. Among his best original works are *Ein ehrlicher Mann* (1850) and *Der Doppelgänger* (1870). Among

the collections of his historical tales are *Fürsten- und Volksbilder aus der vaterländischen Geschichte* (1863) and *Aus den Tagen zweier Könige* (2 vols., 1866). His works are marked by a clear style and a thoroughly patriotic tone.

AD'AMI, JOHN GEORGE (1862—). An English pathologist. He was born at Manchester; was educated at Owens College, Manchester, and Christ's College, Cambridge, and studied also at Breslau and Paris. He became house physician to the Manchester Royal Infirmary, and demonstrator of pathology at Cambridge in 1887. In 1891 he was elected fellow of Jesus College, Cambridge, and in 1892 professor of pathology and bacteriology at McGill University in Montreal, Canada. He was also chosen advisory pathologist to the Montreal General and Royal Victoria hospitals, and in 1896 became Middleton Goldsmith lecturer to the New York Pathological Society. He was president of the Association of American Physicians in 1911–12. He published numerous papers on pathological topics, and articles on inflammation for Allbutt's *System of Medicine*. In addition, he wrote the following books: *The Principles of Pathology* (1908); *Inflammation: An Introduction to the Study of Pathology* (1910).

AD'AMITES. 1. An obscure and probably non-existent sect mentioned by Epiphanius (*Hær.* 52) as extant in the middle of the fourth century, and so called because they imitated Adamic simplicity in going without clothing while at worship. They are said to have practiced absolute continence. 2. A sect of fanatics founded by a certain Picard, which became numerous in Bohemia and Moravia in the fifteenth and sixteenth centuries, but had no connection with the Hussites. Picard styled himself Adam, the son of God, rejected the sacrament of the supper and the priesthood, and was charged with advocating the community of women. After his death his followers increased in Bohemia under several leaders. They even fortified themselves on an island in a tributary of the Moldau and committed various depredations. They were detested as much by the followers of Huss as by the Catholics. Ziska made war against them and slew great numbers, but they were never entirely rooted out. In fact, it is said that in 1849 a similar sect appeared in Austria.

AD'AMNAN, SAINT (625–704). An Irish abbot, properly Adam, of which Adamnan is a diminutive. He was born at Drumhome, southwest Donegal, the extreme northwest county, about the year 625, but entered the monastery of Iona. His father, Ronan, was the great-great-grandson of the uncle of St. Columba and also claimed kin with many Irish kings. The paternal grandfather was Tinne, from whom came the patronymic *Ua Tinne*, or 'grandson of Tinne,' an appellative which is occasionally found coupled with Adamnan's name. Ronnat, the mother of Adamnan, was descended from Enna, son of Niall, whose race, the Cincl Enna, possessed themselves of the tract lying between the channels of the Foyle and Swilly, which was called the Tir Enna, or 'Land of Enna,' and answers to the modern barony of Raphoe. In the year 697 he was elected abbot of Iona. His rule over that community was not, however, destined to be peaceful and fortunate. The Irish church then held the Oriental views about dates for observing Easter and the form of the tonsure. In his intercourse with the Saxon church, Adamnan had adopted the Roman or orthodox views, as they are termed, and endeavored to put them in practice in his own community. He was thwarted in this object, and it is said that mortification at the failure caused his death. He died in Iona, Sept. 23, 704. He left behind him an account of the Holy Land, containing matters which he says were communicated by Arculfus, a French ecclesiastic who had lived in Jerusalem, which is valuable as the earliest information we possess of Palestine in the early ages of Christianity. But far more valuable is his *Vita Sancti Columbæ*, his life of St. Columba, the converter of the Picts and founder of Iona. Along with miracles and many other stories palpably incredible, this book reveals a great deal of distinct and minute matter concerning the remarkable body to which both the author and his hero belonged. The standard edition of the book is that of William Reeves, D.D., edited in 1857 for the Bannatyne Society of Edinburgh, and the Irish Archæological Society (Dublin, 1857), which, with an English translation, forms the sixth volume of *Historians of Scotland* (Edinburgh, 1874), reissued with additional notes by J. T. Fowler (Oxford, 1894). Nearly all the information to be had about the early Scoto-Irish church is comprised in that volume.

AD'AM OF BREM'EN. A German historian. He was born, probably, at Meissen, Saxony (the date uncertain), and came to Bremen in 1067 from Magdeburg and became a canon of the cathedral and in 1068 principal of the cathedral school. He won perpetual fame by writing (between 1072 and 1076) from all available sources, including the oral testimony of Svend Estridson, King of Denmark, to see whom he made a special journey, a history of the Hamburg Church, which is one of the most precious of mediæval histories. The best edition of this great work, *Gesta Hammaburgensis Ecclesiæ Pontificum*, is by Lappenberg (Hanover, 1876). The third edition of the German translation, by J. C. M. Laurent, appeared in the series *Die Geschichtschreiber der Deutschen Vorzeit* (Berlin, 1893). As the appendix to the third and last book Adam gives a general account of the lands belonging to the Danes and Swedes and of Norway. In it occurs this interesting passage referring to America: "Besides this he [Svend Estridson, King of Denmark] told of still another island that had been found by many in that ocean [the Atlantic]. It is called Wineland, because vines spring up there spontaneously, producing excellent wine. I mention this confidently, for I have learned from no fabulous rumor, but through definite information from Danes, that crops also grow there in abundance without having been sown." (Cap. 247, or § 38.) In his book Adam quotes from preceding chroniclers, from Cicero, from the Latin poets, Vergil, Horace, Lucan, Juvenal, and Persius; from the Latin Fathers, Jerome, Ambrose, Gregory the Great; from Bede, Cassiodorus, and Paulus Diaconus. But the style is defective and the Latin difficult and faulty, notwithstanding that he took Sallust as his master. Although the day of his death, October 12, is known from the church record of Bremen, the year is not, but probably it was about 1076.

ADAM OF ST. VIC'TOR (?–c.1192). A monastic poet of France. Nothing is known of him except that he died in the abbey of St. Victor in Paris. Yet he was "the most prominent and prolific of the Latin hymnists of the Middle

Ages." His works—complete as far as discovered, but doubtless far from being really so—were edited by Léon Gautier (3d ed., Paris, 1894; Eng. trans., London, 1881, 3 vols.). Consult: Julian, *Dictionary of Hymnology* (1888), French, *Sacred Latin Poetry* (1874), and Duffield, *Latin Hymns* (1888).

AD'AMS. A town, including the villages of Renfrew, Maple Grove, and Zylonite, in Berkshire Co., Mass., 16 miles north of Pittsfield, on the Pittsfield and North Adams branch of the Boston and Albany Railroad and on the Hoosac River (Map: Massachusetts, A 2). Within the town limits is Greylock Mountain (3535 feet), the highest point in Massachusetts. The town has a public library, a statue of McKinley, a Quaker meeting-house, and churches of almost every denomination. Cotton and woolen goods, paper, foundry, and lime products are manufactured. Laid out and settled as "East Hoosuck" in 1749, Adams was incorporated under its present name (in honor of Samuel Adams) in 1778. It originally included both North and South Adams. The government is administered by town meeting. Pop., 1890, 9213; 1900, 11,134; 1910, 13,026; 1913 (est.), 13,500; 1920, 12,967. Consult J. G. Holland, *History of Western Massachusetts* (Springfield, 1855).

ADAMS, Abigail Smith (1744–1818). The wife of John Adams, second President of the United States, and daughter of Rev. William Smith, minister of the Congregational Church at Weymouth, Mass. She was born at Weymouth, Mass., and died at Quincy, Mass. Through her mother, Elizabeth Quincy, she was descended from the Puritan preacher, Thomas Shepard of Cambridge, and though of defective education, delicate health, and nervous temperament, she was among the most influential women of her day, and one of its most vigorous of stylists, owing little to teaching but much to influence and environment. There are in her writings both originality and a remarkable idiomatic unconventionality, especially rare in the authors of her time. During and after the Revolutionary War she was at times separated from her husband, who was a delegate to Congress and who was afterward engaged in diplomatic business in Europe. Joining him in France in 1784, she accompanied him to London, where she had unpleasant social experiences. From 1789 to 1801 she lived at Washington, naturally enough, and then till her death at Braintree, in what is now Quincy. *The Familiar Letters of John Adams and his Wife*, published with a memoir by C. F. Adams (1876), show her to have been a woman of keenness, sagacity, and geniality and they throw very valuable light on the history and social life of her time.

ADAMS, Alvin (1804–77). The founder of Adams Express Company of America. He was born at Andover, Vt., and in 1840 established between New York and Boston an express route which, subsequently extended, led in 1854 to the incorporation of the Adams Express Company. Consult Stimson, *History of the Express Business* (New York, 1881).

ADAMS, Andy (1859—). An American author, born in Whitley Co., Ind., and educated in the public schools. After an early youth spent on a farm in Indiana, he removed to Texas, where for ten years he lived the life of a cowboy. During the excitement following the discovery of gold in Cripple Creek, Colo., he went to that State and engaged in mining. Shortly afterward he began to write. His first book, *The Log of a Cowboy* (1903, 1912), showed a thorough knowledge of the conditions which he described and a considerable gift of vivid and graphic description. It was followed by *A Texas Matchmaker* (1904); *The Outlet* (1905); *Cattle Brands* (1906); *Reed Anthony, Cowman* (1907); *Wells Brothers* (1911).

ADAMS, Brooks (1848—). An American lawyer and social essayist. He was born at Quincy, Mass., a son of Charles Francis Adams (q.v.). He was educated in Quincy, in Washington, and in Europe, according to the changes of his father's residence. He graduated at Harvard in 1870, was admitted to the bar, and practiced law till 1881. His writings include many magazine articles and the following books: *The Gold Standard; The Emancipation of Massachusetts* (1887), a study in the evolution of religious freedom; an historical essay, *The Law of Civilization and Decay*, and *America's Economic Supremacy* (1900); *The New Empire* (1902); *Railways as Public Agents* (1910); *Charles Francis Adams, an American Statesman* (1912); *The Theory of Social Revolutions* (1913); *Economics and Public Affairs* (1913).

ADAMS, Charles Baker (1814–53). An American naturalist. He was born at Dorchester, Mass. He graduated at Amherst; assisted Prof. Edward Hitchcock in geological field-work; became tutor at Amherst, 1836; professor of chemistry and natural history in Middlebury College, Vt., 1838 to 1847, and was professor of astronomy and zoölogy at Amherst from 1847 till his death. From 1845 to 1847 he was State geologist of Vermont. He went several times to the West Indies in the interest of science; wrote on conchology, and with the assistance of Prof. Alonzo Gray, of Brooklyn, published an elementary work on geology.

ADAMS, Charles Darwin (1856—). An American philologist and educator. He was born in Keene, N. H., and in 1877 graduated from Dartmouth College. After post-graduate studies at that institution he studied at the Andover Theological Seminary from 1879 to 1881. In the latter year he was appointed instructor in Greek at Cushing Academy. After remaining here until 1884, he became professor of Greek at Drury College. In 1893 he was appointed to the chair of Greek language and literature at Dartmouth College. In 1891 he studied at the University of Kiel, where he received the degree of Ph.D. In 1908 he became editor of *The Classical Journal*, and in 1906 and 1907 was president of the Classical Association of New England. He edited *Lysias, Selected Speeches* (1906).

ADAMS, Charles Follen (1842—). A humorous dialect poet. He was born at Dorchester, Mass., and was educated in the common schools. He served in the Civil War and was wounded and captured at Gettysburg. In 1872 he began poetic production, cultivating the ballad in German dialect. His verses are collected under the titles *Leedle Yawcob Strauss and Other Poems* (1878) and *Dialect Ballads* (1887). His complete poems were collected and published together in 1910.

ADAMS, Charles Francis (1807–86). An American diplomat and statesman, the son of President J. Q. Adams. He was born in Boston; spent the years 1809 to 1817 with his father in Europe, chiefly in Russia and England; prepared for college at the Boston Latin

School, and graduated at Harvard in 1825. He then spent several years in Washington and later studied law in the office of Daniel Webster (at Boston) from November, 1828, to January, 1829, when he was admitted to the bar, though he never practiced. During the next ten years he devoted himself chiefly to literary pursuits, contributing many papers to magazines, writing an able political pamphlet entitled *An Appeal from the New to the Old Whigs* (1835), and editing the *Letters of Abigail and John Adams* (1840–41). From 1841 to 1846 he was a member of the State Legislature, serving three years in the House and two in the Senate; and from 1846 to 1848 he was editor of the *Boston Whig*, and as such was the leader of that wing of his party called the "Conscience Whigs." In 1848 he presided over the Free Soil Convention at Buffalo, and was unanimously nominated for vice-president, but after the election retired to Quincy, Mass., and spent several years in editing the *Works of John Adams* (10 vols., 1850–56). In 1858 he was elected to Congress as a Republican and served with marked ability until May, 1861, when he was sent as United States Minister to England. Here he remained for seven years and during the Civil War rendered invaluable services to his government. In face of the pronounced sympathy for the South manifested by the aristocracy and the upper social classes generally and of the favoritism at times of the British government itself, he preserved throughout a dignified demeanor and performed his duties with such ability as to earn for himself a place second only to that of Franklin in the history of American diplomacy. Indeed, many years later Lowell said: "None of our generals in the field, not Grant himself, did us better or more trying service than he in his forlorn outpost in London." He returned to America in 1868 and was elected to the presidency of Harvard in the following year, but declined to serve. In 1872 he barely failed of a nomination to the presidency at the hands of the Liberal Republicans. He was the arbitrator for the United States at Geneva in 1871 and 1872 (see ALABAMA CLAIMS) and to him is due in great part the credit for the successful settlement of all difficulties with England growing out of the controversy of the Civil War. On his return he was engaged for several years in editing the *Memoirs of John Quincy Adams* (12 vols., 1874–77). Both in politics and diplomacy Mr. Adams was austere, dignified, eminently sincere, and independent to a fault. As an authoritative biography consult C. F. Adams, Jr., *Life of Charles Francis Adams* (Boston, 1900), in the American Statesmen Series.

ADAMS, CHARLES FRANCIS (1835–1915). An American soldier, publicist, and historian. He is a son of Charles Francis Adams and was born in Boston, Mass., May 27, 1835. He graduated at Harvard in 1856, studied law in the office of Richard Henry Dana, Jr., and was admitted to the bar in 1858. He entered the Union Army as first lieutenant in a Massachusetts cavalry regiment in 1861, became a captain in 1862, served as chief of squadron at Gettysburg, and at the close of the war was in command, as colonel, of a regiment of colored cavalry. In March, 1865, he was brevetted brigadier-general of volunteers, and in August retired from active service. From 1884 to 1890 he was president of the Union Pacific Railroad Company. From 1893 to 1895 he was chairman of the Massachusetts Park Commission and as such took a prominent part in planning the present park system of the State. After the year 1874, he devoted much of his time to the study of American history and in recognition of his work in this field was chosen president of the Massachusetts Historical Society in 1895 and of the American Historical Association in 1901. In 1913 he lectured at Oxford University on American History. His writings and addresses both on problems of railway management and on historical subjects are marked by a singular clarity of statement and a degree of intellectual independence that has frequently given rise to widespread controversy. His works include: *Railroads, Their Origin and Problems* (New York, 1878); *Notes on Railway Accidents* (New York, 1879); *Richard Henry Dana: A Biography* (Boston, 1891); *Three Episodes of Massachusetts History* (Boston, 1892), a work which gives an account of the settlement of Boston Bay, of the Antinomian controversy, and of church and town government in early Massachusetts; *Massachusetts: Its Historians and Its History* (Boston, 1893); an excellent *Life of Charles Francis Adams* (Boston, 1900), in the American Statesmen Series, and *Lee at Appomattox, and Other Papers* (New York, 1902). With his brother, Henry Adams, he wrote *Chapters of Erie, and Other Essays* (Boston, 1871).

ADAMS, CHARLES KENDALL, LL.D., J.U.D. (1835–1902). An American educator and historian, born in Derby, Vt. He graduated at the University of Michigan in 1861, where he was assistant professor of Latin and history from 1863 to 1867 and full professor of history from 1867 to 1885. Having studied abroad in 1867 and 1868, he established (1869–70) an historical seminary which proved of great value in promoting the study of history and political science. In 1881 he was made non-resident professor of history and Latin at Cornell and in 1885 succeeded Andrew D. White as president of that university. From 1892 until 1902 he was president of the University of Wisconsin. In 1890 he was president of the American Historical Association. From 1892 to 1895 he was editor-in-chief of Johnson's *Universal Cyclopædia* (now the *Universal Cyclopædia*). Among his publications are *Democracy and Monarchy in France* (1872); *British Orations* (1884); *Higher Education in Germany*, a *Manual of Historical Literature* (1889); *Christopher Columbus, his Life and Work* (1892); a *History of the United States*, with W. P. Trent (rev. ed., 1913).

ADAMS, CHARLES R. (1848–1900). An American dramatic tenor. He was born at Charlestown, Mass. He studied in Vienna and sang for three years at the Royal Opera, Berlin, and for nine years at the Imperial Opera, Vienna. His reputation, especially as a Wagnerian singer, was earned chiefly abroad. In 1879 he took up his residence in Boston, where he was highly esteemed as a teacher.

ADAMS, EDWIN (1834–77). An American actor. He was born in Massachusetts and first appeared at the Boston National Theatre, Aug. 29, 1853, as Stephen in *The Hunchback*. He played Hamlet with Kate Bateman and J. W. Wallack at the New York Winter Garden in 1860 and then starred in all the principal cities; reappeared in New York in 1866, as Robert Landry in *The Dead Heart;* was in the company when Booth's Theatre opened, Feb. 3, 1867, and played Mercutio, Iago, and Enoch Arden in that

house. It was in the latter character that he attracted the most attention.

ADAMS, Ephraim Douglass (1865—). An American educator, born in Decorah, Iowa, and graduated from the University of Michigan in 1887. He took a post-graduate course also at his alma mater, receiving the degree of Ph.D. in 1890. In the same year he was appointed special agent in charge of street railways for the eleventh census. His earlier work as teacher was done at the University of Kansas, where he became assistant professor (1891) and associate professor (1894) of history and sociology and in 1899 professor of European history. He was made associate professor of history in Leland Stanford Junior University in 1902 and, four years later, full professor. His published writings include *The Control of the Purse of the United States Government* (1894); *The Influence of Grenville on Pitt's Foreign Policy* (1904); *British Interests and Activities in Texas* (Albert Shaw Lectures, Johns Hopkins University, 1910).

ADAMS, Frank Dawson (1859—). A Canadian geologist, born in Montreal. He was educated in McGill, Yale, and Heidelberg universities and became a member of the Geological Survey of Canada in 1880. Having been appointed lecturer in geology in McGill University in 1889, five years later he became dean of the faculty of applied science and Logan professor of geology. His publications include *Iron Ore Deposits of Bilboa* (1901); *The Monteregian Hills* (1903); *On a New Nepheline Rock* (1904); *An Investigation into the Elastic Constants of Rocks* (1906); *Geology of the Haliburton and Bancroft Areas* (1910).

ADAMS, Franklin Pierce (1881—). An American writer of humorous prose and verse, born in Chicago and educated at the Armour Institute and the University of Michigan. After two years (1903–04) of newspaper work on the Chicago *Journal*, he went to New York to become a member of the staff of the *Evening Mail*. For this paper he began to write, daily, a column of miscellany of a kind sufficiently defined by its caption, "Always in Good Humor." "F. P. A.'s" "Diary of our own Samuel Pepys" is a clever parody of the famous Englishman; while his verses, especially those in which he imitates certain odes of Horace, show considerable skill and felicity of expression. At the beginning of 1914 he went over to the *New York Tribune*. His writings in book form include *Tobogganing on Parnassus* (1911); *In Other Words* (1912).

ADAMS, Frederick Upham (1859–1921). An American author and inventor. He was born in Boston, but removed to Elgin, Ill., and was educated in the schools of that city. He practiced the profession of mechanical engineering from 1882 to 1890, during which period he invented (1886) an electric lamp-post which became the standard throughout the United States, and (1887) a form of electric light tower. From 1894 to 1897 he was chief smoke inspector for Chicago. Adams constructed, in 1900, an experimental passenger train for the Baltimore and Ohio Railroad which broke the speed records made up to that time. An active interest in social problems induced him to found a periodical called *The New Time*, which he edited from 1896 to 1898. He wrote several works on engineering and social topics as well as a number of novels. These publications include: *Atmospheric Resistance and its Relation to the Speed of Railway Trains* (1893); *President John Smith* (1896); *The Kidnapped Millionaires* (1901); *John Burt* (1903); *How Cities are Governed in Great Britain* (1904); *John Henry Smith* (1905); *The Bottom of the Well* (1905); *The Revolt* (1907); *The Vegetarians*, a comedy, and *Ramley*, a drama (1911).

ADAMS, George Burton (1851—). An American historian; professor at Yale after 1888. His writings include: *Primer of Mediæval Civilization* (1883); *Civilization During the Middle Ages* (1894); *The Growth of the French Nation* (1896); *European History* (1899); vol. ii. in Hunt and Poole's *Political History of England* (1905); *The Origin of the English Constitution* (1912).

ADAMS, Hannah (1755–1832). One of the earliest American women writers. She was the author of *Views of Religious Opinions* (1784), *History of New England* (1799), *Evidences of Christianity* (1801), and a *History of the Jews* (1812), all of which brought fame but little money. Her home was in Brookline, Mass.

ADAMS, Henry (1838–1918). An American historian, third son of Charles Francis Adams (q.v.). He was born in Boston and graduated at Harvard in 1858. He was private secretary to his father when the latter was Minister to England, assistant professor of history at Harvard from 1870 to 1877, and editor of the *North American Review* in 1875 and 1876. One of the fruits of his original methods of instruction was a volume of *Essays on Anglo-Saxon Law* (1876), of which he wrote the first, on *Anglo-Saxon Courts of Law*. The others were by H. C. Lodge, E. Young, and J. L. McLaughlin. He subsequently made his home in Washington and devoted himself to a study of the administrations of Jefferson and Madison, the results of which appeared in nine volumes as a *History of the United States from 1801 to 1817* (1889–90; new ed., 1909), a work of original research. He previously edited the writings of Albert Gallatin (3 vols., 1879) and wrote a life of John Randolph (1882; 2d ed., 1898) for the American Statesmen Series. He also wrote *Historical Essays* (1891); *Life of George Cabot Lodge* (1911); *Mont-Saint-Michel and Chartres* (1904 and 1913); *The Education of Henry Adams* (issued for private circulation, but published in 1918 after his death) and various letters and essays some of which were published posthumously. *The Education of Henry Adams* became for a time after his death the most widely read and discussed of all his writings, being remarkable for its original point of view and the high distinction of its literary style.

ADAMS, Henry Carter (1851—). An American economist. He was born in Davenport, Iowa, and was educated at Iowa College and Johns Hopkins University. After serving some years as government statistician and college teacher, he became (1887) professor of political economy and finance at the University of Michigan. In 1913 he accepted a position as adviser to a Chinese commission appointed to standardize railway records. His publications, besides reports, include: *Taxation in the United States, 1789–1816* (1884); *Public Debts* (1887); *Relation of the States to Industrial Action* (1887); *Relation of American Municipalities to Quasi-Public Works* (with others, 1888); *Economics and Jurisprudence* (1897); *The Science of Finance; an Investigation of Public Expen-*

ditures and Public Revenues (1898); *Regulation of Railway Rates* (with H. T. Newcomb, 1906).

ADAMS, HENRY CULLEN (1850–1906). Congressman from Wisconsin, 1903–06, and author of the Adams Act of 1906, under which the state experiment stations receive $720,000 per annum for original research in agriculture. Most of his life was spent in Wisconsin, where he engaged in dairying and fruit-growing and filled numerous state offices, notably that of Dairy and Food Commissioner from 1895 to 1902. His interest in agricultural matters continued in Congress, and he took a prominent part in the passage of the food and drug act of 1906 and the meat inspection legislation of that year. His efforts to aid the experiment stations by an enlarged federal appropriation began in 1903, and despite feeble health he was indefatigable in support of his bill until its passage in 1906 without a dissenting vote. The Adams Act is among the most important ever passed in encouragement of American agriculture, and its author is regarded as one of its principal benefactors.

ADAMS, HERBERT (1856—). A prominent contemporary American sculptor. He was born Jan. 28, 1856, at West Concord, Vt., and was educated in the public schools of Fitchburg, Mass., and in the Institute of Technology at Worcester. He studied art in the Normal Art School of Boston, but principally with Mercier in Paris, where he remained five years. On his return to the United States he was instructor in the art school of Pratt Institute, Brooklyn; he was elected to the National Academy of Design in 1899 and became vice-president in 1906. Important exhibitions of his works were held at the Chicago World's Fair in 1893 and the St. Louis Exposition in 1903, in both of which he received highest awards. He is a member of the National Institute of Arts and Letters. Adams is especially known among American sculptors for his beautiful busts of women. Perhaps the best of such productions is the exquisite bust of Miss Pond, his future wife, carved at Paris in 1887. Other examples are "Primavera," the tinted busts of "St. Agnes," of "A Young Lady" in pink marble (Metropolitan Museum, New York), of "The Rabbi's Daughter," and the marble bust of Miss Julia Marlowe. The same qualities of refinement and grace are seen in his other works, such as the "Angel" in the Emmanuel Baptist Church, Brooklyn; the Hoyt Memorial (1895) in the Judson Memorial Church, New York, and the more solemn Welch Memorial in the Auburn Theological Seminary. His contribution to the Vanderbilt memorial entrance of St. Bartholomew's, New York, consists in two bronze doors and a beautiful marble tympanum of the "Madonna with Angels" (1902), reminiscent of early Florentine sculpture. For the Congressional Library, Washington, he modeled two bronze doors and a statue of Professor Channing. His other works include the bronze Jonathan Edwards Memorial in a church at Northampton, Mass.; bronze statues of Richard Smith, the typefounder, in Philadelphia, of William Ellery Channing in Boston, and William Cullen Bryant (1911) in New York. Of all American sculptors, Adams stands nearest to the Early Renaissance in his fresh and refined realism and in his technical skill in marble cutting, yet he is none the less modern and original. Consult Taft, *History of American Sculpture* (New York, 1904).

ADAMS, HERBERT BAXTER (1850–1901). An American educator and historian. He was born at Amherst, Mass., and educated at Amherst College. He took his doctor's degree at Heidelberg and then became connected with Johns Hopkins University on its inception in 1876. He was made associate professor of history in 1883 and professor in 1891. Owing to ill health, he resigned in 1901. He edited the valuable *Johns Hopkins Studies in History and Political Science* from the beginning, and an important series of monographs on American educational history published by the United States Bureau of Education. Besides many monographs, he wrote *The Life and Writings of Jared Sparks* (2 vols., 1893). Dr. Adams's influence upon historical studies in America, especially through the numerous pupils whom he trained, was very beneficial. He took great interest in university extension and in the work of the American Historical Association, of which he was secretary from its founding in 1884 until 1900, when he resigned and was made its first vice-president.

ADAMS, JOHN (1735–1826). The second President of the United States. He was born at Quincy, Mass., Oct. 30, 1735, of a family descended from Henry Adams, a Puritan emigrant who settled in Massachusetts about 1640. He graduated from Harvard in 1755 and, after an interval of teaching, studied law and was admitted to the bar in 1758. In 1764 he married Abigail Smith, daughter of the minister at Weymouth, a woman who herself became conspicuous, and whose influence and assistance were important factors throughout the entire career of her husband. (See ADAMS, ABIGAIL.) Soon after he went into politics and, although not a resident of Boston, was selected to act as counsel with Gridley and Otis in presenting to the Governor a memorial against the Stamp Act (q.v.). Adams then took the bold stand that the act was void because Parliament had no right to tax the colonists, and that such statutes could have no possible force over persons who had not consented to the passage thereof. In 1768 he moved to Boston, and soon after was offered and declined the position of advocate-general in the Court of Admiralty, an office which would have greatly increased his professional opportunities, though it would have placed him under embarrassing obligations to the Royalist politicians. Two years afterward he was able, without prejudicing himself among the patriot party, to render the unique service of defending Captain Preston in the Boston Massacre case and securing his acquittal. He had already written on taxation for the *Boston Gazette*, and he again published articles at the time of the controversy over the independence of the judiciary, collaborated in the authorship of the reply to Hutchinson in 1773, and later produced the "Novanglus" articles in reply to the Tory, Leonard. He was closely associated with Samuel Adams in the political leadership of Massachusetts, especially in the legislative crisis of June, 1774, and then was chosen by the House of Representatives as one of their five delegates to the Continental Congress. In that body his energy was devoted to the adoption of a comprehensive program having three distinct elements—the organization of commonwealth governments on an independent basis, the formation of a national confederate government, and the establishment of diplomatic

relations with foreign powers. The first victory was gained when the Congress passed the resolutions of May 10 and 15, 1776, recommending to all colonies the formation of State governments on a basis such as to serve them if permanently independent. This made natural, if not inevitable, the formal Declaration of Independence (q.v.), the original motion for which was seconded by Adams, who now was placed on the committee which drafted that document.

While a member of the Second Continental Congress it was Adams who, on June 14, 1775, suggested that George Washington be selected to command the continental forces. And for three years he worked arduously in perfecting the details of the new national government, serving on numberless committees, and being placed at the head of several important ones at a time when the congressional committees were the heads of the undeveloped executive departments. Especially in the War Department, and to a considerable extent in the Navy Department, was his influence great and his work attended with quite permanent results, while his membership of the Committee on Foreign Relations enabled him to become equipped for the service by which later he attained distinction. In 1778 he was sent to France to supersede Silas Deane; but his stay was brief, the treaty between that country and the United States having been concluded just before his departure from Boston. During his attendance upon the Continental Congress he continued to be an active counselor of the leaders in Massachusetts, although he declined the office of Chief Justice of the State. He was an active member of the committee of three which drafted the first constitution of Massachusetts. To that work he came almost directly from his first mission to France, and from it he proceeded at once to undertake his further duties of securing from Holland support for the national finances and of negotiating, with the other commissioners, terms of peace with England.

His success in effecting a loan in Holland was preceded by several months of difficult diplomacy, the result of which was that in April, 1782, the Dutch government formally recognized Adams as the minister of an independent nation. Stimulated by this notable accomplishment and by the realization that upon his exertions depended the New Englanders' rights in the Newfoundland fisheries, Adams entered upon the negotiations at Paris with a spirit of independence and of determination which, although seeming to occasion rather than to allay embarrassments, contributed much to the successful issue.

The post of minister to Great Britain was next occupied by Adams, but the relations between the countries were still such as to make the life irksome to one of Adams's temperament, especially as his desire to be recalled was strengthened by his belief that the service he was rendering was bringing no particular benefit to his country. Accordingly, in the spring of 1788, he returned, having already shown in detail his views on American affairs in his elaborate *Defense of the Constitution of the United States* (3 vols., London, 1787). He was elected Vice President at the first election under the new constitution and served for two terms, exercising, in the formative years of political parties and in the time of nearly equal division of the Senate between them, a power seldom possessed by a vice president. Where matters of foreign policy raised the questions at issue, Adams sympathized with England and thus was thrown into opposition to the friends of France, led by Jefferson. In matters of internal policy, also, he supported the program of Hamilton, and where party lines were finally drawn he was recognized as one of the leaders of the Federalists. By them he was advanced to the presidency at the same time that, under the system then prevailing, the leader of the opposing party became Vice President. Jefferson's success in 1800 was made possible, however, largely by the developments of Federalist policy and of factional controversy within the party. Upon Adams's accession to office, relations with France had been complicated by the Directory's refusal to receive Pinckney, and when finally the joint mission of Pinckney, Marshall, and Gerry met with highly questionable treatment, the prospect seemed dubious. (See X Y Z Correspondence.) War seemed imminent, and indeed there were hostile encounters on the water. Preparations for the struggle were coupled with the effort to repress the violent opposition to the policy of the administration through the harsh means of the Alien and Sedition Acts (q.v.). While Adams's attitude toward France was the most criticised act of his administration, yet he himself felt that it was his best public service, as is evidenced by the epitaph he wished placed over his body: "Here lies John Adams, who took upon himself the responsibility of peace with France in the year 1800."

War having been averted, it was at once recognized that the Federalists in these statutes had gone too far in restraining the rights of the individual and in encroaching upon the jurisdiction of the States. Certain it was that in his thoroughness Adams had given his opponents a very welcome and a very powerful means of attack, of which they promptly and vigorously took advantage, and at once began, by such steps as the Virginia and Kentucky resolutions (q.v.), the campaign which finally established the party of the opposite doctrine. This establishment was made easy also by the internal weakening of the Federalist party in the bitter fight for leadership between Adams and Hamilton. The retirement of Adams thus occurred amid the hostility of his enemies and the hatred of those who were his party associates. Nor was it possible to expect any relief from the painfulness of such a situation when the defeated one possessed a manner and a temperament such as were Adams's. Consequently, aside from intermittent criticism and counter criticism, and aside from service in the Massachusetts Constitutional Convention of 1820, this retirement continued unbroken. He died July 4, 1826, on the same day as Jefferson. President John Quincy Adams was his son.

Consult: His *Works*, with a biography, edited by C. F. Adams, 10 vols. (Boston, 1850–56); also his biography, J. T. Morse (Boston, 1885); *The Letters of Abigail and John Adams* (Boston, 1840–41), and *Familiar Letters of John Adams to his Wife during the Revolution; With a Memoir of Mrs. Adams*, edited by C. F. Adams (New York, 1876), and Chamberlain, *John Adams* (1898).

ADAMS, John (1760–1829). The assumed name of Alexander Smith, one of the mutineers of the English ship *Bounty*. With eight sailors and some men and women from Tahiti he landed on Pitcairn Island and formed a government, of

which he was the head. In 1800 he was the only surviving Englishman. He established worship and such a school as was possible. In 1808 Captain Folger, an American, landed there and brought the world the first news of this strange settlement. Adams had not heard a word from civilized countries for twenty years. England never sought to punish him, and he died in peace, leaving a prosperous and religious people. See PITCAIRN ISLAND.

ADAMS, JOHN (1772–1863). An American teacher. He was born in Connecticut, graduated at Yale in 1795 and, after teaching for fifteen years in secondary schools in New Jersey and his native State, became principal of Phillips Academy, Andover, Mass. That place he filled for 23 years, resigning in 1833. Besides having built up one of the historic schools of New England, Dr. Adams is remembered as the schoolmaster of Oliver Wendell Holmes and the subject of the lines:

> "Uneasy lie the heads of all that rule—
> His most of all whose kingdom is a school."

He wrote numerous pamphlets on education. Consult M. E. B. and H. G. B., *The Story of John Adams, a New England Schoolmaster* (1900).

ADAMS, JOHN COUCH (1819–92). An English astronomer and mathematician. He was born near Launceston, in Cornwall, and early manifested an aptitude for mathematics. After the usual amount of school training he was sent to St. John's College, Cambridge, where he attained the honor of senior wrangler and became a mathematical tutor. In 1843 he attempted to ascertain by mathematical calculation whether certain observed irregularities in the motion of Uranus could be explained on the hypothesis of perturbation (q.v.) exercised by an exterior planet. The problem at issue was the inverse of the usual perturbation problem. Instead of computing the effect brought about by a planet of known mass pursuing a known orbit, it was required to determine the unknown cause of a known effect. By 1845 Adams had solved this new problem and was able to assign to the hypothetical planet, the now well-known Neptune, a position differing less than two degrees from its actual place in the sky. But a careful telescopic search was at the time postponed or neglected, so that the honor of the great discovery completing Adams's mathematical researches by an observational verification was lost to Great Britain. Leverrier, of Paris, had been making an independent investigation, and by Aug. 31, 1846, he too had determined Neptune's place in the sky. He wrote to Galle at Berlin, and the latter found the planet on September 23d of the same year. This mathematical discovery of Neptune is justly counted among the greatest triumphs of science. To commemorate it, the Adams Prize, which is awarded biennially for the best essay on some subject in pure mathematics, astronomy, or other branch of natural philosophy, was founded at the University of Cambridge in 1848. In 1858 Adams became professor of mathematics at St. Andrews, but was recalled to Cambridge before the end of the year to assume the Lowndean chair of astronomy, which he held until his death. In 1861 he succeeded Challis as director of the University observatory. He was awarded the Copley Medal of the Royal Society in 1848. His collected papers were published in two volumes at Cambridge under the editorship of his brother, Prof. William Grylls Adams, and R. A. Sampson, the first volume appearing in 1896, the second in 1901.

ADAMS, JOHN QUINCY (1767–1848). The sixth President of the United States and son of the second President, John Adams. He was born in Quincy, Mass., July 11, 1767. In 1778 he was taken abroad by his father when the latter visited Paris on a diplomatic mission, and only three years later, after studying for brief periods at Paris, Leyden, and Amsterdam, the youth was appointed private secretary to Francis Dana, the American Minister to Russia. As Dana was not received by the Russian government, Adams rejoined his father in Paris and served in a secretarial capacity to the American commissioners who were negotiating the treaty of peace with England. At the conclusion of that important work the elder Adams was rewarded with the English mission; the younger Adams returned home and entered Harvard College, graduating in 1787.

Upon his graduation he began the study of law with Theophilus Parsons (q.v.) and was admitted to the bar in 1790. He contributed to the political literature of the time, discussing the theories of Tom Paine, and especially the Genet incident (see GENET, E. C.), and our relations with France. His unusual opportunities and training were readily recognized, and in 1794 Washington sent him as Minister to The Hague. Later he was appointed to the Portuguese mission, but before he had entered upon the duties of that office his father had become President, and the son, upon the recommendation of Washington himself, was transferred to the more responsible post of Minister to Prussia. His father recalled him in 1801, in order that his successor in the presidency might be under no embarrassment. In the year following his return Adams was sent to the State Senate, and in 1803 the Massachusetts Legislature sent him to the United States Senate in preference to Timothy Pickering (q.v.).

While in the Senate he gave his support to the purchase of Louisiana (q.v.), although he disagreed with the administration upon some of the ensuing problems, and also approved the policy of the embargo and the non-importation acts. The support of these measures so unpopular in New England caused him to be hated by the Federalists there and finally cost him his seat in the Senate. His successor was chosen several months before the usual time of filling the vacancy and Adams at once resigned. He was, however, so identified with the party in power that in 1809 President Madison appointed him Minister to Russia. While there he was named as one of the commissioners who were to act in connection with the mediation proposed by Russia, but which was made impossible by the declination of England. He was soon appointed, however, one of the five negotiators who concluded the Treaty of Ghent (q.v.) at the close of the War of 1812.

From that work Adams proceeded to London, where he served as Minister to England until his varied and remarkable diplomatic career was ended in 1817 by his appointment by President Monroe to the post of Secretary of State. His work as Secretary was concerned with the difficult negotiations which in 1819 ended in the purchase of Florida, the more delicate relations with England with reference to the fisheries

convention of 1818 and the conflicting claims in the Columbia River basin, and the more far-reaching steps taken to counteract the encroachments of the Holy Alliance, in connection with which was announced the Monroe Doctrine (q.v.), so that some credited the latter to Adams. As a member of the cabinet, aside from matters of diplomacy, he took a unique position in upholding General Jackson for his conduct in the Florida War, and in rendering a highly valuable service to his later antagonist.

By virtue of his position, the friends of Adams expected that in 1824 he would be advanced in the same manner as Madison and Monroe, who had each in turn passed from the State department to the presidency. The nominations, however, were still made by the congressional caucus, which at this time was controlled by Crawford. Moreover, the newly formed trans-Alleghany States were pressing their claims for recognition, so that the revolt against the old nominating system and the crystallizing of the various factions within the one great party alone remaining active led to the candidacy of four Republicans in 1824. Of these Jackson received 99 electoral votes, Adams 84, Crawford 41, and Clay 37. When the vote, according to the Constitution, was thus given to the House of Representatives, choosing from among the three highest, the Clay interests joined with those of Adams and effected the defeat of Jackson. Adams, upon his accession, made Clay his Secretary of State, and not only brought upon himself charges of corruption, but also secured the vigorous enmity of the rapidly increasing Jackson wing of the Republican party. To offset this, Adams was not qualified to exert the influence usually attaching to a political leader, nor was he able so to make use of his office as to build up an Adams faction that could hope to wage a successful warfare with the embittered Jacksonians. It was natural, therefore, that after four troublous and not particularly profitable years, Adams should be overwhelmed in the election of 1828. Instead of going into retirement, he adopted the unprecedented course of returning to Washington as a member of the House of Representatives, and in that capacity rendered still further and conspicuous service to the nation from 1831 until his death. Being practically above party restraints, he was free to do a work which made notable the later years of "the old man eloquent." The slavery issue appeared in Congress in two forms, involving the question of the right of the government or of its officials to exclude abolitionist literature from the mails, and involving the question whether petitioners to the House of Representatives might demand that their petitions should be read, even if not considered. The former problem provoked a long and severe dispute, while the second controversy was made acute by the introduction of the "Gag Rules" (q.v.), which, Adams contended, substantially destroyed the right of petition, and against which he labored vigorously and in the end successfully. Late in 1846 he was stricken with paralysis, and early in 1848 he was again stricken, while in his seat in the House, and died two days later, on Feb. 23, 1848.

Adams followed the example of his father in keeping an extensive diary, which is included in his *Memoirs*, edited by C. F. Adams (12 vols., Philadelphia, 1874–77). For his biography consult W. H. Seward, *Life of Adams* (Auburn, 1849), and Quincy, *Memoir* (Boston, 1858); or, for the most recent work, Morse, *John Quincy Adams* (Boston, 1882 and 1899).

ADAMS, JOHN QUINCY, 2D (1833–94). An American politician. He was born in Boston, the grandson of President J. Q. Adams and son of Charles Francis Adams. He graduated at Harvard, 1853, and became a lawyer. He served three terms in the Massachusetts Legislature, and was an unsuccessful candidate for governor on the Democratic ticket in 1867 and 1871. In 1872 he was nominated for the vice-presidency on the ticket with Charles O'Conor by those Democrats who would not support Horace Greeley. He became a member of the Harvard Corporation in 1877. Two years before his death he declined a seat in President Cleveland's cabinet.

ADAMS, JULIUS WALKER (1812–99). An American civil engineer. He was born at Boston, Mass., studied for two years at the United States Military Academy, and from 1833 to 1869 was connected as engineer with various railways and public works. From 1869 to 1878 he was chief engineer of the Brooklyn board of city works, and from 1878 to 1889 consulting engineer of the board of public works of New York City. A suggestion of his led to the formation of a company which eventually had charge of building the first bridge over the East River at New York. During the Civil War he for a time commanded the First Long Island Volunteers and during the New York draft riots of 1863 commanded the troops at Printing House Square.

ADAMS, MAUDE KISKADDEN (1872—). A popular American actress. She was born at Salt Lake City, Nov. 11, 1872, the daughter of James and Annie Adams, both actors. She first appeared on the stage in the West, in children's parts, when very young. At 16 she joined E. H. Sothern's company in New York, and played in *The Midnight Bell*. Afterward she was a member of Charles Frohman's stock company. With John Drew in *The Masked Ball* (1892) she made an extraordinary advance in public favor. She became a star as Lady Babbie in *The Little Minister*, produced in New York (1898), where in 1899 she played Juliet to the Romeo of William Faversham. In 1900 and 1901 she won another popular success as the Duc de Reichstadt in Rostand's *L'Aiglon*, and the next season she played Miss Phœbe in Barrie's *Quality Street*. She played in Mrs. Burnett's *The Pretty Sister of José* (1905), and in 1906 was successful in Barrie's *Peter Pan*. She has taken the Shakespearean parts of Viola in *Twelfth Night*, June, 1908, and of Rosalind in *As You Like It*, June, 1910. During the year 1909–10 she also appeared in *What Every Woman Knows*, and in 1911 she took the title rôle in a translation of Rostand's *Chantecler*. In 1913–14 she starred in Barrie's *The Legend of Leonora*. Consult Clapp and Edgett, *Players of the Present*, in Dunlap Society Publications (New York, 1899).

ADAMS, NEHEMIAH (1806–78). An American Congregational clergyman. He was born in Salem, Mass., graduated at Harvard in 1826, and three years later at Andover Theological Seminary. He then became pastor in Cambridge, Mass., and from 1834 was pastor of the Essex Street Church, Boston. After a winter spent in Georgia for his health, he published *A South Side View of Slavery* (1854). His praise of the effect of slavery on the religious character of the

negroes provoked much hostile criticism. He published several controversial works and a *Life of John Eliot*.

ADAMS, Oscar Fay (1855—). An American editor and author. He was born at Worcester, Mass., was educated in secondary schools, taught classes in English literature and, beginning in 1880, wrote much for periodicals. He edited *Through the Year with the Poets* (12 vols., 1886), and published *The Story of Jane Austen's Life* (1891; 2d ed., 1897); *The Archbishop's Unguarded Moment, and Other Stories* (1899); *A Brief Handbook of English Authors* (1884; 7th ed., 1893); *Dear Old Story Tellers* (1889; new ed., 1911); *A Dictionary of American Authors* (1897; 5th ed., 1905); *Sicut Patribus and Other Verse* (1906); *A Motley Jest—Shakespearean Diversions* (1909).

ADAMS, Parson Abraham. A leading character in Fielding's novel, *Joseph Andrews*. He is a country curate, a very learned scholar, skilled in dead and living languages but excessively simple-minded and unfamiliar with the ways of the world. In spite of his poverty, his generosity and native dignity command respect; his oddities, however, and his absence of mind bring him into many quaint adventures.

ADAMS, Samuel (1722–1803). One of the leading men in the promotion of the American Revolution. He was born in Boston, Mass., Sept. 27, 1722, of an aristocratic family and, like John Adams, the second President of the United States, was descended from Henry Adams, a Puritan emigrant. He fitted for college at the Boston Latin School and entered Harvard in 1736. On leaving college in 1740, he entered a law office; but the law proving distasteful, he next entered a counting-house, and soon became a merchant himself, but failed. Subsequently he became a partner with his father in a brewery and failed after the latter's death. As a business man, he seems throughout to have been a complete failure; and the burden thus thrown on the other members of the family was increased later by the complete absorption with which he devoted his time and energy exclusively to political affairs and public service. When a candidate for the degree of A.M. at Harvard College, he had maintained in his thesis the affirmative of the question: Whether it be lawful to resist the supreme magistrate, if the commonwealth cannot be otherwise preserved.

He was early engaged in the activities of town politics in Boston; and the overthrow of the Land Bank, with the incidental destruction of his father's estate, brought him into contact with provincial affairs and decisively influenced his general attitude toward the home government. His formal entry into politics was in his election as a tax collector of Boston in 1763, an office which he held for two years. His careless, or at all events unsuccessful, performance of the duties of that office soon afforded his opponents the basis for a vigorous though ineffectual attack, but both his personal integrity and political uprightness remained above suspicion. By him were drafted the important instructions given by the town of Boston to its representatives in the assembly in 1764, and in these was put forth one of the earliest protests against the ministerial plan of Colonial taxation.

Likewise in 1765 Adams drafted the Boston instructions to representatives, and in the same year he himself was sent to the Legislature, and remained a member until 1774. Being elected clerk of the House in 1766, and also serving on many committees, it was natural that he should be the author of many of the most important state documents of the pre-revolutionary period. Instructions to the political agent in London, addresses to the Governor, appeals to the ministry, and proposals or exhortations addressed to fellow colonists, in great number issued from the Massachusetts House of Representatives, and in many instances from the pen of Adams. Thus the very influential circular letter of February, 1768, as well as the *True Sentiments of America*, issued in the same year, and the widely read *Appeal to the World* of 1769, have been traced to the authorship of Adams. Later, in 1772, he prepared for the town of Boston the very telling pamphlet on *The Rights of the Colonists as Men, as Christians, and as Subjects*. Very important as were all these contributions to the movement toward revolution, the most effective literary work of Adams was, undoubtedly, the great number of newspaper articles, under various pseudonyms, in the patriotic *Boston Gazette*. In these he made plain the cause of the colonists, exposed the impracticability of any reconciliation, converted the hesitating and inspired the Radicals, and exerted a very far-reaching influence in preparing the popular mind for revolution and in hastening the approach of the crisis. In practical politics as well, he was recognized as a leader not only in Massachusetts but in the other colonies. He bore the burden of the long series of controversies with the governors of Massachusetts over the presence of troops, the salaries of judges, and the place of meeting of the Legislature and, at the time of the Boston Massacre of March, 1770, headed the committee which demanded from Hutchinson the immediate withdrawal of the troops. He was conspicuous in planning the local "committees of correspondence"; and when finally, in June, 1774, the Massachusetts Legislature bade defiance to Gage and issued the call for the Continental Congress, it was Adams who directed the movement.

He was naturally sent to the Continental Congress (1774–81), and when that body finally declared for independence, it may be said that the real life work of Adams had been completed. He had been the ideal representative of the town-meeting system, the extreme defender of the "natural" rights of man, and the irrepressible advocate of independence. His work during the Revolution was less noteworthy and was at times open to criticism. Thus, he was one of the strongest supporters of the committee system of national administration, and one of those who delayed unnecessarily and unfortunately the organization of executive departments under single heads. In the politics of his native State he always took an active and effective interest. He was one of the committee which prepared the present constitution of the State, the only constitution of the Revolutionary period still in force. He served on the Executive Council of the State, was for several years Lieutenant-Governor (1789–94), and three times was elected Governor (1794–97). He was considered an opponent of the Federal Constitution in 1788, but on his finally giving his voice in favor of adoption, with the proposal of amendments, its ratification was assured. He died in Boston, Oct. 2, 1803. For his biography, consult: W. V. Wells (3 vols., Boston, 1865); J. K. Hosmer (Boston, 1885); H. A. Cushing (ed.), *The Writ-*

ings of Samuel Adams (4 vols., New York, 1904–08).

ADAMS, Samuel Hopkins (1871—). An American author, born at Dunkirk, N. Y. Having graduated from Hamilton College in 1891, he spent the next nine years as reporter and special writer on the New York *Sun*. He was managing editor of McClure's syndicate in 1900–01; advertising manager of McClure, Phillips & Co., 1901–02, and a member of the staff of *McClure's Magazine*, 1903–05. Becoming interested in the evils of some phases of the patent medicine business, he contributed to *Collier's Weekly* in 1906 and later, a remarkable series of articles on quack medicines. The exposures which he made resulted in the correction of many of the abuses described, even driving several manufacturers of patent medicines out of business. Adams wrote also *The Mystery* (with Stewart Edward White, q.v., 1905); *The Flying Death* (1906); *Average Jones* (1911); *The Secret of Lonesome Cove* (1912); *The Health Master* (1913).

ADAMS, Sarah Fuller Flower (1805–48). An English poet. She was born at Great Harlow, Essex, and married William Bridges Adams in 1834. Her longest work is *Vivia Perpetua, A Dramatic Poem* (1841), having as its subject the early life of the Christians. It is a fine lyrical drama. Vivia's monologue on forswearing Jupiter is especially impressive. Mrs. Adams was the author of several beautiful hymns, among which are "Nearer, my God, to Thee" and "He sendeth sun, He sendeth shower." She was a Unitarian.

ADAMS, Suzanne (1873—). An American lyric soprano. She was born in Cambridge, Mass., Nov. 28, 1873. She studied with Marchesi in Paris, and made her début at the Paris Opera in 1894 as Juliette in Gounod's *Roméo et Juliette*. She remained at the Opera three years, then went to Nice. In the summer of 1898 she appeared at Covent Garden, London, and during the season of 1898–99 at the Metropolitan Opera House, New York. In 1898 she was married to Leo Stern, the violoncellist, who died in 1904. Her rôles include Juliette, Marguerite, Gilda, Queen in *Les Huguenots*, Queen of the Night in the *Magic Flute*, Mimi, and Micaela. Her voice is of beautiful quality and great compass, but is rather slender.

ADAMS, Thomas (1612–55). An English preacher, called by Southey "the prose Shakespeare of Puritan theologians . . . scarcely inferior to Fuller in wit or to Taylor in fancy." He was minister at Willington, Wingrave, and London, and "observant chaplain" to Sir Henry Montague, the Lord Chief Justice. Adams was a Puritan within the Church of England, as distinguished from the nonconformist Puritans who left the church. He published a large number of sermons, the quaint titles of two of which are *Heaven and Earth Reconciled* and *The Devil's Banquet*. It is likely that John Bunyan read and was influenced by these writings. They have been republished in Nichol's *Puritan Divines* (3 vols., 1862).

ADAMS, Thomas Sewall (1873—). An American economist and educator, born in Baltimore, Md. He received a bachelor's degree from the Baltimore City College in 1893, and the degree of Ph.D. from Johns Hopkins University in 1899. After a year as clerk in the census office at Washington, he resigned (1900) to become assistant to the Treasurer of Porto Rico. He was made associate professor of political economy in the University of Wisconsin in 1901 and full professor in 1908. The chair of political economy in Washington University was offered him in 1910, and he accepted it, resuming his former position at the University of Wisconsin, however, the next year. In 1911 he was tax commissioner of Wisconsin. His published writings include: *Taxation in Maryland* (1900); *Labor Problems* (with H. L. Sumner, 1905); *Mortgage Taxation in Wisconsin and Neighboring States* (1907); *Outlines of Economics* (with R. T. Ely, 1908).

ADAMS, Walter Sydney (1876—). An American astronomer, born in Antioch, Turkey. After graduating from Dartmouth College in 1898 he did advanced work at the University of Chicago and in Munich. In 1901 he was appointed assistant in the Yerkes Observatory. In 1904 he was made assistant astronomer, and in 1909 astronomer, at the Mt. Wilson Solar Observatory. For two years (1910–11) he was acting director of the observatory. Adams became a member of several astronomical societies. He wrote numerous papers on solar and stellar spectroscopy and on the rotation of the sun. Among his more important published works is *Investigation of the Rotation Period of the Sun by Spectroscopic Methods* (1911).

ADAMS, William (c.1575–c.1620). The first Englishman in Japan, whose romantic story is closely connected with the opening of that Empire. He was born in Kent, near the mouth of the Thames. Having entered the service of some Dutch merchants, he sailed, in 1598, for the East, from the Texel, as the chief pilot of a fleet of five small ships. After a severe voyage the *Charity*, in which Adams was sailing, anchored off the coast of Bungo (Kiushiu). Iyéyasu had recently come to power, and Adams, after a brief imprisonment, was taken into his favor and employed in the government service, to its great advantage. He built vessels and gave helpful information in respect to the intrigues of the Spanish and Portuguese. At a later day he received the revenues of the village Hémi, near Yokosuka, the modern imperial dockyard in Yeddo Bay. In 1613 the *Clove*, an English ship, brought other Englishmen to Firando, and, with Adams, they proceeded to establish a factory, of which Richard Cocks was chief. In 1616 Iyéyasu died, and foreigners soon fell into disfavor. Not being allowed to return to his wife and children in England, Adams married a Japanese wife, and their descendants are still living. He died May 16, 1620. A street in Yeddo was named after him, and a celebration is still held in his honor. Letters of Adams may be found in *Purchas his Pilgrimes* and in the publications of the Hakluyt Society. Consult: *The Diary of Richard Cocks, 1615–22* (London, 1883); Hildreth, *Japan as It Was and Is* (Boston, 1855); and Diósy, "In Memory of Will Adams," in *Transactions and Proceedings of the Japan Society*, vol. vi, pp. 325–353 (London, 1905).

ADAMS, William (1814–48). An English allegorist. He was educated at Eton and at Merton College, Oxford, where he became tutor and fellow in 1837. Appointed vicar of St. Peter's-in-the-East, Oxford, in 1840, he resigned because of his ill health, and passed the last four years of his life at Bonchurch, Isle of Wight. Adams was the author of several popular religious allegories, most of which were written during the years when he was slowly dying.

They comprise *Silvio, The Shadow of the Cross, Fall of Crœsus, The Old Man's Home,* and the *King's Messengers.* They are all of interest, and *The Old Man's Home* is likely long to survive, because of its natural grace and charm. Adams is also the author of a boy's story entitled *Cherry Stones,* reprints of which are still frequent.

ADAMS, WILLIAM (1807–80). An American Presbyterian clergyman. He was born at Colchester, Conn., graduated at Yale in 1827, and at Andover Theological Seminary in 1830. He became pastor of the Congregational Church, Brighton, Mass., in 1831, and of the Broome Street Presbyterian Church in New York City in 1834 (out of which the Madison Square Presbyterian Church was formed in 1853), and there he ministered till in 1873 he became president of Union Theological Seminary (New York) and professor of sacred rhetoric. He died at Orange Mountain, N. J., Aug. 31, 1880. He was moderator of the New School Presbyterian General Assembly in 1852. He published several volumes of discourses.

ADAMS, WILLIAM DAVENPORT (1851–1904). An English journalist and author, the son of W. H. Davenport Adams. He was educated at Edinburgh University and began newspaper work in 1870. He became literary editor of the London *Globe* in 1885 and was also well known as a dramatic critic. He published *Famous Books; Sketches in the Highways and Byways of English Literature* (1879); *Byways in Bookland* (1888), and edited a *Dictionary of English Literature* (1877) and a *Dictionary of the Drama* (1899).

ADAMS, WILLIAM GRYLLS (1836–1915). An English physicist. He was born at Laneast, Cornwall, and was educated at Cambridge University, where he was made a fellow of St. John's College. In 1863 he was appointed professor of natural philosophy and astronomy in King's College, London, where he carried on many investigations in addition to giving instruction, until his retirement in 1906. Professor Adams served as vice-president and president of the Physical Society of London, as president of the Society of Electrical Engineers, as president of the mathematical and physical section of the British Association, and is a member of the Royal Society. He devised a new form of polariscope which could be used to measure the optical axes of crystals. Among his more important investigations which have been published are those on *Simultaneous Magnetic Disturbances, Action of Light on Selenium, Alternate Current Machines,* and the *Testing of Dynamo Machines.*

ADAMS, WILLIAM TAYLOR (1822–97). An American educator and writer of juvenile fiction, popularly known as "Oliver Optic." He was born at Medway, Mass. For 20 years he taught in Boston public schools; for 14 years he was a member of the Dorchester School Committee; and he was once elected to the Legislature. His first book, *Hatchie, the Guardian Slave* (1853), was followed by more than 100 volumes of juvenile fiction, contributed in large part to *Oliver Optic's Magazine,* of which he was the editor. These stories appeared in series, of which the most popular were *The Boat Club, Young America Abroad, The Starry Flag, Onward and Upward,* and *The Yacht Club.* He published also two novels, *The Way of the World* and *Living Too Fast.* His books of the *Young America Abroad* series had a lasting influence in creating and perpetuating a system of education at sea and under naval discipline.

AD'AM'S APP'LE (Lat. *Pomum Adami*). The projection seen on the front of the neck nearly midway between the summit of the breastbone and the chin. It is particularly visible in males, but rarely noticeable in females and then only at a late period of life. Its name originated from the superstition that a portion of the apple given to our first parent stuck in his throat and that the enlargement thus caused has been transmitted to the race. It is produced by the convergence of the two quadrilateral plates of the thyroid cartilage of the larynx. See LARYNX.

ADAM'S BRIDGE. A chain of islands extending across the Gulf of Manar, between Ceylon and the peninsula of Hindustan (Map: India, C 7). It is cut by several channels through which small boats can pass.

AD'AMSON, PATRICK (1537–92). A famous Scotch prelate and writer, originally known as Conston, Constant, Consteane, or Constantine. He was born at Perth. He studied law at the University of St. Andrews and in 1566 went to France as a tutor, where he underwent six months' imprisonment for referring to the son of Mary, Queen of Scots, as King of France and England, in a Latin poem he wrote on the occasion of the prince's birth. He narrowly escaped death during the Paris massacre, and, obliged to live in concealment for seven months, he employed his time in writing Latin poetical versions of the Book of Job and of the tragedy of Herod. In 1573 he returned to Scotland, took orders, and became minister at Paisley. In 1576 he received the appointment of Archbishop of St. Andrews from his patron, the Earl of Morton, Regent of Scotland, and entered into frequent polemics with the Presbyterians concerning episcopacy. In 1588 he was excommunicated on various charges and died in great poverty and affliction at St. Andrews, Feb. 19, 1592. Consult: P. Adamson, *Poemata Sacra* (London, 1619); Baillie, *The Recantation of Patrick Adamson* (Glasgow, 1646).

ADAMSON, ROBERT (1852–1902). An English educator and philosophical writer. He was at one time professor of logic and mental philosophy at Owens College (Victoria University) and in 1895 was appointed professor of logic and rhetoric at the University of Glasgow. He is regarded as an important representative of the so-called Neo-Hegelian movement in English philosophy. Among his writings are *The Philosophy of Science in the Middle Ages* (1876); *On the Philosophy of Kant* (1879); the article on Kant in the *Encyclopædia Britannica,* and *Fichte* (1881). Following his death various volumes were published from the lecture notes of his students, edited by W. R. Sorley: *The Development of Modern Philosophy, and Other Essays* (2 vols., with memorial introduction, 1903); *The Development of Greek Philosophy* (1906); *A Short History of Logic* (1911).

ADAM'S PEAK (native, *Samanhela*). A mountain in the south of Ceylon, 7350 feet high, terminating in a narrow platform, in the middle of which is a hollow 5 feet long, having a rude resemblance to a human footprint (Map: India, D 7). Mohammedan tradition makes this the scene of Adam's penance, after his expulsion from Paradise; he stood 1000 years on one foot, and hence the mark. To the Buddhists the impression is the *sripada,* or sacred footmark, left by Buddha on his departure from Ceylon; while

the Hindus claim it as the footprint of their god Śiva. Over the sacred spot stands a wooden canopy, and multitudes of devotees, Buddhist, Hindu, and Mohammedan, frequent it.

ADANA, ä'dä'nä. The capital of the Turkish vilayet of Adana (15,400 square miles; pop., 422,400) (Map: Turkey in Asia, F 4). It is situated in the southeast of Asia Minor on the Seihan River (ancient Sarus), about 42 miles northeast of the seaport of Mersina, with which it is connected by rail. Its position near the passes of the Taurus gives it strategical importance. The river is deep, and in 1912 plans were consummated to irrigate 1,200,000 acres in the plain. Adana is the seat of considerable trade in emery, cotton, wool, grain, and wood. Iron is found in the vilayet in the vicinity of Adana, and the output is 40,000 tons a year. The town has a large steam spinning-mill. The population is about 49,000, including a large number of Armenians and Greeks. There was a massacre of Christians here in 1909. Adana was an important place in the time of the Romans. After a period of decline its prosperity revived under the Caliph Harun-el-Rashid.

ADANS LE ROI. See ADENEZ.

ADANSON, ä'dän'sôn', MICHEL (1727–1806). A French naturalist and physicist. He was born at Aix, in Provence. He studied the natural and physical sciences under Réaumur and Jussieu in Paris and journeyed to Senegal in 1749, where, during a period of five years, he engaged in researches in botany, electro-physics, and meteorology, and made collections of plants and animals. He was one of the first to recognize the electrical nature of the lightning stroke, and he demonstrated also the similarity of the shock from the electric eel (*Gymnotus electricus*) to the discharge from the Leyden jar. He was also one of the earliest to describe the mode of transportation and deposit of beach sands along oceanic coasts. On his return to Paris from Senegal he was elected a member of the Academy of Sciences. His most important work, however, was in botany, and he published many important monographs on various groups of plants and devised several schemes of classification, none of which latter has, however, received any considerable amount of recognition. Among his more important works are *Histoire naturelle du Sénégal* (Paris, 1857; German ed., Leipzig, 1773); *Familles des plantes* (2 vols., Paris, 1763); *Histoire de la botanique et plan des familles naturelles des plantes*, a posthumous work edited by his son, A. Adanson, and by Payer (2 vols., Paris, 1864). For further particulars concerning his life and works, consult Cuvier, *Eloge historique* (Paris, 1819).

AD'ANSO'NIA. A genus of about four species belonging to the family Malvaceæ and named by Linnæus in honor of the botanist Adanson (q.v.). The best-known species, *Adansonia digitata*, the baobab, also called the monkey-bread tree, is a native of tropical Africa and the East Indies. It is one of the largest known trees—not, indeed, rising to a very great height, but exceeding most other trees in the thickness of its trunk (20 to 30 feet). Even its branches (60 to 70 feet long) are often as thick as the trunks of large trees, and they form a hemispherical head 120 to 150 feet in diameter, their outermost boughs drooping to the ground. The leaves are 5 to 7-parted; the flowers are white and extremely large, on drooping peduncles of a yard in length. The fruit, monkey-bread, is of the size of citron. The bruised leaves (Lalo) are mixed with the food of the inhabitants of tropical Africa, and Europeans in that country employ them as a remedy for diarrhœa, fevers, and diseases of the urinary organs. The pulp of the fruit, which is slightly acid and pleasant to the taste, is eaten with or without sugar; and the expressed juice mixed with sugar is much esteemed as a beverage, being very refreshing, effectual in quenching thirst, and regarded as a specific in putrid and pestilential fevers. The bark is said to be powerfully febrifugal. The other species occur in East Africa, Madagascar, and Australia.

ADAPA, ä'dä-pä. The hero of a Babylonian myth known to us through a tablet from the reign of Amenhotep IV (c.1377–1361 B.C.) found at Tel el-Amarna (q.v.) and three tablets from the library of Assurbanipal (668–625 B.C.) in Nineveh. Adapa, whose name may perhaps also be read Adama (see ADAM), is the son of Ea, endowed by his father with wisdom but not with immortality. His home is at Eridu, once situated on the Persian Gulf. Fishing in the sea, his boat is overturned one day by the south wind. He is called to account for this by Anu (q.v.). But his father, Ea, warns him, when he shall appear before Anu, not to eat the food of death or drink the water of death set before him and tells how by mourning apparel he is to secure the sympathy of Tammuz and Gishzida. In heaven, however, food of life and water of life are finally placed before him. That had not been expected by Ea, and the son, following his advice, lost immortality. Adapa is distinctly said to be a human being (*Zir ameluti*, 'offspring of men'); this phrase likewise shows that he is not the first man. Yet he is also called "the son of Ea." He is the priest and representative of this god in Eridu and possibly identical with one of the antediluvial kings. These lived for thousands of years, but finally had to die. The point of the myth is the failure to attain immortality, though almost within grasp. This it has in common with the story of Adam in Genesis. It is of great interest to observe that such Babylonian myths found their way to Egypt as early as in the fourteenth century B.C. In the Tel el-Amarna copy the divisions of words are marked by small dots in red ink, showing that it was intended for use in teaching the Babylonian language in Egypt. This renders it probable that the myth was also known in Palestine at that time. See Jensen in *Keilinschriftliche Bibliothek*, vi. 1 (1900); Zimmern, in Gunkel's *Schöpfung und Chaos* (1895); *Keilinschriften und das Alte Testament* (1902); Rogers, *Cuneiform Parallels to the Old Testament* (1912).

AD'APTA'TION (Lat. *ad*, to + *aptare*, to fit). In plants, the adjustment of an organ or an organism to its environment or surroundings, as shown in its structural form; e.g., a thick-skinned leaf is an adaptation to a dry environment. The state of a perfectly adapted plant is sometimes called "epharmony," but this condition is rarely found, and the adaptations of most plants may be regarded as more or less imperfect. See ECOLOGY; NATURAL SELECTION.

A'DAR. The twelfth month of the ecclesiastical, and the sixth month of the civil, Jewish year, coinciding with February–March of the common year. The 7th of Adar became a fast for the death of Moses; the 9th another on

account of the dissension of Hillel and Shammai; but more important is the 13th, which is called the fast of Esther, in memory of the fasting of Mordecai, Esther, and the Jews, whose destruction was threatened by Haman (Esther iv. 15–16). The fast is followed by the feast of Purim, celebrated on the 14th and 15th, in commemoration of the escape of the Jews of Persia from the fate designed for them by Haman, the cruel counselor of Ahasuerus. See ESTHER.

ADDA, ăd'dà (Lat. *Adua*). A tributary of the Po (q.v.), rising in the Rhætian Alps, on the northern borders of Italy above Bormio (Map: Italy, D 2). After traversing the Valtellina, it flows, or rather expands, into the Lake of Como. Below Lecco it traverses the plain of Lombardy in a direction south-southeast, passing Lodi, and falls into the Po about 8 miles above Cremona. Total length, about 180 miles; navigable for 75 miles.

AD'DAMS, JANE (1860—). A social settlement worker. She was born at Cedarville, Ill., Sept. 6, 1860. She graduated at Rockford Female Seminary in 1880, and the following year, when the seminary became a college, received the degree of A.B. After two years of study in Europe, and a year at the Women's Medical College at Philadelphia, she decided to devote her life to social work among the city poor. Together with Miss Ellen G. Starr, she established (in 1889, at Chicago) the Hull House, the leading social settlement in the United States, of which she became the head worker and guiding spirit. Miss Addams has less sympathy with theoretical studies of the social problem than with every-day experience with all sorts and conditions of people. Her practical common sense, great executive ability, and fine unselfish spirit have made her the natural leader of the settlement movement in this country. She has taken an active interest in city administrative problems and served for three years as inspector of streets and alleys in the district around Hull House. She took a prominent part in the formation of the National Progressive Party in 1912. She has been a frequent contributor to current periodical literature on the nature of the social settlements, their relation to the labor movement and to philanthropy, and various other topics, and published *Democracy and Social Ethics* (1902), *The Spirit of Youth and the City Streets* (1909), *Twenty Years at Hull House* (1910), *A New Conscience and an Ancient Evil* (1912). See HULL HOUSE; SOCIAL SETTLEMENTS.

AD'DAX, or **AD'DAS** (Lat., of African origin). A hippotragine antelope (*Addax nasomaculatus*) of northeastern African deserts, related to the oryx. It is about 3 feet in height at the shoulders, robust in form, nearly white in color, tinged with reddish brown forward, and having a white blaze upon the nose, and black hoofs, large and rounded for treading upon the desert sands. It has long ears, a long, tufted tail, shaggy forehead and throat, and both sexes have high, spirally twisted horns, alluded to by Pliny when he described the antelope under the name strepsiceros. Its habits are similar to those of the oryx, and it is hunted by the Arabs with greyhounds. Consult A. E. Pease, *Proceedings Zoölogical Society of London* (1896, p. 810), who says that it is called by the French of Algeria "antilope du sud," by the Arabs, "begra el Oouash" or "meha," and by the Tuaregs, "tameeta." See plate of LARGE ANTELOPES, in vol. i.

AD'DER (*an adder* by mistake for *a nadder*, AS. *nædre*, Goth. *nadro*, Ger. *Natter*, a snake). A common name applied both to certain poisonous snakes, mostly of the family Viperidæ, and to certain harmless snakes of the family Colubridæ. In the former case it is practically a synonym of viper (q.v.). Several venomous serpents are known as puff-adders and death-adders, under which names they will be found described and illustrated elsewhere. Various harmless snakes of the genus Tropidonotus are known as adders both in Europe and America, as well as the American copperhead (q.v.), the water adder (see MOCCASIN SNAKE), and the spreading or blowing adder (see HOGNOSE), which, under provocation, assumes somewhat the appearance of a viper. Specifically, in English literature, the word usually means the common viper (*Vipera berus*) of Europe, the only venomous snake of Great Britain.

AD'DICKS, JOHN EDWARD (1841—). An American capitalist and politician, born in Philadelphia. Through the construction of gas plants and the financing of gas companies he acquired a considerable fortune, which he vastly increased through the organization of the Bay State Gas Company of Boston in 1884, and the purchase in 1892 of a controlling interest in the Brooklyn Gas Company. In his later years he gave himself up largely to the pursuit of political ambitions and established himself in the State of Delaware with the belief that it would be possible to win a United States senatorship from that State. In 1895 he entered upon a campaign for the senatorship which has scarcely been paralleled in persistence, factional bitterness, and charges of political corruption, in the whole history of senatorial elections. In the election of 1895 Addicks was able to prevent the election of his rival, H. A. Dupont, although unable to win the election himself. In 1898, in consequence of the schism between the Addicks and Dupont factions in the Republican party, then the majority party, the Legislature was deadlocked and the senatorship remained vacant. Again, in 1901, with two senatorships vacant, the Addicks candidacy deadlocked the Legislature and left the State unrepresented in the United States Senate. In 1903 Addicks procured the election to the Senate of one of his followers, J. Frank Allee, with the understanding, according to common report and intimations from Addicks himself, that Allee would later resign, in order that the Governor, another supporter of Addicks, might appoint the latter for the unexpired senatorial term. Allee, however, refused to recognize the supposed obligation to resign, and in 1905 Addicks again entered upon a campaign for election by the Legislature. After a long deadlock Addicks was defeated in 1906 by Dupont.

The great fortune of Addicks was seriously impaired by the expenses, legitimate and illegitimate, of his long senatorial campaign. It suffered further impairment by a court order in 1907 which compelled Addicks to pay over to the receiver of the Bay State Gas Company, bankrupted largely through Addicks's mismanagement, $890,000 of profits unlawfully drawn from the concern.

ADDING MACHINES. See CALCULATING MACHINES.

AD'DINGTON, HENRY, first VISCOUNT SID-

MOUTH (1757–1844). An English Tory statesman. He was born at Reading. He graduated at Brasenose, Oxford, in 1778, studied law, and was admitted to the bar in 1784. Persuaded by his college mate and friend, the younger Pitt, he entered Parliament in 1783. Subsequently he filled the positions of Speaker of the House of Commons, 1789–1801, and Premier and Chancellor of the Exchequer, 1801–04. Owing to the opposition to his war policy, he resigned in 1804, but the King raised him to the peerage as first Viscount Sidmouth and made him President of the Council (1805). He was Lord Privy Seal in 1806, and again President of the Council in 1806 and 1807. He was Home Secretary from 1812 to 1822, and member of the cabinet from 1822 to 1824. Addington was an extreme reactionary. As Home Secretary he approved heartily of the Manchester massacre (1819). He was also the author of four of the infamous "six acts" (q.v.), and the instigator of the state trials for sedition and blasphemy that made his government ridiculous. He died at Richmond Park, Feb. 15, 1844. Consult G. Pellew, *Life and Correspondence of the Right Hon. H. Addington, first Viscount Sidmouth* (London, 1847).

AD'DIS, WILLIAM E. (1844—). An English clergyman. He was born at Edinburgh and was educated at Merchiston Castle School, Glasgow College, and Balliol College, Oxford. He became a Roman Catholic in 1866 but returned to the Church of England in 1901. He was parish priest of Sydenham from 1878 to 1888, an assistant clergyman at Melbourne from 1888 to 1892, and minister of the High Pavement Chapel (Unitarian), Nottingham, from 1893 to 1898. In 1898 he became professor of Old Testament criticism in Manchester College, Oxford. He was appointed curate of St. Martin and All Saints, Oxford, in 1909, and in the following year he became vicar of All Saints, Ennismore Gardens, London. He is the author of the following works: *Catholic Dictionary*, written in conjunction with Thomas Arnold (new ed., 1903); *Documents of the Hexateuch* (new ed., 1906); *Christianity and the Roman Empire; Hebrew Religion to the Establishment of Judaism under Ezra* (1906).

ADDIS ABEBA, ăd'dês ă-bā'bà. The capital of Abyssinia, situated in the province of Shoa, in about lat. 9° N. and long. 39° E. (Map: Africa, H 4). It occupies an extensive area, and is picturesquely situated at an altitude of nearly 10,000 feet. In its general appearance it resembles more a camp than a capital city. The town is absolutely without any streets and is intersected in several parts by deep ravines. The royal palace is situated on an eminence and consists of a number of buildings of cheap and flimsy architecture surrounded by several walls. It is the seat of the only Abyssinian school in the country. Of recent years there have been several projects undertaken to better the railway and telegraph facilities of the capital. The permanent population is estimated at 50,000, and the floating population at from 30,000 to 35,000. Addis Abeba was the scene of the signing of the treaty of peace between Italy and Abyssinia on Oct. 26, 1896, in which Italy resigned her claim to a protectorate over Abyssinia. See ABYSSINIA.

AD'DISON, DANIEL DULANY (1863—). An American clergyman and writer, born in Wheeling, W. Va., and graduated from Union College in 1883. After studying at the Episcopal Theological School, Cambridge, Mass., he was ordained to the priesthood of his denomination, becoming assistant rector of Christ Church, Springfield, Mass., in 1886. Three years later he was chosen rector of St. Peter's Church at Beverly, Mass., where he remained until 1895. He then became rector of All Saints Church, Brookline, Mass. A member of many church societies, and with varied interests, he gave especial attention to conditions in Liberia. He was made a trustee of the College of Monrovia and in 1904 was knighted by the government of Liberia in recognition of his services. Among his published writings are *Lucy Corcoran, Life, Letters, and Diary* (1894); *Phillips Brooks* (1894); *Life and Times of Edward Bass, First Bishop of Massachusetts* (1897); *All Saints Church, Brookline* (1896); *The Clergy in American Life and Letters* (1900); *The Episcopalians* (1904).

ADDISON, JOSEPH (1672–1719). An English poet and essayist. He was the son of Lancelot Addison, a clergyman of the Church of England, and was born at Milston, near Amesbury, in Wiltshire, May 1, 1672. After attending the Charterhouse and other schools, he entered Queen's College, Oxford, in 1687. Two years later he passed to Magdalen College. At Oxford he was distinguished for the ease with which he wrote graceful Latin verse. By 1697 he was receiving high compliments from Dryden. He won the favor of Montagu (afterward Lord Halifax), and Lord Somers, through whom he obtained, in 1699, a pension of £300 a year. The pension was probably intended to enable him to prepare himself for diplomacy by foreign travel. At any rate he left England toward the close of 1699 for a continental tour. While in France he became familiar with the language of that country. On the outbreak of the Spanish War of the Succession he went to Italy, where he wrote the most successful of his poems, the *Letter*, addressed to Lord Halifax. In the autumn of 1703 he returned home by way of Switzerland and Germany; but in his expectations of place he was disappointed, for the Whigs were out of office. The battle of Blenheim, however, which occurred the next year, presented a brilliant opportunity, which he did not fail to make the most of. The ministry wished the victory commemorated in verse, and Addison was appointed to do it. Lord Godolphin, the Treasurer, was so pleased with the first half of the poem that before *The Campaign* was finished he made Addison a Commissioner of Appeals.

The poet was now fairly involved in politics. He became Under-Secretary of State in 1706, accompanied Halifax to Hanover the next year, and in 1709 went to Ireland as Secretary to the Lord-Lieutenant, where he also obtained the office of Keeper of the Records, worth £300 a year. In the same year Sir Richard Steele began the *Tatler*, to which Addison soon became a frequent contributor. He also wrote a number of political articles in the *Whig Examiner*. On March 1, 1711, appeared the first number of the *Spectator*, which continued as a daily till Dec. 6, 1712. In 1714 it was revived as a tri-weekly. In 1713 appeared the *Tragedy of Cato*, the popularity of which, considering its total want of dramatic power, is amazing, though it contains some fine lines that have become almost proverbial. It was generally understood to have a political as well as a poetical inspiration; but so skillfully had Addison expressed himself that both parties, Whig and Tory, received its decla-

mations with rapture. It was translated into several European languages; and even the prince of French criticism, Voltaire, held Shakespeare a barbarian in tragedy compared with Addison. In 1716 Addison married Charlotte the Dowager Countess of Warwick. The marriage is said to have been "uncomfortable," but this legend is based upon no definite information, though it is generally accepted, and will be found in Thackeray's study of the poet. He reached his highest political position when he was appointed Secretary of State in 1717. For this place he was not at all suited, and he resigned the next year. Addison's health had been poor for some time, and, after an illness of a few months, he died at Holland House, Kensington, on June 17, 1719, three years after what Thackeray calls "his splendid but dismal union."

Thomas Tickell, whom Addison had appointed his literary executor, published his works two years later in four volumes, including, besides those already mentioned, papers Addison had written for the *Guardian* and the *Freeholder*, a play entitled *The Drummer*, *Dialogues on Medals*, and several poems. The most delightful and original of Addison's productions is that series of sketches in the *Spectator*, of which Sir Roger de Coverley is the central figure and Sir Andrew Freeport and Will Honeycomb the lesser ones. Sir Roger himself is an absolute creation; the gentle yet vivid imagination, the gay and cheerful spirit of humor, the keen, shrewd observation, and fine raillery of foibles which Addison has displayed in this character make it a work of pure genius. In prose, Addison is always excellent. He gave a delicacy to English sentiment and a modesty to English wit which it had never known before. Elegance, which in his predecessors had been the companion of immorality, now appeared as the advocate of virtue. His style, too, is admirable. There are many nobler and grander forms of expression in English literature than Addison's, but there are none comparable to his in propriety and natural dignity. "Whoever wishes," says Dr. Johnson, "to attain an English style, familiar but not coarse, and elegant but not ostentatious, must give his days and nights to the volumes of Addison." His various writings, but especially his essays, fully realized the purpose which he constantly had in view, "to enliven morality with wit and to temper wit with morality." He also did more than any other man of his time toward creating a wide public for literature. Consult: Johnson, *Lives of the Poets* (many editions); Macaulay, "Essay on Addison," *Edinburgh Review* (1843); Aiken, *Life of Addison* (London, 1843); Courthope, *Addison* (New York, 1884); and Beljame, *Le public et les hommes des lettres en Angleterre* (2d ed., Paris, 1897). The *Spectator* is edited by H. Morley (1868), and in eight volumes by G. Smith (1897–98). Addison's complete works are published in Bohn's *British Classics*.

ADDISON, JULIA DEWOLF (GIBBS) (1866—). An American art craftsman and author, born in Boston. After an early childhood spent in England, where she was privately educated, she returned to Boston in 1878, to study art. Further training in her profession she obtained in England and Italy. In 1889 she married Daniel Dulany Addison (q.v.), becoming widely known subsequently as a designer of ecclesiastical ornaments, metal work, mosaic, etc., and as an illustrator on vellum. Besides composing the music for many songs and writing several Christmas carols, Mrs. Addison published the following: *Florestan the Troubadour* (1903); *Art of the Pitti Palace* (1903); *Classic Myths in Art* (1904); *Art of the National Gallery* (1905); *Arts and Crafts in the Middle Ages* (1908); *Mrs. John Vernon* (1908); *The Boston Museum of Fine Arts* (1910); plays, *A False Note* and *Blighted Buds; The Spell of England* (1912).

AD'DISON'S DISEASE. A disease characterized by pigmentation of the skin and by degenerative changes in the suprarenal glands. The pigmentation of the skin varies from a light yellowish brown to a dark brown or blackish color. Various changes have been noted in the suprarenals, the most common being tuberculous inflammation. Fatty and waxy degenerations and carcinoma have also been described. The suprarenal glands, or adrenal bodies, were little understood till 1855, when Dr. Thomas Addison, of Guy's Hospital, London, published his work *On the Constitutional and Local Effects of Disease of the Suprarenal Capsules*. The leading symptoms of Addison's disease are anæmia, general languor and debility, feeble heart action, irritability of the stomach, and the peculiar bronzing (melasma) to which reference has been made. It is a rare disease, more common among the poor, more frequent in males than in females, and generally occurs between the ages of 30 and 50 years, although no age is exempt. There may be profuse diarrhœa, also rheumatoid pains in the loins and abdomen, and the temperature, as a rule, is subnormal. The bronzing is more pronounced on the face, neck, and backs of the hands and upon points of pressure. The disease lasts from 18 months to a few years. No curative treatment is known. Tonics, generous diet, proper climate, and the internal administration of suprarenal extract or the dried glands of sheep are beneficial and will often prolong life. See SUPRARENAL CAPSULES.

ADDISON'S WALK. In the grounds of Magdalen College, Oxford, a tree-bordered walk to which Joseph Addison is said to have frequently resorted when he was a "demy" in that college.

ADDI'TION. The process of uniting two or more number groups into a single group. In elementary arithmetic, which deals with natural numbers, the process of addition is simply counting all the units of two or more collections into a single collection. The different groups added are called the *addends*, and the result is called the *sum*. Since there is one and only one unit in the sum for every unit in the addends taken together, there is said to be a 1 to 1 correspondence between the sum and the addends. From this it appears that the sum is the same in whatever order the addends are taken or in whatever groups they may be placed. The former fact is expressed by saying that addition is commutative, and the latter by saying that addition is associative. See article ASSOCIATIVE LAW.

AD'DLED PAR'LIAMENT, pär'li-ment, THE. A name given to the second Parliament of James I of England, 1614, because it did not produce a single statute. It holds, nevertheless, a noteworthy place in the history of constitutional liberty. Its members were chosen at a contested election, the first which had occurred for many years. The principle at issue was the right of

Parliament to grant all supplies. It is significant that 300 members, or about two-thirds of the entire number, were then elected for the first time. Among these new men were John Pym and Sir Thomas Wentworth, each destined to take a leading part in the coming struggle. After a two-months' session the Parliament was dissolved by the King, because it declined to grant him a supply of money without a proper settlement of the question of the imposts.

ADDRESS', Forms of. See Forms of Address.

ADE, ād, George (1866—). An American humorist and playwright, born at Kentland, Ind. He graduated at Purdue University in 1887 and was in newspaper work in Lafayette, Ind., and Chicago from 1887 to 1900. His first mark as a writer was made in a column of the Chicago *News*, known as *Stories of the Streets and the Town*. He succeeded to Eugene Field's department in that journal. In *Fables in Slang* and other similar volumes, he showed considerable cleverness as a satirical humorist. In a somewhat similar vein he afterward wrote such plays and sketches as *The Sultan of Sulu* (1902); *Peggy from Paris* (1903); *The County Chairman* (1903); *The Sho-Gun* (1904); *The College Widow* (1904); *Just Out of College* (1905); *The Slim Princess* (1907); *The Fair Co-ed* (1908); *The Old Town* (1909); *Knocking the Neighbors* (1912).

A'DEE, Alvey Augustus (1842—). An American official. He was born at Astoria, N. Y. In 1870 he was appointed Secretary of Legation at Madrid, and in 1878 chief of the Diplomatic Bureau at Washington. He served from 1882 to 1886 as Third Assistant Secretary of State, and in the latter year was promoted to be Second Assistant. He became known in diplomatic circles for his skill in writing diplomatic papers. It was he who drew up the points on which the Treaty of Paris was built after the war with Spain. He was acting Secretary of State during the Chinese trouble in 1900.

ADELAAR, ä'dĕ-lär (Norw. The Eagle). An appellation of Curt Sivertsen (1622–75), one of the greatest naval commanders of the seventeenth century. He was born at Brevig, in Norway, and in his twentieth year was employed in the naval service of Venice against the Turks. On one occasion he broke through a line of 67 Turkish galleys which surrounded his ship, sank 15, and burned several others. Frederic III engaged him as Admiral of the Danish fleet; and in 1675, under Christian V, he took the command of the whole of the Danish naval force against Sweden, but died suddenly at Copenhagen before the expedition set out. See Brunn, *Curt Sivertsen Adelaar* (Copenhagen, 1875).

AD'ELAIDE. The capital of South Australia, on the Torrens, 7 miles by rail from its port, Port Adelaide, on Gulf St. Vincent, and 508 miles northwest of Melbourne (Map: Australia, F 5). It has a large trade in agricultural produce and wool; lead and copper are mined in the vicinity, and its manufactories include iron foundries, potteries, tanneries, breweries, and woolen, starch, and soap factories. The Torrens, artificially converted into a fine river, spanned by several bridges, traverses a strip of park land which divides the town into North Adelaide, largely residential, and South Adelaide, the business portion. The streets are broad and regularly laid out. It is the seat of a United States consular agent and the see of Anglican and Catholic bishops and contains numerous churches, a university, several colleges, a meteorological observatory, and extensive botanical gardens, including a museum of economic botany. Adelaide University, founded in 1872, had, in 1911, 642 students; and a library of over 25,000 volumes. There is a school of mines and industries. The town is almost surrounded by the reserved park lands half a mile wide. Large water works and reservoirs, from 6 to 7 miles distant, and the cemeteries, are the property of the South Australian government. There are municipal abattoirs. Area, 3700 acres, of which 1751 acres are public parks. Founded in 1836, the city was named after Adelaide, queen of William IV. Pop., 1911, 42,294; including suburbs, 189,646. Port Adelaide, its port, protected by two forts, has a safe and commodious harbor, with a dock for ocean steamers, and extensive quays; pop., 3386 (local government area, 24,015). Consult G. T. Ellery, "Greater Adelaide," in *Municipal Extension* (Adelaide, 1899); "City of Adelaide," in *Municipal Journal*, ix, 237 (London, 1900).

ADELAIDE, ä'dä'lä'ĕd', Eugénie Louise (1777–1847). Princess of Orleans, sister of Louis Philippe. Proscribed in the Revolution as an *émigrée*, she sought refuge in the Netherlands, Switzerland, and Germany (1793). Ten years later she met her brother in Spain and was with him until the Restoration, using her influence to induce him to accept the crown. From 1830 to 1847 she played an influential part in politics.

AD'ELARD, or ÆTH'ELHARD, OF BATH. An English philosophical writer who lived about the beginning of the twelfth century. He is said to have studied at Tours and Laon. He traveled extensively in southern Europe, Asia Minor, and North Africa, and it was during these travels that he acquired the great knowledge of Arabian philosophy shown in his writings. His works include *Perdifficiles Quæstiones Naturales* (printed toward the end of the fifteenth century); *De Eodem et Diverso* (before 1116), an allegory in which worldliness and philosophy are represented as endeavoring to win the soul of man; and a Latin translation of *Euclid* (printed 1482), made at a time when that work was almost unknown in western Europe. He also translated and wrote several other treatises on mathematical and medical subjects which are to be seen in MSS. in the libraries of Corpus Christi and Trinity colleges, Oxford.

AD'ELBERT COL'LEGE. See Western Reserve University.

AD'ELOCHOR'DA, ăd'ĕ-lō-kôr'dȧ, or **HEM'ICHOR'DA,** hĕm'ĭ-kôr'dȧ (Gk. ἄδηλος, *adēlos*, unclear, invisible + ἡμι-, *hēmi-*, half + Lat. *chorda*, a cord, a dorsal nervous cord). A subclass of the Chordata, including Balanoglossus and its allies. See Balanoglossus, and Plate of Ascidians.

ADELPHI, ȧ-dĕl'fī. The latest of the six extant comedies of Terence (q.v.) It was produced in 160 B.C. at the funeral games of L. Æmilius Paulus, and was derived chiefly from the Ἀδελφοί, *Adelphoi* ('Brothers') of Menander, but also in part from the Οἱ Συναποθνήσκοντες, *Hoi Synapothnēskontes* ('Those who Die Together,' 'Comrades in Death') of Diphilus. Terence's play gets its name from two pairs of brothers who figure in it—the old men, Micio and Demea, and the young men, Æschines and Ctesiphon.

The two old men differ widely in character. The young men are sons of Demea, but one is adopted by Micio. Each father is sure he is bringing up his son aright, and that his brother is all wrong; the play proves both in the wrong. Molière is said to have owed to it the idea of his *Ecole des maris*.

ADEL'PHI, The (from Gk. *ἀδελφοί, adelphoi*, brothers). A locality in London between the Strand and the Thames Embankment, a little distance east of Charing Cross. The name came from the fact that the Adelphi Terrace, which lies in it, was laid out in 1768 by the brothers Adam, whose names appear in Adam Street, James Street, William Street, John Street, and Robert Street.

ADELPHI COL'LEGE. An American college, formerly Adelphi Academy, situated at Clifton and St. James Places and Lafayette Avenue, Brooklyn, N. Y. It was incorporated in 1896, and until 1912 admitted both men and women students as candidates for the degree of A.B. It grants also the M.A. degree. The college now consists of (1) a college for women; (2) a normal department for the training of kindergarten teachers; (3) an extension department, including courses in the entire college curriculum, for teachers in the public schools; (4) a summer session; (5) an art department. It has a library of 15,000 volumes; faculty, 1913, 34; students enrolled in regular college courses, 467; students in extension courses, 734. President, Charles H. Levermore, 1896–1912; acting president, S. Parkes Cadman, D.D., 1912.

ADELPHI THE'ATRE. A theatre on the Strand, London, more fully designated the Royal Adelphi Theatre. It dates from 1806, but was rebuilt on a larger scale in 1858. It was known chiefly for its melodramas and farces.

ADELSBERG, ä'dels-bĕrk (Sloven. *Postojna*). A small market town of the Austrian crownland of Carniola, 22 miles east-northeast of Triest by rail (Map: Austria, D 4). It is a popular summer resort, but is famous principally for its wonderful stalactite cavern, the largest in Europe and one of the finest known. It may be explored for more than 2 miles, and is penetrated for about 800 yards by the river Poik, which then disappears in the bowels of the earth. The cavern consists of several different chambers. The largest is the Franz Josef and Elisabeth grotto, 223 yards in length by 214 yards in breadth. The stalactite and stalagmite formations are particularly notable for their beauty and variety. Pop., 1910, 3900.

ADELUNG, ä'de-lung, Friedrich von (1768–1843). A German philologist. He was born at Stettin, studied philosophy and jurisprudence at Leipzig, went later on to Russia, and was tutor to the Grand Duke, later Czar Nicholas. In 1824 he was appointed director of the Oriental Institute at St. Petersburg, and in 1825 president of the Academy of Sciences. He is chiefly known for his researches respecting foreign sources for Russian history, the most important results of which are embodied in the *Kritisch-litterarische Uebersicht der Reisenden in Russland bis 1700* (1846). He also wrote on Sanskrit language and literature such volumes as *Versuch einer Litteratur der Sanskritsprache* (1830), translated into English under the title *An Historical Sketch of Sanskrit Literature* (1832).

ADELUNG, Johann Christoph (1732–1806). A distinguished German linguist and lexicographer. He was born at Spantekow, Pomerania; was a journalist and author at Leipzig from 1761 to 1787, and from 1787 until his death chief librarian of the Electoral Library at Dresden. He is principally known for his historico-critical studies of the German language and of Low Latin. His chief works are his *Grammatisch-kritisches Wörterbuch der hochdeutschen Mundart* (Dictionary of High German, 1808), in which he took Dr. Johnson as his model, and his *Ueber den deutschen Stil* (1785; 4th ed., 1800). His *Ueber den Ursprung der Sprache und den Bau der Wörter* (1781) is an important landmark in the early history of comparative philology. From 1784 to 1787 he was the continuer of Jöcher's *Allgemeines Gelehrten-lexicon*.

ADEMP'TION (Lat. *adimere*, to take away). The cancellation or reduction of a legacy either by voluntary act of the testator or by loss or destruction of the thing bequeathed. The term is properly used only in connection with legacies, although it is sometimes used interchangeably with advancement (q.v.), and some courts also treat the term as synonymous with satisfaction (q.v.). If a testator *in loco parentis*, before his death, made a gift to his legatee of the same kind as the legacy, the presumption is that the gift was made as part of, or in place of, the legacy; and it is, therefore, adeemed *pro tanto*. Specific legacies may be adeemed by the sale or alienation by the testator of the property bequeathed, or by its loss or destruction, and general legacies are adeemed by lack of sufficient assets to pay them. See Legacy.

ADEN, ä'den *or* ā'den. A peninsula and strongly fortified town near the southwestern end of Arabia, situated in lat. 12° N., and long. 45° 5′ E., and connected with the mainland by a narrow sandy isthmus (Map: Asia, O 7). In a broader sense the name of Aden is applied to the whole British territory in that part of Arabia, which includes, besides the peninsula and the isthmus, a small strip of territory on the mainland, with a total area of 75 square miles, or with the island of Perim 80 square miles. Politically this is a part of the Bombay presidency, British India. The peninsula proper is of volcanic origin and reaches in the peak of Jebel Shan-shan an altitude of 1775 feet above the sea. The climate of the region is healthful, but the scarcity of rain makes cultivation of the soil impossible, so that all the necessaries of life have to be imported. Water is obtained partly from the wells within the crater in which the town of Aden is situated and partly from the hills. The town of Aden is strongly fortified. The most populous settlements are Steamer Point and Shaikh Othman on the mainland. There are two harbors, but only one of them, Aden Back Bay, on the western side of the peninsula, is of any commercial importance. Owing to its favorable location, Aden was of considerable importance already in Roman times, when it was an entrepôt for the trade between the Roman Empire and the east. In the beginning of the sixteenth century it was taken by the Portuguese, who were succeeded by the Turks in 1535. From the seventeenth century until the British occupation, Aden was under the rule of the Sultan of Sana and some native chiefs. In 1839 it was captured by the British as a punishment for the maltreatment to which the crew of a shipwrecked British vessel had been subjected by the natives in 1837. The great importance of Aden as a

coaling station and port of call began with the opening of the Suez Canal. The population, which in 1839 was less than 1000, was 43,974 in 1901 and 46,165 in 1911. The trade is principally one of transshipment. Exclusive of government stores and specie, imports and exports in the year 1911–12 were valued at £2,643,276 and £2,318,595, respectively. The chief articles of commerce are coffee, gums, hides, skins, piece goods, and tobacco. The territory is administered by a political resident, who is also the military commander. A territory of about 9000 square miles in Arabia, officially reckoned a British protectorate, Socotra, and the Kuria Muria Islands, are administrated from Aden. An agreement defining the boundaries of the protectorate was concluded with the Turkish government in 1902, and the delimitation of the frontier was completed in 1905. Consult F. M. Hunter, *Aden* (London, 1877), and Lucas, *Historical Geography of the British Colonies* (Oxford, 1906–07).

ADENEZ, ȧd'-nȧ′, or **ADANS LE ROI,** ȧdäN′ *le* rwȧ′, also written ADENÈS and ADENET. A trouvère of the thirteenth century. He is first known as a minstrel at the court of Henry III, Duke of Brabant, whose reign ended in 1261. Later he was for a time in the service of Guy de Dampierre, Count of Flanders; then he went to France, where he was in high favor with the royal family. His surname of *le Roi* is commonly understood to have come from the authority which he exercised as leader of the minstrels at the Brabantine court. His greatest work is the *Cléomadès* (of which an edition was published in 2 vols., Brussels, 1863–66), a long poetical romance. Previously he had written a number of *chansons de gestes* from the epic cycle of Charlemagne, *Les enfances Ogier* (edited Brussels, 1874), and *Berte aus grans piés* (edited Paris, 1832), and also *Buèves de Commarchis* (edited Brussels, 1874). Consult: Comfort, "Adenet le Roi; the End of a Literary Era," in the *Quarterly Review*, vol. ccxviii (London, 1913).

ADENIS-COLOMBEAU, ȧ′dᵘnĕ′kō′lōN′bō′, JULES (1823–1900). A French dramatist. He was born at Paris and was educated at the College Bourbon (Lycée Condorcet). He wrote a large number of comedies and vaudevilles, as well as libretti for comic operas and operettas. Among his independent works are *Philanthropie et repentir* (1855); *Une crise de ménage* (1857); *Les chasseurs et la laitière* (comic opera in one act, music by Gevaert, Opéra Comique, Paris, 1865); *Les trois souhaits* (comic opera in one act, music by Poise, Opéra Comique, 1874). In collaboration with Plouvier, Decourcelle, Tourte, Granvallet, Rostaing, and others, Adenis-Colombeau produced works, of which the following are the more important: *Madame Pygmalion* (Bouffes Parisiens, 1863); *La jolie fille de Perth* (opera in four acts, music by Bizet, Théâtre Lyrique, 1867); *La czarine* (drama in five acts, Ambigu, 1868); *La fée des Bruyères* (Brussels, 1877); *Les templiers* (opera in five acts, Brussels, 1886).

ADENITIS, ȧd'ĕ-nī′tĭs, or **LYMPHADENITIS,** lĭm′fȧd- (Gk. *ἀδήν, adēn*, gland; Lat. *lympha*, water). An inflammation of the lymphatic glands. Lymphangitis is inflammation of the lymphatic vessels which lead into and bind together these glands. In both structures the inflammation may assume an acute or chronic form. Acute lymphadenitis and lymphangitis usually take their origin from a wound or from some form of sore on the skin or a mucous membrane. The inflammatory process extends from the initial lesion along the chain of lymphatic vessels, and its presence is indicated by bright red lines over the course of the lymphatic vessels leading from the wound, and by heat, swelling, pain, and tenderness in the glands with which these vessels communicate. If infective microorganisms, bacteria, are present at the time of the injury, or subsequently find their way into the tissues, a suppurative inflammation results, and pus is formed in and around the affected glands. Where the inflammation is severe, or the infection intense, such general symptoms as fever, headache, vomiting, and prostration are present. The chronic forms of adenitis are usually due either to tuberculosis or syphilis. In addition to the local enlargement of the glands, and the softening and suppuration that often follows, are found the general symptoms of the two diseases named. The treatment of acute adenitis consists in putting the affected part at rest, using such bandages and supports as may be necessary, the application of moist antiseptic dressings, the use of a non-stimulating diet and of laxatives. If suppuration ensues, an incision must be made and the pus allowed to escape. The chronic forms of adenitis are met by tonic and constitutional treatment, and, when this is unsuccessful, surgical removal of the enlarged glands is indicated.

AD'ENOID, ADENOIDS (Gk. *ἀδήν*, gland; *εἶδος*, resemblance); also called POST-NASAL or ADENOID VEGETATIONS, NASO-PHARYNGEAL TONSIL, LUSCHKA'S TONSIL. A term now generally applied to an excessive growth of spongy tissue in the naso-pharynx, that region lying above and back of the soft palate. This growth begins in early infancy, often being well developed at the age of three months, and continues, if not removed by operation, until puberty. During the first few years it is of a soft, spongy nature, prone to bleed easily, but becomes harder and more fibrous as adult life approaches. It is frequently accompanied by enlarged tonsils and swollen cervical glands, but is not confined to the tubercular.

Adenoid tissue is present in the normal child and becomes detrimental only when it takes on an unusual growth. This enlargement, or hypertrophy, is due to various causes, among which heredity undoubtedly plays an important rôle. Bad hygienic surroundings, improper feeding, poor ventilation, dust-laden air, and indeed any condition causing a lowered systemic resistance predisposes to its development, but it is common in all classes and in all climates. Adenoids cause such a narrowing of the air passage that breathing through the nose is difficult or impossible. This, in aggravated cases, gives rise to a characteristic facial expression with open mouth and a drawn, vacant, semi-idiotic look. The difficult nasal respiration prevents symmetrical growth of the facial bones, so that the upper jaw may become narrowed, the teeth misshapen, and the hard palate unduly arched. Mentally the child is sluggish, inattentive, and unable to concentrate his attention on anything for more than a few minutes. This condition is termed *aprosexia*. By preventing proper inflation of the lungs the chest becomes flat and deformed. And because the indrawn air is not purified of dust and germs by passing through the nose, the child is subject to colds, bronchitis, tuberculosis, and pneumonia. Asthma is not infrequently associated with adenoids. In the

nursing infant sucking becomes difficult. Sleep is impaired and is often interrupted by attacks of smothering. In older children mouth-breathing is the rule, especially at night, with snoring and "night-terrors," the latter due to semi-suffocation.

Adenoids cause a swollen, congested condition of the mucous membrane lining the nose and throat, thereby producing an excessive secretion of mucus, or catarrh. The "snuffles" in young children, and cough or hawking in the older, are usually due to this disease. There is a tendency to nosebleed and to bleeding from the mouth. The voice becomes thick and unmusical, with a nasal quality. An important and common complication is the blocking up of the eustachian tubes. These tubes, one on either side, lead from the naso-pharynx to the ear, and maintain an even air pressure within the ear drums. Any impairment of them causes deafness, earache, or abscess. In this way, by preventing proper ventilation of the drums, adenoids become the main cause of deafness and of "running" ears. Digestive disturbances, vomiting and catarrh of the stomach and intestines, may be caused by the constant swallowing of mucus. During the infectious diseases this growth adds a serious menace. Indeed the presence of these vegetations hinders the entire mental and physical development of the child.

Except in cases of deformed palate adenoids cannot be seen by direct vision. Rough or granular masses of tissue appearing on the back wall of the throat are suggestive, however, and the medical examiner can easily confirm the diagnosis with his finger or, in older children, by means of a small mirror.

Treatment consists in the early and complete removal of the growth, preferably under a general anæsthetic. Any other treatment is useless and often means a serious loss of time. If the diseased condition is sufficient to cause any of the symptoms mentioned, then the sooner surgical aid is invoked the better. The operation in skilled hands is practically without danger, the slight risks being from the anæsthesia and from possible hemorrhage. The latter is serious only in bleeders, on whom no operation should be attempted. Many cases undoubtedly get well without treatment, but always at a serious risk to the child.

Recurrence of the disease is frequent under the age of four years, especially following measles and whooping-cough, and in children with nasal obstruction.

The timely removal of adenoids causes, in the great majority of cases, a marked mental as well as physical improvement. The child's mind becomes more active, and he increases in weight and strength. If, however, operation be delayed until bone development has largely progressed, the benefits are not so great, and mouth-breathing may become a fixed habit. In the older children and young adults, however, it is important to remove the growths if for no other reason than in the hope of preventing deafness.

Although little was known of this disease until recent years, it has probably always existed in the human race. See THROAT.

ADERBAIJAN, ä'dĕr-bī-jän', or **ADERBIJAN.** See AZERBAIJAN.

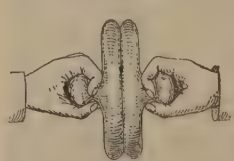
ADERNÒ, ä'dĕr-nō'. A city of Sicily, 23 miles northwest of Catania, southwest of Mount Etna, and 1905 feet above sea level (Map: Italy, J 10). The ancient Hadranum was founded by Dionysius I about 400 B.C. Among interesting ruins near by are fragments of the Sikelian temple of Hadranos, reputed to have been guarded by 1000 dogs, and remains of the Ponte Carcari, an aqueduct. Roger I founded, in 1157, the convent of Santa Lucia. A Norman castle, also erected by him, still stands and is used as a prison. Fragments of frescos still extant represent Adelasia, Roger's granddaughter, taking the veil. In 344 B.C. Hicetas of Syracuse was defeated here by Timoleon. Adernò is the market town of a flourishing agricultural district. Pop., 1901, 25,689; 1911, 30,190.

ADERSBACH ROCKS, ä'dĕrs-bäk. A group of sandstone rocks near the village of Adersbach, on the northeastern frontier of Bohemia. They are about 4 miles long and over 1 mile in width, and rise in some parts over 200 feet. They are remarkable for their fantastic form, which has been produced by the rain, frost, and other atmospheric agencies. During the Thirty Years' War the miserable people of Bohemia often found refuge in this locality.

ADHEMAR DE CHABANNES, ä'dē-mär' dē shä'bän' (c.998–1034). French monk and author. He was born at Chabannes, now in the département of Haute Vienne, and was educated at S. Martial in Limoges. He wrote several works concerning S. Martial; but his chief production was a chronicle in three books, extending to 1028. This work was formerly unjustly condemned because of fabulous additions by later copyists; the last of the three books is a very useful historical source. For the value of the various editions, see Molinier, *Les Sources de l'histoire de France*, vol. ii (Paris, 1902). His other works are published in Migne: *Patrologia Latina*, vol. cxli. Adhemar died, in 1034, at Jérusalem while on a pilgrimage.

ADHER'BAL. Eldest son and one of the heirs of Micipsa, King of Numidia, who died 118 B.C. He was killed by order of Jugurtha (q.v.) six years after his father.

ADHE'SION (Lat. *adhæsio*, a sticking to, from *ad*, to + *hærere*, to stick). The phenomenon observed when two bodies are brought into close contact, viz., they become so attached to each other that it requires force to separate them. Adhesion is seen in the case of two solid bodies when their polished surfaces are pressed together, as in the case of the two lead disks shown in the illustration; but it is more evident between solids and fluids, owing to their intimate contact. We have instances of this in the film of water adhering to a piece of glass which is dipped in water and then removed. The adhesion of gases to the surface of solids plays an important part in many processes. A condensed atmosphere of gases surrounds every body, and every particle of a powdered or porous body has its own surface layer of gases. This property of powdered bodies to retain gaseous atmospheres in a state of great condensation is called adsorption.



ADHESION.

ADHESION, IN PATHOLOGY. The term sometimes refers to the closing of a wound. If two granulating surfaces (see GRANULATION) be kept in contact, they may fuse and the wound unite by secondary adhesion—"second intention."

Serous membranes, such as the pleura, pericardium, and peritoneum, when inflamed often become adherent. After operation involving any of these membranes similar inflammatory adhesions may occur. In inflammations of the appendix vermiformis (see VERMIFORM APPENDIX) and the pelvic organs (see UTERUS; OVARIES; FALLOPIAN TUBES), more or less extensive adhesions are apt to occur, interfering with the free motion of the organs or actually drawing them out of proper position.

ADHESION, IN PLANTS. The term is sometimes applied to an apparent coalescence of adjacent cycles; e.g., stamens which seem to be borne upon the tube of the corolla are called "adherent." The term is now passing into disuse.

ADIABATIC, ăd'ī-ă-băt'yk. Without transfer of heat. See THERMODYNAMICS.

ADIABENE, ă'dē-ă-bē'nē. An ancient kingdom, originally the territory between the Tigris and its two tributaries, the Upper Zab (Lycus) and the Lower Zab (Caprus), called by the Aramæans Hadyab, but later including all of Assyria proper as well as temporarily the Mesopotamian province of Nisibis and the district of Ecbatana to the southeast. Before he came upon the throne of Persia Artaxerxes III Ochus (359–336 B.C.) bore the title "King of Hadyab." To judge from the names of the kings in Arsacid times, the dynasty must have been Macedonian. At the end of the first century B.C. Monobazus I reigned over Adiabene. His wife, Helena, became a convert to the Jewish religion. About 25 A.D. their son Izates, who succeeded his father, also became a Jew. Helena moved to Jerusalem about 43 A.D. Izates died 55 A.D. and was succeeded by Monobazus II, who also was a Jew. He erected a mausoleum north of Jerusalem to his mother and other members of the family. It has been identified with the so-called "Tombs of the Kings," where two inscriptions have been found, one giving the name "Zaddan, the Queen," in Estrangelo and square Hebrew, the other "Helena" in square Hebrew. In 61 Monobazus II assisted Tiridates against Tigranes. Meharaspes was King of Adiabene in 116 A.D., when the country was conquered by Trajan, who made it a Roman province under the name of Assyria. Hadrian, however, allowed it to resume its semi-independence under Parthian suzerainty. Septimius Severus conquered Adiabene in 195 A.D. and assumed the title "Adiabenicus." After the war of 297 Diocletian and Maximian assumed the title "Adiabenicus maximus," and as a result of the war of 338 Constantius II claimed the same title. The capital of the kingdom was Arbela (q.v.). Consult Grätz, *Geschichte der Juden,* vol. iii. 2, pp. 403, 783 (4th ed., 1888); Marquardt, *Römische Staatsverwaltung,* vol. i, pp. 435 (1881); Schürer, *Geschichtedes jüdischen Volkes,* vol. iii, p. 169 (4th ed., 1909).

AD'IAN'TUM. See MAIDENHAIR.

AD'IAPH'ORISTS (Gk. *ἀ, a,* priv. + *διάφορος, diaphoros,* different). The name given to Melanchthon and those who agreed with him in submitting, in "things indifferent," to an imperial edict. When, in 1548, Charles V issued an edict called the Augsburg Interim, relating to disputed religious doctrines, Melanchthon drew up the Leipzig Interim, in which he yielded several doctrinal and liturgical points as *adiaphora,* "things indifferent." This stirred up a vigorous controversy, which lasted till the adoption of the Formula of Concord (1577), which lays down the law on the matter.

ADI-BUDDHA, ä'dē-bud'dä (Skr. the primordial Buddha). A conception of the supreme deity which arose about the tenth century and prevails especially among the northern Buddhists. He is the spiritual source out of whom through successive emanations of the five Dhyani Buddhas (q.v.) and their less perfect Bodhisattvas (q.v.) came all the visible creation. The similarity of this view to certain Gnostic theories has suggested that it may have been indirectly affected by contact with Eastern Christianity. See BUDDHISM.

ADIGE, ä'dē-jā (ancient *Athesis*). A river of Austria-Hungary and Italy, rising in the Rhætian Alps of Tyrol (Map: Italy, F 2). It is formed by the union of numerous streamlets near Glarus, where it is called Etsch, a name by which the entire river is known in Germany. It flows in a general southerly direction past Meran and Trent, entering Italy midway between Rovereto and Verona. A few miles above the latter town it turns to the southeast and subsequently enters the Adriatic north of the mouth of the Po. Its total length is 250 miles, for 180 of which it is navigable, although not without difficulty, owing to its swift current. It is connected with the Po by a small navigable canal called Adigetto. Its most important tributaries are the Eisack and the Avisio. The Adige is a transit river for the trade of Germany and Italy.

ADI-GRANTH, ä'dē-grănth, primal book. The Bible of the Sikh religion (see SIKHS). It consists largely of poems and legends originating with Nanak (1469–1538 A.D.), the founder of the sect, and the *gurus* ('divine revealers') who immediately succeeded him, its materials having been collected by Arjun (1584–1606), the fourth of these successors. Many of its passages show a very elevated conception of the deity and deal with such problems as predestination, the freedom of the will, etc. Its ethical teachings are notably such as combat the sins of personal selfishness and attachment to the pleasures of the world. A second granth ('book'), known as the "Granth of the Tenth Reign," was composed in 1696 under the direction of Govind Singh, the last of the ten gurus. This more especially exalted the martial virtues and added further legends of the incarnation of God. The sacred books are treated with great veneration in the assemblies of the Sikhs.

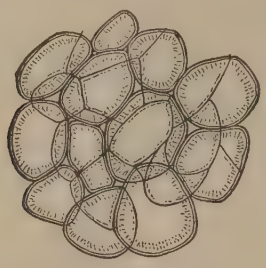
ADIPIC, ă-dĭp'ĭk, **ACID** $(COOH)CH_2CH_2CH_2CH_2(COOH)$. A dibasic acid similar to oxalic acid. It is often obtained in the oxidation of fats by nitric acid. Its derivatives, the stereoisomeric tetra-oxy-adipic acids (COOH).CHOH.CHOH.CHOH.CHOH.(COOH), are close relatives of the simple sugars (mono-saccharides).

ADIPOCERE, ăd'ĭ-pō-sēr' (Lat. *adeps,* fat + *cera,* wax). A peculiar mixture of fatty acids resulting from the decomposition of animal bodies buried in moist places. Its formation has been supposed by some investigators to prove the change of nitrogenous tissues into fats, but this has been much disputed.

AD'IPOSE SUB'STANCES (Lat. *adeps,* fat, grease). Same as fats (q.v.).

ADIPOSE TIS'SUE. A variety of animal tissue consisting of an aggregation of vesicles filled with fat or oil and supported partly by areolar tissue, but chiefly by a fine network of capillary blood-vessels. Each droplet of fat is

contained within a delicate protoplasmic envelope thickened at one part, where a flat nucleus is found. The vesicles are round, oval, or, when closely packed, polyhedral, from mutual compression. The supporting tissue is organic and vital, the vesicles secreting fat from the



ADIPOSE TISSUE (MAGNIFIED).

capillary blood-vessels; the secreted product—the fat—is unorganized and devoid of vitality. Adipose tissue differs from cellular tissue in having the vesicles closed, so that the fat does not escape even when fluid. There is a considerable layer of adipose tissue immediately under the skin; also around the large vessels and nerves, in the omentum and mesentery, around the kidneys, joints, etc. See FATS.

AD'IPO'SIS DO'LORO'SA, See OBESITY.

AD'IRON'DACKS. A group of mountains in northeastern New York. They lie west of the main axis of the Appalachians, as represented in the Green Mountains of Vermont, and constitute quite an independent mountain system. The name Adirondack is applied in a wider sense to that area embracing about 12,500 square miles contained between the valley of Lake Champlain, the St. Lawrence, and the Mohawk rivers. The counties of Essex, Clinton, Franklin, St. Lawrence, Lewis, Herkimer, Hamilton, and Warren lie partly or wholly within its limits. The more mountainous portion is on the east, and the higher peaks are chiefly within Essex County. From northeast to southwest the individual mountains become less pronounced, and the surface grades into a plateau of 1500 to 2000 feet altitude. Two peaks, Mount Marcy (5344) and Mount McIntyre (5112) are the highest in the State, while several others, Whiteface, Dix, Giant, Haystack, Skylight, and the Gothics, are but little lower. The mountains are grouped in minor ranges, which run a little east of north, and which are separated by deep, often narrow, valleys, as the depressions of Lake George, of the Schroon-Boquet rivers, of the Boreas-Ausable, and other rivers. The ranges approach Lake Champlain, *en échelon,* and produce on the lake shore a succession of bold, rocky headlands and open, receding bays and valleys. As a rule, the mountains are dome-shaped in their outlines; but some sharp peaks, like Whiteface, exist. Precipitous escarpments over 500 feet high are common. Thus picturesque passes occur which are a delight to travelers. The best known are Wilmington Notch, Indian Pass, and Avalanche Pass. Deer's Leap and Roger's Rock on Lake George are similar.

Drainage. The mountains constitute the water-shed between the Hudson and the St. Lawrence drainage systems, but the actual divide is a very irregular line that is due to the glacial drift. Thus Lake Champlain and Lake George rise far to the south and discharge into the St. Lawrence; small ridges of drift alone separate them from the Hudson, which rises a hundred miles to the northwest of the heads of their basins and flows around their southern ends. In the heart of the mountains rocky divides of older date separate the streams. The main tributaries of the Hudson are the Sacondaga, Schroon, Boreas, and Indian rivers. The Mohawk receives East and West Canada creeks. The Black River carries to Lake Ontario the contributions of the Moose, Beaver, and several minor streams. The Indian, Oswegatchie, Grass, Raquette, St. Regis, Salmon, and Chateaugay flow into the St. Lawrence. The Chazy, Saranac, Ausable, and Boquet discharge into Lake Champlain. In the eastern portion all these streams follow the northeast-southwest structural lines until they can break across the ridges to the great lines of drainage.

Lakes. The region has many lakes. The largest are lakes Champlain and George, but hundreds of smaller ones add an indescribable charm to the scenery. The greater number are due to barriers of glacial drift that block the streams. Often they run in chains, apparently indicating former great lines of drainage. The Fulton chain, Raquette, Forked, Long, and Saranac lakes are strung out in a northeast and southwest series and are familiar summer resorts.

Geology. The Adirondack region is formed almost entirely of ancient Pre-Cambrian crystalline rocks. Gneisses and coarsely crystalline igneous varieties abound, and many smaller areas of crystalline limestones and quartzites are present. The gneisses and crystalline limestones are without doubt equivalents of the Grenville series of Canada. The most abundant igneous rocks are anorthosites, or labradorite rocks, and syenites. All the higher peaks are formed of the labradorite rocks. Basaltic and trachytic dikes, usually but a few feet wide, often intersect these older rocks. On the borders of the ancient crystallines, and on the southeast, as rare exposures from 25 to 40 miles from their edges, are the Paleozoic sediments, beginning with the Potsdam sandstone of the Cambrian system and terminating with the Utica slate of the Ordovician. All the Paleozoic rocks dip at low angles, and while small folds may be sometimes seen, the strata usually appear in faulted blocks. No rocks are found between the Utica slate and the glacial deposits of the Pleistocene period, so that the geological history of this long space of time can only be imperfectly inferred from the physiography. The great ice sheet moved from the northeast to the southwest and covered the highest summits. It spread a mantle of sand and boulders all over the region. On its melting many temporary lakes were formed, of which beaches and deltas are often found. During the Champlain submergence clays were deposited in great quantities in the Champlain valley.

Flora. The flora is of a pronounced northern character as compared with that of southern New York, but it naturally varies with the altitude. On the higher summits many small boreal plants remain as relics of the glacial epoch. The tree distribution is significant. Chestnuts penetrate only the southern and lower and more open valleys, whereas the spruce is found only at 1000 feet and more above the sea.

Fauna. The animals are likewise those of the north. Moose, though once abundant, are

now exterminated. Black bears are frequent, and deer are numerous because protected by game laws. The smaller animals are those characteristic of the north. Of fish, black bass and brook trout are most sought, and in the larger lakes lake trout are frequent. Salmon are now extinct.

Resources. The Adirondacks contain vast deposits of iron ore, chiefly magnetite, which is extensively produced near Port Henry, on Lake Champlain, at Lyon Mountain on the north and at the Benson mines on the west. The region was once the home of the bloomery process, but almost all the old forges are in ruins. At the head waters of the Hudson on Lake Sanford there are immense bodies of titaniferous magnetite not as yet utilized. Building stone in the form of green granite has been quarried near Keeseville, and a highly prized sandstone is produced near Potsdam on the northwest. Marble is found near Gouverneur on the west, and to some extent in the Champlain valley. Talc is extensively mined near Gouverneur. Graphite occurs in the vicinity of lakes George and Champlain.

The products of the forests form the most important industries. For lumber, the pine trees have been practically exhausted; spruce is the chief wood sought. The paper-pulp mills, however, consume much more than do the saw-mills. They take either spruce or poplar. The former is stripped from the mountains, where it may not grow again, but the latter rapidly renews itself upon the sandy barrens. After the timber has been cut off, and more especially in earlier years, when the outer mountains were stripped for charcoal, the owners often allowed the taxes to remain unpaid until the tracts were sold by the State at public auction. The State itself has at these times acquired extensive possessions, to which it adds yearly, with a view of preserving the waterways and forming a great public park for the people, and now possesses a million and a half acres. Enormous tracts are also held by private individuals and clubs as recreation grounds. Forestry has received much attention from the State authorities, and the denudation of the mountains by lumbermen has been materially checked.

Summer Resorts. The Adirondack region is one of the most important places for summer recreation for the dwellers in cities of the northeastern United States, and many thousands turn annually to it. Lake George, Schroon Lake, Lake Placid, the Saranacs, the Fulton chain, Long Lake, the Keene valley, and dozens of other localities attract their habitual visitors. The climate is especially adapted to the treatment of pulmonary complaints, notwithstanding extremely low temperatures in winter, frequently reaching —30° or —40° F. Saranac Lake, with its well-known sanitarium, is the chief resort. The establishment of State sanitariums has received favorable consideration from the State government.

Bibliography. For geology and mineral resources, see *Reports of the New York State Geologist,* and *Bulletins of the New York State Museum,* especially those since 1888, containing papers by J. F. Kemp, C. H. Smyth, Jr., H. P. Cushing, and others. For botany, see *Reports of the State Botanist,* and especially *Bulletin 28 of the State Museum.* For forestry, see *Reports of the State Forestry Commission.* All these are published at Albany.

AD'IT (Lat. *aditus,* access, approach). A nearly horizontal passage opened for the purpose of prospecting, entering, draining, or ventilating a mine or mining district. If the opening is driven across the formation, it is called a *cross-cut adit.* In the United States these passages are usually called tunnels, though the latter term, strictly speaking, applies when the opening passes through the hill and is opened at both ends. Very few adits warrant the expense of driving unless they are for drainage purposes where water from the ground above can be intercepted or the water from the ground below can be raised to the adit and discharged through it, thereby saving the extra cost of raising the water from the adit level to the top of the shaft. In the rich silver mines of Japan, before the invention of power pumps, as many as 1500 men were employed at a single property for handling the water, which later was drained by the driving of an adit. The adits to drain the Sado Mine in Japan were started in 1629 and completed in 1639; the length was only 2880 feet. Numerous other short adits were driven in Japan about this time for drainage and ventilation which required many years to complete. An adit in Cornwall opens at the level of the sea, and extends inland about 30 miles, draining the district of Gwennap. It meets some shafts at the depth of 400 feet. The Ernst August adit in the Hartz Mountains is 13 miles long. The Joseph II adit at Schemnitz, in Hungary, is 10 feet high, 5¼ feet wide, extends 10 miles to the valley of the Gran, and is used as a canal and railway passage. The Sutro Tunnel, driven for the purpose of draining and ventilating the Comstock Mines in Nevada, is a cross-cut adit, 4 miles long. The water and air of these mines were so hot that it was difficult to keep labor at work more than one or two hours at a time. The Roosevelt Tunnel at Cripple Creek, Colo., which is also a cross-cut adit, was driven for the purpose of prospecting the formation and draining of the entire district. The New-house Tunnel at Idaho Springs was driven to prospect the ground, drain the upper workings, and serve as a means for entering and conveying ore to the railroad. For a description of early adits, consult vol. xliii of the *Transactions of the American Institute of Mining Engineers;* also, *Handbook of Mining Details;* compiled from the *Engineering and Mining Journal* (New York, 1912).

ADIVE, ȧ-dīv'. The Tibetan fox. See Fox.

AD'JECTIVE (Lat. *adjectivum,* from *ad,* to + *jacere,* to throw, add, literal translation of the Gk. *ἐπιθετικόν, epithetikon,* something added). One of the parts of speech in grammar, a word joined to a substantive to extend its meaning and to limit its application. When *tall* is joined to *man,* there are more properties suggested to the mind by the compound *tall man* than by the simple name *man;* but *tall man* is not applicable to so many individuals as *man,* for all men that are not tall are excluded. Adjectives are variously classified. The following classification is simple and sufficiently complete: Descriptive adjectives, or adjectives of quality and of quantity, and pronominal adjectives. The articles (q.v.) are sometimes included in this class. Nouns, or names of things, are often used in English as adjectives; thus, we say a *silver chain,* a *stone wall.* In such expressions as "income-tax assessment bill," *income* plays the part of an adjective to *tax,* which is, in the

first place, a noun; the two together then form a sort of compound adjective to *assessment;* and the three, taken together, a still more compound adjective to *bill,* which, syntactically, is the only noun in the expression. Languages differ much in their way of using adjectives. In English the usual place of the adjective, when it is not in the predicate, is before the noun. This is also the case in German; but in French and Italian it may follow. In these languages, again, the adjective is varied for gender and number, and in the German for case also. In English it is now invariable, and in this simplicity there is a decided superiority; for in modern languages these changes in the adjective serve no purpose. The only modification of which the modern English adjective is capable is for degrees of comparison.

ADJECTIVE COL'ORS. Those colors in dyeing which are fixed by a base or mordant to render them permanent, as distinguished from *substantive colors,* in which the dye in its natural hue is fixed without the use of a mordant.

ADJECTIVE LAW. The term applied to the rules of law relating to procedure, as distinguished from substantive law (see SUBSTANTIVE LAW), which is the term applied to the common law rules of right which courts are called upon to enforce. Thus, the rule that the owner of real estate is entitled to recover damages for trespass upon it is a rule of substantive law; but the rules determining to which court he should apply for relief and the method he should adopt to obtain it are rules of adjective law. Adjective law thus comprehends the law of the forum, including the conflict of laws, pleading, evidence, rules regulating admission to the bar, and rules for the conduct of cases in and out of court. Consult Holland, *The Elements of Jurisprudence* (9th ed., London, 1900; New York, 1910).

ADJOURN'MENT (Lat. *ad* + Fr. *jour,* belonging to the day). In law, the suspension or winding up of a term or session of a court, as distinguished from the suspension or postponement of a pending cause, which is technically known as a continuance (q.v.). Adjournment may be to a designated time, as from day to day, or it may be indefinite, in which case it is said to be "without day." The suspension of a session to be resumed on the same day is not called an adjournment, but a recess. An adjournment is in the discretion of the court and cannot ordinarily be inquired into by any other tribunal unless the discretion has been abused. The power of adjournment is an inherent attribute of judicial tribunals. Ordinarily the suspension of a judicial sitting at the close of a day to be resumed the next day does not call for an order of adjournment, the session being deemed continuous until the end of the term.

ADJU'DICA'TION (Lat. *adjudicare,* to adjudge). In the most general sense the judicial determination of a controversy. Specifically, in English and American law, the term is used to denote the final determination of a proceeding in bankruptcy. In the Federal Bankruptcy Act of 1898 it is defined as "a decree that the defendant, in a bankruptcy proceeding, is a bankrupt." The phrase "former adjudication" is often used, the rule being that persons shall not relitigate a matter which has been the subject of a former adjudication between them. See JUDGMENT; RES JUDICATA; and the authorities there referred to.

ADJUNTAS, ad-hōōn'thas. A mountain resort in Porto Rico, one of the healthiest and most pleasant towns on the island. It is in the central part, 15 miles northwest of Ponce, and is about 2400 feet above sea level. It is surrounded by coffee and fruit farms. Adjuntas was visited by a disastrous hurricane in 1899. Pop., 1899, 1963; 1910, 1406.

ADJUST'MENT. In the law of insurance, the act of ascertaining the exact amount of indemnity which the party insured is entitled to receive under the policy and of fixing the proportion of the loss to be borne by each underwriter. The nature and amount of damage being ascertained, an indorsement is made on the back of the policy, declaring the proportion of loss falling on each underwriter, and on this indorsement being signed by the underwriters the loss is said to have been adjusted. There has been some difference of opinion as to the nature of the obligation incurred by the underwriter upon agreeing to and subscribing to the adjustment; but it is now settled that the act is not absolutely conclusive upon him, but creates only a contract obligation, from which he may free himself upon proof of fraud, mistake, misrepresentation, etc. For the particular applications of the doctrine to marine insurance, where it is of most importance, see AVERAGE. Consult Arnould, *On Marine Insurance* (London, 1901; Boston, 1909). See INSURANCE.

AD'JUTANT (Lat. *ad,* to + *jutare,* to assist, help). A staff officer. In the United States army, generally a regimental officer of captain's rank appointed by the regimental commanding officer to assist him in the training, discipline, and duties of his command, together with the general supervision of its interior economy. Squadron and infantry battalion adjutants appointed from the lieutenants and field artillery battalion adjutants appointed from captains have similar duties in a more limited degree and sphere. Post, garrison, artillery district, brigade and division adjutant majors have similar relationship to their respective commanding officers. The duties of the position are practically the same throughout the armies of all the great powers. In the United States the regimental adjutant is appointed for a term of four years and the squadron or battalion adjutants two years. Such officers are not eligible for re-appointment, except under certain specified conditions. The application of these regulations was modified by the detached service law of 1912 ("Manchu Law"), which provided that all line officers below the grade of field officer must actually serve two years out of six with a troop, battery, or company of the arm of the service in which they are permanently commissioned. For a description of their duties, consult the *United States Army Regulations.*

ADJUTANT (for origin of name, see above). A large East Indian stork (*Leptoptilus argala* or *dubius*), about 5 feet high and 5 feet in length. It is chiefly white, but the back and wings are slate-colored, and the head and neck bare and flesh-colored, marked with black. From the front of the neck hangs a long pouch, which is connected with the respiratory system and possibly serves as an air-reservoir under special conditions. "Adjutant" is really a nickname given to these birds, because of an absurd resemblance at certain times to a self-important army officer. The adjutant is very voracious, and though it is especially fond of fresh meat,

its chief source of food is in carrion and offal. It is, therefore, an efficient scavenger, and since it also eats many of the smaller noxious animals, it is protected by law in India. Although so large a bird, its powers of flight are considerable, and it soars to great heights, mingling with vultures in its search for food. The adjutant is found in India and southeastern Asia, a smaller species (*L. javanicus*) occurring in the East Indies. A closely allied species, the marabou (q.v.), inhabits Africa. All three furnish the marabou feathers of commerce, their lengthened under tail and under wing-coverts being of unusual beauty.

AD'JUTANT-GEN'ERAL. A military staff officer with the rank of colonel, one of the assistants of the commanding general of a field army in the execution of his military duties, as in issuing and executing orders, receiving and registering reports, regulating details of the service, and so forth. In the United States army there is also a department known as the *Adjutant-General's Department*, all the officers of which are above the grade of captain and who have, in addition to the title of adjutant-general, the specific title of brigade adjutant or division adjutant when serving as such with a brigade or division in the field. The chief of the adjutant-general's department has the rank of brigadier-general and the title of "the adjutant-general." The adjutant-general is an important officer of the War Department (see ARMY ORGANIZATION), having the rank of brigadier-general. His duties include the management of the recruiting service, the collection of military information, the preparation of annual returns of the militia, the custody of all records, etc. Most of the individual States also have adjutant-generals, performing similar duties with respect to the militia of their several States.

AD'LER (*Ger. pron.* äd'lēr), CYRUS (1863—). Founder of the American Jewish Historical Society. He was born at Van Buren, Ark., graduated at the University of Pennsylvania (1883), became associate in Semitic languages at Johns Hopkins, and in 1892 librarian of the Smithsonian Institution. As special commissioner for the World's Columbian Exposition at Chicago, he spent fifteen months in Egypt, Turkey, Servia, and Persia in 1890–91, and obtained most of the Oriental collections for that exhibit. He was chosen one of the editors of the *Jewish Encyclopædia* and, in 1899, editor of the *Jewish Year Book*. In 1905 he became assistant secretary of the Smithsonian Institution and, in 1908, president of Dropsie College for Hebrew and Cognate Learning. Among his publications are *The Shofar, Its Use and Origin* (1893); *Told in the Coffee House* (with Allan Ramsay, 1898), a series of folk tales collected in Constantinople; *International Catalogue of Scientific Literature* (1905); *Jews in the Diplomatic Correspondence of the United States* (1906).

ADLER, FELIX (1851—). A German-American educator and reformer. He was born Aug. 13, 1851, at Alzey, Germany, and came in 1857 to the United States, where his father had been called to the ministry of Temple Emanu-El at New York. After graduating at Columbia College in 1870, he studied philosophy and economics at the universities of Berlin and Heidelberg, receiving the degree of Ph.D. in 1873. On his return to New York he was appointed professor of Hebrew and Oriental literature at Cornell University and held this position from 1874 to 1876, when he organized in New York the Society for Ethical Culture (q.v.), with which his name has since been identified. He became widely known as a lecturer and writer, serving as an editor of the *International Journal of Ethics*. In 1902 Dr. Adler was called to the chair of social and political ethics created especially for him in Columbia University. He was also Roosevelt professor at the University of Berlin for the year 1908–09. He took a conspicuous part in the agitation against child labor and other evils. His principal literary works are *Creed and Deed* (New York, 1877); *The Moral Instruction of Children* (New York, 1898); *Marriage and Divorce* (1905); *Life and Destiny, or Thoughts from the Ethical Lectures of Felix Adler* (1905); *The Religion of Duty* (1905; 2d ed., 1912); with W. H. Maxwell, *What the Ethical Culture School Stands for* (1910).

ADLER, FRIEDRICH (1827–1908). A German architect and art historian. He was born at Berlin; studied at the architectural academy there and later traveled widely. He was appointed professor in the Berlin Academy in 1863, and from 1877 until his retirement in 1903, he was consulting architect to the Prussian Minister of Public Works. He designed several church structures, including Christ Church and St. Thomas's at Berlin, St. Paul's at Bromberg, and the Church of the Redeemer at Jerusalem (1898). He made an extensive study of the architecture of ancient times and of the Middle Ages, and took an active part in the excavations at Olympia. Besides contributions to official reports, he published *Mittelalterliche Backsteinbauwerke des preussischen Staats* (1858–98); *Die Baugeschichte von Berlin* (1861); *Baugeschichtliche Forschungen in Deutschland* (1870–79); *Das Mausoleum zu Halikarnass* (1900); *Zur Kunstgeschichte* (1906).

ADLER, GEORG (1863–1908). A German economist and author, born at Posen. He lectured as extraordinary professor of sociology at the University of Basel, Switzerland, and afterward became professor of political economy in the University of Freiburg, Germany. In 1900 he was made professor of political science in Kiel University. His writings on economic and sociological questions, in which he usually advocates moderation as opposed to revolutionary agitation, include *Karl Marxsche Kritik* (1886); *Internationaler Arbeiterschutz* (1888); *Social-Reform und Theater* (1891); *Staat und Arbeitslosigkeit* (1894); *Die Social-Reform im Altertum* (1898); *Geschichte des Socialismus und Communismus* (1900); *Ueber die Epochen der deutschen Handwerkerpolitik* (1903); *Die Bedeutung der Illusionen für Politik und sociales Leben* (1904); *Stirners Anarchist* (1907); *Hauptwerke des Sozialismus und der Sozialpolitik* (1908–09).

ADLER, GEORGE J. (1821–68). A German-American philologist. He was born in Germany, and at the age of 12 came to New York. He graduated at the University of New York in 1844 and in 1846 was appointed professor of German in that institution, which position he held until 1854. His last years were clouded with insanity. He published *German-English Dictionary* (1848; frequently reprinted); *German Grammar* (1868); *Wilhelm von Humboldt's Linguistic Studies* (1868), and a translation of Fauriel's *History of Provençal Poetry* (1860).

ADLER, GUIDO (1855—). An Austrian

writer on music. He was born at Eibenschütz (Moravia) and attended the gymnasium at Vienna, where he conducted a chorus of the pupils. At the same time he received his musical education at the conservatory (under Bruckner and Dessoff). In 1880 he received the degree of Ph.D., his dissertation being *Die historischen Grundklassen der christlich-abendländischen Musik bis 1600*. From 1881 to 1885 he was lecturer on the science of music at the University of Vienna. In 1885 he became professor of music at the German University of Prague. After the retirement of Hanslick (q.v.) he returned in 1898 to the University of Vienna as professor of the history and theory of music. Together with Chrysander (q.v.) and Spitta (q.v.) he founded in 1884 the important *Vierteljahrsschrift für Musikwissenschaft*, to which he subsequently contributed many valuable articles dealing with the history and the theory of music. In 1884 he began the monumental publication *Denkmäler der Tonkunst in Osterreich*, published by Artaria in Vienna and Breitkopf and Härtel in Leipzig, which is subsidized by the Austrian government. Up to 1913, 19 double volumes appeared containing works of the old Austrian composers and such masters as spent the greater part of their life in Austria. Many of the historical introductions were written by Adler himself. During the International Exhibition at Vienna in 1892 he acted as chairman of the historical section. His essays, dealing chiefly with the history of music and embodying the result of original research, were published in various musical periodicals. An important contribution to the æsthetics of music is his book *Der Stil in der Musik* (1911).

ADLER, Hermann (1839–1911). Chief rabbi of the United Hebrew Congregations of the British Empire. He was born at Hanover, Germany, and was educated at London, Prague, and Leipzig, receiving the degree of Ph.D. in 1862. In 1863 he was appointed principal of the Jews' College, London, where, notwithstanding his appointment as minister of the Bayswater Synagogue in 1864, he remained as tutor of theology until 1879, and upon his unanimous election as chief rabbi of the United Hebrew Congregations of the British Empire in 1891 he became president of the college. Afterward he became minister of the Cathedral Synagogue in Duke's Place. He wrote many essays, such as *Ibn Gabirol, the Poet Philosopher, and his Relations to Scholastic Philosophy* (1864); *Can Jews Be Patriots?* (a reply to Goldwin Smith, *Nineteenth Century*, 1878); *Anglo-Jewish Memories, and Other Sermons* (1909).

ADLER, Nathan Marcus (1803–90). Chief rabbi of the United Hebrew Congregations of the British Empire. He was born in Hanover and educated at the universities of Göttingen, Erlangen, and Würzburg. He was appointed chief rabbi of Oldenburg (1830), of Hanover and the provinces a year later, and, in 1845, chief rabbi of the British Empire. He was one of the organizers of Jewish schools in London and the provinces; he joined Sir Moses Montefiore in his appeal for the Holy Land, by which £20,000 was raised; was one of the founders of the "United Synagogue," and was founder and first president of the Jews' College, London. He published several important Hebrew works, among them *Netinah la-Ger* (1875), a commentary on the Targum of Onkelos, besides volumes of sermons, including *Sermons on the Jewish Faith*.

ADLER, Samuel (1809–91). A German-American rabbi and author, born at Worms, Germany. He studied at the universities of Bonn and Giessen, was rabbi of congregations in Alzey and vicinity (1842–56), and rabbi of the congregation Emanu-El of New York City (1857–74). He was a learned Talmudic scholar and an earnest progressionist. His works include *Jewish Conference Papers* (1880); *Benedictions* (1882); and *Kobez 'al Yad* (*Collections*, 1886).

ADLER, Victor (1852—). An Austrian Socialist leader, born at Prague, and educated in the Vienna University. After visiting England, he wrote a book on factory inspection there. He founded at Vienna a Social Democratic weekly journal, which was suppressed by the government. Afterward he founded and became editor-in-chief of the *Arbeiter Zeitung*. He was a member of the lower Austrian diet, and in 1907 of the Imperial Council. His publications include *Die Arbeiter Kammern und die Arbeiter* (1886).

ADLERBERG, äd'lĕr-bĕrk, Vladimir Fiodobovich, Count (1790–1884). A Russian statesman, born in St. Petersburg. In 1817 he was Adjutant to the Grand Duke Nicholas, and later, for his devotion during the Decembrist revolution in 1825, became Major-General, accompanying the Emperor during the Turkish campaign in 1828. He soon became Director of the War Department and in 1841 was made Postmaster-General, distinguishing himself by many reforms in the postal service. He was made General of Infantry in 1843, Count in 1847, and in 1852 Minister of the Imperial Household, in constant attendance on the Emperor, and kept the position under Alexander II, retiring in 1872.

ADLERCREUTZ, äd'lĕr-kroits, Karl Johan, Count (1757–1815). A Swedish general and statesman, born in Finland. He was defeated in Finland by the Russians in 1808, and his estates were confiscated. With Georg Adlersparre he brought about the overthrow of Gustavus IV, who was succeeded on the Swedish throne by Charles XIII. Later the two generals quarreled, and Adlersparre was disgraced, while Adlercreutz remained in favor.

ADLERSPARRE, äd'lĕrs-pä'*re*, Georg, Count (1760–1835). A Swedish general and statesman; educated at the University of Upsala; entered the army, took part in the war against Russia in 1788 and in the campaigns against Norway. After the death of Gustavus III he devoted himself to the study of political economy. He reëntered military service in 1808 and fought against Russia; and the next year joined with Adlercreutz in the movement to elevate Charles XIII to the Swedish throne. In 1810, finding himself succeeded in the new King's favor by his rival Adlercreutz (q.v.), he withdrew from court. In 1831 he was fined for publishing secret state papers, including his correspondence with Charles XIII.

AD LIB'ITUM (Lat. at will, It. *a piacere, a piacimento*). In music, a term indicating that the part, accompaniment, embellishment, or instrument may be omitted at will. Thus, a song written with 'cello accompaniment *ad libitum* may be sung to the piano accompaniment alone or with the 'cello added. The term also denotes liberty in tempo and rhythm. See Accompaniment.

ADMEAS'UREMENT. See Measurement of Ships.

ADMEASUREMENT OF DOW'ER (Lat. *ad*, to + *measurement*). In English law, an ancient writ by which an heir could obtain redress against the widow of his ancestor in case the heir or his guardian had, during the heir's minority, assigned to her more land as her dower than she was entitled to. The writ has been superseded by simpler forms of action; but the remedy, often under the same title, still remains wherever the common law principle of dower (q.v.) is recognized, as is still generally the case in this country. Consult Scribner, *Treatise on the Law of Dower* (Philadelphia, 1883), and Roper, *Treatise on the Law of Property Arising from the Relation between Husband and Wife* (Philadelphia, 1841).

ADME'TUS (Gk. *Ἄδμητος, Admētos*). A mythical King of Pheræ, in Thessaly. He was in the Calydonian hunt and the Argonautic expedition. By the aid of Apollo, who was his herdsman during a year of banishment from Olympus, he won for his wife Alcestis, daughter of Pelias. Apollo also procured for him a prolongation of life, if another would die in his stead. Alcestis consented, but was sent back from the lower world by Persephone, or, according to Euripides, was rescued by Hercules from death at the tomb itself. The story forms the subject of a celebrated drama by Euripides (q.v.), *Alcestis*. Compare Browning, *Balaustion's Adventure* (London, 1871).

AD'MI. Cuvier's gazelle. See GAZELLE.

ADMIN'ISTRA'TION (Lat. *ad*, to + *ministrare*, to attend, manage). In general, the management or conduct of any business; especially, in politics, executive government. In its broadest sense, in public affairs, it means the full activity of the government engaged in the practical exercise of its authority in conformity with the constitution of the nation. But, usually, administration refers only to those functions of the government exercised through the executive and, in some cases, through the judicial department, designed to carry into execution the laws enacted by the legislature. The organization of administration may be divided into two kinds, centralized and localized. In France the administration is highly centralized, every official being held to a strict account by those of a higher order. In the United States the national administration is centralized; state administration is, in general, decentralized, or localized. In the case of most of the States not all, if any, of the chief executive officers are subject to the control of the governor; the execution of State laws is often left to local elective officials who are not subject to central control. Current tendencies in the States are, however, in the direction of centralization. In a broader sense the administration includes the whole executive organization of government.

In American national politics the administration, in its narrower sense, signifies the president and his cabinet; in State and local politics, the governor and his chief executive officials, or the mayor and his department heads. This is the sense in which the term is used in England and on the Continent. In England the administration, represented by the premier and his cabinet, is always composed of members of the party having the legislative majority. See GOVERNMENT; MUNICIPAL GOVERNMENT; CIVIL SERVICE; also *Government* under UNITED STATES, FRANCE, GERMANY, ETC. Consult Goodnow, *Principles of the Administrative Law of the United States* (New York, 1905); id., *Comparative Administrative Law* (New York, 1893); Fairlie, *The National Administration of the United States* (1905); Freund, *Cases on Administrative Law* (St. Paul, 1911).

Administration, in Law. A term applied to the management and disposal of a deceased person's estate. It includes payment of debts, getting in of credits and choses in action belonging to the deceased person, and the distribution of his personal estate to his legatees or next of kin. Anciently, the king as *parens patrii* administered decedent's estate through his officers. By the statute of Westminster II this duty was delegated to the ordinary, and by later statute he was directed to grant administration to the husband or wife or next of kin of the decedent. To-day the jurisdiction over decedents' estates is committed in England to the Court of Probate, and in the United States to courts variously known as probate courts, surrogates' courts, and orphans' courts. The officer of administration, if appointed by will, is called an executor; if not nominated by will and appointed by the court having jurisdiction over decedent's estates, he is called an administrator. An administrator may be *temporary*, when he is appointed pending litigation upon the question as to who is entitled to administer upon the estate; or *with the will annexed*, when the will failed to name an executor, or the executor named fails to qualify for his office; or *de bonis non*, that is, to administer upon the goods not administered by a prior administrator, who no longer retains his office because of death or removal. Administration may also be ancillary, in which case the officer of the administration is said to be an ancillary executor or administrator. The distinction is a consequence of the rule that the place of administration is the domicile of the decedent, and that the administrative officer has no authority outside the jurisdiction where he is appointed or confirmed. Thus, when a decedent leaves property in two jurisdictions, his estate should be administered in the jurisdiction of his domicile, and the administrative officer, in order to act in the other jurisdiction, should obtain an appointment ancillary to his appointment in the domiciliary jurisdiction. It is then his duty to transmit the assets to the jurisdiction of domicile, to be there administered. By the canon law the administrator or executor becomes vested with title to the decedent's personal property. This is still the rule by statute in most jurisdictions. In addition to the duties already referred to, special duties might be imposed upon an executor by the will. In most jurisdictions the administrator, and in some the executor, is required to give a bond for the faithful performance of his duties. He remains bound on his obligation, and subject to the direction of the court, until his final accounting and discharge by order of the court. See Schouler, *Treatise on the Law of Executors and Administrators* (3d ed., Boston, 1901); Woerner, *Treatise on the American Law of Administration* (2d ed., Boston, 1899); Williams, *Treatise on the Law of Legal Representatives* (London, 1899); Woerner and Wizlizenous, *Law of Decedents' Estates Including Wills* (Boston, 1913).

ADMINISTRATION, MILITARY. A form of government which takes the place of the civil governing powers in regions placed under martial law. The city of Paris, during the war with

Germany, 1870–71, and Cape Colony, South Africa, during the recent Boer War, are cases in point. The term "military administration" is also used to designate the system which regulates the government of the military establishment both in peace and war. See MARTIAL LAW.

ADMINISTRATION OF ESTATES. The settlement of the estate of a decedent or a bankrupt. Administration of the estates of deceased persons was formerly in England committed to the ecclesiastical courts, acting through an administrator, appointed by the court, or an executor designated by the last will and testament of the deceased. It is now under the jurisdiction of the Divorce, Probate, and Admiralty Division of the High Court of Justice. In the United States it is usually the function of special tribunals, known variously as probate or surrogate's courts, but is often committed to the ordinary tribunals, as county courts. For the principles governing the administration of decedents' estates, see EXECUTOR AND ADMINISTRATOR. The administration of the estates of bankrupts is committed to a trustee in bankruptcy. See BANKRUPTCY.

ADMIN'ISTRA'TIVE LAW. That part of the law which regulates the enforcement of the will of the State as expressed by the authorities which are permitted by the governmental system to express that will, particularly the legislature. Since it is necessary under all governmental systems that authorities be formed for the purpose of enforcing the law, administrative law treats, in the first place, of the organization of the administrative authorities, both those having jurisdiction over the entire State (who are known as central administrative authorities), and those having jurisdiction over only a portion of the State, who are known as local authorities. In the United States, e.g., the administrative law treats: of the President; the heads of the Federal executive departments and their subordinates (both at Washington and in the districts into which the country is divided for purposes of Federal administration, such as the customs and internal revenue districts); or the State governor and State officers generally; or the county, town, and city officers. Since no administrative officer may legally take any action which he is not authorized by the law to take, the administrative law treats, in the second place, of the powers and duties of administrative officers; in other words, of administrative functions. Finally, since there is no use in delimiting by law the powers and duties of administrative officers, unless some means is provided of preventing them from exceeding their powers and forcing them to perform their duties, administrative law treats of the remedies afforded in case of an excess of power or violation of duty. American administrative law thus embraces certain well-defined minor branches of the American law, such as the law of officers, the law of municipal corporations, the law of taxation, the law of public nuisances (whether common law or statutory), the law of extraordinary legal remedies (such as mandamus, prohibition, certiorari, quo warranto, and habeas corpus), as well as the law of equitable remedies, so far as they are applicable to public authorities.

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AD'MIRABLE CRICH'TON, krī'ton. See CRICHTON, JAMES.

ADMIRABLE DOC'TOR. A translation of the Latin, *Doctor Admirabilis*, a title given to Friar Roger Bacon (1214–94) on account of his extensive knowledge.

AD'MIRAL. The title of a naval officer of the highest rank. The word is derived from the Arabic *amīr*, or *amīr al-* ('lord,' or 'chief of the'), forming the first part of many compound words, such as *amīr al-mu'minīn*, 'commander of the faithful'; *amīr al-umarā*, 'commander of the forces'; *amīr al-bahr*, 'commander of the sea'; *amīr al-umarā 'asākir*, 'commander of the troops, marshal.' The term appears to have been introduced into Europe during the Crusades and to have been first used in a definite sense by the Sicilians and afterwards by the Genoese. In French the word is preserved without change, as *amiral;* in Spanish and Portuguese it has developed into *almirante*, and in Italian into *ammiraglio*. The early English form was doubtless similar to that of the French, as we find it spelled *amyrell* and *admyrall*. It was Latinized in England as *admiralius*, and as early as the time of Edward III was Anglicized as *admyrall*. The first English "admiral of the seas" of whom there is any record was William de Leybourne, 1297. His office, however, was not that of a commander of sea forces, but embraced those general and extensive powers afterwards associated with the title of lord high admiral of England; that is, both the administrative functions now vested in the lords commissioners of the admiralty (five in number) and the judicial authority belonging to the present high court of admiralty. The office of lord high admiral was last filled by the Duke of Clarence, afterward William IV. Upon his resignation in 1828 it was put in commission, reverting to a previous practice. The duties of the office were administered by a board of commissioners from 1632 to about 1650, from 1685 to 1702, and from 1708 to 1827, while under the Commonwealth they were performed by a committee of Parliament.

In the United States navy the grades of admiral, vice-admiral, and rear-admiral were established by act of Congress, primarily for the purpose of conferring exceptional distinction upon the great naval commander Capt. David Glasgow Farragut (q.v.). The lowest of these grades, that of rear-admiral, was established in 1862, as was also that of commodore; though the latter had previously existed as a courtesy title without authority of law. The number of rear-admirals on the active list was limited to nine. In 1864 the President was authorized to appoint one of the rear-admirals a vice-admiral. Under the laws, Captain Farragut became the first commodore, first rear-admiral, and first vice-admiral. In 1866 Congress provided for an active list of one admiral, one vice-admiral, and 10 rear-admirals. Farragut was promoted to be admiral, and Rear-Admiral David D. Porter to be vice-admiral. On the death of Farragut (1870), Porter became admiral and Rear-Admiral Stephen Clegg Rowan was promoted to be vice-admiral. With the death of Porter (1891) and Rowan (1890), the grades of admiral and vice-admiral became extinct. In 1899 the grade of admiral of the navy was established by act of Congress. This is a grade above admiral and corresponds to "admiral of the fleet" in the

British navy and a similar one in other naval services. Rear-Admiral George Dewey was promoted to this grade in recognition of his services in the battle of Manila Bay and of his judicious management of the difficult international situation following the defeat and destruction of the Spanish fleet. In 1882 Congress reduced the number of rear-admirals on the active list to six and the number of commodores to 10; but in 1899 the number of rear-admirals was increased to 18 and the grade of commodore on the active list abolished. In addition, the chiefs of the bureaus of the Navy Department have the rank of rear-admiral during their term of office. Under the original act of Congress (Nov. 15, 1776), looking to the establishment of the ranks of admiral, vice-admiral, and rear-admiral, the first named ranked with the general of the army, the second with a lieutenant-general, and the last with a major-general. Since 1862 various acts have confirmed these provisions; but the act of 1899, which abolished the rank of commodore, provided that the first nine rear-admirals should rank with major-generals and the second nine with brigadier-generals. The pay of flag officers is as follows: admiral of the navy and admiral, $13,500; senior nine rear-admirals, $8000; junior nine rear-admirals, $6000. All officers on sea duty or on shore duty beyond seas receive 10 per cent in addition to foregoing amounts. The pay of officers on the retired list is 75 per cent of their active pay at time of retirement. The number in 1913 on this list was 145. The flag of the admiral is a rectangular blue flag with four white stars and is flown at the main; that of the vice-admiral, flown at the fore, is a similar flag, with three stars. The flag of a rear-admiral, flown at the mizzen, is similar in shape, has two stars, and is usually blue in color, but in case two or more rear-admirals are in company the senior flies a blue flag, the juniors fly red flags. For illustration see Plate of United States Flags accompanying FLAG.

In the British navy the admirals are distinguished into four classes: admirals of the fleet, admirals, vice-admirals, and rear-admirals. In former times each grade was sub-divided into three sections, known as admirals (or vice or rear-admirals) of the red, of the white, and of the blue, respectively. The flag hoisted by the admiral (thence called a flag officer) agreed in color with his section; and all the ships under his command carried ensign and pennant of the same hue; but the distinction was otherwise without practical effect and is now abolished. Admiral of the fleet is a higher rank, conferred at the will of the sovereign. The rates of full or sea pay of flag officers are as follows: admiral of the fleet, per day, £6; admiral, £5; vice-admiral, £4; rear-admiral, £3. An admiral commanding-in-chief receives £3 a day additional at home and £4 10s. abroad, as table money. In 1913 there were 92 flag officers on the active list in the British navy: viz., 3 admirals of the fleet, 12 admirals, 22 vice-admirals, and 55 rear-admirals; and on retired and reserved pay, 6 admirals of the fleet, 99 admirals, 13 vice-admirals, and 18 rear-admirals. The admiral of the fleet takes rank with a field marshal, admirals with generals, vice-admirals with lieutenant-generals, and rear-admirals with major-generals.

ADMIRAL. 1. In entomology, any of several nymphalid butterflies, ordinarily the "red" admiral (*Pyrameis* or *Vanessa atalanta*), common throughout North America, Europe, northern Asia, and Africa. It has an expanse of about 2½ inches and is brown, the hinder wings broadly margined with red, including a row of four dark dots; the same color forms a curved diagonal band across the fore wings, beyond which the angle of the wing is spotted with white and edged with purple. (See Plate of AMERICAN BUTTERFLIES.) The caterpillar is 1⅛ inches long, brown and spinous; the chrysalis is brown, naked, and suspended to the food-plant upon which the larva has fed, usually some species of nettle, hop, or related plant. Butterflies of the related genus Basilarchia are called white admirals. 2. In conchology, a cone (*Conus ammiralis*) whose shell was formerly rare and valuable.

AD'MIRALTY, THE. In England, the state department which exercises the administrative functions of the lord high admiral, and which, accordingly, has the management of all matters concerning the British navy and the royal marine. These functions of the lord high admiral have been transferred to and vested in a board of commissioners. (See ADMIRAL.)

The board of admiralty, as at present constituted, comprises five lords commissioners of the admiralty, who decide collectively on all important questions. Besides this collective or corporate action, each commissioner has special duties assigned to him. There are two civil or political lords, and three naval or sea lords. The first lord, who is always a cabinet minister, besides a general control, has the management of naval estimates, finance, political affairs, slave-trade prevention, appointments, and promotions. The first naval lord manages the composition and distribution of the fleet, naval discipline, appointment of inferior officers, commissioning ships, general instructions, sailing orders, and the naval reserve. The second naval lord attends to armaments, manning the navy, the coast-guard, the marines, marine artillery, and naval apprentices. The third naval lord has control over the purchase and disposal of stores, victualing ships, navy medical affairs, transports, convicts, and pensioners. The junior civil lord attends to accounts, mail-packets, Greenwich hospital, naval chaplains, and schools. Naval architecture, the building and repairing of ships, steam machinery, and new inventions are superintended by the comptroller of the navy, who is not a member of the board, but is directly responsible to the first lord. Under the lords are the first secretary (parliamentary), the second secretary (permanent), and the naval secretary (professional), who manage the daily office work. The lords all resign when the prime minister resigns, and those who have seats in Parliament are replaced by others.

ADMIRALTY IN'LET. The central and main passage of Puget Sound (q.v.), forming in its southern part the eastern branch of the arm of the sea which here penetrates the State of Washington. The width varies from one to 10 miles, and the channel is obstructed by relatively few islands. The coast line is marked by a succession of projecting points of land and receding minor inlets, which render the form as a whole exceedingly irregular. Seattle, Tacoma, and Port Townsend are the chief cities on the Inlet. The channel has usually a depth of several hundred feet and thus offers valuable facilities for transportation.

ADMIRALTY ISLAND, *Ĭland* (Map: Alaska, J. 4). An island about 80 miles long well wooded and watered, included in Alaska (q.v.).

ADMIRALTY ISLANDS. A group of about 40 islands, constituting a part of the Bismarck Archipelago (q.v.), lying to the northeast of New Guinea, between 2° and 3° S. lat. and 146° 18′ and 147° 46′ E. long. (Map: East India Islands, L 5). The largest is about 60 miles long from east to west and is covered with rich tropical vegetation. They abound in cocoanut and rubber trees and are inhabited by savages. They were discovered by the Dutch in 1616 and became a German protectorate in 1885.

ADMIRALTY LAW. The system of law and procedure relating to maritime transactions. It owes its name to the fact that originally it was administered in England by the lord high admiral. Not only its rules of substantive law but its procedure were adopted from the civil law and from such sea codes as those of Rhodes (q.v.) and Oléron (q.v.). This fact, and its adaptability to new causes of action, which led suitors to resort to the admiralty rather than to the common law courts, aroused the hostility of the common law bench and bar. The contest between the partisans of the two systems which followed resulted in contracting the jurisdiction of English admiralty courts to very narrow limits. Modern statutes have extended it, and have also made the Court of Admiralty a part of the High Court of Justice, forming it, with the courts of probate and divorce, into the Probate, Divorce, and Admiralty Division. At present the ordinary jurisdiction of English admiralty courts embraces actions to recover possession of a ship, to recover damages for injuries to shipping, to recover seamen's wages, for salvage, for necessaries supplied to a ship, for bottomry, respondentia, and mortgage, for pilotage and towage, for restoration of goods taken by pirates, and for assaults or batteries on the high seas.

By the United States Constitution (Article III, §2), the cognizance of "all cases of admiralty and maritime jurisdiction" is granted to the Federal judiciary. The limits of this grant of judicial authority were in doubt for many years. On the one hand it was insisted that the admiralty jurisdiction of the Federal courts was confined to the cases cognizable by the English admiralty when our States separated from the mother country. On the other hand, it was argued that the broad language of the Constitution extended this jurisdiction to all cases of maritime law. The latter view has prevailed, and to-day the Federal courts of admiralty have cognizance of all maritime cases arising, not only on the high seas and great lakes, but on almost all navigable rivers and canals within the United States. While the United States have no court whose duties and jurisdiction are confined to admiralty cases, the district courts possess exclusive original jurisdiction over all admiralty and maritime cases. From their final decisions appeals may be taken to the Circuit Court of Appeals and to the Supreme Court. The Federal courts sitting in admiralty have criminal as well as civil jurisdiction; but their practice in criminal cases is similar to that of common law courts, including trial by jury. The State courts of this country have no admiralty jurisdiction. Consult: Benedict, *The American Admiralty, Its Jurisdiction and Practice* (Albany, 1900); and Roscoe, *Treatise on the Jurisdiction and Practice of the Admiralty Division of the High Court of Justice* (London, 1882).

ADMIRALTY SOUND. A southern extension of the Strait of Magellan near its middle part, penetrating Tierra del Fuego to a distance of nearly 100 miles. Its mouth is partially blocked by Dawson Island. In the upper 50 miles of its extent its width varies from 5 to 10 miles. The coast land is elevated.

ADMIS'SION. In the law of evidence, a confession or acknowledgment of a party to an action, made at any time, as to the existence of a fact in issue. An admission is valid evidence against the party making it at the trial of the action, but, on the other hand, is never permitted to operate in his favor. While admissions admissible in evidence are most frequently made by a party to the action, they may be made by one acting by his authority or by one identical in interest with him. Thus, admissions made by an agent, or servant, or by the husband or wife of a party, will be received in evidence against him if actually or impliedly authorized by him. Admissions made by one claiming under the same title or interest as the party are also admissible in evidence against him. For example, admissions made by a deceased person during his lifetime are admissible against his executor or administrator, and admissions made by the owner of real estate with reference to his title are competent evidence against his grantee, when the grantee is a party to an action in which his title is in issue. In England and the United States, excepting New York and the Federal courts, the doctrine of admissions made with reference to title to real property has been extended to apply to cases of admissions made with reference to title of personal property and negotiable paper transferred after maturity.

In criminal law admissions of guilt by one accused of a crime are technically known as *confessions*. At common law, confessions were held not to be competent evidence against the prisoner when obtained by threats or promise of favor, and modern statutes have generally still further limited the admissibility of confessions in criminal cases.

Admission should be distinguished from *admission against interest*, a term which embraces a distinct class of evidence. Admissions against interest are statements or book entries made by one against his financial or proprietary interest, and are admissible in evidence in any action in which the truth of the matter stated in the admissions is in issue, provided the person making the admission be dead at the time it is offered in evidence. The person making the statement need not represent or be in privity with a party to the action or have acted by his authority. See the works referred to under EVIDENCE.

ADMONI'TIONISTS. A name applied to the partisans of *An Admonition to the Parliament*, published in 1572 by two Puritan clergymen, and of the *Second Admonition to the Parliament*, by Thomas Cartwright (q.v.), the leader of the sect.

ADOBE, ȧ-dō'bē (Spanish). A Spanish-American name applied to sun-dried bricks made from any suitable material which becomes

hardened on exposure to the sun. Such bricks, employed largely in the arid and semi-arid districts of North America, are usually made in two sizes, the approximate dimensions of which are 18 by 9 by 4 inches, and 16 by 12 by 4 inches. Those of the latter size when laid alone are used as "headers," i.e., with the greatest dimension crosswise to the length of the wall, though a much stronger wall results from a combination of the larger size as headers, with the smaller as "stretchers," or lengthwise to the direction of the wall. The process of baking consists in first exposing the newly moulded adobes to the direct rays of the sun for a day, then turning them for exposure of the under face and continuing the exposure for from seven to fourteen days, eventually stacking the finished product under cover till required for use. Because of the lack of coherency, adobes can be employed only in regions of limited rainfall. Many of the bricks made in ancient Egypt, Assyria, and Babylonia were made of clay mixed with straw and baked in the sun.

Adobe Soil. A term applied to certain clay soils in the western portions of the United States, which, when moist, are of exceeding plasticity, and when dry are of such coherency as to prohibit easy tillage. They are composed of quartz, clay, and other minerals in extreme state of fineness. These soils may be rendered more docile by plowing into the moist clay considerable quantities of sand loam. They cover thousands of square miles in the arid region of the West, principally in the States of Utah, Nevada, Colorado, New Mexico, Arizona, Texas, and California. Under irrigation they show astonishing fertility, yielding undiminished harvests of grains, alfalfa, and other crops year after year. The origin of adobe soils has been something of a puzzle, but it is likely they are of complex derivation, formed in some places by streams that head in the mountains and in other sections by accumulation of wind-blown materials. They may also have been formed by the disintegration in place of clay shales or slates.

ADOLES'CENCE. The period of life extending from puberty (q.v.) to the age of 21 in females and 25 in males. It is marked by active growth, especially in the osseous and muscular systems, and certain vascular tissues. The reproductive organs reach their full maturity during the latter part of the period, at which time there is a partial cessation of the exaggerated nutritive activity prevailing throughout the earlier part. During adolescence the mind becomes conscious of new capabilities; self-assurance and constructive and originating tendencies become apparent. In the boy, extravagant plans, conceit, and egoism are prominent characteristics; in the girl idealizing, reverie, and romantic imagination. It is apparent that the sexual and mental development occurring during this period render proper training and influence during adolescence of the utmost importance. Consult: G. Stanley Hall, *Adolescence* (2 vols., New York, 1907); *Youth: its Educational Requirements and Hygiene*, by the same author (New York, 1912); and for the sexual aspects, Havelock Ellis, *Psychology of Sex* (Philadelphia, 1910).

ADOLF, ä'dôlf. **King of Germany.** See ADOLPHUS.

ADOLF I (?–1220). Archbishop of Cologne from 1194 to 1205. He was one of the foremost opponents of the Hohenstaufen dynasty, and, despite his oath of fealty to Frederick II, and in defiance of the will of the majority, he nominated Otto IV of Brunswick and crowned him at Aix-la-Chapelle, June 9, 1198. He forestalled the papal influence upon the imperial election, and when finally Otto revealed his inability to protect his adherents against Philip of Swabia, Adolphe crowned his opponent (1205). He was excommunicated, and deposed in 1205.

ADOLF I (1353–90). Archbishop of Mainz. In 1371 he was appointed Bishop of Speyer and two years later, after the death of his rival, John, succeeded to the see of Mainz. When, at the instigation of Charles IV and with the consent of the Pope the Landgrave of Thuringia sought to bring about his deposition, Adolph firmly maintained his ground and upon the outbreak of a schism in the Church obtained the papal sanction of Clement VII (Antipope) and Urban VI.

ADOLF, WILHELM AUGUST KARL FRIEDRICH (1817–1905). Grand Duke of Luxemburg, previously Duke of Nassau, the eldest son of Duke William of Nassau by his first wife, Princess Louise of Saxe-Hildburghausen. He succeeded his father, as Duke of Nassau, Aug. 20, 1839. His anti-progressive policy led in 1848 to a revolt which, however, was speedily suppressed. In the first Schleswig-Holstein War he commanded a brigade of German troops. In the war of 1866 he sided with Austria and as a result was deprived of his territory. During the illness of King William III of the Netherlands, Adolf, as next of kin, succeeded as Grand Duke of Luxemburg, the ruler of which he became upon the death of William III (Nov. 23, 1890). He died Nov. 17, 1905, and was succeeded by his son Wilhelm Alexander (born 1852).

ADOLPHE, â'dôlf'. An important novel by Benjamin Constant de Rebecque, published in 1816. In the hero, Adolphe, is found a realistic presentation of the author's sentimental experience with Madame de Staël.

ADOL'PHUS, or **ADOLPH,** OF NASSAU (c.1255–98). King of Germany. He was the son of Walram, Count of Nassau. He was elected to succeed Rudolph of Hapsburg, and was crowned King of the Romans (June 24, 1292). Adolphus agreed to assist England in her war with France for a large subsidy, but failed to fulfil his agreement. For certain high-handed acts he was summoned before the college of electoral princes. He refused to appear, and was formally deposed in May, 1298, the crown being transferred to Rudolph's son, Albert. Adolphus took the field and was killed in the first battle. Consult: Preger, *Albrecht von Oesterreich und Adolf von Nassau* (Leipzig, 1869); Roth, *Geschichte der römischen Königs Adolf. I* (Wiesbaden, 1879); Gebhardt, *Handbuch der deutschen Geschichte*, vol. i (Berlin, 1901).

ADOLPHUS, JOHN (1768–1845). An English historian and lawyer, born in London. He was celebrated in criminal practice and gained much credit in the defense of Arthur Thistlewood, charged with treason in the Cato Street conspiracy in London, 1820. His best-known work is the *History of England from the Accession of George III to the Conclusion of Peace, 1783* (7 vols., 1802–45). He also wrote *Bio-*

graphical Memoirs of the French Revolution (1799) and a *History of France* (1803).

ADOLPHUS FRED'ERICK (1710–71). Duke of Holstein-Gottorp and, later, King of Sweden. He was elected successor to the Swedish throne in 1743 and became King in 1751; but, owing to fierce wrangling between "The Hats" and "The Caps," as the political cliques in the Riksdag were known, he found himself but a nominal king. Urged on by his wife, he attempted to better his position and in consequence nearly lost his throne.

ADONAI, ăd'ô-nā'ī *or* ā-dō'nī (Heb. my lord). A term employed in the Old Testament over 100 times in direct address to the deity. It is often used before Yahwe, forming the expression "my lord Yahwe." When the pronunciation of the sacred name (see JEHOVAH) was forbidden, which was before the third century B.C., Adonai was substituted for it. This was already done in the Greek translation of the Pentateuch, which renders it Kyrios (*κύριος*): hence the Latin *dominus* and the English "The Lord." See Dalman, *Der Gottesname Adonaj und seine Geschichte* (1889).

AD'ONA'IS. The title of an elegy written by Shelley in 1821 upon the death of the poet Keats, who is therein likened to Adonis in his untimely end.

AD'ONA'I SHO'MO. See COMMUNISTIC SOCIETIES.

ADO'NIA. See ADONIS.

ADO'NI BE'ZEK. See ADONI-ZEDEK.

ADON'IC VERSE. A dactyl and a spondee (— ⏑ ⏑ | — —), or dactyl and trochee (— ⏑ ⏑ | — ⏑), adapted to light, lively versification, as in the famous hymn:

> "Plaudite cœli;
> Rideat æther," etc.

It forms the last verse of the Sapphic and the Adonic stanzas.

ADONIJAH, ăd'ô-nī'jâ (Heb. Yahwe is Lord). A son of David and Haggith (1 Kings ii. 21), born at Hebron. After Absalom's death he was the natural heir to the throne and was supported by Joab and Abiathar. He called together his sympathizers at a sacred stone near Jerusalem (1 Kings i. 9), but Benaiah, the captain of the body-guard, Zadok, the priest, and Nathan, the prophet, succeeded, by the aid of Bathsheba, in getting the King's consent to the immediate enthronement of Solomon. Adonijah sought refuge at the horns of the altar. Solomon saved his life, but when he afterward demanded Abishag, David's concubine, for a wife, it was considered a plot for the throne, and Solomon ordered Benaiah to kill him.

ADO'NIS (Gk. *Ἄδωνις*). A youthful hunter, beloved by Aphrodite, but slain by a boar sent, according to one version, by the jealous Ares, husband of Aphrodite. Aphrodite descended to the lower world and won from Persephone permission for her favorite to return to the light for a time every year. Another and seemingly older myth makes Aphrodite and Persephone quarrel for the possession of the beautiful infant. Zeus finally decided that he should annually spend four months with each of the goddesses and four months as he chose. The legends about Adonis have sprung from the rites of the Adonia, a two-day festival celebrated in midsummer. On one day the loving union of Aphrodite and Adonis was represented, and on the other the sorrow caused by his death. All the funeral rites were performed by women about little images of Adonis. A special feature was the "gardens of Adonis," potsherds, filled with earth, in which quick-growing plants, such as lettuce and fennel, were sown. After the burial these were thrown into springs. The Adonia was a woman's festival and seems to have been celebrated chiefly by courtesans and others associated in the worship of Aphrodite. It is obviously the worship of a spirit of vegetation, who is believed to have a short life, to die, and then to rise again to renewed life for a season. These rites were widely spread throughout Greek lands; for the rites as celebrated at Alexandria, see the fifteenth Idyll of Theocritus. In Phœnicia they were associated with Thammuz or Tammuz (q.v.). The theory that the name and worship of Adonis are Semitic is not proved.

ADONIS. A genus of about five species belonging to the family Ranunculaceæ. All of the species are natives of Europe and Asia, but the European *Adonis autumnalis* (sometimes called *Adonis annua*) is cultivated for ornament in the United States and has escaped from cultivation. It is an annual herb, with dissected leaves and showy yellow or red flowers. The orange or red petals with a dark-colored base have suggested the common name "pheasant's eye" or "bird's eye." Its bright scarlet petals have also obtained for it the name of "Adonis-flower," their color having been fancifully ascribed to their being stained with the blood of Adonis. It is a well-known ornament of our gardens, in which also *Adonis æstivalis* frequently appears, and *Adonis vernalis*, a perennial species common upon the lower hills of the middle and south of Germany, with early and beautiful flowers. See Plate, ACANTHUS, ETC.

ADO'NI-ZE'DEK (Heb. Zedek is lord). A King of Jerusalem who opposed resistance to the invasion of southern Palestine by tribes afterward forming a part of the kingdom of Judah. Zedek was a god worshiped in Syria and southern Arabia. The account in Judges i. is more credible than that in Joshua x. Adonibezek is probably a scribal error for Adonizedek. No place called Bezek has been found, and 'Lord of Bezek' would not be a natural name. No god by the name of Bezek is known. On the other hand, Adoni-zedek reminds one strongly of Melchizedek, 'Zedek is king,' another ruler of Jerusalem (Gen. xiv.).

ADOP'TIAN CON'TROVERSY, THE. An echo of the Arian controversy. It originated toward the end of the eighth century in Spain, the country in which the doctrine of Arius had longest held out. Elipandus, Archbishop of Toledo, and Felix, the learned bishop of Urgel, advanced the opinion that Christ, in respect of his divine nature, was doubtless by nature and generation the Son of God, but that as to his human nature he must be considered as only declared and "adopted" through the divine grace to be the first-born son of God (Rom. viii. 29), just as all holy men are to be adopted as sons of God, although in a less lofty sense. The flame of controversy thus kindled spread into the Frankish Empire, the special domain of "Catholic" Christianity, and gave occasion to two synods—one held at Ratisbon (792), and another at Frankfort (794), in which Charlemagne took part in person and which condemned Adoptianism as heresy. The Catholic doctrine of the unity of the two natures of

Christ in one divine person and the consequent impossibility of there being a twofold Son—an original and an adopted—was upheld by Alcuin and the other learned men of Charlemagne's court. At the synod of Aix-la-Chapelle (799) Felix, yielding to compulsion, recanted his opinions without, as it would seem, being convinced. Elipandus adhered fanatically to his views, which were in after times defended by Folmar (1160), Durandus (died 1334), and the Protestant divine Calixtus (died 1656). Adoptianism was charged against Abelard and also erroneously attributed to Duns Scotus. See Harnack's *History of Dogma* (Eng. trans., New York, 1905).

ADOP'TION (Lat. *adoptio*, a taking or receiving of one in place of a child, from *ad*, to + *optare*, to choose, select). A legal institution of much importance in early society, because of the importance attached to the perpetuation of household worship, particularly the worship of deceased ancestors; also because before the introduction of testaments an heir could, in the absence of natural children, be created only by adoption. In Roman law there were two forms of adoption, viz., *adrogation* and *adoption* in the strict sense. Adrogation was the earlier form. It was possible only where the person to be adopted was an independent person (*sui juris*), i.e., was not under the authority of a father or grandfather. It took place originally in the patrician assembly (*comitia curiata*) with the coöperation of the pontifices. Under the Emperors it was effected by an imperial rescript. Adoption in the strict sense was the transfer of a person from the authority of his father or grandfather into the paternal authority of the adoptive father. It was accomplished by formal acts in the presence of a magistrate. It was usually requisite, alike in adrogation and adoption, that the adoptive father should have no children at the time, and no reasonable prospect of having any. He was also required to be 18 years older than the person adopted. Females could not be adrogated, nor, until the third century, could they adrogate. They could be adopted, but they could not adopt. The effect of adrogation was to place the adopted person in the same legal position for nearly all purposes as a child born in wedlock. The same results originally attached to adoption, but Justinian introduced important restrictions. Adoption was unknown to the law of the Teutonic nations; and though most of the States of the Continent have borrowed it, with some modifications, from the Roman law, it has never existed as an institution in England or Scotland, either at common law or by statute. The theory of the English law is that the parent, as legal guardian, cannot be permitted to abdicate his parental responsibility, though he may by abuse or neglect forfeit it, and in such case the Court of Chancery may transfer the custody of the child to a proper guardian.

Adoption is permitted and regulated by statute in most if not all the States of the American Union. While State legislation upon this topic differs in detail, its characteristic features are as follows: Any inhabitant of the State, of legal age and competent to contract, may adopt a child, provided that the husband or wife of such person, if married, the living parents of the child, and the child, also, if above a certain age (usually 12 or 14 years), consent in writing to the adoption. Only children are capable of adoption and in most of the States only minor children. In some States the transaction is consummated by an order of court, in others by a deed duly acknowledged and recorded. As the claims of an adopted child are in derogation of the common law rights of the heirs and next of kin of the adopter, our courts are disposed to put a strict construction on these statutes, and to treat as invalid an adoption which has not been made in a manner which conforms to every statutory requirement. As a rule, the legal relation between adopting parents and adopted children is that of natural parent and child, including the powers of parental control, the duties of filial obedience, and reciprocal property rights by inheritance. In a few States, however, the adopting parent does not inherit from the adopted child. Consult Stimson, *American Statute Law* (Boston, 1886); Schouler, *Treatise on the Law of Domestic Relations* (Boston, 1900); and see PARENT AND CHILD.

AD'ORA'TION. A term originally applied among the Romans to an act of homage or worship performed by raising the hand to the mouth (Lat. *ad os*, whence the word), kissing it, and then waving it toward the object of reverence. It was natural to extend to great men the formal adoration at first paid only to deities, and the Roman Emperors were saluted by bowing or kneeling, touching the imperial robe, and kissing the hand that did so. In eastern countries the form of adoration was to fall on the knees at a prince's feet, strike the forehead on the ground, and kiss the floor. On this analogy both the modern practice of kissing a sovereign's hand and the custom at Rome of kissing the cross embroidered on the Pope's slipper may be said to be forms of adoration. While the term "adoration" is very generally employed nowadays to express a mental attitude toward God, it may be well to remember that both it and the similar term "worship" had a much more limited sense: thus, in the English marriage service the bridegroom says to the bride: "With my body I thee worship and with all my worldly goods I thee endow." Thus, too, as a matter of theological terms, the Roman Catholic church makes a distinction between *latria*, the worship due to God alone, and *dulia*, that given to the angels and saints.

ADORATION OF THE IMMAC'ULATE LAMB, THE. A celebrated altar painting in the cathedral of Ghent, Belgium, by the Flemish artists Hubert and Jan van Eyck. It represents Christ surrounded by the saints, and on the lower panels the sacrifice of the lamb.

ADORATION OF THE MAGI. See MAGI, ADORATION OF THE.

ADORF, ä'dôrf. A manufacturing town of Saxony, 72 miles by rail southwest of Chemnitz (Map: German Empire, E 3). It is situated 1450 feet above sea level in the valley of the Weisse Ester and is at the junction of the Leipzig and Eger railroads. Pop., 1905, 7079.

ADOUR, ä'dōōr'. A river of southwestern France, rising near Tourmalet Pass in the department of Hautes-Pyrénées (Map: France, E 8). It flows through the department of Gers and the fertile part of the department of Landes and enters the Atlantic below Bayonne, after a course of 200 miles. It receives several tributaries and is navigable to the extent of 80 miles. Bagnères-de-Bigorre, celebrated for its hot baths, is situated on the Adour.

ADOWA, ä'dō-à, or **ADUA,** ăd'ū-à. The capital of the Abyssinian province of Tigré, situated in lat. 14° 12′ N. and long. 39° 3′ E. (Map: Africa, H 3). It has an excellent climate on account of its elevated location (nearly 6500 feet) and was, prior to the Italian campaign of 1896, the capital and one of the best-built cities of Abyssinia. During the wars which ended in that year the town was razed several times. Its importance as a commercial centre suffered a decline in consequence, but the development of railway facilities has revived industrial activity. Its population was formerly about 3000, but is probably less now. Adowa was the scene of the defeat of the Italian troops under General Baratieri by the Abyssinians on March 1, 1896. Consult Setetin, "La bataille d'Adoua: Etude tactique," in vol. ix and x, *Journals des Sciences Militaires* (Paris, 1901), and Berkeley, *The Campaign of Adowa and the Rise of Menelik* (London, 1906).

ADRA, ä'drà. A seaport town of Spain, in the province of Granada, 49 miles southeast of Granada. It is situated on the shore of the Mediterranean, at the mouth of the Adra (Map: Spain, D 4). The ancient Abdera, founded by the Phœnicians, was on a hill, at the base of which the modern town stands. The location is unhealthy because of near-by swamps. The port is much exposed to the wind, and the absence of railroads is a great drawback to commercial development. Lead mines in the neighborhood give employment to many of the inhabitants. Among other exports are grapes, wheat, esparto, almonds, wine, and sugar-cane. Spirits, wool fabrics, and sugar are manufactured. Pop., 1900, 11,246.

ADRAIN′, Robert (1775–1843). An Irish-American mathematician, born at Carrickfergus. During the Irish rebellion of 1798 he was wounded and escaped to America, where he became a teacher of mathematics and occupied chairs at Rutgers (1810–13), Columbia (1813–25), and the University of Pennsylvania (1827–34). He was editor of the *Mathematical Diary* (1825–29) and prepared an edition of Hutton's *Mathematics*. His original work includes papers on the shape and size of the earth and on gravity.

ADRAMMELECH, ă-drăm′e-lĕk. 1. A god worshiped by the inhabitants of Sepharvaim after they had been deported to Samaria by Sargon (2 Kings xvii. 24, 31). Sepharvaim is, no doubt, the Babylonian Sippar (q.v.) and not, as has been conjectured, the Sibraim of Ezek. xlvii. 16, a city in northern Syria. The similarity of *r* and *d* in the old script has probably, here as elsewhere, led to the change of Adad and Hadad into Adar and Hadar. Shamash was the chief god of Sippar, but Adad was undoubtedly also worshiped there. (See Hadad.) Adad is frequently connected with Shamash, both being gods giving oracles. Human sacrifices were not offered in Babylonia. The identification of Adad with Melek, who demanded such, may have led the colonists who sought the favor of the gods of the land to resort to such means, or the statement may be due to prejudice on the part of Jewish writers.

2. A son of Sennacherib who, together with his brother Shar-ezer, killed his father, while he was worshiping in the temple of Nisroch, his god, and then fled to Ararat (2 Kings xix. 37). The Babylonian chronicle (*Keilinschriftliche Bibliothek*, ii, 281) mentions only one son. It is possible that a letter to "Shar-itir-Ashur, king of the world," gives us the throne name of this son, abbreviated in the Hebrew as Sharezer, who held the throne from the 20th Tebet to the 2d Adar, 681, and that Adad-malik, corrupted Adar-malik, was his private name. The murder undoubtedly took place in Babylon, according to a statement of Assur-banipal, and the temple was then the I-zagila of Marduk, the name of this god having been intentionally distorted, as in the case of Abd-nego for Abd-nebo. Consult Winckler, in Schrader's *Die Keilinschriften und das Alte Testament* (Leipzig, 1902).

ADRAR, à-drär′. An oasis in the western part of Sahara, east of the Spanish possession of Rio de Oro, of which it formerly constituted a part (Map: Africa, C 2). Its area is estimated at about 30,000 square miles, and it contains a considerable portion of fertile land on which grain and dates are grown. Ostriches are raised for their feathers, and salt is mined. Its position on the caravan route of Morocco gives it considerable commercial importance. The inhabitants are mostly Berbers. In accordance with the agreement of 1892 it forms at present a part of French Sahara. The chief town is Wadan, with a population of about 4000.

ADRASTE, à'drâst′. The hero of Molière's comedy *Le Sicilien, ou l'amour peintre*, from whose disguise as an artist comes the sub-title of the piece.

AD′RASTEI′A (Gk. *Ἀδράστεια*). In Grecian mythology, the Cretan nymph by whom the infant Zeus was cared for in the cave on Mount Dicte, at his mother's request. The name is also applied to Rhea herself and to Nemesis.

ADRAS′TUS (Gk. *Ἄδραστος, Adrastos*). King of Argos, who gave his daughter in marriage to Polynices, son of Œdipus (q.v.) and led the expedition of the "Seven against Thebes" to restore Polynices to the throne. As was predicted by Amphiaraüs (q.v.), Adrastus alone escaped alive. A later story makes him die of grief at the death of his son in the war of the Epigoni against Thebes. Adrastus was worshiped at Sicyon, Megara, Athens, Argos, and in the Troad. See Epigoni; Eteocles and Polynices.

ADRE′NALIN. An active principle of the adrenal glands or suprarenal capsules. It is the most powerful hemostatic and astringent known, being from 600 to 1000 times as active as the extracted gland. The substance was simultaneously discovered by Aldrich and Takamine, a Japanese chemist in 1901. It occurs as a light brown finely crystalline powder, having a bitter taste. See Suprarenal Capsules.

ADRETS, dà'zà'drĕ′, François de Beaumont, Baron des (1513–87). A French Protestant soldier, from 1562 prominent for persecuting the Catholics of Dauphiné and Provence. He was born at the Château de la Frette, Dauphiné, early entered the army, and during the wars of the League achieved a reputation for cruelty on the Huguenot side corresponding to that of the Duke of Guise or the notorious Monthic among the Catholics. His acts, however, appear to have been dictated less by religious fanaticism than by predilection for the career of brigand and bravo. Having assumed the style of Lieutenant-General of the King, he organized pillage and murder on a large scale, and, as Martin (*Histoire de France*) testifies,

he left among the simple peasantry a name repeated for centuries as synonymous with destruction. Many interesting tales regarding him are still preserved. Ultimately he accepted the Roman faith. For a detailed account of his doings, consult Beza, *Histoire ecclésiastique des Eglises Réformées* (edited by Baum, Cunitz, and R. Reuss, Paris, 1883–89, 3 vols.).

ADRIA, ā'drē-ȧ (ancient *Adria, Atria, Hadria,* or *Hatria*). An episcopal city of Italy, province of Rovigo, on the Canal Bianco, 16 miles southwest of Venice in the province of Rovigo (Map: Italy, G 2). It was originally an island and in the time of the Romans was a naval station and a flourishing port. After the fall of the Empire frequent inundations of the Po and the Adige, caused by the bad state of the dikes, brought down alluvial soil and gradually extended the land until Adria attached itself to the continent. It is now 14 miles from the Adriatic and in spite of the canal connecting it with the sea its commercial importance is declining. The ruins of the ancient city that was sacked and burned by the Venetians in the fifteenth century are south of the present city and several meters below the surface. The chief trade is in wine, cattle, grain, silk, linen, leather, and pottery. Pop., 1901, 15,678; 1911, 17,878.

A'DRIAN. A city and county-seat of Lenawee Co., Mich., on the Raisin River, at the intersection of the Wabash, the Lake Shore, the Detroit, Toledo, and Ironton, and the Toledo and Western railroads, 59 miles southwest of Detroit (Map: Michigan, E 7). It was settled in 1825, incorporated as a village in 1828 and as a city in 1853. It is the seat of Adrian College, a Methodist Protestant institution, St. Joseph's Academy (Roman Catholic), and of the State Industrial Home for Girls. Adrian has important industrial interests, including large factories for the manufacture of wire fence, steel posts and castings, pianos and organs, cotton goods, razor strops, condensed milk, electrical appliances, etc. It is governed by a charter, granted in 1861, and revised in 1897, which provides for a mayor, elected annually, and a city council of 12 members. Adrian maintains its public works by city labor under city supervision. Pop., 1890, 8756; 1900, 9654; 1910, 10,763; 1913 (est.), 11,500; 1920, 11,878.

ADRIAN. Roman Emperor. See HADRIAN.

ADRIAN. The name of six popes, two of them of considerable interest.—ADRIAN I, Pope, 772–795, invited Charlemagne to enter Italy. His letters are in Migne, *Pat. Lat.*, xcviii.—ADRIAN II, Pope, 867–872. His letters are in Migne, *Pat. Lat.*, cxxii and cxxix.—ADRIAN III (Agapetus), Pope, 884–885. He was the first occupant of the papal chair to change his name on election.—ADRIAN IV (Nicholas Brakspere), Pope, 1154–59. He was by birth an Englishman, the only one of that nation who ever sat in the papal chair. His father became a monk in the Benedictine monastery of St. Albans, and so Adrian was in early life thrown on the world. He became first a lay brother or servant in the monastery of St. Rufus, about 50 miles south of Lyons, France, then successively regular monk, prior, and in 1137 was elected abbot. His zeal for strict discipline raised a combination to defame his character, and he had to appear before Eugenius III at Rome. Here he not only cleared himself of all charges, but gained the esteem of the Pope, who appointed him Cardinal-bishop of Albano in 1146 and, later, delegate to Scandinavia. On the death of Anastasius IV, in 1154, he was raised to the papal see. Adrian had great trouble with the Romans, who disliked his pretensions and were influenced by Arnold of Brescia, whom he caused to be put to death. He was on friendly terms with the Emperor Frederick I, until his high notions of the papal supremacy, which he carried as far as did Gregory VII, led to the beginning of that long contest of the popes against the house of Hohenstaufen which ended in the destruction of the dynasty. He was living away from Rome in practical exile and was about to excommunicate Frederick when he died at Anagni, Sept. 1, 1159. His most remarkable pontifical act was giving, in 1154, Ireland to Henry II, which he claimed he had the right to do because all islands which had been Christianized belonged to the Holy See. Consult S. Malone, *Adrian IV and Ireland* (London, 1899). His letters are in Migne, *Pat. Lat.*, clxxxviii.—ADRIAN V, Pope, July 12–Aug. 18, 1276 (Otto buono de' Fieschi), and a cardinal-deacon when elected; he died before he had been consecrated a bishop.—ADRIAN VI, Pope, Jan. 9, 1522, to Sept. 14, 1523. His family name was (probably) Dedel, his birthplace Utrecht (1459), his first teachers the Brothers of the Common Life; his professional studies were made at Louvain, and there he became professor of theology. He was appointed tutor to Charles of Hapsburg (the future Emperor Charles V), 1507; was made Bishop of Tortosa, Spain, 1516; cardinal, 1517. Charles made him regent of Spain, 1520, but the Spaniards resented the rule of a foreigner and embittered his life. His troubles did not cease when elected Pope, but he inspired respect by his uprightness. He confessed to serious corruptions in the Church, but died before he could do anything for its reform. Consult the *Lives* by H. Bauer (Heidelberg, 1876) and by A. Lepître (Paris, 1880).

ADRIAN COLLEGE. One of the oldest co-educational institutions in the country, at Adrian, Mich., organized in 1852. The school is under the control of the Methodist Protestant Church. It has property valued at $250,000, five buildings, including dormitories, and a library of 7000 volumes. The students in 1913 numbered 200 and the faculty 22. Connected with the school are a conservatory of music and a department of fine arts. President, B. W. Anthony, D.D.

A'DRIAN DE CASTEL'LO, or **ADRIANO DI CASTELO,** ä'drē-ä'nō dē kȧs-tĕl'lō (c.1460–c.1521). An Italian scholar and ecclesiastic. He was born in Tuscany and went to England in the reign of Henry VII, who made him his agent at Rome and gave him the bishopric of Hereford (1502), whence he was translated to that of Bath and Wells (1505). He was made cardinal by Pope Alexander VI (1503). In 1517, however, he was implicated in the conspiracy of Cardinals Petrucci, De Sauli, and Riario to poison Leo X and was deprived of his cardinalate and dignities in England (1518). What became of him afterward is uncertain. It is thought that he lived in retirement at Venice and was murdered while on his way to Rome after the death of Leo X in 1521. His writings include *Venatio,* a poem (1505); *De Vera Philosophia* (1507); and *De Sermone Latino et Modo Latine Loquendi* (1513).

A'DRIANO'PLE (Gk. Ἀδριανόπολις, *Hadria-*

nopolis, the city of Hadrian, Turk. *Edirneh*) (Map: Balkan Peninsula, F 4). The capital of the Turkish vilayet of Adrianople, in ancient Thrace. It is situated on the Maritza (the ancient Hebrus), where that river is joined by the Arda and the Tunja, 137 miles by the state railway northwest of Constantinople. Its position at the confluence of three navigable rivers and at the meeting of several routes made it a place of considerable commercial importance, but its economic condition declined after the Russo-Turkish war of 1877–78, and, upon the cession of eastern Rumelia to Bulgaria in 1885 and the consequent adverse tariff, the city lost the greater part of its foreign trade. It was formerly fortified by a strong wall, of which only a few fragments are left. The place is now defended by an extensive circle of forts. In appearance the city is Oriental and for the most part mean and irregular. It has two fine bazaars, a palace, numerous inns, churches, mosques, and schools. The population is about 81,000, about half of whom are Turks and the remainder Bulgarians, Armenians, and Jews. It is the seat of several European consuls. A very ancient town of Thrace, it was rebuilt by the Emperor Hadrian, who gave it his name. It was the scene of an important battle between the Goths and the Romans in 378 A.D., in which the former were victorious and broke through the Roman frontier, effecting a settlement within the limits of the Empire. The city was conquered from the Byzantines by Amurath (Murad) I in 1361, and was the residence of the Turkish sultans from that time until the capture of Constantinople in 1453. The Russian General von Diebitsch occupied Adrianople in 1829. By the treaty signed here on September 14 of that year Russia forced Turkey to relinquish to her the northeastern coast land of the Black Sea and to allow her to establish her sway over the tribes of the Caucasus, to cede to her the district of Akhaltsikh, to accord to her a protectorate over Moldavia and Wallachia, and to recognize the independence of Greece. After the capture of the Turkish army defending the Shipka Pass, in January, 1878, the Russians entered Adrianople unopposed. The occupation of the city was followed by the cessation of hostilities and the conclusion of the Treaty of San Stefano. In the Balkan War of 1912–13 (q.v.) the Turkish garrison valiantly defended the city until forced by starvation to surrender. The city was first attacked Oct. 22, 1912, and within ten days its investment was practically complete, but it did not capitulate until March 26, 1913. By the Treaty of London, signed May 30, 1913, the city and that portion of the vilayet of Adrianople lying west of a line drawn from Enos to Midia were ceded by the Turks to the Balkan allies, but the subsequent outbreak of hostilities among the allies (see BALKAN WAR) obliged Bulgaria to withdraw her garrison from Adrianople and enabled the Turks easily to reoccupy the city on July 20. By the Treaty of Constantinople, Sept. 29, 1913, Bulgaria formally restored to Turkey Adrianople together with the outlying circle of fortifications and sufficient territory to give Turkey control of the railway to Dedeagatch. The vilayet of Adrianople, which, previous to the Balkan War, comprised an area of about 14,822 square miles and a population of about 1,028,200, and extended from the Black Sea and eastern Rumelia to the Sea of Marmora and the Ægean Sea, was cut in twain by the Treaty of Constantinople, approximately the part west of the Maritza going to Bulgaria and that to the east remaining in Turkish possession.

A'DRIAN'S WALL. See ROMAN WALL.

ADRIATIC SEA, ā'drī-ăt'ĭk *or* ăd'rĭ- (from the Etruscan city Hatria, modern Adria, at the mouth of the Padus or Po). A large arm of the Mediterranean Sea, separating Italy from the Balkan peninsula and communicating with the Ionian Sea by the Strait of Otranto. It is 500 miles long and about 130 miles in its greatest width (Map: Italy, J 4). Its depth varies from over 4000 feet in the southern part to about 500 feet in the north. Its west coast is almost unbroken, while the east is lined with numerous rocky islands, belonging to Istria and Dalmatia. The main gulfs of the Adriatic Sea are Manfredonia on the west, Venice and Triest on the north, and Quarnero on the northeast. The only considerable rivers emptying into it are the Adige and the Po, and that accounts for the great salinity of its water. The most important commercial points are Triest, Venice, Fiume, Ancona, and Brindisi. The navigation of the Adriatic is generally safe, although there are some dangerous points off the eastern coast. The commercial importance of the Adriatic Sea was greatly impaired by the opening of the sea route to India; but with the opening of the Suez Canal it has regained some of its former commerce. Consult: Jackson, *Shores of the Adriatic* (London, 1906); C. E. Yriarte, *Les bords de l'Adriatique* (Paris, 1878).

ADRIENNE LECOUVREUR, ä'drī-ĕn' le-kōō'vrēr'. The title of a five-act French drama by Scribe and Legouvé, based on the tragic history of the noted actress. (See LECOUVREUR, ADRIENNE.) It was produced April 14, 1849.

ADRIFT'. Floating at random. The state of a boat, vessel, buoy, or other floating object which has parted or lost its lines or moorings and is driven about by the tide, sea, or wind; also the condition of a sail, gun, or other object which has broken loose from its fastenings.

ADSORP'TION. The condensation of a gas on the surfaces of solids, or of solutes on the surface of solid or colloidal particles suspended in a solvent, brought about in each case by a reduction in surface tension, or in some cases by chemical union. See COLLOIDS; SURFACE TENSION.

ADUA, ăd'û-ä. See ADOWA.

AD'UAT'UCI, or **AD'UAT'ICI.** A people of Belgic Gaul, dwelling in Julius Cæsar's time between Eburones and the Nervii, near the river Sambre, and conquered by him 57 B.C. They were descended from survivors of the Cimbri and Teutones after their defeat by C. Marius, 102–101 B.C. (Cæsar, *De Bello Gallico*, ii, 29).

ADULARIA, ad'ula'ria. See ORTHOCLASE.

ADULE, ä-dū'lē (Gk. Ἀδουλή, *Adoulē*). An ancient Ethiopian town on the Red Sea, near the modern Zula. It was an important trading post, especially for fine ivory. It is noted chiefly on account of two inscriptions of some importance relative to the ancient geography of those regions, known as the Monumentum Adulitanum, one celebrating the victories of Ptolemy Euergetes, the other the much later conquests of a native king. Both are of value for ancient geography, and were first published in the sixth century in the *Topographia Christiana* of Cosmas Indicopleustes.

ADUL'LAM. A city in the lowlands of Judæa, which was the abode of a Canaanite king before the conquest of the country by the Israelites (see Josh. xii. 15) and continued to be an inhabited town at least as late as the Maccabees. Its locality has been identified by some scholars with that of the modern Dier Dubban, some distance west of Bethlehem, and by others with that of Aid-el-ma, a few miles northeast of Hebron.

ADULLAM, Cave of. A cavern in southern Judæa, noted as a retreat of David while he was in hiding with his band of 400 outlaws from King Saul (see 1 Sam. xxii), and later when as king he was fighting the Philistines (1 Chron. xi. 15). It was perhaps near the town of the same name, some 10 miles northwest of Hebron.

ADUL'LAMITES. A term applied in English history to those seceding Liberals who voted with the Conservative party when Earl Russell and Mr. Gladstone sought to extend the elective franchise in 1866. The designation of *Adullamites* was fastened on the new party by Mr. Bright, who, in the course of debate, likened them to the political outlaws who took refuge with David in the cave of Adullam (1 Sam. xxii. 1, 2). The comparison was taken up by Lord Elcho, who humorously replied that the band congregated in the cave was hourly increasing, and would succeed in delivering the House from the tyranny of Saul (Mr. Gladstone) and his armor-bearer (Mr. Bright). The group of seceders was also known as "The Cave," and as "The Cave of Adullam."

ADULT'. A person of full age and therefore of full legal capacity, according to his status in point of sex or condition of servitude. The age at which one becomes an adult is generally fixed at 21 years for men and women alike, but in a few of the American States women are classified as adults on attaining the age of 18, and both men and women upon marriage. See Age.

ADUL'TERA'TION (Lat. *adulterare*, to defile, to falsify). The act of intentionally debasing articles offered for sale, by abstracting from them some valuable constituent, or by adding to them some worthless, more or less deleterious, foreign substance. Adulteration has been practiced throughout the civilized world since early in the Middle Ages, and unfortunately the methods and devices used by unscrupulous men of commerce in adulterating commodities in common use have kept pace with the progress of the useful arts.

According to the Federal Food and Drugs Act of 1906 and the laws of many of the States a food is declared to be adulterated under the following conditions: "First, if any substance has been mixed and packed with it, so as to reduce or lower or injuriously affect its quality or strength; second, if any substance has been substituted wholly or in part for the article; third, if any valuable constituent of the article has been wholly or in part abstracted; fourth, if it be mixed, colored, powdered, coated, or stained in a manner whereby damage or inferiority is concealed; fifth, if it contains any added poisonous or other added deleterious ingredient which may render such article injurious to health . . . when such products are ready for consumption; sixth, if it consists in whole or in part of a filthy, decomposed, or putrid animal or vegetable substance, whether manufactured or not, or if it is the product of a diseased animal or one that has died otherwise than by slaughter."

The term "adulteration" is to be distinguished from "misbranding," which is usually applied to false or misleading statements on the package or label as to the contents of the package, its weight, place of manufacture, qualities, etc.

The sale of a spurious article under the name of the genuine article for which it is intended to pass is a common law cheat, and modern legislation is extending the scope of this crime with a view to the protection of health and the promotion of honest and fair business dealings. The common law cannot be depended on, however, to protect the community from adulterated goods, since the amount at stake is not sufficient to warrant the consumer in bringing action against the vendor who has sold him such goods. Since the middle of the last century the subject of food adulteration has attracted a constantly increasing amount of attention, and specific legislation intended to correct its evils is now widespread. In 1883 the first practicable food-inspection law in the United States was enacted in Massachusetts. Other States have gradually followed the example of Massachusetts, and, in 1913, all but two States had taken serious steps toward regulating the character and quality of their food products by enacting pure food laws, though their enforcement in three others was practically nullified by failure to grant appropriations. Food legislation has received much attention abroad, and the more highly civilized foreign countries have efficient food laws and enforce them with a degree of thoroughness which we in this country have not always attained. In this, as in so many other matters of national concern, the several States, with their varying standards and divergent interests, cannot be relied upon entirely to afford efficient protection against adulteration, and for this reason the legislative power of Congress was employed in 1906 to fix a standard for the whole United States. This could under the Constitution be effected only indirectly by the exclusion of foods falling below the legislative standard from foreign and interstate commerce, but though limited in scope these provisions are from their very nature comparatively easy of enforcement. For an analysis of this legislation and its provisions, see Pure Food Law. See also Health, Public.

The following are some of the more common forms of adulteration and sophistication, many of these, however, not being illegal if the products are properly labeled:

Wine. The cheaper grades of wine are sometimes colored artificially and chemically preserved. If made by the addition of water and sugar to the partially expressed pomace of grapes and then fermented, a qualifying term, such as "pomace wine," should be used. Carbonated wines, prepared by dissolving in ordinary wine carbonic acid gas under pressure, are sometimes sold as champagne.

Non-alcoholic beverages, such as ginger ale and fruit syrups, are often preserved with salicylic acid and benzoic acid, and colored with coal tar derivatives. These products are sometimes altogether artificial in their nature.

Canned vegetables, contrary to the general impression, are relatively free from adulteration, except that more water is sometimes used than is necessary. Being hermetically sealed, no artificial preservative is necessary, and, generally speaking, none is used. In this class of goods artificial color is sometimes employed with tomatoes, and some imported products, such as

peas, were formerly colored with salts of copper, but this is now prohibited. Vegetables, such as peas and beans, which have reached a relatively mature state, may be soaked for some time, canned, and placed on the market as high grade materials. Such products are not unwholesome, but should be labeled "Soaked." In the preparation of sugar corn a small amount of cane sugar is sometimes added, but must be declared. The use of saccharin for this purpose in place of sugar is rare, and is now prohibited in all foods.

Breakfast foods. In connection with the question of food adulteration, a word may be said as to the claims of breakfast-food manufacturers. These products are wholesome and convenient foods, but in nutritive value are in no way superior to the ordinary cereal products from which they are made.

Flour and bread are comparatively free from adulteration. The adulteration of flour with ground mineral matter and with alum was probably never practiced in this country. Its adulteration with corn-meal was quite prevalent at one time, but has now been discontinued in the United States, The bleaching of flour with nitrogen peroxid to whiten it prematurely was formerly practiced on a large scale, but prohibited under the Federal law in 1908. So-called "Graham flour" is frequently prepared by mixing low-grade white flours with bran.

Cocoa and chocolate preparations have been mixed with starchy cereal products and other starchy ingredients, such as wheat, rice, maize, arrowroot, and potato starch. An excess of cocoa husks is also reported in such preparations, showing that the husks have not been completely removed in the preparation of the product, or that an actual addition of husks has been made.

Coffee, when sold in the ground state, is easily adulterated. Chicory was formerly used almost entirely for this purpose, also ground peas, wheat, beans, barley, and other materials. Attempts have repeatedly been made to adulterate unground coffee with artificially molded pellets made to resemble the coffee bean, and composed of the constituents mentioned above. Such attempts have apparently not been successful, however, as products of this nature are no longer found in the market in this country. The principal offense in the coffee trade is misbranding in regard to country of origin; for example, the sale of Brazilian coffee, as Java or Mocha.

Catsups are commonly colored and preserved artificially. Some manufacturers prepare tomato pulp in large quantities when tomatoes are most plentiful and store it in barrels, using chemical preservatives to keep it and coloring matter to restore the loss of color.

Butter is frequently renovated after it has become stale, and much inferior country butter is treated in the same manner. The product is first washed with alkali to remove rancidity and the fat is churned with fresh milk. The practice of selling the product as fresh butter has been greatly lessened by Federal legislation, but "Renovated Butter," when labeled as such, may be manufactured and sold under Federal license. The sale of oleomargarin as butter is also much less common than formerly, as a result of Federal and State legislation.

Cheese was formerly adulterated by removing the cream from the milk from which it is made and replacing the cream by fat of other origin. This "Filled Cheese" when so labeled may be manufactured and sold under Federal license. Another fraudulent practice consists in soaking the cheese curd in water to increase the moisture content and improve the texture.

Cream is sometimes preserved artificially and given a fictitious appearance by means of "thickeners," such as gelatin. A somewhat similar result is obtained by forcing cream through a "homogenizer," which breaks up the fat globules. This practice has some advantages, especially for ice cream making, but the product should be labeled "homogenized cream."

Milk lends itself very readily to adulteration. Considering the fact that a large portion of the milk supply is consumed by infants and invalids, its purity is a matter of greater importance than that of any other food. Milk is commonly adulterated by dilution with water or by removal of cream, and the water used may be a source of typhoid fever and other dangerous diseases. Skimmed milk contains a large amount of protein, and when sold on its merits is a most useful food, but of course it is unfit for infants and often for invalids. Milk is still frequently treated with chemical preservatives, chiefly formaldehyde. This enables the vendor to keep the milk at a higher temperature and to ship it over considerable distances without the use of refrigeration, and eliminates to an extent the necessity of cleanliness in the dairy. The addition of preservatives to such an article as milk, however, is almost universally considered to be inexcusable and is steadily decreasing.

Lard. Most of the States in this country have enacted specific laws governing the manufacture and sale of this product, and the adulteration of lard is now unusual. Cooking fats are commonly prepared by mixtures of cotton-seed oil, beef suet, etc., but they are usually sold as "compound lards" or "lard substitutes," and not represented to consist of lard alone. In order to correct the excessive softness of lard, high-melting stearin from beef fat is frequently added to it. The percentage of stearin added is higher in the summer than in the winter, and in the product consumed in hot climates than in that consumed in cold climates.

Salad oils. The substitution of cheaper oils for olive oil has always been far too common. A cheap adulterant is cotton-seed oil, although some sesame and peanut oils are imported for the purpose of adulterating cotton-seed oil. The enforcement of the pure food law has practically stopped the importation of adulterated olive oil in bottles, but the oils may be still imported in barrels and mixed in this country.

Flavoring extracts are easily adulterated with cheaper products. An extract of the tonka bean is frequently substituted for vanilla extract, and a still cheaper product is prepared in the form of a solution of artificial vanillin colored with caramel. Lemon extract is sometimes substituted by an extract prepared from lemon grass. Lemon oil is sometimes distilled with steam, the non-volatile product used for the preparation of the so-called terpeneless extract, and the terpenes obtained by this method of distillation used in the preparation of a product in which the non-volatile portions of the lemon oil are absent.

Jellies, jams, and marmalades are often adulterated with glucose and artificially colored and preserved. In the cheapest forms of these products no fresh fruit is employed, the product

consisting entirely of an extract prepared from dried apple peelings and cores and glucose, artificially colored and sometimes artificially flavored. As a result of recent legislation it is not uncommon for articles of this nature to be labeled with a declaration regarding their nature. Sometimes, however, these declarations are misleading.

Meat preparations occasionally contain preservatives and are adulterated by the substitution, in the case of comminuted articles, as sausage and chopped meat, of a cheaper article than that supposed to be present. Fresh meat is probably never subject to adulteration except on the block of butchers who are not equipped with storage facilities. Oysters, when kept in bulk after shucking, are sometimes treated with preservatives, and their bulk increased by absorption of water.

Spices are usually sold in the ground state and for that reason are easily imitated. They are frequently adulterated with ground cereals, cocoanut shells, almond shells, sometimes parched, and sawdust. Even the whole spices are sometimes distilled with steam to remove the essential oil and then placed on the retail market.

Sugars, both high and low grade, are practically free from adulteration, although at one time indigo was used in white sugar to counteract a yellow tint due to imperfect bleaching.

Syrups, strained honey, and similar preparations are often mixed with glucose, or corn syrup. Maple products may contain large amounts of cane sugar and should be properly labeled.

Vinegar in the United States is understood to be a product in the acetic fermentation of apple juice without any addition whatever, the products made from the juice of grapes, malt, sugar-house residues, glucose, etc., being properly qualified by these terms. The addition to natural vinegar of water, boiled cider, or coloring matter is regarded as adulteration unless they are labeled as imitation products. Diluted acetic acid and pyroligneous acids are not vinegar and should not be so sold.

Confectionery is deemed adulterated under the Federal law and that of most of the states if it contains terra alba, barytes, talc, chrome yellow, or other mineral substance or poisonous color or flavor, or other ingredient deleterious or detrimental to health, or any vinous, malt, or spirituous liquor or narcotic drug. The quality of cheap candies has been improved in recent years, particularly by the decreased use of injurious coloring materials, but the use of materials of inferior nutritive value is still possible.

Drugs are sometimes adulterated by the addition of substances resembling the genuine articles in outward appearance but having none of their valuable physiological effects. The practice cannot be denounced too strongly or punished too severely. The fraud can usually be detected only by careful chemical examination.

Chemical Preservatives. During the last half-century the practice of using chemicals to preserve food has been widely extended. By means of such chemicals foods may be preserved with much less desiccation than is possible otherwise, and the taste of the fresh article is retained practically unchanged. The substances most commonly employed have been formaldehyde with milk, boric acid with butter and with meat preparations, sulphites with beer, wine, dried fruits, molasses, and meat, and salicylic and benzoic acids, and benzoate of soda with beverages of all kinds and fruit preparations. Fluorides have also been employed with many varieties of foods. Preservatives may cheapen the production of prepared foods, as with their use it is possible to transport and store products in a partially prepared state until it is convenient to complete the manufacture. It is possible, in making tomato catsup, for instance, to prepare the pulp, by cooking and straining off the insoluble material during the growing season and preserve it with salicylic or benzoic acid for working up later, so that a small plant can be kept in operation throughout the year. They also, however, sometimes make possible the use of inferior materials, and there is danger that they may be employed as a substitute for cleanly methods. The question as to the wholesomeness of some of the preservatives has not been definitely settled. It is conceded, however, that most of them are injurious to health, that they should not be employed where it is practicable to dispense with their use, and that wherever they are employed a plain statement of that fact should be made on the label. The Federal authorities permit the use of benzoate of soda, when its presence and amount are stated on the label, and of ordinary quantities of sulphur dioxid when its presence is stated.

Coloring Matter. The objection to the use of coloring matter with foods is from the standpoint of fairness and honesty and also from that of wholesomeness. In the adulteration of foods with articles of less value it is frequently found impracticable to select substitutes of the same color as that of the substances supposed to be employed. To remedy this defect and make the adulterated product more nearly resemble the article it simulates, coloring matter is added. Formerly coloring matter was obtained from vegetable sources. At present artificial colors are almost exclusively employed. The use of coloring matter has already been referred to above in connection with several articles of food. In addition to those mentioned, fruit jelly, prepared from glucose and apples, is frequently colored artificially to be sold as currant, strawberry, or grape jelly. Cane sugar is colored and flavored to resemble maple sugar. Glucose is colored and sold as honey, or as syrup of different origin. Canned tomatoes, which would bring a relatively low price because deficient in color, are frequently treated with an aniline dye. Flour is sometimes added to spices, such as pepper, and the natural coloring matter of the spice is replaced with charred cocoanut shells. Many colors which have been used with foods are admittedly unwholesome, and, furthermore, from the method of their manufacture, they may contain small amounts of poisonous metals, such as arsenic. Although, in general, the amount of coloring matter required is very small, it is believed that the use of those which are unwholesome should be prohibited. The United States and several European countries now forbid the use of certain colors, but specifically permit the use of others.

The enactment of Federal and state pure food legislation has already brought about great improvement in food manufacture and sale. Most of the grosser forms of adulteration are now comparatively unknown, and while many imitation products are found on the market, they are now required to be properly labeled and sold on their merits, thereby protecting the dis-

criminating consumer and the manufacturer of high grade goods.

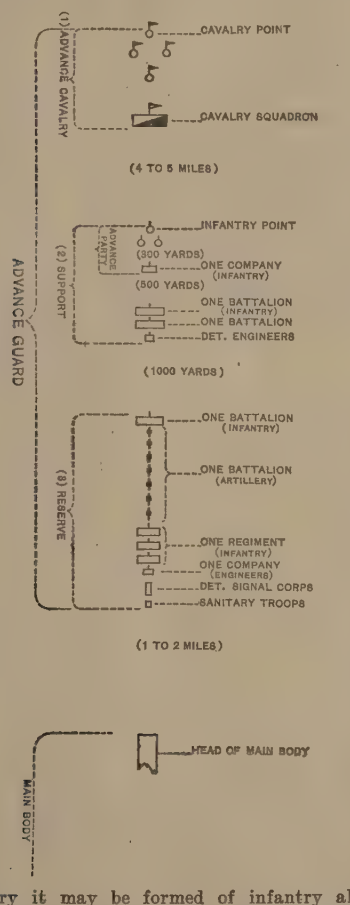
Consult: In English, Wiley, Richardson, Crampton, and Spencer, *Foods and Food Adulterants*, 7 parts (Washington, 1887–92); Wedderburn, *Report on the Extent and Character of Food and Drug Adulteration* (Washington, 1894); Bower, *Simple Methods for Detecting Food Adulterations* (London, 1895); Blythe, *Foods, their Composition and Analysis* (London, 1903); Leach, *Food Inspection and Analysis* (New York and London, 1904, 1909, 1913); Leffmann and Beam, *Select Methods of Food Analysis* (2d ed., Philadelphia, 1905); Winton, *Microscopy of Vegetable Foods* (New York, 1906); Wiley, *Foods and their Adulterations* (Philadelphia, 1907, 1911); Walker, *The Food Inspector's Encyclopedia* (London, 1912); also the Bulletins and Reports of the Bureau of Chemistry, United States Department of Agriculture, and of the agricultural experiment stations and food commissions of various States. In German, Röttger, *Kurzes Lehrbuch der Nahrungsmittel-Chemie* (Leipzig, 1894); Bujard and Baier, *Hilfsbuch für Nahrungsmittel-Chemie* (2d ed., Berlin, 1900). In French, Bellenger, *Manuel de l'Inspecteur des denrées alimentaires* (Paris, 1894); Chevallier and Baudrimont, *Dictionnaire des altérations et falsifications des substances alimentaires, medicamenteuses et commerciales, avec l'indication des moyens de les reconnaître* (Paris, 1893–97); Girard, *Analyse des matières alimentaires* (2d ed., Paris, 1904); Courcelle and Ricard, *Traité des fraudes alimentaires agricoles et medicamenteuses* (Paris, 1909); Monier et al., *Traité théorique et pratique sur les fraudes et falsifications* (Paris, 1909), 2 vols.; Villiers et al., *Traité des falsifications et altérations des substances alimentaires* (Paris, 1911), 6 vols. See Food.

ADUL'TERY (Lat. *adulterium*, the violation of another's bed, from *ad*, to + *alter*, other). "The voluntary sexual intercourse of a married person with a person other than the offender's husband or wife." By the canon law, the husband and wife were placed on the same footing; and this view has been adopted by all the nations of modern Europe. In America it has never been doubted that the offense necessary to found the sentence of divorce is committed by unlawful sexual intercourse equally whether the *particeps criminis* were married or single. In Rome, the Julian law, enacted in the time of Augustus (17 B.C.), revised the previous legislation on the subject, and imposed special penalties, consisting of forfeiture of goods and banishment, both on the adulteress and the paramour. The husband, in certain cases, was permitted to kill the latter, and the father might sometimes kill both. A constitution of Constantine, the authenticity of which has been doubted, made adultery a capital offense on the man's part. Whatever Constantine's law was, it was confirmed by Justinian, who further condemned the wife to be whipped, and imprisoned in a convent for the rest of her days, unless relieved by her husband within two years (*Novel.*, 134, c. 10). The offense was visited in Athens with punishments closely resembling those of the earlier Roman legislation. In many Continental countries adultery is still treated as a criminal offense, but in none of them does the punishment now exceed imprisonment for a limited period, which is frequently accompanied with a fine. Lord Coke says that by the law of England in early times adultery was punished by fine and imprisonment. During the Commonwealth it was made a capital offense, but this law was not confirmed at the Restoration. In Scotland the records of the Court of Justiciary show that capital punishment was frequently inflicted. At the present day it is punishable in Great Britain only by ecclesiastical censure, and even this may be regarded as in desuetude. But when committed by the wife it is regarded as a civil injury, and forms the ground of an action of damages for criminal conversation (commonly known as an action of *crim. con.*) by the husband against the paramour. No corresponding action was allowed the wife, either in England or America, until recently, and her only remedy consisted in obtaining a separation or divorce. In some of the States of the United States adultery is made criminal by special law; in some the act itself is not a crime, but open and continued adultery, amounting to a public nuisance, is. Some statutes define the crime, some only state the punishment; and this leaves a wide margin for interpretation by courts, giving rise to great diversity of opinions and decisions. Some hold that if only one of the parties be married, the other does not commit criminal adultery; some that a married man with a single woman does not commit criminal adultery, because the act cannot impose spurious issue on a husband or wife. See Divorce, and the authorities there referred to.

AD VALO'REM (Lat., according to the value). A phrase used in customs legislation to designate taxes levied upon goods in proportion to their value. The valuation which serves as a basis for the tax is commonly the fair selling value in the country of origin. When this is indeterminate, as in the case of goods produced solely for export, a more or less fictitious value is deduced from data as to cost, prices in the country of import, etc. Such duties, inasmuch as they fall with just proportion upon the different grades of goods, cheap as well as expensive, are in theory the most satisfactory. They involve, however, a cumbrous and often inefficient machinery for the ascertainment of values, and from the standpoint of customs administration are deemed inferior to specific duties, which levy a definite tax upon a given unit of measure (pound, bushel, gallon, etc.) of the imported articles. The tariffs of the United States embrace both kinds of duties and sometimes combine them. See Tariff.

ADVANCE' GUARD. A detachment of troops which precedes the main body of the command for the purpose of insuring its safe and uninterrupted advance. Troops on the march are in a formation in which they cannot fight effectively. When they come upon the enemy they must first deploy. This takes time, especially in large columns; consequently such columns require detachments to protect them against surprise. The detachment placed at the head of the column is called the advance guard. Good reconnaissance by the independent cavalry in front of the army affords some protection, but this cavalry may at any time be beaten by the enemy and forced off to one flank, or it may have been drawn off in pursuit of the enemy's cavalry; hence immediate protection for the heads of the columns is still a necessity. The strength and composition of the advance guard depends on the tactical situation, but should be the least required, on account of the

arduous duty it demands. The strength of advance guards varies between one-ninth and one-third of the entire command, but seldom exceeds the latter, and in large commands is usually composed of all arms. In making details for advance guard duty the integrity of tactical units should be preserved. The larger the force the larger in proportion should be the advance guard. In open country it should be strong in cavalry and field artillery, but artillery is seldom assigned to the advance guard of a command not larger than a brigade. In difficult



country it may be formed of infantry alone. Machine guns are valuable with the advance guard. Engineers are usually present to remove obstacles, repair roads, place bridges, etc. The signal and sanitary troops required may also be attached. The field trains usually accompany those of the main body. The independent cavalry is a body of cavalry with an independent mission and precedes the advance guard by a day's march or more. The advance guard is composed of the advance *cavalry*, the *support* and the *reserve*. Communication between these parts is maintained by wire, messenger service, or signals. The strength, composition, designation of parts, and distribution of the troops composing the advance guard of a normal division of about 18,000 men, are indicated in the accompanying diagram. The advance guard is here assumed to consist of two regiments of infantry, one squadron of cavalry, one battalion of artillery, one company of engineers, and a detachment of sanitary troops.

If the main column halts for a considerable time, the advance guard takes up temporarily the duties of outposts, but must keep up reconnaissance. Every column of march must also be protected on the flanks by patrols, and when these small bodies are not sufficient a flank guard must be organized.

In a retreat a rear guard is formed, and since the latter cannot, as a rule (like the advance or flank guard), count on the immediate support of the main body, it must be stronger than either of the others, and requires more artillery, and also cavalry, the latter playing the part of mounted infantry in this case. All European armies, except the German, have a small rear guard besides the advance guard in an advance. France and Russia have very strong advance guards and send them far out to the front. See OUTPOSTS; RECONNAISSANCE; BATTLE; TACTICS, MILITARY.

ADVANCE'MENT. In law, a gift by a parent to a child of all or a portion of the share of the parent's personal property to which the child would be entitled upon the death of the parent intestate. An advancement has the effect of reducing by its amount the distributive portion that would come to the receiver upon the death of the parent. The doctrine of advancement is applicable only to gifts from parent to child, but has been extended to gifts to others by statute in some States. An advancement is not required to be made in any particular form. Any such gift is presumptively an advancement, but the contrary may be shown. The subject is now generally regulated by statute, and in many jurisdictions real estate may be given by way of advancement to the heir. Consult Thornton, *Law Relating to Gifts and Advancements* (Philadelphia, 1893). See ADEMPTION.

ADVANCEMENT OF SCI'ENCE, ASSOCIATIONS FOR THE. Important bodies of scientific men in America, Great Britain, France, and other countries. The purpose of these associations is to emphasize the solidarity and unity of interests among workers in all branches of science, to give a stronger impulse to scientific research, both theoretical and practical, and to gain for scientific achievement a more immediate recognition and a wider usefulness, through the means of financial bequests, the publication of *Reports*, and the offering of special facilities for the prosecution of original and difficult scientific work. The organization of the societies was one of the numerous manifestations of the scientific spirit of the nineteenth century; and the continued growth of this spirit was shown at a joint meeting of the British and French associations in September, 1899, when plans were formulated for an international association for the advancement of science, art, and education. The first meeting of this international association was held in Paris during the exposition of 1900. The American Association for the Advancement of Science, now one of the most noted scientific societies of America, was founded in 1847 as an outgrowth of the association of American geologists and naturalists. The association is organized in 11 sections, each of which holds its own convention at the annual

meeting of the association during the summer. The sections embrace the following departments of science: *A*, mathematics and astronomy; *B*, physics; *C*, chemistry; *D*, mechanical science and engineering; *E*, geology and geography; *F*, zoölogy; *G*, botany; *H*, anthropology and psychology; *I*, social and economic science; *K*, physiology and experimental medicine; and *L*, education. The association also serves as a centre for the meeting of a number of important special scientific societies which have become connected with it. The association publishes annually a volume of *Proceedings*, and in 1901 became affiliated with the journal *Science*, making it the semi-official organ of the society. The membership of the society is about 8100. The British Association for the Advancement of Science was founded in the city of York in 1831, under the leadership of David Brewster and with the coöperation of many of the most prominent men of the time. The annual meetings of the association are held for a week each summer and consist mainly of papers read before the several sections of the society and of conferences following them. The society is divided into 10 sections, each having its own president and governing committee. The society sets aside yearly a large sum for the prosecution of scientific researches which require special apparatus and the employment of assistants. The membership of the association is about 5500. Reports have been published since 1831. The French Association for the Advancement of Science (*L'Association Française pour l'Avancement des Sciences*) was formed in 1865 at Lille. The work is carried on through general meetings, publications, and the bestowal of prizes for brilliant scientific work. The four sections into which the society is divided are those of the mathematical, the physical and chemical, the natural, and the economic sciences. Records of its proceedings and of the scientific work accomplished under its guidance have been published since its organization. The Australasian Association for the Advancement of Science was formed in 1886 and the South African Association in 1903.

AD'VENT (Lat. *adventus*, the approach, coming), or **TIME OF ADVENT.** A term applied by the Christian Church to certain weeks before Christmas. In the Greek church the time of Advent comprises 40 days; but in the Roman church and those Protestant churches in which Advent is observed, only four weeks. The origin of this festival as a church ordinance is not clear. A synod at Saragossa, Spain, in 380, enjoined that every one must attend church from December 17 to Epiphany; but not till the sixth century was Advent fully adopted as a church season. The four Sundays of Advent, as observed in the Roman Catholic church and the Church of England, were probably introduced into the calendar by Gregory the Great. It was common from an early period to speak of the coming of Christ as fourfold: his "first coming in the flesh"; his coming at the hour of death to receive his faithful followers (according to the expressions used by Saint John); his coming at the fall of Jerusalem (Matt. xxiv. 30), and at the day of judgment. According to this fourfold view of Advent, the "gospels" were chosen for the four Sundays, as was settled in the western church by the Homilarium of Charlemagne. The season of Advent is intended to accord in spirit with the object celebrated. As mankind were once called upon to prepare themselves for the personal coming of Christ, so, according to the idea that the ecclesiastical year should represent the life of the founder of the Church, Christians are exhorted, during this season, to look for a spiritual advent of Christ. The time of the year when the shortening days are hastening toward the solstice—which almost coincides with the festival of the Nativity—is thought to harmonize with the strain of sentiment proper during Advent. In opposition possibly to heathen festivals, observed by ancient Romans and Germans, which took place at the same season, the Catholic church ordained that the four weeks of Advent should be kept as a time of penitence; according to the words of Christ, "Repent, for the kingdom of heaven is at hand." During these weeks, therefore, public amusements, marriage festivities, and dancing were prohibited, fasts were appointed, and sombre garments were used in religious ceremonies. The Protestant church in Germany has also abstained from public recreations and celebrations of marriage during Advent. In the Greek church the observance of the season dates from a period much later than in the Latin, perhaps not till the tenth century.

AD'VENTISTS. A family of religious denominations which, accepting the inspiration of the Scriptures, taking the Bible as their rule of faith, and holding to the fundamental doctrines of the Christian churches generally, expect the near approach of the end of the world and the personal second coming of Christ. They arose from the preaching of William Miller, who taught, from 1831 on, as the results of his studies of the prophetic books of the Bible, that the end of the world would come in 1843, and be followed by the coming of Christ and the installation of the millennium. When 1843 had passed, the date was changed to October, 1844. Mr. Miller was joined by other preachers, and several thousand followers were gathered from many churches. The Adventists now, as a rule, simply await the second advent without attempting to fix a date for it. A declaration adopted at Albany, N. Y., in 1845, set forth a belief in the visible personal coming of Christ at an early but indefinite time; the resurrection of the dead, both the just and the unjust, and the beginning of the millennium after the resurrection of the saints; but denying that there is any promise of the world's conversion, and that the saints enter upon their inheritance at death. The Adventists baptize by immersion; and, except the Seventh Day branch and the Church of God, are congregational in polity. Carroll, *The Religious Forces of the United States* (New York, 1912).

1. The Evangelical Adventists. The American Millennial Association was formed in 1845 for the publication and circulation of denominational literature. The Evangelical Adventists began to call themselves by that name in 1845. They believe that all the dead will be raised, the saints first, to the enjoyment of the millennial reign with Christ and eternal bliss after the judgment, and the wicked last, to be sent into everlasting punishment, and that the dead in Hades are conscious. They had, in 1913, 8 ministers, 18 churches, and about 1150 members. Literature: H. F. Hill, *The Saints' Inheritance* (Boston, 1852); D. T. Taylor, *The Reign of Christ* (Boston, 1889); J. Litch, *Discussion on the Millennium* (Boston, between 1860 and 1865).

2. **Advent Christians.** The general association of this body was formed in 1861. The Advent Christians believe that man was created for immortality, but forfeited it through sin and can become partner of the divine nature and live forever only through faith in Jesus Christ; that death is a condition of unconsciousness to all till the resurrection at Christ's second coming, when the righteous will receive everlasting life and the wicked will be punished with complete extinction of being; and that salvation is free to all who will accept the conditions. They have, in the United States, 528 ministers, 550 churches, with about 26,800 members, and a Bible institute. The principal publication society is in Boston. The missionary society sustains missions in England, the Cape Verde Islands, India, and China. In home missions it is aided by the Eastern, Western, and Southern Boards, and by the woman's society called "The Helper's Union." It also has charge of a church extension fund. The leading periodicals are *The World's Crisis*, and Sunday school publications (all Boston). Literature: J. G. Wellcome, *History of the Second Advent Message* (Yarmouth, Me., 1874); Charles L. Ives, *The Bible Doctrine of the Soul* (Philadelphia, 1877); E. A. Stockman, *Our Hope* (Boston, 1884); Mrs. L. C. McKinstrey, *The World's Great Empires* (Haverhill, Mass., 1887); Rev. H. Constable, *Hades or the Intermediate State of Man* (Boston, 1885).

3. **Seventh-Day Adventists.** The doctrine of the obligation of the seventh day as the Sabbath was adopted by a body of Adventists at Washington, N. H., in 1844. The Seventh-Day Adventists believe that Christ's closing work as priest—the cleansing of the sanctuary and the investigative judgment—are events marked in the prophecies as beginning in 1844. They hold that the dead sleep until Christ's second coming; that the righteous dead are raised to life and with the living righteous are made immortal; that the wicked are destroyed by the glory of Christ's presence; and that the second resurrection, that of the wicked, takes place at the end of a thousand years. During this millennium the righteous are in heaven, the earth desolated, and empty of its inhabitants. They believe that Christ's coming is near, but set no time for that event, maintaining that it is hidden from all mortals. They believe in the restoration in the Church of all the gifts of the Spirit, bestowed by Christ, including the gift of prophecy, believing the writings of Mrs. E. G. White to be special illuminations of the Spirit, though adding nothing to the doctrine of the Holy Scriptures, which are held to be the sole and sufficient standard of faith and doctrine. They believe that the whole Bible is inspired and look to Christ alone for salvation and righteousness.

The chief governing body is the General Conference, having headquarters in Washington, D. C. The General Conference is divided into 23 Union Conferences, embracing practically the entire world. Union Conferences are composed of a group of local conferences, of which there are 126, and 100 mission fields. At the close of 1912 operations were being carried on in 86 countries, by 863 ordained ministers, 492 licensed ministers, and other evangelistic workers, making the grand total of evangelistic laborers approximate 6000. The number of evangelistic laborers in non-Christian and non-Protestant lands is 1481, thus constituting this denomination the sixth in point of total missionaries in foreign service of all the missionary societies in the United States. Over 500 missionaries have been placed in service in foreign lands during the past five years; the contributions for foreign missions from the membership in the United States during 1912 were $619,826.85, a per capita of $9.40. Missionary work is conducted in 91 languages. The total funds raised annually for evangelistic purposes approximate $3,000,000. In 1912 the denomination had 2874 churches and 114,206 communicants. The denomination has 69 sanitariums; 90 colleges and intermediate schools, 573 primary schools; total investment in denominational institutions exceeds $13,000,000; 123 periodicals are regularly issued in 31 languages. The leading weekly periodicals are *The Advent Review and Sabbath Herald* and *The Youth's Instructor* (Washington, D. C.); *Signs of the Times* and *Our Little Friend* (Mountain View, Cal.); *The Present Truth* (Watford, England); *Signs of the Times* (Warburton, Australia); *The Gospel Messenger* (Danish), (College View, Neb.). The monthlies include *Liberty*, *Life and Health*, and *Protestant Magazine* (Washington, D. C.); *The Watchman* (Nashville, Tenn.); *South African Sentinel* (Cape Town, South Africa); *Herald of Truth* (German), (Hamburg, Germany); *Signs of the Times* (Glarus, Switzerland); *Signs of the Times* (Shanghai, China); *Oriental Watchman* (Lucknow, India); *West Indian Watchman* (Riversdale, Jamaica).

The literature of the denomination is issued from 37 publishing houses, in 75 languages, in the form of 350 bound books, over 300 pamphlets, and about 1200 tracts, and annual literature sales approximate $2,000,000. Among the leading works may be mentioned *History of the Sabbath and First Day of the Week*, by J. N. Andrews and L. R. Conradi; *The Great Controversy between Christ and Satan*, *Desire of Ages*, and *Patriarchs and Prophets*, by Mrs. E. G. White; *Thoughts on the Book of Daniel and the Revelation*, by Uriah Smith; *The Great Second Advent Movement*, by J. N. Loughborough; *Heralds of the Morning*, by A. O. Tait.

4. **The Church of God.** This was formed after a division among the Seventh-Day Adventists, 1864–65, concerning the acceptance of the revelations of Mrs. E. G. White as inspired and the application of Rev. xii. 11–17 to the United States. It holds to the mortality of man and unconsciousness in death; resurrection of the righteous to everlasting life and of the wicked to judgment and final extinction; observes the seventh day and practices tithing. The general conference is the head of its work, and the State conferences are subordinate to it. It has 32 ministers, 20 churches, and about 600 members, with a publishing house at Stanberry, Mo., and a sanitarium at White Cloud, Mich. Periodicals: *The Bible Advocate*, *Herald of the Coming Kingdom* (Stanberry, Mo.). Literature: A. P. Dugger, *Bible Sabbath Defended* (Marion, Iowa, 1881); Jacob Brinkerhoff, *Kingdom of Heaven upon Earth* (1882); W. C. Long, *The End of the Ungodly* (1886).

5. **Life and Advent Union.** Organized 1860. The distinctive feature of its belief is that those who die in sin have no resurrection, but are doomed to sleep eternally, while the righteous rise to immortality. A general conference meets every year, and quarterly conferences have been

instituted in some places. Four camp-meetings are held every year—in New England and Virginia. The missionary work is carried on, in the home field only, by two societies, one of which is organized among the young people. The Union has in the United States 12 ministers, 12 churches, and about 500 members. Literature: O. S. Halstead, *The Theology of the Bible* (Newark, N. J., 1860); *Discussion between Miles Grant and J. T. Curry* (Boston, 1863); W. N. Pile, *The Doctrine of Conditional Immortality* (Springfield, Mass.); *The Coming Kingdom of God* (Springfield, Mass.); Wm. E. Brown, *The Divine Key of Redemption* (Springfield, Mass.); "A Disciple," *Redemption* (Springfield, Mass.).

6. **The Churches of God** (Age-to-Come Adventists) believe in the final restitution of all things; the establishment of the kingdom of God on the earth, with Christ as King of kings and the immortal saints joint heirs with him; the restoration of Israel; the final destruction of the wicked, and eternal life only through Christ. The journal, *The Restitution*, was begun in 1851, and a general conference representing 13 States was formed in 1888. The Churches have 56 ministers, 62 churches, and about 2100 members in the United States, and churches in Canada. Periodical: *The Restitution* (Plymouth, Ind.). Literature: J. P. Weethee, *The Coming Age* (Chicago, 1884).

ADVEN'TIVE (Lat. *ad*, to + *venire*, to come). A plant which is but incompletely naturalized (see NATURALIZATION) is said to be adventive. Most adventive plants are spontaneous for a few years and then disappear, while a few species become more and more numerous and ultimately become naturalized.

ADVEN'TURES OF AN AT'OM, THE. A satire by Tobias Smollett (q.v.) published in 1769 and treating, under a Japanese disguise, of English politics during the preceding 14 years.

AD'VERB (Lat. *adverbium*, from *ad*, to + *verbum*, word, verb, "the word" of a sentence *par excellence*. A literal translation by the Roman grammarians of the Gk. *ἐπίρρημα, epirrhēma*, from *ἐπί, epi*, at + *ῥῆμα, rhēma*, word, verb). As an adjective is joined to a noun, so is an adverb joined, for analogous purposes, to a verb, an adjective, or another adverb. From the frequency with which adverbs are joined to verbs, only the adverbs of degree modifying other parts of speech, they get their name. An adverb cannot be the subject, the copula, or the predicate of a proposition, and is, therefore, a secondary part of speech, logically speaking. According to their signification, adverbs may be divided into (1) adverbs of place and direction, as *where, towards;* (2) of time, as *ever, immediately;* (3) of degree, as *very, almost;* (4) of manner, as *thus, wisely;* (5) of belief or doubt, as *perhaps, no*, etc. It is commonly said that "some adverbs admit of comparison," as if in this respect they differed from adjectives. The truth is that adverbs admit of comparison under the same limitations, neither more nor less, that restrict the comparison of adjectives. Thus, *soon* is compared as naturally as *hard*. If *now* or *thus* cannot be compared, neither can *woolen* nor *circular;* and in both cases for the same reason—the sense forbids it. The laws of euphony prevent alike *miserable* and *miserably* from being compared grammatically, i.e., by the addition of *er* and *est;* but both admit of logical comparison by the use of *more* and *most*. A large class of adverbs in English are formed from adjectives by annexing the syllable *ly*, which is derived from the word *like*. Most languages have some such means of distinguishing the adverb from the adjective, but in German they are alike. Adverbs in general may be looked upon as abbreviations of phrases; thus, *here = in this place, then = at that time, wisely = like a wise man*. Combinations of words that can thus be represented by a single adverb, and all combinations that are analogous, though they may have no single word equivalent to them, are called adverbial expressions.

AD'VERSE POSSES'SION. The possession of lands under a claim of title inconsistent with that of the true owner. It originates in the disseisin (q.v.) or ouster of the freehold tenant and, if continued for the statutory period of limitation, results in the acquisition of a complete title by the adverse possessor or disseisor. In order to constitute a good adverse possession there must be an actual occupancy (*pedis possessio*) of the premises claimed and an exclusion of the rightful owner from the whole thereof. The possession must be open and notorious and continued without interruption for the requisite period. It need not be continued by one and the same person, however; a subsequent occupant who claims by descent, devise, or grant from a former occupant being entitled to tack his possession to that of his predecessor in order to make up the requisite period of adverse holding. In some of the United States it is not even necessary that the subsequent occupant shall show a legal transfer of the property to him so as to connect his possession with that of the original disseisor in order to tack the two periods. The claim of title required of the adverse possessor is not an assertion of a legal right, but only an obvious intention to hold as owner. This may be innocent, as under a will or deed which proves to be void or unintentional, as by the accidental inclusion of another's land with that of the occupant, or it may be with the deliberate intention of gaining for one's self land belonging to another. The existence of the requisite intention, or claim of title, is a question of fact to be determined from the circumstances of the occupancy. In some of the United States certain acts (as fencing, improvement of the premises, or actual residence) have been prescribed by statute as requisite to prove the intention. In general the claim of the adverse possessor is limited to the land actually occupied; but where the claim is under color of title (i.e., under a deed, will, or other instrument describing a definite parcel of land) the actual occupation of a part may be extended by construction to the whole parcel so described. This doctrine of "constructive adverse possession" is a modern addition to the law of disseisin and is peculiar to the United States. The period of time required to ripen an adverse possession into a valid and indefeasible title varies greatly, but it is usually fixed by statute at 20 years. (See LIMITATION OF ACTIONS.) The subject is fully considered in all the leading treatises on real property. Leake and Williams are the modern English authorities. For the American doctrine see Tiffany, *The Modern Law of Real Property* (St. Paul, 1903).

ADVER'SITY HUME. A nickname given to the parliamentarian Joseph Hume (q.v.), who was noted for his attention to financial

abuses in the government, and whose predictions of a crisis were justified in 1825.

ADVERTISEMENT, ăd-vĕr'tĭz-ment *or* ăd-vĕr-tīz'ment. In legal phraseology, a process resorted to whenever actual notice is necessary but is legally or physically impossible (as by reason of a want of jurisdiction of the parties to be notified, or ignorance of their whereabouts). Publication must be made in a newspaper published at or as near as possible to the place where the persons to be affected when last heard of resided. Such advertisement in law is construed to have the same effect as actual service of the notice, as, for example, in proceedings brought to foreclose a mortgage or other lien on real property. An attempt to notify personally all parties affected would often only result in delay, if not miscarriage, of justice. For advertisement in business, see ADVERTISING.

ADVERTISEMENTS OF ELIZ'ABETH. A series of enactments issued by Parker (q.v.), Archbishop of Canterbury, in 1566, for the purpose of establishing "due order in the public administration of Common Prayer and using of Holy Sacraments." Enforcing as it did the wearing by the clergy of the surplice and college cap, and of the cope in cathedrals and collegiate churches, it was in harmony with Elizabeth's love for decency and order in public worship; but after waiting more than a year for her official sanction, and long correspondence with Cecil, Parker was obliged to issue it on his own responsibility. During the latter half of the nineteenth century there was much controversy as to the exact force of the advertisements, which came to a head in the Ridsdale ritual case of 1877. Lord Selborne held that they were an absolute and authoritative prescription of the vestments to be worn, contending that they were the "other order" mentioned in the Act of Uniformity as to be taken later; while the High Church party, ably represented by James Parker, considered them as merely archiepiscopal injunctions intended to enforce a minimum of ritual. Consult Strype, *Life and Acts of Matthew Parker* (Oxford, 1821).

AD'VERTIS'ING (Lat. *advertere*, to turn [the mind] to, to notice). The method by which the producer of commodities disseminates information regarding them. For the producer it has the value of an automatic process, since it makes it possible to reach thousands of people through printed words, where formerly the seller was limited to his vocal organs. For the consumer it has the value of a system of education, since it keeps him in touch with the invention of new commodities, the improvement of old, and the constant advance in industry.

In tracing back the history of advertising, signs and criers are found in Palestine, Greece, and Rome, where they were used for public announcements and a few private purposes. Pompeii has furnished us with many wall inscriptions in red and black, as well as the familiar Roman signs, the amphora and two slaves for a wine shop, a goat for a dairy, or a boy being whipped for a school. Quaint signs prevailed throughout the Middle Ages, and the public crier was an important institution in towns. It was, however, the advent of printing and later of the newspaper which provided an adequate medium for advertising, although it was not until the industrial changes of the nineteenth century had revolutionized production, creating innumerable new commodities and stimulating new wants, that advertising could become an important feature of commercial life. In the seventeenth century small advertisements appear in the newspapers for books, tea, coffee, or medicine. The chief advertisements for a hundred years or more are curiously illustrative of the crude social customs. A heavy stamp tax hampered the growth of newspapers and advertising in England until 1855.

America is par excellence the country of the advertiser. In the Colonial papers advertisements furnish material for history. Brief notices tell of new goods just imported from England, coffee, slave sales, runaway slaves and servants, or lost cattle. Advertising has grown with the newspapers. In 1795 there were 200 newspapers in the United States; in 1850, 2526; and in 1913, 24,381. Newspaper advertising on a large scale dates from the establishment of the New York *Sun* in 1833, followed shortly by the New York *Herald*, the Philadelphia *Public Ledger*, and the New York *Tribune*. According to census reports the sums paid for advertising in newspapers and other periodicals were, in 1899, $95,861,127; in 1904, $145,517,591; in 1909, $202,533,245. Receipts from advertising represented 55 per cent of the total income of newspapers and other periodicals in 1899; 56.6 per cent in 1904; 60 per cent in 1909. The amount annually spent on advertising in the United States is variously estimated at from $300,000,000 to $500,000,000. The mediums for advertising are as follows: (1) the newspapers, magazines and trade journals; (2) occasional literature, such as catalogues, booklets, circulars, almanacs, calendars, or handbills; (3) street advertising, including bill-boards (see POSTER), stereopticons, signs, and street-cars; (4) salesmen; and (5) personal advertising.

As early as 1850 there existed in New York agencies whose function it was to arrange rates with newspapers, to gather information as to the extent and character of newspaper circulation, etc., for the guidance of the advertiser. At that time advertisements consisted commonly of plain statements of the character of the things offered for sale. With the enormous development of the patent medicine industry after the Civil War advertising assumed a more complicated technique. Illustrations were required, and a nice adjustment of character of advertisement to territory covered. In the 80's and 90's there was a great development of advertising through illustrated catalogues. Examples of businesses built up through such advertising are the "mail order houses" and the garden seed concerns. After 1890 there was a vast increase in the production of trade-marked articles of personal and household use which were wholly dependent upon advertising for a market. The "advertising campaign" became a characteristic feature of American business. The management of such campaigns made necessary the development of a new type of advertising agency, well supplied with capital, having at its command a corps of highly trained writers and illustrators and possessing a complicated technical apparatus in the form of records of advertising experience, etc.

Advertising methods are still essentially empirical. Whether a given form of advertising will be profitable is left to the judgment of advertising experts, and in many cases an elaborate and expensive campaign proves fruitless.

A business advertising in many newspapers and other periodicals of various classes usually attempts, through direct or indirect means, to ascertain how much business is secured through each medium or through each form of advertisement. In this way wasteful and ineffective advertisements are gradually eliminated. Since, however, novelty is an important factor in securing public attention, this process of experimentation must go on continuously. It has been urged that by the employment of experimental psychology much of the waste of ineffective advertisements could be avoided. Experiments have been carried on in the laboratories of Professor Münsterberg at Harvard and Prof. W. D. Scott at Northwestern University with a view to establishing the effectiveness of scientific methods in advertising. Practical advertisers, while admitting the value of such studies, are generally skeptical as to the possibility of reproducing in the laboratory the conditions which the business advertisers must meet.

Efforts to Prevent Abuses in Advertising. The choice of farmers' barns and fences and more especially of rocks and prominent scenic effects for the placing of advertisements has led to various efforts to stop such abuses. A number of London societies interested in preserving historical sites or beautiful places incidentally make efforts in this direction. The Society for Checking Abuses in Public Advertising—now generally known as "Scapa" (q.v.)—is the leader in this work. It publishes circulars and asks for parliamentary action. Dr. G. Alder Blumer, Superintendent of the State Asylum at Utica, N. Y., started a crusade in 1898 to preserve the rural scenery in that vicinity. He obtained farmers' addresses from the Good Roads League and sent them Scapa circulars. The New York Central Railroad has made an effort to get rid of unsightly advertising along its line. The nuisance of circulars has been met in some cities, as in Philadelphia, by ordinances forbidding their distribution. The city of Chicago attempts to regulate advertising on the streets through restrictions upon the size of bill-boards, etc. A tax upon bill-boards, graduated according to area, has been employed in some European cities and has been urged upon various legislatures in the United States.

Bibliography. Quarterly publications of American Statistical Association, vii, New Series, No. 52 (Boston, 1900); Chauncey M. Depew, *One Hundred Years of American Commerce* (New York, 1891); W. D. Scott, *The Theory of Advertising* (Boston, 1903); Id., *Influencing Business Men* (New York, 1911); Calkins and Holden, *Modern Advertising* (New York, 1909); T. D. MacGregor, *Pushing Your Business* (New York, 1911); H. Münsterberg, *Psychology and Industrial Efficiency* (Boston, 1913).

ADVICE'. See Bill of Exchange.

AD'VOCATE (Lat. *advocatus*, one called to aid, from *ad*, to + *vocare*, to call). In the time of Cicero the term *advocatus* was not applied to the patron or orator who pleaded in public, but rather, in strict accordance with the etymology of the word, to any one who in any piece of business was called in to assist another. Ulpian defined an advocate to be any person who aids another in the conduct of a suit or action (Digest 50, title 13), and in other parts of the Digest it is used as equivalent to an orator (see also Tacit., *Annal.*, x, 6), so that the word would seem gradually to have assumed its modern meaning. The office of the advocate or barrister who conducted the cause in public was, in Rome, altogether distinct from that of the *procurator*, or attorney, or agent who represented the person of the client in the litigation, and furnished the advocate with information regarding the facts of the case. The distinction between these two occupations is still observed in Great Britain, but in many of the States of Germany, in Geneva, in the United States, and in some of the British colonies, as, for example, in Canada, they are united in the same person. In England and Ireland advocates are called barristers, under which title will be found a statement of the duties and responsibilities which the advocate undertakes to his client and of the state of the profession in these countries. In Scotland, as in France, the more ancient name has been retained. In France the *avocat* and *avoué* correspond very nearly to the barrister and attorney in England. The French advocate is simply a free man who has graduated in law and possesses the privilege of addressing the tribunals. The advocates who practice in each court form a separate college, admission to which can be obtained only with the approval of those who are already members. The French advocate possesses the same privileges as to irresponsibility for his advice, and for the facts contained in his instructions, which belong to members of the corresponding branch of the legal profession in Great Britain. As he has no action for his fees, they are required to be paid in advance. His functions correspond to those of the counsel, as distinguished from the attorney-at-law, in the United States. In Belgium, in Geneva, and also in those of the German States in which the Code Napoléon has been adopted, the organization and discipline of this branch of the legal profession are similar to those which prevail in France. In the other German States, with the exception of Saxony, the formation of the advocates into a body has been perseveringly resisted by the governments. See Attorney.

ADVOCATE, Lord. The public prosecutor of crimes in Scotland, senior counsel for the crown in civil causes, and a political functionary of great importance in the administration of Scottish affairs. He may issue warrants of arrest and imprisonment in any part of Scotland, is entitled to plead within the bar, and possesses many other discretionary and indefinite powers. He is a member of Parliament and, as first law-officer of the crown for Scotland, is expected to answer all questions relating to the business of Scotland and to take the superintendence of legislation for that portion of the United Kingdom. The corresponding office in the English system, that of the king's or queen's advocate, once of equal dignity and importance, has lately become obsolete, and its functions devolve upon the attorney-general and the solicitor-general (q.v.). In some of the English colonies and in the Indian presidencies, however, the title "advocate" is retained to describe the chief law officer of the crown. Consult Bell, *Dictionary and Digest of Law of Scotland* (Edinburgh, 1890).

AD'VOCATES, Faculty of. An incorporated society in Scotland, composed of about 400 lawyers who practice in the highest courts. Applicants for admission are required to pass an examination following a prescribed course of study. From the membership vacancies on the bench are supplied.

AD'VOCA'TUS DIAB'OLI, dĭ-ăb'ō-lī (Lat. the devil's advocate). In the Roman Catholic church, when it is proposed that a sanctified person shall be canonized, an examination of his past life takes place. In this process one party holds the office of accuser, or *advocatus diaboli*, and it is his duty to bring forward all possible objections against the proposed canonization; while, on the other side, the *advocatus Dei* (God's advocate) undertakes the defense. Hence the term *advocatus diaboli* has been applied to designate any person who brings forward malicious accusations. See CANONIZATION.

ADVOW'SON (A. Fr. *advoëson*, OF. *avoeson*, patronage, from Lat. *advocatio*, legal assistance). In English law, the right, as patron, to present or appoint a curate to a church or ecclesiastical benefice. Advowsons are either appendant or in gross. Lords of manors were originally the only founders and the only patrons of churches, and the advowsons, when created, were usually made an incident or appurtenance to the manorial estate, which would pass with it upon alienation. So long as the advowson continues annexed or appended to the manor, it is called an advowson appendant. Such rights are conveyed with the manor as incident thereto by a grant of the manor only, without adding any other words. But where the advowson is created independently of the manor, or has been once separated from the property of the manor by legal conveyance, it is called an advowson in gross or at large. It is thus no longer incident to the property of the manor, and may be conveyed and disposed of independently of it. Advowsons are classed by Blackstone as the first of the incorporeal hereditaments, and they still constitute in England an important class of property interests. They do not exist in the United States. Consult Stephen, *New Commentaries on the Laws of England* (13th ed., London, 1899); Phillimore, *Ecclesiastical Law of the Church of England* (2d ed., London, 1895); Addy, *Church and Manor* (London, 1913).

ADY, ā'dĭ (Mrs. HENRY) JULIA (CARTWRIGHT). An English writer and art critic. She was born at Edgcott, Northamptonshire, and was educated privately. In 1880 she married Rev. W. H. Ady. Her published writings include, besides numerous novels and contributions to reviews and magazines: *The Pilgrim's Way* (1892); *Sacharissa* (1893); *Madame: The Life and Letters of Henrietta, Duchesse of Orleans* (1894); *Life and Work of Sir Edward Burne-Jones* (1894); *J. F. Millet: His Life and Letters* (1896); *Life and Letters of J. G. F. Watts* (1896); *Bastien-Lepage* (1895); *Christ and His Mother in Italian Art* (1897); *Beatrice d'Este, Duchess of Milan* (1899); *The Painters of Florence* (1901); *Isabella d'Este, a Study of the Renaissance* (1903); *Sandro Botticelli* (1904); *Raphael* (1905); *Hampton Court* (1909), *The Life of Christian of Denmark* (1913).

ADYE, ā'dĭ, Sir JOHN MILLER (1819–1900). An English soldier. He was educated at the Royal Military Academy, Woolwich, entered the Royal Artillery in 1836, and was Assistant Adjutant-General of the Royal Artillery in the Crimean War. He also served during the Indian mutiny in several important actions and in various other Indian campaigns. He was Director-General of Artillery from 1870 to 1875, and from 1875 to 1880 Governor of the Royal Military Academy at Woolwich. He was promoted in 1879 to be Lieutenant-General, and in 1882 was Chief-of-Staff of the expedition to Egypt. He was Governor of Gibraltar from 1883 to 1886, when he retired from active service. He published *The Defense of Cawnpore* (1858); *Sitana: a Mountain Campaign; On the Borders of Afghanistan in 1863* (1867); *Recollections of a Military Life* (London, 1895); and *Indian Frontier Policy* (1897).

AD'YTUM (Lat. from Gk. ἄδυτον, *adyton*, the innermost sanctuary, from ἀ, *a*, priv. + δύειν, *dyein*, to enter). The most sacred part of a building, usually associated with secrecy and darkness, because in Greek and Egyptian temples, with which the term originated, it designated a furthermost recess not accessible to the people. See TEMPLE.

ADZE. See AXE.

ÆACIDES, ē-ăs'ĭ-dēz (Gk. Αἰακίδης, *Aiakidēs*). A patronymic of Achilles, as the descendant of Æacus, his grandfather.

ÆACUS, ē'ā-kŭs (Gk. Αἰακος, *Aiakos*). The fabled son of Zeus and Ægina, and King of Ægina; the father of Telamon and Peleus. He was so renowned for justice that not only men but the gods sought his decisions. After death Pluto made him one of the judges in Hades.

AEBY, or **ÄBY,** ĕ'bē, CHRISTOPH THEODOR (1835–85). A Swiss anatomist and anthropologist, born near Pfalzburg, Lorraine. He studied medicine at Basel and Göttingen. In 1863 he was made professor of anatomy at Bern, and in 1884 at the University at Prague. He is best known for his contributions to anthropology, which include a new and valuable craniometric method. He also demonstrated the influence of atmospheric pressure on the several joints of the human body. His published works include *Untersuchungen über die Fortpflanzungsgeschwindigkeit der Reizung in der quergestreiften Muskelfaser* (Brunswick, 1862); *Eine neue Methode zur Bestimmung der Schädelform von Menschen und Säugetieren* (Brunswick, 1862); *Die Schädel formen des Menschen und der Affen* (Leipzig, 1867); *Ueber das Verhältnis der Mikrokephalie zum Atavismus* (Stuttgart, 1878).

ÆCIDIOMYCE'TES, ē-sĭd'ĭ-ō-mī-sē'tēz (*æcidium*, see below + Gk. nom. pl. μύκητες, *mykētes*, mushrooms, fungi). A group name formerly used to include the "smuts" and "rusts," and referring to the appearance of an "æcidium" in the life history of many rusts. See UREDINALES.

ÆCID'IUM (dimin. of Gk. *aikia*, *aikia*, injury), or CLUSTER CUP. One form of spore cluster ("sorus") of the parasitic fungi called "rusts." See UREDINALES.

ÆDIC'ULA (Lat., a small building, dimin. of *ædes*, building). In Roman literature, a designation for a small house or for part of a house; in modern usage, applied to chapels, shrines, or free-standing niches containing statues, and to sepulchral monuments in the form of little temples or chambers. In the large temples this name was given to architectural apses or niches containing statues, and even to little portable models given as votive offerings. During the Middle Ages the founders of churches were often represented in sculptures or paintings holding the model of the church; such models were termed "ædiculæ." The term may also be used to designate almost any small structure of a decorative or votive character.

ÆDILES, ē'dīlz. In ancient Rome, a sort of commissioners of public works, with general

supervision over the public buildings (*ædes*), the cleansing and paving of the streets, the public games and spectacles, the water-supply, the inspection of weights and measures, and the market regulations. In connection with the public games, baths, taverns, and the like they had also police duties. At first, from 494 B.C., there were only two ædiles, both plebeians, elected by the plebs; their name, Ædiles Cereales, was derived from their headquarters, the Ædes Cereris. Afterward, two others, styled Ædiles Curules, were chosen at first from the patricians (366 B.C.), but later in alternate years from the patricians and the plebeians. Julius Cæsar appointed a new order of Ædiles Cereales to take charge of the public granaries. See A. H. J. Greenridge, *Roman Public Life* (1901); J. E. Granrud, *Roman Constitutional History* (1902); F. F. Abbott, *Roman Political Institutions* (1901); Botsford, *The Roman Assemblies* (New York, 1909).

ÆDUI, or **HÆDUI,** ĕd′ū-ī *or* hed′ū-ī. A people of Gaul, between the Saône and the Loire, the first Gallic tribe that formed an alliance with the Romans, who therefore called them "Brothers of the Roman People" (Cæsar, *B. G.*, i, 33). Their chief town was Bibracte (Mont-Beuvray), which they later abandoned for Augustodunum (Autun).

ÆGA′DIAN ISLANDS (ancient ÆGA′TES). A group of three small islands situated directly off the west coast of Sicily and forming a part of the Italian province of Trapani (Map: Italy, G 10). They consist of the islands of Favignana, the largest and best populated of the group, Maritimo, and Levanzo. The total area is about 16 square miles. The island of Favignana is very fertile and has good tunny fisheries. The population of the group is about 6000, of whom nearly 5000 are found on the island of Favignana. In 241 B.C. the Romans, under Lutatius Catulus, achieved a great naval victory over the Carthaginians off these islands, which brought the first Punic War to a close. The islands belonged to the Pallavicini family of Genoa from the middle of the seventeenth century until 1874.

ÆGÆON, ê-jē′ŏn (Gk. *Αἰγαίων, Aigaiōn*). In Greek mythology, the name by which, according to the *Iliad*, i, 403, Briareus (q.v.) was known among men.

ÆGA′TES, or ÆGA′TES IN′SULÆ. See ÆGADIAN ISLANDS.

ÆGA′TIAN ISLANDS. See ÆGADIAN ISLANDS.

ÆGEAN ISLANDS. The islands of the Ægean Sea (see ARCHIPELAGO). They comprise the following: Thasos, in the extreme north, off the Macedonian coast; Samothrace, Imbros, and Lemnos, near the Dardanelles; Eubœa, the largest of all, lying close along the east coast of the Greek peninsula; the northern Sporades, including Skiathos, Skopelos, and Skyros, near Eubœa; Lesbos, Chios, Samos, and the large group of other Sporades, such as Rhodes, Cos, and Patmos, adjacent to the coast of Asia Minor; and, finally, the large group, the Cyclades, extending southward from Eubœa toward Crete and including Andros, Delos, Naxos, Paros, and Melos. The islands are of volcanic origin, have a healthful climate and beautiful scenery, and are peopled mainly by Greeks. In ancient times they played a conspicuous part in the course of Greek history, giving to the world poets and philosophers. In the fifteenth and sixteenth centuries all the islands passed under Turkish dominion. In 1832 Eubœa, the northern Sporades, and the Cyclades were united with the independent Greek kingdom, and in 1835 Samos, while remaining under Turkish suzerainty, was erected into an autonomous principality under the joint protection of France, Great Britain, and Russia. In the course of the Turco-Italian War of 1911–12 (q.v.) the Italians seized 12 of the Sporades, including Rhodes and Patmos, but promised by the Treaty of Lausanne (Oct. 15, 1912) to surrender them on condition that the Porte should accord effective reforms to the Christian inhabitants. During the Balkan War of 1912–13 (q.v.) the Greeks occupied all the Turkish islands in the Ægean except those held by the Italians. The Treaty of London (May 30, 1913) left the final disposition of the islands in the hands of the European Powers. For a more detailed description, see CYCLADES; SPORADES; and individual islands.

ÆGE′AN SEA. See ARCHIPELAGO.

ÆGE′ON. In Shakespeare's *Comedy of Errors* (q.v.), the merchant of Syracuse.

Æ′GERI′IDÆ. A family of moths. See CLEARWING.

ÆGEUS, ē′jūs *or* ē′jê-ŭs (Gk. *Αἰγεύς, Aigeus*). King of Athens, son of Pandion. He was the father of Theseus (q.v.) and by the latter was restored to the throne of Athens, of which he had been deprived by his brother Pallas. When Theseus set out for Crete to deliver his country from the tribute of Athenian lads and lasses it had to pay Minos (q.v.) for the Minotaur (q.v.), he put black sails on his funeral ship, but agreed in case he conquered the Minotaur to exchange these black sails for white. On approaching the coast of Attica he forgot his promise, and Ægeus, believing his son lost, threw himself into the sea, which, according to tradition, was named "Ægean" after him. Ægeus is supposed to have introduced the worship of Aphrodite into Athens, where he himself was honored with a *heröön*, or shrine.

ÆGIDI, ā-gē′dê, LUDWIG KARL (1825–1901). A German jurist, politician, and author, born at Tilsit and educated at the universities of Königsberg, Berlin, and Heidelberg. He was editor of the *Konstitutionelle Zeitung* until January, 1851, and extraordinary professor at Erlangen from 1857 to 1859. During the Italian war he published, while in the service of the Russian ministry, the famous anti-Austrian pamphlet entitled *Preussen und der Friede von Villafranca* (1859), which was followed by *Suum Cuique: Denkschrift über Preussen* (1859) and *Der deutsche Kern der italienischen Frage*. Afterward he was a professor at the universities of Hamburg, Bonn, and Berlin, and served as a member of the Prussian Chamber of Deputies (1867–68, 1873–93), and as Councilor of Legation in the Foreign Office. He published numerous writings, among which the following is perhaps the most important: *Das Staatsarchiv, Sammlung der offiziellen Aktenstücke zur Geschichte der Gegenwart* (in collaboration with Klauhold, Hamburg, 1861–71; afterward continued by Hans Delbrück, and since 1894 by G. Roloff).

ÆGIDIUS, ê-jĭd′ĭ-ŭs. See GILES, SAINT.

ÆGI′NA (Gk. *Αἴγινα, Aigina*). Now EGINA. An island forming part of the kingdom of Greece, about 33 square miles in extent, in the ancient Saronicus Sinus, now the Gulf of Ægina, between Argolis and Attica. It is mountainous, with deep valleys and chasms, and the coast af-

fords only one haven, on the northwest. The modern town of Egina stands on the site of the ancient town, at the northwest end of the island. The island contains about 8200 inhabitants, who are chiefly occupied in trade, navigation, and agriculture. The soil produces the best almonds in Greece, with wine, oil, grain, and various fruits. An ancient legend derived the name of the island from the nymph Ægina, daughter of the river god Æsopus, who was brought to it by Zeus, by whom she became the mother of Æacus, famed for his justice. The ancient Achæan population was driven out by Dorians from Epidaurus, who built up one of the richest trading cities in Greece. It was said that money was minted first on Ægina. The Æginetans took a prominent part in the defeat of the Persians at Salamis, but with the growth of the Athenian power they were first forced to become tributary to Athens and in 431 B.C. were expelled from the island. They were later restored by Lysander, but the island never recovered its old position. See ÆACUS; ÆGINETAN SCULPTURES; TALENT.

ÆGINA, or AIGINA, GULF OF (the ancient SARONIC GULF). An arm of the Ægean Sea, between the Peloponnesus and Attica, and separated from the Gulf of Corinth by the Isthmus of Corinth (Map: Greece, D 6). In the Gulf of Ægina are the islands of Salamis and Ægina.

ÆGINETA, ĕj'ĭ-nē'tȧ, PAULUS (Gk. Παῦλος) (latter half of seventh century, A.D.). A Greek physician, born in the island of Ægina, from which he took his name. Of the details of his life little is known, save that he was a great traveler; his medical works were highly prized, though they were little more than compilations from earlier writers. The chief of these is still extant, *De Re Medica Libri Septem,* last edited by Briau (Paris, 1855). This work was translated into Arabic; there is an English version by Adams (London, 1834). See Krumbacher, *Byzantinische Litteraturgeschichte,* pp. 614, 616 (Munich, 1897).

ÆG'INE'TAN SCULP'TURES. The small island of Ægina holds an important position in the history of early Grecian art, as the seat of a famous school of bronze workers, whose most celebrated artist was Onatas (about 490–460 B.C.). The school was especially noted for its statues of athletes and seems to be connected with the Peloponnesian art. On an eminence in the northeastern part of the island stand the ruins of a temple, where in 1811 excavations conducted by Cockerell, von Haller, Foster, and Linckh brought to light fragments of sculpture, which were bought by the Crown Prince, Louis of Bavaria, and, after restoration (not always correct) by Thorwaldsen, set up in the Glyptothek at Munich. In 1901 Prof. A. Furtwängler began new excavations on this site in behalf of the Prince Regent of Bavaria. These excavations have yielded a number of important fragments of the pediment sculptures, as well as of other statues and some inscriptions, four of which indicate that the temple was not dedicated to Athena, as had been believed, but to an Æginetan goddess, Aphæa, of whom little is otherwise known; her name appears in full on two inscriptions, in part on two others, all found within the sanctuary. By some scholars, however, the ascription of the temple to Aphæa is still questioned. The temple was built in the earlier part of the fifth century B.C. New fragments of the pedimental sculptures were found, which throw light on the groups represented in the pediments. The statues in the pediments are somewhat under life size. In the centre of each pediment stood Athena, with groups of fighting warriors about her. It is probable that in the eastern pediment was represented the Trojan expedition of Hercules, in the other that of Agamemnon. In both pediments the figures were symmetrically arranged. These sculptures are among the best works of archaic Greek art, of which they were for a long time almost the only examples. The figures are carefully modeled, and the anatomy is in general good, but the treatment is somewhat dry and hard, in spite of an evident effort to give a realistic character to the groups. The sculptures of the eastern pediment show a decided superiority in this respect, and in particular have nearly lost the "archaic smile" which appears in the companion group. Both groups testify to the high quality of Æginetan art as early as 480 B.C. For an account of the excavations consult Cockerell, *The Temples of Ægina and Bassæ* (London, 1860), and more especially, Furtwängler, *Ægina. Das Heiligthum der Aphæa* (1906). For a convenient discussion of the latter book, see *American Journal of Philology,* xxviii, 329–335. For an account of the sculptures, see Furtwängler, *Kurze Beschreibung der Glyptothek* (Munich, 1900), *Sitzungsberichte der Bayerischen Akademie* (1901), and *Ægina. Das Heiligthum der Aphaia* (1906). For illustrations, see Furtwängler, *Ein Hundert Tafeln nach den Bildwerken der Kgl. Glyptothek zu München* (1903).

WESTERN PEDIMENT OF THE TEMPLE OF PALLAS AT ÆGINA.

ÆGIR, ā'jĭr *or* ä'jĭr. A Norse deity who presides over stormy oceans and entertains the gods with foaming ale. His wife is Ran, who tries to catch voyagers in her net and wreck their ships. They have nine daughters, the waves of the sea, whose names suggest the different appearances of the ocean.

Æ'GIS (Gk. *αἰγίς, aigis,* a rushing storm, from *ἀίσσειν, aïssein,* to move violently, or *αἰγίς, aigis,* a goat-skin). In the Greek epic, sometimes the shield of Zeus, which had been fashioned by Hephæstus, sometimes the whirlwind that drives the storm-cloud, ascribed to Zeus as his shield because he was god of the weather. Later writers explained it as the skin of the goat Amalthea (q.v.), which had suckled Zeus, with the Gorgon's head in the centre. (See GORGO.) In works of art it is sometimes borne by Zeus and is a regular attribute of Athena.

ÆGIS'THUS (Gk. *Αἴγισθος, Aigisthos*). The

son of Thyestes and adopted son of Atreus. During the absence of Agamemnon at Troy he seduced Clytemnestra, wife of Agamemnon, and helped her murder Agamemnon after the latter returned from Troy. Ægisthus was subsequently killed by Agamemnon's son Orestes. The story forms the subject of the Orestean trilogy of Æschylus. See ÆSCHYLUS; ATREUS; AGAMEMNON; CLYTEMNESTRA; ORESTES.

Æ'GIUM (Gk. *Αἴγιον, Aigion*). A town of Achaia, near the coast, west of the mouth of the Selinus River. According to one legend it was the birthplace of Zeus, who was the principal divinity of the place. After the destruction of Helice, Ægium became the chief city of the Achæan League (see ACHÆA), and the delegates of the league had their place of meeting in a grove near the town. The modern town is Vostitza, but it is officially called by its ancient name.

ÆGLE, ē'glē (Gk. *Αἴγλη, Aiglē*, Radiance, a Greek divinity). A genus of two or three species belonging to the family Rutaceæ, very nearly related to *Citrus* (lemon, orange, etc.), from which it is distinguished by the gourd-like rind of the fruit and the woolly seeds. *Ægle marmelos*, of tropical Asia, is the tree whose fruit is called "elephant apple," "Bengal quince," "bhel fruit," etc. The fruit is delicious, fragrant, and nutritious. In an imperfectly ripened state it is an astringent of great effect in cases of diarrhœa and dysentery, and as such has lately been introduced into English medical practice. The root, bark, and leaves are also used as medicinals. The Dutch in Ceylon prepare a perfume from the rind of the fruit, and the mucus of the seed is employed as a cement for many purposes.

ÆGOSPOTAMI. See ÆGOSPOTAMOS.

Æ'GOSPOT'AMOS (Gk. *Αἰγός, Aigos*, gen. of *αἴξ, aix*, goat + *ποταμός, potamos*, river). A river and town on the eastern coast of the Thracian Chersonese. (See CHERSONESUS.) The Lacedæmonians under Lysander here surprised and captured the Athenian fleet in 405 B.C., and thus brought the Peloponnesian war to an end. The name is also written Ægospotami. The ancient town was near the modern village of Jumalikŏi.

ÆGYP'TUS (Gk. *Αἴγυπτος, Aigyptos*). In Greek legend, a brother of Danaüs and King of Arabia, who conquered the region to which he gave the name of Egypt. His 50 sons followed their 50 cousins, the daughters of Danaüs, to Argos and married them; on the wedding night all, with the exception of Lynceus, were murdered by their brides. See ÆSCHYLUS (in the account of "The Suppliants"); DANAUS; EGYPT.

AEHRENTHAL, ā'ren-tāl, ALOIS LEXA, COUNT VON (1854–1912). An Austro-Hungarian statesman. He was born Sept. 27, 1854, and was educated at the universities of Bonn and Prague. In 1877 he entered the diplomatic service, and after occupying subordinate positions in the Austro-Hungarian embassies in Paris and St. Petersburg and in the Foreign Office in Vienna he was, in 1888, appointed Minister to Rumania. He showed such skill in diplomacy that in the following year he was given the important post of Ambassador to Russia. After serving in St. Petersburg until 1906 he was in that year appointed Premier and Minister of Foreign Affairs. His influence in European affairs soon began to be felt. Before two years had passed Austria had, largely through his efforts, and in the face of strong opposition in the European capitals, annexed the Turkish provinces of Bosnia and Herzegovina (q.v.), which, since the Treaty of Berlin in 1878, had been under an Austrian protectorate. The seizure of these provinces was said to be the conception of the Archduke Franz Ferdinand, the heir-apparent, and he found a strong and skillful ally in Von Aehrenthal. In 1910, however, the latter broke away from the aggressive party in Austrian politics and placed himself at the head of the peace party, insisting especially on a pacific attitude toward Italy, which was then on the verge of the war with Turkey for the possession of Tripoli. Franz Ferdinand became bitterly offended with Von Aehrenthal. The quarrel between the two was laid before the Emperor Franz Joseph for adjudication, and the Premier placed his resignation in the Emperor's hands. The latter gave unqualified support to the peace policy, and this marked a great triumph for Von Aehrenthal. It was, however, his last success. His health already had been broken, and the strain of his struggle with the Archduke completed the wreck. He died Feb. 17, 1912. See AUSTRIA-HUNGARY.

ÆLFRIC (ăl'frĭk) **THE GRAMMA'RIAN** (c.950–c.1021). The author of some of the best Old English prose extant. The only material—and it is slight—for constructing the life of this scholar is contained in his own works. The place of his birth is unknown, but the date of it must have been somewhere between 950 and 955. After studying with a poorly educated "mass-priest," he entered the Benedictine school at Winchester (about 972), where he remained "many years." In 987, then "a monk and mass-priest," he was summoned to rule over the abbey of Cernel in Dorset. There he was engaged in preaching and in giving instruction to monks and to young men. Afterward, probably in 1006, he was made abbot of Eynsham, in the valley of the Thames above Oxford. It is conjectured that he died between 1020 and 1025. Ælfric is best known by his *Homilies*, written in pure and vigorous English. Among his other works are *A Treatise on the Old and New Testaments*, the *Heptateuchus*, an abridged translation of the first seven books of the Old Testament, a Latin grammar and glossary, written in English for the boys of England, and the *Colloquium*, which was designed to teach them to speak Latin correctly. Because of these last two books he is accorded the title of grammarian. For the best account of Ælfric and a bibliography of his works and of critical editions, consult C. L. White, *Ælfric*, a new study of his life and writings, in *Yale Studies in English* (Boston, 1898); Westlake, in *Cambridge History of English Literature*, vol. i (1907); Gem, *An Anglo-Saxon Abbot, Ælfric of Eynsham* (Edinburgh, 1912).

ÆLFTHRYTH, ălf'thrĭth (Latinized *Elfrida*) (c.945–1000). An Anglo-Saxon queen, mother of Æthelred II. Her first husband was Æthelwald, the ealdorman of the East Anglians, and after his death she married King Eadgar, the father of Æthelred II. She is said to have instigated the murder of her stepson, Eadward, at Corfe, in order to secure the accession of Æthelred II. Consult Erich Schmidt, *Elfride-dramen* (1886).

Æ'LIA CAP'ITOLI'NA. The name given to Jerusalem by the Emperor Hadrian (Ælius Hadrianus), who expelled the Jews after the insurrection of 132–135 A.D. and colonized the

city with Romans. The name continued until the time of the Christian emperors.

ÆLIA GENS. One of the plebeian gentes (see GENS) at Rome, to which belonged Ælius Sejanus, and the emperors Hadrian and the Antonines. It included also, among others, the families of Gallus, Lamia, Pætus, and Tubero.

ÆLIA LÆLIA CRISPIS. The subject of a very celebrated enigmatical inscription preserved at Bologna. It has been puzzled over by many learned men, but never solved. The inscription begins:

> Ælia Lælia Crispis,
> Nec vir, nec mulier, nec androgyna;
> Nec puella, nec iuvenis, nec anus;
> Nec meretrix, nec pudica;
> Sed omnia. . . .

> 'Ælia Lælia Crispis,
> Neither man, nor woman, nor hermaphrodite;
> Neither girl, nor youth, nor grandmother;
> Neither vicious nor virtuous
> But all [of them].' . . .

ÆLIANUS, CLAUDIUS. A writer who was born at Præneste in Italy and flourished in the latter part of the second century A.D. He wrote exclusively in Greek in an entertaining fashion, but the information contained in his writings was drawn most uncritically from the works of his predecessors. His extant writings are *On the Nature of Animals*, in 17 books, filled with curious accounts of the nature and ways of animals, and with moral reflections on the same, very valuable for its many excerpts from earlier writers, and his *Miscellanies* (*Varia Historia*), in 14 books. The latter is preserved only in an abbreviated form, and is almost wholly a collection of anecdotes and marvelous tales relating to men. The 20 *Rustic Letters* current under his name are generally reckoned spurious. His works are best edited by Hercher (1858 and 1864); the best annotated edition is by Schneider (1784). The editions of the *Varia Historia*, by Perizonius (1701), and *De Animalium Natura*, by Jacobs (1831), also deserve mention.

ÆLIANUS TACTICUS (Αἰλιανὸς Τακτικός). A Greek writer, who, about 106 A.D., wrote a work entitled Τακτικὴ θεωρία, *Tactikē Theōria*, 'Review of Tactics,' a treatise on Greek (Macedonian) military tactics as practiced by the successors of Alexander the Great. The work has great value, not merely for its detailed account of matters of drill and tactics, but also because Ælianus gives a careful account of the writings of his predecessors in this field. Chief among his sources was Polybius (q.v.). Ælianus's work enjoyed a high reputation; it was much used by the Byzantines, and about 1350 was translated into Arabic. In the sixteenth and the seventeenth centuries it was closely studied by professional soldiers, and much of its material was incorporated in works on tactics. It was translated into Latin by Theodore Gaza (see *Veteres De Re Militari Scriptores*, Venice, 1847); into French, by Machault, in *Milices des Grecs et Romains* (Paris, 1615); into German, on the basis of Gaza's rendering (Cologne, 1524); into English, by Bingham (London, 1616) and by Viscount Dillon (London, 1814). The text was edited, with translation, notes, and reproductions of the original illustrations, by Rüstow and Köchly, in *Griechische Kriegsschriftsteller* (Leipzig, 1855). Consult Rüstow and Köchly, *Geschichte des Griechischen Kriegswesens* (1882); P. Serre, Etudes sur l'histoire militaire et maritime des Grecs et des Romains (1887); A. de Lort-Sérignan, *La Phalange* (1880).

AËLLO, ā-ĕl'ō (Gk. Ἀελλώ, storm-swift, from ἄελλα, *aëlla*, whirlwind). In Greek mythology, the name of one of the Harpies (q.v.).

AELRED, āl'rĕd, SAINT, **AILRED,** ETHELRED (1109–66). An English ecclesiastic and historian, born at Hexham, Northumberland. He was educated at the Scotch court, became a Cistercian monk in Rievaulx Abbey, Yorkshire, then abbot of Revesby (1142), then of Rievaulx (1146), remaining so till his death, Jan. 12, 1166. He was canonized in 1191. He was the author of many historical and theological works, the former of little value owing to their unlimited credulity. Leland says he saw Aelred's tomb at Rievaulx adorned with gold and silver ornaments. His works are in Migne, *Patrol. Lat.*, vol. cxcv.

AELST. See ALOST.

AELST, älst, WILLEM VAN (1626–83). A Dutch painter of still life. He was born in Delft and studied with his uncle Evert van Aelst. He passed four years in France and seven in Italy, where he attained great reputation and was known as Guglielmo d'Olanda. He finally settled and practiced at Amsterdam, devoting himself to game, fish, fruits, and flowers and employing crystal and porcelain vessels, the surfaces of which he painted with rare skill. Two of his paintings are in the Museum at The Hague, others are at Dresden, Munich, Copenhagen, and Karlsruhe. His uncle EVERT VAN AELST (1602–58) painted in a more detailed and careful manner, but with less excellence. His work is very rare.

ÆLUROIDEA, ē'lû-roi'dē-ȧ. See CARNIVORA.

ÆMILIA. A division of Italy. See EMILIA.

ÆMILIA GENS. A famous patrician gens at Rome (see GENS), to which belonged the family of Æmilius Lepidus, Mamercus, Paulus, Scaurus, and other well-known men.

ÆMILIAN WAY (Lat. *Æmilia Via*). A national highway in ancient Italy. It was built by the consul Marcus Æmilius Lepidus, in 187 B.C., to afford easy communication with Transpadane Gaul, as a part of the great centralizing schemes of Rome in her imperial march northward. It began at Ariminum (Rimini) by the Adriatic Sea, where the Flaminian Way terminated, and ran through Bononia (Bologna) to Mutina (Modena) and Parma, crossed the Po at Placentia (Piacenza), and ended at Mediolanum (Milan). Its total length was about 185 miles.

ÆMILIA VIA. See ÆMILIAN WAY.

ÆMILIUS PAULUS (second century B.C.). A Roman general, son of the consul Æmilius Paulus, who fell in the battle of Cannæ, 216 B.C. He inherited his father's valor and enjoyed an unwonted degree of public esteem and confidence. In 168 B.C. he was elected consul for the second time, and intrusted with the war against Perseus, King of Macedon, whom he defeated in the battle of Pydna, which left Macedonia a Roman province. Henceforth he was known as Æmilius Paulus Macedonicus. See AGNOMEN.

ÆNEAS (Gk. Αἰνείας, *Aineias*). The hero of Vergil's *Æneid*. He was, according to Homer, the son of Anchises and Aphrodite (Venus) and was ranked next to Hector among the Trojan heroes. The traditions of his adventures before and after the fall of Troy are various and discordant. Vergil (q.v.) gives the following version: Æneas, though warned by the ghost of Hector in the night when the Greeks entered

Troy to take his household gods and flee from the city, remained in the contest until Priam fell, when, taking with him his family, he escaped from the Greeks to Mount Ida, near Troy, but in the confusion of his hasty flight lost his wife, Creüsa. Having collected a fleet of 20 vessels, he sailed to Thrace, where he began building the city of Ænos, but, terrified by an unfavorable omen, he abandoned his plan of a settlement there. A mistaken interpretation of an oracle of Delphi now led him to Crete, but from this place he was driven by a pestilence. Entering the Adriatic, he passed the promontory of Actium and came to Epirus. Later, he retraced his course and continued his voyage to Italy and round Sicily to the promontory of Drepanum on the west of the island, where his father, Anchises, died. When he set out again for Italy, a storm drove him to the coast of Africa. Landing near Carthage, he was hospitably received and entertained by Queen Dido. His sojourn with Dido was cut short by Jupiter, who sent Mercury with a command to Æneas to proceed to Italy. Accordingly, he sailed away to Sicily again, leaving the disappointed Queen, who committed suicide. During this stay in Sicily, while he was celebrating with games the anniversary of his father's death, the wives of his companions and seamen, weary of long voyages without certainty of finding a home, made an attempt to burn his fleet; four vessels were in fact burned. To provide for those for whom he had no room now in his ships and for others who were unwilling to journey farther he built in Sicily the city of Acesta and then sailed for Italy. On landing there, near Cumæ, he visited the Sibyl at Cumæ. She conducted him into the infernal regions, where he saw Anchises and received intimations of his future destiny and of the history of the Roman race. Then, sailing along the coast of Italy, he soon landed at the mouth of the Tiber and found himself in the country of Latinus, King of the Aborigines (q.v.). Lavinia, the daughter of Latinus, had been destined by the oracles to marry a stranger, but her mother had promised to give her in marriage to Turnus (q.v.), King of the Rutuli. She married Æneas, and war ensued, which terminated in the death of Turnus. Æneas Silvius, the son of Æneas by Lavinia, as the ancestor of the kings of Alba Longa, and hence of Romulus and Remus, was regarded as the founder of the Roman State. See H. Nettleship, "The Story of Æneas' Wanderings," in Conington's edition of *Vergil*, vol. ii; and Gaston Boissier in *Revue des deux Mondes* (1883). See ROME.

ÆNE'AS SIL'VIUS. See PIUS II.

ÆNEAS TACTICUS (*Aἰνείας Τακτικός*). A Greek, who, according to Ælianus Tacticus (q.v.) and Polybius (q.v.), was among the first to write on the art of war. We still have a short Greek work, written about the middle of the fourth century B.C., which deals with the attack and the defense of strongholds. A superscription in the manuscripts ascribes this book to "Æneas or Ælianus." Casaubon (q.v.), who first edited the text, in 1609, as an appendix to his edition of Polybius, disregarded, on chronological grounds, the reference to Ælianus, and ascribed the work to the Æneas mentioned by Polybius. This Æneas he identified with Æneas of Stymphalus, in Arcadia, a general mentioned by Xenophon as fighting at Mantinea (362 B.C.). This identification has been generally accepted. But in 1904 T. Hudson Williams, in the *American Journal of Philology*, vol. xxv, not only challenged this identification, but held that the treatise cannot have been written by the Æneas named by Polybius. The work is of great value and interest, full of anecdotes, and enriched by illustrations from Thucydides and Xenophon. The text has been edited by Hercher (Berlin, 1870), and, with elaborate prologomena, by Hug (Leipzig, 1874). Consult: Beausobre, *Commentaires sur la défense des places d'Æneas* (Amsterdam, 1757); Rüstow and Köchly, *Griechische Kriegsschriftsteller*, vol. i (Leipzig, 1853); Lange, *De Æneæ Commentario Poliorcetico* (Berlin, 1879); and the bibliography attached to Williams's paper, referred to above.

ÆNE'ID (Lat. *Æneis*). Vergil's great epic, in which he tells the story of the Trojan Æneas (q.v.), founder of the Roman race. See VERGIL.

ÆNESIDEMUS, ĕ'nĕs-ĭ-dē'mŭs (Gk. *Αἰνησίδημος, Ainēsidēmos*) (?80–60 B.C.). A Greek philosopher of Alexandria, a contemporary of Cicero. He was born at Cnossus, in Crete. He is well known as the probable author of *Pyrrhonian Principles*, the first part of which deals with the *Ten Tropes*, which Sextus Empiricus enumerates, saying that they had become traditional property of the skeptics (q.v.) of his day. Tropes (Gk. *τρόποι, tropoi*) are methods of proving the validity of skepticism. These arguments are based (1) on differences in the constitution of sentient beings, which involve differences in perceptions and conceptions of the world; (2) on differences of human beings; (3) on differences of sense-organs; (4) on differences in circumstances under which perception occurs; (5) on differences of location and distance of objects perceived; (6) on the confusion of one object with another; (7) on differences in a sensation due to different combinations in which it appears; (8) on the relativity of knowledge in general; (9) on differences in perception due to familiarity or unfamiliarity with the object; (10) on differences observed between the civilizations, morals, laws, superstitions, and philosophical theories of different peoples. The second part of Ænesidemus's above-named work contained an attack upon the principle of causality and on the attempt to attain truth, the latter being shown to be variable. His argument against causality is that it exists only in the mind that perceives, for the reason that the external relation between cause and effect is inconceivable. Two things are either simultaneous or successive, and, if simultaneous, causality is inoperative; if successive, cause must precede effect, and a moment of time is to be supposed when cause does not effect anything or virtually is nonexistent. The latter part of his book disposes of morality and all good. He is the prototype of the skeptic attitude of mind. Consult E. E. Saisset, *Le scepticisme* (Paris, 1865); Schultze, *Ænesidemus* (Berlin, 1911). See RELATIVITY, LAW OF.

Æ'NIA'NES. An Achæan tribe of Thessaly, in northern Greece. In historic times they lived in the mountains west of Thermopylæ. They were members of the Delphian Amphictyony and of the Ætolian League. See AMPHICTYONIC COUNCIL; ÆTOLIA.

ÆNOBARBUS (Lat. *æneus*, bronze, *barba*, beard, bronze-beard). A cognomen (q.v.) borne by some members of the Domitia Gens (q.v.).

Æ'NON (explained in the New Testament as

"many springs"). A locality mentioned in John iii. 23 as a place where John the Baptist was baptizing. It is characterized as being "near Salim" and as having an abundant water supply. Three sites have been proposed as complying with this description: (1) A town called Ainun, in the valley that leads up toward Shechem, about 7 miles from the ancient town of Salem, where there are extensive ruins and many springs; (2) on the basis of statements in Eusebius and Jerome, a place called Silvia (= Salem?), about 8 Roman miles south of Scythopolis, the old Bethshean; (3) a spot in the *Wady Fâr'ah*, some 6 miles northeast of Jerusalem, containing beautiful pools of water, within 2 miles of which is another valley called by the Arabs *Wady Saleim*. The last identification seems the best, in so far as it locates the place of the Baptist's ministry in Judæa rather than in Samaria.

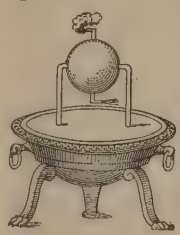
ÆO'LIAN ACCU'MULA'TIONS (from *Æolus*, the god of the winds). Dust, fine particles of soil, and even sand grains of a diameter of two millimeters are transported by the wind and brought together in sheltered places, in much the same manner as these particles are transported and deposited by water. Such æolian accumulations occur in both humid and arid regions, though they attain a more pronounced degree of development in those regions of little rainfall, where the scant vegetation permits the usually powerful winds to exert a considerable erosive action upon the much weathered rocks and dry soil. In humid regions deposits of this nature may be found along the coasts of seas and ocean and also upon upland plains, where the superficial layers of the earth's crust consist of loose sand that may be easily blown away, to be accumulated elsewhere as sand-dunes. In arid regions, dust and sand are being continually transported and deposited in distant places, there to form æolian deposits which are often of considerable geological and also of economic importance. Desert sands traverse wide areas, burying vegetation that may be in the way, even sometimes destroying forests. On the other hand, the fine calcareous dust blown over the prairies of the West settles in the grass and adds to the fertile covering of soil. The fertility of many regions of the Missouri valley is undoubtedly due to these wind-deposited soils, which are known under the name of "loess"; some of the loess is, however, of aqueous origin. Æolian accumulations have been recognized also in ancient rock formations of various geological systems, notably the Cambrian, Devonian, Jurassic, etc. For description of the erosive and transporting power of wind, and for the characters and distribution of the various kinds of æolian deposits, see the articles on DESERT; DUNE; SAND; WIND; and GEOLOGY, paragraph on *Wind Work*.

ÆOLIAN HARP. A musical instrument, consisting of a number (usually 8 or 10) of catgut strings of varying thickness tuned to produce the same fundamental tone and stretched over a narrow, oblong box. When placed in a current of air, the Æolian harp produces full chords, composed of the harmonies of the common fundamental. The sounds change from a breezy, fairy-like pianissimo to an imposing forte, which again dies away with the passing of the gust. For illustration, see MUSICAL INSTRUMENTS.

ÆOLIAN ISLES. See LIPARI ISLANDS.

ÆO'LIANS (Gk. *Αἰολεῖς, Aioleis*). The name of one of the three great divisions of the Hellenic race, borne especially by the Greeks of the island of Lesbos (q.v.) and of the coast of Asia Minor north of Cyme and north of the Ionians (q.v.). Their territory was known as Æolis. They traced their descent to a mythical Æolus of Thessaly, son of Hellen (q.v.), the mythical common ancestor of the Greeks. Later writers extended the name so as to include all Greek races not Dorian or Ionian. It has been maintained that the stories of the *Iliad* originated among the Æolians. At the end of the seventh century B.C., among the Æolians, on the island of Lesbos, in the poems of Alcæus and Sappho, the personal lyric reached its highest development. The Æolians shared the fate of the other Grecian colonies in Asia Minor. First tributary to the Lydian kings, then subjected to the domination of the Persians, they became a portion of the great Empire founded by Alexander the Great, and, after passing through a stage of subjection to the dynasty of the Seleucidæ, were ultimately absorbed in the Roman Empire. See ÆOLIS; ÆOLUS (2); HOMER; LYRIC POETRY; SAPPHO.

ÆOL'IPILE, or **ÆOL'IPYLE** (commonly explained as from Lat. *Æoli pila*, the ball of Æolus). An invention of Hero of Alexandria, often described as the first steam engine. It consists of a hollow metal sphere mounted on trunnions, through one of which steam is introduced. Short bent tubes issue from this ball at diametrically opposite points, from which steam escapes and causes the globe to revolve. A similar device can be used when the globe is filled with water or alcohol, as a blow-pipe for lamp flame. Consult: Gerland and Traumüller, *Geschichte der physikalischen Experimentierkunst* (Leipzig, 1899), for a description of this and other early apparatus; also W. Schmidt, *Heron von Alexandria* (Leipzig, 1899). It is also described in R. H. Thurston's *Growth of the Steam Engine* (New York, 1878).



HERO'S ÆOLIPILE.

ÆO'LIS (Gk. *Αἰολίς, Aiolis*). A district on the west coast of Asia Minor, extending from the Hellespont to the river Hermus. There were about 30 Greek cities in this district, of which 12 in the southern part formed a league in early times. See ÆOLIANS.

ÆO'LUS (Gk. *Αἴολος, Aiolos*). 1. A friend of the gods and controller of the winds. In the *Odyssey* he rules a floating island. In the *Æneid* he keeps the winds confined in a cave and releases them as he wills, subject to laws imposed on him by Zeus. He was also supposed to dwell in a vast cave in the Æolian Isles (q.v.) north of Sicily, keeping the winds in bags and letting them out as demanded by Poseidon. 2. Son of Hellen (q.v.), brother of Dorus and father of Sisyphus. He ruled in Thessaly and is said to have been the founder of the Æolic branch of the Greek race.

ÆON (Gk. *αἰών, aiōn*, an age, long space of time, eternity). A term used by the Gnostics, in a peculiar sense, to designate powers that had emanated from God before the beginning of time and existed as distinct entities or spirits. They were called æons either as partaking of the eter-

nal existence of God or because they were thought to preside over the various ages and transformations of the world. See GNOSTICS.

AEPINUS, ê-pī′nŭs, *or Ger. pron.,* å′pē′nus, FRANZ MARIA ULRICH THEODOR (1724–1802). A German physicist, born at Rostock. He first studied medicine, but afterward devoted himself to physics, of which he became professor in St. Petersburg in 1757. He discovered the electric properties of the mineral tourmaline, improved the microscope, and performed numerous original experiments in frictional electricity and magnetism, devising the method of magnetizing known as "double touch." He, in common with Benjamin Franklin, held the single fluid theory of electricity, in opposition to many men of his time who believed that there were two kinds of electricity. He published *Tentamen Theoriæ Electricitatis et Magnetismi* (1759). Catharine II, Empress of Russia, made him teacher to her son Paul and inspector-general of the normal schools which she proposed to establish.

ÆPYORNIS (Gk. *αἰπύς, aipys,* high + *ὄρνις, ornis,* bird). An extinct group of ratite birds which inhabited Madagascar within recent but undetermined geological time, and 10 species of which are known from fossil remains; no evidence exists that it survived to the time of man, although it is frequently referred to as the "roc." It resembled an ostrich in general structure and appearance, but was perhaps taller, and had no wings suitable for flight, resembling in this respect its close, still living ally, Apteryx, and the extinct Dinornis and Megalapteryx, of New Zealand. Many of its huge eggs have been exhumed from the drifting sands of southern Madagascar. They measure about 9 by 13 inches, and are very large proportionately, since they are double the dimensions of ostrich eggs and much exceed those of the moa. For a circumstantial account of the collecting of its bones and eggs in Madagascar, see *Proceedings Zoological Society of London* (1894).

ÆQUI, ē′kwī, or **ÆQUICULI.** An ancient warlike tribe in the mountains of Central Italy, obstinate enemies of the early Romans, against whom they made alliances with the Volsci (q.v.). They were defeated by Camillus, 389 B.C., and in 304 B.C. were finally subdued. Mount Algidus was one of their strongholds, whence they made raids on Rome.

ÆRARIANS (Lat. *ærarii,* persons pertaining to the *ærarium,* 'the treasury,' i.e., paying taxes). A class in early Rome having no social position now definable and having no civil rights beyond the mere protection of the State. Here belonged the inhabitants of conquered towns which had been deprived of their local self-government. Since Cære was the first town to occupy such relation to Rome (about 353 B.C.), the terms *Cærites* and *ærarii* became synonymous. (See CERVETERI.) For bad conduct any citizen might be degraded to this condition, but not for life. Persons declared infamous became members of this class, and it probably included itinerant retail merchants. They were taxed, but were not subject to military service.

ÆRARII. See ÆRARIANS.

ÆRARIUM (Lat., from *æs,* bronze, money). The public treasury of ancient Rome, containing the money and the accounts of the State, as well as other treasures such as the standards of the legions, the laws, graven on bronze tablets, decrees of the Senate, etc. The temple of Saturn, at the foot of the Capitol, at the western end of the Forum (q.v.), was the place of deposit; hence this treasury was called *Ærarium Populi,* or *Ærarium Saturni.* Besides this common treasury, replenished by general taxes and charged with ordinary expenditures, there was in the same temple a reserve treasury, maintained by a tax of 5 per cent on the value of manumitted slaves, which was not to be resorted to or even entered except in extreme necessity. In addition to these treasuries, the property of the Roman people as represented by the Senate, the Emperor had a *fiscus,* or separate exchequer. To the *fiscus* went the revenues from those provinces which were assigned to the Emperor and from conquered territory, as well as from gifts by various towns in Italy and the provinces, etc. The chief charges against the *fiscus* were for the maintenance of the army and the navy, the administration of the provinces, the grain and water supply, and the care of the Tiber. Augustus established a military treasury to contain all money for the maintenance of the army; one source of revenue for this treasury was an inheritance tax of 5 per cent. Later emperors had separate private ærariums, containing the moneys appropriated to their private use.

AËRATED, ā′ĕr-ā′tĕd, **BREAD.** See BREAD.

AËRATED WATERS. Waters impregnated with carbon dioxide gas and frequently containing mineral salts. Such waters, extensively used to quench thirst, are commonly called soda waters, on account of the use of sodium bicarbonate in the original method of manufacture. Dr. Joseph Priestley (q.v.), the celebrated chemist, is credited with first producing publicly a glass of drinkable aërated soda water, and in 1806 the manufacture was undertaken in the United States, where the familiar soda-water fountain was developed. A few years later in Philadelphia the combination with fruit syrups was made popular. The carbonic acid used in making the common artificial aërated waters is prepared by treating a mineral carbonate, as chalk or lime-stone, with dilute sulphuric acid. The gas thus obtained is forced into bottles or siphons containing water, yielding a brisk, sparkling liquid with a pungent but pleasant acidulous taste. Artificial waters, similar to seltzers, vichy, and other well-known mineral waters, are produced by dissolving the known ingredients of the mineral water in distilled water and then impregnating them with carbon dioxide gas. The carbonic-acid water mixed with fruit syrups is the ordinary soda water of the pharmacy. Formerly carbonic-acid water was made on a small scale in an apparatus called a gazogene or seltzogene, in which sodium bicarbonate was decomposed by tartaric acid in the presence of water. A more recent invention was the use of capsules containing liquefied carbon dioxide. The liquid which it is desired to impregnate with the gas was placed in a specially constructed bottle, the top of which was provided with a receptacle for the capsule containing the liquefied gas; the covering of the capsule was then ruptured, setting free the acid, which was absorbed by the liquid in the bottle. Aërated waters may also be said to occur naturally, for water taken from a spring contains gases, such as oxygen, nitrogen, and carbon dioxide, dissolved in it. Similarly, running waters, such as rivers and rain waters, absorb gases

from the atmosphere, which may be expelled by boiling. Consult *A Treatise on Beverages*, by C. H. Sulz. See CARBONATED OR ACIDULOUS WATERS; MINERAL WATERS; SODA WATERS; also BOTTLING.

A'ËRA'TION (Lat. *aër*, air). In botany, the exchange of gases between living plant tissue and the surrounding medium. This exchange is manifested by two processes. In one of these, viz., the manufacture of certain foods (see PHOTOSYNTHESIS), carbon dioxide is required by the plant and oxygen must be eliminated. On the contrary, in the other process, viz., respiration (q.v.), oxygen is necessary, and carbon dioxide must be eliminated. The former process is confined to green plants; the latter is essential to all except a few of the lowest and simplest type (anærobic bacteria). Among the smaller plants, and those whose bodies are made up of interwoven filaments (Fungi), the gaseous exchanges can take place directly, since almost every part of the body is in contact with the air or with water. In the former case the outside gases dissolve in the constituent water of the cell-wall and are then free to enter; or, arising within the cell and being already dissolved, they pass off into the air. In water plants the free inward or outward migration of dissolved gases depends on the relative amounts inside and outside the body. (See ABSORPTION.) In the larger land plants the greater number of cells and the more compact structure make it impossible for the cells more distant from the surface to conduct the necessary changes at an adequate rate. Such plants have therefore developed an extensive aërating system (Fig. 1), consisting of irregular passages, *i*, between the interior cells, which communicate with the outer air through microscopic openings, *s*, between the surface cells (see STOMATA), or through larger breaks in the corky layers of tissue on the surface of the stems (see LENTICELS). The intercellular passages and stomata are formed by the partial separation of the cells as they mature. In land plants they are most abundant, and largest in the green parts, because the gas exchanges in food-making, photosynthesis, exceed those in respiration. In water plants, however, whose opportunity for securing gases from the air is more limited, the aërating system reaches its highest development. (See HYDROPHYTES.) The tissues may present to the eye a spongy appearance, and in some cases the canals in stems and leafstalks may even be large enough to be easily seen with the naked eye (Fig. 2). The internal atmosphere pervading these canals is voluminous enough to permit both considerable exchanges between it and the adjacent tissues and the freer diffusion of gases entering from the restricted area of organs exposed to the air. The composition of the internal atmosphere is generally different from that of the outer and varies from time to time. During the day the internal atmosphere contains less carbon dioxide and more oxygen than the external atmosphere, at night the reverse being the case. At all times the internal atmosphere contains a larger amount of water vapor, because the wetness of the cell-wall, which is necessary for gaseous exchanges, permits evaporation. The pressure of the internal atmosphere may also vary considerably from that outside. It is generally greatest in illumination and least in darkness. See TRANSPIRATION.

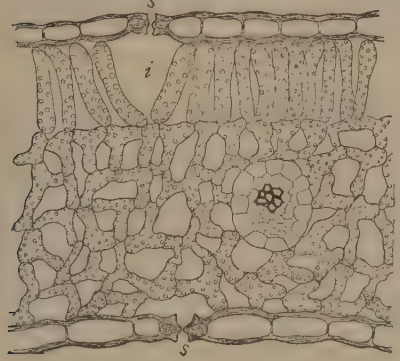


FIG. 1.

Diagrammatic cross-section of a leaf, showing the intercellular spaces in the interior, *i*, and in the epidermis (= stomata), *s*.

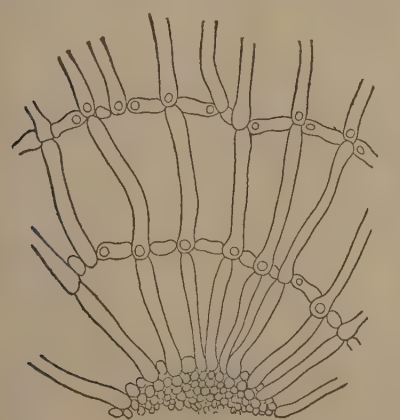


FIG. 2.

Part of a cross-section of the root of *Jussiæa*, showing aërenchyma, with enormous intercellular spaces, the cells being a mere scaffolding between the surface (not shown) and the central cylinder (at the lower margin).

A'ËRA'TOR (literally, 'airer,' from Lat. *aër*, air). In dairying, an apparatus for aërating milk to remove the animal and barn odors. The milk is usually caused to run or ripple in a thin layer over an exposed surface immediately after milking, being, in most forms of apparatus, cooled at the same time by the use of ice, ice water, or cool water from wells or springs. Where aëration is combined with cooling, which removes the animal heat and thereby renders the conditions less favorable to the growth of the micro-organisms which cause souring and other changes, the keeping quality of the milk is increased. Aëration alone, however, has been found of much less benefit, and unless carried on in surroundings free from dust may even increase the opportunity for bacterial contamination. Aërators should be simple in construction and easily cleaned.

AËRENCHYMA, ā'ër-ĕn'kĭ-mȧ (Gk. *ἀήρ*, *aër*, air + *ἔγχυμα*, *enchyma*, infusion, in the

sense of a tissue). In plants, a loose, spongy tissue, which is especially common in water plants (see HYDROPHYTES), and which is supposed to facilitate aëration—whence the name. Aërenchyma is typically composed of more or less radially arranged arms of thin-walled cells inclosing large air spaces. For illustration, see AËRATION, fig. 2.

AËRIAL FAUNA, ā-ē′rĭ-*ăl* fą′nȧ. See DISTRIBUTION OF ANIMALS.

AËRIAL LAW. See NAVIGATION, AËRIAL, LAW OF.

AËRIAL PLANTS AND ROOTS. See EPIPHYTES; ROOTS.

AËRIAL POI′SONS. See MIASMA.

AËRIANS, ā-ē′rĭ-*unz*. A Christian sect founded in the fourth century by Aërius of Pontus. He opposed prayers for the dead and the keeping of Easter and all set fasts and asserted the equality between a bishop and a presbyter. John Glas (q.v.) wrote a scholarly monograph on the so-called heresy of Aërius (Perth, 1745), which so strikingly antedates Reformation doctrine. The original source is Epiphanius, *Adversus Hæreses*.

AËROBES. See RESPIRATION.

A′ËROCLI′NOSCOPE (Gk. *ἀήρ, aër*, air + *κλίνειν, klinein*, to incline + *σκοπεῖν, skopein*, to watch, examine). An instrument invented by Buys Ballot and used in Holland and elsewhere as a storm signal. It consists of a vertical axis, turning on a pivot and carrying at the top a horizontal arm whose inclination can be varied. One end of this arm is painted red and the other white, and when weather conditions are normal it rests at a horizontal position. In case of falling barometer the arm is rotated so that the red end points in the direction of the storm, the amount of inclination indicating the degree of change in the barometer.

AËRO CLUB OF AMERICA. See AËRONAUTICS.

A′ËRODYNAM′ICS (Gk. *ἀήρ, aër*, air + *δύναμις, dynamis*, power). That branch of science which treats of the properties of air and other gases in motion, and specially of the effect of the air upon solid bodies in motion through it. It is, therefore, a branch of pneumatics.

AËROLITE. See METEORITE.

A′ËROL′OGY (Gk. *ἀήρ, aër*, air + *λογία, logia*, discourse). An old term, formerly used as applying to the physics of the atmosphere in general, recently revived by meteorologists, notably Köppen, as the name of that science which studies the physics of the higher strata of our atmosphere. The study of aërology is carried on by means of self-recording instruments attached to special kites, to manned balloons and to small free balloons called sounding-balloons. See METEOROLOGY.

A′ËROMAN′CY. See SUPERSTITION.

A′ËRONAU′TICS (Gk. *ἀήρ, aër*, air + *ναύτης, nautēs*, sailor). The art of aërial navigation. It is of comparatively recent development, although it figures in classical mythology. A more comprehensible tale than the mythological legend of Dædalus related by Ovid, but yet one which is based entirely on tradition, is that told by Aulus Gellius in his *Attic Nights*, of the wooden dove invented by the Greek mathematician Archytas of Tarentum (400 B.C.), which could maintain sustained flight and was set in motion by "hidden and inclosed air." Archytas is also reputed to have invented a kite. Passing to the Middle Ages, there are recorded a few actual and usually disastrous attempts at gliding flight, but, generally speaking, the consideration of the problem of flight by human beings was confined mostly to surmise and speculations which in many cases were nearly as fanciful as the earlier Grecian fables. The thing which placed the art of aërial navigation upon a more practical basis than mere speculation was the invention of the balloon.

AËROSTATION

Balloons. The germ of the invention of balloons is to be found in the discovery by the English chemist and physicist, Henry Cavendish, in 1766, of the remarkable lightness of hydrogen gas, then called inflammable air. Professor Black, of Edinburgh, seems to have been the first who conceived the idea that a light envelope containing this gas would rise of itself; but for some reason or other the experiment was never made. The first practical attempts were made by Tiberius Cavallo, an Italian philosopher living in England, who in 1782 published an account of experiments in which he succeeded in raising soap-bubbles inflated with the gas.

The invention of the balloon is due to Etienne and Joseph Montgolfier, two wealthy papermakers of Annonay, in France. It occurred to them, on reading Cavendish's *Different Kinds of Air*, that the air could be rendered navigable by inclosing a light gas within a covering of inconsiderable weight. They first attempted to make balloons of paper filled with inflammable air, but finding that these emptied themselves almost as soon as they were filled, instead of abandoning the paper as an unsuitable covering for the gas, they sought after another gas more suited to the paper. They thought that the gas which resulted from the combustion of slightly moistened straw and wool would answer the purpose, since it had, as they imagined, an upward tendency, not only because it was hot, but also because of its supposed electrical properties, which caused it to be repelled from the ground.

It is hardly necessary to say that this Montgolfier "gas" possessed no advantages for raising balloons other than that possessed by heated air of any kind; in fact, the abundant smoke with which it was mixed, by adding to its weight, rather detracted from its merits. At Avignon, in November, 1782, Etienne Montgolfier first succeeded in causing a silk parallelopiped, of about 50 cubic feet, to rise to the ceiling of a room. Encouraged by this success, the brothers made experiments on a larger scale at Annonay, 36 miles from Lyons, and finally, on June 5, 1783, they raised a balloon 35 feet in diameter to a height of 6000 feet. This balloon, nearly spherical in shape, was made of packcloth, covered with paper, and was heated by a small iron grate placed beneath it, in which 10 pounds of moist straw and wool were burned.

A commission was appointed by the Academy of Sciences at Paris to report upon the experiments of the Montgolfiers. A subscription was raised to defray the expense of repeating the Annonay experiment. The construction of the balloon was intrusted to the brothers Robert, famous philosophical instrument makers of the day, and to Professor Charles, a young but experienced physicist. As the detailed account of the Annonay ascent had not reached Paris, and

as nothing was therefore known of the Montgolfier gas, Charles fixed upon hydrogen as the gas most likely to insure success. It was, however, a formidable undertaking to produce it in abundance for a balloon, as it was at that time prepared only in small quantities in the lecture room and laboratory. He, however, succeeded in filling, in the course of four days, a silk globe 13 feet in diameter. This balloon was transferred to the Champs de Mars, where, on Aug. 27, 1783, it ascended in the presence of over 50,000 spectators. This was the first time that a hydrogen balloon ascended from the earth. At the instance of the commission already referred to, Etienne Montgolfier constructed a fire-balloon 72 feet high and 41 feet in diameter. It ascended before the commission on Sept. 12, 1783, but being held captive it was much injured by a violent wind which blew at the time, and after it descended it was finally broken up by heavy rains. Another was made of nearly the same dimensions, which ascended on the 19th of the same month at Versailles, the King and royal family witnessing the spectacle.

The balloon was now an accomplished fact, and it began to be discussed whether it might not be serviceable as an airship for bearing men aloft as passengers. All doubt was dispelled by Pilâtre de Rozier. In a "montgolfière," as the heated air-balloon was called, 85 feet high and 48 feet in diameter, supporting at its base a gallery of wicker-work, he, in company with the Marquis d'Arlandes, made the first aërial voyage, Nov. 21, 1783. They remained in the air 25 minutes and sailed across the Seine and over a considerable part of Paris. Later a recent trip of 30 leagues was made in a montgolfière.

The year 1783, so fertile in the annals of aëronautics, witnessed an additional and even greater triumph. On December 1, Professor Charles, accompanied by one of the Robert brothers, rose from the Tuileries gardens with a hydrogen balloon—then called a "Charlière"—made with the proceeds of a public subscription. This balloon was made of alternate red and yellow gores of silk sewed together and coated with caoutchouc varnish, an invention of the Roberts. It was covered with a net which supported the car and was furnished with a valve, a barometer, and sand-ballast, and was, in fact, a complete aërial machine. In consequence of the danger attending the use of fire-balloons, and the demands made on the aëronaut's attention, hot-air balloons soon gave way to hydrogen balloons. They have now entirely given way to the hydrogen or coal-gas balloons.

Among the names of the first professional aëronauts, those of Jean-Pierre Lunardi, Vincent Blanchard, and A. J. Garnerin deserve special note. Lunardi made the second ascent in Great Britain, rising from London in 1784 in a hydrogen-filled balloon. The first ascent had been made in the same year by James Tyler; and Blanchard, along with an American, Dr. John Jeffries, crossed the English Channel from Dover to Calais in circumstances of almost unparalleled danger, Jan. 7, 1785. Garnerin first descended from a balloon by a parachute (q.v.), Oct. 22, 1797.

Briefly described, the passive balloon, or aërostat, as it is commonly employed to-day, is a large pear-shaped or spherical bag, made of any pliable cloth, usually alpaca or cotton (though silk is the best), covered with a varnish, made by dissolving caoutchouc in oil of turpentine, to render it air-tight. Modern balloons have bags made of a special fabric formed of several layers of cotton or silk cloth by vulcanizing thin layers of rubber between them. The common size of the bag varies from 20 to 30 feet in equatorial diameter, with a proportionate height. A network of hempen or cotton twine is accurately fitted to the balloon, and the ends of the separate cords, of which it is formed, are tied to a circular hoop placed a few feet below the neck. The car, generally a large wicker-basket, is suspended by ropes from this hoop and hangs at a considerable distance below, so that the aëronaut may be removed from the vicinity of the gas. The network serves to distribute the weight of the car and its charge equally over the whole upper surface of the balloon. One of the most important requisites in the construction is the valve, which is introduced into the top of the balloon. It consists of a wooden or metal clapper, from 1 foot to 3 feet in diameter, opening inward, and kept closed by springs. A rope attached to this valve descends through the neck into the car, where, to prevent accidental opening, it is allowed to dangle freely. There is also a long ripping panel which extends from the equator to the summit of the balloon. This ripping panel can be torn open by a cord extending to the car below. This device, invented in 1844 by the American aëronaut, John Wise, serves to deflate the balloon quickly and to prevent its being dragged or bumped along the ground upon landing should there be wind.

The equipment of the car comprises ballast, in the form of sandbags, by emptying which the balloon may be lightened; barometers or corresponding apparatus for indicating the height attained at any given moment; thermometers and hygrometers for determining respectively temperature and moisture; maps and a compass for showing the direction of the voyage; a grappling iron attached to a long rope for anchoring the balloon when it nears the ground; a long rope known as a guide or drag rope which may be trailed over land and water, serving to keep the balloon at a constant height without expenditure of ballast and to check the speed on landing; photographic cameras and such additional instruments as may be needed.

During his flight the aëronaut has at his disposal the means of guiding his balloon only in an upward or downward direction, the motion of translation being wholly dependent on the wind. But he can take advantage of the air currents traveling in different directions at various heights by ascending or descending. If he wishes to ascend, he throws some of the ballast over the side of the car, and if to descend, he pulls the valve-rope, so that, the gas rushing by virtue of its specific lightness through the passage made for it by the open valve, the buoyant material may be lessened. It is evident that the power of thus directing his machine becomes more limited after each discharge of ballast or gas. In ordinary flights the mouth of the balloon is left open, so that there is no danger of explosion from the expansion of the gas in the rarer regions of the atmosphere.

The gas most commonly used for balloons is coal gas, first employed for this purpose by George Green in England in 1821. To-day hydrogen is generally available. It is either generated on the spot or drawn from steel tubes into which it has been compressed for convenient transportation.

Captive Balloons, as the name signifies, are balloons which are held captive to the earth by means of a cable. The cable is usually arranged to be let out and hauled in by means of a windlass or drum operated by hand or by mechanical power. Captive balloons have been much used for military observations (see MILITARY AËRONAUTICS), latterly in the form of the so-called kite or sausage balloon, and at one time were used for amusement purposes, as Giffard's famous balloon of 45,000 cubic feet capacity carrying 40 passengers, which was a feature of the Paris Exposition of 1878. Captive balloons have been employed to some extent for scientific observations. At the Lindenberg Observatory, Feb. 20, 1913, three such balloons were sent up to a height of 7180 meters (23,556 feet), but more often the *ballons sondes* (sounding balloons) are used.

Balloon Altitude Records. High ascents in balloons have been made by a number of aëronauts. On Sept. 5, 1862, two English aëronauts, Messrs. James Coxwell and Henry Glaisher, starting from Wolverhampton, England, ascended to a point calculated by them as 37,000 feet, or fully 7 miles. This ascent, however, is now generally estimated at less than 6 miles. At a height of 5½ miles one of the aëronauts became insensible and the other very nearly so; at the height of 4 miles railway trains could be heard, but at a height of 6 miles there was perfect silence. On April 15, 1875, M. Gaston Tissandier and two companions, MM. de Sive and Crocé-Spinelli, rose from Paris in the spherical balloon *Zenith,* a height of 5½ miles. M. Tissandier alone survived the trip, his companions dying in mid-air, and he himself being rendered unconscious. In later years, by the use of oxygen in the rarefied higher atmosphere great heights have been attained with more facility. On July 31, 1901, Professor Berson and Dr. Süring, two German aëronauts ascending from Berlin in the balloon *Prussia* of 300,000 cubic feet volume, reached a height of 35,600 feet, which has remained as the world's record, though as will appear later over 40,000 feet has been attained in an airplane.

Long Distance Balloon Voyages. Thanks to atmospheric researches and to the improved construction of balloons, venturesome aëronauts have made long journeys in spherical balloons or aërostats. Year by year the distances covered have increased, and annual international contests have stimulated interest in such flights. The first notable achievement occurred in 1836, when, on November 7, Green, Mason, and Holland made a trip in *The Great Balloon of Nassau,* of 85,000 cubic feet capacity, from London to Weilburg, Germany, 500 miles in 18 hours. In 1859, the celebrated American aëronaut, John Wise, made 809 miles from St. Louis, Mo., to Henderson, N. Y., in 20 hours. In 1870 one of the balloons escaping from Paris during the siege sailed to Norway, about 1000 miles. An unofficial record of 1032 miles from Leipzig to Wilna in 24½ hours was made by M. Godard. At the Paris Exposition of 1900, on October 9, the Comte de la Vaulx in the balloon *Centaure,* starting from Paris, reached Korostichev, in Russia, 1193 miles, in 36 hours and 45 minutes. The extreme altitude attained on the trip was 18,810 feet. The *Centaure* was a balloon of 1650 cubic meters (58,000 cubic feet) capacity and on the trip was filled with a mixture of hydrogen and common illuminating gas.

This record stood until 1912, when 1211 miles were accomplished on January 7–8 by M. Emile Dubonnet and M. P. Dupont in *Condor III,* starting from La Motte-Breuil, France, and landing at Sokolowska, Russia, and in turn was supplanted in the Gordon Bennett cup race of the same year when of 20 balloons leaving Stuttgart, Germany, the *Picardie* with M. Maurice Bienaimé as pilot and M. Rumpelmayer as aide, landed near Moscow two days later after a trip of 1361⅝ miles. On March 24, 1913, Rumpelmayer made a trip of 1492 miles from Paris to a point near Kharkov, Russia. An even better performance was made Feb. 8–10, 1914, when the *Berliner* traveled from Bitterfeld to Bigsertsk, Perm, Russia, a distance of 1895 miles. The record for duration of time in air is 87 hours made by Hugo Kauten, Dec. 13–17, 1913, on a trip from Bitterfeld to Perm. The James Gordon Bennett cup referred to is competed for annually by spherical balloons without motive power and has served to increase interest in this branch of aëronautics.

Aërological Research. The first ascension of any value for scientific observations was that of Gay Lussac in 1804 from Paris. The balloon rose to 23,000 feet, and the fall in temperature was 67° F. or 1° in 340 feet. Specimens of air collected at the highest point showed precisely the same composition as at the earth. The magnetic force did not exhibit any sensible variations at different heights. The next ascent of importance was that of Barral and Bixto in July, 1850. At 19,700 feet the aëronauts observed a temperature in a cloud of 15° F., and at 23,000 feet above the cloud a temperature of —38° F.

The modern plan which seeks a large number of observations and at different altitudes is to use small india-rubber unmanned balloons, *ballons sondes,* which carry recording apparatus to considerable heights and thus enable a study to be made of atmospheric conditions. This method of research was developed in France by P. E. Teisserenc de Bort, in Germany by Dr. Richard Assmann, and in America by A. Lawrence Rotch. The balloons, some of which have gone as high as 18 miles, are filled with pure hydrogen gas, which enables them to reach considerable altitudes, at which the pressure of the gas bursts the envelope of the balloon, while the meteorograph (a combination of instruments, such as a barometer, thermometer and hygrometer), which is attached to a parachute or second balloon, falls to the ground without injury. The instrument is sufficiently conspicuous to attract attention, and it is picked up and forwarded to the station from which the balloon was dispatched. While this has been a favorite method of research in France and Germany, it was not tried in the United States until 1904, in connection with the St. Louis Exposition. Regular observations with *ballons sondes* are now made by the United States Weather Bureau, and data thus obtained are studied in connection with those derived from kites and other sources.

Naturally with aviation and the use of aircraft during the World War assuming such vast dimensions, considerable aërological research and regular observation were demanded from the meteorologists attached to the armies and regular bulletins and forecasts were issued. In the United States subsequent to the war the United States Weather Bureau developed a special

service for the information of mail and other aviators.

Pilot Balloons. These small unmanned balloons are sent up from aëronautical and meteorological stations, and their course and elevation are watched with a theodolite so that the direction and strength of the air currents can be determined. These pilot balloons reach an average height of 2½ to 5 miles. Their function is different from that of the *ballons sondes*, as they enable the observer to ascertain at once the direction of the air currents and their intensity, and consequently they are employed to investigate conditions preceding the flight of aircraft as in military operations. They are employed extensively at aërological observatories to determine the direction which a more expensive *ballon sonde* will take after it is released. At the stations of the United States Weather Bureau where observations are taken with pilot balloons these are made twice daily, and they are telegraphed to the central office at Washington where they are studied and charted along with the data obtained from the kites, and aviation forecasts are prepared for the 13 zones into which the United States is divided.

Aëro Club of America. In 1905 considerable interest began to be manifested in ballooning in the United States, and the Aëro Club of America was formed in the summer of 1905 by men for the most part interested in motor cars, but to whom the balloon appealed. The club was an original member of the Federation Aëronautique Internationale, founded in 1905, through which pilots were licensed and records accepted. In January, 1906, it held its first exhibition at the Sixth Annual Automobile Show in New York. The Aëro Club did not restrict itself to aërostation, but all forms of aërial navigation were included in its activities, and in particular its members have exhibited the greatest interest in aviation and the development of aërial navigation and military aëronautics. The Aëro Club of America united with the American Flying Club, Aug. 16, 1920.

DIRIGIBLE BALLOONS OR AIRSHIPS

Dirigible Balloons. It was early suggested that balloons could be arranged with steering apparatus and propelling machinery, by which the direction of their flight could be regulated at will. Such pioneer aëronauts as the Robert brothers endeavored to paddle or row their balloons through the air with silk-covered oars worked by hand. Instead of spherical or pear-shaped gas bags, pointed envelopes of elongated form were early suggested. The design for a very elaborate power balloon operated by muscular effort was in fact worked out in great detail in France by General Meusnier. Lack of an efficient source of power in the form of a light-weight engine hindered attempts in this direction, and despite Julien's torpedo-shaped model of 1850, it was not until Giffard, the inventor of the steam injector, in 1852, constructed a spindle-shaped gas bag, 143 feet in length by 39 feet in diameter, driven by a 11-foot propeller screw connected with a 3 horse-power steam engine, that the idea was realized. After a successful dirigible had also been constructed by Dupuy de Lome in 1872, Gaston Tissandier in 1882 built a balloon 91 feet long and 29 feet in diameter, in the shape of a very thick cigar, with both ends pointed. The envelope was made of thin cloth covered with an impermeable varnish, and from it was hung by means of the usual netting and suspenders a car containing an electric battery supplying current to an electric motor which operated a two-bladed screw propeller 9¼ feet in diameter. A triangular silk rudder was fitted above the propeller in much the same relative position as the rudder of a steamship and arranged so as to be operated from the car. The total weight of the propelling machinery, the car and the appurtenances, exclusive of 850 pounds of ballast, was 1200 pounds, while the balloon itself weighed 600 pounds. With the propeller making 180 revolutions per minute this balloon was able to maintain its position against a wind blowing 6.8 miles per hour, and when traveling with the wind to deviate to one side or the other with ease.

This balloon was followed in 1884 by one of the French government, also driven by an electric battery and motors, the construction having been suggested by Tissandier's experiments. The craft was designed by MM. Renard and Krebs on similar lines to, but somewhat longer (165 feet) in comparison with its diameter (27.5 feet) than Tissandier's. Seven ascents were made during 1884–85 with this airship, which was named *La France*, with the following practical results: In five of the ascents the voyagers were able to return to their starting point, and an average speed of 14.5 miles per hour was attained independently of the wind.

Such efforts and experiments, however, may be considered merely as preliminary to the more practical work of the development of the dirigible, which towards the close of the nineteenth century was made possible in a large part by the evolution of a suitable light-weight internal combustion motor to drive the propellers. This found expression in the rigid dirigible developed by Count Zeppelin, the non-rigid airship of Parseval and others in Germany and the semi-rigid of the French.

Zeppelin Airships. In 1900 Count Zeppelin brought out his first and notable airship, introducing the rigid form and serving as the prototype for many subsequent dirigibles, although a few years previously (1897) Schwartz, an Austrian, had constructed a rigid metal-framed balloon driven by an internal combustion motor and propellers. Count Zeppelin's 1900 model consisted of a row of 17 balloons, confined like lozenges in a package, in a cylindrical shell 416 feet long and 38 feet in diameter, with pointed ends and having a capacity of 399,000 cubic feet. These balloons served to lift the structure in the air, where it was driven forward or backward by means of large screw propellers. A pair of rudders, one forward and one aft, served to steer the airship. The crew and passengers occupied two aluminum cars suspended forward and aft, below the body of the balloon shell. From these cars, which were connected by a speaking tube, all the machinery of the airship was operated. The Daimler benzine engines, one in each car, were of 16 horse-power capacity each, and weighed 715 pounds each. The screw propellers, two for each engine, had four blades and were 3¾ feet in diameter. At the first trial of the Zeppelin airship on July 2, 1900, with five persons in the cars, it rose 1300 feet above Lake Constance and traveled 3¾ miles in 17 minutes in the direction desired. In 1905 Count Zeppelin made extensive trials of a new

and much improved airship. Thus the two engines of the 1905 airship were able to supply 170 horse-power at an increase in weight of only a few pounds, the entire machinery weighing but 880 pounds. Furthermore, the length of the new airship was decreased to 410 feet, and the number of gas compartments was made 16 instead of 17. The cubical contents of the balloon were diminished to 367,120 feet, while the weight to be lifted was smaller by 2200 pounds, amounting to about 19,800 pounds. The propellers, on the other hand, were of increased size. In 1908, with the improved but short-lived *Zeppelin IV*, 260 miles were accomplished in nine hours. Count Zeppelin next proceeded to rebuild his older airships, and in 1909, with *Zeppelin III*, made a flight from Friedrichshafen to Berlin and return, a total distance of 800 miles.

To the Zeppelin airship must be given credit for first establishing a commercial means of regular passenger travel in the air. On June 22, 1910, the *Deutschland* made a successful trip with passengers from Friedrichshafen to Düsseldorf, a distance of 300 miles at an average speed of 33 miles an hour. On the third trip the craft was caught in a severe storm and wrecked in a forest. In the meantime other large airships were built, and on June 9, 1913, the *Sachsen*, the seventeenth Zeppelin airship, under the direction of Count Zeppelin himself, made a trip with 24 passengers from Baden-Baden to Vienna, a distance of 435 miles in 8 hours, or an average speed of 54⅓ miles an hour. By 1913, 10 Zeppelin airships were in passenger service, several of which had a gas capacity of between 600,000 and 700,000 cubic feet.

The huge gas bag, with the rigid frame of the Zeppelin airship or its British and other counterparts or imitators, afforded great lifting capacity, which permitted a considerable crew and space for useful cabins, conveniences and cargo as well as powerful engines. At the beginning of the World War the German Zeppelins had a speed of 45 miles an hour and a capacity of 1,000,000 cubic feet of gas, at the end of the war the speed was 75 miles an hour and the displacement had reached 2,000,000 cubic feet. Naturally the large rigid frame dirigible presents an enormous surface to the wind, and there were serious failures as the destruction of the British R-38 built for the United States in 1922.

Under modern conditions the lifting capacity of an airship of the Zeppelin type might amount to as much as 65 tons of which 38 tons might be available for crew, fuel, ballast, cargo, etc. In fact on such an airship it has been estimated that freight to the amount of 18 tons might be transported. The exposure of a large surface to the wind becomes a serious source of danger when the airship is held to the earth by mooring cables with the gas bag inflated. It has been under such conditions that most of the serious accidents to the Zeppelin airships have occurred. Accordingly large structures or hangars were constructed to house the airship. For example, in the United States the large hangar at Lakehurst, N. J., was built to house the ill-fated R–38 and also was used for the construction of ZR–1, an American designed airship based somewhat on the Zeppelin L–49 which was captured intact during the war in France.

The airship with its powerful engines has a wide sphere of usefulness, and its importance in military operations early was recognized, as will be found discussed elsewhere. (See MILITARY AËRONAUTICS and VOLUME XXIV.)

Airships of Santos-Dumont. In striking contrast with the large Zeppelin dirigible with its rigid frame were smaller airships built about the same time by M. Alberto Santos-Dumont, a Brazilian gentleman resident in Paris. Santos-Dumont's earliest airship was in the form of a cylinder, terminated at each end by a cone, and was 82 feet long and 11½ feet in diameter, with a capacity of 6400 cubic feet. A basket suspended from the balloon carried a 3½ horse-power gasoline motor, which operated a screw propeller, the first time that this had been done in an airship. After building a series of airships in which he made flights, finally on Oct. 19, 1901, in his sixth balloon, Santos-Dumont succeeded in making a trip from Saint-Cloud to and around the Eiffel Tower and then back to the starting point in 30 minutes 40¼ seconds. The trip won the coveted prize of 100,000 francs offered to the aëronaut who should make the journey in 30 minutes.

French Dirigibles. Following Santos-Dumont's airship came the larger and more practical dirigibles of the Lebaudy brothers. The 1903 airship, called the *Yellow* (*Le Jaune*), consisted of a long and finely pointed balloon, containing 80,000 cubic feet of gas and with its lower surface flat. Around the balloon was a well designed and constructed frame of steel tubing, from which the car was suspended. The balloon for this airship was made of two thicknesses of cotton cloth colored yellow to protect the India-rubber placed between from the actinic effects of the sunlight, and, while reasonably light, was quite impervious to the gas. The car was of steel and contained a Mercedes engine of 40 horse-power, driving steel propellers which rotated at a rate of 1000 revolutions a minute. The weight of this airship, including its passengers, was 5700 pounds. In 1903 it traveled on one trip 61 miles and was in the air 2¾ hours. The best speed recorded was 25 miles an hour, and were it not for the untimely destruction of the airship in a fierce gale, while resting on the ground, much more could doubtless have been accomplished. In 1904 a new airship, the *Lebaudy*, was built, embodying essentially the features of the former. In this a motor was used whose weight was about 7½ kilograms (16½ pounds) per horse-power, and the consumption of fuel was but 315 grams per horse-power. The *Lebaudy* was cigar-shaped, with its rear end rounded. It was 57.75 meters (189.5 feet) in length; its maximum diameter was 9.80 meters (32.5 feet), and it had a volume of 2666 cubic meters, which afforded a sustaining capacity for more than three tons. In the experiments with this airship it was demonstrated conclusively that it could be controlled in windy weather and could maintain its equilibrium satisfactorily, and in 1905 and 1906 Lebaudy airships were built for the French army.

La République, built on very similar lines but in some respects an improvement on the Lebaudy airships, was also acquired by the French army, but was destroyed in 1909 in an accident caused by the breaking of one of the propeller blades, which cut through the gas bag.

In the development of the dirigible balloon for military purposes, and in its operation, the officers of the French army worked most assidu-

ously, and despite accident and misfortune they persevered in their efforts. Preference for the semi-rigid flexible as typified in the *Ville de Paris, France,* and *Clement-Bayard,* rather than for the Zeppelin form of construction, was manifested, and it was not until 1912 that the *Spiess,* a rigid dirigible with a wooden frame, was added to the French air fleet. This airship, with a capacity of 11,500 cubic meters (371,000 cubic feet), in 1913 was the largest French dirigible, yet it was considerably smaller than several in Germany. In addition to Lebaudy, the Zodiac and Astra companies had built notable airships along the lines of the German Parsevals. In 1913 the French air fleet included some excellent airships, of which the *Adjutant-Vincenot,* the *Adjutant-Reau,* and the *Dupuy-de-Lôme,* each of about 9000 cubic meters (318,000 cubic feet) capacity and 55 kilometers (34 miles) per hour speed, are worthy of mention, as is also the smaller but speedier *Fleurus.* Of their military value, however, more extended discussion will be found under MILITARY AËRONAUTICS.

German Dirigible. In Germany, through the efforts of Major von Parseval, of the Bavarian army, who had also been one of the inventors of the kite balloon, there was developed a form of dirigible balloon without a rigid frame which could be transported readily by an army in the field and inflated from portable gas cylinders or generating apparatus. The Parseval airship was driven by two motors placed to the right and left above the suspended car. Each propeller had four blades of elastic steel $\frac{1}{25}$ of an inch thick and driven by a 6-cylinder motor. In some cases increased stiffening was being given, but the framing was of wood instead of aluminum as in the Zeppelin airships. In addition, among the dirigible balloons that were adopted by the German army, were several Gross airships designed by Major von Gross of the balloon section which, while supplied with a stiffening frame, were neither as large nor as well equipped as the Zeppelin craft, but were well suited for many military purposes. Another important type of German airship was the Schütte-Lanz, with a rigid framing of wood and large gas capacity.

British Dirigibles. Previous to the World War the dirigible balloon had aroused little interest in Great Britain, and few if any airships comparable with the Zeppelins and the larger French dirigibles had been built and put in either military or commercial service. In 1915 the British Government decided that dirigibles were not worth building on account of the inflammability of the hydrogen gas, which could be readily ignited by an incendiary bullet from an airplane, even if it withstood the natural dangers in connection with the machinery and other equipment. The British Government, of course, did build in 1916 a series of non-rigid or semi-rigid dirigibles, or miniature airships, known as "blimps" largely for observation purposes, but in 1918, when it was realized that there was available a process to obtain helium in quantity, it was decided to build a fleet of rigid helium airships which would be safe from dangers of explosion or fire. Accordingly, with the experience derived from the war and particularly from a study of captured Zeppelins which had been brought to earth, including the L–33 which had been brought down in England, Sept. 23, 1916, there were designed in England before the Armistice, a type of airship not only suitable for a transatlantic trip, but which filled with helium gas would be able to transport and discharge large amounts of high explosive. Inasmuch as the British had suffered from the Zeppelins they sought to make these craft, eight of which were projected, as efficient as possible. While none was completed before the Armistice yet the R–34 put into commission in 1919 made the first transatlantic flight by a dirigible as described elsewhere. Unfortunately, this craft ran aground and was destroyed Jan. 28, 1921, during night flying in Yorkshire. Another one of the group, the R–38, was purchased by the United States Government, and was preparing for an overseas trip to America when it was wrecked in the air and almost the entire crew of British and American officers and men perished. The R–36 on June 10, 1921, had a successful endurance test, being 30 hours in the air on a trip from Pulham to Land's End and back.

American Airships. In the United States, before the World War, flights had been made by airships of moderate size, but little accomplished comparable with European achievements. A dirigible balloon of limited size, representing the best American and foreign practice at the time, was constructed for the United States Army Signal Corps by Thomas S. Baldwin, and was turned over to the government after satisfactory tests in August, 1908. It had a spindle-shaped gas bag 96 feet in length and of 20,000 cubic feet capacity and was driven by a 20 horsepower water-cooled gasoline motor of the Curtiss type. The lifting capacity of the balloon was 1350 pounds, and of this 500 pounds was available for passengers, fuel, and ballast. A few small rather crude airships were built for exhibition purposes, but the only really notable American airships, which showed originality of design and construction, were the *America* and the *Akron,* built to make the transatlantic voyage. On Oct. 15, 1910, Walter Wellman, who, in 1906 and 1907, had made unsuccessful attempts to reach the North Pole from a base in Spitzbergen, set out from Atlantic City, N. J., in an attempt to cross the Atlantic Ocean in the *America,* a dirigible 228 feet in length, designed by Melvin Vaniman. The engines and propellers of this airship, which had a lifting capacity of 23,650 pounds, were designed to give a speed of 26 miles an hour with both engines working, and a crossing in six days was planned. The *America* passed out to sea on Oct. 15, 1910, and within five hours, due to a failure of the engine and other misfortunes, the crew was compelled to abandon the airship and take refuge on a passing steamer after having been in the air 71½ hours and after having drifted or sailed a distance of 1008 miles, both of which were records for dirigibles.

Melvin Vaniman, designer and chief engineer of the *America,* then designed a new and larger airship which compared favorably with the large dirigibles of Europe. On July 2, 1912, the *Akron,* as it was named, left Atlantic City on its initial trip and within less than half an hour was totally destroyed by an explosion, due to fire or other cause not definitely determined. Vaniman and his crew of four perished.

In the meantime, several small dirigibles had been secured for the United States Army and on the entrance of the United States into the World War a number of non-rigid dirigibles

resembling the British "blimps," which had been ordered, became available, the first of which were tested in May, 1917. By 1919, a useful American dirigible had been developed, of which the C–5 was a representative. This non-rigid airship was 192 feet in length, 43 feet wide and 45 feet high with a capacity of 180,000 cubic feet of gas. It had a cruising speed of 42 miles an hour and in May, 1919, made an attempt to cross the Atlantic by way of Halifax. A distance of 1050 miles was accomplished successfully, but a heavy gale arising, the airship was driven from its moorings and carried out to sea where it was destroyed.

The U. S. War and Navy Departments, however, had manifested an interest in still larger dirigibles, as they seemed to possess for the United States a considerable field of usefulness. Accordingly, as told above, the R–38 (U. S. Navy designation ZR–2) was ordered from the British Government and was destroyed on Aug. 25, 1921. The ZR–2 was 690 feet in length with a capacity of 2,700,000 cubic feet of hydrogen gas and was designed for a cruising speed of 70 miles an hour, at this rate having a range of 5000 miles. The American Government also put under way the ZR–1, another airship of the rigid type, but following the lines of the German Zeppelin L–49, captured intact in France during the war, and supposed to represent the best efforts of the German designers. The ZR–1 which was 645 feet in length and 78 feet in diameter was built at the Philadelphia aircraft plant of the United States Navy and was to be assembled at the large hangar at Lakehurst, N. J.

The American list of airships was further increased in 1921 by the addition of the large semi-rigid dirigible *Roma*, which, purchased from the Italian Government, was brought to the United States and assembled at Langley Field. It was 410 feet in length, 82 feet wide, 88.6 feet high, and capable of carrying a useful load in the neighborhood of 19 tons. It had a capacity of 1,200,000 cubic feet and a possible cruising range of 8000 miles or 3500 miles at 80 miles per hour. This machine made several flights, but early in 1922 it was destroyed in an air explosion in which its crew perished.

Transatlantic Flights of Dirigibles. Transatlantic flight was for many years the goal set by the designers of dirigibles and this was accomplished first in July, 1919, when the British dirigible R–34 made the crossing from East Fortune, near Edinburgh, Scotland, to America, via Newfoundland, landing at Mineola, near New York City. The departure on the westbound trip was made at 2 A.M., July 2, and the landing at Roosevelt Field occurred at 9 A.M., July 6, 108 hours 12 minutes in the air, after a voyage attended by head winds and generally unfavorable weather. The return trip, which began on July 9, was even more successful and a landing was scored at Polham, England, on July 12, after a trip of 3200 miles. The actual flying time for the round trip of some 7000 miles was 183 hours and 15 minutes and no serious difficulties were experienced. At the time of this flight the R–34 was the largest dirigible in commission, though exceeded in size by subsequent airships, being 643 feet in length from nose to stern with an envelope 91½ feet in height, and a beam of 71 feet. From the envelope were suspended 4 cars, one forward for the captain and pilot, two wing cars amidships and an after car in which were two engines attached to the single shaft that drove the largest of the four propellers, which was 19 feet 6 inches from tip to tip. In each of the other cars was an engine; all five were of the Sunbeam-Maori type of 275 horse-power, driving propellers of 17 feet 6 inches diameter. The envelope fully inflated had a capacity of 2,000,000 cubic feet of hydrogen while the gasoline tanks 81 in number held 5670 gallons, which proved sufficient for the transatlantic trip even under such unfavorable conditions as attended the western voyage. The airship was lighted by electricity and fully electrically equipped with a wireless outfit with a range of 800 miles for sending and receiving.

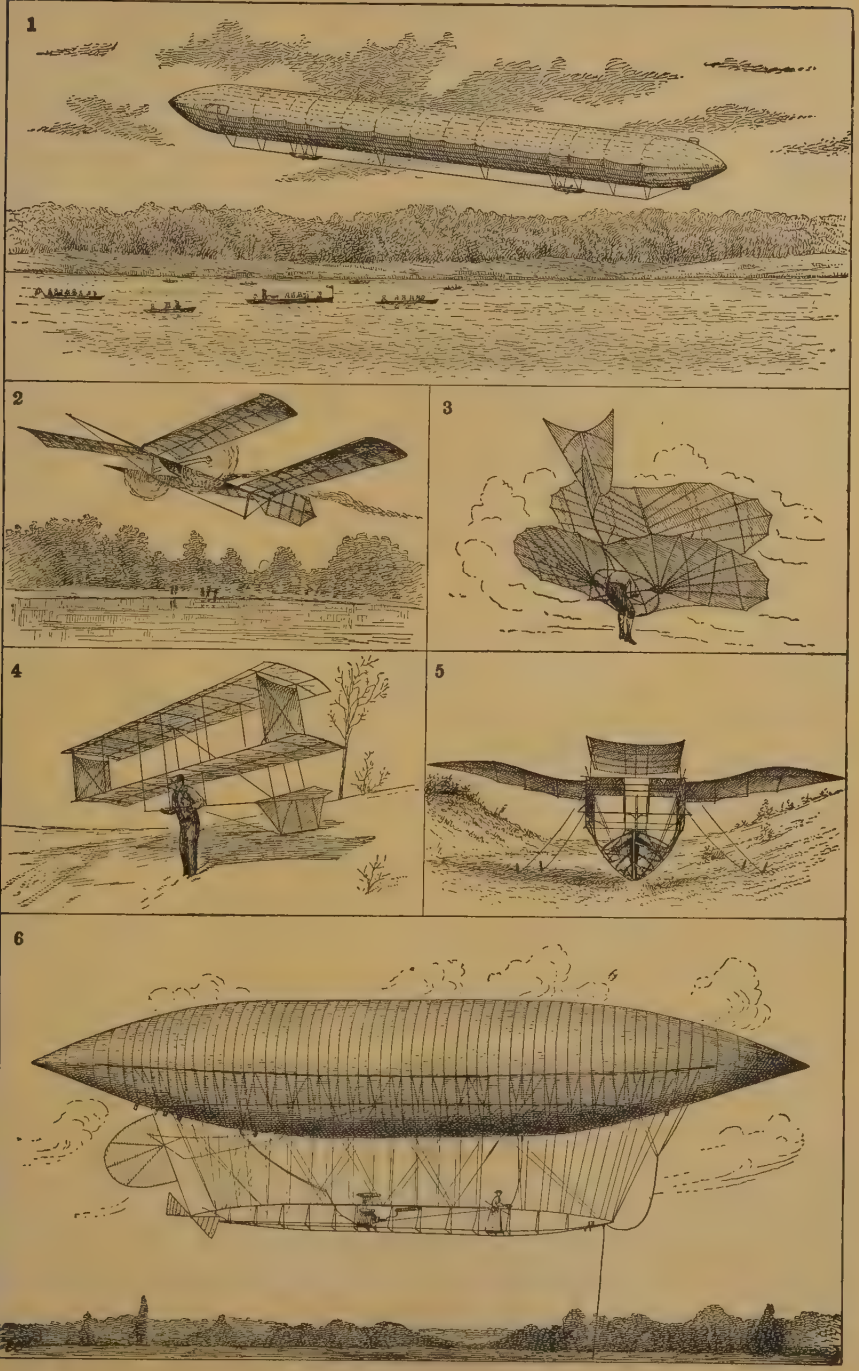
Helium for Airships. In view of a number of distressing accidents caused by the ignition and explosion of the hydrogen in the gas bags of airships, unusual interest attached to the development during the World War of a plant for the production of helium on a commercial scale. This was done by the United States Government at Fort Worth, Texas, using the oil from certain wells in Texas and Oklahoma and separating the helium from the other gases by a complicated refrigerating process. This plant and process was developed so that on Dec. 1, 1921, the United States Navy non-rigid airship C–7 was successfully inflated with gas thus produced and made a number of trips. Helium (q.v.) is non-inflammable and is non-explosive, but it has 92 per cent of the lifting power of hydrogen. It is less diffusive than hydrogen so that less is wasted through the envelope. Helium also was found to keep better than hydrogen not absorbing impurities as readily.

AVIATION

Mechanical Flight. All devices for mechanical flight may properly be classed as passive and power or dynamic flying machines. The passive fliers in turn can be divided into machines intended for gliding flight, or, as the modern aviator terms it, *volplaning*, and those designed for soaring or moving through the air, without loss of altitude, by the force of the wind. Obviously experiments with passive fliers and those with dynamic machines are intimately related, and the development of the latter has depended in large measure upon investigations with gliders and soaring devices.

There are on record a few more or less authenticated early instances of persons who by some parachute-like contrivance attempted to imitate the flight of birds. Some of these antedate the balloon by centuries. There is the story, for example, of Elmerus, a monk, who is said to have flown more than a furlong from the top of a tower in Spain, a distance probably much exaggerated. Leonardo da Vinci made a serious proposal to beat a pair of mechanical wings and also considered the use of an aërial screw, as sketches in his notebooks testify. An interesting paper by him on *The Flight of Birds* was published in 1505. In the seventeenth century Allard, a tight-rope dancer, attempted a flight with artificial wings in the presence of Louis XIV, while in 1678 Besnier, a locksmith of Sable, France, built a pair of oscillating wings with which he was reputed to be able to leap safely from very elevated positions and to pass over rivers of considerable breadth. The first properly authenticated ac-

AIRSHIPS AND FLYING-MACHINES — HISTORIC TYPES



1. DIRIGIBLE BALLOON OF COUNT ZEPPELIN, in flight, July 2, 1900.
2. LANGLEY'S AERODROME, in flight.
3. LILIENTHAL'S APPARATUS FOR SOARING FLIGHT.
4-5. CHANUTE'S APPARATUS FOR SOARING FLIGHT.
6. SANTOS-DUMONT'S AIRSHIP.

count of an artificial wing was that given by Borelli in 1670, and despite fundamental errors his experiments and conclusions were the basis for such investigations as were undertaken for many years.

Perhaps the first to make substantial and original contributions to the modern science of aviation was an Englishman, Sir George Cayley, who in 1809 and 1810 described in *Nicholson's Journal* experiments with aërial gliders in the form of large models. He took into consideration the placing of the wings at an angle of incidence, the use of a tail to steady the machine, and even calculated the energy necessary for propulsion from an engine. In 1867, Prof. J. B. Pettigrew, an English scientist, published the results of an elaborate and careful series of studies made by him upon the flight of birds, which wrought a revolution in the construction of flying machines.

Previously, in 1842, William Samuel Henson, of Chard, England, had designed and patented a flying machine which had a single supporting surface and two aërial screws driven by a steam engine. It was of course impossible at that time to construct a full-size machine, but it was the earliest commercially designed aëroplane and contained many principles later embodied in present-day machines, notably the system of control which was substantially that of the early Voisin monoplane. Some of these early features were cited in the litigation on the Wright patents 70 years afterwards.

F. H. Wenham, also an Englishman, in 1867, thinking to improve upon Henson, invented what he designated as a multiplane or aëroplane with two or more supporting superposed surfaces to secure increased sustaining power without increasing the general plan. In his design we have the forerunner of the modern biplane. John Stringfellow, who was originally associated with Henson and had constructed the first successful flying model aëroplane in 1848 (for it flew about 40 yards), built a second model in 1868 in which Wenham's aëroplanes were combined with aërial screws. This model was on view at the exhibition of the Aëronautical Society of Great Britain, held at the Crystal Palace, London, in 1868. It had three superposed and parallel planes and was remarkably compact and light, obtaining the $500 prize of the exhibition for its engine, which was the most powerful for its weight ever constructed. The aëroplane was not successful and later was purchased by Prof. S. P. Langley for the United States National Museum in Washington, where it is now on exhibition. In 1873 a tandem monoplane with two lifting planes was invented by D. S. Brown, and in 1874 Thomas Moy invented an aërial steamer, consisting of a light powerful skeleton frame resting on three wheels, a very light and efficient engine which was built on a new principle and which dispensed with the old-fashioned cumbrous boiler, narrow horizontal aëroplanes, and two very large aërial screws. This engine, which weighed with its boiler 80 pounds, developed fully 3 horse-power. In its general features Moy's machine resembled that of Stringfellow.

Various experiments with flying-machine models of many forms and occasionally with full-sized machines were carried on by inventors. The most satisfactory results, as will be seen, were secured with flat or slightly curved supporting surfaces; but, before proceeding to their consideration, brief mention can be given of other classes of devices suggested and employed. Vertical screw machines, or helicopters, have much to recommend them, and latterly have attracted more attention, but as yet have not passed out of the experimental stage.

Both theory and experiment early indicated that a practical machine for artificial flight could be best secured by the use of the principle of a sustaining surface advanced through the air, or, in other words, an aëroplane or aërocurve. When a thin surface is drawn through the air and is slightly inclined to its path, the equivalent of a pressure is developed on the side which is exposed to the air current—that is, the under side—which is much greater than the driving force which is necessary to produce it. If a surface arched in the line of the motion be substituted for the plane, we have an aërocurve, whose chief advantage is that it has a higher efficiency, as was successfully demonstrated by Horatio Phillips in England in 1884.

The earliest systematic experiments to apply this principle of the supporting plane were those of Sir Hiram Maxim of England, Prof. S. P. Langley of the United States, and Otto Lilienthal of Germany. Maxim's ideas found expression in 1893 in a gigantic twin-screw multiplane flying machine, the largest ever built, and while his experiments conducted on a large scale were not altogether successful yet he reached the conclusion, "that a flying machine is now possible without the aid of a balloon in any form."

His machine was mounted on rails so that it could rise, but was prevented from flying freely by an upper guard track. Several runs were made during which the machine rose from the lower track. On a gusty day in 1893 the machine during a test carried away part of the upper track and was damaged. In the light of later achievements it is not likely that the machine would ever have flown freely for any length of time. Nevertheless its construction is a milestone in the history of aviation, for Maxim had developed much that present-day experience and knowledge endorse.

In 1891 Professor Langley published his now famous memoir entitled *Experiments in Aërodynamics*, and in 1893 his equally celebrated book on the *Internal Work of the Wind*. The experiments upon which many of the statements in these books were based were begun in 1887, and from 1891 to 1896 Professor Langley was more or less constantly at work perfecting a model flying machine which he termed an "aërodrome." Professor Langley's small model, which was driven by a steam engine using naphtha as fuel, made its first successful flight on May 6, 1896. It was flown several times and came down when the fuel gave out. The average distance accomplished was about three-quarters of a mile. This was the first time in history that a motor-driven aëroplane accomplished a sustained flight.

By the aid of an allottment of $50,000 from the Board of Ordinance and Fortification of the United States War Department, a full-sized man-carrying aërodrome was constructed by Professor Langley and his assistant, Charles M. Manley, and tested in 1903. Its failure, due to defects in the launching mechanism, was a source of keen disappointment to many who had believed that in the aërodrome Professor Langley would solve the problem of mechanical flight. The aërodrome had a sustaining surface of 1040 square feet and with the aëronaut weighed, when ready for flight, 830 pounds. The gasolene engine, which was

able to furnish 52.4 brake horse-power, weighed, without fuel or water, 2.2 pounds to the horse-power approximately. The engine to this day remains a marvel of lightness. The unsuccessful character of two trial flights made in 1903 did not demonstrate that the engine was unable to lift the machine, as the mishaps on both occasions were due to the apparatus catching on the launching apparatus, and this in the second instance resulted in the wreck of the machine. The government refused to extend additional aid, and no further developments of the aërodrome were made by Professor Langley before his death.

Critical examination of Professor Langley's plans in the light of modern knowledge and experience has shown that his aëroplane "had every equipment needed for a steady flight of many hours in fair weather." Thus wrote Dr. A. F. Zahm, a recognized authority in aviation, and he added: "Professor Langley had, in 1903, a dynamic aëroplane quite the peer in many respects of the best that were developed during the first decade of aviation, and a mere accident, which should be expected in such complex experimentation, deprived him of the credit of the first man-flight on an adequately controlled and powered machine."

Furthermore a practical demonstration was given in 1914, when Glenn H. Curtiss took Langley's original aërodrome and reclothed the machine without changing its size or shape, and in particular arranging framing, engine, propellers, wings, rudders, and controls just as Langley had left them. Only a modern radiator and carburetor were added and floats supplied, so that the machine could rise from the water. Notwithstanding its heavier weight, on May 28, 1914, the machine rose successfully under its own power and flew over the surface of the lake under the control of Mr. Curtiss in the pilot's seat. With a modern engine installed the machine performed even more satisfactorily, and showed that the design was in every degree practical, notwithstanding that later practice made a number of important departures from Langley's original ideas. The original machine is now in the National Museum at Washington.

In this connection the work of Clément Ader, a French inventor, also should be mentioned, for by Frenchmen he is sometimes given the credit of having been the first to navigate the air in a dynamic flying machine. In 1890 he completed a bird-like monoplane driven by a 40 horse-power steam engine with a screw propeller in front of the machine. On October 9 he is said to have risen in the air and flown for a distance of 150 feet with this machine and with a second and similar aëroplane to have made a flight of 300 feet on one occasion. In 1897 a larger machine was completed in the form of a bat with folding wings, spreading 270 square feet. It was driven by a 40 horse-power steam engine driving twin screws in front. The engine weighed about 280 pounds, or 7 pounds to the horse-power produced. In preliminary tests the aëroplane and engine worked satisfactorily, but the machine was able merely to leave ground. On the final test the aëroplane operating in the face of a severe wind was seriously damaged, and the clever inventor was then unable to find the further support which his experiments clearly merited. Subsequently this machine was resurrected and was honored by exhibition at the Aëronautical Salon of 1908 at Paris. It has since been given a permanent place in the Conservatoire des Arts et Métiers.

Aside from the work of Maxim, Langley, and Ader, valuable experiments with large aërocurves and aëroplanes capable of carrying one man but without propelling motors and screws were conducted by Otto Lilienthal of Germany, Octave Chanute, an American engineer, and subsequently by the Wright brothers, of Dayton, Ohio.

With the machine shown in the illustration Lilienthal, starting from a height, was able to sail several hundred feet—the flight in some instances being against a wind of 24 miles per hour—and to make turns to the right or left with considerable certainty. Lilienthal began his flights in 1891. After making 2000 flights he was killed in 1896 in a biplane glider. Although he was an engineer, the trussing between the wings was very weak. Mr. Chanute's experiments were conducted first with a machine like Lilienthal's but with one pair of wings only; later, with a machine having five pairs of wings, one above the other, and a sixth pair forming a tail, and finally, with a machine consisting of two wings, one above the other, and without any break in the middle, as shown in the first of the two illustrations of his apparatus. His last model was a large bird-like structure of the form shown in the illustration. The greatest success, perhaps, must be credited to the double-decked machine, which made numerous flights, some of them against winds of from 10 to 31 miles per hour. The longest flight made was 359 feet, from a starting point 62 feet higher than the point of landing. This was in 1896 and showed that a trussed biplane used as a glider was reasonably safe. Mr. Chanute in the construction of this biplane glider was assisted by A. M. Herring.

Working with apparatus similar to that tested in gliding flights by Chanute, whose advice and assistance they enjoyed, Orville and Wilbur Wright, of Dayton, Ohio, after a long series of practical experiments by which great dexterity of manipulation was obtained, constructed a machine with a front rudder, in which the operator occupied a horizontal position. After many glides and after testing many forms and designs, a machine eventually was devised, to which a 16 horse-power four-cylinder gasoline motor and twin propellers were fitted. In this a movable or elevating rudder was placed in front, and the wings could be warped for transverse control. This machine, which weighed a little over 200 pounds, was tested on Dec. 17, 1903, at the Kill Devil sand hills near Kitty Hawk, N. C., and four successful flights were made, in one of which the aëroplane rose of its own power, was in the air 59 seconds, and traveled a distance of 852 feet. This is the first instance where a person had been carried from ground in actual flight by mechanical means without artificial aids. Such success naturally led to other experiments, and on Oct. 5, 1905, the aëroplane made a flight of 24¼ miles, under full control, remaining in the air 38 minutes and 3 seconds. It was able to carry fuel for an hour's run and was able to move at a speed of about 38 miles an hour.

Wilbur Wright gave in France, where the patent rights had been sold, a number of public exhibitions in which the superiority of the Wright biplane over contemporaneous French machines was clearly demonstrated.

AËROPLANES

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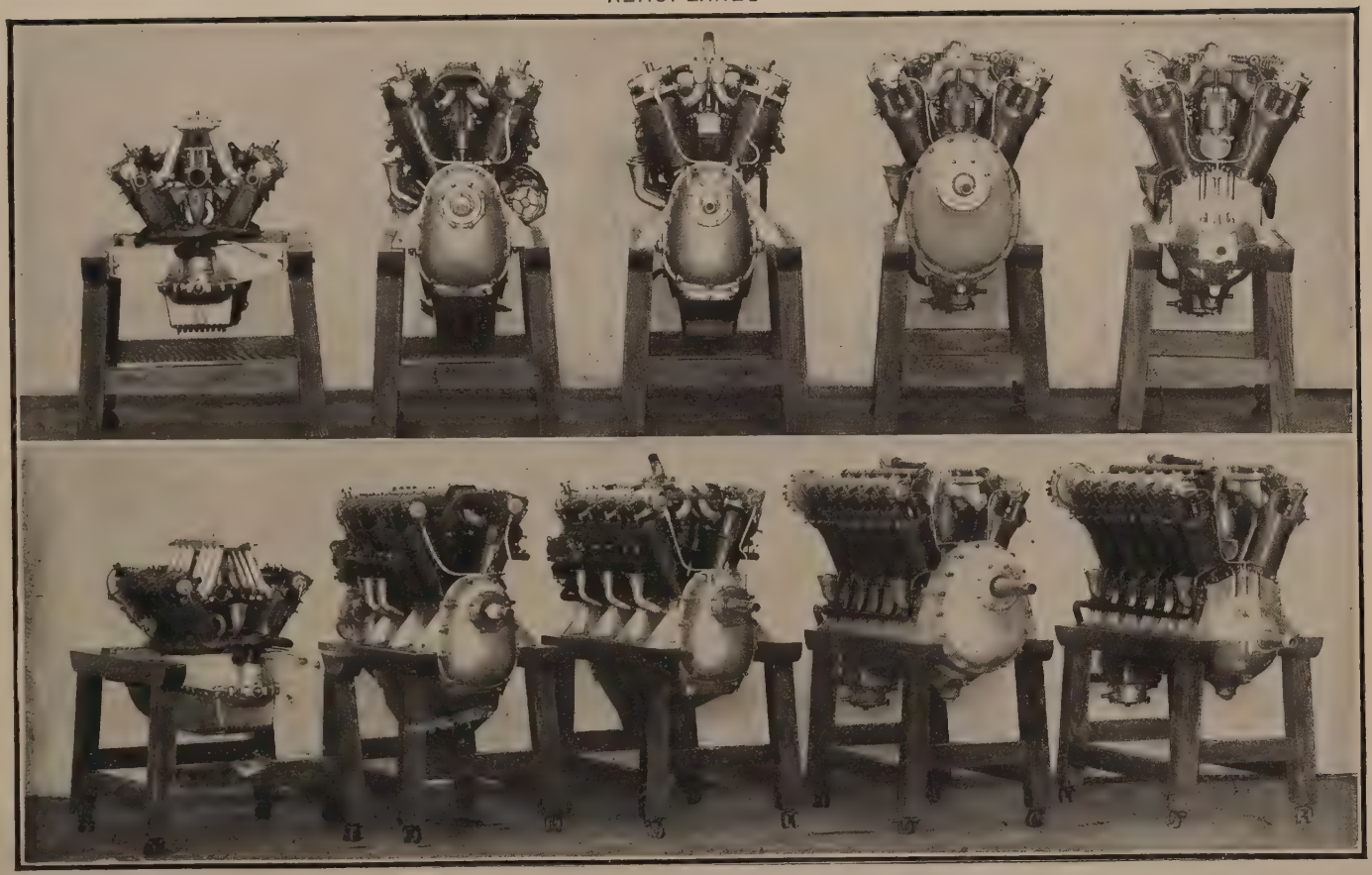
(1) MARTIN BOMBER
(2) BRITISH HANDLEY-PAGE BOMBER
(3) CURTIS EAGLE PASSENGER PLANE



PROGRESSIVE STEPS IN THE EVOLUTION OF THE PACKARD LIBERTY MOTOR

Simultaneously in America, Orville Wright demonstrated before the Signal Corps of the United States army an aëroplane consisting of two superposed main surfaces aggregating about 500 square feet and spaced 6 feet apart. The two planes had a spread of 40 feet and were 6½ feet front to rear. A horizontal rudder of two parallel planes was placed in front, while a vertical rudder was carried at the rear. A 4-cylinder gasoline water-cooled motor developing about 25 horse-power when working at 1400 revolutions per minute drove two wooden propellers, each 8½ feet in diameter and making 400 revolutions per minute.

Successful trials of this machine at Fort Myer, Va., were interrupted by an accident, Sept. 17, 1908, in which Orville Wright was injured and Lieut. T. E. Selfridge, U. S. A., was killed. One flight at these trials lasted for 1 hour 14 minutes and 20 seconds, and an estimated speed of 40 miles an hour was obtained.

Improvements followed and in 1910 the front rudder was done away with, because it was found that it caused pitching. Instead of starting the machine on an inclined rail, bicycle wheels were employed so that ascents could be made from the ground—a method long before adopted by others.

The first patents awarded to the Wrights were sufficiently broad in their scope to protect the invention. Infringements followed giving rise to extensive litigation. In a decision handed down by Judge John R. Hazel in the United States District Court on Feb. 27, 1913, the Wright claims in the main were upheld, the Court holding that while the elements in the Wright aëroplane were conceded to be old the inventors were the first to discover that the vertical rudder of a flying machine must be used in conjunction with wing-warping devices, or ailerons, to prevent the machine from spinning on a vertical axis in straight-away flight.

In England, Horatio Phillips, in 1904, a few months after the initial success of the Wrights, flew across a field in a gasoline-driven multiplane mounted on wheels. In France, however, there was the greatest enthusiasm and interest, for here the light-weight gasoline motor of high efficiency and power had been highly developed so that no longer experiments in gliding flight from elevations were in order, as there were available sufficiently powerful motors to operate aërial propellers.

In 1906 Santos-Dumont turned from his dirigible balloons to a new form of aëroplane of cellular form which was the first practical aëroplane publicly to be shown. On November 12, in a flight of 215 meters (715 feet), he gained the prize of 1500 francs of the Aëro Club of France for the first public flight of 100 meters. Santos-Dumont in 1909 evolved a monoplane with the least weight (242 pounds) and the smallest supporting surface (115 square feet) of any machine constructed up to that time.

Sharing the early honors with the Wright brothers' aëroplane, was the biplane of Glenn H. Curtiss, who had been an inventor and manufacturer of motor cycles and held several speed records with machines of his own design. This biplane depended for its stability on movable ailerons or tips placed at the extremity of the supporting plane. This machine on July 4, 1908, won for the first time the *Scientific American* trophy with a flight of over a mile. A second machine improved this performance, and in 1909 a Curtiss machine was entered in the great international competition at Rheims, France, and won the Gordon Bennett aviation prize for the fastest time (15 minutes 56⅕ seconds) over a distance of 20 kilometers (12.42 miles). In 1910, on May 29, he flew from Albany to Governor's Island, N. Y. Harbor, a distance of 142 miles, stopping but three times to replenish oil and fuel, at an average rate of about 49 miles an hour. Charles K. Hamilton in the same year, using a Curtiss aëroplane, made an even more noteworthy flight from Governor's Island to Philadelphia and return, doing the air-line distance of 74.7 miles, or over 82 miles as flown, in 1 hour and 45 minutes, or about a rate of 45 miles an hour.

In 1912 Curtiss who, in 1910 had devised the hydro-aëroplane, was voted a "Langley Medal," the second to be awarded by the Regents of the Smithsonian Institution for "specially meritorious services in connection with the science of aërodromics." He also received the medal of the Aëro Club of America.

The success of the Wrights in France was followed by that of Henri Farman, who in 1907 had flown a Voisin cellular biplane with two curved parallel surfaces. In construction the machine resembled both the Chanute glider and the box kite of Hargrave (see KITE) which had exerted considerable effect on aëroplane design. It was the first machine to be fitted with wheels for convenience in rising and landing. It was the first machine in France to fly a sufficient distance to win various prizes offered for practical flight.

Other notable French biplanes were those of Breguet and Sommer, to mention but a few of the different types that were soon developed. In England there were the biplanes of Cody and Dunne and others patterned more or less closely on French and American models, although Dunne's system of inherent stability was distinctly original. Later in the United States, the Burgess biplane, a modified Wright type was developed, and was the first enclosed body tractor to be built in the United States, a covered fuselage containing the motor, aviator, and observer.

It was found that the biplane with the single engine was used in the United States and England in the large number of planes that came to be developed, while in France and Germany, as will appear, where there was a tendency towards speed for sporting or military purposes, the monoplane was being developed. In some cases the area of the lower plane was reduced so that the biplane practically approached a monoplane, while in other cases to secure an increased amount of supporting surface triplanes were designed. Naturally a biplane or triplane lends itself more readily to construction as it is possible to arrange the bracing and general framing, etc., to secure adequate strength.

Monoplanes. By 1908 it was realized that a successful aëroplane with a single supporting surface was possible, and for some purposes preferable, and one designed by Louis Blériot on Oct. 31, 1908, made a successful flight from Châlons to Rheims, a distance of 17 miles. This type of machine already had made the first flight for an aëroplane across the English Channel from Baraques to Dover on July 25, 1909. The success of the Blériot monoplane immediately established the type.

It consisted of a long central trussed structure

or spine, mounted on wheels and carrying at the front the propeller and motor and at the rear two of the rudders for direction and elevation. The direction of the machine to right or left was effected by a vertical rudder at the rear, while a horizontal rear rudder served to control elevation and pitching. The lateral rudder was placed at the wing terminals, and lateral stability was obtained by warping or bending the edges of the main wings, after the Wright principle. The supporting surface was firmly attached to the central frame, which was covered to diminish the atmospheric pressure against the framing and engine as well as the body of the aviator. The monoplane, as thus developed by Blériot, straightway became a competitor of the biplane and served as a point of departure from which much successful designing was done, involving of course more or less radical variation from the original model. The power of the engine was materially increased, and this naturally involved increase of structural strength.

But Blériot was by no means the only successful designer of monoplanes. Immediately there were a number of machines with greater or less divergence in design and construction among themselves, but in the main embodying in common most of the essential characteristics. Nevertheless different designers and makers had often secured individual features that worked for efficiency, so that there were evolved a number of types. The Nieuport machine, the Deperdussin, the Hanriot, the Esnault-Pelterie, the Morane-Saulnier, and other monoplanes developed in France figured in various flights and competitions and acquitted themselves with merit. In Germany, Austria, Great Britain, and to a less extent the United States, other monoplanes were developed, but the differences for the most part were minor.

At first it was claimed that the monoplane, while speedier for short distances, was less stable and incapable of sustained flight or ability to endure varying conditions of the air. This, however, was soon disproved, and many notable distance and endurance records were made with monoplanes. The biplane, however, seemed to have greater lifting power and was used in the various types of hydroaëroplanes, while in order to secure increased supporting surface a number of triplanes were developed of various sizes.

During and after the war there was a pronounced tendency to secure greater aërodynamic efficiency of monoplane wings, realizing the fact that a monoplane essentially possesses greater efficiency than a biplane structure. Accordingly monoplanes with cantilever wings became increasingly used and considered more efficient. This was particularly the case with the all metal monoplanes.

By the time of the World War it was realized that all aëroplane construction was an engineering matter, based not only on experience and originality of conception, but on technical study to evolve safer, more powerful, and generally more efficient machines. Careful attention must be paid to sound principles and details figured more than ever in design and construction. As quantity production followed experiment and design in turning out airplanes and their engines, it was apparent that from the mechanical standpoint few departments of engineering have ever experienced more rapid or satisfactory progress. Strength was an important element and while during the war planes could be used up rapidly in the military service, for regular or commercial flight it was realized that strength and stability must be maintained. The all-metal plane of steel and duralumin in large measure carried out this idea and care in selecting materials and developing designs was also a controlling factor.

HYDROAËROPLANES

An important development of the aëroplane, and one destined widely to extend its use, was the hydroaëroplane designed to rise from the surface of water and to alight thereon. Not only is this type virtually a flying boat, but it is one that is reasonably safe. The idea, which had been suggested in patent specifications by Hugo Matullath of New York in 1899, had its practical origin in Curtiss, who added to the aëroplane with which he was experimenting at Lake Keuka in 1908 floats placed under each wing so that in case of accident the machine would not sink but could be reached and saved readily with a boat. In fact, it will be recalled that Langley and other inventors for like reasons made their experimental flights over bodies of water. Probably the first to add the floats as an integral part of the machine with the express idea of rising from the surface of the water was Fabre, who on March 28, 1910, made the first flight with a practical hydroaëroplane at Martigues on the Seine, France. His machine was a monoplane to which were fitted three floats, so that he was able to ascend and descend at will on the surface of the water. In the meantime Curtiss, who had been working at San Diego, Cal., on aëroplanes for the United States navy, developed a hydroaëroplane which was shown on Jan. 26, 1911, and on which he based a patent application August 23. This was a biplane with floats instead of the usual landing skids, but provided, however, with wheels for use on land. Various arrangements of floats were tried, and the machine straightway commended itself to navy officers and a number of yachtsmen. Curtiss eventually abandoned floats and used a true boat body. For this development of the hydroaëroplane Curtiss received the Aëro Club of America trophy in 1911, and in 1912 for the flying boat. Curtiss' broad patent on the hydroaëroplane was sustained in the United States Circuit Court of Appeals in a decision handed down Dec. 15, 1921.

By 1912 a distinct type of craft was being developed that would perform satisfactorily both above and on the surface of the water, that could be moored at anchor in fairly rough water, and that could be hoisted in or out of the water with an ordinary crane tackle in addition to traveling distances of as much as 300 miles in the air. This required a strongly built and framed aëroplane, well engined and embodying the best features of aëroplane construction, together with a suitable hull or floats. At the outbreak of the World War this was one field of aëronautics in which the United States was preëminent.

The hydroaëroplane had an effect on aëroplane construction and design by bringing about even stronger construction and greater power. It was early realized by aëroplane designers that once the practical aëroplane was secured extreme lightness at the expense of strength or other essential features was in no way desirable, and with the increased use of

metal naturally came increased weight. Now with the hydroaëroplane, in which the principle of safety was carried even further than in previous aëroplane construction, there was added the desire to secure carrying capacity. The hydroaëroplanes accordingly were designed for carrying capacity as well as strength both of the planes and of the hull or floats.

During the war the problems for the Allies was to detect and destroy submarines and floating mines, so that large flying boats were developed possessed of considerable endurance. To combat these the Germans put out small fast seaplanes designed for fighting rather than flying boats. The American flying boats developed during the war proved most successful, and the N. C. class had to its credit the first transatlantic flight.

Airplane Engines. It did not take airplane engineers long to depart from the early motor-cycle or automobile type of motor and develop a machine specially suited to their special needs; and in fact on its ability to run for long periods without attention and with absolute reliability depended such achievements as a transatlantic trip, long distance flights as from Europe to Australia, or even the trans-Continental mail maintained in the United States. Aëroplane motors may be either rotary, as the Gnôme, a famous motor which figured in many successful aëroplanes, or some form of motor with from four to twelve or more cylinders where the pistons, arranged vertically, opposed, radially, or at an angle, work directly on the crankshaft. These are either air-cooled, as in the case of the Gnôme and Esnault-Pelterie, and the more recent American 3-cylinder Lawrance engine, or water-cooled, as in the Curtiss-Wright-Hispano-Suiza, Aëromarine, and Packard. It should be noted that there have been constant improvements in all of these engines, and that some of those of foreign engines brought over at the time of the war, as the Hispano-Suiza, have become modified and adapted to American conditions of manufacture and use as well as generally improved and fitted to special types of aëroplanes.

With a fuller knowledge of the conditions of service, naturally it was possible to design motors and planes for specific uses. Thus a machine to develop high speed would be differently engined and designed from one where long-distance flying was the main object and all conditions of weather were likely to be encountered, while the ability to use a number of engines on a single airplane increased not only the available power but the safety, as not all were likely to meet with mishap.

Inasmuch as artificial flight by heavier than air machines has been possible largely by the development of the internal combustion engine, it is interesting to consider the great increase in the efficiency of this machine. This is indicated below where there is a comparison by years of the horse-power, weight, and weight for horse-power of the average airplane engines, except in the case of the Wright motor first used at Kitty Hawk, N. C., in 1903, and the figures for 1918 which are for the Liberty motor of that year.

YEAR	1903	1910	1914	1915	1916	1917	1918
Horsepower . .	12	54	112	133	185	243	450
Weight, pounds	152	309	437	512	570	693	825
Pounds per H.P.	12.7	5.7	3.9	3.8	3.1	2.8	1.8

Liberty Engine. This engine developed in the United States War Department during the war by American automotive engineers was in the main a composite design comprising the best elements of the various motors in use in 1917 when it was designed, and which could be united in a single efficient machine suitable for immediate quantity production. That this was done was shown by the fact that from December, 1917, when the first engines were turned out to Nov. 29, 1918, 15,572 Liberty engines were produced in the United States of which a certain number were ordered by the British and French governments. It was a 12-cylinder engine of 5-inch bore and 7-inch stroke with the two sets of cylinders arranged at an angle of 45°. The cylinders were made of steel inner shells surrounded by pressed steel water jackets. It ranged from 275 to 400 horse-power. The Liberty engine not only served an important purpose in being used by the American and Allied governments for their war planes, but in the United States was a point of departure for further work. Being made economically in quantity it was generally available and could be adapted to different forms of airplanes. In the government services its constant improvement was aimed at, and one of the most notable developments was its modification to use oil fuel in place of gasoline. The announcement was made in 1922 that the Liberty engine had been so arranged after experiments that it could function by an injection of oil from a jet. This was accomplished by increasing the size of the piston to produce a suitable compression. After the air is admitted with the oil the mixture is rapidly compressed sufficiently to raise its temperature so that it can be readily ignited. This improvement was important in that a less weight of oil was required at a smaller cost and the fire risk of more volatile fuel was diminished.

Applications. The conclusion of hostilities in the World War naturally raised the question of both the immediate and the remote future of aëronautics and aircraft generally. For military purposes the art had advanced by leaps and bounds and manufacturing facilities had been developed of unusual capacity and completeness. Furthermore, there was available a vast supply of airplanes belonging to the Allies in addition to many in course of manufacture. Indeed, as regards the military uses of the airplane it was quite possible not only to appraise its position after the war, but even to consider its future usefulness which increased capacity among other things had brought about. In a future war it was clear that aircraft would serve as a means of transportation as well as for observation and offence, which crossings of the Atlantic Ocean were placed within the realm of possibilities for both airplanes and airships.

On the commercial or civil side the years immediately succeeding the World War saw no such extensive haste to employ aircraft. But it must be remembered that in the United States and in Europe the years 1920 and 1921 were marked by economic depression in which such innovation as flight or air transportation did not appeal actively on a commercial basis, nevertheless, a number of air routes were maintained and unofficial flying done. In 1921, for example, it was stated that there were in the United States 1200 aircraft operated by civilians with a flying record amounting to more than

6,500,000 miles and carrying approximately 275,000 passengers.

In Europe beginning immediately after the war a number of air routes were laid out and aërial transportation was arranged for. In Great Britain, Civil Aviation was resumed May 1, 1919. Naturally the cross-Channel service between Paris and London proved attractive for passengers as well as for mail and light freight, and though at times it failed for lack of support, as in the winter of 1920–1921, after a temporary suspension it reopened March 9, 1921, with state assistance. This service, however, gradually developed, and the number of passengers, and the amount of freight and mail handled increased. There were three commercial air routes between England and the Continent that by 1920 were established and in working order, London to Paris 223 miles, London to Brussels 210 miles, London to Amsterdam 258 miles. These grew in use so that in 1921 for the week ending September 4, there were in the Channel Service 103 machines which carried a total of 427 passengers and a crew of 129 or a total transported of 556.

In France also by 1922 a large number of air routes had been established and more were contemplated for passenger and general service as well as mails. In 1919 the total number of passengers by air was 960, which increased in the following year to 6750, while in March, 1921, 665 persons traveled by the air mail. The French aviation promoters were not merely satisfied with local or direct routes; they developed extensive systems of connecting lines and long distance routes, plans being made in 1921 for a regular service between Paris and Constantinople in a plane carrying 16 passengers and their baggage. In October of that year service was inaugurated between Paris and Bucharest.

With the resumption of aviation in Germany after the war interest and traffic steadily increased. Regular routes were laid out and the leading companies established service both local and to distant points.

Airplane Mail Service. The experience in flying derived during the war found its first general application outside of military service in the transportation of mail, and this was begun on a fairly large scale even before the close of hostilities. Previously there had been attempts to carry mail from point to point or across intervening bodies of water, but not on a large and regular basis of service. On May 15, 1918, a daily aërial mail service was inaugurated between New York and Washington and this was regularly maintained until 1920, when it was discontinued from motives of economy. The service was begun first with a special stamp of 24 cents for a letter, but later the rate was reduced to 16 cents and then again to 6 cents, and finally the airplane mail service was placed on the same basis as any other. At first the Washington-New York service was maintained by the air service of the Army, but as soon as its reliability was demonstrated it was turned over to the Post Office Department and until its discontinuance May 31, 1921 was operated by it. The success of the Washington-New York service led to the test of a similar service between New York and Chicago, and during 1918 a number of experimental flights were made between the two cities, the various exchange and fuel stations being carefully studied and determined. On May 15, 1919, the Cleveland-Chicago route was established a distance of 325 miles, requiring 3½ to 4 hours of flight as against 340.28 miles by rail and 6.35 to 10.30 hours train time. On July 1, 1919, the New York and Cleveland route was established, a distance of 410 miles by air and requiring a flight of 4½ to 5 hours as against 620.64 miles by rail and a train time of 13.05 to 17.20 hours. This aërial mail made possible the overtaking of fast trains and in some cases advanced time of delivery 24 hours. A regular service between Omaha, Nebraska, and San Francisco, California, was started on Sept. 10, 1920, forming the last link in the Transcontinental Route which had been developed by the establishment of airplane mail between Chicago and Omaha on May 15, 1920.

The Transcontinental Mail was inaugurated on Sept. 8, 1920, when a mail-carrying airplane left Mineola Field, New York, and on September 11 another airplane delivered this mail at Marine Field, near the Presidio, San Francisco, while the first eastern trip was begun on September 10, from the last-named station and the mail reached Mineola Field on September 12. In place of 91 hours as required by rail for this 2630-mile distance the early schedules of the air-mail service called for 57 hours in the winter months and 54 hours in summer. In February, 1921, in a continuous flight with night-flying mail was delivered in New York 48 hours after it left San Francisco, while in July of the same year photographs of the Carpentier-Dempsey prize-fight were delivered on the Pacific Coast within 48 hours of mailing.

The United States Government by contract maintained air-mail service between Key West and Havana, Cuba, a distance of 90 miles and also a similar service between Seattle, Washington and Victoria, B. C.

Crossing the Atlantic by Airplane. In the spring of 1913 Lord Northcliffe of the *London Daily Mail* offered a prize of $50,000 for the first transatlantic flight from the United States, Canada, or Newfoundland to Ireland or Great Britain by airplane in 72 hours, thus indicating that a trip where it was permitted to alight on the surface of the water to take on supplies of fuel was then in the range of possibilities. Preparations were being made in 1913 and 1914 for such an attempt, but the war necessarily interfered and it was not until 1919 that aviators with vast experience in long-distance flying once more addressed themselves to the problem. On May 18, 1919, Commander Mackenzie Grieve and Major Harry Hawker left St. Johns, Newfoundland in a Sopwith biplane of war model driven by Rolls-Royce engines of 375 horsepower. After a flight of 15 hours in which some 1000 miles out of the 1900 required for the trip were accomplished, they were forced to alight on the surface of the water on account of engine troubles and were rescued in a rough sea. A more successful trip was that of the United States Navy NC–4, which with two similar airplanes left Rockaway, N. Y., for Trepassey Bay, Newfoundland, whence on May 16, a departure was made for the Azores a distance of 1250 miles. NC–4 piloted by Commander A. C. Read, U. S. N., reached Horta, in 15 hours and 13 minutes, or an average speed of 78.4 knots per hour. On May 20, the NC–4 proceeded to Ponta Delgada, and then on May 27, flew to Lisbon, Portugal, 810 miles, making the trip in 9 hours

and 43 minutes with a total flying time for the 2472 miles from Newfoundland to Portugal of 26 hours and 51 minutes. The trip was extended to Plymouth, England, where the first transatlantic flight was terminated on May 31.

This flight was carefully arranged over a patrolled course, but it demonstrated the possibilities of such a trip, and on June 14, a Vickers-Vimy Bomber, a twin-engined biplane piloted by Captain John Alcock, left St. Johns and in 16 hours and 12 minutes made a landing at Clifton, Galway, Ireland, a distance of 1960 miles accomplished at an average speed of 120 miles an hour, thus winning the *Daily Mail* prize of $50,000 for the first non-stop transatlantic flight, which at the time also set a new world record for distance.

Long-Distance Flying. With aviators and airplanes released from war service in 1919 many long-distance flights were made over land and water, that on August 11, of a Farman Goliath biplane from Paris to Morocco with 10 passengers in 16 hours and 20 minutes, being perhaps as notable as any at this time and indicating the possibilities of long-distance aviation. There were a number of long flights such as that by Captain Ross Smith from Hounslow aërodrome in England to Port Darwin, Australia, 11,500 miles accomplished in 27 days 20 hours and 20 minutes or from November 12 to December 10. In the United States Lieut. B. W. Maynard in a DH–4 equipped with 400 horsepower Liberty motor flew from New York to San Francisco and return, or 5402 miles, October 8 to 30. Numerous other flights were made about this time which served to demonstrate the absolute reliability of the engines and the strength of the planes, although in practical applications such as mail carrying and passenger service shorter distances and relays were more useful and desirable.

Aërial Photography. In the World War photographing and mapping from airship and airplane played an important part, and the experience secured was immediately applied to surveying and topographic work. The government coast surveys reported that shore lines could be mapped accurately and expeditiously and shoals and sunken obstructions readily detected by such means. The United States Coast Survey employed photographic surveying on the New Jersey Coast, at the mouth of the Mississippi River on the Olympic Peninsula in Washington and elsewhere. A map of Guantanamo Bay was prepared for the United States hydrographic office. In Canada a reconnaissance survey of considerable accuracy was carried on at slight expense and with considerable speed on the boundary between Northern Manitoba and Saskatchewan. These air surveys have been used in railway locating and in timber studies and mapping.

Similar surveys also were made in India, while in new country generally the plan is useful and economical. Furthermore on a smaller scale topographic surveys or aërial photographs have been made of cities or suburban districts and these show the landmarks and divisions with great faithfulness and accuracy and aid materially in any scheme of city planning.

Forest Patrol. The patrol of the forests by airplanes during the dry season proved a very efficient way to detect incipient fires and a report by radio telephone would immediately bring the matter to the attention of the nearest forest ranger before the fire had had a chance to make headway. This plan was followed on the Pacific Coast with great success beginning in 1920, and in the season of 1921, 41 army airplanes operated on the Aërial Forest Patrol made 396 patrols during the season, discovering 832 fires and protecting 7,230,459 square miles of timber land.

The airplane patrol also proved useful for customs or coast guards to prevent smuggling and violation of the liquor laws. Particularly where a long and thinly inhabited coastline is concerned it is possible to maintain a useful patrol. Likewise for the discovery of schools of fish it proved useful and also in seal hunting for spotting herds of seals.

Altitude Records. The ability of the aëroplane to ascend to extreme heights of the atmosphere is of considerable significance, as it is more than a feat of mere daring on the part of the aviator and a test of his ability to withstand cold and rare atmosphere, even when equipped with oxygen tanks and respiratory apparatus and fur-lined clothing. For the engine there is required more power to advance and raise the plane in the rarer atmosphere than at lower levels, and to accomplish this there is used a "supercharger" which during altitude flights automatically changes the mixture in the carburetor and keeps the water in the radiator warm regardless of the temperature. Consequently increase in altitude indicates progress in aviation, and this was strikingly illustrated in the progress from the year 1909, when the record stood at 1473 feet, to 1910, when, on December 9, Legagneux rose in a Blériot monoplane at Pau to 10,499 feet. But this was by no means the end for the spiral soaring aviators, and by Dec. 11, 1912, Roland Garros at Tunis, Africa, went up to a point 19,032 feet, while, March 14, 1913, Perreyon in a Blériot monoplane went to a height of 19,650 feet. On Sept. 28, 1921, at Dayton, Ohio, Lieut. John A. McCready in a Lepere biplane made an altitude record of 40,800 feet officially corrected to 37,800 feet, ascending until his motor ceased to function and then gliding back to earth. A supercharger was used in this ascent as also in one made Dec. 8, 1921, by Lieut. Leigh Wade who took a United States Army Martin twin motored bombing plane to a height of 26,500 feet. This flight indicated the feasibility of day bombing from airplanes as such an altitude was well beyond the range of observation and anti-aircraft fire. On this trip an observer was carried, and in August, 1921, a monoplane, a Loening flying yacht, carried four passengers to a height of 19,500 feet above Port Washington, N. Y.

Speed Records. The increase in speed developed by the aëroplane in successive years is well shown in the records of the Bennett cup competition, which began in 1909. In that year the trophy was won by Glenn H. Curtiss with an average speed of 47.04 miles an hour in a biplane. In 1910 Grahame-White with a Blériot monoplane made the 100 kilometers in 1 hour 1 minute 4¾ seconds, or at a speed of 61 miles an hour, which represented a gain of 30 per cent over the average of Curtiss; and while these were not the best records of the two years, yet they show very well the proportionate gain. In 1911 the 150 kilometers were accomplished by C. Weymann in a Nieuport monoplane in 71 minutes 36.5 seconds, or 78.728 miles an hour, or an increase of 29 per cent over the previous

year. In 1912 Jules Védrines in a Deperdussin monoplane won over a 200-kilometer course with a flight of 1 hour 10 minutes 56.85 seconds, or at an average speed of 105.04 miles an hour, a gain of 33.2 per cent over 1911. These also were not necessarily the best speed records of the years mentioned, but they stand on a comparable basis. The best official speed record of 1912 was made, however, by Védrines at Chicago on September 9, after the Bennett cup competition, and was 107.4 miles an hour. In 1913 Maurice Prevost in a Deperdussin monoplane at the Bennett cup competition on September 29 went over the 200 kilometers (124 miles) in 59 minutes 45⅘ seconds, or an average speed of 124.5 miles an hour, making new records for all distances from 10 to 200 kilometers.

In the Bennett cup competition on Sept. 28, 1920, Sadi Lecointe in a Nieuport monoplane with 300 horse-power Hispano-Suiza engine flew the 200 kilometers in 43 minutes 42⅘ seconds. Sadi Lecointe went 187½ miles in 1 hour 6 minutes 17⅙ seconds, or at a speed of 168.26 miles an hour. On November 10 he bettered this record at Villacoublay, France, achieving a speed of 188 miles or 302 kilometers an hour. The American speed record made in 1921 according to official timing was 184.8 miles an hour, achieved by Bert Acosta in a Curtiss navy racer at Mineola, L. I. His maximum speed as taken by electric timing apparatus was 197.8 miles an hour.

One reason why in the years before the World War the French planes were the speediest was the numerous competitions with valuable prizes well worth the aviators while, whereas in America and Great Britain there was less of sporting interest.

Duration Records. The first flight of a heavier than air machine made by Wilbur Wright, Dec. 17, 1903, lasted 18 seconds. In 1906 Santos Dumont was in the air for 21 seconds, while in 1907 Henry Farman had increased this to 52 seconds. In 1908 there came a succession of wonderful flights by Farman, Delagrange, and Wilbur Wright, which raised the year's record to 2 hours 30 minutes 23 seconds, this being made by Wilbur Wright at Auvours, France, December 23. On Dec. 18, 1910, Henry Farman at Etampes, France, set a record of 8 hours 12 minutes and 23 seconds for duration, and on July 12, 1914, Boehm at Johannisthal, Germany, made a flight of 24 hours and 12 minutes duration. After the war a notable record was made on June 4, 1920, by Lieutenants Boussoutrut and Bernard in a Farman Goliath airplane at Villesauvage le Marmogne, when they were in the air continuously for 24 hours 19 minutes and 7 seconds. On Dec. 30, 1921, Edward Stinson and Lloyd Bertaud were in continuous flight for 26 hours 19 minutes and 35 seconds above Roosevelt Field near Mineola, N. Y., flying in a Larsen all-metal plane. In the course of this flight they accomplished a distance estimated at about 2500 miles, or considerably in excess of the transatlantic non-stop flight of Alcock and Brown from St. Johns, Newfoundland to Clifden, Ireland, a distance of 1936 miles made June 14–15, 1919.

Aëroplane Carrying Capacity. In 1908 Delagrange, who had been in competition with Farman, carried the latter aloft and thus made the first ascent on record of two men in an aëroplane. In the following year Farman made an ascent with three passengers, and since that time the weight-carrying capacity of aëroplanes has been greatly extended. Passenger-carrying machines are made with inclosed cars, and adequate protection for aviator and passengers became a feature of even the smaller cars, especially those maintained on regular routes. In 1918 the U. S. Navy trimotored seaplane NC–1 made a flight with 50 men, most of whom were stowed in the large boat body. The flying weight of the machine was 22,000 pounds, while unloaded and without a crew it weighed 13,000 pounds. It was rumored that designs were prepared by European aviation engineers for airplanes to carry 100 or more passengers.

In the American Army drop bombs of 4000 pounds weight have been carried aloft from airplanes and released, and bombing planes of large capacity have been developed that would readily lend themselves to commercial uses.

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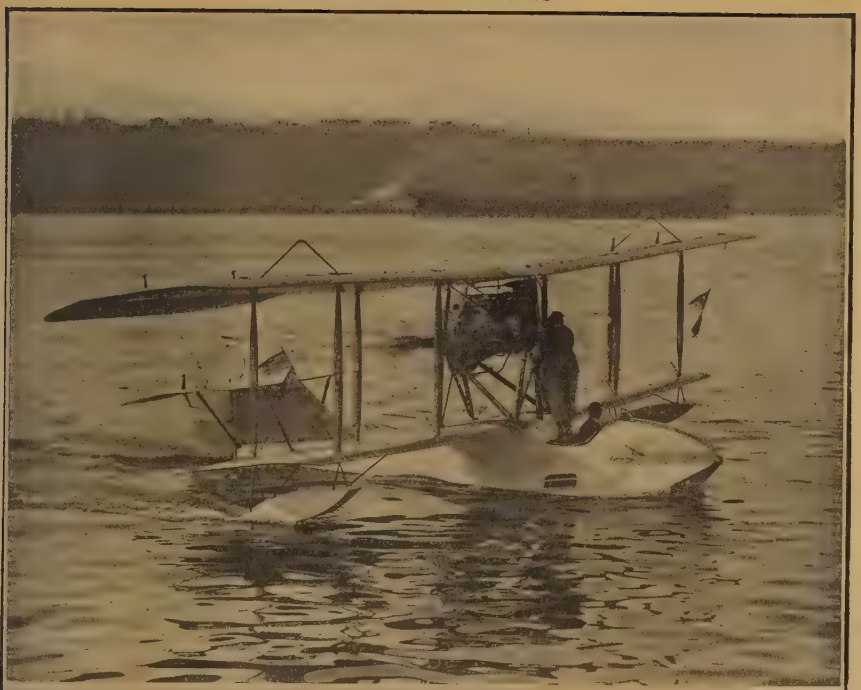
HYDROAËROPLANES



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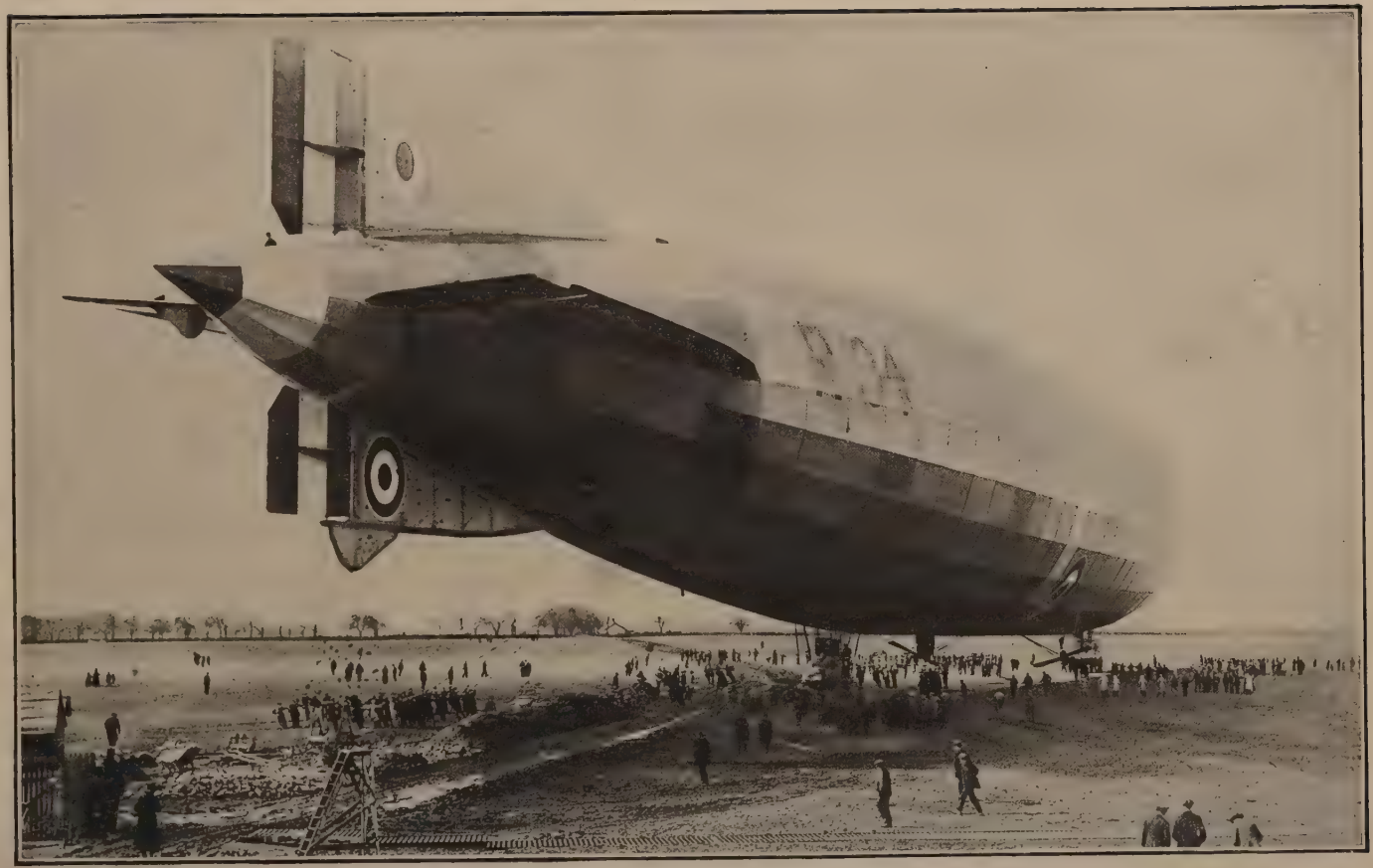
(1) AËRO-MARINE FLYING BOAT
(2) NC3 TYPE OF HYDROPLANE WHICH FIRST CROSSED THE ATLANTIC OCEAN



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GIANT BRITISH DIRIGIBLE R34

First Airship to cross the Atlantic Ocean

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AËRONAUTICS, MILITARY. See MILITARY AËRONAUTICS.

AËROPHAGIA, ā′ĕr-ō-fā′jĭ-ȧ, AIR SWALLOWING. A habit associated with gastric affections of the neurotic type, with lack of tonicity of the stomach walls. It is a common symptom of hysteria. No specific treatment is required apart from that of the disorder with which it is associated.

A′ËROPLANE. See AËRONAUTICS.

A′ËROSTAT′IC PRESS. A machine used for extracting the coloring matter from dyewoods and other materials. A vessel is divided by a horizontal partition pierced with small holes. Upon this the substance containing the color is laid, and a cover, also perforated, is placed upon it. The extracting liquid is then poured on the top, and the air being drawn from the under part of the vessel by an air pump, the liquid is forced through the substance by the pressure of the atmosphere. This instrument was used in place of the modern hydraulic press.

A′ËROSTAT′ICS (Gk. *ἀήρ, aër*, air + *στατός, statos*, standing). That branch of science which treats of the weight, pressure, and equilibrium of air and other gases and of the equilibrium of solids immersed in them. It is, therefore, a branch of pneumatics.

AËROTHERAPEUTICS, ā′ĕr-ō-thĕr′ȧ-pū′tĭks. A system of treating diseases by subjecting the patient to varying degrees of atmospheric pressure, sometimes also by changing the composition of the air. Pulmonary tuberculosis is the disease most usually treated by this method. The air inhaled may be filtered, cooled, warmed, moistened, or dried, or impregnated with vaporized medicinal substances. The characteristics of different climates may thus be imitated very closely. Pneumatic cabinets of various types are employed, all being so constructed that the air within them can be condensed or rarefied to the desired degree. The *absolute* method is carried out by means of a chamber resembling the diving bell, in which the patient remains for a considerable time under pressure gradually increasing up to 1½ or 2 atmospheres, which is then gradually lowered. The *differential* method, that in most common use, is carried out by means of two separate kinds of apparatus. In the gasometer type the patient remains under ordinary atmospheric pressure and inhales or exhales, or both, into cylinders containing either condensed or rarefied air. In the cabinet type of apparatus the patient is surrounded by either condensed or rarefied air, while he breathes into ordinary air. Thus, it will be seen, a considerable number of combinations may be made. For example, the patient, surrounded by condensed air, may breathe into the unaltered atmosphere, or into condensed air, or into rarefied air; or, being in rarefied air, he may exhale into rarefied, condensed, or unaltered air, etc. Certain definite and constant phenomena are observed in each of these combinations. It is found that the inhalation of condensed air slows and deepens respiration, giving better ventilation to the lungs and increased vital capacity. The heart beats more slowly and powerfully, and the pulse is fuller. With the increased absorption of oxygen there is correspondingly increased metabolic activity. Exhalation into rarefied air facilitates expiration by making chest contraction easier. The heart is more thoroughly emptied of blood, and pulmonary congestion relieved. Thus, by a combination of inhalation of condensed air and exhalation into rarefied air, the benefits of climate and exercise are attained. The lungs are used to their full capacity, the appetite is increased, nutrition improved, and sleep promoted. It is to be noted, however, that this form of treatment is not safe when active inflammation of the lungs is present. Patients must be selected with great care and judgment. The beneficial effects of fresh, moving air in treating many diseases is now well recognized and appreciated. The various phases of the subject are more fully noticed under CLIMATE; TUBERCULOSIS; PNEUMONIA; ETC. (qq.v.).

A′ËROT′ROPISM (Gk. *ἀήρ, aër*, air + *τροπή, tropē*, a turn, turning). The sensitiveness of certain plant organs which enables them to orient themselves with reference to the movements of gases—usually oxygen—dissolved in the medium in which they are grown. Aërotropism is a special case of chemotropism (q.v.). The pollen tubes of many plants are negatively aërotropic: when grown in sugar solution, they grow away from the surface of the medium which is in contact with air and from which oxygen molecules are diffusing. Various roots are also positively aërotropic in nature, though it is

doubtful whether aërotropism has a great part to play in the distribution of roots in the soil.

ÆSCHINES, ĕs′kĭ-nēz (Gk. *Αἰσχίνης, Aischinēs*) (389–314 B.C.). An Athenian orator, second only to his great rival, Demosthenes (q.v.). He was born at Athens in humble station, served as a soldier, then became a clerk to some of the lower magistrates, and for a time was an actor in smaller parts. Finally, he became secretary to two distinguished statesmen, Aristophon and Eubulus, through whose influence he twice obtained election to a government secretary's office as clerk of the Ecclesia (popular assembly). Then, through his eloquence, grace, and legal knowledge, he rapidly became one of the leading men in the State. Sent as a member of the embassy to Philip of Macedon in 347 B.C., he was won over to favor the Peace of Philocrates (346), and then became the leader of the peace party at Athens as against Demosthenes, who headed the party which believed that Philip was to be opposed at every point and at any cost. In 345, because of his part in the embassy, he was charged with treason by Demosthenes and Timarchus, but, with the aid of powerful friends, defended himself so successfully that Timarchus disappeared from public life. Again, in 342, Demosthenes revived the charges in his famous speech *On the False Embassy.* Again Æschines answered successfully in a speech having the same title. He continued to favor Philip actively and no doubt contributed to the spread of Macedonian supremacy. His fall was due, however, to his hatred of Demosthenes, whom Ctesiphon had proposed to reward with the public gift of a golden crown in recognition of his services to the State. Æschines thereupon charged Ctesiphon with making an illegal proposal, and at the trial in 330 attacked him in his brilliant oration, *Against Ctesiphon,* really directed against Demosthenes. He was completely defeated by Demosthenes's speech, *On the Crown,* and so failed in his suit against Ctesiphon, suffered *atimia,* or loss of civil rights, and was condemned to pay 1000 drachmas fine. He went into exile at Rhodes, where, tradition says, he opened a school of oratory. He died at Samos. Æschines's posthumous fame is due to his three extant speeches, *Against Timarchus, On the False Embassy,* and *Against Ctesiphon,* which, according to Photius, were called in antiquity "The Three Graces." An anecdote often repeated shows the esteem in which the third was held. On one occasion, when he was reading to his audience in Rhodes his oration against Ctesiphon, some of his auditors expressed their astonishment that he should have been defeated in spite of such a powerful display; he replied: "You would cease to be astonished if you had heard Demosthenes." The speeches are edited by Schultz (1865); Weidner (1872); and in all collections of the *Attic Orators.* Consult especially, Jebb, *Attic Orators* (London, 1876–80); Blass, *Attische Beredsamkeit* (Leipzig, 1887–98); Norden, *Die Antike Kunstprosa* (Leipzig, 1909). The 12 letters which bear his name are spurious.

ÆSCHINES (*Αἰσχίνης*). An Athenian philosopher of the fifth century B.C., intimate friend of Socrates. He was for a time a seller of perfumes at Athens, but unsuccessfully. Thereafter he lived in Syracuse, at the court of Dionysius the Younger, till the latter was expelled. He returned to Athens, and, unable to rival Plato and Aristotle, taught philosophy privately; he ranked high also as an orator and as master of a pure Attic style. He wrote *Orations, Epistles,* and at least three Socratic *Dialogues.* The titles of the Dialogues were *On Virtue, On Riches,* and *On Death;* they sought to determine whether virtue can be taught, whether riches are good, and whether death is to be feared. We have treatises bearing these names, ascribed to Æschines, but they are not his, at least in their present form. See Gomperz, *Greek Thinkers,* vol. iii, Eng. trans. (London, 1905).

ÆSCHYLUS, ĕs′kĭ-lŭs (Gk. *Αἰσχύλος. Aischylos*) (?525–455 B.C.). The first of the three great Athenian tragic poets. He was born in Eleusis and was of noble descent, being the son of Euphorion. He fought against the Persians at Marathon (490), Salamis (480), and Platæa (479); his epitaph celebrated his bravery on the field. He early turned to tragic composition and, according to tradition, appeared first in 497 as a rival of the older tragedians, Pratinas and Chœrilus. His first victory, however, was not won until 484. We hear also that he wrote in unsuccessful competition with Simonides an elegy over those who fell at Marathon. He undertook, apparently, three journeys to Syracuse; one about 476–475, when he composed a play, *The Ætneans,* 'The Women of Ætna,' for King Hiero (q.v.), in honor of the new city, Ætna, just founded by Hiero on the site of ancient Catana. He was back in Athens apparently in 472, but seems to have been again in Sicily between 471 and 469, when he had his play, *The Persians,* repeated there at Hiero's request. Soon after 458 he left his native city for Sicily for the last time and died at Gela in 456–455. The story that he was killed by the fall of a tortoise from the talons of an eagle, which had mistaken the poet's bald head for a rock on which it could crack the shell of its prey, is probably only a popular tale applied to Æschylus, although it may owe its origin to a misinterpretation of a scene on his monument. The citizens of Gela erected a splendid tomb to him; by a decree of the Athenians a chorus was granted for his plays alone after his death, and, about 330 B.C., at the proposal of the orator Lycurgus, a bronze statue of him, as of Sophocles and Euripides, was erected in the theatre at Athens.

The productiveness of Æschylus lasted for more than 40 years, during which he is said to have written 90 plays, of which 20 were satyr dramas. These tragedies were produced in groups of three, "trilogies," bound by a connecting thread of motive or interest, and each trilogy was followed by a satyric drama, of which genre Euripides's *Cyclops* is the only extant representative. (See SATYR.) We know 79 titles in all, among them 13 satyric plays. Only 7 tragedies are extant, *The Suppliants, The Persians, The Seven against Thebes, Prometheus Bound,* and the trilogy, known as the *Oresteia, Agamemnon, Choëphori,* and *Eumenides.* Æschylus won 13 victories during his lifetime; that is, he was successful with over half the trilogies he presented.

The Suppliants, or *The Suppliant Women,* is, in form, the earliest of the extant tragedies; the date of its presentation is unknown. The chorus is still the principal feature, the choral parts standing to the dialogue in the approximate relation of 1: 2. The name is taken from the chorus, which is composed of the 50 daughters of Danaüs (q.v.), who have fled from Egypt

to Argos in their attempt to escape their suitors, the sons of their uncle Ægyptus, and there beg for protection from the Argive King. The odes set forth the violence of the sons of Ægyptus, the unholy character of the union which they wish, and the maidens' fears. The actors only interrupt these odes and carry the action forward but slightly in our modern sense. Yet the play has dignity, adequately expresses noble sentiments, and contains choral songs of great beauty. It was apparently the first play of the trilogy; the other tragedies were *The Egyptians*, which had for its theme the marriage of the sons of Ægyptus (q.v.), and *The Danaids* (see DANAÜS), in which the murder of the bridegrooms was accomplished, and Hypermnestra was brought to judgment for disobeying her father in sparing her husband.

The Persians was presented in 472 and is also very simple in its structure. It has great interest for us, since it is the earliest extant attempt of the Greeks to treat in the drama contemporary history. The subject is the battle of Salamis, in which Æschylus took part. The scene is laid, however, at the Persian court, where the dowager Queen, Atossa, is awaiting the return of Xerxes. The chorus consists of Persian elders, who give their name to the play. The story of the Persians' defeat is dramatically told by a messenger; then, at the advice of the chorus, Atossa summons the shade of Darius, in the hope that his wisdom can save the State; but he can only prophesy the defeat at Platæa. The appearance of the defeated Xerxes and an ode of sorrow for him and his subjects close the play. This was the second play of a trilogy; the first was *Phineus*, the third *Glaucus*, but the plots of both are unknown to us. This trilogy won the first prize.

The Seven against Thebes handled a favorite subject drawn from the cycle of Theban myths. It was the third of a trilogy, the first two being *Laïus* and *Œdipus;* the satyric play was *The Sphinx*. This trilogy was presented in 467 and also won the first prize. The extant play represents the conflict between Eteocles and Polynices for the throne. Œdipus, ill-treated by his sons after he had blinded himself, prayed that they might divide the kingdom with the sword. To defeat the purpose of that prayer, the brothers agreed to reign alternate years; but Eteocles, the elder, once upon the throne, refused to surrender control at the expiration of the first year. Polynices, having raised a large army at Argos, where he had married the daughter of King Adrastus (q.v.), came to besiege Thebes; he and six other chieftains arrayed themselves each before one of the seven gates. A messenger relates to Eteocles the preparations of the seven and their oath to die rather than leave Thebes and then describes the appearance of each chief; when Polynices is reached, Eteocles can no longer control himself and rushes forth to slay his brother and be slain himself. See ETEOCLES AND POLYNICES; LAÏUS; ŒDIPUS.

The *Prometheus Bound*, produced about 470 B.C., was the first of a trilogy, of which the *Prometheus Loosed* and probably *Prometheus the Fire-Carrier* were the other plays. In punishment for his rebellion in stealing fire from heaven for mortals' use, Prometheus (q.v.) is chained to a crag on the confines of the world, where a vulture sent by Zeus is to feed continually on his liver. He declines the proffered assistance of Oceanus, boasts of his services to men, condoles with Io, who comes to him in her mad wanderings, and prophesies her future, and, finally, when visited by Hermes, the messenger of Zeus, bids defiance to him and amid whirlwind and earthquake disappears from view. In the following play Hercules shot the vulture and released Prometheus, and in the third the story of Prometheus was probably brought into relation with a local Attic cult of the hero.

The remaining three plays, *Agamemnon*, *Choëphori*, and *Eumenides*, formed the *Oresteia* trilogy. In the first play Agamemnon returns from Troy to his home, where his unfaithful wife, Clytemnestra (q.v.), is living with her paramour, Ægisthus (q.v.), by whom Agamemnon is treacherously murdered. This tragedy is not only the greatest of Æschylus' extant works, but rivals, in the minds of critics, even Sophocles' *King Œdipus* for the first place among all Greek tragedies. The *Choëphori* ('The Libation Pourers') is named from the chorus of women who offer libations at Agamemnon's tomb. In this play Agamemnon's son Orestes returns to Argos to avenge his father's murder and under a disguise obtains entrance to the palace, where he slays his mother and Ægisthus. This impious act of matricide was punished by the Furies. In the *Eumenides* Orestes is pursued by these avenging powers until he is cleansed from his blood guilt and set free through the aid of Athene, by the ancient court of the Areopagus (q.v.). This trilogy represents the maturest work of Æschylus, and we may well doubt whether a greater literary masterpiece was ever written.

The best critical edition of the text is by Wecklein (1885). There is an edition with English notes by Paley (4th ed., 1879), and many annotated editions of single plays; among these may be named Verrall's *Septem* (1887), *Agamemnon* (1904), *Choëphori* (1893), *Tucker's Suppliants* (1889), and *Choëphori* (1901). For complete translations consult Potter, Blackie, and Plumptre; for translations of separate plays, Browning, *Agamemnon* (London, 1887), Fitzgerald, *Agamemnon* (London, 1876), E. B. Browning, *Prometheus* (4th ed., London, 1856), and Warr, *Oresteia* (1900).

ÆS'CULA'PIUS (Lat. form of the Gk. Ἀσκλήπιός, *Asklēpios*). Among the Greeks and the Romans, a god of healing. No fully satisfactory derivation of the name has been presented. Æsculapius' worship seems to have originated in the valley of the Peneus in Thessaly and to have had an important centre at Tricca. From this region it was probably carried by the inhabitants, as they were forced southward by invading tribes, and thus appears in Phocis, Bœotia, and Peloponnesus, where were celebrated sanctuaries of Æsculapius at Titane and Thelpusa, in Eleusis (q.v.) in Attica, Pergamum (q.v.) in Asia, Cyrene in Africa, and, above all, at Epidaurus in Argolis, whence the worship of this god was introduced into Athens in 420 B.C. At Athens the worship spread rapidly because Æsculapius was taken under the protection of Dionysus. Colonists carried the cult of Æsculapius far and wide; at Cos, Cnidos, and Pergamum were famous temples. In consequence of a plague the god was brought to Rome in 293 B.C. and his temple established on the island in the Tiber. Æsculapius had temples in nearly 200 places. His sanctuaries were sought by the sick, and his priests undertook the cure of disease. The patient, after certain religious ceremonies, slept in a hall near the temple (the

sleep was often induced by narcotics), and during the night the god was believed to manifest himself in a vision, which, when interpreted by the priests, furnished directions for the treatment. After the cure the patient left an account of his case and an offering for the god—often a representation of the part of the body cured, eyes, hands, or feet, with liberal fees. (See Aristophanes, *Plutus*, 653 ff.) Records of cures at Epidaurus and at the shrine in Rome have come down in great numbers. It seems likely that the priests had acquired considerable medical knowledge and skill in treating the sick and that the sacred sleep was merely a device to preserve the credit of the god. Greek medicine was thus intimately connected with the worship of Æsculapius.

It should be said that in the *Iliad* Æsculapius is not spoken of as a god, and his sons Machaon and Podalirius differ from the other heroes only in their superior skill in treating wounds. It seems evident, however, that he was originally a divinity who later became subordinate to the great Apollo cult. Much points to Æsculapius as a chthonic god, though many regard him as connected with the light. Whatever his nature, Æsculapius early became fixed as a god of healing, perhaps losing his other functions through association with Apollo. His sons Machaon and Podalirius play a considerable rôle in heroic legend and were claimed as ancestors by the Asclepiadæ (q.v.). His daughters, Hygeia (health), Panacea (all-healing), Iaso, Aigle, and others, bear names that show them to be merely personifications of abstract ideas connected with healing.

The myths connected with the life of Æsculapius varied in different localities; but the one which has become canonical appeared in a lost Hesiodic poem (the *Eoeæ:* see HESIOD), and is known to us from a poem by Pindar and some scattered allusions in other writers. Apollo loved Coronis, daughter of Phlegyas, but she proved faithless and wedded the Lapith, Ischys. The news was brought to Apollo by the raven; the bird was punished for its message by being changed from white to black. Apollo slew Ischys, and Artemis killed Coronis; but, while Coronis' body was on the funeral pile, Apollo rescued his yet unborn son Æsculapius, and took him to the centaur Chiron, who trained him in the healing art, in which he became so expert that he even raised the dead. For this presumption Zeus slew him with his thunderbolt. In art, Æsculapius is usually represented as a bearded man, wearing a mantle which leaves the right shoulder and the breast bare; a snake usually attends the god. A beautiful head from Melos in the British Museum is probably an Æsculapius of the Praxitelean school. Consult: Walton, *The Cult of Asklepios* (New York, 1894); Wilamowitz-Möllendorff, *Isyllos von Epidauros* (Berlin, 1886); Farnell, *Cults of the Greek States* (Oxford, 1896–1907).

ÆS'CULUS. See HORSE CHESTNUT.

ÆSIR, ē'sĭr *or* ă'sĭr (pl. of As, Icel. *āss*, god, demi-god). The gods of the Northmen of Scandinavia and Iceland. There were 11 chief gods or Æsir besides Odin (the 'all-father'), viz., Thor, Balder, Ty or Tyr, Bragi, Heimdal, Höd, Vidar, Vali, Ull, Forseti, and Loki or Lopt. To these may be added Njörd and his son Frey, who were not originally Æsir. The naming of the gods differs in different parts of the *Younger Edda* (see EDDA). The chief goddesses of Asgard, the Scandinavian Olympus, were Frigga, Freyja, Nanna, Sif, Saga, Hel, Gefjon, Eir, Hlin, Lofn, Vör, and Snotra. These names, considered in the primary old Norse signification of the words, in most instances allude to some characteristics; yet it is impossible to determine whether they personify merely certain physical powers of nature or were originally the names of individuals in the prehistoric period. Probably they have a mixed origin and combine real names with physical powers. The principal source of information concerning these gods is the *Eddas* (q.v.), collections of the oldest songs and traditions of the people of Scandinavia.

Thor, son of Odin and Frigga ('the vivifying'), is the chief god next after Odin and is the strongest of the Æsir. He seems to have been a god of that Phœnician form of nature worship which was superseded in Scandinavia and northern Germany by the faith of Odin. From Thor's hammer flashed lightning, and his chariot wheels made thunder as he went through the air, cleaving mountains, loosening frozen streams and pent-up rivers, and slaying giants and monsters. He was seldom in Asgard with the other Æsir, but dwelt in his mansion Bilskirner, in the densest gloom of the clouds. With his hammer he consecrated the newly wedded, and the sign of the hammer was made by Northmen when they took an oath or any serious obligation. Thor was the god of thunder, the destroyer of evil spirits, the friend of mankind, and the defender of the earth, the heavens, and the gods against the giants. The early Christian missionaries in Scandinavia, finding the faith in Thor too strong to be suddenly uprooted, tried to transfer many of his characteristics to their zealous convert, St. Olaf, who was said to have resembled the old Norse god in his comeliness of person, his bright red beard, hot temper, and personal strength; while some of the monks of a later period tried to persuade the Northmen that in Thor their forefathers had worshiped Christ and that his mallet was a rude image of the cross. Slaves and thralls killed in battle were believed to be under the protection of Thor, who, as the god of the Finns before the spread of the As religion, was honored as their special guardian against the tyranny of their old masters.

In Balder, the son of Odin and Frigga, the Norsemen honored the beautiful, the eloquent, the wise, and the good, and he was the spirit of activity, joy, and light. His name signifies the 'strong in mind.' His wife Nanna reflected these attributes in a less degree. On his life depended the activity and happiness of all the Æsir except Loki, the 'earthly fire' or incarnation of evil; and hence Loki, from envy of the beauty and innocence of Balder, accomplished his death and afterward hindered his release from the power of Hel, the goddess of death. As the death of Balder was to be followed by the fall of all the Æsir, the gods had caused all things to swear not to injure him. But the insignificant mistletoe was overlooked or thought unimportant. Loki secured an arrow of mistletoe, and when the gods were amusing themselves by shooting at the invulnerable Balder, Loki gave his arrow to Höd, the blind god, and directed his aim so as to hit Balder, who was killed. The death of this beneficent god, for he was the symbol of the summer sunlight, signifies the fading of summer before the blind and fierce winter, her preordained destroyer. The myth

continues: After Balder's death the gods captured Loki and shut him up in a mountain, where he will remain until the earth and all therein and the gods themselves shall be destroyed by fire (the powers of evil). The companion and liberator of Loki, Odin, alone will survive, and then a new and purer world will arise in which Balder will again appear, and Loki, or evil, be no more heard of.

At first Loki, under the name of Lodhur, or 'flame,' and as the foster brother of Odin, had united with the all-father in imparting blessings to the universe. Afterward he left the council of the gods and wandered into space, desolating and consuming with flame all things that came in his way. In the under-earth, where volcanic fires attest his presence, he consorted with evil giantesses and became the father of Hel, 'pallid death,' of Angerboda, 'announcer of sorrow,' of the wolf Fenrir, and of the Midgard serpent, who ever threatens the destruction of the world. Loki assumes any shape at will. As sensuality he courses through the veins of men, and as heat and fire pervades nature and causes destruction. After the establishment of Christianity the attributes of Loki were transferred to Satan; but in Iceland an *ignis fatuus* is still known as "Loki's burning."

Njörd and his children, Frey or Fricco and Freyja, appear to have been honored in the North before the time of Odin. Njörd is said to have lived in Vanaheim, and to have ruled over the Vanir, or elves of light, long before he became one of the Æsir. He is the god of oceans and controller of winds and waves, and to him seafarers and fishermen raise altars and make prayers. Frey, his son, is the god of rain and fruitfulness, and his worship was accompanied with phallic rites. His sister Freyja, who holds a high rank among the Æsir, is the goddess of love, but her influence, unlike her brother's, is not always beneficent and varies with the form she assumes in operating on the minds of men. Her chariot is drawn by cats, who are emblems of fondness and passion; and a hog, implying fructification or sensual enjoyment, attends upon Frey and herself. The Swedes paid especial honor to Frey, while the Norwegians worshiped Thor.

Ty (Tyr), the Mars of the Norsemen, is wise and brave, giving victory, and fomenting strife. He is also a son of Odin, and is the most daring and intrepid of all the gods. His name lives in our Tuesday (Ty's day), as does the name of Odin in Wednesday (Woden's day), Thor in Thursday (Thor's day), and Freyja in Friday (Freyja's day). Tyr's name signifies 'honor,' and his worship was widely spread in the North. Bragi, the son of Odin, was the god of eloquence and wise sayings, the originator of the Skaldic poems; and when men drank Bragi's cup they vowed to perform some great deed worthy of a skald's song. Bragi's wife was Idun, who guarded the casket of apples that gave to those who ate them perpetual youth. She was abducted by the giant Thiassi, and by Loki's craft removed to the other world. Her release in spring seems analogous to the myth of Proserpine. Heimdal, personified by the rainbow, is the god of watchfulness, the doorkeeper of the Æsir. Vidar, the strongest of the gods except Thor, is the personification of silence and caution. He is the brother of the gods, being the son of Odin. Vali is the brother of Balder and a great marksman. Ull decides issues in single combat; Forseti settles all quarrels; lovers find protection in the goddesses Lofn and Vör, of whom the former unites the faithful and the latter punishes the faithless; Gefjon keeps a watch over maidens and knows the decrees of fate; Hlin guards those whom Frigga, the Queen and mother of heaven, desires to free from peril. The Queen herself, as Odin's wife and mother of the Æsir, knows but does not reveal the destinies of men. Saga is the goddess of narration and history; her home is in Sökvabek, the abyss, an allusion to the abundant streams of narrative, from which streams Odin and Saga daily drink and pledge each other. Snotra is the goddess of sagacity and elegance, from whom men and women seek good sense and refined manners. The Norns, the weird sisters, and the Valkyrias are closely connected with the gods. The principal Norns are Urd, past time; Verdandi, present time, and Skuld, future time. They twist and spin the threads of destiny and make known what has been decreed from the beginning of time. They preside at the birth of every man and cast the weird of his life. The Valkyrias, a troop of goddesses, of whom there are over a dozen, are sent by Odin to the battle-fields to choose the slain.

It remains to add that in the gods here mentioned the Northmen recognized the makers and rulers of the world that now is, from whom emanated the thought and the life that pervade and animate nature. With Odin and Æsir the intellectual life of the northern people began; and although they ascribed to them human forms and acts, these were seldom without something higher and nobler than pertains to mortals; and while they recognized the existence of a state of chaos and darkness before the world began, they anticipated the advent of another state in which the gods, like men, would receive their reward at the hands of a supreme All-father. Consult Anderson, *Norse Mythology* (Chicago, 1901). See the article on SCANDINAVIAN AND TEUTONIC MYTHOLOGY, and the separate articles on the gods, such as FREY; LOKI; ODIN, ETC.

Æ'SOP (Gk. *Αἴσωπος, Aisōpos*). The name of a famous Greek writer of fables, who is said to have been born a slave in Samos late in the seventh century B.C., but to have gained his freedom by his cleverness. We may, however, well doubt whether he ever existed; we have the most varied accounts of him, many of which on their face are pure inventions; and the fables which passed under his name were certainly not written until long after the period in which he is supposed to have lived. Socrates in prison turned some of the current Æsopic fables into elegiac verse; and about 320 B.C. Demetrius of Phalerum made a prose collection of the fables known to his day. Whatever the facts as to Æsop's existence, it is certain that his soon became a generic name attached to those beast fables which are part of the common property of the Indo-European peoples. The collection which now bears his name consists for the most part of prose paraphrases of the collection of fables made, in choliambic verse, by Babrius (q.v.), edited by Halm (2d ed., 1860). Consult Jacobs, *Introduction to the Fables of Æsop* (New York, 1896); Keidel, "The Editio Princeps of the Greek Æsop," in *American Journal of Philology*, xxiv, 304–317 (1903). See PHÆDRUS.

ÆSOPUS, ē-sō'pŭs, CLODIUS, or **ÆSOP.** A great Roman tragedian, contemporary with Quintus Roscius (q.v.), the comedian. Cicero put himself under the direction of these two to perfect his own elocution, and Æsop did many friendly services to Cicero during the latter's banishment. Æsop was noted for sinking his own personality in the character he represented; grave and sedate, he acted best the less vehement tragic rôles. He made his last appearance in 55 B.C. at the dedication of Pompey's theatre, after which his voice failed him. He left a fortune to a worthless son—the Æsop who, according to a well-known story, dissolved in vinegar a pearl valued at $40,000, to have the satisfaction of swallowing the most expensive drink ever known.

ÆSTHESIOMETER, ĕs-thē'sĭ-ŏm'ē-tĕr *or* ĕs-thē'zhĭ-. See PSYCHOLOGICAL APPARATUS.

ÆSTHETICS, ĕs-thĕt'ĭks (Gk. *τὰ αἰσθητικά, ta aisthētika,* or *ἡ αἰσθητική, hē aisthētikē,* the science of the beautiful, from *αἰσθητικός, aisthētikos,* perceptive, sensitive, *αἰσθάνεσθαι, aisthanesthai,* to perceive, apprehend by the senses). The name now generally given to the science of the beautiful, the sublime, and the ludicrous. The history of this science furnishes us with a striking illustration of the truth that theory always follows practice. It was not till the noblest period of art in Greece had passed its zenith that any serious attempt was made to ascertain the nature of the beauty which art presents. The Sophists and Democritus seem to have made some essays in this direction, but we know practically nothing of the results they reached. It is only when we come to Socrates that we are on secure historical ground; and even in his case we know only enough to make it possible to begin our sketch of the history of æsthetics with his name. He seems to have taught that beauty is one with utility—a doctrine which is thoroughly in keeping with his ethical utilitarianism, but which gives no distinctive recognition to the beautiful as in any way differentiated from the good. Plato, in one respect, follows in his master's steps. While we cannot say that he identified the æsthetic and the ethical, yet in his most serious discussions he so completely subordinated the former to the latter as to make it a mere handmaid of morality. This attitude is unintelligible to any one who does not remember that Plato lived in an age of decadence in art and in art appreciation. The great poets in the Hellenic world were not in his time appreciated so much for their beauty as revered for their infallibility as guides in faith and practice. A quotation from Homer would definitely settle a question in policy or morals, and a "Thus saith Simonides" was a *ne plus ultra* of debate. This dogmatism in the interpretation of poetry was responsible for the degradation of the poets from their places as artists charming and inspiring mankind to the position of pedantic pedagogues, whose deliverances were open to question on the ground of fact by any one who had the temerity to deny their popularly conceded inerrancy. Such a one was Plato, who proceeded to meet this dogmatization of poetry by a demand for its moralization. Homer, he claimed, must be expurgated in the interests of a more worthy view of God and man. Other arts suffered a like fate. For instance, only such music as could directly fit a man the better for a life of courage and temperance was to be tolerated in the ideal Platonic State. But this insistence upon the right to judge art by moral standards alone, though very prominent on the surface of Plato's thought, does not represent his best philosophy of the beautiful. Remembering that music was for Plato a general term for all the human interests over which the Muses presided, and that training in music was for him a cultivation of a proper habitual attitude toward the good, and that a scientific education in moral values was to follow the musical education and so bring habitual attitude to insight, one might almost say that with Plato the beautiful is the form in which the good appears to a properly trained but unreflective consciousness, a view quite like that of Hegel, 2200 years later. And as the good is the supreme principle of unity in the universe, beauty is itself a relatively simple unity in variety. This variety, however, must not be too complicated. It must have a very narrow range, or it would break over the bounds of unity. Hence only those works of art which are severe in their classical simplicity were considered as true embodiments of the principle or "idea" of beauty. Such an embodiment was technically called an "imitation." This term, without doubt, meant more for Plato than it would naturally mean for us. Imitation was symbolization as well as copy. But, for the most part, Plato was unable to free himself from the conception that second-hand reproduction was characteristic of all art. Hence art is further from reality than nature, which is the first embodiment of reality. But no definite statement of Plato's æsthetic views would do justice to the unsystematic many-sidedness of his thought on the subject. His dialogues contain many stimulating suggestions as to the nature of beauty, but no explicit æsthetic theory, built on the basis of these suggestions, could be fairly attributed to Plato.

Aristotle, being himself less artistic than Plato, was in a better position to make a more scientific study of æsthetics. His works on rhetoric and poetics, and, in a more desultory way, many of his other writings, were the first inductive studies we know of the principles of art. He differentiates the good from the beautiful: the good is dynamic (*ἐν πράξει, en praxei*), the beautiful may be static (*ἐν ἀκινήτοις, en akinētois*). The good, being thus always connected with action, appeals to consciousness in the form of desire for possession. We are interestedly concerned in the good; our concern in the beautiful is disinterested. For Aristotle, as for Plato, a beautiful object is a unity in variety, but Aristotle gives a wider scope to the variety than his predecessor. Under the proviso that a thing be not too large for easy apprehension, a considerable multiplicity in its organization was regarded as conducive to beauty, and, other things being equal, the greater the size the greater the beauty. Among these other things were propriety in the arrangement of parts, symmetry, and clearness of outline. Aristotle followed Plato also in making art an imitation of inartificial beauty, but he refused to follow Plato when the latter depreciated art for this reason. While Plato put the fine arts far below the works of the artisan, Aristotle put poetry, in one passage, above theoretic philosophy. This position, however, does not accord with the rank given in his *Ethics* to the life of philosophic contemplation. The value Aristotle attributed to art, especially to the drama, was

due to the fact that it "effects, by means of pity and fear, the purgation (*κάθαρσις, katharsis*) of such emotions." The meaning of this has been warmly debated. If purgation is taken in a moral sense, then Aristotle has relapsed into the Socratic position that art is not differentiated from morality. But a more plausible interpretation is that purgation is used in its physiological significance. This would make the meaning to be that drama gives free and healthy discharge to the passions of pity and fear and thus prevents emotional congestion. Greek speculation on æsthetical theory comes to a close in Plotinus (q.v.), who explains beauty by referring it to the work of an objective reason, which gives a form to dead matter so as to make it become an expression of itself. This creative reason is the transcendentally beautiful; matter transformed by it is the empirically beautiful. Artistic production is not, however, necessarily limited to the copying of the natural products of the supreme reason. The human reason, by virtue of its participation in the divine, may so transform objects that they shall become more beautiful than they are in their naturalness. Art is thus raised from the stage of imitation to that of idealization, although idealization is taken mystically.

No important æsthetic speculations come from mediæval writers. Mr. Bosanquet, in his *History of Æsthetic*, has satisfactorily explained this comparative barrenness of the Middle Ages in æsthetic theory. It was not due, as the traditional view of mediævalism would seem to imply, to the deadness of that period in things intellectual and spiritual, but to the enormous tension of the higher life, which busied itself so absorbingly in practical creative activity as to leave no leisure for reflection upon its own work. Mediævalism was engaged in the problem of building the foundations for a new life and, therefore, for a new art. The art of classical antiquity was comparatively simple; the perfection of its form was made possible so early by its limited ambition. In general, it sought to do justice merely to the beauty of form. It was a successful criticism of life, only because it criticised one aspect of life, leaving the richness and variety of its contents to the one side. But Romanticism as a creative principle in art began to work early in the Middle Ages. The wilder, more turbulent spirit of the Teutonic barbarians would not brook confinement within the narrow lines drawn by classic masters, and for a whole millennium was wrestling with the practical problem of making art richer by the incorporation within it of all the phases of nature and of human life, which classic art, with true instinct for its own essential limitations, had ignored; and just as ancient æsthetic theory was not constructed until the returns from ancient practice were all in, so modern æsthetic theory could not be supplied with its data till modern art had become to a great extent a completed achievement, challenging reflection to concern itself with the discovery of the principles involved. Mr. Bosanquet is, perhaps, right in representing Shakespeare as being the last of the great artists in the long succession that began with the architect of St. Sophia; Shakespeare succeeded in the great common endeavor to render into art life and nature in all their infinite complexity, and yet to make the rendition as unitary in its effect as were the art products of the golden age of Æschylus and Pheidias. In him the wheel of artistic creation had come full circle, and after him, therefore, the wheel of æsthetic theory could begin to turn. But there was another reason why, after the time of Shakespeare, æsthetic theory should have become a great need. Not only did all the richness of mediæval and modern artistic achievement challenge the theorist to study it, but the art of classical times had come to life again in the great archæological discoveries of the eighteenth century. The literary renaissance of antiquity in the fifteenth century was now followed by the resurrection of the plastic arts of Greece and Rome. The striking contrast between the formal severity of the antique and the freedom of the modern demanded that an inquiry should be instituted which should succeed in correlating, and, by correlating, succeed in justifying, the two strikingly different types. This demand that theory should do injustice to the principles of beauty incorporated in art was reinforced from the side of philosophical speculation.

The seventeenth and eighteenth centuries were a time of tremendous philosophical energy; and as the idealism of modern philosophy became more and more concrete, it was inevitable that æsthetic questions should force themselves more and more upon the attention of philosophy. Thus, as we find Lessing and Winckelmann representing predominantly an interest in art for art's sake, so we find Baumgarten and Kant representing an interest in art for philosophy's sake. These two tendencies united in working out a modern æsthetic theory, which was finally to be based on solid scientific grounds with the aid of experimental psychology. The appreciation of the æsthetic significance of all these contributions cannot be attempted here. Suffice it to say that Lessing made an important addition to æsthetic theory by marking off the boundaries of poetry from the plastic arts. The medium of the former is time, and that of the latter is space. The former can represent action and is, therefore, capable of expressiveness, whereas the plastic arts are limited to the treatment of formal beauty and of the beauty of colors. The ugly is out of place in the plastic arts, because, once represented in painting or statuary, it gets a permanence that becomes revolting. This thought might be illustrated by referring to a line of Keats's *Ode on a Grecian Urn*, "Forever wilt thou love and she be fair." There is a subtle but powerful delight ministered by this insistence upon the immortality of youth and love, caught and made perpetual by the ceramic art. But change the *motif;* let it be: "Forever wilt thou *loathe* and she be *foul*," how quickly the thought of the abidingness of the unpleasant creates disgust with the pottery, however skillful may be the representation of this phase of life! Baumgarten's significance was more that of a pioneer and name-giver than that of an important contributor. Carrying out the Cartesian idea that sense is confused thought, he added to the Wolffian (see WOLFF) philosophical encyclopædia, which included ontology, cosmology, ethics, and psychology—all sciences of clear thought—a new discipline dealing with obscure thought; and he gave to the work in which he treats this new subject the title *Æsthetica*. This was the first time that the term was employed to designate the science which has since Baumgarten's day quite constantly been called by this name. But great as

is the convenience of having a name to give to a science, an advance in the way of a satisfactory handling of this science could hardly be expected from a thinker who appreciated beauty only as an imperfect imaging of what is intellectual.

Kant (q.v.) has been an important factor in determining the speculations of modern philosophical æsthetics, although what he calls æsthetics in his famous *Critique of Pure Reason* is something entirely different from what to-day passes under that name. He strikes, in his *Critique of the Faculty of Judgment*, a distinctly modern note in emphasizing the affective or emotional side of æsthetic appreciations, thus exalting the artistic consciousness from the position of being an imperfectly developed logic and metaphysics. But Kant's views are too completely determined by the idiosyncrasies of his philosophy ever to have become generally acceptable. His philosophy is dominated by the thought of a great breach between noumena and phenomena. (See APPEARANCE.) The datum of philosophy is this apparent breach, but the problem is in large measure the healing of it. But this Kant could never succeed in effecting. In his first two *Critiques*—those of Pure Reason and of Practical Reason—he deals with phenomena and noumena in their antithesis and separation. In his *Critique of the Faculty of Judgment* (1790) he attempts to bring about a connection and synthesis. In his definition of beauty he follows his division of categories into those of quality, quantity, relation, and modality. Qualitatively, the beautiful is the disinterestedly pleasing; quantitatively, it is the universally pleasing; relationally, it is that which has the form of purposiveness without the reality of purpose, and, modally, it is the necessarily pleasing. Thus, disinterested, universal, and necessary pleasure in simulated design is for Kant the essence of beauty. The sublime is that which pleases because of a reaction, after an inhibition of vitality—a reaction which gives rise to a higher degree of vitality. The ridiculous is also a reaction against tension, being "the sudden change of a tense expectation into nothingness." As in the case of Kant, so in those of Schelling (q.v.) and Hegel (q.v.), the philosophy of the beautiful has its part assigned to it in accordance with a comprehensive view of the universe. Schelling's absolute was one of utter indifference of subject and object. Therefore, in artistic appreciation it is this ultimate unity of absolute indifference which is perceived as the beautiful. In Hegel the absolute is not the indifferent, but the differentiated unity of subject and object, and art is a form of the absolute consciousness, i.e., it is such an attitude of consciousness toward its objects as does not eject them into an existence independent of itself; yet it does not fail to observe the distinction between consciousness and objects. There are three forms of absolute consciousness, of which art is the first. In the art-consciousness the unity of subject and object is relatively simple. Although subject and object are not reflectively identified, they are not held apart, as in scientific knowledge. The beautiful is thus the absolute idea immediately perceived. Hegel's followers, Rosenkranz, Schasler, and Vischer, worked along these lines and elaborated a very detailed æsthetics. Schiller (q.v.) returns to Kant and differentiates the material and the formal impulses which, working in conjunction, produce the beautiful.

In England Shaftesbury (q.v.) worked in a Platonic spirit, and Hutcheson (q.v.) makes "all beauty relative to some mind perceiving it." The mind has a faculty, "an internal sense," which is capable of receiving ideas of beauty from all objects in which there is uniformity in variety. Reid (q.v.), on the contrary, gives an objective value to beauty, claiming that it exists apart from our perception of it. Henry Home calls beauty the pleasure connected with sight and hearing. Hogarth (q.v.) makes a great advance in paying attention to details. He went back to the ultimate sensitiveness of the mind to certain geometrical forms and colors, and in this respect was the forerunner of recent psychological æsthetics; while Burke (q.v.) goes further and looks for the explanation of beauty in certain physiological effects produced by the beautiful object. The relaxation of nerves by appropriate stimuli has a soothing effect, which is the basis of æsthetic pleasure. Hence the beautiful must be *petite*. Alison (q.v.) is distinguished by the thoroughgoing way in which he applies Associationism to the explanation of pleasing æsthetic effects. The delight we take in a beautiful object is due to its delightful suggestions. Bain (q.v.) elaborates this Associationism and differentiates the æsthetic pleasures from others by their disinterestedness, purity, and sympathetic value, as being sharable in a way in which others are not. Spencer (q.v.) introduces Evolutionism into æsthetics and thus accounts for the æsthetic pleasures that in the individual seem to arise from congenital dispositions, by claiming that these dispositions are the survivals by heredity of associations formed in the history of the race. Consult: Gayley and Scott, *Guide to the Literature of Æsthetics* (Berkeley, Cal., 1890); W. Knight, *Philosophy of the Beautiful* (New York, 1891); B. Bosanquet, *History of Æsthetic* (London, 1892); Walter, *Geschichte der Aesthetik im Altertum* (Leipzig, 1893); Hirn, *Origins of Art* (New York, 1900); Puffer, *Psychology of Beauty* (New York, 1905); *Dessoir, Aesthetik und allgemeine Kunstwissenschaft* (Stuttgart, 1906); A. J. Balfour, *Criticism and Beauty* (Oxford, 1910); J. M. Guyau, *Les Problèmes de l'Esthétique contemporaine* (Paris, 1897); H. R. Poore, *The Conception of Art* (New York, 1913).

ÆSTHETICS, EXPERIMENTAL. Experiment made its way into the field of æsthetics from psychology on the one side and from philosophy and mathematics on the other. About the middle of the last century, while experiment was young in psychology, a dispute arose among theoretical writers concerning the æsthetic value of simple space-forms. A. Zeising, professor of philosophy in Munich, urged that formal beauty demands a simple proportionality; and while others saw, in both nature and art, a preference for equality, balance, or the relations given by the vibration ratios of consonant musical intervals, or the heptagon, or the square, Zeising carried out his theory most methodically of all. He meant by proportionality the division of an object in such a way that the smaller part, the minor, stands to the greater, the major, as the greater to the whole. This division is called the Golden Section. Zeising made the most extravagant claims for the importance of his law. He maintained that it furnished the pattern for the human body, the structure of plants, the forms of crystals, the arrangement of planetary

systems, and that it determined the proportions of buildings, sculptures, and paintings.

It occurred to G. T. Fechner (q.v.) to test the claims of Zeising and his opponents, in so far as æsthetical preference was concerned, by observing series of divided lines and of simple forms—rectangles, ellipses, and crosses—under experimental conditions. He made use of a large number of persons, asking each to state his preference within each series. Fechner also performed an important service in discriminating between the associational factors in the æsthetic judgment (those furnished by the use, purpose, rareness of objects) and the direct effect produced upon the feelings by the form or the color or the rhythm itself. It is to this latter non-associational element that experiment has directed its attention. It offers the advantages of simple and constant conditions and of a direct appeal to the undivided judgment. It has confined itself thus far to the elements which are common to all individuals. Within this limited field it may fairly be said to have been successful.

Methods and Results. The result of Fechner's work was to modify the assertions of Zeising and other theorists. A decided preference for the proportion of the Golden Section was found with certain figures, particularly the rectangle. For the simple sectioning of a line, on the other hand, preference was shown for the division into halves and thirds. Fechner is justly called the founder of experimental æsthetics. He laid out the field, distinguished the direct and the associative factors, gave the methods, and applied them successfully. There are three chief methods now used in experimental æsthetics: (1) choice, (2) construction, and (3) use. In the method of choice, series of simple figures, tones, or colors are presented to the observer, who selects the one most pleasing in its own right. The objects may be given in pairs (method of paired comparisons), or in a progressive series (serial method), or promiscuously, according to the material used. In the method of construction the individual is given elements, e.g., two narrow strips of cardboard, and is asked to make from them the most pleasing figure (cross) that he can. The method of use or application consists in collecting the dimensions of simple, common objects, as visiting or playing cards, envelopes, vases, newspapers, books, windows, façades, in order to discover the usual or most common proportions. The value of the last-named method rests on the supposition that the proportions most used are the most agreeable. This is true only in part: fitness, cost, use to which an object is put, and custom play a large part; for these reasons the method requires caution. The second method suffers from rather narrow limitations. Both it and the third, however, are of value as checks upon the method of choice, which is the most trustworthy and has been most successfully employed.

The methods named have been used chiefly with spatial forms: rectangles, crosses, lines, angles, circles, ellipses, and triangles. They have succeeded best with the simpler figures. Fechner's early results have been, for the most part, confirmed. We know now that certain divisions and dimensions are æsthetically pleasing for their own sake, that is, with no specific association attaching to them. The most agreeable are expressed by the ratio 1 : 1 and (approximately) 3 : 5, the last-named ratio standing near the relation for the Golden Section given above. For example, the grand average from 23 series in which various forms (lines, angles, crosses, and ellipses) were used, with a number of observers, gave as the most pleasing ratio 1 : 1.635, with an extremely low fluctuation for the different series. We conclude, then, that the most satisfying combinations are those in which the parts are alike and those in which they are moderately similar. One is tempted to point to the mathematical relation of the Golden Section as an explanation of the æsthetic enjoyment found in proportion. But the relation is in itself no explanation, and, even if it were, the deviations from it which many individuals show would invalidate it. A recent explanation of the æsthetic feelings connected with space forms points out that man involuntarily invests spatial objects with the activities—strains, resistings, tensions—which he himself feels in his own body. According as an object—a pillar, a statue, or a block of stone—gives evidence that it is capable or incapable of holding its own, supporting its load, and maintaining its own integrity does it awaken a feeling of satisfaction or dissatisfaction in the observer. This tendency shows itself, it is argued, even where the object is reduced to a mere outline. The argument gains part of its weight from the fact that it also gives a reason for a host of illusions connected with our perception of spatial relations. A true mathematical square is not seen as a square at all, but as a rectangle whose height is greater than its breadth; a bisected vertical line looks longer above the point of division than below, and so on. The allowance made for these illusions is probably the most important advance in method since the days of Fechner. It is to be noted that the explanation, which we may call a dynamic one, brings in the associational factor. Yet this is not a fatal objection, for the associations assumed are generic, so to speak, and thus constant, within limits, for all individuals. The theory must, however, share honors with a psychophysical one, which accounts for the elementary æsthetic feelings in terms of the simplicity and complexity of psychophysical processes underlying them. It is probable, that is, that the facility with which certain proportions are cognized affects directly the excitability of the nervous system in such a way as to produce pleasure.

The method of choice may be adapted to the determination of the æsthetic value of elementary musical combinations. We obtain thus a graded series of pleasantnesses for tonal intervals both when the constituent tones are given simultaneously (see FUSION) and when they are given successively. There is afforded in this way an opportunity to compare directly the result of experimentation and the elements of musical composition established by generations of practice. It must be added that simple musical combinations offer a particularly good field for experimental exploration of the æsthetic feelings, because the direct, sensuous factor plays a much more important rôle here than in spatial form, and the associative factor is correspondingly less prominent. This is especially true of rhythm.

Finally, æsthetic preference in the realm of color, saturation, and brightness has been determined by the method of paired comparisons—the observer comparing in turn a red, then a green, then a blue, etc., with each of the other members in a series of colors, and also by passing judgment on those visual sensations taken singly

The chief results are these: (1) the most saturated colors are usually preferred; (2) given likeness of saturation, individual preferences vary from color-tone to color-tone, and (3) with colors which are equally pleasing, the combination of any two gives greater satisfaction the more unlike (contrasting) the colors.

A beginning has been made in the experimental investigation of the comic. The methods of comparison and choice, and certain modifications of psychophysical methods have been applied to comic pictures. The results show that the comic impression decreases with repetition of the stimulus, while it increases with an increase in the size of the picture. Other factors which determine the nature of the impression are: the disposition of the observer, the effect of the preceding picture, and the facial expression of the subject of the picture. It has also been found that the degree of exaggeration which produces the comic effect can be measured.

Finally, various forms of the method of expression have also been used. (See AFFECTION.) The most promising of these methods is a photographic registration of mimic and pantomimic movements. (See EXPRESSION; EXPRESSIVE MOVEMENTS.) A picture is shown; and a photograph, taken of the observer at the same time, reveals characteristic differences in bodily posture, facial expression, position of the hands, etc. The photographic method has also been employed in the study of an observer's eye movements while he is regarding graceful curves and symmetrical forms. The results seem to disprove the theory that our pleasure in such forms is due to the ease and smoothness of the eye movement. This movement is, in fact, interrupted, jerky, and unlike the outline of the figures.

Consult: G. T. Fechner, *Zur experimentalen Aesthetik* (Leipzig, 1871); *Vorschule der Aesthetik* (Leipzig, 1876); T. Lipps, *Raumästhetik und geometrisch-optische Täuschungen* (Leipzig, 1897); George Santayana, *The Sense of Beauty; Outlines of Æsthetic Theory* (New York, 1896); O. Külpe, "Der gegenwärtige Stand der experimentellen Aesthetik," in *Bericht ü. d. II Kongress f. exp. Psychol.* (Leipzig, 1907).

ÆSTIVAL, ĕs'tĭ-val *or* ĕs-tī'val, or **ESTIVAL** (Lat. *æstivus*, of summer, from *æstas*, summer). Plants whose conspicuous functions, especially the blooming of the flower, occur in summer, are said to be æstival. Prairie plants, especially of the composite family, are largely æstival and contrast strongly with the vernal plants of the woods, such as many members of the lily family.

ÆS'TIVA'TION. See FLOWER; HIBERNATION; and ESTIVATION.

AËTA, ä'ā-tă. The woolly-haired, dark-colored, dwarfish aborigines of the Philippines. See NEGRITO.

ÆTHEL, ăth'ĕl. A combining form which occurs as the first element in many Anglo-Saxon names. It is derived from AS. *æfel*, noble, and is akin to Ger. *Adel*, nobility, *edel*, noble; compare Engl. *atheling* (q.v.), an Anglo-Saxon prince or nobleman, and *ethel*, noble. The names in which this combining form occurs (e.g., *Ethelbald*, 'Noble Bold,' *Ethelwulf*, 'Noble Wolf,' etc.), when given in the present work, are generally to be found under the more modern spelling *Ethel-*, which is that adopted in Leslie Stephen's *Dictionary of National Biography*.

ÆTHELBALD, ăth'ĕl-bạld. See ETHELBALD.

ÆTHELFLÆD, ăth'ĕl-flăd. See ETHELFLEDA.

ÆTHELHARD, ăth'ĕl-härd. See ADELARD.

ÆTHELING, ăth'ĕl-ĭng. See ATHELING.

Æ'THIO'PIS (Gk. *Αἰθιοπίς*). The name of a Greek epic in five books by Arctinus of Miletus, one of the Cyclic Poets (q.v.). It relates the events of the Trojan War immediately succeeding those described in the *Iliad*, the heroine of the poem being the Amazon queen, Penthesilea, slain by Achilles.

Æ'THRIOSCOPE (Gk. *αἰθρία, aithria*, clear sky + *σκοπεῖν, skopein*, to observe, watch). An instrument to measure the temperature effects produced by radiation, invented by Sir John Leslie in 1817, and described in the *Transactions* of the Royal Society of Edinburgh for the following year. It consisted of a concave metallic mirror, or cup, containing a differential thermometer, and was so finely constructed as to be influenced by a passing cloud. With it Leslie hoped to discover the effect of the clouds upon atmospheric conditions and to explain other meteorological phenomena.

AËTION, ā-ē'shĭ-on, or **EËTION,** ee'shĭon (Gk. *Ἀετίων, Ἐετίων*). A Greek painter and sculptor who flourished in the latter half of the third century B.C. He was highly praised for his technique and was classed with such painters as Nicomachus and Apelles. His most famous painting represented the wedding of Alexander and Roxana. Scarcely anything is known of his life.

AËTIUS, ā-ē'shĭ-ŭs. Called "the ungodly." A Roman theologian who lived in the fourth century. He was born in Antioch and sold into slavery; when liberated, studied medicine and theology at Antioch, became a deacon, and developed the doctrines called the Aëtian heresy. This was an extreme Arianism, holding that the idea of sonship was incompatible with the idea of Deity, and so Christ could not be "of the same substance" with God. Under the Emperor Constantius he was banished (360), but recalled in 361 by Julian and shortly after made bishop. He died in Constantinople, 367.

AËTIUS. A Roman general, born about 390 A.D. He long defended Gaul from the barbarians; with Theodoric he compelled Attila to raise the siege of Orleans; he followed the Huns to the plains of Châlons and defeated them in a great battle, in which 300,000 men are said to have been slain. The Emperor Valentinian III became jealous of Aëtius and slew him with his own hand, 454 A.D. Consult *The Cambridge Mediæval History*, vol. i (New York, 1911).

ÆTNA, ĕt'nȧ. A Latin poem, in 646 hexameters, describing Mount Ætna and one of its eruptions, with a theory as to their cause. The writer was well informed in natural science. The work used to be attributed to Vergil, but was probably written by Lucilius Junior, a friend of Seneca the philosopher (q.v.), who was a procurator in Sicily. The author's views agree strikingly with those found in Seneca's *Quæstiones Naturales;* probably the latter work was used by the writer of the "Ætna," so that the work was written between 65 A.D. and 79 (the great eruption of Vesuvius in 79 is not mentioned in the poem). Consult: Munro, *Criticisms and Elucidations of Catullus;* also *Ætna; Revised, Amended and Explained* (New York, 1905).

ÆTNA, MOUNT. See ETNA, MOUNT.

ÆTOLIA, ê-tō'lĭ-ȧ (Gk. *Αἰτωλία, Aitōlia*). A district of ancient Greece, lying on the north coast of the Gulf of Corinth. The ancient Ætolia was

divided from Acarnania on the west by the river Acheloüs, and extended as far east as the river Daphnos, where it was bounded by Locris and Doris; on the north it bordered on Thessaly and Epirus. In later times these boundaries were extended considerably to the north and the east. The country now has few cities and is generally wild and barren, though the southwest portion (old Ætolia) contains two marshy but fruitful plains—one on the coast, the other north of Mount Zygos, largely occupied by the lakes Apokuro (Trichonis) and Zygos (Hyria). This was the Ætolia of the Heroic Age; in that age the Ætolians play a conspicuous part; it was in Calydon that, according to the legend, Meleager (q.v.) slew the boar. When the Ætolians next appear in Greek history, at the time of the Peloponnesian War, they are described by Thucydides as rude and barbarous. The Ætolian confederacy, first mentioned in 314 B.C., but of unknown, though undoubtedly much earlier, origin, became important in the time of the Achæan League. (See ACHÆA.) The supreme authority was the general assembly of all Ætolians, which met yearly after the autumnal equinox at Thermon and elected the general and other officials. During the third century B.C. the league steadily increased its power, in conflict with the Achæans and Macedon, and, finally, in pursuance of its characteristically selfish policy, entered into alliance with the Romans, about 200 B.C. As this did not yield all that was expected, it afterward joined Antiochus and Perseus in their wars against Rome. The political influence of Ætolia was destroyed in 189 B.C. by the Romans, though the league existed nominally even to the time of Sulla. With Acarnania, Ætolia now forms a province (nomarchy) of the modern kingdom of Greece. The chief rivers of Ætolia are the Aspropotamo (Acheloüs) in the west, the Phidaris (Euenos) in the centre, and the Marnos (Daphnos) in the east. The people in the plains are employed in agriculture and fishing; in the mountain districts some traces of the rude and martial character of ancient Ætolia may still be found. The chief towns are Mesolonghi (where Byron died), Lepanto, and Agrinion. Consult: Oberhummer, *Akarnanien, Ambrakia, Amphilochien, Leukas im Altertum* (Munich, 1887). For the language of ancient Ætolia, see Collitz, *Sammlung der Griechischen Dialectinschriften*, vol. ii, 1409–1428 b; W. J. Woodhouse, *Ætolia* (Oxford, 1897).

ÆTO'LIAN LEAGUE. A confederacy of the tribes of Ætolia and afterward including also parts of Acarnania, Locris, Thessaly, etc. Its executive officers were chosen at a yearly meeting called Panætolicum. It was formed after the battle of Chæronea (338 B.C.) to resist the encroachments of Macedon, to which, after the death of Alexander, it proved a serious antagonist, as well as to its rival, the Achæan League. (See ACHÆA.) Later, for a time, it was in alliance with the Romans, but, having taken part with Antiochus III against them, it lost its power upon his defeat, 189 B.C.

AFANASIEFF, ä'fà-nä'syĕf, ALEXANDER NIKOLAYEVICH (1826–71). A famous student of Russian folklore and national poetry. He received a good education at the Moscow University, where he pursued the study of law with great credit and success. Thus, on completing his course, he at once entered the Department of Foreign Archives at Moscow—a position for which he was eminently fitted by taste and training. This was in 1849, when he was but 23. At 30 Afanasieff became the head of his department. Soon the supervision of the government's Bureau of Printing also fell to his lot. It was during these years—and he remained in these positions till 1862—that most of his literary work was done. Besides scores of essays and historical articles contributed to the foremost Russian periodicals, Afanasieff has to his credit several monumental works, among them *The Ancient Slav's Poetic View of Nature* (3 vols., Moscow, 1866–69), *Russian Tales and Fables for Children* (3 vols., Moscow, 1870). In 1862 he seemed to have incurred the government's displeasure by his political activities and had to give up his lucrative posts. The struggle for existence that followed proved unfavorable both to his health and literary activity. He died at the age of 45, but little appreciated in his own land.

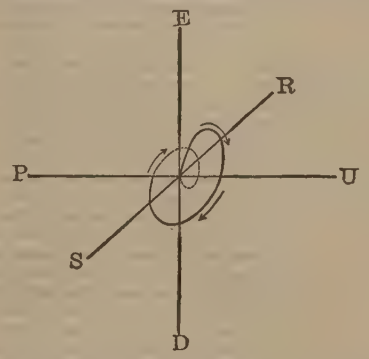
AFAR, ä'fär. See DANAKIL.

A'FER. See ARNOBIUS.

AFER, CN. DOMITIUS. A Roman orator, teacher of Quintilian. He was born at Nemausus (Nîmes) in Gaul, about 15 B.C. and died 59 A.D. He was made a consul by Caligula.

AFER. See TERENCE.

AFFEC'TION, AFFEC'TIVE PROC'ESSES (Lat. *affectio*, a state of mind produced by some influence, from *afficere*, to do something to one, *ad*, to + *facere*, to do). For many centuries psychologists have discussed the phenomena of the human mind under the three headings of Intellect, Feeling, and Will. (See PSYCHOLOGY.) One of the chief aims of modern psychology is to analyze the experiences thus designated into their simplest component processes and so finally to reach the mental elements, the ultimate and



AFFECTIVE PROCESSES.

Wundt's Scheme of the Affective Processes. *P, U*, Pleasantness, Unpleasantness; *E, D*, Excitement, Depression; *S, R*, Strain, Relaxation. The curved line represents the course in consciousness of an actual feeling.

irreducible constituents of mind. The various forms of intellectual experience (perception, idea, association of ideas, etc.) reduce, on such analysis, to the sensation (q.v.); the various forms of feeling (emotion, passion, mood) to the affection; while the simplest will-processes are found to contain both sensational and affective elements.

Affection, then, is the mental element which characterizes all varieties of our emotional life. It is the last result of the analysis of joy and sorrow, love and hate, anger and fear; it forms the common basis of the sense-pleasures of eat-

ing and drinking, and of the highest æsthetic appreciation of music and painting. Like sensation, it is the product of scientific abstraction; it is never experienced singly, but always in connection with other processes. And, like sensation, it cannot be reduced to anything simpler than itself. Many attempts have been made, in the interests of scientific economy, to derive it from sensation, which would then remain as the only mind-stuff, the sole material of which the mind is built. Stumpf, for example, identifies affection with a certain kind of sensation; pleasantness, he says, is a diffuse sensation of tickling, or a weak sensation of lust; unpleasantness is a low intensity of cutaneous or organic pain. The principal objections to this theory are that both tickle and pain have each a quality of its own, so that to describe either by the term "pleasant" or "unpleasant" is not to describe it at all. Furthermore, the affective quality which accompanies these sensations may change while the specific quality which characterizes them remains unchanged; for example, tickle, with change of circumstances, may be either pleasant or unpleasant, while the specific quality which distinguishes tickling from itch, pain, or any other sensation remains the same.

As to the different kinds or "qualities" of affection, modern psychology is divided. Some psychologists maintain that the manifold forms of affective experience are traceable, in the last resort, to the two typical processes of pleasure and pain, or, in the better phraseology—since pain (q.v.) is a sensation, with a definite organ in muscle and skin—to pleasantness and unpleasantness. Relief, despair, hope, satisfaction, anxiety, resentment would then be, as pure feeling and at any given moment of their course, either simply pleasant or simply unpleasant. There are two principal objections to this view: (1) that it does not do justice to the immense complexity and variety of the emotions; and (2) that it confuses the lower with the higher, the pleasure of a good dinner with that of Beethoven's *Ninth Symphony*. The latter point is very differently taken by different psychologists. One says, e.g., that the unpleasurableness of a toothache, of an intellectual failure, and of a tragical experience is so patently diverse that assertions to the contrary require no criticism. Another declares as positively that there is no qualitative difference discoverable between the pleasantness of a color and that of a successfully concluded argument, when careful abstraction is made from the very wide differences in their attendant circumstances. And so the matter rests. The former objection, however, has suggested a more elaborate classification of the affective qualities.

According to this second view, the number of affective qualities is as large as, if not larger than, the number of sensations. We have, it is true, no names for the great majority of them; but that is because language has been developed, not for the sake of a scientific psychology, but for purposes of practical intercourse, and for all practical purposes the discrimination of the main emotional types (anger, fear, and the rest) has been sufficient. We can, however, distinguish three main trends or directions of the affective consciousness, within each of which a long series of ultimate qualities is ranged between opposed extremes. These directions are those of (1) pleasantness-unpleasantness; (2) excitement-depression (tranquilization, inhibition); and (3) tension-relaxation (resolution). The first series of qualities comprises the affections of the present time; our affective state, as determined by the occurrence of any given moment, is one of pleasure or displeasure. The second series contains all the shades and tints of our affective anticipation of the future; we are aroused or subdued by what is to come. And the third series represents the effects of experiences just past; we are kept on the stretch, or relieved from our tension, by what has just happened. Or—to put the differences from another point of view—we are pleased or displeased by the *character* of our experience; we are excited or tranquilized, according as it is more or less *intensive;* and we are held on the strain of expectation, or relieved from this strain, according as it lasts a longer or a shorter *time*. Affections of all three types are, as a rule, combined in the concrete feeling, in "real" affective experience. Suppose, e.g., that one is looking forward to a pleasant event. One has, at first, a feeling of tension, to which are soon added, in succession, feelings of unpleasantness and of excitement. All three affections increase gradually in strength until the expected event occurs. At that moment the unpleasantness changes to pleasantness, and the strain to relaxation, while the excitement is still continued. Presently the excitement dies away. Then the feeling of relaxation or satisfaction fades out; and finally the effect of the event passes off altogether, with the fading of pleasure to its indifference-point.

It would seem, then, that expert opinion could hardly be more sharply divided. On the one hand, we have the belief in two and only two affective qualities, homogeneous throughout the affective life; on the other, the suggestion that there are many thousand feelings, each of which is unique in quality, though the whole number fall roughly into three great groups. It should, however, be said that these conflicting views are held tentatively, not dogmatically. It is generally agreed that we do not as yet possess the data for a scientific theory of affection. The appeal lies to experiment; and the application of experimental method in the sphere of feeling is extraordinarily difficult. Nevertheless, the problem stands to-day in the forefront of psychological inquiry, and much may be expected from the near future.

We have, as things are, two principal methods for the study of affection: the method of impression and the method of expression. The former we owe to Fechner (q.v.); the latter to the Italian physiologist A. Mosso. (1) The method of impression in its original form is also known as the serial method or the method of selection. (See ÆSTHETICS, EXPERIMENTAL.) A long series of graded stimuli (colors, textile fabrics, ovals, or crosses) is laid before the observer, who notes his preference for particular terms in the series. From these preferences a curve may be constructed, showing the relative feeling-value of dull and brilliant colors, of rough and smooth surfaces, etc. In its later form the method is known as that of paired comparisons. The stimuli are here presented to the observer two at a time, so that every term in the series is compared with every other term. The experimenter records the number of preferences that each term receives, and a curve is platted from the results. It is found, e.g., in work with colored impressions that saturated colors (red, blue) are as a rule preferred to unsaturated (pink, brown, sky blue, navy blue), but that

there is a curious uncertainty as regards yellow —some observers ranking this color very high, while others as decidedly prefer orange (yellowish red) and yellow green. (2) The method of expression, on the other hand, seeks to reconstruct the affective consciousness from a study of its bodily symptoms or manifestations. It is a matter of common knowledge that men blush with shame and tremble with fear. The bodily indications of affection are, indeed, both widespread and easily observable, while at the same time they appear to reflect the most subtle and delicate phases of affective process. Their common cause is to be found in changes of muscular innervation; the whole muscular system, voluntary and involuntary, answers to those changes of nervous excitation which correspond, on the physical side, to changes in our state of feeling. Recourse has therefore been had to the various physiological instruments which register the systemic effects of such excitatory changes. Appeal has been made to the sphygmograph, which records the height and frequency of the pulse (change in the innervation of the heart); to the pneumograph, which records the depth and rate of respiration (change in the innervation of the respiratory muscles); to the plethysmograph, which records the volume of a limb or member, of arm or finger (change in innervation of the superficial blood-vessels, and therefore of the amount of blood contained in them); and to the dynamometer or dynamograph, which records the grip or pull exerted by the voluntary muscles. In spite of the attention which this method has received, psychologists are as yet far from unanimity as regards its value or its results: the simple correlations between the physical and the mental, made out for pleasantness and unpleasantness by the earlier workers, have not been confirmed by more recent researches. A correlation does, perhaps, obtain with some definiteness in the case of involuntary movement. If the hand is laid upon the plate of a planchette while our mood is one of indifference, the pencil will make a little ragged spot upon the paper, but will take no definite direction. Let a pleasant stimulus be given and the arm travels away from the body, as though the organism were reaching out after the pleasing object; the pencil traces a steady line outward. Let an unpleasant stimulus be given, and the arm comes in toward the trunk, as if the organism were shrinking from the displeasing object; the pencil traces a steady line inward.

There are, however, four reasons why this method of expression has not determined the number of affective qualities. In the first place, the method is still very young, and the technical difficulties involved in the giving of stimuli have not yet been fully overcome. Several of the instruments ordinarily used are too crude for the tasks imposed on them. Secondly, the method presupposes that the subject of the experiment is in a normal, indifferent state, and the regulation of this state is exceedingly difficult. Thirdly, knowledge of the physiological mechanism of the curve variations is at present incomplete: we have reason to believe that a particular feeling must always be connected with a particular change of innervation, although such a change may be wrought wholly within the physiological sphere. Fourthly, the expressive method gives us the expression, so to say, not only of affection but also of sensation; the organic reaction consequent upon the application of a sensory stimulus, as such, is both complicated and far-reaching. Hence, so long as introspection gives no decided verdict, the bodily symptoms may and will be differently interpreted. The correlation of physical and mental in pleasantness and unpleasantness has not yet been satisfactorily made out. An elaborate correlation has been suggested by those who hold the alternative theory, of a large number of ultimate affections. On this view, pleasantness is indicated by strong and slow, unpleasantness by weak and rapid, heartbeats. We must suspend judgment until further evidence is submitted.

It remains to consider the nature of the physiological processes that underlie the appearance of an affection in consciousness. Sensations are conditioned directly upon the excitation of a determinate sense-organ. Affections, in all probability, are conditioned by excitatory processes which arise indirectly, by way of reaction, from these first processes. The secondary excitations may be supposed to originate within the cerebral cortex, though some psychologists have referred them to the medulla, or even to the sympathetic system; but whether they are localized (Wundt) or diffused (Meynert), we have no means of deciding. The English school have found a biological sanction for their traditional doctrine of pleasure-pain in the law that whatever is pleasurable tends to further and perfect life, and whatever is painful to disturb or destroy it. The law appears to be substantially true. Expressed in psychological terms, it would run somewhat as follows: A pleasant stimulus is a stimulus of moderate intensity, permitting the full exercise of attention, and connecting with the organic sensations set up by "anabolic" bodily processes; an unpleasant stimulus is one the intensity of which is adverse to maximal attention, and which connects with the organic sensations set up by "catabolic" bodily processes. Pleasantness and unpleasantness would then be conditioned, in the last resort, upon the *intensity* of stimulus: a result which accords well both with the results of experiment and with the notion of a diffused cortical reaction as substrate of the affective process. On the other hand, as we have seen, later theory connects pleasantness and its opposite with the quality, excitement-depression with the intensity, and tension-relaxation with the duration of stimulus. No one has yet attempted to work out these correlations upon the biological or teleological side. Here, as before, we must look to the future for a settlement of the questions at issue.

Consult: for the theory of the three affective directions, W. Wundt, *Outlines of Psychology*, translated by C. H. Judd (Leipzig, 1897, 3d ed., 1907); for methods, O. Kuelpe, *Outlines of Psychology* (London, 1909); E. B. Titchener, *Feeling and Attention* (New York, 1908); for the teleological law, H. Spencer, *Principles of Psychology* (New York, 1890), and *Principles of Ethics* (New York, 1892).

AF'FIDA'VIT (perf. of Low Lat. *affidare*, 'he has made an oath,' from Lat. *ad*, to + *fides*, faith). A written declaration, or statement of fact, made before a magistrate or other person legally authorized to administer an oath, the truth of which is confirmed either by an oath sworn or a solemn affirmation. The name and designation of the party making the affidavit are written at length, and he usually signs it

at the foot. When the paper is shown to him, he is required to swear or affirm that its contents are true, and that the name and handwriting are his, and it is thereupon attested by the officer before whom it is made. Affidavits in all the English courts must be taken and expressed in the first person of the deponent. In the United States, all judges, justices of the peace, notaries, commissioners, and some special officers have authority of law to take affidavits. All the States appoint commissioners, residing in other States, to exercise the power. Generally the authority of foreign officials to take affidavits must be certified or verified in court. When a judge takes an affidavit in court, his signature must be authenticated. American ministers and consuls abroad have power to take affidavits, and so have British consuls and nearly all similar officers. No particular form of affidavit is prescribed. An *affidavit of merits* is one made by a defendant in an action which sets forth that he has stated his case to counsel and is by him advised that he has a good defense to the pending action on its merits. This is required in certain cases to protect plaintiffs from delay by frivolous shows of defense, but does not always effect the purpose.

AFFIL'IA'TION (Low Lat. *affiliatio*, adoption as a son or daughter, from Lat. *ad*, to + *filius*, son, *filia*, daughter). In the civil or Roman law, the ascertainment of the parentage and determination of the descent of a person, either through the mother or the father. In our law the term is commonly used to designate the proceeding for the judicial determination of paternity, especially of the paternity of bastards. (See BASTARD.) In cases where the person seeking to establish his paternity was born during coverture, i.e., in lawful wedlock, there is a presumption of law that the husband was the father, which cannot be rebutted by direct evidence to show that there was no cohabitation, but only by proof that, owing to absence abroad, or in prison, or on the high seas, no cohabitation could have taken place or that it was physically impossible, or establishing beyond a reasonable doubt that the husband could not have been the father. In French law, the term "affiliation" refers to a customary mode of adoption prevailing in some parts of France. See FILIATION.

AFFIN'ITY (Lat. *affinitas*). The relationship created by marriage between the husband and the blood-relations of the wife, and between the wife and blood-relations of the husband. It is to be distinguished from consanguinity, which signifies relationship by blood. There can be no inheritance by legal succession from a relation by affinity. The relations of the wife stand to the husband in the same degree of affinity in which they stand to the wife by blood or consanguinity, or vice versa. But between the relations of the two parties by affinity there is no affinity. Thus, there is no affinity between the husband's brother and the wife's sister, and, by our law, there is no impediment to their marriage. The question as to whether those who are related by affinity stand in all respects in the same position as regards marriage as those who are connected by blood is one on which some difference of opinion at present prevails. Marriage between a man and the sister of his deceased wife was until recently forbidden in England by statute, but is permitted in the United States and the British colonies, as well as in most continental countries. See CONSANGUINITY; MARRIAGE, and the authorities there referred to.

AFFINITY, CHEMICAL. A term used to denote, on the one hand, the cause or "driving power" of chemical reactions and, on the other hand, the force that holds in combination the constituent elements of chemical compounds. Considering chemical reactions, the questions suggest themselves: How are we to measure the amount or intensity of their chemical affinity? Since most reactions are accompanied by the evolution of heat, are we to conclude that affinity is proportional to the amount of heat evolved? Or, since some reactions proceed with explosive rapidity, while others are extremely sluggish, are we to assume that the affinity of a reaction is proportional to its velocity, and therefore measure affinity by measuring velocity? But speculation on the subject is to-day no longer necessary, for thermodynamics furnishes us here with a definite and indubitable principle. It teaches, namely, that any process or change whatever which takes place of itself, as does a chemical reaction, can be harnessed to do mechanical work; that any system in process of transformation must contain energy available for such work—"free energy," as it is called; and that this free energy is the obvious cause of the transformation itself. The affinity of a reaction can thus be measured with certainty by measuring the maximum mechanical work that could be furnished by it. Van't Hoff (q.v.) has shown that the maximum work or affinity of a reaction can be calculated from the relative concentrations of the reagents and reaction-products present together when the reaction has reached equilibrium. (See REACTION, CHEMICAL.) On the other hand, J. Willard Gibbs (q.v.) and Helmholtz (q.v.) have shown independently of each other that the maximum work or affinity of a reaction is equivalent to the electromotive force of a galvanic cell whose working depends on the given reaction. (See ELECTRO-CHEMISTRY.) And so we have to-day two independent methods for measuring the affinity, or driving power, of chemical reactions, and both are capable of great experimental precision. This phase of the affinity question is thus freed from its old-time mystery.

Still, it may be asked further: But what is the *form* in which free energy is contained in mixtures undergoing chemical change? Hydrogen and oxygen gases combine to give water; a mixture of hydrogen and oxygen must therefore have free energy not possessed by their compound. Is it that the atoms vibrate faster within the molecules of the free gases than they do in the water molecule? Or is the free energy still more deeply hidden as "potential energy" in the ether itself, as energy is hidden when a weight is suspended above ground?

That atoms move within the molecules is more than a plausible assumption. Unfortunately, no one has yet succeeded in correlating any such assumption with experimental facts, and nothing is scientifically known regarding that motion. The potential energy idea, too, remains in the realm of speculation. In recent years, however, attempts have been made to impart a practical aspect to such speculations, with the aid of assumptions concerning the nature and mode of action of the forces that hold atoms together within the molecules of chemical compounds. Such attempts are by no means

novel in chemistry. Borelli and Lemery imagined that the ultimate particles of matter are supplied with minute hooks, the shape of which determines the capacity of a particle for combining with certain other particles. Newton, Bergman, Berthollet, and others, have thought that chemical affinity might be identical with the force of gravitation. Berzelius sought to explain all chemical phenomena on the hypothesis that chemical combination is caused by the mutual attraction of electrically different particles. This last idea was abandoned before the middle of the nineteenth century. Yet now, a century after Berzelius first advanced it, the electrical hypothesis of the nature of affinity is struggling into life again—in more or less modified form, to be sure.

A strong impulse to the revival of the electric hypothesis resulted from Arrhenius's theory of electrolytic dissociation, in the 80's of the past century. Then, in the early years of the twentieth century, J. J. Thomson ingeniously developed the hypothesis that the atom itself is made up of particles of negative electricity revolving with great speed within a positively electrified sphere; and that a negative particle from one atom may attach itself to another atom, the result being a "tube of force" by which the two are bound together. Thomson gave practical value to his hypothesis by showing that a number of known but obscure phenomena, including the periodic law itself, were easily explained by it. On the other hand, organic chemists have felt more and more distinctly that their formal working-theory of valency (q.v.) has been used almost to exhaustion, and that much practical good might result from the birth of a new guiding-idea. No wonder, therefore, that speculations concerning the nature and mode of action of the affinity forces are again uttered, and even listened to, by practical investigators.

Bibliography. T. Bergman, *Traite des affinités chymiques ou attractions électives* (Paris, 1788); C. L. Berthollet, *Researches into the Laws of Chemical Affinity* (trans. by M. Farrell, Baltimore, 1809); C. M. Guldberg and P. Waage, *Studien über die chemische Affinität* (original ed., Christiania, 1864; French trans., Christiania, 1867; German trans., Leipzig, 1879); Pollitzer, *Die Berechnung chemischer Affinitäten* (Stuttgart, 1911). See bibliography of theoretical chemistry under CHEMISTRY. See also ACIDS; NERNST'S HEAT THEOREM; and especially ELECTRO-CHEMISTRY.

AF'FIRMA'TION (Lat. *ad-firmare*, to make secure). A solemn declaration, not under oath, made by a witness in open court or before an officer authorized to administer an oath in a like case, that he will tell the truth. Formerly oaths were required of all witnesses and affiants in all cases, but many exceptions are now allowed in England and in the United States. Generally all persons who declare that they have conscientious scruples about taking an oath are permitted to make an affirmation instead. The affirmation has the same effect as an oath, and for a false affirmation a witness is punishable as though he had been sworn. See OATH; PERJURY.

AFFOR'ESTA'TION (Lat. *ad*, to + Low Lat. *foresta*, a wood, forest). The converting of open or partially wooded ground into forest or woodland. See FORESTRY.

AFFRAY' (Fr. *effroi*, fright, terror, compare Eng. *afraid*). The fighting of two or more persons in a public place in such a manner as will naturally cause terror to other people. It differs from assault (q.v.) in that it must occur in a public place, and from a riot (q.v.) in that only two persons are necessary for the commission of the offense. Two persons engaged, although in a public place, must each be guilty of unlawfully fighting the other or there is no affray. No matter how publicly, or in how terror-breeding a manner, A may attack B, if the latter does not go beyond the limits of self-defense in repelling the attack, the occurrence is not an affray, but an assault. An affray which did not develop into a higher crime, such as homicide or an attack upon a public officer, was punishable at common law by fine and imprisonment. In some of our States it is not recognized as a separate offense from assault and battery (q.v.). Consult Wharton, *Criminal Law* (Philadelphia, 1896).

AFFRE, åf'r', DENIS AUGUSTE (1793–1848). An archbishop of Paris. At the time of the Restoration he was professor of theology at the Seminary of Saint Sulpice and on account of his prudent and temperate character was made Archbishop of Paris by the government of Louis Philippe in 1840. Though not yielding a blind submission to all measures of the government, he abstained from all offensive opposition. During the insurrection in Paris in June, 1848, he climbed upon a barricade in the Place de la Bastille, carrying a green bough in his hand as a messenger of peace, and sought to persuade the insurgents to lay down their arms. He had scarcely uttered a few words, when the insurgents and the troops commenced firing again, and he fell, mortally wounded by a musket-ball. He was removed to his palace, where he died, June 27. He was the author of several theological writings and of a work on Egyptian hieroglyphics. Consult Alazard, *Denis-Auguste Affre, archevêque de Paris* (Paris, 1905).

AFFREIGHT'MENT (Lat. *ad*, to + Eng. *freight*). The contract of a shipowner for the carriage of goods in his ship for compensation, or freight. The shipper is technically known as the *freighter*. Where the freighter ships his goods in the ordinary way, without acquiring any control over the ship, the contract is a bill of lading (q.v.), and the rights of the parties are mainly determined by the laws relating to common carriers. (See CARRIER, COMMON.) Where the freighter charters the ship, the contract is known as a charter-party (q.v.) and has certain features and is subject to certain rules peculiar to the law of shipping. A complete treatment of the subject will be found in Scrutton, *The Contract of Affreightment, as Expressed in Charter Parties and Bills of Lading* (London, 1899).

AFFRONTÉ, å'frôN'tā' (Fr. p.p. 'face to face,' from Lat. *ad frontem*, to the face). In heraldry, a term applied to animals represented as facing the spectator directly, as the lion in the royal crest of Scotland.

AFFU'SION, or POURING, BAPTISM BY. See BAPTISM.

AFGHAN, ăf'gan, or PUKHTU (North Afghan), or PUSHTU (South Afghan). A modern Iranian dialect which is spoken by about 3,000,000 people. The Afghan language is divided into two great dialects, the southern and the northern. The differences between these two dialects are mainly phonological; thus, North Afghan *kh*, *j*, and

initial *c* = South Afghan *sh, zh, k*. The Afghan is undoubtedly an Iranian language, although it has suffered many corruptions, especially in its vowel system. The dialect has many foreign loan-words, chiefly from the Persian, and through this from the Arabic, and from the Indian, particularly Sindhi. The alphabet is a modification of that of the Arabs. The Afghan literature is scanty and dates only from the sixteenth century. The poetry is copied closely after Persian models, although there exists a great mass of popular Afghan songs of true Oriental beauty. The French scholar J. Darmesteter (1849–94) made a collection of these. Reference may be made to Geiger, *Sprache der Afghanen*, in Geiger and Kuhn's *Grundriss der iranischen Philologie*, vol. i, part ii, pp. 201–230 (Strassburg, 1898), and works cited. Consult: J. Darmesteter, *Chants populaires des Afghans* (Paris, 1888–90), which contains an historical sketch, a grammar, texts, and translation; Lorimer, *Grammar and Vocabulary of Waziri Pashto* (Calcutta, 1902); Cox, *Notes on Pushtu Grammar* (London, 1911).

AFGHANISTAN, ăf-găn'ĭ-stăn'. A country in Central Asia, between British India and Persia. It is situated between lat. 29° and 38° 30' N., and long. 61° and 75° E. (Map: Afghanistan, J 4; Asia, F 5). It is bounded by Russia, Bokhara, and the Pamir on the north, British India on the east, Baluchistan on the south, and Persia on the west. Its total area is estimated at 245,000 square miles. It is generally divided into five parts: (1) The northeastern part, comprising Badakhshan, Kafiristan, and a portion of the Pamir; (2) Afghan Turkestan, in the north; (3) Kabulistan, or the region of Kabul, in the east; (4) Southern Afghanistan, which comprises Kandahar and the country south, down to the Baluchistan boundary line; (5) the province of Herat, in the west. The political divisions of Afghanistan, however, are far from coinciding with its ethnographical or geographical divisions, as there are still numerous independent khanates and tribes which do not fully recognize the authority of the ameer. Persian is spoken by a large part of the people, though the common language is mainly Pushtu—a language of the Iranian group of the Indo-European family.

Physical Features. The surface of Afghanistan is exceedingly mountainous, a great part of it being covered with the mighty chain of Hindu-Kush and its offshoots. The Hindu-Kush extends in a northeast and southwest direction for about 400 miles to the Irak and Shibar passes, where it assumes the name of Koh-i-Baba. Its highest peaks are 24,000 feet above the sea, and the passes of Irak and Shibar on the route from Afghan Turkestan to Kabul are 12,000 feet and 8000 feet high respectively. The Koh-i-Baba chain branches off into two ranges, the Safed-Koh and Siah-Koh. Another branch is sent off by the Hindu-Kush above the Sirak Pass, which is called the Paghman Mountains. They run in a southwestern direction and eventually unite with the Suleiman Mountains, which traverse the eastern part of Afghanistan. Besides the above-mentioned principal chains, there are many secondary ranges and single mountains too numerous to describe.

The principal rivers of Afghanistan are the Hari-Rûd, which flows through the Herat valley; the Helmand, the largest river of Afghanistan, which rises near the Bamian valley and flows in a general southwestern direction, entering the Lake of Hamun; the Kabul, a tributary of the Indus, and the Amu-Daria (Oxus), which forms the northern boundary of Afghanistan.

The climate is generally healthful and dry, although there are great variations of temperature, depending largely on altitude, rising in the same place as high as 120° F. in the summer, and falling as low as —15° F. in the winter. At Kabul, with an elevation above sea level of 6500 feet, the thermometer (F.) marks 90° to 100°, while correspondingly on the higher lands the cold is intense; and the difference between summer and winter is extremely wide in all places, while at the same time the daily range is extraordinary, especially in summer. The rainfall is very scanty, even during the rainy season, and for agricultural purposes a system of irrigation, called *karez*, is maintained. It consists of subterranean channels connecting the springs with one another, by which the water is brought to the surface.

The mineral deposits of Afghanistan are supposed to be very rich, but so far the expectations have not been realized. Iron, lead, and sulphur are worked on a small scale, and gold is found in small quantities in some of the hills and rivers, while precious stones are known to exist in Badakhshan. Extensive coal beds lie in the north.

The flora is very rich in the valleys, while the mountains are all barren, except those in the north, which are covered with forests to an elevation of 10,000 feet. The main products are wheat, corn, rice, grapes, sugar, tobacco, and cotton. The country is especially famous for its fruits, which include apples, pomegranates, and peaches of an excellent quality. Vegetables are also grown to a considerable extent, and a very important product is the asafœtida, a resinous gum exported in large quantities to India.

The fauna includes the leopard, wolf, bear, cheeta, hyena, jackal, various gazelles, and wild asses. Among the domestic animals may be mentioned the horse, the dromedary, ass, cow, two kinds of sheep, and the goat.

Agriculture and Trade. The soil of Afghanistan, where it is fit for agriculture, is generally very fertile and in most cases yields two crops a year. Wheat, barley, peas, and beans are sown late in the fall and ripen in the summer, while rice, millet, corn, turnips, beets, and tobacco are sown in the spring and harvested in autumn. Fruits, melons, and madder are also of importance. The breeding of domestic animals is carried on extensively, and wool forms one of the chief exports to India. Owing to the practical absence of any manufacturing industries, the exports of Afghanistan are confined largely to raw products, such as wool, cattle, silk, and dried fruit. Some rugs, felts, and silk articles are produced on a small scale. The trade is chiefly with India and Bokhara. There is no accurate system of trade registration. Indian statistics show imports from Afghanistan valued at £570,459 and exports to Afghanistan £764,274 in the fiscal year 1909; in 1912, £652,665 and £877,096. The mountainous character of the country makes the use of wheeled vehicles in most cases impossible, and merchandise is usually carried on camels or ponies.

Ethnography. The Afghans, or Pathans, speaking a language called Pukhtu, or Pushtu, form three-fifths of the population of Afghanistan. They are of mixed ancestry, although the Indic affinities of their language indicate a preponderance of Aryan blood of the Mediter-

41° A 46° B 48° C 50° D 52° E 54° F 56° G 58°
CASPIAN SEA
CAUCASUS
CAUCASIA
RUSSIA
PERSIA
ARABIA
ARMENIA
KURDISTAN
MESOPOTAMIA
Vladikavkas
Petrovsk
Temirkan-Shura
Derbent
Tiflis
Kuba
Elizabetpol
Sevan L.
Erivan
Mt. Ararat
Alexander B.
Kinderli B.
C. Sivaghi
C. Aspheron
Baku
Sai Kuyu
Ittieje
Suraga
Tabassu
Baraa-Kitmas
Kizil Aghir
Kinderlinsk
Sumbia
Kara-ilik
Uzuk
Karakin
Sari Kamish L.
Gulf of Kara Bugaz
Kara-Bugar Str.
Tuar
Dirin
Dakhli
Haji Kuyusi
Kazakh
Akcha
Gelin
Chad
Karsiman
Degli-ata
Dundir
Jumud Turkomans
Oglanish
Gerli Ata
Gogunak
Bala Ishem
KRASNOVODSK
Krasnovodsk Bay
Ashurada I.
Gt. Balkan
Ferevalaya
Adja
Kizil Arvat
Ula Chashma
Bugdaili
Dux Olum
Kaka
Kuren Dagh
Chat
Chikishliar
Ogurchinski
Cheleken I.
Tchikishliar
Gurgan
Astrabad
Finderisk
Nardin
Jahjerm
Bujnurd
Kuchan
Sarakhs
Tejend
Merv
Yulatan
Kelat
Khiva
Khanka
Urgenj
Aral Sea
Sea of Aral
Kara-Kum Desert
Kara-Kum
Kizil-Kum
Kizil-Kum Desert
Ust-Urt Plateau
Mangishlak Peninsula
Mangishlak
Ust-Urt
Tabriz
Ardebil
Urmia
Urmia L.
Maragha
Bijab
Miandab
Mamajuk
Takhti
Serdesht
Sakiz
Zenjan
Tarum
Kaflan-kuh
Vanek
Sultanieh
Kaslin
Abhar
Kasbin
Kuhjur
Tuzil
Kizil-ab
Merivan
Boriter
Sinna
Hurin
Zohab
Kelesen
Khanikin
Kerind
Harunabad
Kermanshah
Zerna
Dehbala
Imam
Changulat
Pilli Tepe
Dizful
Shustar
Amir
Tulo
Band-i-Kyr
Kut el-Chinaise
Ahwaz
Ismailieh
Hamormus
Basra
Muhammera
Mastura
Babbehan
Falahieh (Dorak)
Hindian
Tigris R.
Euphrates R.
Shatt-el-Arab
Bushire
Abu Ali Pt.
El Katif
Bahrain
Manama
Ras Rekkan
El Hofuf
El Ribat
Debai
Das I.
Kafai
Sis Bezu Jas
Abu Musa I.
Sharjeh
Dibbah
Shinas
Jask
Gulf of Oman
Gulf of
Persian Gulf
Arabian Sea
Indian Ocean
Long 58°
Tehran
Kum
Kashan
Nushki-gul L.
Saveh
Veramin
Kuhrud
Nutenz
Ardistan
Soh
Ispahan
Murchakar
Kuhpaya
Nefesfahan
Zendeh R.
Kuhpaya
Aceh
Ardakan
Allahabad
Niaband
Yezd
Dattin
Dashtab
Kuhbenan
Derbend
Nawar
Jashrir
Kai Gosh
Sirkhan
Sarbenan
Zarand
Gudar-i-Barut
Khabis
Nemeka
Kerunan
Bahramabad
Sengalabad
Shebri-Babek
Ardakun
Murghab
Jamarm
Reisi
Kuh-i Ayub
Kuh-i Bul
Kuh-i Aljuk
Kuh-i Dinar
Kuh-i Dehbid
Kuh-i Sukhtak
Kuh-i-Hormuz
Kuh-i Shahri
Kuhrun
Kuhbitak
Minab
Ormuz
Strait of Ormuz
Jebel Turunjah
Khamir
Lingeh
Charak
Bastak
Bandar Abbas
Jerun
Kishm I.
Larak I.
Hormuz I.
Kishm
Shiraz
Kazerun
Firuzabad
Jahrum
Darab
Forg
Niriz
Tasht
Khir
Fasa
Dehbid
Arsinjan
Sirjan
Jiruft
Kerman
Bardsir
Sarvistan
Hazar Gumbez
Ahmedabad
Dashtab
Chemeh
Dehi Sard
Sanjar
Sultanabad
Kuruk
Allahabad
Bijdera
Khanu
Kontak
Nadurjan
Nilaw
Kuhrun
Yezdikhast
Shir Kuh
Kuh-i Hezar
Kuh-i Jupar
Kuh-i Lalezar
Kuh-i Jupar
Kuh-i Hez

PERSIA
AFGHANISTAN,
BALUCHISTAN,
AND PARTS OE
CENTRAL ASIA
SCALE OF STATUTE MILES
0 25 50 100 200
SCALE OF KILOMETERS
0 50 100 200 300
Important towns are shown in heavy face type
Capitals of Countries Capitals of Provinces
Railroads Telegraph and Cables
Important Roads
60° J 62° K 64° L 66° M 68° N 70° O 72° P 74° Q 76°
1 42° 2 40° 3 38° 4 36° 5 34° 6 32° 7 30° 8 28° 9 26° 10
CASPIAN SEA
KIZIL KUM (Red Sands)
KARA KUM (Black Sands)
KHIVA
BOKHARA
SAMARKAND
TASHKENT
KARATEGIN
DARWAZ
PAMIR PLATEAU
ALEXANDER MTS
Kara Kol
Kurtka
Yulduz Plateau
Mt. Kaufmann
Peter the Great Mts.
Lake Victoria
Great Pamir
Lit. Pamir
CHINESE TURKESTAN
KHOKAND
Kara Tau
Alai
Tagh
KASHGARIA
KAFIRISTAN
KABUL
Kabul
Khyber Pass
Peshawur
Safed Koh Range
Tirach Mir
Chitral
Gilgit
Hunza
Nagar
Ghazni
Matun
Laram
Bannu
Kohat
Indus R.
Ismail Khan
Persjat
Multan
Bhawalpur
Sutlej R.
Chenab R.
Jhelum R.
AFGHANISTAN
Kandahar
Kelat-i-Ghilzai
Zarmelan
Mulla Kurma
Lora
Baruni
Mullah
Mena
Drug
Ramgulla
Anambar
Chappadkha
Sibi
Harnai
Mir Hasi Kot
Chotiali
Vitakri
Mut
Kaban
Dera Bugti
Shikarpur
Jacobabad
Nuttal
Sukkur
Shikarpur
Larkana
Khairpur
Hyderabad
Karachi
BRITISH BALUCHISTAN
Quetta
Pishin
Chaman
Khushdil
Ramgulla
Loralai
Gwal
Anambar
Chappadkha
Sibi
Harnai
Mir Hasi Kot
Chotiali
Vitakri
Mut
Kaban
Dem Bugti
Shikarpur
Jacobabad
Nuttal
Sukkur
Shikarpur
Larkana
Khairpur
Hyderabad
Karachi
KELAT
Nushki
Nok Kundi
Dalbandin
Nushki
Saindak
Nok Kundi
Dalbandin
Nushki
Saindak
Nok Kundi
Dalbandin
Nushki
Saindak

ranean stock. They are not Semite, as some authorities have believed, their national claim to an Israelitish descent being an afterthought, based upon the occasional appearance among them of Jewish traits. Besides a dash of Semitic blood, they have in all probability inherited some of a different sort from the earlier inhabitants of the country, who may have been akin to the Dravidians of India. Among the principal tribes are the Duranis of the west and south, Ghilzais in the east, and the Yusufzais and Afridis on the Indian frontier. Less important Afghan tribes are the Swatis, Waziris, Kakars, Khostis, etc. Some other peoples of Afghanistan, such as the Tajiks, Hindkis, Jats, Aimaks, and Hazaras (Mongolians), are not Afghans, while the Kizilbashes are largely Persianized Turks. The Afghans were already well established in their present habitat when the Greeks reached India in the fourth century B.C. Most of the Afghan and allied peoples are agriculturists, but the dominant tribes compel the inferior ones to do the work. Physically the Afghans are well developed and are of a very warlike disposition. Nearly all the tribes scattered along the east of Afghanistan and the northwest frontier of India are within the sphere of British influence. The population, according to statistics available, is about 5,000,000. See, concerning Afghan peoples and their culture: Oliver, *Across the Border, Pathan and Biloch* (London, 1890); Darmesteter, *Chants populaires des Afghans* (Paris, 1888–90). See also the excellent article on Afghanistan in *The Encyclopædia of Islam*, vol. i, pp. 146–172 (London, 1913).

Government. The government of Afghanistan is an absolute monarchy, under an ameer, an hereditary ruler whose actual power varies with his personality. The country is divided for administrative purposes into six provinces, under governors: Afghan-Turkistan, Badakhshan (including Wakhan), Herat, Kandahar, Farrah, and Kabul. The provinces are subdivided into districts, where, up to the time of the ameer Abd-ur-Rahman (d. 1901), members of the royal family and nobles ruled in feudal fashion. Abd-ur-Rahman centralized governmental authority and power at Kabul, reducing the powers of the provincial governors, and established legal codes which have been continued under his successor. Some of the tribes, however, still maintain a more or less turbulent and independent existence. The depredations of the border tribes on Indian territory have afforded the Indian government excuse and opportunity for pushing forward the military frontier. The warlike Afridis and a considerable proportion of the Pathan tribes are now under British control. Frequent conflicts have occurred between the British troops stationed on the northwest frontier, particularly those of the Peshawar district in the northwest frontier province, and the Pathan and Afridi tribes of Afghanistan. The latter are of greater political consequence because of their location, the importance of the Khyber pass to India, and the necessity of maintaining a clear road from India to Kabul.

The State revenue is probably between 120 and 130 lakhs of rupees (13,000,000) a year, of which 18 lakhs are a subsidy paid by the Indian government. Revenue consists largely of payments in kind calculated on an average year's produce. There are many arbitrary exactions and other abuses of taxation, which press heavily on the people.

Afghanistan has a regular army modeled after European fashion. Its strength is not accurately known, but it is estimated at between 50,000 and 60,000 men, including 16,000 cavalry. There is an arsenal, and an ammunition factory at Kabul is equipped with English machinery. The medium of exchange is the rupee. There is a mint at Kabul under the supervision of an Englishman, but its operation is very limited. Instruction is supplied by the Mohammedan schools. The chief cities of Afghanistan are Kabul, Kandahar, and Herat. Among the towns are Balkh, Kunduz, Maimana, Andkhui, Tashkurghan, Akcha, and Mazar-i-Sharif, Faizabal, and Jelalabad.

History. The country now known as Afghanistan was embraced in the ancient Aria. It was a part of the conquests of Alexander the Great, who, it is supposed, founded Alexandria Arion, the modern Herat, the modern Kandahar and a settlement near Kabul. Its masters changed many times in the waves of conquest that rolled over Asia. On the decline of the Bagdad caliphate it was included in the domains of the Samanides, one of the many independent dynasties that then arose in the Mohammedan world. The Samanide princes were overthrown by a Turkish tribe, who founded the Ghaznevide dynasty, and Afghanistan was a part of their realm until the fall of the Ghaznevides in 1186. It was overrun by the conquering Mongols of Genghis Khan in the first quarter of the thirteenth century, and in the last quarter of the fourteenth it was subjugated by the great Tatar conqueror Timur. In 1504 Baber, a descendant of Timur and founder of the Mogul Empire, made Kabul his first capital, and Afghanistan remained a part of that Empire until its decline. In 1722 Mahmud, an Afghan chieftain, invaded Persia, captured Ispahan, and dealt a permanent blow to the prosperity of that famous capital; but a few years later the Afghans were defeated and driven out by Nadir Kuli, a Persian soldier of fortune, who became by his great ability Shah of Persia and the last of the conquerors of Afghanistan. After the assassination of Nadir Shah (1747), one of his officers, Ahmed (see AHMED SHAH), founded the Durani dynasty in Afghanistan, and that country has since maintained an independent existence. Ahmed made considerable conquests in India and maintained a mastery over the Sikhs and Mahrattas, but established no permanent sovereignty. The Durani dynasty fell in 1809, and Shah Sujah, the grandson of Ahmed, became an exile.

Upon the fall of Shah Sujah anarchy ensued, a condition not unfamiliar to the warlike and restless Afghan tribes. The statesmanlike Dost Mohammed succeeded in establishing his authority over the eastern part of the country, with Kabul as his capital. Shah Sujah from his asylum in India carried on intrigues for the restoration of his sovereignty and succeeded in making an alliance with Runjeet Singh, the Sikh ruler. A small subsidy was also obtained from the Anglo-Indian government, and Afghanistan was invaded. The only result was to involve the Afghans and the Sikhs in unprofitable warfare, while Sujah soon returned to India. When Lord Auckland became Governor-General of India, he declared a policy of non-interference in questions concerning the native States; but in direct contradiction of this declaration, in 1838 his government actually undertook to re-

store Sujah, alleging that Dost Mohammed had attacked Great Britain's ally, Runjeet Singh —an attack, it may be noted, for which there had certainly been reason enough. It was further alleged that the military operations of the Afghans had betrayed a hostile purpose toward India; and that Shah Sujah, as the rightful heir to the Afghan throne, had placed himself under British protection. Furthermore, Dost Mohammed, unable to win recognition from Great Britain, was intriguing with Russia. A primitive expedition was determined upon. The British forces entered the country in March, 1838. Some stiff fighting was encountered, but Kabul was finally captured, Aug. 7, 1839, and the conquest was regarded as complete.

In this, however, as in all their dealings with the Afghans, the British showed an entire misunderstanding of the nature of the country and the character of the people. The land had been invaded, but was by no means conquered. Dost Mohammed had surrendered to the English; but his son, Akbar Khan, was actively engaged in a conspiracy, of which the British envoy, Sir William Macnaghten, and his successor, Sir Alexander Burnes, were not aware until it was too late. Early in the winter of 1841, when help from India was impossible, the outbreak took place at Kabul. Burnes, Macnaghten, and several British officers were slain. It was then agreed that the invaders should leave the country; while, on the other hand, Akbar Khan and his confederates stipulated to provide an escort and make other necessary arrangements for the retreat. Depending on these promises, the British army left Kabul on Jan. 6, 1842, in order to return by the Khyber pass into India; but neither escort nor provisions were supplied by the Afghan leaders, and the severity of the season increased the misery of the retreat. The fanatical tribes of the districts harassed the flanks and rear of the army. To escape total destruction, the women and children, together with the married men, surrendered to Akbar Khan, and out of the 16,000 souls that had set out from Kabul, only one man (Dr. Brydon) escaped to carry the dismal tidings to General Sale, who still held his position at Jelalabad. Almost against his own will, the new Governor-General, Lord Ellenborough, sent other forces into Afghanistan. General Nott held out at Kandahar, while General Pollock, at the head of the invading army, forced the Khyber pass, relieved General Sale, and effected a victorious march to Kabul, which he entered in September. The English officers and the women who had surrendered as prisoners to Akbar Khan were restored to liberty, and soon afterward the troops marched back to India. It was believed that the Afghans were deprived of all power to confederate against the government of India; but this conclusion was too hasty, for in 1846 they formed an alliance with the Sikhs against the British, Dost Mohammed being released and permitted to reoccupy his throne. After the decisive battle of Gujerat (Feb. 21, 1849), the Sikhs were forsaken by the Afghans, and Dost Mohammed, with about 10,000 men, fled over the Indus. After this period Dost Mohammed devoted his attention almost exclusively to the consolidation of his dominions, governing well and always seeking to maintain friendly relations with the Anglo-Indian government. He died in 1863, appointing Shere Ali, one of his younger sons, as his heir. At first the choice was acquiesced in by the 16 sons of Dost Mohammed, a large number of whom were governors of provinces; but disputes followed, which for many years kept Afghanistan in a state of anarchy. (See KABUL.) The British government of India had recognized Shere Ali at his accession, and it was the policy of Lord Lawrence's administration in India to abstain from any interference with Afghan affairs. Lord Mayo assumed a like attitude. The claims of Shere Ali's son Yakub to share in the government were ignored, and in 1870 he headed a rebellion against his father; but in the following year a reconciliation was effected through the intervention of England. In 1869 it was settled between England and Russia that all the territory between the Amu-Daria and the Hindu-Kush should be treated as part of Afghanistan. The British conservative government which came into power in 1874 was totally opposed to the policy of non-interference; Russia had already annexed Bokhara and Khiva, and her influence was predominating at Kabul. The Indian government therefore was ordered to insist upon the reception of a British resident at Kabul. This demand was made imperatively in 1878, when a Russian mission had been received. The Afghans were bitterly opposed to any more British residents, and the refusal of the ameer to receive the mission led to the second Afghan war, which in many ways was a repetition of the first, although the disasters were somewhat mitigated. The British invading columns forced the Khyber pass and were victorious at the Peiwar pass, and occupied Jelalabad before the end of 1878. In January, 1879, they entered Kandahar. A few weeks later Shere Ali died, and his rebellious son, Yakub, whose cause had been taken up by the British, was proclaimed ameer and concluded the Treaty of Gandamak with them in May. It was provided that there should be a British resident at Kabul, and that Great Britain should defend Afghanistan against foreign aggression, the ameer receiving a subsidy. The Kuram, Pishin, and Sibi valleys became British territory, and the Khyber pass came under British control.

The peace did not last. In September of the same year there was a revolt in the capital, the British resident, Sir Louis Cavagnari, and his suite were murdered, and the British troops, which were on the point of withdrawing from the country, were compelled to renew the campaign. The Kabul army under General Roberts was the strongest column and held the key to the situation. General Burrows was defeated by the Afghans in July, 1880, and compelled to retreat to Kandahar, which seemed likely to be captured. It was saved by the brilliant march of General Roberts with a strong force from the main army, a march which won for him a peerage with the title "Lord Roberts of Kandahar." Abd-ur-Rahman (q.v.), having been accepted as ameer by the Afghan chiefs, was recognized by Great Britain, which abandoned its claim to maintain a permanent mission at Kabul and agreed to pay to the ameer an annual subsidy of 12 lakhs of rupees (about $400,000). Abd-ur-Rahman established his government firmly and maintained a good understanding with Great Britain while not antagonizing Russia. In 1893 he concluded the Durand agreement with the Indian government, in which he recognized the Chitral, Bajaur, and Swat as within

the sphere of British influence and withdrew his pretensions to Waziristan. Great Britain in return abandoned its claims upon Kafiristan, which was subsequently occupied by the Afghan forces, and increased its subsidy to 18 lakhs (about $600,000). Abd-ur-Rahman died Oct. 1, 1901, and was succeeded by his son Habib Ullah (q.v.). The treaty with Great Britain was renewed, and in 1907 an Anglo-Russian compact was drawn up whereby Great Britain acknowledged Afghanistan's independence. In 1910 the Indian government and Afghanistan agreed to leave their disputes to a joint commission.

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AFIUN-KARA-HISSAR, ä'fê-o͞on'kä-rä'-his-sär' (Turk. Opium Black Castle). A city of Anatolia, Asiatic Turkey, 170 miles northeast of Smyrna (Map: Turkey in Asia, D 3). It is surrounded by rocky hills, on one of which are found the ruins of a castle. The town contains several mosques and Armenian churches. It manufactures saddlery, woolen carpets, and opium, the latter being one of the chief articles of commerce, from which the town derives its name. The trade is considerable because of its situation on several caravan routes and its railway connection with Smyrna, Constantinople, and Konieh. Pop., about 20,000.

AFRAGOLA, ä'frä-gō'lä. A city in south Italy, 5 miles northeast of Naples, noted for the manufacture of straw goods. Pop., 1881, 19,000; 1901, 22,438; 1911, 22,822 (commune).

AFRA'NIUS, Lucius. A Roman poet and playwright, who lived about 100 B.C. He was praised by Cicero and Quintilian for the excellence of his plays, which were known as *fabulæ togatæ*, i.e., comedies on Roman subjects, laid on Roman soil; only the titles and a few fragments survive. They are collected by Ribbeck, *Comicorum Romanorum Fragmenta* (Leipzig, 1898).

AF'RICA (Lat. *Africa*, from *Afer*, inhabitant of Africa; of uncertain derivation, possibly of Phœnician origin. It seems to have been originally the designation of Carthage, as the colony of Tyre, and later extended to the whole continent. It is certain that the name "Africa" was first applied to the neighborhood of Carthage—the part first known to the Romans—and *Afrygah*, or *Afrikiyah*, is still applied by the Arabs to the land of Tunis). A continent of the eastern hemisphere, and in point of size the second of the great land divisions of the globe, with an area of about 11,262,000 square miles, exclusive of islands. Africa is an independent continent in even less degree than is either of the two Americas, for it forms the southwesterly extension of the Old World land-mass, and it lies in close proximity to Asia and Europe, with both of which continents it has, during long periods of past geological time, been intimately united by broad isthmuses. In form Africa consists of two parts—a northern ellipsoid, with an east and west longitudinal axis, comprising the Sahara-Sudan region, and a southern triangular limb attached to the southern side of the eastern half of the northern portion, and consisting of the Congo region and the South African highlands. Somewhat north of the middle point of the eastern side of the continent, a massive triangular projection, the Somali Peninsula, extends almost 1000 miles toward the Indian Peninsula of Asia. The extreme length of Africa from Cape Blanco in Tunis (lat. 37° 20′ N.), its most northerly point, to its southern termination, Cape Agulhas (lat. 34° 51′ S.), is about 5000 miles in an almost north and south direction; and its greatest width from its western outpost, Cape Verde (long. 17° 30′ W.), to its eastern apex, Ras Hafun, on Cape Guardafui (long. 51° 28′ E.), is about 4500 miles in an almost west and east direction. The northern and southern points of the continent are almost equidistant from the equator, so that Africa, compared with South America, has a greater proportion of its area situated in the torrid zone.

At its northeast corner, by the Isthmus of Suez, Africa has a geographic union 90 miles wide with Asia. Until a comparatively recent period it had a much closer union, for the Red Sea and the Gulf of Aden now occupy the deep, narrow basin of a rift valley that has been formed since Pliocene time. On the north the Mediterranean Sea separates Africa from Europe by a wide and deep basin that is restricted at its western end, so that the shores of Spain and Morocco approach to within about 9 miles of each other. Africa and Europe were once united at this point, but were later separated by the continental fracture now occupied by the Strait of Gibraltar. This northern Mediterranean coast is broken only by the broad and shallow embayment that holds the gulfs of Gabes and Sidra. The western extension, from Gibraltar to Cape Palmas, projects into the Atlantic Ocean with a regularly rounded coast line that is almost unbroken by bays or peninsulas, capes Blanco and Verde being inconspicuous projections. From Cape Palmas the coast runs eastward along the north shore of the Gulf of Guinea for about 1200 miles to Kamerun and thence in an undulating line, slightly east of south, for nearly

3000 miles to Cape Agulhas at the southern extremity of the continent, where the Atlantic and Indian oceans meet. The eastern coast of the southern limb, washed by the Indian Ocean, extends from Cape Agulhas with gentle curves for 3600 miles to Cape Guardafui at the apex of the Somali Peninsula.

The coast line of Africa is peculiar in that it presents a remarkably even front, almost unbroken by bays and peninsulas, contrasting strongly in this respect with the coast lines of Europe, Asia, and North America, but resembling that of South America. The length of the coast line of Africa, 18,400 miles, bears a smaller proportion to the shortest possible periphery of a regular figure of its own area (the proportion is 1.8 to 1) than does that of any other continent. It is so compact in shape that with an area about three times that of Europe its coast line is about 1000 miles shorter. The only irregular portion of the coast line is on the northern edge, where the Atlas Mountains send spurs into the Mediterranean Sea. This regularity of the shore line is undoubtedly due to the plateau character and the stability of the larger part of the continent, which during great periods of geological time has stood emerged at approximately the same level above the ocean.

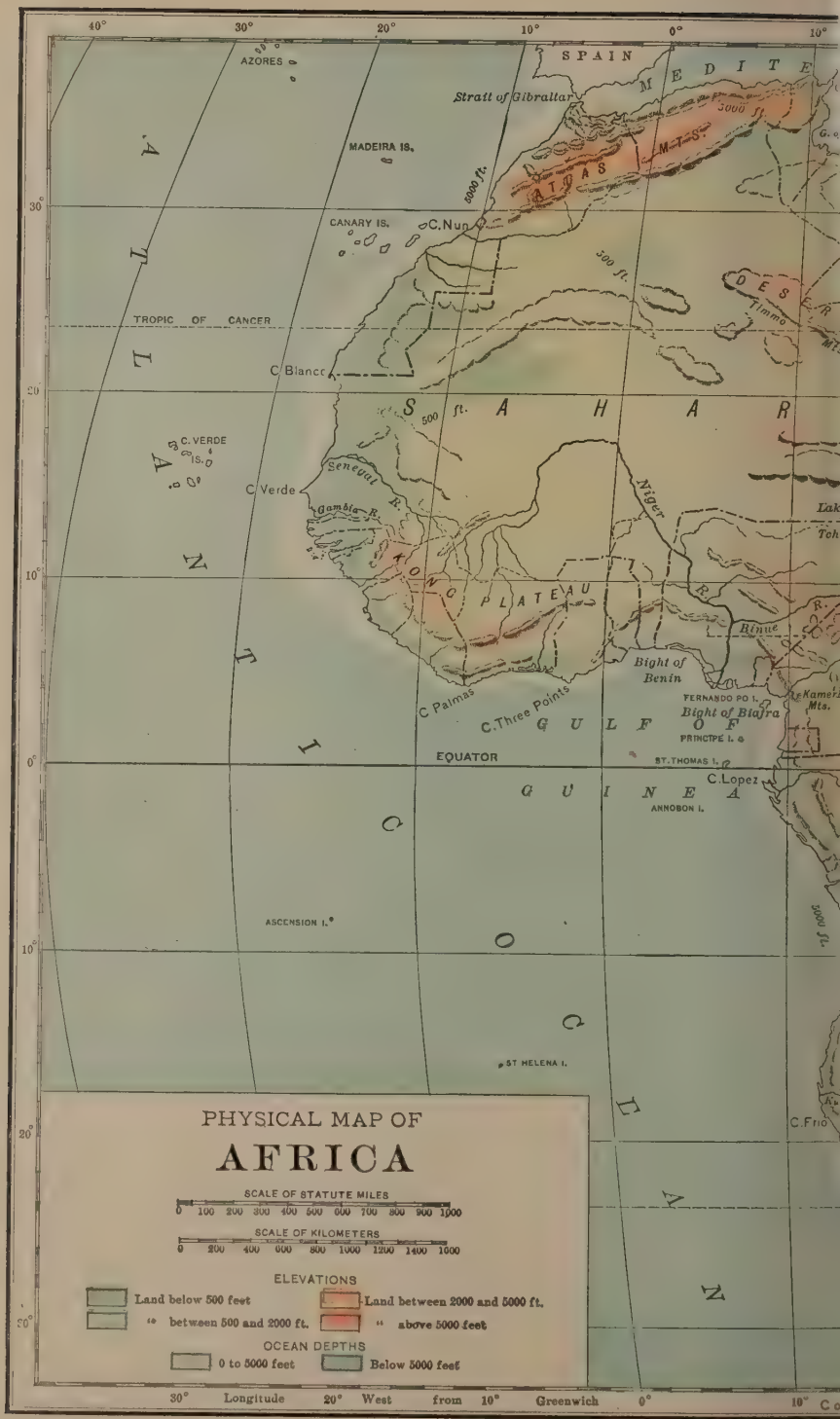
Islands. In connection with the regularity of the coast line, it is of interest to note the small number of islands adjacent to this continent, and also the small proportion of these that have any physical relations with the mainland. Madagascar, off the eastern coast, is the only large island near the continent; it was at a distant period of geological time an integral part of the mainland, but it is now separated from it by the Mozambique Channel, which appears to be a rift valley analogous to that of the Red Sea. The Seychelles, the islands in the vicinity of Zanzibar (Mafia, Zanzibar, and Pemba), and Socotra, off the apex of the Somali Peninsula, may be considered as fragments of the continental mass, while many of the small islands along the east coast, including those in the Red Sea, are of volcanic and coral reef origin and rise apparently from submerged portions of the continental plateau. On the Mediterranean coast the islands of Jerba and Kerkenna in the Gulf of Gabes were formerly united to the mainland, and in past geological times even the island of Sicily was part of a chain of folded mountains that extended from the Tunisian highlands northeastwardly across the Mediterranean Sea. Off the western extension, the Madeira, Canary, and Cape Verde archipelagoes are of volcanic origin, and appear to lie on the outer submerged slope of the continent, perhaps marking lines of folding and fracture that are extended under the ocean level. The Bissagos group, thirty in number, lying a short distance south of Cape Verde, are small fragments of the mainland. From the Bissagos group, the coast is free from islands as far as the head of the Bight of Biafra, where four volcanic islands, Fernando Po, Principe, St. Thomas, and Annabon, extend in a southwestward direction from Mount Kamerun on the coast. Southward from this point the coast has but few islands, and these of small size, all the way to the Cape of Good Hope; and this same condition, in even more marked degree, is continued along the eastern coast for 2500 miles to the island of Mafia. The small extent of Africa's island territory is expressed by its proportion to the mainland area, which is as 1 to 48.

Topography. The typical expression of African topography is that of a plateau that rises here and there by successive terraces to increasing elevations up to and beyond 4000 feet, which altitude is the general level of the highland region that covers a large part of the southern and eastern portion of the continent. The edges of the continental mass are, as a rule, somewhat more elevated than is the interior, and the plateau rims approach close to the sea. Only along the eastern part of the Mediterranean shore and along that part of the Atlantic seaboard between Cape Juby, near the Canaries, and Freetown, can there be said to exist a coastal plain that extends for any considerable distance toward the interior. Swampy districts of limited extent are found along the upper Guinea shore and on the east coast about the mouths of the Zambezi River, and a lowland borders the south side of the Somali Peninsula. The mean elevation of Africa, obtained by a reduction of all irregularities of the surface, has been computed by Prof. H. Wagner to be 2130 feet, which is 160 feet more than that of South America and 170 feet less than that of North America, while it is greatly exceeded by the mean elevation of the Eurasiatic continent.

The topography of the interior presents over large areas a marked uniformity of expression, though different regions exhibit distinctive features. The general plateau character of the surface is broken in the interior of the continent by four areas of depression which in the south and north are occupied by basins of internal drainage. In the southern highland is the Kalahari-Ngami Desert (altitude 2250–3000 feet); the central plateau falls toward its middle to form the Congo Basin (altitude 600–1600 feet); in the central Sudan the Lake Chad (altitude 900 feet) and Bodele (altitude 500 feet) depressions receive the drainage of a great interior region that has no outlet to the sea; and in the northwestern Sahara several inclosed basins lie at altitudes of from 400 to 600 feet above the ocean.

Africa is divided topographically into the following regions: (1) the elevated Southeastern Highlands, (2) the Sahara and Sudan plateau of lower level that covers the entire central and most of the northern part of the continent, and (3) the narrow, comparatively small area of the Atlas Mountains on the extreme northwest coast. On the whole, the general slope of the surface is from the southeast to the northwest.

The highest portions of the continent, called the Southeastern Highlands, lie near the eastern coast and in the lower end of the southern limb. They are limited on the north by an irregular line that may be drawn from Loanda on the west coast, at the mouth of the river Kuanza, eastward to Ankoro on the Upper Congo, thence northward to Daruma, and through Lado and Kassala to Suakin on the Red Sea. Northward from Suakin the eastern highland is continued as a narrow ridge of lower elevation along the western shore of the Red Sea almost to Cairo. This great highland region may be topographically considered to form the backbone of the continent, though it is scarcely that in a geologic sense, for the rocks of which it is composed lie generally horizontal, and the differences of topography are the result of long-continued erosion and denudation rather than of mountain-



PHYSICAL MAP OF

AFRICA

SCALE OF STATUTE MILES

0 100 200 300 400 500 600 700 800 900 1000

SCALE OF KILOMETERS

0 200 400 600 800 1000 1200 1400 1600

ELEVATIONS

Land below 500 feet — Land between 2000 and 5000 ft.

" between 500 and 2000 ft. — " above 5000 feet

OCEAN DEPTHS

0 to 5000 feet — Below 5000 feet

20°
30°
40°
50°
60°
70°
A S I A
CRETE
CYPRUS
5000 ft
G. of Sidra
ISTHMUS OF SUEZ
Mt. Sinai
PERSIAN GULF
Libyan Desert
500 ft.
Nubian Desert
RED SEA
3000 ft.
2000 ft.
Nile
Atbara R.
Blue Nile
L. Tana
SOKOTRA I.
C. Guardafui
GULF OF ADEN
Mbomu R.
Uele R.
Kongo
Aruwimi R.
L. Albert
Rudolf
5000 ft.
EQUATOR
Mt. Ruwenzori
Stanley Falls
Edward Nyanza
Victoria Nyanza
Mt. Kenia
Mt. Kilimanjaro
Kassai
Sankuru
PEMBA I.
ZANZIBAR I.
SEYCHELLE IS.
Lake Tanganyika
L. Nyeri
COSMOLEDO IS.
C. Delgado
Lake Nyassa
COMORO IS.
C. Amber
MOZAMBIQUE CHANNEL
MADAGASCAR
REUNION
MAURITIUS I.
TROPIC OF CAPRICORN
Kalahari Desert
Limpopo R.
Victoria Falls
Zambesi R.
Orange R.
C. Corrientes
C. St. Mary
INDIAN OCEAN
5000 ft
Longitude 40° East from 50° Greenwich 60°
L.L. POATES ENGR'G CO., N.Y.

making forces. This highland has an elevation of over 4000 feet, and above this height rise numerous isolated and grouped peaks to altitudes of 10,000 feet and over. The majority of these high peaks are remnants of a dissected plateau of still higher level, while others are volcanic mountains that rest upon the tableland and rise above it to still greater heights of from 12,000 to 19,000 feet. The central depression of the Kalahari Desert and Ngami Basin in the southern part of the highland, and the deep valleys cut by the rivers that drain this interior basin, serve to divide this southern region into four well-marked isolated plateaus. The most southerly plateau occupies the Cape of Good Hope, Natal, Transvaal, and Orange Free State, provinces of the Union of South Africa and their seaward edges, known as the Roggeveld, Schnee, Zwarte, and Drakensberg mountains, which rise in single peaks of 9000 to 11,000 feet. North of the Transvaal, between the Limpopo and the Zambezi valleys, is the less extensive plateau of Matabeleland, with an average level of 4500 feet and a single peak (Panga Mountain, 6967 feet) near its eastern edge. On the western side of the continent, between the Kalahari-Ngami Basin and the Atlantic coast, is the plateau of German Southwest Africa, covering Damara and Great Namaland. This plateau rises to somewhat lesser single heights than does the plateau of British South Africa: Karas (6570 feet), Awas (6988 feet), and Omatoka (8972 feet). Northward of all these, and extending from west to east through Angola and British Central Africa to the vicinity of lakes Nyassa and Tanganyika, where it joins the great eastern highland, is a broad plateau 750 miles wide from north to south and 1500 miles from west to east, with a general elevation of 3000 to 6000 feet. This forms the divide between the Ngami and Zambezi basins on the south and the Congo waters on the north, and has its highest points on the west end in the plateau of Bihe (Lovili Mountains, 7800 feet), and at the eastern end in the plateau mountain of Chitane (6500 feet) near Nyassa Lake. Toward the south it slopes gradually to the Ngami and Zambezi basins, and toward the north it falls more abruptly to the Congo region. Near the eastern end are two lakes, Moero or Meru (3188 feet) and Bangweolo (3700 feet), that drain into the Upper Congo River.

Stretching northward from the Zambezi River to the Red Sea is that great eastern highland which attains its most extensive development just south of the equator in the region about the Victoria Nyanza. Through a large part of its extent this highland maintains an elevation of over 5000 feet, which in Abyssinia rises over considerable areas to heights of 6000, 8000, and 10,000 feet. The main highland extends northward nearly to Suakin, and a narrow, interrupted spur reaches eastward from lakes Abba and Zuway to the apex of the Somali Peninsula, with peaks declining in height from Mount Mulata (9840 feet) to Godobb (4875 feet) at Cape Guardafui. The surface of this eastern highland is traversed longitudinally by a great system of so-called rift-valleys that constitute the most important feature of East African topography, and with which is associated a system of great lakes. These rift-valleys mark the course of parallel cracks in the earth's crust, between which the surface has sunk for thousands of feet, forming narrow, elongated depressions, or broad cañons, with precipitous walls that rise to the broken edges of the high-level plateau. In these rift-valleys lie the majority of the great African lakes, most of which, consequently, are of elongated form. The longest of these rifts has its northern end in Palestine, in the Jordan and Dead Sea valleys; it forms the Red Sea Basin southward to the straits of Bab-el-Mandeb, where it is joined by a broader rift that comes from the east, forms the Gulf of Aden, and continues southwestward through French Somaliland and the Galla country into British East Africa to lakes Stephanie and Rudolf. At this point the rift-valley divides. One branch continues southward to beyond Lake Manyara, and another trends westward from Lake Rudolf to Lake Albert, and then southward to Lake Shirwa at the southern end of the eastern highland. In addition to these great rift-valleys there are many smaller fracture lines throughout the entire highlands that exercise considerable control over the smaller drainage features.

In the vicinity of the rifts are found the highest mountains, and in general the courses of the great rifts mark the location of volcanic peaks. The massive, snow-topped Ruwenzori range, with its culminating peak, Mount Stanley, rising to 16,800 feet, is among the most important of African mountain ranges, and it appears now to be entirely due to an uplift of a part of the Archæan floor of the continent. South of Lake Edward, on the eastern side of the western rift-valley, is a group of volcanic mountains, some of which are active, culminating in Mount Kirunga (11,194 feet). The most extensive volcanic district, however, lies along the eastern rift-valley and on the Abyssinian highland. Kilimanjaro (19,728 feet) and Kenia (17,191 feet), two isolated, snow-clad, volcanic peaks, rise from the eastern margin of this rift-valley near its southern termination. About the southern half of Lake Rudolf is a series of volcanic peaks, where several active cones rise 2000 feet above the plains, the best known of which is Teleki. Several very high mountains lie between Lake Rudolf and the Victoria Nyanza, the highest of which is Mount Elgon (14,206 feet). The Abyssinian highland is topped by massive fields of ancient lava, from which rise extinct volcanic peaks to heights of about 15,000 feet (Ras Dashan, etc.).

The great topographical feature of West Central Africa is the Congo Basin, surpassing in area the basin of the Mississippi by 175,000 square miles, and stretching from lat. 12° S. to lat. 8° N. and from long. 13° to 31° E. The whole of this area is an elevated plain, sloping gradually from all sides toward the middle west, where the vast outlet debouches, in lat. 6° S. It presents no elevated regions worthy of mention, except about the borders. The southeast watershed is not high, nor is that on the south, which separates the Congo waters from those flowing into Lake Ngami or collected by the Zambezi. North of Lake Tanganyika the high mountains form a lofty watershed between the northeastern sources of the Congo and the sources of the Nile. The basin of the Kotto River, a tributary of the Ubangi, supplies the most northern waters of the Congo system. The high ranges of Adamawa and the coast mountains separate the Congo's more westerly northern tributaries from the Ogowe and other coastal rivers. The mountains which separate the Congo

Basin from the coast are rather the broken eroded margin of the continental plateau than true mountains, and few if any peaks exceed 5000 feet in height.

The topographical division of Sudan covers the equatorial area between the watershed of the Congo and the Sahara Desert, from the head-waters of the Bahr-el-Ghazal, a tributary of the Nile, to the mountains of the coast—that is, the drainage basins of Lake Chad and of the Niger. The basin of Lake Chad is an inclosed area almost in the centre of the continent, its southern margin being removed but a few hundred miles from the head of the Gulf of Guinea. The lake itself has no outlet, and lies about 850 feet above the sea. The eastern border of this basin is separated from the Nile waters by a line of highlands which continue northward across the desert and which culminate in Darfur in the Jebel Marra, rising some 6000 feet above the sea and forming a watershed for eastern Sudan. The western border of the Chad Basin is formed by rocky plateaus, which constitute a divide between this and the Niger Basin; and a uniform plain, diversified by rocky hills, stretches westward to the coast mountains. Large portions of the Chad Basin are dry and open, while other extensive areas are forested or swampy, passing northward into desert. At the head of the Gulf of Guinea are high mountains culminating in Mount Kamerun, which rises to an altitude of 13,368 feet. Farther westward along the coast of Upper Guinea there are mountains, but of no great height, the supposed "Kong Range" of old geographies having been proved non-existent. The irregularly distributed heights in the hinterland of Sierra Leone, Liberia, and the Ivory Coast that mark the edge of the plateau and the descent to coastal plains do not exceed 3500 feet, except in the Peak of Kommono (4600 feet). The coast of Senegal is flat; that more southerly, except in Liberia, swampy; all the rivers, and especially the Niger, form extensive deltas.

The region of arid waste lands called the Sahara lies between the Sudan on the south and the Atlas Mountains and the Egyptian coast on the north. It is a part of an arid belt extending eastward to Baluchistan, the entire area measuring about 4,000,000 square miles. Of this area at least two-thirds lies west of Suez and is known in general as the Sahara. It is all an elevated plain, into which many valleys have been eroded by the ancient drainage systems which are now the most marked topographical features of the region. The whole area may, therefore, be divided into certain regions, limited by natural features. First, the so-called Arabian or Nubian Desert, the area between the Nile, the only living river that crosses the arid zone, and the Red Sea. This is marked in its southern portion by the continuation of the volcanic uplands of Abyssinia, which lessen in height toward the north, but border the Red Sea in a line of jagged mountains, many of which exceed 4000 feet, and one, Jebel Soturba, reaches 6900 feet. In the south is the great rift of the Wady Mahall, probably an ancient Nile channel; and in Lower Egypt are the rifts occupied by the Kharga, Dakhla, and others, forming a line of notable oases. West of the Nile rises the desolate plateau of the Libyan Desert, which covers the whole region from Central Darfur to the Mediterranean (long. 18° to 30° E.), excepting the few oases above mentioned. Its general altitude varies from about 1500 feet in the south to 500 on the Mediterranean, where it breaks down in hills. A line of elevations extending northwestward from the Marra Mountains in Darfur to the Algerian Atlas forms a sort of boundary to the Libyan Desert and makes possible the thinly inhabited oasis regions of Tibesti and Murzuk. Farther west there are wadies, or dried-up river valleys, of which one, with numerous branches, is traceable from the Tropic of Cancer north to the "shotts," or swampy lakes, which occupy the large, low plain (in places below sea-level) west of the Gulf of Gabes. It is believed that within 2500 years this valley was occupied by a flowing river, but now only a few pools and springs exist through the dry season. West of this more broken region between Algeria and Lake Chad there stretches an enormous space of waterless waste land, with shifting sand dunes, broken by lines of rugged and naked elevations having a general northeast and southwest direction. This waste extends to the Atlantic coast all the way from about lat. 18° to 28° N., that is, from the hills of Senegal to the western extremity of the Atlas. The elevation of the Sahara throughout the greater part of its extent exceeds 1000 feet, diminishing gradually from the south toward the north in the Libyan Desert, and from its centre in the western half of the desert toward the Lake Chad Basin and the Niger, and toward the coast of Tunis and Tripoli. Only very small and irregular areas along the northern border are below the level of the Mediterranean.

The elevated district called the Atlas Region, with its littoral margin along the Atlantic Ocean and Mediterranean Sea, is a part of the great Alpine system of Europe, to which it is linked by the mountains of Spain and the Pyrenees. Unlike other African mountains, the Atlas have a folded structure and an Alpine character, and present many parallel zones. These ranges extend in a nearly straight line from Cape Nun, on the Atlantic, northeast to the headlands of Tunis, where they are broken through by the narrows of the Mediterranean. Along the Mediterranean coast the elevations are volcanic and descend very abruptly. Toward the interior, irregular ranges form a long line of heights of Paleozoic rocks, which is sometimes called the Tell Atlas; but this is more prominent in Algeria than in Morocco, where the seaward side is a rough plateau. The Atlas stretches over a distance of about 1400 miles and attains its greatest elevation in the western portion, where it rises to a height of nearly 15,000 feet.

Geology. The geological structure of Africa, in its broad features, may be said to exhibit great simplicity and uniformity. The entire lower limb, with the Sudan and the western portion of the Sahara Desert, has a basal complex of crystalline rocks supporting sediments of Paleozoic and Mesozoic age. Strata of more recent deposition, with but one exception (Lower Egypt), occur only along the sea coast and the rivers. The greater part of the land surface, therefore, was formed in early geological times and has remained above sea-level during succeeding periods. Owing to this uniformity, Africa cannot be divided upon a strictly geological basis into more or less distinct units; such a division, however, has been made from a combined geological and geographical standpoint, separating the entire area into three provinces. The first of these comprises South

Africa, Madagascar, and a large portion of Central Africa, which in late Carboniferous time was united with India by an easterly land extension through the area now occupied by the Indian Ocean; the second includes the Sahara Desert and Egypt and is a continuation of Arabia and Syria; the third comprises the Atlas Mountains and is really a part of the Eurasian continent and of the great system of upheaval that is represented in Europe by the Alps and the Apennines.

The most ancient rocks found in South Africa are granites, gneisses, and schists, which lie below all fossil-bearing rocks and may therefore be classed as Archæan. Above these are tilted and eroded beds of sandstones and slates, which form the rampart along the southern extremities of Cape Colony and extend around to the west and north, spreading out over large areas in Namaqualand, Griqualand, Rhodesia, and regions to the north, and which have special economical importance, as they include within their limits the rich gold deposits of the Transvaal. These rocks are mostly of Paleozoic age. Higher up in the series are the Kimberley shales and the Karoo formation of sandstones and slates, which attain great development in British South Africa. Immensely thick deposits of this sedimentary material were laid down on the floors of the vast lakes that then extended through South Africa and the Congo Basin. No remains of a sea fauna have been found in the Karoo beds, but they are rich in amphibian and reptilian fossils that bear a striking similarity to the Triassic (Gondwana) life-forms of India, and also to those of Australia. They were probably deposited during the Permian and Triassic periods. Underlying them unconformably in places are the Dwyka conglomerate, a peculiar rock that often has the appearance of a volcanic breccia, and the Ecca mudstones and sandstones, constituting a group some 4000 feet in thickness. Volcanic rocks are represented by diabase and basalt, which are spread out over the surface in large sheets, being especially prominent along the eastern edge of the Drakensberg Mountains in the Transvaal. The diamond mines of South Africa are located in the vents of old volcanoes through which a basic rock (peridotite) was erupted. On the other edge of the plateau, along the sea coast, are small detached areas of sediments, more recent in origin than the foregoing.

Livingstone mentioned the presence of sandstones and coal seams along the Zambezi River (lat. 16° 40′ to 15° 50′ S.), and somewhat farther south crystalline rocks of Archæan type appear, as also along the shores of Lake Nyassa. The Rovuma River flows for a considerable distance (about lat. 11° S.) over sandstone beds that rest upon granite. The sandstones are found as high as 2500 feet above sea-level and extend from near the coast to long. 39° E. North of the Rovuma River sandstone strata, possibly of Carboniferous age, are developed on a large scale along two general lines—one extending northwest beyond the shores of Lake Tanganyika and the other extending north to near the equator. Between the diverging areas of sandstone crystalline rocks predominate, inclosing Lake Victoria Nyanza and reaching northward nearly to Lado on the Nile. They have been broken through and are overlaid by volcanic rocks, especially around Lake Rudolf, where volcanoes are still in eruption, and in the region east of Victoria Nyanza, where there are many inactive cones. Volcanic action has been accompanied here by great vertical displacements, to which allusion has already been made. (See also article on GREAT RIFT-VALLEY.) The west side of Central Africa, from the Kunene River to the Gulf of Guinea, appears to be similar in structure to that of the eastern coast. On the shores of Angola there is a narrow fringe of Cretaceous sandstones, and in the interior crystalline rocks, mostly granite and gneiss, and fossiliferous sandstones of undetermined age predominate. These formations extend into the interior toward the Congo Basin, and they may reach also northward into the Sudan. In the Congo Basin there comes into prominence a peculiar superficial deposit called "laterite," which also covers wide areas in Sudan and the Sahara Desert. It is a porous yellow or reddish rock, formed by the disintegration and weathering of the underlying strata.

The plateau of Abyssinia has been found to consist of gneisses and granites as a basal formation, with overlying sandstone strata in nearly horizontal position. This region is especially characterized by the enormous development of volcanic rocks, which at different times have spread out over the surface. Westward, between Khartum and Fashoda on the Nile, there is a large area of Paleozoic sediments, extending on the eastern Nile bank as far south as Lado, where it sweeps around to the west. In Central Sudan crystalline rocks have been found along the Benue River and in the region between this river and the Niger. In the extreme western Sudan sedimentary strata with Devonian and Carboniferous fossils prevail; they are also developed to a lesser extent on the Gold Coast, where they overlie gneisses and schists. The interior of Liberia and Sierra Leone is supposed to be composed largely of crystalline rocks. The Sahara Desert presents a monotonous stretch of horizontal eroded beds of Paleozoic age resting upon eruptives and gneisses. After Carboniferous times, the whole Sahara region appears to have been elevated above sea-level and to have maintained this position until the beginning of the Cretaceous, when there was a subsidence, and the eastern part of the Sahara, including Egypt, was formed. Volcanic rocks are found in certain parts of the interior, but they are relatively unimportant. In Lower Egypt the ridge that forms the western border of the great rift or fault of the Red Sea is made up of gneisses, granites, and basic igneous rocks, with a sedimentary cap called the "Nubian" sandstone. The last-named constitutes the banks of the Nile at Assuan and also extends for a considerable distance into the desert region. To the north the Nubian sandstone is succeeded by Cretaceous and Tertiary limestones.

The Atlas region of Morocco, Algeria, and Tunis offers a striking contrast to the remainder of Africa, in that it is the only present representative of a mountain system formed by crustal folding. It is composed of eruptives, including trachyte and basalt, along the northern edge, with interfoliated gneisses, schists, granite, limestone, and sediments of Carboniferous, Jurassic, and Triassic age. Suess divides the region into parallel zones; the first is composed of volcanic rocks on the coast; the second consists of granite, gneiss, and schist; the third is a belt of sandstone and limestone, reaching southward into the Sahara Desert.

The continental islands, including the Canary, Madeira, and Cape Verde groups, and many isolated islands, are mostly of volcanic origin. Madagascar, however, is an exception and represents the remnant of a larger area that once extended from southern Africa to lower India. The central part of Madagascar is made up of granites and gneisses similar in character to those found on the mainland, while the western shore is formed by Jurassic and Tertiary sediments. See also articles on countries of Africa.

Hydrography. The great river systems of Africa, excepting the Niger, have their sources in the mountains of the south and southeastern parts. At the Gulf of Suez a line of highlands crosses to Africa from Syria, which follows the coast line of the Red Sea to its southern extremity, then bends to the south and southwest, passes the equator, and joins the broad plateaus that extend over South Africa. As there is no prominent interior mountain range, this long line of coastal highlands forms the most important water-parting of the continent. Within its bounds are the upper courses of the Nile, Congo, and Zambezi, as well as of the Orange and of most of the smaller streams. The Nile, Niger, and Congo rivers have their origin on the interior slopes of the highlands, and therefore discharge into the Atlantic Ocean, while the Zambezi drainage basin, lying largely on the outer slopes, falls off toward the Indian Ocean. The longest river system is that of the Nile, whose head stream is the Kagera River rising on the plateau of Ruanda to the east of Lake Kivu and west of Victoria Nyanza. After issuing from that lake on the Nile proper, the river flows northward through the mountainous divide to the plateau region of eastern Sudan, where it receives an important affluent from the west in the Bahr-el-Ghazal, and is joined farther north by the Sobat, the Bahr-el-Azrek (Blue Nile), and the Atbara, all from the plateau of Abyssinia. In the northern third of its course the Nile practically completes its vertical descent by numerous cataracts, after which it flows through a valley that is but little above the level of the sea. The drainage basin of the Nile includes an area of about 1,600,000 square miles. Next to the Nile in length and superior to it and to all other rivers of the world excepting the Amazon in volume is the Congo, which rises in the headwaters of the Lualaba tributary near the boundary between the Belgian Congo and Rhodesia and drains an area estimated at 1,170,000 square miles. The Congo flows a little west of north, then describes a great arc, with its chord formed by the equator, and finally turns southwest, and pierces the coastal barrier of Lower Guinea to enter the Atlantic. The tributaries of the Congo include many great rivers, such as the Ubangi, Kassai, Kuango, Sanga, and Aruwimi. The Lukuga River drains Lake Tanganyika to the Congo; and the Malagarasi tributary of the lake extends a narrow wedge of the Congo basin to within 500 miles of the Indian Ocean. South of the Congo are the drainage basins of the Zambezi and Orange rivers, which extend nearly across the lower limb of the continent and have an eastward and westward slope respectively. The great land-mass composing the western limb of the continent is poorly watered, the Niger being the only river of first importance lying wholly within the area. This river drains the northern slopes of the coastal highlands of Guinea, through which it breaks after being joined by an important tributary from the east, the Benue, and enters the Gulf of Guinea. Of lesser rivers may be mentioned the Limpopo, Rovuma, Sabi, Tana, and Jub, which enter the Indian Ocean, and the Kunene, Kuanza, Ogowe, Volta, Gambia, Senegal, and Draa on the western coast. Owing to the mountainous barrier through which they must pierce to reach the sea, the smaller rivers of Africa generally are unnavigable in their lower courses.

Between the drainage basins of the Nile, Niger, and Congo, and west of the north and south range of highlands of Sudan, is the interior basin of Lake Chad. This lake is fed chiefly by the Shari and Waube, and is subject to great variations of level. It is a shallow body of fresh water, varying in area from 10,000 to 20,000 square miles, according to the amount of its water receipts. In 1902 it was at a low stage and had for years been decreasing in size. In 1911–12 it was again slowly enlarging. This phenomenon of sudden variations in level and consequently in area is peculiar to all the rivers and lakes of Africa within the equatorial regions and is due to the seasonal distribution of rainfall. Between Abyssinia and the Zambezi River and within the bounds of the north and south highland region there is another inland drainage basin with several large lakes, which together constitute one of the most striking physiographical features of Africa. The lakes lie along a line of rifts or fissures which have been formed by sudden displacements of the earth's crust. Some of the lakes are, Margherita, Abaya, Stephanie (in 1912 completely dried up), Rudolf, Manyara, Natron, Baringo, Eyassi, and Leopold (Rikwa), all but Rudolf being small bodies of water. Lakes Victoria, Albert, Albert Edward, Kivu, Tanganyika, and Nyassa drain into the Nile, the Congo, or the Zambezi, and are fresh water bodies. Victoria, Tanganyika, and Nyassa rival in extent the great lakes of North America. For further details, see articles on CONGO; VICTORIA NYANZA, etc.

Climate. Of all the great land divisions of the globe, Africa is characterized by the greatest uniformity of climate. It stretches into both the north temperate and south temperate zones, but the greater part of its area is included within the tropics; there is consequently a successive decrease of average annual heat northward and southward of the equatorial belt, but the regularity of the decrease is modified by certain other factors, so that the region of greatest average heat for the year is located not at the equator but considerably north of it, between the parallels of 10° and 20°. These modifying factors are mainly the direction of the winds and the distribution of the mountains. It is, of course, cooler here in certain seasons than in others; but the average temperature of any given season shows little fluctuation. In summer the isotherm of 80° F. incloses the whole of the Sahara Desert, and over a considerable portion of this area the average summer temperature is 97° or more. This region of extreme heat, which is the largest in the world, may be delimited by a line drawn from Khartum west to Timbuktu, thence north to El-Golea in the Algerian Sahara, thence southeast to Murzuk and thence to Berber on the Nile. The mountain regions of Algeria and Morocco and parts of British South Africa and of German Southwest Africa have a subtropical or temperate climate. Throughout a large portion of Africa, especially

in the mountains of the east and in the Sahara and Kalahari deserts, the temperature varies widely between summer and winter and between day and night, as is characteristic of all desert regions. (See DESERT.) In the Kalahari Desert the extreme seasonal fluctuation reaches 113°, and in the Sahara Desert the temperature during the night often approaches the freezing point. In general, the western coast of Africa is cooler than the eastern coast, owing to the conditions heretofore stated and to the influence of the drift northward along that coast (south of the equator) of the cool water from the Antarctic Ocean. (See article on CLIMATE.) *Winds.*— Trade winds are characteristic of nearly the whole continent. The Sahara Desert is a region of high barometric pressure during the winter months, thus causing outward blowing winds, while in the summer season the pressure is lowered, and there is an indraught from the surrounding territory. In the western part of the Sahara Desert and Sudan, north and northeast winds prevail during the greater part of the year, alternating with northwest and west winds for a few months in winter. The eastern Sahara region and Egypt have prevailing north and northeast winds. A devastating wind called the "khamsin" blows from the southeast across this region at times, carrying dust and sand and causing sudden rises of temperature. A similar dust wind, but usually cooler, blows from the interior of the Sahara over Senegambia and Upper Guinea and is called the "harmattan." During the summer, in the lower limb of Africa, an area of low pressure occurs in the interior, and the prevailing winds are from the east and southeast on the eastern border, and south and southwest on the western. In winter there is a shorter period in which the winds blow outwardly. (See article on WIND.) *Rainfall.*— The principal factors governing rainfall are evaporation, direction of winds, and distribution of mountains. A combination of these factors most favorable to a large rainfall is found on the west coast of Africa near the equator. Here the humid atmosphere from the Atlantic is carried landward by the winds and, becoming cooler, deposits the greater part of its moisture before passing the highland region. The maximum limit of precipitation is probably attained in Kamerun, where the total rainfall in the year may exceed 350 inches, while the Niger Delta and the coasts of Sierra Leone and Liberia also are excessively humid. On the east equatorial coast the winds from the Indian Ocean deliver considerable moisture, but not in such abundance as on the west coast. As they pass into the interior, the winds from both the Atlantic and Indian oceans are deprived of their humidity, especially in the mountains, which act as precipitating agents. Equatorial Africa, as a whole, is thus characterized by a heavy rainfall. North and south of this region, however, the conditions exhibit a striking contrast. In the north is the Sahara Desert, the largest arid region in the world, where the prevailing winds are from the northeast and are hot and dry, while the humidity of the southerly winds that may penetrate into the interior is diminished by the heat and seldom falls as rain. A second arid region, the Kalahari Desert, is found in the southern limb of the continent, between the Zambezi and Orange rivers and the eastern and western coastal highlands. It has a small spasmodic rainfall, which is usually insufficient to support a constant growth of vegetation. The Mediterranean coast region and the extreme southern extension have a dry climate that is tempered by rains during certain seasons. Besides the continental distribution of rainfall, there is a seasonal variation in the amount received in different latitudes. In the regions near the equator rain may fall during every month of the year, but the periods of greatest precipitation occur when the sun is nearly vertical, in spring and fall. Away from the equator there is generally but one wet season. See articles on countries of Africa.

Flora. The vegetation of Africa is very diversified on account of the well-marked topographic districts and the varied climatic conditions. The three zones of tropical, north temperate, and south temperate climate have their peculiar types of vegetation, the distribution of which in each zone is determined by the immediate physiographic features. Forest, steppe, savanna, and desert floras are found in each zone. The flora of the Mediterranean slope of the northern temperate zone has a general resemblance to that of southern Europe, with forests of oak and of smaller trees, as olives and figs, with also the vine and the same cereal grains. The desert regions (typified by the Sahara in the north temperate zone and the Kalahari Desert in Bechuanaland of the south temperate zone) support a scant xerophytic vegetation, which, contrasted with the flora of the North American deserts, has for its most prominent types quite leafless, thorny and fleshy euphorbias and acacias instead of cactuses. In the Sahara Desert the date palm grows often in extensive groves in the oases, and its wide distribution is probably due in large part to the dispersion of its seeds by the nomadic tribes, for whom its fruit serves as an important article of food. Bordering the Sahara and the Kalahari deserts are extensive semi-arid steppe or prairie regions, where the slight rainfall permits of the existence of a somewhat more varied flora, which combines certain of the desert and forest types. The steppe region of the southern temperate zone has, by reason of its isolation, developed a flora peculiarly its own, which is characterized both by the abundant presence of many members of the heath family (which often grow to a height exceeding 10 feet) and also by the general brilliancy of color of the flowering plants.

Those portions of Africa which have a moist climate are divisible into the savanna and forest regions. The forests are found mostly in the equatorial districts, where they are of enormous extent. Here the trees grow to great heights (often 200 feet) and, being close together, support numbers of parasitic vines, forming over vast areas a dense, tangled covering of foliage, through which the direct rays of the sun seldom penetrate. The savanna districts are uniform plains of both high and low land. On the damp lowlands, reeds, especially the papyrus, abound (as, for example, in the marshy regions of the Nile and Congo valleys); on the drier high grounds good pasture grass with euphorbias forms the dominant vegetation, together with forest growths in the river valleys. The more important trees are the baobab (*Adansonia*) and the wine and oil palms (*Raphia* and *Elæis*). In conclusion, it may be stated that the flora of Africa is characterized by the extensive development of acacias and euphorbias over the

entire continent, with the date palm in the northern (particularly in the arid) regions, and the papyrus in the marshes. See DISTRIBUTION OF PLANTS.

Fauna. The fauna of Africa is remarkable for its homogeneity, for the continental range of a great number of its groups and species, due to the absence of extensive mountain barriers, and for its remarkable alliance with the faunæ of the other divisions of the southern hemisphere. Africa—apart from the northwestern corner (the Atlas Mountains, in which live the aoudad and certain other European forms)—is now regarded as forming, together with Arabia and Palestine, a single zoögeographical prime division called Ethiopian. Surveying its principal groups of animals, it is seen to be characterized in respect to the mammals by the preponderance of hoofed animals and the great size of many, such as the elephant, hippopotamus, and rhinoceros, by the originally vast numbers of gregarious grazers, and by their distinctive forms. Thus, there are no true oxen, but a buffalo is abundant; no camels nor llamas; no sheep nor goats; no deer (except the aberrant chevrotain) nor true swine. But it has exclusively several species of the horse family, the zebra, quagga, and wild ass; a giraffe, once ranging all the southern plains, and the okapi (q.v.); the tribe of hyraxes, and almost 100 kinds of antelopes and gazelles, few of which range outside of Africa and Arabia. Of apes, the chimpanzee and gorilla belong to the equatorial forests alone; but more widely distributed, though exclusively African, are the baboons, various kinds of monkeys, and nearly all the lemuroids. Among the carnivora, bears, wolves, and foxes are wholly absent, and several feline, viverrine, and canine forms are peculiar, although the characteristic lion and leopard are not restricted to Africa. The lesser mammals are mainly the same as or allied to southern Asiatic and Oriental forms. Resident birds display similar unlikeness to Europe and Asia, and suggestive resemblances to those of the Australian and Neotropical regions. Thus, the ostrich, so widespread and characteristic of Africa, is unknown elsewhere, but its allies are the extinct and modern ratite birds of the Australasian archipelago and the rheas of Argentina. Africa is rich in reptiles, but few are peculiar, chiefly terrestrial venomous snakes and the chæmasaurid lizards; and the affinities of this group, as of the fishes, are Oriental, though some of the fishes are remarkably related to ancient American families. Similar remarks apply to the invertebrates, where many genera even are the same as those of either Australia, the Malayan region, or America. For particulars as to the various faunal sub-regions, Madagascaran, West-coast, etc., see DISTRIBUTION OF ANIMALS.

Population. Recent authorities roughly estimate the population of Africa at about 140,000,000, or 12.4 to the square mile—a density slight when compared with that of Europe, but much greater than that of the American continent. According to the nature of the soil and of the climate, the population is distributed very unevenly over the surface, being very dense in the Nile delta and massed somewhat densely in the Upper Nile valley, and generally throughout the Sudan, less thickly over the southern plateau, and very thinly in the outlying regions of Morocco and Tripoli; while large tracts, especially in the western Sahara and in the Libyan and Kalahari wastes, are absolutely uninhabited. Of the inhabitants of Africa, only a small portion are recent immigrants from Europe, settled chiefly in the extreme north (Algeria) and in the extreme south (Union of South Africa).

Ethnology. The yellow, the brown, and the red varieties of the human genus have no representatives in Africa, with the exception of some of the Polynesian tribes in Madagascar and the intrusions of eastern Asiatics in recent times. The 140,000,000 inhabitants of the continent represent the white and the black varieties of man, or mixtures of these. Northern and northeastern Africa have been occupied in historic times by white races, while equatorial and southern Africa were the home of black races; but the white Africans have from remote antiquity forced themselves into the black man's territory, and negro blood has mixed with that of Hamite and Semite across the Sahara; hence, especially on the border line, the ethnic stocks are intermingled.

Various schemes of classification have been proposed for the people of Africa, one of the best-known being that by Deniker. Deniker's scheme (*Races of Man: an Outline of Anthropology and Ethnology*, London, 1900) is as follows:

I. Arabo-Berbers, or Semito-Hamites — (1) Jjerba subrace; (2) Elles type; (3) Dolichocephalic Berber subrace; (4) Jerid or Oasis type.

II. Ethiopians, or Kushito-Hamites, sometimes called Nuba, or Nubians.

III. Fulah-Zandeh group. Mixture of Ethiopians and Nigritians or Sudanese Negroes.

IV. Nigritians—(1) eastern Sudan, or Nilotic Negroes; (2) Nigritians of central Sudan; (3) Nigritians of western Sudan and Senegal—Haussas, Mandes or Mandingans, Toucouleurs or Torodos, Yolofs of Senegal; (4) Littoral Nigritians or Guineans—Krus, Agnis, Tshis, Ewes; (5) Yorubas.

V. Negrillos.

VI. Bantus. In central and southern Africa, divided into western, eastern, and southern Bantus.

VII. Bushmen-Hottentots.

VIII. Hovas, Malagasies, and Sakalavas of Madagascar.

This classification is not altogether based on physical difference, for the term "Bantu" has a purely linguistic significance. Thus, some Pygmy tribes, at least, speak Bantu dialects, though their physical type differs widely from that of their taller Bantu-speaking neighbors, and the same applies to some of the East African peoples, whose appearance suggests a mixture of Negro and Asiatic blood. Disregarding relatively recent immigrants into the continent and also tribes of obviously mixed blood, we may distinguish the following racial types: (1) Pygmies, now scattered in small groups over the Congo and neighboring areas; (2) Bushmen, sometimes classed with the Pygmies, but hardly on quite convincing grounds; (3) Hottentots; (4) Negroes. The last-mentioned are often subdivided into Sudanese and Bantu Negroes, but, as already stated, this is not a racial but a linguistic distinction. The Pygmies and Bushmen are commonly assumed to have been the oldest aborigines of Africa and to have been pushed back into more and more undesirable habitats by stronger immigrant peoples.

The northern Africans are Hamitic, and were

DARK RACES OF AFRICA

A BUSHMAN TYPE SOUTH AFRICA

HOTTENTOT TYPE SOUTH AFRICA

CONGO TYPE

ZULU TYPE SOUTH AFRICA

GUINEA TYPE

ZANZIBAR TYPE EAST AFRICA

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preceded (1) by Stone Age peoples; (2) by the kindred of Iberians, Silurians, and other tribes of southern and western Europe. The monolith builders apparently merged into the Berber Hamite intruders, who, in turn, were encroached upon by Phœnician Semites; then followed Romans and Teutonic Vandals, though the chief ethnic element continued Berber until the coming of the Arabs (100–200 A.D.) and the irruption of the Moslems (from 639 A.D.). The Arabs are now in the ascendency, but the Hamitic tribes continue in the uplands (Keane, 1895).

There are among the African peoples examples of the lightest and the darkest races. There are also examples of the smallest and the largest of mankind, as the measurements in metric standard from Deniker will show: Akka, 1.378 meters; Bushmen of Kalahari, 1.529; Mzabite Berber, 1.620; Batekes of the Congo, 1.641; Algerian Arabs, 1.656; Danakils, 1.670; Kabyles, 1.677; Bechuanas, 1.684; Mandingo, 1.700; Kaffirs, 1.715; Somali, 1.723; Wolof, 1.730 (many are over 6 feet); Fulah, 1.741. The Wahuma of Ruanda, East Africa, average not less than 1.80 and are probably the tallest people in the world; statures of 2 meters (over 6 feet 6 inches) are said to be relatively common among them. Compare with these the Aeta of the Philippines, 1.465; Eskimo, 1.575; Lapps, 1.529; Cheyennes, 1.745; Sikhs, 1.709, and Marquesas Islanders, 1.743. The range of cranial index is quite as wide. Among the Congo tribes the index is 72°.5, the Fijuan Negroes have an index of 67°.2; the Sara of the Chad Basin have an index of 82°.41, but many peoples in Oceanica, America, Asia, and Europe range between this ratio and 88°.7.

The development of the native African cultures forms one of the most fascinating problems for the ethnologist because of their established or suggested relationship with the cultures of other areas. In the north and east, Asiatic influences have demonstrably been at work. Ruins discovered in Rhodesia have suggested to some scholars the theory of an ancient migration from southern Arabia, but latterly these structures are believed to be of mediæval origin and to have been reared by Bantu Negroes (see Randall Maciver, *Mediæval Rhodesia*). Quite recently Frobenius has advanced the hypothesis that the older civilization of Yorubaland on the west coast was imported ready-made from ancient Etruria. The art of smelting iron is supposed by Foy and others to have been brought in from Asia, while Von Luschan argues for an African origin of metallurgy. Frobenius and Graebner note a number of really striking resemblances between Negro and Oceanian culture and regard the former as in large measure derived from the latter.

While many of the questions just raised have not been definitely decided, it is clear that the theory of extraneous influences has been considerably overdone. Negro culture, to which that theory is largely confined, bears many characteristic features that indicate independent origin, or at least independent remodeling of imported elements. Moreover, archæological finds within the last 10 or 15 years establish the existence of a stone age over the greater part of Africa and thus suggest a probable beginning for the observed Negro cultures on African soil. It is interesting to note in this connection that there is no evidence for an African copper or bronze age, the natives having apparently taken the step directly from stone to iron implements (granting that the iron technique is of African origin; see above).

A few essential traits of African culture may now be noted. Economically, the three principal modes of securing food are all represented. The Bushmen and Pygmies are hunters and gatherers of wild roots and small animals; the Hottentots and a number of East African tribes, such as the Wahuma and Masai, are primarily herdsmen and in a subordinate way hunters; all the Bantu (with the exception of the Herero) and the Sudanese Negroes are, above all, tillers of the soil, though cattle-raising looms large among the Kaffir and a number of other peoples. Apart from the Bushmen, Pygmies, and Hottentots, the industrial life of the Africans has for its most distinctive feature the practice of the blacksmith's art, for while pottery, weaving, and basketry are extensively cultivated, they are not peculiar to the Negroes as compared with the natives of other continents. Politically the Negroes show a striking tendency towards the formation of powerful monarchies under the sway of absolute despots—a tendency that is strongly contrasted to the essentially democratic spirit displayed by the North and South American Indians. The social organization of relatively few tribes has been determined, so that it is not practicable to generalize on this subject. In many localities, however, a definite clan system has been noted with descent traced either on the father's or the mother's side. The social and political life is often dominated, especially on the west coast, by a secret society that terrorizes the uninitiated; this is one of the cultural elements that lend some support to the theory of Oceanic influence (see above). The existence of markets for the intertribal exchange of goods is highly characteristic of a large part of Africa, as is also the adjudication of legal cases by an ordeal to which the accused is obliged to submit. In the discussion of African native religions such little-understood catchwords as "fetichism" have generally taken the place of sound information. According to recent publications by Pechuel-Loesche and the Congo Museum at Tervueren, Belgium, fetichism, which is especially well developed along the west coast and its hinterland, is at bottom not very different from the manitou beliefs of the American Indians. The carving of a human image, which is usually emphasized in popular accounts, is really unessential; a leaf, or some other inconspicuous natural object, may become a fetich provided it has exerted a peculiar psychological effect on the beholder. What is important is that the object, whether natural or artificial, should be endowed with mysterious qualities by means of magical rites and substances. Amulets, whether produced in this or other ways, are used extensively all over the continent. In some regions, e.g., Yorubaland, divination by the casting of lots, plays a very important part. The Yoruba also worship a very large number of deities, each presiding over some definite department of nature or human activity. What corresponds in Africa to the literature of written languages takes the form of mythic tales about the gods, and more particularly that of animal fables and proverbs, the latter often revealing great shrewdness in the affairs of every-day life.

On the whole, then, the African native cultures must not be underestimated. In many directions, e.g., political organization and cer-

tain forms of artistic endeavor, the Negroes have achieved very creditable results, and if Von Luschan's theory should hold they would have to be honored as the originators of the iron technique.

Religions. Fifty-eight per cent of the population, according to the estimate of H. P. Beach, are devotees of the native religions, which are characterized by features noted in the preceding section.

Imported Religions.—(1) Mohammedanism. Of the religions imported into the continent, by far the most important is Mohammedanism, the faith of 36 per cent of the population. It came thither in the seventh century and overran all North Africa in a hundred years, so completely overturning the Christian churches which had been planted there that they have never been revived. Mohammedanism retains its conquests in Egypt, Barca, Tripoli, Algeria, and Morocco, and it is to-day one of the greatest missionary religions. It presents a one-sentence creed, "There is but one God and Mohammed is his prophet," and has the simplest methods. The missionary is unpaid and usually a native. There are no mission boards, or expenses for salaries and printing. There is usually no special training, although in Cairo there is a Mohammedan university, attended by thousands of students, and from this many of the missionaries go forth. They have been remarkably successful in spreading their faith among heathen populations in Central Africa. In this way Mohammedanism has exerted an influence which counteracts the native religions and so improves the condition of the peoples it reaches. (2) Christianity; (*a*) Copts, the descendants of those original Christians who in the fifth century adopted the theory that in Jesus the human and divine make one composite nature (monophysitism) and so are reckoned among Christian heretics. They are found in Egypt and number about three-quarters of a million. (*b*) Abyssinian Christians, who trace their faith back to the Coptic missionaries of the fourth century, but present a curious mixture of Christianity and Judaism. (*c*) Roman Catholics. The first missionaries of this faith to penetrate the Dark Continent were Jesuits, and they began work in the middle of the sixteenth century. Indeed St. Francis Xavier came to Mozambique as early as 1541, but he did not stay more than six months. The result of the work, carried on continuously ever since, has been that now 1⅞ per cent of the population are Roman Catholics, living in all parts of the continent. Livingstone bore testimony to the value of the work of these missionaries. (*d*) Protestants. The first who came to Africa were Moravians. This was in 1792. Since then all branches of Protestantism have labored there, and their converts now number 1 $\frac{8}{10}$ per cent of the population, and they are found in every part. Roman Catholics and Protestants, especially the latter, carry on missionary work among the Coptic and Abyssinian Christians. South Africa is to a considerable extent a Christian country of the modern civilized type. (3) Judaism. About $\frac{8}{10}$ of 1 per cent of the population of Africa are Jews.

Social Conditions. Slavery is still "the open sore of Africa," as Livingstone said, and nowhere is it more cruel, bloodthirsty, and destructive. The ivory trade is a constant source of trouble, setting tribe against tribe in war. Polygamy is widespread. The tribal government, the absence of central authority, the usual conditions of savage life, in bondage of superstition and terrors of every kind—these disturb life over great stretches of territory. Yet it is the testimony of travelers that peace and a certain kind of prosperity are found in many villages in the very heart of the land. Consult: F. P. Noble, *The Redemption of Africa* (2 vols., New York, 1899); A. P. Atterbury, *Islam in Africa* (New York, 1899); H. P. Beach, *Geography of Protestant Missions* (New York, 1901).

Early History and Exploration. In the earliest historic times, when civilization centred around the Mediterranean, Libya, as Africa was known to the ancients, was one of the three great divisions of the earth, of which Europe and Asia were the other two. The details of its history are to be found in the history of Egypt, still the earliest recorded civilization, and of the other States of northern Africa, as well as of the Roman Empire, which absorbed them all. The brown-hued Berbers seem to have been the fundamental race stock throughout northern Africa, with perhaps Aryan and Semitic infusions, due to the contact of Egypt with Asia and Europe. Whether the Hamitic peoples of Africa were or were not autochthonous is a problem for the settlement of which no sufficient data exist. The knowledge possessed by the ancients of the continent as a whole, so far as we have accounts of it, can be briefly stated. The rulers of Egypt, as subsequently those of Carthage, attempted to extend their influence toward the south and west; but the physical and climatic conditions and the savage tribes encountered presented an effective bar to extended progress at that time. An inscription assigned to the period of the Eleventh (Theban) Dynasty tells of a voyage made by command of one of the rulers of that dynasty to the land of Punt, probably Somaliland. Recent discoveries also seem to increase the credibility of traditions which assigned the biblical lands of Ophir to the eastern coast of Africa. About 30 centuries ago the enterprising Phœnicians planted Utica (c.1100 B.C.), Carthage (826 B.C.), and other lesser colonies along the Mediterranean coast, and Greek colonies were founded in Egypt, in Cyrenaica, and just east of Carthage, during the period of Greek colonization, which began in the seventh century B.C.

The known explorations of the Dark Continent may be said to begin with the famous voyage made by Phœnicians about 600 B.C., an account of which is preserved by Herodotus (iv, 42). There are no sufficient reasons for doubting the general accuracy of the account, which describes the voyage as made by command of Necho, King of Egypt, who had just completed a canal from the Nile to the Red Sea. The expedition sailed down the Red Sea and along the coast of Africa, until the sun for many weeks "rose on their right hand." After a long absence the explorers returned to Egypt through the Pillars of Hercules, so that they must have circumnavigated the continent. A hundred years later, also according to Herodotus (iv, 43), a Persian of noble birth, Sataspes, started, with a Carthaginian crew, down the west coast of Africa, but was compelled to turn back. It is doubtful if he went far beyond the Phœnician settlements, which, beginning at Gades, just without the Pillars of Hercules, already extended well down the coast of Morocco, along which Hanno, about 480 B.C., planted a series of colonies. The "Islands of the Blessed" also (the Madeira and Canary Islands)

were probably within the scope of the sea-going trade of the Phœnicians and Carthaginians. Carthaginian traders trafficked by sea with the Gold Coast, and by land along the caravan routes which communicated with the flourishing regions of Upper Egypt and the Niger. It is probable that almost contemporaneously with the Phœnician settlements in northern Africa, Arabs entered the country south of the Zambezi and, going inland, found and worked the gold mines which have been recently rediscovered. The Greeks began to colonize northern Africa in the seventh century B.C. After the conquest and destruction of Carthage by Rome (146 B.C.), all northern Africa was gradually drawn into the growing Empire; but Rome's interest lay in the known and organized regions, upon which she strengthened the hold of civilization, ignoring all that lay beyond her well-defined boundaries, a policy which was accentuated as the Empire tended toward decay.

Christianity was introduced into Africa in the earliest days; the North African church was a recognized division of the Christian Church in the second century, and when a synod of this church was held in 258 it was attended by 87 bishops. Its chief city was Carthage. Three names in this church are prominent: Tertullian (third century), the first to employ the Latin language in the service of Christianity; Cyprian (third century), Bishop of Carthage, and one of the great ecclesiastics of the early Church; and Augustine (fifth century), Bishop of Hippo, the greatest of the Latin fathers. The earliest translation of the Bible into Latin was made in North Africa, and it was the battle-ground of the famous fights with heretics and schismatics, such as Donatists, Pelagians, and Montanists. But the church was destined to have a short life. Undermined by formalism and apathy, it fell beneath the Mohammedan onslaught in the seventh century. During the Germanic invasions the Vandals grasped the African provinces, and in the early mediæval period much that had been known to Ptolemy and the geographers who preceded him was forgotten. The maps of Ptolemy, representing the knowledge of the second Christian century, indicate the course and sources of the Nile and the mountains of west Central Africa more accurately than they were again shown on maps before the middle of the nineteenth century. What Europe was forgetting, the Arabs, in the advance of the Mohammedan power, rediscovered. From Arabia the new faith spread rapidly westward along the southern shores of the Mediterranean and inland across the desert. It took such deep root in northern Africa that the Christian religion, which in many places was then well established, has never been able to regain a real foothold among the native races.

Northern Africa became a battle-ground during the later Crusades and all the succeeding struggles on the Mediterranean between Cross and Crescent and was the scene of changes and strife among rival Mohammedan dynasties; but ignorance of the rest of the continent only deepened with the centuries, except among the Arabs, who occasionally pushed their expeditions southward. If traditions may be believed, Norman vessels from Dieppe visited the Gold Coast as early as 1364, and in 1413 the Normans built a fort at Elmina. There is neither inherent improbability in this story nor satisfactory evidence to prove it, but it is probable that Norman voyagers found their way to the West African coast at a very early period. In 1402 Jean de Béthencourt sailed from La Rochelle and established a settlement on Lanzarote, one of the Canary Islands. During the next three years he extended his sway over the natives of the neighboring islands. Although his expedition is sometimes spoken of as the beginning of modern African discovery, the accounts of it show conclusively that the islands were already comparatively well known. Indeed, Béthencourt seems to have started with some sort of grant from the King of Castile. Long before, in 1344, the Pope had granted the islands to a scion of the royal house of Castile, Don Luis de la Cerda, who had taken the title of Prince of Fortune, i.e., of the Fortunate Islands. This same year, 1344, is given as the date for the discovery of Madeira. In that year, so the tale goes, a young Englishman, Robert Machin, eloped with Anne d'Arfet, or Dorset, a woman of noble birth, and sailed away with her for France, but contrary winds carried them to the island of Madeira. There the lovers died; but one of the company returned to Portugal, and the report of his adventures served to guide the captains of Prince Henry, who rediscovered the island in 1419.

The real opening of Africa to the knowledge of the modern world began with Prince Henry of Portugal (q.v.), called the Navigator. In 1415 he participated in the victorious campaign of Portugal against the Moorish citadel of Ceuta, and his interest was awakened by the enigma of the unknown continent. On his return he devoted himself to the task of sending expedition after expedition down the African coast to determine the extent of the continent and to find, if possible, a way to the east around it. These expeditions crept farther and farther southward. In 1434 Gil Eannes passed beyond Cape Bojador, the "bulging cape," off which the Atlantic currents ran so strong as to bar all previous attempts at progress. In 1441–42 Antão Gonçalves and Nuño Tristão passed Cape Blanco and reached the Rio d'Ouro, whence they brought back 10 negro slaves and some gold dust; and the demoralizing trade which was to characterize West Africa for nearly four centuries was fairly begun. In 1445 an exploring party started from the mouth of the Rio d'Ouro and spent seven months in the interior. In the same year Diniz Dias passed the mouth of the Senegal, discovered Cape Verde, and returned to Portugal with four negroes taken from their own country, previous importations having been secured by exchange with the Moors. The next year Nuño Tristão reached the Gambia, where he was killed, with most of his followers, by the natives. Ten years later, 1455 and 1456, Cada Mosto (q.v.) explored the river and discovered the Cape Verde Islands. In 1448 the Portuguese built a fort on the Bay of Arguin, south of Cape Blanco, and soon after formed a company for carrying on trade in slaves and gold with the Guinea Coast. The impulse given to exploration by Prince Henry continued after his death, which occurred in 1460. Pedro de Cintra, in 1462, added the coast as far as Sierra Leone and Cape Mesurado to the Portuguese claims. In 1471 Santarem and Escobar carried the Portuguese flag across the equator. Commerce, meanwhile, was familiarizing pilots and the makers of sailing charts with the details of the West African Coast. In 1482 Diogo Cão passed the Congo and heard from the natives tales which seemed to confirm the old

story of Prester John (q.v.), a Christian king ruling somewhere beyond the wall of Mohammedanism with which Europe was surrounded. It has been supposed by some that the King of Abyssinia was the subject of this legend. The Portuguese King determined to communicate with this unknown Christian brother, and in July, 1487, sent Bartholomeu Dias (q.v.) with two ships of some 50 tons and a smaller tender to carry his message. From the Congo, Dias beat down to Cape Voltas, near the mouth of the Orange River. Thence he was driven by storm southward for 13 days, after which he steered north and east in the hope of regaining land. He sighted the southern coast of Africa, near the Gouritz River, at Vleesch Bay. Keeping on toward the east, he landed on an island in Algoa Bay, still known as Santa Cruz, or St. Croix, from the cross which he set up there. When he reached the mouth of the Great Fish River, long the boundary of Cape Colony, the patience of his crews gave out, and they forced him to put about for home. On the return journey he sighted, first of modern sailors, the great landmark which has appropriated the generic name of The Cape. Dias christened it the Stormy Cape (Cabo Tormentoso), but on his return in December, 1488, the King (or, according to Christopher Columbus, Dias himself) gave it the more cheering name of the Cape of Good Hope.

While Dias was rounding the Cape, the King, fearing lest his vessels might fail to reach Prester John, sent another message to that potentate, overland, by Pedro de Covilhão and Alfonso de Payva. From Aden, in Arabia, Payva made his way to Abyssinia, where he was killed, while Covilhão went eastward to India. From Goa Covilhão sailed to Sofala, in eastern Africa, where he gathered news of Madagascar, and satisfied himself that it would be possible to go around to the western side of Africa by water. His report reached Portugal in 1490, but it was seven years before Vasco da Gama (q.v.) proved its correctness, in November, 1497. Starting from Lisbon, he doubled the Cape and, after encountering storm and tempest and the southern sweep of the Mozambique current, sighted, on Christmas Day, 1497, the land which still bears the name he gave it in honor of the day—Natal. After touching at Mozambique and Mombasa, he arrived on Easter at Melinda, where he found a pilot who took him across to India. The land was sighted on May 17, 1498, and three days later Da Gama anchored off Calicut.

Modern Exploration. Thus far the Portuguese had been almost alone in the exploration of Africa, but in the second half of the eighteenth century a new era of discovery began—an era in which men of several nationalities have had a share, and by the results of which several nations have sought to profit. The new line of explorers is headed by James Bruce (q.v.), a Scotchman who had been British consul at Algiers from 1763 to 1765. While in Egypt in 1768 he conceived the plan of seeking for the sources of the Nile. After crossing the Red Sea to Jiddah, he entered Abyssinia by the way of Massawa and proceeded to Gondar, where he won the favor of the negus. After some delay he succeeded in reaching the headwaters of the Blue Nile, and believed that he had found the true source of the main river. He arrived in Cairo in 1773. His account of his journey and the increasing interest in the slave traffic led to the organization, in 1788, of the African Association, expressly intended to promote the exploration of the unknown parts of the continent. In 1795 the association dispatched Mungo Park (q.v.) a young Scotchman, to the mouth of the Gambia, to explore the interior and to find the Niger, on which was supposed to be the negro city of Timbuktu. Passing up the Gambia, Park, after many adventures, reached the Niger, which he traced for a considerable distance along its middle course. He returned to England, but again set forth in 1805, intending to travel overland to the Niger, and by sailing down that stream prove his theory that it was identical with the river which was known at the mouth as the Congo. He was drowned at Bussa, with one of his companions, and all the other members of the party succumbed to fever.

Meanwhile, the Portuguese Brazilian F. J. de Lacerda in 1797 started from the Zambezi to cross the continent from east to west, but died near Lake Moero. Other Portuguese explorers traversed this region from both sides during the next 35 years. The stories that Park had heard and published about the mysterious city of Timbuktu aroused great curiosity. The city was reached in 1811 by a British seaman named Adams, who had been wrecked on the Moorish coast and carried inland as a slave, but was ransomed by the British consul at Mogador. In 1822 Major Denham and Lieutenant Clapperton (q.v.) attempted the trans-Saharan route to Timbuktu. From Murzuk, the capital of Fezzan, they made their way to Lake Chad and thence to Bornu, adding, in a second trip by Clapperton from Benin to the Niger, some 2000 miles of route to the known geography of West Africa. In 1826 Timbuktu was reached by Major Laing (q.v.), who was murdered there. In 1828 René Caillié reached the far-famed metropolis, and his report aroused widespread interest, one sign of which was the prize poem with which Tennyson began his public career. The doubtful geographical problem of the course and mouth of the Niger was finally solved, 1830–34, by the Lander brothers. At this time the exploration of the Nile was carried on under the auspices of Mehemet Ali, its course being traced almost to the equator. In 1847 the German missionaries Krapf and Rebmann discovered the peaks of Kilimanjaro and Kenia.

The middle of the nineteenth century marked the introduction of the distinctly scientific spirit into African exploration. Heretofore the thirst for adventure, the desire to develop a profitable trade, and a somewhat sentimental humanitarianism had been the chief motives of the expeditions. The era of systematic scientific exploration was ushered in by Dr. Heinrich Barth (q.v.), a German in the English service. The primary object of his activity was the opening of trade with Central Africa. He left Tripoli early in 1850 with James Richardson, who died soon after leaving Bornu, where the party had separated. Overweg, another of the leaders, was the first European to sail on Lake Chad, and died in 1852. Barth, for four years, conducted extensive explorations in the heart of Africa. From Lake Chad he crossed Haussland to the Niger, thence across country to Timbuktu, thence back to Say on the Niger, to Sokoto, to Kukawa in Bornu, and across the desert to Tripoli, whence he returned to England with the most valuable contribution yet made to the geographical knowledge of interior Africa. His voluminous works are of the highest value. Before

AFRICA

SCALE OF STATUTE MILES
0 100 200 300 400 500 600

SCALE OF KILOMETERS
0 200 400 600 800 1000

Important towns are shown in heavy face type

Railways

Canals

Submarine Cables

30° Longitude A West 20° from B Greenwich 10° C D E Longitude 20° East F from 30° Greenwich G 40° H 50° J

EUROPE
SPAIN
Strait of Gibraltar
Cadiz
Gibraltar (Br.)
Tangier
Ceuta
TETUAN
Melilla
Oran
ALGIERS
Blida
Philippeville
Bougie
Bizerta
C. Bon
TUNIS
Constantine
Mostaganem
Kairwan
Sousa
Mokalin
Sfax
KERKENA IS.
Gulf of Cabes
DJERBA I.
MALTA (Br.)
MEDITERRANEAN SEA
CRETE
CYPRUS
Beirut
Homs
Damascus
SYRIA
Mosul
IRAQ
Euphrates R.
MADEIRA
MADEIRA ISLANDS (Port.)
Funchal
RABAT
Casablanca
Mazagan
Fez
Mequinez
Safi
MOROCCO
Mogador
Agadir-n-Ighir
Tarudant
Morocco
Abuam
Figig
Gardaia
Wargla
Shott el Chergui
Shott el Melrir
Biskra
Aïn Sefra
Geryville
Laghuat
Gabes
TRIPOLI
Lebda
Mizratah
Turgurt
Yerid
Derna
Tokra
BENGHAZI
CYRENAICA
Gulf of Sidra
TRIPOLITANIA
Nalut
Misda
Ghurian
Ghadames
Bondjem
Bir Bissam
Djarabub
Alexandria
Rosetta
Damietta
Port Said
Suez
Jerusalem
Dead Sea
Jordan R.
Maan
Shoka
Kerbela
SYRIAN DESERT
Euphrates R.
CANARY ISLANDS (Spanish)
LANZAROTE
PALMA
TENERIFE
FUERTEVENTURA
GOMERA
GRAN CANARIA
FERRO
Ifni
Agadir
El Golea
Wadi Draa
Igli
SOUTHERN TERRITORIES
Ghademais
Timimun
Inifel
Fl. MacMahon
El Harib
Kerzaz
Mayara
Tamentit
Timassinin
Tenduf
Kedda
Bojador
Salkha
Grona
El Guedea
Tuat
Akabli
Insalal
Tasili
Tmidi Mts.
Siwah
Garah
CAIRO
Medinetel-Fajum
Baharjeh
Farafrah
Minjeh
Siut
Mt. Sinai
Suez Canal
NEFUD DESERT
Teima
Hail
Bahrein I. (Br.)
Bereideb
Kheiber
Medina
Jamba el Babr
Riad
TROPIC OF CANCER
ARABIAN DESERT
DESERT OF ROBA EL KHALY
ARABIA
Great Arabian Des.
Ahkaf Desert
Terima
Ras Fartak
HADRAMAUT
Kossair
Mokalla
Haura
Aden
Mocha
Hodeida
Sana
Jebel Nakus
Farsan Is.
Dahlak Is.
Massawa
Adowah
Gondar
Sokota
Kassala
Cherek
Atbara R.
Nile R.
Khartum
Gos Rejeb
N. Medani
Sennar
Wad Medani
Omdurman
Ain Medob
Obeid
Kordofan
Foga
Elag
Shendi
Berber
Adarama
Mt. Alooba
Abu Hamed
Sinkat
Tokar
Port Sudan
Suakin
Jiddah
Mecca
Tabala
ASEER
Yemen
Mt. Erba
Nubian Desert
NUBIA
Wadi Halfa
Korosko
Selimeh
Dongola
Handek
Old Dongola
Hannek
Merowe
Ambukol
Esneh
Kena
Assuan
Kosseir
Esneh
THEBES
El Kasr
El Chargeh
Kharga
Dakhla
Farafra
Bahariyeh
Gatrun
Tedjeri
Wau-el-Keb
Ruseima
Talserboo
OASIS OF FUFRA
Erbeba
Bir Bischra
Kelabo
Ghat
Murzuk
Ederi
Sebha
Fugha
Sokna
El Hassi
Audjila
LIBYAN DESERT
EGYPT
Kharga
Dakhla
Farafra
Bahariyeh
Siwah
Alexandria
Rosetta
Damietta
Port Said
Suez
Cairo
Ghadames
Ghat
Murzuk
Gatrun
Tedjeri
Wau-el-Keb
Ruseima
Talserboo
Erbeba
Bir Bischra
Kelabo
Audjila
Bir Bissam
Djarabub
Sokna
El Hassi
Sebha
Fughe
Ederi
Ghodua
FEZZAN
LIBYA
Tropic of Cancer
Villa Cisneros
C. Barbas
C. Blanco
C. Mirik
Dumus
Auadi
Adrar
Wadan
El Chinguetti
Tagenurt
Tauden
Bir
Tindouf
Semmur
Marabuti
El Eglab
Djedid
Grara
Idjidi
Inzize
Ideles
Abalessa
Tadent
Katelet
Timmo
Tummo
Azawa
Tinifaguine
Tibesti
Djebado
Yat
Mt. Toussido
Bardai
Tao
Kaouar
Bilma
Wadyanga
Zaghawa
Bidadi
Kiehl-Kiehl
BORKU
BORDELE
Agram
Dibbeia
Agadem
Bedouaram
Birfo
Fahai
Bir Alali
Kanem
Lake Chad
Abeshr
Akrub
Kolkol
Kabkabiyeh
Kolgeh
El Fasher
Foga
El Obeid
Kadero
Dara
El Towaisha
Tira Mandi
Shekka
Kalaka
Terkama
Baguirmi Territory
Ft. Archambault
Korbol
Hofaten Nehas
Katuaka
Mesbra-el-Rek
Demjiero
Jur Ghattas
Bahr el Arab
Ghala Shambeh
Nasser
Sobat
Bor
Lado
Ft. Berkeley
Burdjio
Dukana
Lake Rudolf
Lugh
Bardera
Gaberoni
Geledi
Sebidle
Itala
Warsheikh
Hagadoxo
Brava
Obbia
Ethur
Baad
Ulgaras
Bandar Beila
Ras Hafun
Somaliland
Berbera
Hargeisa
Tura
Bohotle
Milmil
Warandab
Badwein
Geriguma
Ogades
Abyssinia
Adis Abeba
Ankober
Harar
Saka
Bonga
Baro
Kaffa
Goba
Mt. Arenda
Sheikh Hussein
Lake Stefanie
Dukana
Lake Rudolf
Lugh
Bardera
Gaberoni
Geledi
Sebidle
Itala
Warsheikh
Hagadoxo
Brava
Obbia
Ethur
Baad
Ulgaras
Bandar Beila
Ras Hafun
Italian Somaliland
Gulf of Aden
Gulf of Tadjura
Obock
Tajurah
Aussa
Aramo
Lake Assal
Hanish Is.
Perim I.
Mocha
Hodeida
Sana
Jebel Nakus
Farsan Is.
Dahlak Is.
Massawa
Adowah
Gondar
Sokota
Kassala
Cherek
Atbara R.
Nile R.
Khartum
Gos Rejeb
N. Medani
Sennar
Wad Medani
Omdurman
Ain Medob
Obeid
Kordofan
Foga
Elag
Shendi
Berber
Adarama
Mt. Alooba
Abu Hamed
Sinkat
Tokar
Port Sudan
Suakin
Jiddah
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Tabala
ASEER
Yemen
Mt. Erba
Nubian Desert
NUBIA
Wadi Halfa
Korosko
Selimeh
Dongola
Handek
Old Dongola
Hannek
Merowe
Ambukol
Esneh
Kena
Assuan
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THEBES
El Kasr
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Dakhla
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Bahariyeh
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Tummo
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Hofaten Nehas
Katuaka
Mesbra-el-Rek
Demjiero
Jur Ghattas
Bahr el Arab
Ghala Shambeh
Nasser
Sobat
Bor
Lado
Ft. Berkeley
Burdjio

Barth started from the north, another of the greatest of African explorers, David Livingstone (q.v.), had unostentatiously begun his remarkable career. He had settled in 1841 in Bechuanaland and, gradually pushing northward, discovered Lake Ngami in 1849. In 1851 he arrived at the Zambezi. He prepared himself thoroughly for more extended work and went to the Zambezi again in 1852, followed up the river almost to its source, crossed to Angola, and then returned and followed the Zambezi to its mouth. He went to London in 1856. Burton (q.v.) and Speke (q.v.) explored Somaliland in 1854 and in 1856 led an expedition under the auspices of the Royal Geographical Society, which discovered Tanganyika and the southern shore of Victoria Nyanza, which Speke and Grant explored from 1860 to 1864. Numerous Austrian, Italian, German, and English explorers had been working in the Nile region. Sir Samuel Baker explored the Abyssinian branches of the Nile, met Speke and Grant in 1864, and discovered the Albert Nyanza and its connection with the Nile. Livingstone, between 1858 and 1864, explored the river Shire and discovered Lake Nyassa. He renewed his work in 1866, going from the Rovuma River to Nyassa, Tanganyika, Moero, the Luapula River, and Bangweolo, where he arrived in 1868. Thence he went to Tanganyika and Nyangwe on the Upper Congo, which he called the Lualaba. At Ujiji a relief expedition sent by the New York *Herald* under H. M. Stanley (q.v.) met him in 1871. Livingstone soon returned to Lake Bangweolo, where he died in 1873. Another relief expedition sent out by the Royal Geographical Society in 1873 under Lieutenant Cameron, starting at Zanzibar, learned of Livingstone's death, but went on, mapped Lake Tanganyika, found that the Lualaba was really the Congo, and reached Benguela in 1875, having crossed the continent.

While the solution of the problem of the sources of the Nile was being achieved, important accessions were made to the knowledge of the geography of western Africa. Du Chaillu explored the country back of the Gabun and the region of the Ogowe, and Burton in 1861 scaled the peak of Kamerun.

Dr. Gerhard Rohlfs (q.v.), a German serving in the foreign legion in Algeria, began to make explorations in Algeria and Morocco about 1860 and in 1866 succeeded in making the journey across the desert to the Gulf of Guinea. Another German, Dr. Nachtigal (q.v.), intrusted by the Prussian government with a mission to the Sultan of Bornu, started from Tripoli in 1868, explored the mountains in the central Sahara, and the whole of the eastern Sahara and Sudan. In 1875 Stanley circumnavigated the great lake, Victoria Nyanza, crossed to the Congo, embarked upon that river at Nyangwe in 1876, and followed its course to the Atlantic, which he reached in August, 1877. In 1882 E. C. Hore circumnavigated Lake Tanganyika, and his survey was long the basis of its map, later modified, however, by more scientific measurements. Schweinfurth (q.v.), a native of Riga, ascended the White Nile in 1868, discovered the Welle River, and returned to Egypt in 1872, having accumulated a large amount of information. Leopold II, King of the Belgians, took an active interest in the work going on in Africa and in 1876 organized the International African Association, in which most of the European countries were associated. Several geographical and scientific expeditions were the product of this organization, and stations were opened from Zanzibar to Tanganyika. In 1879 Stanley was sent into the Congo country, supported by funds furnished chiefly by Leopold, and worked for five years in that region in the name of the association. Several thousand treaties were made with native chiefs, by which territorial rights of more or less value were acquired, and permanent posts, with regular routes of trade and travel, were established along the course of the river. The purpose was to found a state which should be a civilizing centre in the heart of Africa. For a time there was some international interest in the project; but for several years those European powers which had been active in African exploration had been looking forward to possible political results, and the institution of such a state, with a territory comprising about one-eleventh of the whole continent, seems to have been the signal for the rise of territorial claims on all sides. Interest in the international enterprise died out, and the King of the Belgians was left free to develop the Congo State into a Belgian dependency. The English hoped to make it an English possession, and the attempt of Great Britain to come to an agreement with Portugal, whose territory in the southwest touched that of the Congo State, led to the assembling in 1884 of the Berlin Conference, called to bring about an international agreement in African affairs. The results of this conference are described in a subsequent paragraph. The State was annexed to Belgium in 1908 and is now known as the Belgian Colony of the Congo (Belgian Congo).

Of the long list of African explorers up to this time only those have been mentioned whose work marked a distinct advance in the knowledge of the continent. There may be added to the number, prior to 1885, the Portuguese Serpa Pinto (1877–79), and Capello and Ivens (1884–85), who made valuable explorations in South Africa; Junker (1880–83), a traveler, whose examination of the western watershed of the Nile was of great value; Joseph Thomson (1883–84), who made thorough studies of the mountainous country between Mombasa and the lakes and likewise in West Africa and the Atlas Mountains; Wissmann (1881–82), who crossed the continent and returned through the southern side of the Congo basin; Oscar Lenz, who in 1879–87 went from Morocco to Senegambia by the way of Timbuktu, ascended the Congo, and traveled to the Zambezi by the way of Tanganyika; Brazza, who explored the country between the Ogowe and Congo; and Emil Holub, who added greatly to the knowledge of the natural history of South Africa.

Much has been done in the way of exploration since 1885, the object generally being to perfect geographical and scientific knowledge of the different regions. Of such expeditions, the best known and one of the most noteworthy was Stanley's mission, undertaken in 1887, in search of Gordon's lieutenant, the German Schnitzer, better known as Emin Pasha, who had retreated into the interior after the fall of Khartum. Stanley went up the Congo and crossed to Zanzibar. On the journey he traversed the dense and vast forest inhabited by diminutive savages, and thus confirmed ancient accounts of African Pygmies. The predominance of the British in Egypt and in South Africa, and the fact that the territory under British influence stretches with but one break (German East Africa) from the mouth

of the Nile to Cape Town, has given rise to the project of a trunk line railway "from the Cape to Cairo," a project which is likely to be carried out at no distant day, with far-reaching consequences in the development of the continent. This plan led to the crossing of the continent from south to north by Ewart S. Grogan and Arthur Sharp in 1899. This journey was productive of much valuable information regarding the country which the transcontinental line is expected to traverse in the volcanic region around Lake Kivu and on the eastern shores of Lake Albert Edward and the Upper Nile. A host of scientific investigators and explorers have in the last 20 years done useful work in various African fields. Among such, special reference should be made to Donaldson Smith in connection with explorations in Somaliland. Two notable expeditions of recent years were those of Marchand, who in 1896–98 traversed the continent from Loanga in French Congo to Fashoda on the Nile, and Foureau, whose journey in 1900 across the Sahara from Algeria to Lake Chad marked an epoch in African exploration. The Chad region and the Sahara have received the particular attention of French explorers. Between 1902 and 1904 Loeffler and Lenfant established the existence of a channel between the Shari and the Binue rivers, thus showing a possible water connection between Lake Chad and the Atlantic. Chevalier in 1902–04 explored the region south of Wadai and Darfur constituting the watershed of the Congo, the Shari, and the Nile. Between 1900 and 1904 Ch. Pierre crossed the continent, following the same general route as Marchand. The western Sahara was crossed in 1904 for the first time since Caillié's journey of 1828 by Laperrine and Thévenaut, who, setting out from Ain Salah and Timbuktu respectively, met at Timiaouine in 21° north latitude. In 1904–05 an expedition under Alexander and Gosling was active in the Chad region. In 1905 Gautier crossed the Sahara from Tuat to the Niger. Among other great explorations were those of Dr. F. Stuhlmann, who studied part of the region to the west of Victoria Nyanza late in the last century, and Dr. Hans Meyer, the first to ascend Mount Kilimanjaro. About 1890 the era of great explorations began gradually to be superseded by the present period of the detailed study of Africa's geography, peoples, and resources. The colonial powers began to give great attention to surveys and mapmaking. This work advanced so rapidly in nearly all the colonies that there were in 1913 good economic maps of most of them showing topographic and climatic variations, the distribution of great forests, swamps, dry areas, plains, highlands, minerals, and other export products, the development of railroads and navigation, etc. Such maps were of prime importance in the shaping of all kinds of enterprise. The intensive study of many parts of Africa had thus far revealed several large areas within the tropics where the white race might live and toil in comparative comfort. Selected white immigrants were invited to make new homes in some of these regions, as in British and German East Africa from 5500 to nearly 8000 feet above sea level and on the high plateau of Katanga in the Belgian Congo. Thousands of white settlers were then engaged in farming and mining on the plateau of southern Rhodesia. Agricultural experiment stations, supported in all the colonies, discovered many facts that helped to develop farming on a practical basis for the supply of commodities both for home and foreign consumption. The development of railroads had been remarkable. In 1913 the great copper field of Katanga (Belgian Congo) was connected by rail with Capetown, over 2100 miles to the south; the line from Cairo extended to Senaar on the Blue Nile, and a branch had been built across the White Nile to El Obeid, the capital of Kordofan; the Belgian Congo had nearly completed the construction of railroads around all the rapids in the Upper Congo so as to connect the Congo mouth with Katanga by rail; both Victoria Nyanza and Lake Tanganyika were joined with the Indian Ocean by rail; and the Upper and Middle Niger were connected at three points with the sea by rail, the most southern of these roads extending to Kano, the leading commercial centre of the Central Sudan, passing through the great cotton area of northern Nigeria. The volume of trade relations between all the colonies and the home countries was steadily increasing. Many enterprises in Africa depend upon the development of a sufficient supply of native labor. All the colonial governments were carrying out wisely devised plans for industrial training; and the natives were selling to the whites a tremendous total of manual service and more of it every year.

The Partition of Africa. The partition of Africa among the European powers may well be dated from the Berlin Conference of 1884. Before that date, it is true, settlements and conquests had been made, but they were more scientific and commercial, as a general rule, than political, with ill-defined and uncertain boundaries, unsanctioned by international agreement. The Conference was called to determine the status of the Congo territory held in trust for civilization by the African International Association. This it accomplished by establishing the Congo Free State with the King of the Belgians at its head. (See BELGIAN CONGO.) It also defined the general spheres of influence of the powers in Africa so that the series of African boundary treaties and agreements since that date are virtually executory provisions added to the Berlin Convention. Three such treaties were concluded by Great Britain in 1890. The first of these, by far the most important, was the Anglo-Saxon agreement, signed in Berlin, July 1. It was a diplomatic stale-mate: Great Britain, by securing Uganda, thwarted the German dream of an east to west connection across the heart of Africa on German soil; Germany, on the other hand, by the extension of German Southeast Africa to the boundaries of the Belgian Congo, prevented effectually the erection of a Cape-to-Cairo railway under the British flag. The second treaty, the Anglo-French agreement, signed in London, August 5, recognized a British protectorate over Zanzibar and Pemba, a French protectorate over Madagascar, and a French sphere of influence extending from Algeria southward to a line from Say on the Niger to Lake Chad. The third treaty, the Anglo-Portuguese agreement, August 20 and November 14, determined the respective territorial rights of Great Britain and Portugal in the dark continent. Two larger problems now remained unsettled—the control of the upper valley of the Nile and of Morocco. The first of these regions, as a result of the Fashoda incident (q.v.), fell to Great Britain, the second to France. Twice since then, in 1905 and in 1911, Germany has

blocked the French program (see MOROCCO), but in 1912 the independence of that country formally came to an end, and the French protectorate was recognized. In the meanwhile, the Orange Free State and the Transvaal lost their independence in the Boer War (q.v.), Belgium annexed the Congo Free State and Italy seized Tripoli, so that Abyssinia and Liberia remained the only independent nations in Africa. Then came the redistribution of the German colonies after the war.

The partition may be summarized thus: In the northeast, Egypt turned into a British protectorate during the war, struggled afterward for independence, and the issue was still pending in 1921 and 1922. Tripoli is Italian. Tunis and Algeria belong to France, whose influence reaches down across the Sahara to the upper waters of the Congo. On the west coast, below Morocco, lies the small Rio de Oro possession of Spain. Then come French Mauretania and Senegal, British Gambia, Portuguese Guinea, French Guinea, the British Sierra Leone, Liberia, another block of French territory, the British Gold Coast and Ashanti, Togoland (formerly German) divided between England and France, French Dahomey, British Nigeria, and Kamerun (formerly German; after the war under French mandate). Off the coast of Kamerun lies the Spanish island of Fernando Po, to which are attached some other small islands and a small district on the mainland. Then comes French Equatorial Africa (formerly French Congo) within which lies Portuguese Kabinda. Then come Portuguese Angola and Southwest Africa (formerly German; after the war under the mandate of the Union of South Africa). Next comes the Union of South Africa, which comprises the federated British colonies of Cape of Good Hope, Natal, the Orange Free State, and the Transvaal. North of the Union of South Africa on the east coast lies Mozambique or Portuguese East Africa. Between it and Southwest Africa, on the opposite or west coast, lie the British protectorate of Bechuanaland and the British colony of Rhodesia. North of Portuguese East Africa is British Tanganyika (formerly German East Africa), which occupies the east coast north of Lake Nyassa and the Rovuma River. Still farther north is British Kenya (western portion Uganda), which touches on the north the British sphere of influence in the Sudan, Abyssinia, and, on the coast, Italian Somaliland. West of the latter on the Gulf of Aden is the British Somali Coast Protectorate, then French Somaliland, Italian Eritrea, the four territories last named shutting off Abyssinia from the coast.

The area of Africa has been variously estimated at from 11,200,000 to over 11,500,000 square miles, inclusive of islands. Its population has been placed at about 140,000,000. Before the European war the possessions and dependencies of the British Empire in Africa had an estimated area of 3,700,000 square miles and an estimated population of 53,325,000; while the territory under France was placed at 4,641,000 square miles with a population of 29,577,000. Large accessions to the African territory of both these powers resulted from the partition of the German colonies between them in accordance with articles 22–119 of the treaty of Versailles, the decision of the Supreme Council, May 7, 1919, and the Franco-British agreement of July 10, 1919, Kamerun and the larger part of Togoland passing under the mandate of France, German East Africa under that of Great Britain, and German Southwest Africa under that of the Union of South Africa. See GERMAN COLONIES.

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AFRICAINE, L', là'frē'kăn' (Fr. The African). A French opera by Giacomo Meyerbeer (q.v.). The words are by Scribe, and it was produced in Paris, April 28, 1865, a year after the composer's death.

AF'RICAN'DER. See AFRIKANDER.

AF'RICAN HAIR. See CHAMÆROPS.

AFRICAN IN'TERNA'TIONAL ASSO'CIA'TION. In 1876 the King of Belgium called a conference at Brussels of geographers and explorers to consider means for the opening up of Africa to civilization, and there the African International Association was formed, with the object of establishing stations for scientific purposes in eastern Africa. When H. M. Stanley in 1877 revealed the magnitude and importance of the fertile Congo basin, a second conference was assembled at Brussels, at which the African International Association made plans which extended its field of operation over the newly explored territory. But the greed of the different nations, awakened by the dazzling territorial and commercial prospects the Congo basin afforded, brought about endless disputes, until at length it was decided, by the mutual consent of all the great powers, including the United States, to leave the final adjustment of the difficulties to an international conference in Berlin. The conference opened at Berlin, Nov. 17, 1884, with Prince Bismarck in the chair, and ended its labors Feb. 26, 1885. Fifteen States were represented. As a result of mutual compromises, it was declared that the immense regions forming the basin of the Congo River and its tributaries shall be neutral territory, that perfectly free trade shall exist there, that citizens of any country may undertake every species of transportation within its limits, that the powers exercising sovereign rights over neighboring territory are forbidden to exercise monopolies or favors of any kind in regard to trade, and that they shall bind themselves to suppress slavery. The King of Belgium was made sovereign of the new State. See AFRICA; BELGIAN CONGO; STANLEY, H. M.

AFRICAN LAN'GUAGES. Of the numerous classifications of African languages, that which best represents our present knowledge is the following:

1. **Semitic.** Arabic; the Abyssinian languages derived from Geez (the so-called Ethiopic), i.e., Tigré, Tigriña, Amharic, Harari, Gurague. The languages comprised in this division were brought into Africa by Semitic immigrants or invaders.

2. **Hamitic.** Libyan dialects; ancient Egyptian (whence Coptic, now extinct), Bishari (Beja, Bedauye), Saho, Afar, various Agau dialects of Abyssinia (Chamir, Quara, etc.), and of the highlands south of it (Kaffa, Kullo, etc.), Galla, and Somali, Haussa in the west of the Sudan. Quite recently Meinhof has included Ful, Masai, and Hottentot among the Hamitic tongues, but the theory has not yet been under fire for a sufficiently long time to estimate its value. So far as the Hottentot is concerned, it is certainly not convincing, though Von Luschan has tried to prop it up with cultural evidence, such as the pastoral life of both Hottentot and Hamitic tribes.

3. **Hottentot.** For the reasons given above, this language must for the present be considered distinct from the Hamitic stock, the most significant trait shared with members of that family being the category of sex gender. Im-

portant as this feature is, it hardly suffices to establish genetic relationship even of a remote kind.

4. **Bushman.** As there is no anthropological, so there is practically no linguistic, justification for uniting Bushman and Hottentot in a single group. One reason for so classifying them has been a phonetic one. Both Bushmen and Hottentot use "clicks" as normal elements of speech combined in the same words with other elements, while we employ clicks only as interjections, in urging on horses, expressing anger, sympathy, etc. It is a fact, however, established by North American data, that phonetic peculiarities do not necessarily coincide with linguistic boundaries. Some African scholars have suggested that the clicks were originally peculiar to the Bushman language and adopted by the Hottentot. Indeed, such a process of borrowing has almost certainly occurred in some South African Bantu dialects, notably Zulu, which also employ clicks, though these are lacking in the majority of Bantu languages.

5. **The Bantu Family,** which embraces, roughly speaking, all Africa south of the equator. A characteristic type is represented by the language of the Zulu Kaffirs and their nearest relatives. To what extent corrupt Bantu dialects are spoken on the western coast has not yet been determined.

6. **The Sudanese Family.** North of the Bantu-speaking Negroes and south of the Hamitic and Semitic tribes of North Africa there dwell Negroes whose speech showed until recently a bewildering number of distinct languages, even within relatively narrow territories. This diversity stood in marked contrast to the uniformity of language in the Bantu area. Quite recently, however, Westermann has advanced the important theory that many of these supposedly distinct tongues, including some of the eastern as well as the western Sudan, were related and might thus be classed together as the Sudanese family. Among the traits common to all, the monosyllabic character of the root words is laid stress upon. It cannot be said that this theory, however valuable and suggestive in bringing order into what was once chaos, has already been definitely established. It represents, however, the latest thought of one of the best of African linguists and has secured the support of so eminent an ethnographer as Professor von Luschan (in Buschan's *Illustrierte Völkerkunde*, art. "Afrika").

The line of demarcation between the Sudanese and Bantu has not yet been accurately determined throughout its entire course. It certainly passes through the Kamerun, within which both Bantu and Sudanese populations are found, and through the northeasternmost part of the Congo. A tentative linguistic map has been published by Westermann. See BIBLIOGRAPHY.

The Malagasy language, spoken on the island of Madagascar, belongs to the Malay family of speech. By reason of its geographical position it need not be considered here.

Writing. The use of writing and the necessity for it imply a degree of civilization to which the majority of the inhabitants of Africa have never risen. It is, therefore, almost exclusively the white race, represented by the Hamites and the Semitic immigrants, which comes into consideration here.

Semitic. In the Semitic family we have the Phœnician alphabet, used by the Carthaginians along the northern coast. The Punic and later Neo-Punic characters were modifications of the Phœnician and are distinguished by special characteristics. The Arabic character is now used wherever Islam has become the prevailing religion; but it is mainly employed for writing the Arabic language, which forms the general medium of religion, commerce, and social intercourse. The use of the Arabic character for African languages is not very frequent (e.g., among the Berbers, the Suahelis). The Malayan immigrants, however, and the Mohammedan Kaffirs use it as far south as Cape Colony; and the Mohammedans of Shoa as well as the inhabitants — also Mohammedans — of Harrar sometimes write their respective languages, Amharic and the closely related Harrari, in Arabic letters. On the other hand, in and around Abyssinia a number of languages are regularly written in the Amharic modification, or rather amplification, of the old Ethiopic or Geez alphabet. Unlike most of the other Semitic languages, Ethiopic and its modern descendants are written from left to right. The vowels are expressed graphically by modifications of or slight additions to the consonants, thus forming a kind of syllabary. We can trace this peculiar system of writing as far back as the fourth century A.D., through some ancient monuments in the old capital of Axum (consult D. H. Müller, *Epigraphische Denkmäler aus Abessynien*, 1894). The development of those peculiarities took place on African soil, though the consonantal characters are derived from the old South Arabian writing (wrongly called Himyaritic). See ETHIOPIC WRITING.

Ancient Egyptian. From the Egyptian hieroglyphic writing was developed a cursive form, the Hieratic, and this in turn gave rise to the still more cursive Demotic. All these have long since passed out of use, though Coptic, which survives only as the ritual language of the native Egyptian church, retains in its alphabet a few characters derived from the Demotic.

Ethiopian. The ancient Ethiopians of Napata and Meroë had, beside the Egyptian systems of writing, which they used almost exclusively for the Egyptian language, a cursive system of their own for the native idiom. As the few inscriptions in this character which have been preserved have not yet been deciphered, it is not possible to say anything positive about it. It is even doubtful what language these inscriptions represent, although it is perhaps nearer to the (negroid) Nuba than to the Hamitic Beja or Bishari. The alphabet was evidently borrowed from outside sources, though whether Egyptian or South-Arabic elements underlie it cannot at present be determined.

Libyan or Numidian. The old Libyan or Numidian writing, a very imperfect system, goes back to the ancient alphabet of South Arabia (as Euting has clearly shown), and not to Punic. It is represented by many inscriptions in Algeria and Tunis. The first decipherment, on the basis of the famous bilingual inscription of Tukka, is due to Blau (see also Halévy, *Essai d'épigraphie Libyque*, 1875, a collection by Faidherbe, 1870, etc.). It is worthy of note that the ancient funeral inscriptions in this character read from below upward. This system is similar to the *tifinaghen* or alphabet of the modern Sahara tribes (or Tuaregs). Oudney is said to have been the first who observed and called attention to their peculiar system of writing

(1822). The best description of the alphabet is to be found in Hanoteau, *Grammaire de la langue Tamachek* (1860).

Negro. Only one Negro language has developed a writing of its own, the Vei, on the west coast near Cape Mount. Doalu Bukere, a native who knew something of the Roman character, invented it about the year 1834. The writing was afterward used for Mohammedan missionary work. It is a clumsy syllabary with complicated forms sometimes suggestive of hieroglyphics, and quite distinct from European or Arabic writing. A number of books have been written in it, but the Christian missionaries have declined to use it, and it is dying out. It has received considerable attention from linguists, as the only case known in which the actual invention of a system of writing, in popular use, can be clearly shown. The idea, however, was certainly borrowed from the Europeans. Consult Steinthal, *Die Mandē-Neger-Sprachen* (Berlin, 1867).

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In recent years it has become more and more customary to record the myths, tales, proverbs—in other words, what had formerly been the unwritten literature of primitive tribes—in the original by means of phonetic writing. Of the numerous African publications of this sort only a few can be here referred to. Callaway's Zulu works form a pioneer effort for the Bantu tongues. Spieth's *Die Ewe* is perhaps the most noteworthy collection of Sudanese texts. A splendid series of Hottentot fables and other tales will be found in Schultze's *Aus Namaland und Kalahari;* and some of Bleek's long-delayed Bushman material, revised by Miss Lloyd, has at last appeared in book form. Hollis's *The Masai* represents the possibly Hamitic tribes of East Africa.

AFRICAN METH'ODIST EPIS'COPAL CHURCH. See METHODISM.

AFRICAN METH'ODIST EPIS'COPAL ZI'ON CHURCH. See METHODISM.

AFRICAN MIL'LET. See SORGHUM, NONSACCHARINE.

AFRICAN OAK. See TEAK.

AF'RICA'NUS. An *agnomen* (q.v.) borne by two of the Scipios. See SCIPIO.

AFRICANUS, SEXTUS JULIUS. A Christian writer. He was born in Libya, and made his home in Emmaus, near Jerusalem, from 195 on till after 240, but traveled extensively through Asia Minor. He is remembered for his chronology from the creation to 221, of which fragments are preserved. These and portions of other writings are printed in Migne, *Patrologia Græca,* x, 51–108, xi, 41–48; Eng. trans., *Ante-Nicene Fathers* (New York ed.), vi, 123–140.

AF'RICAN WAR, THE. In Roman history, the war between Julius Cæsar and the members of the Pompeian party who, after the battle of Pharsalia, renewed the conflict in Africa and were defeated at Thapsus, 46 B.C. The account known as the *Bellum Africanum* attached to the works of Cæsar is of uncertain authorship.

AFRIDI, ȧ-frē'dē. See INDIA, *History.*

AFRIDIS, ȧ-frē'dēz. One of the Afghan or Pathan peoples of the Indo-Afghan border who have of recent years come into hostile contact with the British authorities. In their somewhat savage yet intelligent semi-independence they represent, perhaps, ancient Aryan society of an early type. A brief account of them by Holdich appeared in the *Journal of the Anthropological Institute* (London) for 1899; see also the same author's *The Indian Borderland* (London, 1901).

AF'RIKAN'DER. The Dutch form for "African," used of white persons born in South Africa, especially the Boers.

AFRIKANDER BUND, bụnt, or **BOND.** An association in South Africa designed to consolidate Africander influence and eventually to form an independent union of the South African States. With its present name it dates from 1880. As a political party in Cape Colony it for a time supported the policy of Cecil Rhodes, but after the Jameson raid (1895) it separated itself from him. In 1898 it secured a majority in the colonial legislature. While it urged President Kruger to a more liberal policy, it favored the Boers in the war with Great Britain. On Dec. 6, 1900, an Africander congress was held at Worcester, Cape Colony, which demanded Boer independence and condemned the war. After the war (December, 1902), the Bund was reorganized to further the federation of the South African colonies under the British crown, and became largely identified with the South African party, which represented the interests of the Afrikanders without assuming an exclusively Dutch character.

AFRITE, ăf'rêt. A powerful spirit, or jinn (Lat. *genius*), figuring in the stories of *A Thousand and One Nights.*

AF'TER-GLOW'. See TWILIGHT.

AF'TER-IM'AGES. Retinal images which appear after the eye has been removed from some illuminated object. When we light our lamp in the evening, we are distinctly conscious that the illumination has a reddish-yellow tinge. As time goes on, however, we lose the color; the paper on which we write seems to be as white as the same paper seen in diffuse daylight; our eyes have become adapted, or have grown used, to their surroundings (*general adaptation*). The law of adaptation is that all brightnesses tend toward a middle gray, and all colors toward neutrality. Adaptation leaves an after-effect, which is termed *disposition.* A yellow-adapted eye is disposed to the complementary color, or blue-sighted: all the yellows that it sees tend toward gray, and all other colors take on a tinge of the complementary blue. See CONTRAST; VISUAL SENSATION.

Adaptation may be *local,* as well as general. Suppose, e.g., that I fixate steadily a green disk seen upon an extended white background. The part of the retina upon which the green falls will become green-adapted, and therefore red-

disposed or red-sighted. Hence, if I presently remove the green disk, I shall see a subjective red disk in its place. This red, the after-effect of local adaptation, is termed (1) the *negative after-image*. The color and brightness of the after-image are always complementary to the color and brightness of the preceding stimulus; a dark-blue stimulus gives a bright yellow after-image, and a bright yellow stimulus a dark-blue after-image. If one stares for half a minute at a window that gives upon a bright gray sky or a snowy landscape, and then turns one's eyes upon a gray screen or wall, one sees an after-image window with white bars and black panes. In general, the vividness and duration of the negative after-image depend upon the intensity and duration of the stimulus which evokes it and on the brightness of the surface upon which the after-image is projected for observation. It is probable, although the point is still disputed, that the course of the after-image is intermittent, not continuous. Theoretically important is the fact that a contrast-color (see CONTRAST) set up in the neighborhood of the stimulus is effective in the after-image; thus, a disk of red paper seen on a gray background, and giving a narrow green ring of marginal contrast, appears in the after-image as a green disk surrounded by a distinct reddish halo. (2) If the original stimulus be very strong and of brief duration, it may give rise to what has been called the *positive after-image*, a subjective phenomenon in which the stimulus-sensation is reproduced, only with diminished brightness and saturation. (See VISUAL SENSATION.) Thus, a flash of brilliant red light would be followed, first, by a brief but noticeable blank interval; then by the positive after-image, a duller and pinker red; then by a second interval, somewhat longer than the first; and, finally, by the dark-green negative image. The usual explanation of this positive image is that the physiological effect of stimulation persists for some time after the physical stimulus itself has ceased to operate; the sensation, therefore, outlasts the stimulus, remaining the same in kind throughout its course. This account is, however, as inadequate as is the theory which would account for the negative after-image on the score of retinal fatigue. It is disproved by the single fact that the short interval which elapses between stimulus and positive image (the first interval described above as "blank") may, under certain circumstances, be filled by a *positive* and *complementary image*. Thus, if a glowing red point be moved slowly to and fro in the dark, one sees first a trail of red light (due to the stimulus and its direct after-effect), and then a bright (positive) green streak. Then should follow, if the series is complete, the positive image proper, a dull red, the second blank interval, and the negative green image. The dull red is, evidently, not a direct continuation of the red of the stimulus. No satisfactory theory is as yet forthcoming.

Especial interest attaches to the colored images obtained from intensive stimulation with white light. Close your eyes and keep them closed until there is no trace of previous stimulation (no colored after-image) on the dark field. Then fixate for some 20 seconds the middle bar of a window which looks out upon a brilliantly white sky. Close your eyes again, and note the development of the after-image on the dark field. You see a color sequence, which is known technically as the *flight of colors*. The current explanation of the phenomenon is that the white light of the sky is broken up into its physical components, in somewhat the same way as a ray of light passing through a prism is broken up into the series of spectral colors; and that the retinal excitations corresponding to the red, green, and violet stimuli (the part-stimuli contained in the white light) are not exactly coincident, but overlap in time, so that now the one and now the other shows itself in the after-image. It is, however, noteworthy that the flight of colors, under conditions of exact observation, shows unmistakable evidence of two overlapping complementary series. The sequence is: a momentary positive image; then, after fluctuations, a blue, a green, a yellow, a red (at this stage the image becomes negative), a blue, and a green image. We have, that is, the series blue-yellow-blue and the series green-red-green laid over one another; there is clear indication of antagonism or complementarism, but none of a general breaking up of the white light into its spectral components. We must remember, also, that "white" light is never quite colorless; there is always some tinge of color in diffuse daylight. The facts point to the validity of an "antagonistic" theory of visual sensation (q.v.). (3) We may note, finally, the existence of a *binocular* or transferred after-image. If one eye be stimulated, under suitable conditions, a faint, positive image appears in the field of the other, unstimulated eye. Lay a bright red-orange disk upon a sheet of white paper and fixate it monocularly for 5 or 10 seconds. Then blow away the disk, close the stimulated eye, open the unstimulated one and fixate the white ground. You see at first a pale-yellowish image. Then the field darkens and a blue negative image makes its appearance. Presently the ground clears and the yellowish patch comes once more. Then the white darkens again and the blue image recurs. The darkening is due to retinal rivalry: the dark field of the closed (stimulated) eye is superposed upon the bright field of the open (unstimulated) eye. The blue image is the negative after-image belonging to the dark field, i.e., to the originally stimulated eye; its appearance requires no explanation. On the other hand, the faint yellowish image belongs to the unstimulated eye, is an after-effect of the orange stimulation, but an after-effect that differs entirely from the after-effect in the stimulated eye, and that has been transferred to the eye which was not exposed to the stimulus. Its existence points to a close functional inter-relation between the two halves of the visual apparatus. Consult H. von Helmholtz, *Physiologische Optik* (Hamburg, 1909–11); E. Hering, *Zur Lehre vom Lichtsinne* (Vienna, 1878); O. Kuelpe, *Outlines of Psychology* (London, 1909); E. B. Titchener, *Experimental Psychology* (New York, 1901).

AFZE'LIUS, *Sw. pron.* åf-sā'lĭ-ŭs, ADAM (1750–1837). A distinguished Swedish botanist who resigned the chair of Oriental languages at the University of Upsala to pursue the work that was more congenial to him. After some years spent in arduous study, he founded the Linnæan Institute at Upsala (1802) and later wrote the standard biography of Linnæus (1823).

AFZELIUS, ARVID AUGUST (1785–1871). A Swedish poet and antiquary. He translated the *Elder Edda* (see EDDA), and, with Geijer, edited a noteworthy collection of old Swedish popular

songs (1814–17). He is esteemed for his poetical *Romances* and for his studies in Norse history and literature, writing a history of Sweden to the time of Charles XII.

AGADES, ä'gà-dez. An African city, the capital of the oasis kingdom of Air (q.v.), situated in lat. 16° 30′ N. and long. 8° E. (Map: Africa, E 3). It is built on the edge of a plateau about half a mile high and was formerly an important stronghold with a population estimated at 50,000. Although still on the caravan route between Sokoto and the Barbary States, its commercial importance has disappeared, and its population has dwindled to about 7000.

AGADIR, ä'gȧdēr′. A seaport in the southern part of Morocco, North Africa, situated in lat. 30° 27′ N. and long. 9° 36′ W. (Map: Africa, D 1). It was founded in the beginning of the sixteenth century by the Portuguese, but was soon taken by Morocco and for a considerable period was an important shipping centre because of its location at the mouth of the Sus River. It is now closed to commerce, and is used as a customs station on the caravan route connecting the northern and southern parts of Morocco. It became the object of international attention in 1911, when Germany announced that the gunboat *Panther* had been sent to the port of Agadir for the protection of German interests. For an account of the crisis that followed between the German and French governments, see Morocco, *History*. Its population is about 1000.

A′GAG (Heb., Gk. 'Αγάγ, in the Septuagint). 1. The name, or possibly title, of a king of the Amalekites conquered by Saul, and preserved alive contrary to the command of Jehovah. He was afterward hewn in pieces by Samuel. (See 1 Sam. xv.) 2. In Dryden's *Absalom and Achitophel*, a character standing for Sir Edmund Berry Godfrey, the justice of the peace who was assassinated shortly after disclosing the revelations made to him by Titus Oates.

A′GAGITE. A name applied to Haman (Esther iii. 1, 10; viii. 3). It is a term of contempt, designating him as a worthy descendant of Agag, the Amalekite whom Samuel hewed to pieces as a sacrifice to Yahwe at Gilgal (1 Sam. xv. 33). This "Amalekite" is opposed to Mordecai, a descendant of Kish, the father of Saul (Esther ii. 5). The Greek translator understood that this was a mere fiction setting forth the struggle between Jew and Gentile, when he rendered the term "Macedonian."

AGALACTIA, ăg'ȧ-lăk′shī-ȧ (Gk. want of milk, from *ȧ, a*, priv. + γάλα, *gala*, milk). A deficiency, either of quantity or quality, in the secretion of milk after delivery. It may be due to exhausting diseases such as pulmonary tuberculosis or syphilis; to severe hemorrhage, emotional disturbances, or a poor diet. Syphilitic or phthisical mothers should not nurse their infants, for obvious reasons. The secretion of milk may often be encouraged by a generous diet, including an abundance of milk and cream. Malt liquors (porter, stout) in small quantities are popular galactagogues. Drugs are of little or no value. (See Milk.) Agalactia is a contagious disease in sheep and goats, characterized by inflammatory foci in the mammary gland, eyes, and articulations. The disease has been known since 1816 and is especially frequent in Italy, France, and Spain. In the acute form there is high fever accompanied by complete, or almost complete, failure of milk. Death takes place after 20 days in about 15 per cent of cases.

AG′ALMAT′OLITE. A hydrated aluminum and potassium silicate of variable composition corresponding to the minerals pinite, pyrophyllite, and talc (q.v.). It occurs massive, and in color is gray, to green and yellow, brown and red. It is regarded as an alteration product of iolite, and is found in Transylvania, in Saxony, and especially in China, where, owing to its softness, it is carved into images and various ornamental designs, in which advantage is taken of the different shades to bring out special portions in different colors.

AG′AMA (Caribbean name). A genus of more than 40 insectivorous ground-lizards allied to the iguanas, and confined to the warm climates of Africa, Australia, Asia, and southern Russia. The handsome armed agama, or toque (*Agama armata*) of South Africa is strikingly adorned and reaches 20 inches in length. Another very brilliant species is the spiny *Agama colonorum* of the Gold Coast. One of those of southeastern Europe best known is the stellio (*Agama stellio*), which is commonly tamed and kept in captivity by Arabic jugglers in Egypt, who call it *hardun*. This little reptile has the habit of running a short distance, stopping suddenly and solemnly nodding its head up and down several times. Mohammedans look upon this as a conscious travesty on their devotional attitudes and often kill the lizard on sight.

AGAMEDES, ăg'ȧ-mē′dēz. See Trophonius.

AG′AMEM′NON (Gk. 'Αγαμέμνων). Son of Atreus and brother of Menelaus. Agamemnon is a prominent figure in Greek heroic legend, though the details of his story differ. He ruled at Mycenæ and exercised lordship over much of the Peloponnesus. Therefore, when Paris carried off Helen (q.v.), the wife of Menelaus, Agamemnon was the natural leader of the expedition made against Troy to recover her. His quarrel with Achilles (q.v.) is the starting-point of the *Iliad*. Later writers told of the sacrifice of his daughter Iphigenia (q.v.) at Aulis to secure favorable winds for the voyage to Troy. In his share of the booty of Troy he received the prophetess Cassandra (q.v.), daughter of Priam. On his return to Mycenæ he was murdered by his wife Clytemnestra (q.v.) and her paramour, Ægisthus (q.v.). His son, Orestes (q.v.), aided by his daughter Electra, subsequently avenged his father. This tragedy of the house of Atreus was a favorite subject of the Greek dramatists. Consult especially the play of Æschylus (q.v.) called the *Agamemnon*, the first play of the trilogy commonly known as the Oresteia.

AG′AMEN′TICUS, Mount. A hill in York Co., Me., 4 miles from the coast, and the summit 673 feet above sea level. It lies in lat. 43° 13′ 25″ N. and long. 70° 41′ 33″ W. (Map: Maine, B 5) and is a noted landmark for sailors.

AG′AMOGEN′ESIS. See Parthenogenesis, *Metagensis*.

AGAÑA, ȧ-gän′yȧ, or San Ignacio de Agaña, sän ĝg-nä′tē-ō dȧ ȧ-gän′yȧ. The capital of Guam (q.v.), one of the Ladrones, belonging to the United States (Map: Guam, U. S. and Dep. Ter., B 3). It is situated on the western coast of the island on Agaña Bay. It has wide, clean streets, and is traversed by a shallow stream crossed by two stone bridges. The bay is unsafe and the landing is obstructed by reefs. The town contains an arsenal, barracks,

churches, schools, and a college. During the Spanish régime in the Philippines it was the seat of government for the Ladrones. Pop., about 7000.

AG'ANIP'PE (Gk. *Ἀγανίππη, Aganippē*). A fountain in Bœotia, near Mount Helicon, which flowed to the river Permessus. The water was sacred to the Muses and was supposed to give poetic inspiration.

AGAO, ä-gä'ō. See AGAU.

AG'APÆ (Gk. nom. pl. of *ἀγάπη, agapē*, love-feast). Love feasts, or feasts of charity, usually celebrated by the earliest Christians in connection with the Lord's Supper. The rich Christians presented their poorer brethren in the faith with gifts, and all ate together, in token of their equality before God and their brotherly harmony. The meetings were opened and closed with prayer, and during the feast spiritual songs were sung. At first a bishop or presbyter presided, who read a portion of the Scripture, proposed questions upon it, and received the various answers of the brethren. Afterward whatever information had been obtained regarding the other churches was read —such as the official letters of overseers, or private communications from eminent members; and thus a spirit of practical sympathy was engendered. Before the conclusion of the proceedings money was collected for widows, orphans, the poor, prisoners, and those who had suffered shipwreck. Then the members gave one another the holy kiss, and the feast was ended with a "philanthropic prayer." Generally the feast of the agape preceded the celebration of the Lord's Supper, but during the period of the persecutions, when the Christians had often to hold divine service before dawn, the agapæ were, for the most part, delayed till the evening. Later, a formal separation was made between the two rites. In the third and fourth centuries the agape had degenerated into a common banquet, where the deaths of relatives and the anniversaries of the martyrs were commemorated and where the clergy and the poor were guests; but with the increase of wealth and the decay of religious earnestness and purity in the Christian Church, these agapæ became occasions of great riotousness and debauchery. Councils declared against them, forbade the clergy to take any share in their celebration, and finally banished them from the Church. At the same time it must be admitted that the heathen ignorantly calumniated the practices of the Christians in these agapæ, and that the defense made by Tertullian, Minucius Felix, Origen, etc., is eminently convincing. In the present Moravian church, love feasts are held on various occasions, differing somewhat in different congregations. They are religious services of praise and prayer, accompanied by a small portion of food and drink, the whole expressive, as were the ancient agapæ, of brotherly love in the membership of the congregation. See LOVE FEASTS.

AGAPEMONE, ăg'ä-pĕm'ō-nē (modern compound from Gk. *ἀγάπη, agapē*, love + *μονή, monē*, a staying, stopping-place). A conventual establishment of a singular kind, consisting of persons of both sexes, founded at Charlynch, near Bridgewater, England, by Mr. Henry James Prince, formerly a clergyman of the Church of England. The inmates belong to a religious sect originating with Mr. Prince and a Mr. Starkey, also a clergyman, and are sometimes called Lampeter Brethren, from the place where Prince was educated and where he formed a revival society. Community of goods being insisted upon, the leaders acquired considerable property, and fitted up in luxurious style a dwelling near Charlynch. Prince, who was styled "The Lord," affirmed in his publications that he was sinless and was sent to redeem the body, "to conclude the day of grace, and to introduce the day of judgment." See Hepworth Dixon, *Spiritual Wives* (London, 1868), and the article by Miss Edith Sellers in *The Newbery House Magazine* (London, November, 1891), reprinted in *Magazine of Christian Literature* (New York, December, 1891).

A society similar in its aims and character, though not conventual in its form, existed in England in the sixteenth and seventeenth centuries. It was called "The Family of Love." Its founder is generally supposed to have been Heinrich Nikolaus, who was born at Münster, in Westphalia, Jan. 9 or 10, 1501 or 1502, but who lived a considerable time in Holland. He held himself to be greater than Moses or Christ, for the former only taught men to *hope*, and the latter to *believe*, while he first announced the doctrine of *love*. He founded his sect, "The House of Love" or "The Family of Love," in Emden, East Friesland, about 1540 and died in 1570. In the reign of Edward VI the sect appeared in England. By 1578 they had apparently increased in numbers considerably, for in that year one John Rogers published a work against them, entitled *The Displaying of an Horrible Secte of Grosse and Wicked Heretiques, naming themselves the Familie of Love, with the Lives of their Authors, and what Doctrine they teach in Corners* (2d ed., 1579). In 1580 Queen Elizabeth issued a proclamation for the hunting out and punishing of the "damnable sect." The family of love—"or lust, rather," as old Fuller has it—tried to insinuate themselves into the good graces of King James by presenting a petition casting aspersions on the Puritans. It had a brief prosperity, and was revived in the seventeenth century, but quickly died. Its name in New England in the seventeenth century was applied to some dissenters, but there is no evidence that there were any Familists there. Their doctrines seem to have been a species of pseudo-spiritual sentimentalism resulting in gross impurity. Consult Thomas, *The Family of Love*, "Haverford College Studies," No. 12 (Boston, 1893). See MUCKERS.

AG'APE'TÆ (fem. form of *Agapeti*). Early Christian virgins who lived, generally in all purity, in the same house with men bound to strict celibacy. See AGAPETI.

AG'APE'TI (nom. pl. of Gk. *ἀγαπητός, agapētos*, beloved). Early Christian men who lived in the same house with deaconesses, both being celibates. The growth of ascetic notions in the Church led to the supposition that all contact between the sexes, except in marriage, must lead to immoral conduct, and so in the fifth and sixth centuries the practice was condemned by the Church and by the civil power.

AG'APE'TUS. The name of two popes. — AGAPETUS I. Pope of Rome from 535 to 536. He was the son of Gordianus, a Roman priest who was killed in the riots under Pope Symmachus. The fear of an invasion of Italy by Justinian led Theodatus, the King of the Goths in Italy, to send Agapetus to Constantinople in 536 to sue for peace from the Emperor. Though

unsuccessful in this mission, Agapetus persuaded Justinian to depose Anthimus from the patriarchal see of Constantinople. He died at Constantinople. His festival is celebrated on the 20th of September by the Roman Catholic church.—AGAPETUS II. Pope of Rome from 946 to 955; a Roman by birth. His first act was to establish his political rule over the churches of the Empire. Against Berenger II, King of Italy, who was a troublesome neighbor to the little pontifical state, he invoked the aid of Otto I.

AGAPIDA, ă'gà-pē'dȧ, FRAY ANTONIO. The imaginary monkish chronicler from whose papers Washington Irving professed in his first introduction to that work to have compiled his *Conquest of Granada.* He was intended, Irving later explained, as a type of the piously prejudiced religious zealots of the time.

AGAR, ȧ'gär'. The stage name of Florence Léonide Charvin (1836–91). A French actress. She was born at Sedan, and went to Paris in 1858, where she made her début as a singer in cafés-concerts. Following the example of Rachel, she adopted the biblical name of Agar (Eng. Hagar). She scored her first great success in the title-part of Racine's tragedy *Phèdre.* In 1870 she was engaged at the Comédie Française, where, during a representation of the play *Le Lion Amoureux,* she sang the Marseillaise in the key of A, as Rachel had done in 1848. She appeared from 1872 to 1876 in many French classic dramas, chiefly tragedies. She was remarkable for her beauty, her mobile and expressive countenance, eloquence of gesture, and perfect diction.

AGAR AGAR. VEGETABLE GELATIN. A substance derived from a number of East Indian seaweeds. It is made principally in China and Japan and is marketed in thin transparent sheets, shreds, or sticks. One variety furnishes the characteristic ingredient of the Chinese dish, "bird's-nest pudding." Japanese agar agar is used chiefly as a culture medium for bacteria in the laboratory. Of late years the substance has found favor as a laxative. Given to the patient in a dry form, it absorbs moisture as it passes through the intestinal canal and by its bulk stimulates peristalsis. Otherwise it has no medicinal properties.

AGARDH, ä'gärd, JAKOB GEORG (1813–1901). A Swedish botanist, son of Karl Adolf Agardh. He was professor of botany at Lund during 1854–79. He increased his father's large collection and wrote several works on algæ. He also published *Theoria Systematis Plantarum* (1858).

AGARDH, KARL ADOLF (1785–1859). A Swedish botanist. He was educated at Lund and devoted himself chiefly to the study of algæ. In 1807 he became lecturer on mathematics at Lund, and in 1812 was appointed professor of botany and rural economy, lecturing at the same time on general economy. He became a priest in 1816; went into politics in 1817 and was elected to the Diet, where he exercised considerable influence, became a leading liberal, and succeeded in improving and raising the standard of education in Sweden. His work, *Systema Algarum* (1824), was an important contribution to the science of botany. He also wrote *Essai de reduire la physiologie végétale à des principes fondamentaux* (1828). In 1834 he was made Bishop of Karlstad. Agardh was author of several books and papers, chiefly on algæ, and a memoir on Linnæus.

AG'ARIC, AGAR'ICUS. See MUSHROOM.

AGARICIN (from Gk. ἀγαρικόν, *agarikon,* a tree fungus). A substance known also as agaric, agaricic, agaricinic, or laricic acid, and obtained from the *Polyporus officinalis,* commonly called white agaric, touchwood, or punk. It is a white powder, slightly soluble in water. Its formula is $C_{16}H_{30}O_5 + H_2O$. It is used as an anhidrotic (q.v.) in the night sweats of phthisis.

AGASIAS, ă-gā'shī-ȧs (Gk. Ἀγασίας). The name of two Ephesian sculptors, kinsmen, who lived at the beginning of the first century B.C. Agasias, son of Menophilus, made several statues of Romans on the island of Delos, to be set up in the Agora there. Agasias, son of Dositheus, was the sculptor of the "Borghese Gladiator" found at Antium (q.v.) and now in the Louvre. It probably represents a warrior on foot raising his shield, as if to guard against a mounted adversary. The figure seems derived from a group. It shows the characteristics of Asiatic art of the period.

AGASSIZ, ăg'ȧ-sē, *or* ȧ-găs'īz; *French pron.* ȧ'gȧ'sē', ALEXANDER (1835–1910). An American naturalist, capitalist, and philanthropist. He was born at Neuchâtel, Switzerland, Dec. 17, 1835, the only son of Louis Agassiz. He joined his father in Boston in 1849, and graduated at Harvard College in 1855. He was made a bachelor of science by the Lawrence Scientific School in 1857; became assistant in the United States Coast Survey in California in 1859, and was assistant in the Museum of Comparative Zoölogy at Harvard College from 1860 to 1865. At this time he became interested in coal and later in copper mining, and assisted in the development of the Calumet and Hecla mines of native copper on the south shores of Lake Superior. These mines were then in an unproductive condition, but Agassiz, as superintendent, applied his extensive knowledge of geology, chemistry, and engineering, and so developed them that they yielded to him and his associates great wealth, which he used to advance zoölogical research. After visiting different museums in Europe (1869–70), he was appointed curator (1874) of the Museum of Comparative Zoölogy, which his father had founded. He retained this position nominally until 1897 and was for some time a fellow of Harvard University. His chief interest was in marine zoölogy, where his studies of invertebrate life, and especially of the development of polyps, jellyfishes, and echinoderms, placed him in the first rank of investigators. He explored Lake Titicaca and the coast of Chile during 1874–75 and founded in 1875 a private laboratory and salt-water aquarium near his residence overlooking Narragansett Bay at Newport, R. I. He superintended deep-sea dredging among the West Indies, in the United States steamer *Blake,* from 1877 to 1880, and in successive winters he explored all the oceans, adding greatly to the knowledge of the fauna of the deep sea. His more important works are *North American Acalephs* (1865); *Revision of the Echini* (1872); *North American Starfishes* (1877); *Report on the Echini of the Challenger Expedition* (1881); *Three Cruises of the Blake* (1888); *The Islands and Coral Reefs of Fiji* (1899). The latter includes a philosophical discussion of the whole subject of coral formations. He continued this line of work in 1901–02 by a private expedition to the Maldive Islands. Mr. Agassiz contributed a million or more dollars toward furthering the

study of zoölogy at Harvard University and elsewhere, always in an unostentatious way, and his abilities have been recognized by many universities and scientific societies in both Europe and the United States, where he was president of the National Academy of Science and of the American Academy of Arts and Sciences. Consult *Letters and Recollections of Alexander Agassiz*, edited by G. R. Agassiz (Boston, 1913).

AGASSIZ, Elizabeth Cabot (Cary) (1822–1907). An American teacher and writer, born in Boston. In 1850 she was married to Prof. Louis Agassiz, whom she accompanied to Brazil (1865–66) and on the *Hassler* expedition in 1871–72. Her publications include *A First Lesson in Natural History* (1859); *Life of Louis Agassiz* (2 vols., 1885), and *Seaside Studies in Natural History* (1865), in which she was assisted by her step-son, Alexander Agassiz. Mrs. Agassiz's home was at Cambridge, Mass. She became president of the board of control of Radcliffe College and took an active part in promoting the interests of that institution.

AGASSIZ, Lake. See Lake Agassiz.

AGASSIZ, Louis (1807–73). An American naturalist, born at Motier, in the Canton of Fribourg, Switzerland. His father was a clergyman and his mother a woman of education and taste. Following a decided bent toward zoölogy, developed from childhood and fostered by his school preparation at Lausanne, he studied medicine and natural history at Zürich and Heidelberg, where he formed a lifelong and influential friendship with the botanist Alexander Braun. He studied also at Erlangen and at Munich, where he became acquainted with Martius and Spix, and when Spix died (1826), Agassiz prepared a description of his Brazilian fishes which attracted Cuvier's notice. After graduating in medicine and taking a degree in philosophy (1830), Agassiz studied in Paris under Cuvier, whose ardent disciple he henceforth was. From 1832 to 1846 Agassiz was professor of natural history at Neuchâtel and there completed his first great work, *Recherches sur les poissons fossiles* (5 vols., 311 plates, 1833–42). Several visits to England, beginning in 1834, enlarged his acquaintance and reputation and gave material for his *Fossil Fishes of the Old Red Sandstone* of the British Isles. Next he turned to echinoderms, which he studied in both living and fossil forms. Another product of his labors at this period was the *Nomenclatoris Zoölogici Index* (Solothurn, 1842–46), of which a practical revision, bringing the lists of genera up to 1882, was made by Scudder and published as Bulletin No. 19, United States National Museum (Washington, 1882). From 1836 to 1845 Agassiz spent his summers in examining the glaciers of the Alps, often in company with A. Guyot, and illuminated and confirmed previous generalizations in respect to a former glacial epoch. In 1846 Agassiz was invited to the United States to give a series of lectures in the Lowell Institute course at Boston. These at once established his reputation as a lecturer and led to his appointment, in 1848, as professor of natural history in the Lawrence Scientific School of Harvard University, which chair he held, except a brief interval at Charleston, S. C., until his death, although he relinquished teaching long before that event. Agassiz came to America untrammeled and undertook the mission of teaching and advancing the cause of science in the United States with the utmost enthusiasm. His wife had died, but he presently remarried (see Agassiz, E. C.), and Mrs. Agassiz established in their house in Cambridge a school for girls, with which Professor Agassiz was identified. He traveled widely and lectured in various cities and in 1848 visited the Lake Superior region with a class of scientific students. This exploration was described in a narrative by Cabot, to which Agassiz contributed chapters on fishes. Similarly, he undertook, in 1850–51, a study of the Florida coral reefs, the results of which were set forth in lectures and in articles contributed to the *Atlantic Monthly* and subsequently gathered into two popular books, *Methods of Study in Natural History and Geological Sketches*. He was everywhere and foremost a teacher, interpreting his facts and theories with such enthusiastic force and persuasive eloquence that he was in constant demand. A series of lectures which he delivered in Brooklyn in 1862 were epoch-making in this direction. They were republished in book form as *The Structure of Animal Life* (New York, 1874). Many of his views were in advance of popular knowledge and opinion and contravened some established religious tenets; yet he rarely excited serious opposition, and no educational influence of his time was so great as that exerted by him. He may be said to have realized at this period the ambition which he expressed in a letter to his father in 1829: "I wish it may be said of Louis Agassiz that he was the first naturalist of his time, a good citizen and . . . beloved of those who knew him."

In 1858 the plans were laid for the great Museum of Comparative Zoölogy at Cambridge, Mass., now one of the most extensive and scientifically useful in the world; and for many years his main efforts were directed to building it up. He secured public appropriations and private gifts for it by his personal influence and kept himself poor by his unselfish labors and liberality toward it. He gathered about him there and trained a body of men who have made for America a creditable record in biology—Alexander Agassiz, his son; J. A. Allen, H. J. Clark, S. Garman, Alpheus Hyatt, D. S. Jordan, E. S. Morse, A. S. Packard, F. W. Putnam, N. S. Shaler, A. E. Verrill, and others.

In 1865 he visited Brazil with his wife and a body of assistants. The results of his researches there he published in his book, *A Journey in Brazil* (Boston, 1868). In 1872 he made a trip to California. In the summer of 1873 he held the first session of a summer school at the island of Penikese in Buzzard's Bay. This set an example that has led to the many summer schools and seaside laboratories since established in all parts of the country. During all these years he was prosecuting a continuous work on a great scale, entitled *Contributions to the Natural History of the United States*, of which four magnificent quarto volumes were published, the first, *An Essay on Classification*, in 1857, the others (monographs of American turtles and acalephs) soon after. The doctrine taught in these was a liberal advance upon the "special creation" views previously in vogue; yet when the Darwinian school of evolutionists arose they found in Agassiz a most earnest opponent, and it was a great grief to him to see that his scientific disciples were almost, without exception, becoming adherents to the new ideas. To stem this tide of scientific heresy, Professor Agassiz prepared

and delivered in Cambridge, in the spring of 1873, a course of six lectures, which attracted very wide attention. This was his final public work, for late in 1873 he was attacked by brain disease and died on December 14. He was buried with extraordinary honors in Mount Auburn Cemetery. His monument is a boulder brought from the glacier of the Aar, where he had made his most enlightening studies of glacial phenomena. Consult: Agassiz, *Life and Correspondence of Agassiz* (Boston, 1886); Marcou, *Life, Letters, and Works of Agassiz* (New York, 1896); Guyot, *Memoir of L. Agassiz* (Princeton, N. J., 1883), and Gilman and other eulogists, *Proceedings California Academy of Sciences*, vol. iv, 1873–74 (San Francisco, 1874).

AGASSIZ, MOUNT. An extinct volcano in Arizona, 70 miles northeast of Prescott and 10,000 feet above the sea level. Another peak of this name in Utah is 13,000 feet high.

AG'ATE (Lat. *achates*, Gk. ἀχάτης, *achatēs*, so named, according to Pliny (*Hist. Nat.*, xxxvii, 54), from the Sicilian river Achates, where it was first found). A variety of quartz (q.v.) composed of successive layers of silica deposited from a silica-saturated water solution. Slight amounts of impurities in the silica solution produce different colors in the agate, giving rise to banded agate in which the successive layers are of different color, clouded agate which has irregularly disposed patches of color, and moss agate which contains sharply defined, moss-like, dark markings due to manganese oxide. Agates are found universally and are much used, when cut and polished, for ornaments and jewelry. The principal supply comes from Uruguay and Brazil, in South America, whence they are sent to Oberstein, in Germany, where their polishing is an important industry.

AGATE SHELL, or **AGATE SNAIL.** Any land-snail of the genus Achatina (family Achatinidæ), of which many species are to be found throughout tropical Africa. They are carnivorous, tall-spired, usually tinted and banded in bright colors, and include the largest land-shells known, some being 10 inches long, producing eggs an inch in length, with a calcareous shell. See Plate of ABALONE, etc.

AG'ATHA, SAINT. According to the legend, a noble Sicilian virgin of great beauty and wealth, who rejected the love of the consul Quintianus, and suffered a cruel martyrdom in the persecution of Sicilian Christians. She holds a high rank among the saints of the Roman Catholic church. Her day falls on February 5. She is the patroness of the island of Malta, and there are churches erected in her honor. It is uncertain whether she ever lived, and if so, whether she died in the Decian persecution (251), or the Diocletian, 50 years later. Legend says that several times the mere carrying in procession of her veil, taken from her tomb in Catania, has averted eruptions from Mount Etna from the walls of that city, and that her intercession saved Malta from Turkish conquest in 1551. Consult A. Butler, *Lives of the Saints*, under February 5 (London, 1847).

AGATHARCHUS, ăg'ă-thär'kŭs (Gk. Ἀγάθαρχος, *Agatharchos*). A Greek painter from Samos, who worked chiefly at Athens, between 455 and 415 B.C.; said to have been the first scene-painter in connection with a tragedy of Æschylus (q.v.), and therefore is of importance in the history of art through the development of perspective, in opposition to the school of Polygnotus (q.v.). He is said by Vitruvius (q.v.) to have left a treatise on this subject.

AGATHARCIDES, ăg'ă-thär'sĭ-dēz (Gk. Ἀγαθαρκίδης). A Greek historian and geographer, of Cnidus, who lived in the earlier half of the second century B.C. He wrote a work on the *Successors of Alexander the Great*, and a treatise, in five books, on *Europe, Asia, and the Red Sea*. From the latter treatise Photius (q.v.) gives extracts, at the same time praising the style of Agatharcides, as modeled on that of Thucydides. See Müller, *Fragmenta Historicorum Græcorum;* Bunbury, *History of Ancient Geography*, vol. ii (London, 1879).

AGA'THIAS (Gk. Ἀγαθίας) (530?–580?). A Greek poet and historian, surnamed Asianus. He was educated at Alexandria and Constantinople, studied Roman law and practiced it with success. He wrote love verses and made an anthology of earlier poets; but his most valuable work is a history of the years 552 to 558, intended to continue that of Procopius (q.v.), in which he tells of the overthrow of the Ostrogothic power in Italy by the Byzantines, of the earthquakes of 554 and 557, the beginning of the Greek and Persian war, the rebuilding of St. Sophia, etc. This work was edited by L. Dindorf in *Historici Græci Minores* (Leipzig, 1871). Consult Krumbacher, *Geschichte der byzantinischen Litteratur* (Munich, 1897).

AG'ATHO, SAINT. Pope from 678 to 681. He was more than 100 years old when he succeeded to the papacy. He was a native of Palermo, Sicily, and is remembered chiefly for his efforts in bringing about the Sixth Ecumenical Council, which assembled at Constantinople in 680 and condemned the Monothelite heresy. His festival is celebrated on February 20 by the Greek church, and on January 10 by the Roman church.

AGATH'OCLES (Gk. Ἀγαθοκλῆς) (361–289 B.C.). A Sicilian despot, ruler of Syracuse. He was born at Thermæ, in Sicily; rose from humble circumstances through the patronage of Damas, a noble citizen of Syracuse, and received under him a command in the expedition against Agrigentum. Afterward he married the widow of Damas and became one of the most wealthy men in Syracuse. Under the rule of Sosistratus (q.v.) he was obliged to flee into Lower Italy, where he collected a band of partisans. Returning to Syracuse after the death of Sosistratus, he secured the supreme power in 317 B.C., strengthened his position by a massacre of several thousand respectable citizens, and took possession of the greater part of Sicily. To establish his power and keep his army employed, he now attempted to expel the Carthaginians from Sicily; but in this undertaking he was defeated. His next plan was to pass over to Africa with a part of his army and there to attack the Carthaginians. This war he carried on with success for more than three years, or until 307 B.C., when disturbances in Sicily compelled him to leave the army for a time. In 305, however, he triumphed completely over his foes in Sicily. He became one of the richest monarchs of the world, and formed an alliance by marriage with the Ptolemies in Egypt. He made raids upon Italy and in 299 conquered the Island of Corcyra. He had Greeks, Etruscans, Celts, and Ligurians in his army. He must have come into touch with the Romans, too; his biographer Kallias was among the first to concern himself much with Roman affairs. It was

his intention to leave the throne to his youngest son, Agathocles; but his grandson, Archagathus, made an insurrection and slew the royal heir. In revenge Agathocles restored the government to the people. He died 289 B.C.

AG'ATHON (Gk. 'Αγάθων) (447?–401? B.C.). An Athenian tragic poet. He gained his first victory at the Lenæan festival in 416 B.C.; this victory is celebrated in Plato's *Symposium*. He was well-to-do and had many friends, among whom were Euripides and Plato. He lived for some time at the court of Archelaus (q.v.) at Pella, in Macedonia. His style was flowery and ornate rather than strong or sublime, and his works were full of the rhetorical figures which marked the style of Gorgias (q.v.) and Prodicus (q.v.). Still, after Æschylus, Sophocles, and Euripides, he was the most important tragic poet of Greece. According to Aristotle, he began the practice of making the chorus songs mere interludes, disconnected in theme from the dialogue. He is ridiculed in Aristophanes' *Thesmophoriazusæ*. About 30 short fragments of Agathon are preserved.

AGATHON. A philosophical novel by Wieland (q.v.), published in 1766. Its hero (Agathon) is a Platonist, and the theme is the proper mean in human life between asceticism and sensuality.

AG'ATIZED WOOD. See CHALCEDONY; FOSSIL FORESTS.

AGAU, ä-gou'. An Hamitic people of Abyssinia, supposed to represent the aboriginal inhabitants of the highlands. The Agau tribes are scattered in various parts of the kingdom, one district, in Amhara, southwest of Lake Tsana, being called Agaumeder. The Agau language is widely diffused among the common people of Abyssinia.

AGAVE, ä-gā'vē (Gk. fem. of *ἀγανός, agauos*, noble, high-born), CEN'TURY PLANT. A genus of about 150 species belonging to the family Amaryllidaceæ and occurring in the arid and even desert regions of America. The most familiar species in cultivation is *Agave americana*, the 'American century plant.' The plants are characterized by the rosette of stiff, fleshy, and often spiny leaves on or near the ground, from the center of which arises a tall flower stalk (sometimes 20 feet high) bearing a large cluster of flowers. Many species are cultivated as ornamental, but in Mexico they are most useful plants. The leaves yield a coarse fibre used in the manufacture of thread, twine, rope, etc., while one species is the source of the well-known "sisal hemp," extensively used for cordage. The two best-known Mexican drinks, called "pulque" and "mescal," are obtained from several species of agave. Some of the species flower every year, others flower only occasionally, while some flower only once and die. The name "century plant" was given on account of an old fable that the species of agave, at least the cultivated *A. americana*, flowered only once in a century.

AGAVE. The mother of Pentheus (q.v.), whom, according to the Greek legend, she and other frenzied Bacchantes tore in pieces for opposing the new orgies of Dionysus. She was the daughter of Cadmus and the wife of Echion.

AGAWAM, ăg'ä-wôm. A town in Hampden Co., Mass., 4 miles southwest of Springfield, on the Connecticut River, and the Central New England Railroad (Map: Massachusetts, B 3). It is situated in an agricultural region, producing tobacco, grain, potatoes and other vegetables. The distilling of gin and the manufacture of woolen goods and paper are the principal industries. Agawam was settled in 1635 and was incorporated in 1854. It was the scene of some fighting during King Philip's War and Shays's Rebellion. Pop., 1900, 2536; 1910, 3501; 1913 (est.), 3900.

AGDE, ägd. An ancient French town in the department of Hérault, on the river Hérault, 2½ miles from the Mediterranean Sea (Map: France, S., H 5). To the north, under the walls of the town, flows the Languedoc Canal. Agde's commerce with Italy, Spain, and Africa has declined, and its chief activity is in coasting and fishing trade. The general aspect of Agde is sombre, on account of the black volcanic rock of which the houses are built and with which the streets are paved. Its most conspicuous building is the cathedral of St. Etienne, Agde having been the seat of a bishopric since the beginning of the Middle Ages. The town was founded by the Greeks of Massilia, and its first name was Agathe. Pop., 1896, 7007; 1901, 9533; 1906, 8435; 1911, 9265.

AGE. A term employed to designate successive epochs in the history of the human race, physiological stages in the growth of man, literary periods, etc. In the Greek mind the life of the race was likened to that of the individual—hence the infancy of the former might easily be imagined to be, like that of the latter, the most beautiful and serene of all. Hesiod mentions five ages—the Golden, simple and patriarchal; the Silver, voluptuous and godless; the Brazen, warlike, wild, and violent; the Heroic, an aspiration toward the better; the Iron, in which justice, piety, and faithfulness had vanished from the earth, the time in which Hesiod fancied that he himself lived. Ovid closely imitates the old Greek, except in one particular—he omits the Heroic Age. This idea, at first perhaps a mere poetic comparison, gradually worked its way into prose and finally became an element of scientific philosophy. These ages were regarded as the divisions of the great world-year, which would be completed when the stars and planets had performed a revolution round the heavens, after which destiny would repeat itself in the same series of events. Thus mythology was brought into connection with astronomy. The Golden Age was said to be governed by Saturn; the Silver, by Jupiter; the Brazen, by Neptune, and the Iron, by Pluto. Many curious calculations were entered into by ancient writers to ascertain the length of the heavenly year and its various divisions. The greatest discrepancy prevailed, as might naturally be expected; some maintaining that it was 3000, and others as many as 18,000 solar years. The Sibylline Books compared it to the seasons of the solar year, calling the Golden Age the spring, etc.; and, on the completion of the cycle, the old order was renewed. The idea of a succession of ages is so natural that it has inwrought itself into the religious convictions of almost all nations. It is sanctioned by Scripture, for it is symbolically adopted in the Apocalypse to a certain extent; it also manifests itself in the sacred books of the Hindus. Modern philosophy, at least in Germany and France, has also attempted to divide human history into definite ages or periods. Fichte numbers five, of which he conceives that we are in the third; Hegel and Auguste Comte reckon three, placing us in the last. Modern anthropology divides the prehistoric period of

man into the older and newer Stone Ages (Paleolithic and Neolithic) and the Bronze Age. Stone and bronze are here not figurative, as in Hesiod's classification, but are indications of the state of man's civilization. In reference to this and other ages, as defined in science, see GEOLOGY, etc. Physiologically, an age marks the span of human life, which is divided into five periods: *infancy* (the first 7 years), *childhood* (the next 7 years), *youth* (up to the 21st year), *adult life* (up to the 50th year), and *senility* (after the 50th year). Literature has had certain distinct ages. Thus, in English literature, we have had the Elizabethan Age, the Victorian Age, etc. History, too, recognizes certain large divisions in the political and social life of man. Hence we speak of the Dark or Middle Ages, the Modern Age, the Age of Steam, etc. The law of every land, too, recognizes certain ages in the growth from infancy to manhood or womanhood, and defines legal rights, duties, and responsibilities in accordance with such classification. Hence, "the age of consent," etc.

AGE. In law, that period of life at which persons emerging from infancy become capable of exercising the rights or become subject to the obligations and penalties of normal persons. As these rights and obligations vary greatly, the age of capacity may vary according to the right or obligation in question. Full age is the period at which a person acquires full legal capacity, and in England and the United States is usually fixed by law at 21 years, for men and women alike. This is considered to be attained on the day preceding the 21st anniversary of birth. In a few States, however, a woman comes of age at 18. Political capacity is usually coincident with the attainment of legal capacity, though greater maturity is usually required in this country of the holders of certain important offices of State. Thus, while one may become a member of the British Parliament at 21, no one can be a Representative in Congress until he is 25, or a Senator of the United States until he is 30, nor become President before attaining the age of 35.

Short of full age, a male minor may become capable of military service at 18 (*military age*), and become capable of consenting to marriage and the choice of a guardian at 14 (*age of discretion*). At common law the age of discretion for female infants was 12, and the age of consent to unlawful carnal intercourse was 10, but recent legislation in the United States has raised the age of consent to 14, 15, 16, and, in several States, including New York, to 18 years. (See CONSENT; RAPE.) The term "age of discretion" is also more commonly employed to designate the period (usually the age of 14) at which persons become subject to criminal liability, an infant under 7 years of age being deemed incapable of crime, and one between 7 and 14 being presumed to lack the discretion which such liability assumes; but this presumption is capable of being rebutted by proof. (See INFANT; CONTRACT; CRIME; MILITIA.) For the modern law of infancy, consult Schouler, *Treatise on the Domestic Relations* (Boston, 1870).

AGE, CANONICAL. The age which, according to the canons, a man must have reached for ordination. This, in the Roman Catholic church, is 22 for the sub-diaconate, 23 for the diaconate, 25 for the priesthood, and 30 for the episcopate. Dispensations may, however, be granted from this rule. In the Greek church the age is 25 for a deacon, 30 for a priest or bishop; in the Anglican communion, 23 for a deacon and 24 for a priest.

AGELADAS. See HAGELADAS.

AGEN, å'zhăN'. The capital of the department of Lot-et-Garonne, France, situated in a fertile region on the right bank of the Garonne, 73 miles from Bordeaux (Map: France, S., E 4). The town is very ancient and was founded during the Roman occupation, when it was known as Aginnum. It was the capital of the Nitiobriges, a Gallic tribe, was later an important city of the Agenois, and was the scene of bloody Huguenot executions. It is the seat of a bishopric, and the cathedral dates from the days of Clovis. Its public institutions include a seminary for the training of the clergy and a library. Standing between Bordeaux and Toulouse, Agen is a market for agricultural products and interchanges trade with both these places. It has, besides, several important home industries. The prunes of Agen are celebrated, and it manufactures other delicacies. Agen is the birthplace of Joseph Scaliger, Lacépède, and Bory de St. Vincent. Pop., 1901, 22,482; 1906, 23,141; 1911, 23,294.

AGENAIS, å'zhe-nā'. A former province of France which included almost the same territory now in the department of Lot-et-Garonne. In the fourth century this was the Civitas Agennensium, in Aquitania Secunda, whence its name. There is little of note in its history until 1152, when it was added to the territory of Henry II of England by his marriage with Eleanor of Aquitaine. In 1196 it formed a part of the dowry of Joan, sister of Richard the Lion-Hearted, when she married Raymond VI of Toulouse. With other lands of the county it was added to France in 1271, but was given back to the English ruler in 1279. In 1453, as a result of the Hundred Years' War (q.v.), it finally became a part of the French Kingdom. See AGEN.

AGENCE HAVAS, å'zhăN' sà'vå'. See HAVAS AGENCY.

AGEN'DA (Lat. things to be done, from *agere*, to do). A term applied by theologians to practical duties as distinguished from the credenda, things to be believed, or doctrines that must be accepted as articles of faith. Among writers of the ancient Church the term signified both divine service in general and the mass in particular. We meet with *agenda matutina* and *vespertina*, morning and evening prayers; *agenda diei*, the office of the day; *agenda mortuorum*, the service of the dead. It is also applied to Church books compiled by public authority, prescribing the order to be observed by the ministers and people in the ceremonies and observances of the Church. In this sense agenda occurs for the first time in a work of Johannes de Janua about 1287. The name was especially used to designate a book containing the formulæ of prayer and ceremonies to be observed by the priests in their several ecclesiastical functions. It was generally adopted by the Lutheran church of Germany, in which it is still in use, while in the Roman church it has been, since the sixteenth century, supplanted by the term "ritual" (q.v.).

AGENOR, å-jē'nôr (Gk. Ἀγήνωρ). Originally a mythical personage in the Argive legends, later said to have been a King in Phœnicia or Egypt, son of Poseidon, and father of Europa (q.v.), Cadmus, Phœnix, and Cilix. When Europa was carried off by Zeus, Agenor sent his sons in search, with orders not to return without their sister. As she was not found, Cadmus

founded Thebes, and the other sons settled in the countries which bore their names. See CADMUS.

A'GENT (Lat. *agens*, acting, pres. part. of *agere*, to act). A modern term in English law. As a generic term, it includes every one authorized to act for and represent another; but it is often used in a specific sense to denote one authorized to act for another in making contracts between that other, called the principal, and third persons. Blackstone does not employ it, and it rarely occurs in law dictionaries, digests, or decisions before the nineteenth century. For a time after its appearance it is used interchangeably with the word "servant." During the last century, however, the tendency of judges and law writers has been toward a complete differentiation of the terms "agent" and "servant." A fair illustration of the result is afforded by the following provisions of the California Civil Code: "An agent is one who represents another, called the principal, in dealings with third persons." "A servant is one who is employed to render personal service to his employer, otherwise than in the pursuit of an independent calling, and who in such service remains entirely under the control and direction of the latter, who is called his master." Using "agent," then, to denote a person authorized to act for and represent another in business transactions with third persons, and reserving the rules relating to *master and servant* (q.v.) for a separate article, let us consider, (1) how agency is constituted, (2) the liability of the principal to third parties, (3) the liability of the agent to third parties, (4) the liabilities of principal and agent to each other, (5) the termination of agency.

1. Ordinarily, the relation of principal and agent originates in a *contract* (q.v.) between the parties, but it may exist without a contract, as where A gratuitously undertakes to do an act for B. The relationship may rest upon ratification, instead of a precedent agreement. For example: A does an act avowedly as B's agent, without authority from B. The act does not bind B, unless he accepts it, as done on his behalf. If he does so accept it, his ratification is equivalent in law to a precedent appointment of A as agent. Even without appointing A or ratifying his acts, B may become liable for those acts, because his conduct induces third parties to believe that A is B's agent. In such a case there is agency by *estoppel* (q.v.). Still another form of agency is that which is created by the law, as where the law authorizes a wife to pledge her husband's credit for necessaries. In the language of a learned judge, "the law creates a compulsory agency, and her request is his request."

2. A principal who has authorized an agent to do an act for him, or has ratified the act, is liable to third persons precisely as if the act had been done by him. As a rule, the principal is disclosed to the third party, and the latter understands that the transaction is between them, the agent being a mere conduit for the transmission of the principal's consent. But even though the principal is not disclosed, nay, even though the third party may refuse to enter into a transaction with the principal and may insist upon contracting with the agent as a principal, yet upon discovering that the transaction was for the principal's benefit and authorized by him, the third party may hold the principal liable. The principal may be liable to third parties for his agent's acts which he has never authorized or which he has even forbidden. His liability in such cases depends upon whether the acts were done within the scope of the agent's apparent authority; for the principal will not be allowed to show that he secretly forbade what he appears to have authorized. What is the scope of an agent's authority depends upon the facts of the particular case, including ordinary business usages relating thereto. As the agent is, in law, a mere conduit of the principal's will, and thus identified with the principal, knowledge acquired by, or notice given to, the former during his agency, at least, is imputed to the latter. An exception to this rule exists where the agent acquires the knowledge or receives the notice in a transaction conducted by him in fraud of the principal. In such a case the agent cannot be expected to disclose his knowledge to the principal, and the legal fiction that the principal and agent are but one person will not be pressed so far as to work palpable injustice.

3. An agent who discloses his principal incurs no liability to third parties if his acts are authorized or ratified and are lawful. From liability for unlawful acts he cannot screen himself by proving an express command of his principal, although such command renders the latter liable also. Every wrongdoer is personally responsible for his misfeasance. An agent will render himself liable on a written contract under seal, or on a negotiable instrument, if he executes it in his own name, although he intends to bind his principal thereby. In order to bind the principal, such an instrument must be in his name and purport to be his deed, or note, or bill. In the case of other written contracts, the agent who discloses his principal will not be bound, unless the intention of the parties that he should be bound is apparent from the writing and attendant circumstances. The agent may render himself liable to the third party by assuming to act for a principal without authority.

4. In the absence of express stipulations in the contract to the contrary, the principal is under obligation to compensate the agent for his services; to reimburse him for all proper expenditures on the principal's behalf and to indemnify him against the consequences of authorized acts which he did not know, or which he was not bound to know, were unlawful. On the other hand, the agent is under obligation to act with the utmost good faith toward the principal, obeying his instructions, advancing his interests, and rendering full and true accounts of all transactions. An agent cannot delegate his authority to another, so as to escape responsibility to the principal for that other's acts, without the express or implied assent of the principal. Nor, ordinarily, will a principal be bound by the acts of a sub-agent whose employment he has not authorized or ratified.

5. Agency may be terminated by the agreement of the parties, or by the principal's revocation of the appointment, or by operation of law. If terminated in either of the first two ways, notice must be given to those who have been accustomed to deal with the agent, or the latter will still be able to subject the principal to liability to such persons; for, until notice of revocation, these have a right to suppose that the relation of principal and agent continues. The death of either principal or agent, and the

bankruptcy of the principal, furnish the most common examples of termination of agency by operation of law, and such termination is effective without notice. An agency which is "coupled with an interest" (i.e., a vested property right) in the subject-matter of the agency is revocable only by the mutual assent of both parties.

Doctrines peculiar to special classes of agents are dealt with under the appropriate headings, e.g., ATTORNEY; AUCTION; BROKER; PARTNERSHIP; FACTOR; CRIME. Consult: Evans, *Principal and Agent in Contract and Torts* (2d ed., London, 1888); Huffcut, *Law of Agency* (Boston, 1901); Story, *Commentaries on the Law of Agency* (9th ed., Boston, 1882).

AGE OF IN'NOCENCE. A celebrated painting by Sir Joshua Reynolds in the National Gallery, London. It depicts a little girl sitting on the ground before a group of trees.

AGE OF REA'SON. The name given to a certain phase and period of the French Revolution when Christianity was decried, Reason proclaimed as the only true deity, and bishops exchanged their mitres for liberty caps. This movement was fomented by Hébert (q.v.) and his followers, professed atheists, who succeeded in persuading many Christians to renounce their faith. The worship of Reason centred around the ceremonies held in her honor at Notre Dame, Nov. 10, 1793. The Goddess of Reason, typified by a beautiful actress, was placed on the altar and received the homage of her adorers. A schism in the party of the Montagnards, to which the atheists belonged, led to their execution, March 24, 1794. It was not, however, till June 8, 1794, that France, in the Feast of the Supreme Being, again received officially religion, at the hands of Maximilien Robespierre. Consult Aulard, *Le culte de la Raison et le Culte de l'Etre Suprême* (Paris, 1892).

AG'ESAN'DER (Gk. *Ἀγήσανδρος, Agēsandros*). A Greek artist of the school of Rhodes who lived in the first century B.C. In conjunction with Athenodorus and Polydorus he executed the celebrated group of Laocoön, which was discovered near the baths of Titus in the sixteenth century. See LAOCOÖN.

AGES'ILAN OF COLCHOS, kŏl'kŏs. The title and hero of one of the romances in *Amadis of Gaul* (q.v.), books xi and xii.

AGES'ILA'US (Gk. *Ἀγησίλαος, Agēsilaos*) (c.444–360 B.C.). The name of several kings of Sparta, of whom the most important was King about 401–360 B.C. He was the son of Archidamus II and succeeded Agis II, Leotychides, the son of Agis, being set aside through the influence of Lysander (q.v.), on the ground of illegitimate birth. (See AGIS, 2.) In 397 B.C. he was sent to Asia Minor as commander-in-chief of the Spartan forces in the war with Persia, which arose out of the expedition of the 10,000 Greeks with Cyrus the Younger (q.v.). He carried on the war with success and was preparing to advance into the interior of Persia, when in 394 B.C. he was called back to Greece to make head against the coalition which had been formed by Thebes, Athens, and other Grecian States against the power of Sparta. Proceeding by land, he arrived in Greece about a month later and in the same year defeated the allies at Coronea, in Bœotia. In the years that followed, Agesilaus took an important part in his country's politics and campaigns. In 361 B.C. he undertook an expedition to Egypt, but while on his way home died, in the winter of 361–360. Agesilaus was small of stature and lame. He was simple in dress and in his way of living; blameless in public and private life alike; a patriot, though a party man; a conservative in politics; a successful, though not a great, general. Biographies of Agesilaus were written by Xenophon and Plutarch.

AGGLOM'ERATE. In geology the name applied to a consolidated mass of fragmental volcanic materials, chiefly bombs and rough blocks of lava that fall close to or within the cone. The fragments are of all sizes, the larger reaching several feet in diameter and tons in weight, and lack the sorted or stratified arrangement characteristic of sedimentary rocks, but lie haphazard just as they fell. The spaces between the blocks are generally filled with volcanic ash, which with the action of the atmosphere and of infiltering waters forms a cement that renders the mass compact and solid. Although the material in an agglomerate chiefly consists of some volcanic rock, like basalt, porphyry, or felsite, scattered pieces of sedimentary nature, such as limestone or sandstone, may occur, these having been torn off from the sides of the chimney in the course of an eruption. Except in very violent outbursts the blocks of lava are not carried any considerable distance away from the vent; for the most part they return to the crater. The finer sizes that range from gravel to dust-like particles and that may be transported many miles from the source form a deposit known as volcanic tuff. There is, of course, no sharp distinction to be made between the two kinds, as they are connected by deposits of intermediate character. When the volcanic fragments have been sorted by water and their angles rounded off by abrasion before their final deposition, the rock is called a volcanic conglomerate. Agglomerates have been described from the very early geological formations, as well as those of recent date. In whatever situation they are found they afford conclusive evidence of local volcanic activity and frequently mark its actual centre. See VOLCANOES.

AGGLU'TINATE LAN'GUAGES (Lat. *ad,* to + *gluten,* glue, paste). One of the chief linguistic groups, characterized by postpositional elements added to roots. These suffixes, ultimately losing their distinct meanings, become integral components of the words, thus forming the transition to inflection (q.v.). Hence, these languages are very numerous, and, for lack of more accurate knowledge, are grouped as yet very loosely. The chief families of agglutinate languages are Ural-Altaic (including Finnish, Turkish, and Hungarian), Dravidian (spoken in southern India), Tibeto-Burman (in Tibet, Siam, and Burma), and Malayo-Polynesian. Consult Friedrich Müller, *Grundriss der Sprachwissenschaft* (4 vols., Vienna, 1876–88). See PHILOLOGY; TURANIAN LANGUAGES.

AG'GREGA'TION, STATES OF (Lat. *ad,* to + *gregare,* to collect into a flock). The three states, *gaseous, liquid,* and *solid,* in which matter occurs. Many substances are capable, under certain conditions of temperature and pressure, of existing in any of the three states. Water, for instance, may be gaseous (steam, or water vapor), liquid (as ordinarily), or solid (ice). Other substances, on the contrary, could, by the means at our disposal, be obtained in

only one of the states of aggregation; thus, the element carbon remains solid even at the highest temperatures that can be produced at present, and many of its compounds undergo chemical decomposition before reaching the point at which they might melt.

Under certain conditions matter has been assumed to be capable of existing in other states besides the above three. Thus, Boutigny thought that liquids, when thrown upon glowing hot surfaces, pass into what he called the *spheroidal* state. Crookes thought that, at the instant of the electric discharge, the gases inclosed within a Crookes tube pass into a *radiant* state, which is characterized by certain properties not found in the other states of aggregation. When under the critical pressure and temperature (see CRITICAL POINT), substances are sometimes said to be in the *critical* state. In this article, however, only the three states of aggregation that are generally recognized may be briefly characterized.

1. A gas (or vapor) occupies the volume and assumes the shape of the vessel within which it is inclosed, and its resistance to a change of shape is very small. The amount of work which must ordinarily be expended in diminishing the volume of a gas is also insignificant compared to that required in the case of liquids or solids. Another characteristic property of gases is their capacity of mixing with one another in all proportions. Gases may be said to be matter in a highly rarefied state, their specific gravity being ordinarily very small compared to that of liquids or of solids. According to the molecular theory, the distances between their particles are very great, and therefore the particles exert very little action upon one another. See MOLECULES—MOLECULAR WEIGHTS.

2. The volume of a liquid varies but little with the external conditions; comparatively great pressures, for instance, will cause but a slight diminution of the volume of a liquid. Like gases, however, liquids have no shape of their own, and they readily assume the shape of the vessel containing them. Certain pairs of liquids (for instance, alcohol and water) are capable, like gases, of mixing in all proportions; others (for instance, carbolic acid and water) dissolve in each other to a limited extent; still others (for instance, carbon di-sulphide and water) are practically insoluble in each other. The molecules of a body in the liquid state are much nearer to one another than those of a gas, and consequently are capable of exerting upon one another considerable attraction. In an overwhelming majority of cases liquids are isotropic and have no effect on the plane of polarized light. But substances in the so-called liquid crystalline state, though incapable of assuming a definite shape like solids, act like crystals when introduced between two "crossed" Nicol's prisms and cause light to pass through the prisms. In memoirs published in 1908 and 1909 Bose made an interesting attempt to explain this peculiar state of substances, on the assumption that the molecules arrange themselves in parallel layers. In 1910 Nernst published a thermodynamic study corroborating this view. See LIQUID CRYSTALS.

3. In the case of solids, not only the volume, but also the shape, cannot be easily changed. Very little is as yet known of the molecular constitution of solids. In recent years the distinction between the metallic and non-metallic states has attracted considerable thought. Metals are characterized by their opaqueness, their complete insolubility in non-metallic solvents, and their extraordinary electrical conductivity. Attempts have been made to explain the conductivity both of pure metals and alloys on the basis of the electron theory. Concerning the mutual solubility of solids, see SOLUTIONS and ISOMORPHISM.

Consult: J. D. van der Waals, *La continuité des états gazeux et liquides* (Paris, 1894; Leipzig, 1899–1900); Ruer, *Metallographie* (Hamburg, 1907); Freundlich, *Kapillarchemie* (Leipzig, 1909); K. Hack, *Das Wesen der Aggregatzustände. Stadtprozelten* (1912). See COLLOID.

AGG'TELEK. See AGTELEK.

AGH'LABIDS. A Moslem dynasty in Kairawan (q.v.). It was founded by Ibrahim ibn al Aghlab in 800 A.D. and was overthrown by the Fatimids in 909. The 11 rulers assumed only the title Emir, and nominally recognized the Abbasid Caliphate, but practically were independent. The hereditary rights were granted by Harun al Rashid. Their territory included all of Ifrikiya, or the ancient *provincia Africa*. In 827 Ziyadat Allah began the conquest of Sicily which was continued by his successors. See the edition and translation by Noël des Vergers of Ibn Khaldun's *Ibar* IV, under the title *Histoire de l'Afrique sous les Aghlabites et de la Sicile* (1891); Amari, *Storia dei Musulmani di Sicilia* (1854); *Bibliotheca Arabo-Sicula* (1857).

A'GIAS (Gk. *'Αγίας*). An ancient Greek cyclic poet of Trœzen, who lived about 740 B.C. His chief work was *Νόστοι, Nostoi*, or the *History of the Return of the Achœan Heroes from Troy*. Only fragments of the poem have been preserved. Consult F. C. Welcker, *Der epische Cyklus* (Bonn, 1849); D. B. Monro's edition of the Odyssey, books xiii–xxiv, pp. 378 ff. See CYCLIC POETS.

AGIB, ā'gīb. The name of two characters in the *Arabian Nights*. 1. In the *History of the Three Calendars*, the third calendar, whose marvelous adventures began with his shipwreck on the lode-stone mountain. 2. In *The Story of Noureddin Ali and Bedreddin Hassan*, the son of the latter.

AGINCOURT, à'zhăn'kōōr'; *Eng. pron.* ăj'ĭn-kort, or **AZINCOURT.** A village in the department of Pas-de-Calais, France, celebrated for the splendid victory over the French gained by Henry V of England on St. Crispin's Day, Oct. 25, 1415. Reviving the ancient claim of the Plantagenets to the French throne, Henry had invaded France and taken Harfleur; but disease and privations in his small army determined him to return to England for reinforcements. Setting out for Calais, he forded the Somme with great difficulty, only to find a French army of about 50,000 men blocking his way. Henry offered advantageous terms, to save his 14,000 men from destruction; but the French were so confident of annihilating the weakened English troops that they would hear of nothing but absolute surrender. Between two woods, near the villages of Agincourt and Tramecourt, the English placed themselves in sullen desperation. The French, mainly Armagnac soldiery and men-at-arms, were drawn up in two lines, cavalry in front, infantry behind. As the English marched forward, the enemy's cavalry, peers and knights of France, charged to meet them. But the loamy ground held their horses' feet, and the rain of English cloth-yard arrows poured upon

rider and horse, broke the front rank, which in confusion retreated on the second line, breaking that too. The English archers, with billhook and hatchet, dashed in among the heavily encumbered men-at-arms and slaughtered them in great numbers, turning the fighting into a butchery. Those of the enemy who could, ran; the rest perished. The French nobility was almost annihilated in this battle; among the 5000 of noble birth being the Constable d'Albret, the commander of the French force, three dukes and very many lords and knights of lesser degree. The English lost very few men, but among them the Duke of York. It is stated that only 13 men-at-arms and about 100 foot-soldiers fell on the English side. Consult Nicolas, *History of the Battle of Agincourt* (London, 1833).

AGIO, ăj'ĭ-ō *or* ā'jĭ-ō. An Italian word, signifying 'accommodation,' first used in Italy to denote the premium taken by money-changers in giving gold for silver, on account of the greater convenience of gold for transport. The same word is now used in particular to denote the difference in the value of a metallic currency and the paper money representing it; also the variations from fixed parts or rates of exchange. It corresponds very nearly to the English word "premium."

AGIRA, â-jē'rà, formerly San Filipo d'Argirò. An ancient city in Sicily, 2130 feet above the sea and 45 miles northwest of Catania (Map: Italy, J 10). The historian Diodorus (q.v.), who was born here, credits it with having been honored by a visit from Hercules, but St. Philip has succeeded the heathen hero as the tutelary genius of the city. To the north is Gagliano, where 300 French knights were ambushed in 1300. The whole vicinity is famous for its fine marble. Pop., 1901, 17,738; 1911, 21,877.

A'GIS (Gk. *Ἄγις*). The name of several kings of Sparta. 1. Son of Eurysthenes and founder of the family of the Agidæ. According to one account, he conquered Helos and established the order of the Helots. (See Helos; Helots.) 2. Son of Archidamus II, and King from 427 or 426 to 401 B.C. He was one of the best kings of Sparta and one of the most distinguished men of his time. He took an active part in the Peloponnesian War, several times invaded Attica, and defeated the Athenians and their allies at the battle of Mantinea (q.v.), in 418 B.C. It was said that Alcibiades seduced Timæa, the wife of Agis; in consequence of this report, in reality incredible, Leotychides, Timæa's son, was excluded from the throne in favor of Agesilaus (q.v.). 3. Son of Archidamus III, and King from 338 to 331 B.C. He tried to overthrow the Macedonian power in Europe while Alexander the Great was in Asia, but was defeated and killed in battle by Antipater in 331 B.C. 4. Son of Eudamidas II, and King from 244 to 240 B.C. He tried to reestablish the institutions of Lycurgus and reform the Spartan State, but, being opposed by the wealthy classes, was thrown into prison and put to death. Consult Plutarch, *Life of Agis* and Barran, *Histoire d'Agis IV* (Paris, 1817).

AGIST'MENT (OF. *agister*, Lat. *ad*, to + OF. *gister*, to assign a lodging, from *giste*, Fr. *gîte*, an abode, resting-place). The common contract of bailment (q.v.), whereby a person (called the *agister*) pastures the horses, cattle, or sheep of another. The agister is not subject to the extraordinary liability of the common carrier (q.v.) and the inn-keeper (q.v.) for the loss of the property intrusted to his care, but is, nevertheless, bound, as an ordinary bailee for hire, to take reasonable care of the animals. On the other hand, he is not, like the inn-keeper, the common carrier, the horse-trainer, etc., entitled to a lien (q.v.) at common law on the animals for his charges. Now, however, he has such a lien by statute. Consult: Sir William Jones, *Essay on the Law of Bailments* (New York, 1828); Story, *Commentaries on the Law of Bailments* (Boston, 1878).

AGLAÏA (Gk. *Ἀγλαΐα*, splendor, beauty). According to Hesiod, the youngest of the three Graces (q.v.), the wife of Hephæstus.

AGLAOPHON (Gk. *Ἀγλαοφῶν*). A famous Greek painter from Thasos, who lived about 500 B.C. He was the father of Polygnotus (q.v.) and Aristophon, also painters and his pupils. Quintilian (12, 10, 3) warmly praises Aglaophon's pictures for simplicity of coloring.

AGLAR, ä-glär'. See Aquileja.

AGLAURA. A play by Sir John Suckling (q.v.), produced in 1637–38, and first published in 1638, in folio, and again in 1646. It is said that the King was present when the play was acted and was so distressed by its sad ending that the author wrote a new conclusion, making the piece a "tragi-comedy."

AGLIARDI, â-lyär'dē, Antonio (1832–1915). Chancellor of the Holy Catholic Church, Bishop of Albano, and Cardinal. He was born at Cologno and studied law and theology at Rome. He was sent to Canada as a Bishop, and after his return in 1884 Pope Leo XIII appointed him Archbishop of Cæsarea in Palestine, and shortly thereafter he was sent as the apostolical delegate to India to settle the Goa controversy with Portugal. In 1889 he was the Papal Nuncio in Munich, and four years later filled the same position in Vienna. His personal interference with the ecclesiastical affairs of Hungary, in 1895, resulted in his receiving a public reprimand from the Hungarian government, in consequence of which a dispute arose between Bánffy, the President of the Hungarian Ministry, and Kálnoky, the Austro-Hungarian Minister of Foreign Affairs, which culminated in the downfall of the latter. He was created and proclaimed a Cardinal in 1896.

AGLOSSA, ā-glŏs'à (Gk. *ἀ, a*, priv. + *γλῶσσα, glōssa*, tongue). A sub-order of anurous amphibia, the frogs, without a tongue and with one pharyngeal opening of the Eustachian tubes. It contains certain fossil forms, but only two recent families—Pipidæ (South American) and Xenopidæ (African). See Pipa.

AGNANO, án-yä'nō. Formerly a small lake near Naples, Italy, situated in the crater of a volcano, now drained on account of its malarial influence. At the southern entrance to Lake Agnano lies the Grotto del Cane, whose floor is covered with a stratum of carbonic acid gas of sufficient strength and depth to kill small animals that are put into the grotto. Nearby are situated the vapor baths of San Germano, used by people afflicted with rheumatism and gout. The volcanoes surrounding the lake have been extinct since 1198 A.D. Immediately to the northwest of Agnano lies the lake of Astroni, which occupies the crater of an extinct volcano and is surrounded by beautiful woodlands.

AG'NATE (Lat. *agnatus*, born in addition to, from *ad*, to + *natus*, born). Agnates, in the law of both England and Scotland, are persons

related through the father, as cognates are persons related through their mother. By the English law of succession, agnates inherit unless the inheritance was received by the deceased person *a parte materna*, i.e., from the mother, or a cognate, in which case it would descend, if he left no issue, to her cognates. In the Roman law both of these terms had a somewhat different signification. Agnates, by that system, were persons related through males only, whilst cognates were all those in whose connection, though on the father's side, one or more female links intervened. Thus, a brother's son was his uncle's agnate, because the propinquity was wholly by males; a sister's son was his cognate, because a female was interposed in that relationship. The reason for having thus changed the meaning of terms manifestly borrowed from the Roman law seems to be that in Rome the distinction between agnates and cognates was founded on an institution which has not been adopted in the Roman sense by any modern nation—that, namely, of the *patria potestas* (q.v.). Roman *agnati* are defined by Hugo to be all those who either actually were under the same *paterfamilias*, or would have been so had he been alive; and thus it was that, as no one could belong to two different families at the same time, the agnation to the original family was destroyed and a new agnation created, not only by marriage, but by adoption (q.v.).

Justinian abolished entirely the distinction between agnates and cognates and admitted both to legal succession. As to the legal effects of the distinction in the modern sense, see SUCCESSION; GUARDIAN. See the works referred to under CIVIL LAW.

AGNES (*Fr. pron.* ăn'yĕs'). 1. In Molière's *L'Ecole des femmes*, a character who has become proverbial as a type of the *ingénue*. She is a young girl brought up in ignorance of many of the social relations, who innocently makes the most suggestive remarks and without intention cruelly wounds other people's feelings. In English, Wycherley's *Mrs. Pinchwife* is in some respects patterned after her. 2. A character in Lillo's tragedy, *Fatal Curiosity*. 3. Agnes Wickfield, in Dickens's *David Copperfield*. See WICKFIELD, AGNES.

AGNES, SAINT. A Christian virgin, martyred in Rome by order of Diocletian when about 13 years old. The legend is that her beauty excited the desires of wealthy suitors, who, vainly seeking her in honorable marriage, denounced her to the governor as a Christian. Unmoved, she heard threats of torture and was sent to the public brothel, where only one, however, ventured to touch her, and he was stricken with miraculous blindness until his sight was restored in answer to her prayers. She was a little later beheaded. Her day is January 21, and her symbol is a lamb. Her legend resembles that of St. Agatha (q.v.). Consult A. Butler, *Lives of the Saints*, under January 21 (London, 1847).

AGNES GREY. A novel by Anne Brontë, published 1847, under her pseudonym of Acton Bell.

AGNESI, ân-yā'zê, MARIA GAETANA (1718–99). An Italian mathematician, born at Milan. Her family was prominent at Milan, and she had all the educational advantages that wealth could procure. Her linguistic and philosophic powers suggested the title of "oracle in seven languages." She also gave much attention to the sciences, particularly to mathematics. "Algebra and geometry," she said, "are the only provinces of thought where peace reigns." In 1748 she was made a member of the Academy of Bologna, and in the same year appeared her *Istituzioni analitche ad uso della gioventù italiana* (2 vols., Milan, 1748; Paris, 1775; London, 1801). In 1750 she was appointed by Pope Benedict XIV lecturer on mathematics at the University of Bologna. Early devoted to religious observances, after the death of her father (1752), she renounced her scientific work and took the veil. Her name is connected with an interesting cubic curve. Consult J. Boyer, "La mathématicienne Agnesi," in the *Revue Catholique des revues françaises et étrangères* (Paris, 1897), and Antonio Francesco Frisi, *Elogio* (Milan, 1799; translated by Boulard, Paris, 1807).

AG'NES OF AUSTRIA (1281–1364). A daughter of Albrecht I, Emperor of Germany. She was the wife of Andreas III, King of Hungary, and after the murder of her father (1308) lived at the monastery of Königsfelden, which her mother had erected upon the site of the assassination of the Emperor. She took an active part in the political events of the period and frequently acted as mediator between Austria and the Swiss Confederacy. See Liebenau, *Lebensgeschichte der Königin Agnes von Ungarn* (Regensburg, 1868).

AGNES OF MERAN, mā-rän' (?–1201). A Queen of France, daughter of the Duke of Meran (Tyrol). She was married in 1196 to Philip Augustus (q.v.), who had obtained (through the French bishops) a divorce from Ingeborg of Denmark. The Pope refused to allow the divorce, but the King braved the Papal wrath. In 1200 France was placed under an interdict; but the King, by a feigned compliance, secured the raising of the interdict. Agnes died in 1201, but it was not until 1213 that Philip was reconciled to Ingeborg. Then the Pope legitimized the two children of Agnes.

AGNES OF POITIERS, pwä'tyâ' (1025?–1077). A Queen of Germany, daughter of William V, Duke of Aquitaine, and second wife of Henry III of Germany, to whom she was married in 1043. She was much influenced by the ideas of Cluny. After the death of Henry (1056), Agnes became Regent of the Empire as guardian of her son, Henry IV. In 1062 rebellious nobles secured possession of the young Henry, and Agnes went to Italy. She became closely associated with Gregory VII in his contest against Henry.

AGNES'S EVE, SAINT. The night of January 20. In popular superstition it is regarded as an occasion when young women can by various magic arts behold the faces of their destined husbands.

"The Eve of St. Agnes" is the title of an exquisite poem by Keats.

AGNÈS SOREL' (c.1422–50). The mistress of Charles VII of France from 1444 until her death. She was the first royal mistress in France to receive public recognition as an acknowledged power in the kingdom. She received many gifts and honors and aroused much scandal. Her death was sudden, and it was supposed that she was poisoned by the Dauphin, afterward Louis XI. She had four children by the King. Many legends gathered about her name, and credit was erroneously given her for aiding Joan of Arc in her work. She has been popularly regarded as a virtuous character, using her influence for

good. There is a beautiful monument to her in the church at Loches. See Duquesne, *Vie et Aventures galantes de la belle Sorel* (Paris, 1909).

AG'NEW, Cornelius Rea (1830–88). An American physician. He was born in New York City, and graduated from Columbia College in 1849, and from the College of Physicians and Surgeons in 1852. In 1858 he was appointed surgeon-general of New York State, and during the Civil War was medical director of the New York Volunteer Hospital. He was prominent in the United States Sanitary Commission. He assisted in founding the Columbia School of Mines in 1884, founded the Brooklyn Eye and Ear Hospital in 1868, and the Manhattan Eye and Ear Hospital in 1869.

AGNEW, David Hayes (1818–92). Professor of surgery at the University of Pennsylvania and very widely known by his surgical inventions and by his writings, among which is *The Principles and Practice of Surgery* (3 vols., 1878–83). He was one of the surgeons who attended President Garfield when he was shot.

AGNEW, Sir William (1825–1910). An English publisher and publicist. He was born in Manchester and was educated privately in that city. His father, Thomas Agnew, was a printer, with large establishments in Manchester, Liverpool, and London. William Agnew entered the firm and eventually became senior member, a position which he held for many years, the firm name, however, remaining Bradbury, Agnew & Co. Among the publications of this house is *Punch*, the great English humorous weekly. William Agnew was for many years a warm friend and supporter of Gladstone. In 1880 he was elected to Parliament as a Liberal from a Lancaster division. He was reëlected five years later, but retired from politics in 1892, after a defeat for reëlection. He was a prominent figure in the publishing and art world of his day, and in public activities became known as chairman of the Art Committee of the Manchester Exposition (1887); member of the Royal Commission for the Melbourne Centenary Exposition; and member for the Paris Exposition of 1892. He printed a volume of essays, addresses, and travel notes, which had a private circulation.

AGNI, äg'nē (Skr. *Agni-s*). The fire god of the Hindus, corresponding in name to the Latin *ignis*, Lithuanian *ugnīs*, and Old Slavic *ognĭ*, fire. Next to Indra (q.v.), he is the most prominent of the gods in the *Veda* (q.v.). No less than 200 hymns celebrate his praise under his three-fold form, as the fire on earth, especially the altar-fire, the lightning in the sky, and the sun in heaven. His birth is of divine origin, as the lightning of the clouds, or he is daily produced by a miracle, the rubbing together of two sticks which are regarded as his parents, and he devours them as soon as he is born. Kindled each morning at the sacrifice, his worship forms one of the most important parts of the ritual. He is especially the messenger between the gods and men, and he rides upon a chariot drawn by two or more steeds. Although an immortal, he has taken up his abode among men, and he is regarded as the most honored guest. He is also the flame of the sacrifice offered by the gods themselves to maintain their sovereignty and assure the persistence of the supreme laws of the universe. In the later literature less is made, perhaps, of Agni than in the early hymns; but, as one of the most prominent gods, several legends are preserved regarding him in the Hindu epics Mahābhārata and Rāmāyana (q.v.). The Harivanśa (q.v.) describes him as clad in black, with a banner of smoke and a javelin of flame. In pictures he is variously portrayed, but his color is red, and he is represented as having two faces, which typify his destructive as well as his beneficent character, and he has three legs and seven arms. Sometimes he is represented as riding upon a ram or as accompanied by that animal. Consult: Macdonell, *Vedic Mythology* (Strassburg, 1897); Hopkins, *Religions of India* (Boston, 1895); Wilkins, *Hindu Mythology* (London, 1900).

AGNO, äg'nō. The second river of importance in the island of Luzon, Philippines, rising near the boundary of the provinces of Banguet and Lepanto. It is about 128 miles long and because of the irregularity of the country through which it flows receives a great many tributaries throughout the lower part of its course. It empties into the Gulf of Lingayen.

AGNOETÆ, äg'nō-ē'tē (Gk. *ἀγνοεῖν, agnoein*, to be ignorant). A Monophysite sect in the sixth century, which gave prominence to the statement that, in his human nature, Christ was ignorant of many things, especially of the time of the day of judgment. An Arian sect of the same name in the fourth century denied the omniscence of God.

AGNOLO, dän'yō-lō, Baccio d'. See Baglioni.

AGNOLO. See Agostino.

AGNO'MEN (Lat. *ad*, to, in addition + *nomen*, name). A term used by the ancient Roman grammarians of the fourth century A.D. to denote an additional personal name derived from some exploit, personal characteristic, or important event; as *Cunctator*, 'the Delayer,' given to Q. Fabius Maximus because of his policy of delay in the war against Hannibal. Compare also Pompeius *Magnus;* Æmilius *Macedonicus* (see Paulus Æmilius). The Romans of an earlier time apparently regarded such a designation as an additional *cognomen* (q.v.). The *cognomen* was inherited or bestowed at birth, and belonged to all members of a *familia;* the *agnomen* was a name won later by an individual.

AGNONE, ân-yō'nâ. A city of south Italy, 22 miles northwest of Campobasso (Map: Italy, J 6). It stands on a hill said to be the site of the Samnite *Aquilonia*. There are sulphur and mineral springs and copper mines in the neighborhood, and the town has cloth, steel, and copper works. Pop., 1901, 9793; 1911, 10,106.

AGNOS'TICISM (Gk. *ἄγνωστος, agnōstos*, unknown, unknowable, ignorant). A word coined in 1869 by Professor Huxley to express the doctrine that man from his very nature is incapable of forming trustworthy conclusions concerning ultimate reality. The doctrine is by no means new. It is essentially one with the view of Protagoras (q.v.), that the individual man is the measure of the universe, and with the view of the Greek skeptics from Pyrrho onward. (See Ænesidemus.) Among English-speaking philosophers H. Spencer (q.v.) is the best-known agnostic. The tenability of the agnostic position depends on the justifiability of the dualistic assumption that reality is independent of mind. It argues that knowledge is the result of a mental process which claims to represent an external

reality; that the knowledge that this claim is valid is possible only after a comparison of the representation with the original; but that the original is, by hypothesis, not an object of knowledge; hence, that no comparison is possible for the knower. Knowledge of reality is thus a huge undemonstrable assumption. Consult Sir Leslie Stephen, *An Agnostic's Apology* (New York, 1903) and W. U. Moore, *Glimpses of the Next State* (London, 1911). For a criticism of agnosticism see KNOWLEDGE, THEORY OF; ABSOLUTE; DUALISM; APPEARANCE.

AGNOS'TUS (Gk. *ἄγνωστος, agnōstos*, unknown). A characteristic Cambrian genus of blind trilobites distinguished by their small size, the elliptical form of the dorsal shield of carapace, the close resemblance of the head-shield (cephalon) and tail-shield (pygidium), and the presence of only two segments in the thorax. This genus, comprising over 150 species, is abundantly represented in the Cambrian formations of Scandinavia, Bohemia, Great Britain, Spain, and North America; indeed, certain kinds of Cambrian shales are filled with the detached fragments of the discarded moults of these crustaceans. A few species are, in northern Europe, known from the lowermost Ordovician beds. An allied genus, also characteristic of the Cambrian formations, is Microdiscus, with four thoracic segments, which seems to be a somewhat earlier form than Agnostus and may perhaps be in a certain sense the ancestral form from which Agnostus was evolved. For illustration, see TRILOBITA. See also articles on TRILOBITA; CAMBRIAN SYSTEM.

AG'NUS, FELIX (1839—). An American soldier and editor. He was born in Lyons, France, and fought in the war waged by Napoleon III against Austria, and after the battle of Montebello was detailed to the celebrated flying corps under Garibaldi. He came to America in 1860, and enlisted in the Duryea Zouaves (New York Volunteers), upon the outbreak of the Civil War, and at the battle of Big Bethel saved the life of General Kilpatrick. He served as lieutenant-colonel under Sheridan in the latter's famous campaign in the Shenandoah valley (1864), and toward the close of the war, as inspector-general in the Southern Department, he was commissioned to dismantle the Confederate forts in South Carolina, Georgia, and Florida. At the close of the war he was brevetted brigadier-general of volunteers (March 13, 1865), and soon afterward was retired from the service. He then became business manager, and later editor and publisher, of the Baltimore *American*.

AG'NUS DEI (Lat. Lamb of God). One of the titles of Christ (John i. 29); also the name given to a certain prayer used in the Roman Catholic service of mass. The litanies generally conclude with the same prayer: "O Lamb of God, that takest away the sins of the world, have mercy upon us." The figure of a lamb bearing a cross, stamped upon an oval of wax, silver, or gold, is also styled an Agnus Dei. Such medals have been consecrated by the popes since the fourteenth century, and are generally distributed among the faithful on the first Sunday after Easter. In the ancient Church candidates for baptism received similar medals of wax and wore them as objects of devotion. In the Greek church the cloth which covers the cup in the communion service bears the image of a lamb and is styled the Agnus Dei.

AGOG'ICS. A musical term denoting the subtle modifications of tempo inseparable from an expressive interpretation. The term was first introduced by H. Riemann (q.v.) in his *Musikalische Dynamik und Agogik* (1884). The author shows that all dynamic variations affect the strict time-value of accented notes, so that in a crescendo the performer almost unconsciously prolongs the actual value of every accented note, whereas in a diminuendo the time-value is lessened.

AGONA'LIA. A Roman Festival. See FESTIVALS.

AGON'IC LINES (lines without angles, from Gk. *ἀ, a*, priv. + *γωνία, gōnia*, angle). Imaginary lines on the surface of the earth such that at each point through which one passes the magnetic declination is zero; that is, at such a point a magnetic compass needle lies in the geographical meridian and hence points in a "true" north and south direction. There are two agonic lines at the present time (1913). One is a closed curve passing across Hudson Bay, into the Atlantic Ocean east of Florida, across Brazil, through the Antarctic Ocean, near the south pole of the earth, northward through Australia, the Indian Ocean, Russia, near the north pole of the earth, and back again. The other is a much smaller closed curve, called the "Siberian Oval," because it is contained in Eastern Siberia and China. The agonic lines as well as the isogonals and isoclinic lines are shown on special charts of the world published by the British Admiralty, and for the United States by the Coast and Geodetic Survey. See MAGNETISM, TERRESTRIAL.

AGONOTHE'TES (Gk. *Ἀγωνοθέτης*, from *ἀγών*, contest + *τίθημι*, place, arrange). The name of an official at Greek games, serving usually as judge of the contests. Sometimes as giver or exhibitor of them. See FESTIVALS; GREEK GAMES.

AG'ONY COL'UMN. In England, a term applied to that part of a newspaper, generally the second column of the advertisement sheet, headed by notices of losses and disappearances, mysterious communications, etc., corresponding to the American *personal column*.

AGOO, ä-gō'ō. A town of Luzon, Philippines, in the province of La Union. It is situated on the west coast, about 19 miles south of San Fernando. Agriculture and fishing are the important industries. Cotton, sugar-cane, and rice are produced. Pop., 1903, 10,653.

A'GORA (Gk. *ἀγορά*, an assembly, later, a gathering-place). A part of a Greek city corresponding in general to the Forum (q.v.) of a Roman city. See ATHENS.

AG'ORAC'RITUS (Gk. *Ἀγοράκριτος, Agorakritos*). A Greek sculptor of the fifth century B.C. He was born on the island of Paros and was the favorite pupil of Phidias. His works are said to have been so perfect that the ancients were frequently uncertain whether they should be ascribed to him or to Phidias. His chief creation was the colossal figure of Nemesis at Rhamnus, which he is supposed to have developed from his unsuccessful Aphrodite, prepared for the contest with Alcamenes. Fragments of the work were discovered at Rhamnus; part of the head is in the British Museum. Consult Ulrich von Wilamowitz-Moellendorff, "Antigonos von Karystos," in his *Philosophische Untersuchungen*, vol. iv.

AG'ORAPHO'BIA. A symptom of neuras-

thenia, characterized by a fear of open spaces, not necessarily open country, but of streets, squares, or the interior of large buildings, theatres, churches, and the like.

AGOSTA, ä-gō'stä, or **AUGUS'TA**. A walled city of Sicily, in the province of Syracuse, 19 miles north of that city. It stands on a peninsula (now an island), jutting into the Mediterranean, and is said to occupy the site of the Megara Hyblæa of the ancients. Agosta, founded by the Emperor Frederick II in 1232, played an important part in the war of the Sicilian Vespers, withstanding Charles of Anjou until betrayed into the hands of William L'Estendart, one of his barons (1286). The city was then sacked and the inhabitants ruthlessly butchered, and many years passed before Agosta was repeopled or began to prosper. In 1551 Agosta was taken and burned by the Turks. Earthquakes devastated the city in 1268, in 1551, in 1693, when one-third of the inhabitants perished, and in 1848. In 1676 a great naval battle was fought near here between the Dutch under De Ruyter and the French. De Ruyter himself was killed. The port is spacious, but rather difficult of access. While salt is the chief article of export, oil, wine, cheese, fruit, honey, and sardines are also exported. Pop., 1901, 16,402.

AGOSTINO, ä'gô-stē'nô, and **AGNOLO**, ä'nyô-lō (active 1310–50). Sienese sculptors and architects, of the school of the Pisani (q.v.). They have been erroneously called brothers, because they sometimes worked together; but Agostino was the son of Giovanni, and Agnolo the son of Ventura. Their sculptural masterpieces include the monument of Bishop Tarlati at Arezzo (1330) and that of the jurist Pino de Sinibaldi in the cathedral of Pistoia; much sculpture is also ascribed to them in Siena. Documentary evidence shows that each designed important buildings for their native town. Agnolo designed the important out-gates and the Castello of Grosseto, while Agostino worked upon the vaults and the celebrated tower of the Palazzo Comunale, Siena, and the fortress of Massa. Agostino was usually assisted in his work by his son Giovanni.

AGOSTINO DI DUCCIO, dē dōōt'chô (1418–c.1481). A Florentine sculptor and architectural decorator, one of the foremost of the later fifteenth century. His master in sculpture is unknown; he probably developed as a stonemason. At 23 he executed a series of reliefs for the cathedral at Modena (1442). Accused of theft, he fled from Florence in 1446, and in 1447 he was placed by the architect Alberti in charge of the sculptural decorations of the interior of San Francesco at Rimini. Some parts of these, such as the tomb of Sigismundo Malatesta, which is attributed to him, are masterly. But his full capacity was shown in his next work, the façade of San Bernardino at Perugia, one of the finest pieces of Renaissance sculpture composition (1457–61). In the spring of 1463 he was again in Florence. To this last period belong the beautiful tabernacle of Ognissanti, Florence, the marble relief of the Madonna in the Museo del Opera, two others in the Louvre, and one of terra cotta in the Berlin Museum. His last-known work is the fine San Pietro Gate in Perugia, upon which he was occupied after 1480. His style was sometimes mannered and incorrect, but always excellent from the decorative point of view. His forte was very low relief with evanescent effects, poetic female figures with marvelous flowing draperies.

AGOULT, ä'gōō', Marie Catherine Sophie de Flavigny, Comtesse d' (1805–76). A French author, whose pseudonym was Daniel Stern. She was born at Frankfort-on-the-Main, but was educated at Paris, where, in 1827, she married the Count d'Agoult. Afterward she lived with Franz Liszt, and of her two daughters by him the youngest, Cosima, was married to Richard Wagner. After a series of novels, including *Hervé* (1841) and *Nelida* (1845), she published several political works, of which the best known are *Lettres républicaines* (1848), criticising the government of Louis Philippe, and the *Histoire de la Révolution de 1848* (3 vols., 1851–53). Her best work is *Esquisses morales et politiques* (1849), a volume of political and moral aphorisms in the style of the *Maximes* of Rochefoucauld. Though her moral laxity made her the subject of much unpleasant notoriety, the Comtesse d'Agoult's salon was, for many years, the rendezvous of many leading statesmen, poets, critics, painters, and musicians. There Alfred de Vigny, Chopin, Meyerbeer, Heine, George Sand, and Sainte-Beuve were frequently seen; there Ponsard read his tragedy of *Lucrèce* for the first time. During the period from 1838 to 1848 her salon had merely a social character. When, however, the fall of Louis Philippe in the revolution of 1848 led her to join the ultra-democratic party and to begin her crusade against "property and capital, orthodoxy and family," society was closed against her, and it was then that such men as Rodrigues, Enfantin, Lamartine, and Louis Blanc sought her company. Consult her own reminiscences contained in *Mes souvenirs* (Paris, 1877); and the works of Fleury, *Portraits révolutionnaires*, vol. i (Paris, 1889); also Rochelaure, *Une amitié romanesque: George Sand et Mme. d'Agoult* (Paris, 1895).

AGOUTA, ä-gōō'tä. See Solenodon.

AGOUTI, ä-gōō'tē (Fr. through Sp., from the native name). Any of several large rodents of South America and the West Indies, of the genus Dasyprocta and family Dasyproctidæ. They are 18 or 20 inches long, have somewhat squirrel-like forms, with slender legs and hoof-like claws, and are brownish above and yellowish below. They inhabit woodlands, where they are gregarious and dwell in holes, and whence they ramble abroad, mainly at night, with grunting cries, to feed on vegetables, often doing great damage to sugar-cane. About 12 species are known, as: the "pampas hare," pursued as game in southern Brazil and southward; Azara's, the acouchy (or acuchi) of Guiana and the West Indies; the black and the yellow-rumped, which are West Indian and best known. Also spelled "agouty" and "aguti"; it is to be noted that Darwin (*A Naturalist's Voyage*) applies the name to the Patagonian cavy. See Plate of Cavies accompanying Cavy.

AGRA, ä'grä. A part (formerly Northwest Provinces) of the United Provinces of Agra and Oudh (q.v.), British India, and a division, district, and city thereof. The area of the Agra portion of the United Provinces is 83,198 square miles; pop., in 1901, 34,859,109; in 1911, 34,624,040, of whom 29,415,419 are Hindus. Agra division, 10,078 square miles: pop., 1901, 5,249,970; 1911, 5,007,921. Agra district, 1845 square miles: pop., 1901, 1,060,528; 1911, 1,021,847. See Agra (city).

AGRA (evidently from *Akbarabad*, city of Akbar). A city in the United Provinces of Agra and Oudh, British India, in the district of the same name on the right bank of the Jumna, 110 miles southeast of Delhi and 841 miles by rail northwest of Calcutta (Map: India, C 3). As the railway and administrative centre of its district and of the large division to which it gives its name, Agra is a place of great importance. It has an extensive trade in cotton, tobacco, indigo, salt, sugar, and grain, and manufactures of inlaid mosaic work, for which it is famous, gold lace, and shoes. It also has a considerable transport trade by the Jumna and Agra canal. Agra is fortified and has a garrison; there is a military station in the neighborhood of the city. The climate during the hot and rainy seasons (April to September) is injurious to Europeans, but, on the whole, the average health of the city is equal to that of any other station in the United Provinces. The mean annual temperature is 79° F.; January, 60°, June, 95°. The ancient walls of the city embrace an area of about 11 square miles, of which about one-half is at present occupied. The houses are, for the most part, built of the red sandstone of the neighboring hills. The principal street, running northwest from the fort, is very spacious, but the rest are generally narrow and irregular, though clean. The Strand, a thoroughfare on the river banks, is 2 miles long and 80 feet wide.

Some of the public buildings, monuments of the House of Timur, are of striking magnificence. Among these are the fine fortress built by Akbar, within the walls of which are the palace and audience-hall of the Emperor Shah Jehan, and the Moti Masjid or Pearl Mosque, so called from its surpassing architectural beauty. Still more celebrated is the Taj Mahal, situated without the city, about a mile to the east of the fort. This extraordinary and beautiful mausoleum, "the most splendidly poetic building in the world," was built by Shah Jehan for himself and his favorite wife, Arjimand Banoo (surnamed Mumtaz Mahal). Twenty thousand men, says Tavernier, who saw the work in progress, were employed incessantly on it for 22 years. The principal parts of the building are constructed or overlaid outside and in with white marble; and the mosaic work of the sepulchral apartment and dome is described by various travelers in terms of glowing admiration. It is composed of 12 kinds of stones, of which lapis-lazuli is the most frequent, as well as the most valuable. (See TAJ MAHAL.) Of British and other European edifices in and near the city, the principal are the buildings of a Catholic mission and episcopal see founded in the sixteenth century, the government house, the college for the education of natives, the Metcalfe testimonial, the English church, and the barracks. A committee appointed by the government administers municipal affairs, derives revenue from real estate and octroi, and operates the water works. This city is held in great veneration by the Hindus as the scene of the incarnation of Vishnu under the name of Parasu Rama. It first rose to importance in the beginning of the sixteenth century, and from 1526 to 1658 it was the capital of the Mogul sovereigns. In the latter year Aurungzebe removed to Delhi; thereafter Agra declined. It was taken in 1784 by Scindia, and surrendered in 1803 to Lord Lake after a bombardment of a few hours. During the Sepoy mutiny of 1857 Agra was one of the places in which the Europeans were confined. They were obliged to abandon the city in June and retire to the fort or residency, to which fugitives also flocked from all parts of the country. Most of the European buildings in the city were burned by the Sepoys. Heroic sallies were made from the fort, until the place was relieved in October by the rapid and brilliant march of Colonel Greathed. Pop., 1901, 188,022; 1911, 185,449. See H. G. Keene, *The Agra Guide* (Agra, 1872), and E. B. Havel, *Handbook to Agra*, etc. (London, 1904). See TAJ.

AGRA AND OUDH. See UNITED PROVINCES OF AGRA AND OUDH.

AGRAM, ä'grăm (Hungarian *Zágráb*, Croatian *Zagreb*). The capital of the Hungarian crownland of Croatia-Slavonia, beautifully situated at the foot of the Agram Mountains, about 2 miles from the Save, and 141 miles east-northeast of Fiume by rail (Map: Hungary, D 4). It consists of the upper, lower and episcopal towns. The chief public buildings are the cathedral, a late Gothic edifice dating from the fifteenth century; the palace of the *ban*, or governor; the National Theatre; the Gothic church of St. Mark; the archiepiscopal palace; the Academy of Sciences, with fine collections of pictures and antiquities, and the palace of justice. Agram is the seat of government of the highest courts of the province and of the archbishop. The city is a great centre of South-Slavic national life. Its educational institutions include the Franz Josef University, founded in 1874, a gymnasium, a high school, industrial school, normal training schools, and several libraries. Its manufactures include leather, linen, porcelain, silk, and tobacco, and it has a considerable trade in grain and wine, the latter made from the vineyards which nearly surround the city. Pop., 1890, 38,000; 1900, 57,690; 1910, 79,038. Probably Roman in origin, Agram became an episcopal see in 1093 and was destroyed by the Tatars in 1242. Rebuilt and made a free royal city, it developed rapidly. In 1880 it was partially destroyed by an earthquake and suffered considerably from another shock in 1901.

AGRAMAN'TE, or **AG'RAMANT.** The King of the Moors in Boiardo's *Orlando Innamorato* and in Ariosto's *Orlando Furioso*. He was the son of Trogano and crossed over into Gaul to ravage the land and avenge himself on Charlemagne for the death of his father. He was slain by Orlando.

AGRAMONTE, ä'grä-mōn'tā, IGNACIO (1841–73). A Cuban revolutionist. He was born at Puerto Príncipe, Cuba, studied law at the University of Havana, and was admitted to the bar in 1867. He took a conspicuous part in the insurrection which broke out against Spain in 1868 and became Secretary of the provisional government in 1869. He commanded the Cuban forces in the Camagüey district and for some time—on the retirement of Quesada, Jordan, and Cavada—acted as commander-in-chief. He was killed in the battle of Jimaguayú.

AG'RAPHA (Gk. unwritten, from *ἀ*, *a*, priv. + *γράφειν*, *graphein*, to write). Since the last part of the eighteenth century this term has been used to denote alleged sayings of Jesus not found in the canonical Gospels and yet deemed worthy of consideration as to their possible genuineness. With the growth of textual criticism

it became customary to put into the same class sayings of Jesus found in some manuscripts or versions of the Gospels, but not sufficiently supported to be regarded as having formed a part of the original text, as e.g., the addition to the Lord's Prayer (Matt. vi. 13b), the reference to exorcism of demons through prayer and fasting (Matt. xvii. 21), the words of the risen Jesus (Mark xvi. 9–20), and those spoken to the woman taken in adultery (John vii. 53–viii. 11). Finally, the term is also employed by some writers to designate alleged quotations from the Old Testament in the New Testament which are not found in our Hebrew text, and other passages in the New Testament, not containing words of Jesus, found in various manuscripts and versions, but not considered as part of the original text. In earlier times such agrapha were chiefly gathered from Acts, the Pauline epistles, the earliest apocryphal gospels, ancient liturgies, and patristic writers. More recently the material has greatly increased by the discovery of new gospel fragments and collections of sayings. The bulk of the rich apocryphal gospel-literature (see APOCRYPHA) has generally been left out of consideration as being too late to contain a reliable tradition. A collection of extracanonical sayings was made by Cotelerius, *Ecclesiæ Græcæ Monumenta* (1677–88), who was followed by J. E. Grabe, *Spicilegium patrum et hæreticorum* (1698–1700), and J. B. Fabricius, *Codex Apocryphus Novi Testamenti* (2d ed., 1719). A more complete work on the subject was that of Alfred Resch, *Agrapha*, in Gebhardt and Harnack's *Texte und Untersuchungen*, 1889. His conclusions were criticised by J. H. Ropes, *Die Sprüche Jesu* (1896), who reduced the number of genuine sayings from 74 allowed by Resch to 13. Most critics, however, were unwilling to accept any of them as genuine. Great expectations were aroused by the announcement in 1897 that a papyrus had been discovered at Behnesa, the ancient Oxyrrhyncus, in Egypt, containing a number of sayings of Jesus, each beginning with "Jesus saith." They were published by the discoverers, Grenfell and Hunt, under the title *Logia Jesu: Sayings of our Lord from an Early Greek Papyrus* (1897). The seven distinct sayings proved to be of a very late type, showing a certain kinship to the Gospel according to the Egyptians, and are now generally dated between 150 and 300 A.D. The same applies to the five additional sayings found at the same place some years later and published by Grenfell and Hunt under the title: *New Sayings of Jesus and Fragment of a lost Gospel from Oxyrrhyncus* (1904). The latest and most extensive presentation and discussion of the whole material is the second edition of Resch's book, called *Agrapha: Ausserkanonische Schriftfragmente*, in the *Texte und Untersuchungen* (1906). He there maintains that 36 are genuine. As a rule, however, New Testament scholars hesitate to admit the authenticity of any of them. See Hennecke, *Neutestamentliche Apocryphen* (1904), and *Handbuch zu den neutestamentlichen Apocryphen* (1904); Preuschen, *Antilegomena* (2d ed., 1905); Bernard Pick, *Paralipomena. Remains of Gospels and Sayings of Christ* (1908).

AGRAPH'IA. A variety of aphasia, characterized by inability to write.

AGRA'RIAN LAWS (Lat. *leges agrariæ*). Laws regulating the division or the holding of the public or State lands (*ager publicus*) of the Roman domain. With the name of agrarian laws was formerly associated the idea of the abolition of property in land, or at least of a new distribution of it. This notion of the agrarian laws of the Romans was not only the popular one, but was also received by most scholars. The French Convention, in 1793, passed a law punishing with death any one who should propose an agrarian law, understanding by the term an equal division of the soil among all citizens. Now, it would have been strange if the Romans, with whom private property was so sacred, could ever have been brought to sanction any measure of that kind. German scholars, Heyne, Savigny, and especially Niebuhr, first explained the true character of the Roman agrarian laws. There are still some disputed points in this matter; but one thing is settled—those laws had no reference to private lands held in absolute property but to public or State lands. Their purpose was to give to the poorer citizens allotments out of the land belonging to the State and to regulate the terms on which such assignments and the rest of the land not so allotted could be held and used.

As the dominion of Rome extended (an extension due for centuries wholly to conquest), a portion of each conquered territory, sometimes as much as a third, was confiscated to the State and became public domain. All laws respecting the disposition of these lands were called agrarian laws, which are therefore of various kinds. What caused these laws to be so long mistaken for an interference with private rights, and excited such opposition to them, was the use which was made of the public domain while it was unappropriated. "It was the practice at Rome," says Dr. Arnold, "and doubtless in other States of Italy, to allow the individuals to occupy such lands, and to enjoy all the benefits of them, on condition of paying to the State the tithe of the produce, as an acknowledgment that the State was the proprietor of the land, and the individual merely the occupier. Now, although the land was undoubtedly the property of the State, and although the occupiers of it were in relation to the State mere tenants-at-will, yet it is in human nature that a long undisturbed possession should give a feeling of ownership; the more so as, while the State's claim lay dormant, the possessor was, in fact, proprietor, and the land would thus be repeatedly passing by regular sale from one occupier to another."

The State, however, was often obliged to interfere with these occupiers of the public lands and to resume its rights. The very idea of a citizen, in ancient times, involved that of a landholder, and when new citizens were to be admitted, each one had to receive his portion out of the unallotted public domain; this involved, of course, the ejection of the tenants-at-will. It appears, also, that the right to enjoy the public lands in this temporary way was confined to the old burghers or patricians. This, taken in conjunction with the tendency, strong at all times, of larger possessions to swallow up smaller, kept up an ever-increasing number of landless commoners, whose destitution and degradation came from time to time to such a pitch that alleviation was necessary to prevent the very dissolution of the State. Hence sprang such agrarian laws as are considered below. It is easy, however, to see what motive the patricians, as a body, had to oppose all such measures, since it was their interest, though not their right, to keep the lands unallotted.

The enactment of agrarian laws occasioned some of the most remarkable struggles in the internal history of Rome. Most of the kings of Rome are said to have carried an agrarian law; that is, to have divided a portion of the public land among those whom they admitted to the rights of citizenship. About 24 years after the expulsion of the Tarquins, the distress of the commons called aloud for remedy, and in 486 B.C. the consul Spurius Cassius proposed an agrarian law, of whose nature we have no real knowledge. The aristocracy, however, contrived to defeat the proposal, and, when the year of his consulship was out, Cassius was accused of having tried to win popularity to make himself king, was condemned for treason, scourged, and beheaded, and his house was razed to the ground.

The first important agrarian legislation of a permanent nature actually passed was that proposed by the tribunes C. Licinius Stolo and L. Sextius, and carried, after a struggle of five (or, according to some authorities, ten) years, in the year 367 B.C. The provisions of this legislation, known as the Licinian Rogations (q.v.), *Rogationes Licinianæ*, were as follows: "Every Roman citizen shall be entitled to occupy any portion of the unallotted State land not exceeding 500 *jugera* (see ACRE), and to feed on the public pasture land any number of cattle not exceeding 100 head of large, or 500 head of small, paying in both cases the usual rates to the public treasury. Whatever portions of the public land beyond 500 *jugera* are at present occupied by individuals shall be taken from them and distributed among the poorer citizens as absolute property, at the rate of seven *jugera* apiece. Occupiers of public land shall also be bound to employ a certain number of freemen as laborers.

This law produced for a time very salutary effects. But before the year 133 B.C., when Tiberius Gracchus was elected tribune, the Licinian laws had been suffered to fall into abeyance; and although vast tracts had been acquired by the Italian, the Punic, and the Greek wars, no regular distribution of land among the destitute citizens had taken place for upward of a century. Numerous military colonies had indeed been founded in the conquered districts, and in this way many of the poorer Romans or their allies had been provided for; but there still remained large territories, the property of the State, which, instead of being divided among the poorer members of the State, had been occupied and brought into cultivation by the rich capitalists, many of whom thus came to hold thousands of *jugera*, instead of the 500 allowed by the Licinian laws. To a Roman statesman, therefore, looking on the one hand at the wretched pauper population of the meaner streets of Rome, and on the other at the enormous tracts of the public land throughout Italy which the wealthy citizens held in addition to their own private property, the question which would naturally present itself was: Why should not the State, as landlord, reclaim from these wealthy capitalists, who are her tenants, as much of the public land as may be necessary to provide little farms for these pauper citizens, and so convert them into respectable and independent agriculturists? This question must have presented itself to many; but there were immense difficulties in the way. Not only had long possession of the State lands, and the expenditure of large sums in bringing them into cultivation, given the wealthy tenants a sort of proprietary claim upon them, but in the course of generations, during which estates had been bought, sold, and inherited, the State lands had become so confused with private property that in many cases it was impossible to distinguish the two. Notwithstanding these difficulties, Tiberius Gracchus had the boldness to propose an agrarian law, to the effect that no one should occupy or use more than 500 *jugera* of the State land (a father of a family might occupy 500 *jugera* of the State land for himself and 250 *jugera* additional for each of his sons, with a maximum of 1000 *jugera*); in every case where this amount had been exceeded, the State should reclaim the surplus, paying the tenant a price for the buildings, etc., which he had been at the expense of erecting on the lands thus taken from him. The recovered lands were then to be distributed among the poor citizens; a clause was inserted in the bill to prevent these citizens from selling the lands thus allotted to them, as many of them would have been apt to do.

According to the laws and constitution of Rome, there was nothing essentially unjust in this proposal, which was, in private, at least, approved of by some of the most distinguished men of the time. The energy of Tiberius Gracchus carried the measure, in spite of the opposition of the aristocratic party, to whose enmity he fell a victim. His work was taken up a decade later by his brother Gaius, who also met a violent death. (See GRACCHUS.) The attempts to carry out the "Sempronian law," as it was called (from the name of the *gens* to which the Gracchi belonged), were attended with great difficulties, and although not formally repealed, it continued to be evaded and rendered inoperative. Various agrarian laws were subsequently passed, some by the victorious aristocratic party, in a spirit directly opposed to that of the Licinian and the Sempronian laws.

Beside agrarian laws having for their object the division among the commons of public lands usurped by the nobles, there were others of a more partial and local nature, for the establishment of colonies in particular conquered districts; these naturally met with less opposition. Still more different were those violent appropriations of territory made by the victorious military leaders in the later times of the Republic, in order to reward their soldiers and to establish exclusively military colonies (such appropriations, made, e.g., by Sulla and Octavianus, were called proscriptions). In these the private rights of the previous occupants were often disregarded. Consult Botsford, *The Roman Assemblies* (New York, 1909); Hardy, *Six Roman Laws* (Oxford, 1911).

AGRARIAN PAR'TY. See POLITICAL PARTIES, *Germany*.

AG'RAVAINE, Sir. One of the knights of the Round Table. He and his half-brother Sir Mordred hated Sir Launcelot, and, according to Sir Thomas Malory, contrived to surprise him in Queen Guinevere's apartment, after they had sent the King out hunting. Sir Launcelot, however, killed Sir Agravaine and the 12 attendants; only Sir Mordred escaped.

AGREDA, ä-grā'dä, MARIA (CORONEL) DE (1602–64). The superior of the convent of the Immaculate Conception, whose monastic name was Maria of Jesus. She was born at Agreda, Spain. She reported that she had had revelations from heaven, and that God had commanded her to write an inspired life of Mary, the mother

of Jesus. The book is entitled *La Mística Ciudad de Dios*, etc. (3 parts, Madrid, 1670; French trans., *La cité mystique de Dieu*, etc., 6 vols., Marseilles, 1695, Paris, 1857; German trans., *Die geistliche Stadt Gottes*, etc., 2d ed., Regensburg, 1893). Pope Innocent XI prohibited its universal circulation, but, at the request of the King of Spain, excepted the Spanish countries. An English translation has recently been made.

AGREE'MENT. See CONTRACT.

AGREEMENT, METHOD OF. See INDUCTION.

AGREEMENT OF THE PEO'PLE, THE. A remarkable document set forth by the Council of the Army, Jan. 15, 1649, 15 days before the execution of King Charles I of England. It is based upon "The Heads of the Proposals Offered by the Army," Aug. 1, 1647, except that no reference is made to royalty; and it is an outline of a written constitution for a republic. According to its provisions, the existing Parliament is to be dissolved on or before the last day of April, 1649; and thereafter an assembly called the "Representative," composed of not more than 400 members, is to be elected by the people every two years on the first Thursday in May. The members, or "representers," are fairly distributed among the counties of England and Wales, thus remedying the defects in the existing apportionment. The franchise is conferred upon such natives or denizens "as are assessed ordinarily toward the relief of the poor," provided they be men 21 years of age or housekeepers "dwelling within the division for which the election" is held. Servants "receiving wages from any particular person" are excluded; and those who have aided the King are temporarily denied the right of voting or of being chosen members of the assembly. Officials are not eligible, and lawyers are incapable of practicing their profession while serving as representers. There is to be a "Council of State for the managing of public affairs." The Christian religion "is held forth and recommended as the public confession"; but it is to be "reformed to the greatest purity in doctrine, worship, and discipline." Popery and prelacy are not tolerated, and the "teachers" or ministers are to be paid from the public treasury. To the assembly is given the "supreme trust in order to the preservation and government of the whole"; but six important points are absolutely "reserved" from legislative action. With the exception of those of the Connecticut and New Haven colonies, the agreement is the earliest example of a written instrument designed for the government of a commonwealth. But this English constitution was never established, since "The Levelers" who stood sponsor for it were defeated by Cromwell. For the text of the agreement, consult Gardiner, *Constitutional Documents*, pp. 270–282 (Oxford, 1889); for a full discussion, his *History of the Civil War* (new ed., London and New York, 1894–97). See LEVELERS.

AGRIC'OLA, ALEXANDER (c.1446–1506). One of the most famous composers of the School of the Netherlands. He was of German birth, his real name being Ackermann. The works which have been preserved comprise several masses, motets, magnificats, and about 30 chansons.

AGRICOLA, CHRISTOPH LUDWIG (1667–1719). A German landscape painter. Born at Regensburg, he passed much of his life in traveling and lived long at Naples. He was greatly esteemed by his contemporaries, but his work seems stilted and unnatural to modern taste. One of the so-called classic or heroic landscape painters, he developed under the influence of Gaspard Poussin and Claude Lorraine. His works are found chiefly in German and Italian galleries.

AGRICOLA (Latin version of his original German name BAUER), GEORG. A German scholar and scientist of wide attainments. Born March 24, 1494, at Glauchau, Saxony; entered the University of Leipzig in 1514; graduated in 1517 with the degree of B.A.; in 1518, vice-principal, and two years later principal, of the Municipal School at Zwickau, during which time he published a small Latin grammar; from 1524–1526 studied medicine, philosophy, and then natural sciences at various universities in Italy; and in 1527 chosen town physician at Joachimsthal, in Bohemia, in the midst of the most active mining centre in Central Europe. While not busy professionally, he studied mining, mineralogy, and geology, and in 1530 resigned his appointment to travel for three years and study mining in different parts of the country, after which he accepted the appointment of city physican of Chemnitz, Saxony, 1533, where he resided until his death, caused by fever, Nov. 21, 1555. For eight years after moving to Chemnitz there is very little record of his activities, but soon after (1544), he began publishing his more important books. His most important work, the one for which he is best known, *De Re Metallica*, consisting of 12 books covering mining, metallurgy, and geology, was begun about 1533, completed about 1550, went to press in 1553, and appeared in 1556, one year after his death. The original publication in Latin was translated into German and Italian, and in 1912 appeared in English, translated by Herbert Clark Hoover and Lou Henry Hoover, and published by *The Mining Magazine* of London. The original publication, together with 10 editions in three languages, served as a textbook and guide to miners and metallurgists for 180 years until the publication of Schluter's work on Metallurgy in 1738. In this book Agricola repudiates with great vigor certain teachings of the Greeks and has no patience with the alchemists. For the first time we receive descriptions of methods and processes based upon research and observation as opposed to speculation. In 1546 appeared *De Natura Fossilium* (revised 1558), which deserves an equal place with *De Re Metallica*. The work comprises 10 books on mineralogy and is the first attempt at a systematic subdivision. *De Ortu et Causis Subterraneorum* appeared in 1546 (revised 1558) and consists of five books on geologic phenomena. In 1530 *Bermannus*, his first work on mining, appeared. Many other books on mining, geological, medical, religious, political, and historical subjects appeared up to the time of his death.

It was not until 1546 that he entered public life in a diplomatic and advisory capacity at the request of Duke Maurice. Although the government was in the hands of Protestants, Agricola, a stanch Catholic and much favored by the Saxon electors, was elected Burgher of Chemnitz and the same year appointed Burgomaster. During the Schmalkaldic War he was sent on various missions from the Duke to Emperor Charles, King Ferdinand of Austria, and other princes. At the close of the war his public duties did not cease, as we read of his attendance at the Diet of Leipzig in 1547, 1549,

and 1553; at the Diet at Trojan, 1550, and again a second time just before his death. In recognition of his scientific investigations and publications on mining and allied subjects, he received a pension from Duke Maurice recorded in a letter dated June 14, 1543, consisting of "a freehold house, the right to brew beer for his household, and that he shall not be summoned before any Court of Justice, but only before us and our Councilor." As Burgomaster of Chemnitz at the time of his death, he was entitled to burial in the Protestant church of St. Jacob. This burial was refused his family at the command of the Prince, as the feeling against the Catholics was high at the time and the Prince probably was afraid of public disturbances. After a delay of four days his body was moved to Zeitz and interred in the cathedral.

We have a record of his marriage, in 1543, to Anna, widow of Matthias Meyner, a petty tithe official. There is reason to believe that Anna was his second wife and that he had several children. Consult: Jacobi, *Der Mineralog Georg Agricola und sein Verhältniss zur Wissenschaft seiner Zeit* (Werdau, 1889). Hoover, trans. of *De Re Metallica*, published by *The Mining Magazine* (London, 1912).

AGRICOLA, Gnæus Julius (37–92). A Roman of the imperial times, distinguished not less by his great abilities as a statesman and a soldier than by the beauty of his private character. He was born at Forum Julii (now Fréjus, in Provence). Having served with distinction in Britain, Asia, and Aquitania, and gone through the round of civil offices, he was, in 77 A.D., elected consul, and in the following year went as Governor to Britain—the scene of his military and civil administration during the next seven years. He was the first Roman general who effectually subdued the island, and the only one who displayed as much genius and success in training the inhabitants to the amenities of civilization as in breaking their rude force in war. In his seventh and last campaign (84 A.D.) his decisive victory over the Caledonians under Calgacus, at a place called Mons Grampius, established the Roman dominion in Britain to some distance north of the Forth. After this campaign his fleet circumnavigated Britain for the first time, proving it to be an island. Among the works executed by Agricola during his administration were a chain of forts between the Solway Firth and the Tyne and another between the firths of Clyde and Forth. Numerous traces of his operations are still to be found in Anglesey and North Wales and in Galloway, Fife, Perthshire, and Forfarshire. The news of Agricola's successes inflamed the jealousy of the Emperor Domitian, and he was speedily recalled. Thenceforth he lived in retirement, and, when the vacant proconsulships of Asia and Africa lay within his choice, he prudently declined promotion. The jealousy of the Emperor, however, is supposed to have hastened his death, which took place at the early age of 55. His *Life*, by his son-in-law, Tacitus, has always been regarded as one of the choicest specimens of biography in literature. For an excellent modern edition of it, see that by Furneaux (Oxford, 1898). See Tacitus.

AGRICOLA, Johann (1492–1566), also called Magister Islebius (i.e., of Eisleben), but seldom by his patronymic, Schnitter. A zealous disciple of Luther, whom he served as teacher and Preacher at Frankfort-on-the-Main, Eisleben, Wittenberg, and Leipzig, but with whom he became involved in the Antinomian controversy (see Antinomianism), and withdrew to Berlin in 1540, where, under stress of poverty, he made a recantation, ineffectual and probably not sincere. Joachim II, Elector of Brandenburg, became his protector, and made him court preacher and general superintendent, in which office he labored zealously for the spread of Protestantism until his death at Berlin, Sept. 22, 1566. His share in drawing up the Augsburg Interim (1548) made him unpopular for a time, but did not permanently check the growth of his influence in Brandenburg, which became very great. He wrote several theological treatises, now forgotten, but he will always be remembered for his collection of German proverbs, *Die gemeinen deutschen Sprüchwörter mit ihrer Auslegung* (1592), a work of native humor, morality, and patriotism that has endeared him to the heart of scholarly Germany. His life was written by Kawerau (1881).

AGRICOLA, Martin (1486–1556). A German composer and writer on musical subjects, born at Sorau, Silesia. From 1524 until his death he was cantor and musical director in the first Protestant school established at Magdeburg. His books are marked by a forceful style and extensive knowledge, and in his own day passed through numerous editions. His *Musica Instrumentalis* (1528) is, together with Virdung's work, our principal source of information regarding the old instruments. It contains not only numerous illustrations, but also detailed explanations as to the mechanism and the method of playing each instrument. This work was reprinted by Eitner as vol. xx of the publications of the Gesellschaft für Musikforschung. Other important works are *Rudimenta Musicæ* (1529), republished in 1543 under the title *Quæstiones Vulgariores in Musicam; Musica Figuralis Deudsch; Von den Proportionibus.*

AGRICOLA, Rodolphus (properly Roelof Huisman) (1443–85). An eminent Dutch humanist, born at Baflo. He studied at the universities of Louvain and Paris and afterward in Italy and by his Latin style and his skill in disputation attained high scholastic distinction. For some time he lectured on classical philology and philosophy at Heidelberg. The most important of his works is the *De Inventione Dialectica* (1467), in three books, in opposition to the scholastic philosophy; but he is noteworthy less for his writings than for his personal influence. He did much to substitute classical Latinity for mediæval barbarisms, to diffuse in Germany the knowledge of Greek; in short, to transmit beyond the Alps the spirit of the Italian renaissance of letters. Of theology, painting, and music he seems also to have known considerable. His writings were collected by Alardus (2 vols., Cologne, 1539). Consult Tresling, *Vita et Merita Rodolphi Agricolæ* (Groningen, 1830), and Ihm, *Der Humanist Rudolf Agricola, sein Leben und seine Schriften* (Paderborn, 1893).

AGRICULTURAL ANT. A species of ant living on the semi-arid plains of Texas that cultivates areas of grass about its dwelling. On this cultivated space, which may have a diameter of 10 to 15 feet, only one kind of grass is allowed to grow, and it is said that the seeds of this grass are even planted by the ants. Roads are laid out radiating from the ant hill across the plain, and all shoots of undesirable plants are promptly nibbled off as rapidly as they appear

among the crops. When the harvest of the protected grass is ripe, the ants collect the seeds and convey them along the radiating highways to the chambers in the hill. Interesting and wonderful as is the economy of these ants, the insects may, when the colonies are large and numerous enough, do considerable damage to the grain fields in which the mounds are reared and the clearings made. See ANT; INSECTS; and consult McCook, *Agricultural Ant of Texas* (Philadelphia, 1879). Wheeler, *Ants* (New York, 1910), considers it probable that the supposed actual planting near the nest is due to the growth of seeds which have sprouted in the underground stores of grain, and becoming thus useless for food have been carried out and left near the entrance.

AGRICULTURAL ASSO'CIA'TION. A voluntary association of farmers or other persons interested in agriculture, formed for the purpose of promoting a knowledge of agriculture.

United Kingdom. The movement began with the organization of the Society of Improvers in the Knowledge of Agriculture in Scotland, in 1723, by a company of landholders. This society existed for more than 20 years and did much valuable work. Its *Select Transactions* were published in 1743. The Bath and West of England Society was established in 1777, and the Highland Society in 1784. The latter society afterward included in its operations the whole of Scotland, and under the name of the Highland and Agricultural Society of Scotland has ever since continued its work. The Highland Society has a large income, expended in studying manures, feeding stuffs, seeds, plants, etc.; in holding annual shows of live stock, implements, etc., at which large prizes are offered; and in publishing an annual volume of *Transactions*.

The Royal Agricultural Society of England, founded in 1838, has been an important factor in the development of British agriculture, and, indeed, has undertaken many duties which in other countries are performed by the government. This society has at present more than 10,000 members, holds an annual show of live stock, implements, and machinery, dairy and other products, at which some $50,000 is distributed in prizes. It issues a quarterly journal, containing information on a great variety of agricultural topics, retains the services of chemical, botanical, zoölogical, and veterinary experts for advice to members, as well as for experiments and research, maintains an experimental farm at Woburn, and a veterinary college at Camden Town, London, and conducts, in coöperation with the Highland and Agricultural Society of Scotland, an annual examination for a national diploma in the science and practice of agriculture.

The Agricultural Organization Society, Ltd., was founded in 1901 to organize in England and Wales agricultural coöperative societies. It has about 400 affiliated societies with a membership of over 20,000. There are also several hundred nonaffiliated societies. Similar, but smaller, central societies were subsequently organized in Scotland and Ireland and have a large number of branches.

In Ireland the interests of agriculture are also promoted by a department of the Royal Dublin Society, chartered in 1749, and other agricultural organizations. Agricultural societies are maintained also in Wales, Canada, Australia, and other parts of the British Empire.

United States. In the United States the first society for promoting agriculture was established at Philadelphia in 1785. In the same year a similar society was formed in South Carolina, followed by those in Kennebec, Me. (1787), New York City (1791), and the Massachusetts Society for Promoting Agriculture (1792). The movement continued, until in 1809 we have the germ of a national organization in the Columbian Agricultural Society, formed in the District of Columbia. The holding of agricultural shows, or "fairs," was begun in the city of Washington in 1804 and was made a popular movement largely through the efforts of Elkanah Watson, of Massachusetts, who, beginning with an exhibition of two imported merino sheep on the public square at Pittsfield, Mass., in 1807, soon developed the more elaborate and picturesque "cattle shows" which for many years have been popular rural festivals, especially in New England. Shows are now held in different parts of the country by 2740 international, national, State, county, and other local and interstate associations, 1647 being devoted to general agriculture, 801 to poultry, and the remainder divided among horticulture, floriculture, live stock, dairy products, dogs, etc. Societies for promoting different agricultural interests have been organized under many different forms, and many of these are now in a flourishing condition. Many of the States have important agricultural societies, the published reports of which contain much valuable information. There are also national, State, and local associations for the live-stock interests (including the breeding of cattle, horses, sheep, swine, and poultry), dairying, horticulture, forestry, irrigation, good roads, bee-keeping, etc. The great majority of farmers' organizations have endeavored to develop some phases of business coöperation, and many have been formed for this specific purpose. In 1908 it was estimated that there were about 85,000 farmers' coöperative organizations with an estimated membership of more than 3,000,000. About 30,000 societies were irrigation associations, and others were coöperative telephone companies, grain elevators, creameries, associations for insurance against fire, hail, loss of live stock, etc., marketing of fruits and vegetables, purchase of supplies, etc. (See COÖPERATION.) In 1913 the United States Department of Agriculture established a rural organization service to assist farmers in forming organizations for bettering agriculture and country life.

Among the general associations which have exerted the most widespread influence in the United States are the Farmers' Alliance, the Patrons of Husbandry (otherwise known as the Grange), and the Farmers' Educational and Cooperative Union. See the separate articles on FARMERS' ALLIANCE and GRANGE.

Germany. The first agricultural society in Germany is said to have been established in 1764. Now there are several thousand societies in the German Empire. The most important of these is the German Agricultural Society, with headquarters at Berlin, which is the largest in the world with a membership of some 15,000. It holds a great annual meeting and fair, at which numerous prizes are given, a winter meeting, and meetings of sections on fertilizers, plant culture, seeds, implements, and agricultural technology and engineering; gives prizes for essays based on scientific investigations, tests agricultural materials, carries on a large amount of experimental inquiry through coöperation with agricultural experiment stations, publishes a

year-book and a journal appearing weekly, and maintains a bureau of information. It also aids its members in the coöperative purchase of fertilizers, seeds, and feeding stuffs.

France. The Society of Agriculturists of France has more than 11,000 members, maintains a library and chemical laboratory, holds meetings at which lectures are given by eminent agricultural experts, gives annual prizes, patronizes the agricultural shows given under the ministry of agriculture in different parts of France, and issues a semi-weekly publication. The National Society of Agriculture of France is another very important French society.

The Royal Danish Agricultural Society, the Central Society of Agriculture of Belgium, the Italian Federation of Agricultural Societies, the Imperial Agricultural Society of Vienna, the Agricultural Association and Union of Hungary, the League of Swiss Peasants, and the Imperial Economic Association at St. Petersburg are among the most active and influential agricultural organizations in Europe.

Agricultural Syndicates. In recent years coöperative unions (see COÖPERATION) have been formed by thousands in most of the countries of Europe, and less extensively in Asia, Africa, and Australia, and have exerted an increasing influence in the promotion of agricultural advancement. These have reached their most complete development, as directly related to agriculture, in France, where they are known as agricultural syndicates. The syndicates are national, regional, or local in their organization and operations. Their number has reached about 5000 and their membership about 800,000, including all classes interested in agriculture. They do an extensive business in the purchase of fertilizers, feeding stuffs, seeds, plants, implements, and live stock (especially animals for common use in breeding), and in the sale of agricultural products. They have also established coöperative dairies, and factories for fruit pulp, olive oil, etc., and have developed numerous forms of coöperative insurance. They have also disseminated much information through meetings and the agricultural press, and have exerted important political influence on legislation affecting agricultural interests. Some syndicates have received financial aid from the government, and others have been aided by private endowments. Otherwise they are supported by fees and brokerage. The organization and spread of the syndicates have been greatly promoted by the assistance of the agricultural societies throughout France.

AGRICULTURAL CHEM'ISTRY. See CHEMISTRY, AGRICULTURAL.

AGRICULTURAL COÖPERATION. See COÖPERATION; MARKETING ASSOCIATIONS, AGRICULTURAL; RURAL CREDIT.

AGRICULTURAL CREDIT. See CREDIT, AGRICULTURAL.

AGRICULTURAL ED'UCA'TION. The modern system of agricultural education in its most complete form includes (1) university courses of instruction and research; (2) general college courses; (3) college courses or schools in special subjects, e.g., dairying, animal husbandry, apiculture, or veterinary science; (4) special secondary agricultural schools; (5) vocational departments and agricultural courses in high schools; (6) instruction in elementary schools; (7) university and school extension, through farmers' institutes, correspondence courses, "movable schools," etc. The term "agriculture," as related to education, may be used broadly with reference to an institution or course of instruction in which agricultural subjects are taught along with other branches of knowledge. It is in this sense, for example, that we speak of a college of agriculture or a college course in agriculture. Or the term may be restricted to that portion of a course of instruction in which agricultural subjects only are taught, as when we say, "Agriculture is taughb in that college."

Technical agriculture has been subdivided by the committee on methods of teaching agriculture of the Association of American Agricultural Colleges and Experiment Stations into (1) agronomy, (2) zoötechny, (3) agrotechny, (4) rural engineering, and (5) rural economics. Agronomy is defined as "the theory and practice of the production of farm crops," and is made to include what is to be taught regarding the structure, composition, and physiology of farm crops and their environment, i.e., climate, soil, fertilizers, etc., and regarding the culture, harvesting, preservation, and uses of individual kinds of crops, as well as the obstructions to their growth from weeds, fungi, bacteria, insects, birds, and other animals. Zoötechny is "the theory and practice of the production of animals useful to man," and includes especially types, breeding, feeding, hygiene, and systems of management of different kinds of farm animals. Agrotechny is "the theory and practice of the conversion of raw materials produced by agriculture into manufactured articles for use in commerce and the arts." In its broadest sense, agrotechny includes such things as the making of butter, cheese, sugar, vinegar, concentrated foods, canned goods, liquors, textiles, leather, etc.; but in the agricultural colleges generally, only dairying is usually taught under this head. Rural engineering is "the science and art of laying out farms, designing and constructing farm buildings and works [i.e., water systems, irrigation works, drains, sewage systems, and roads], and making and using farm implements and machinery." Rural economics "treats of agriculture as a means for the production, preservation, and distribution of wealth by the use of land for the growing of plants and animals."

United States. Probably the earliest record of agriculture as a school subject within the present limits of the United States is found in the account of the early mission schools established by the Franciscan monks in what is now Mexico. The exact date of the establishment of these schools is not known, but in 1629 there were many elementary schools for natives scattered through the pueblos of New Mexico, according to the *Memorial of Benavides to the King of Spain*, dated 1630 and printed at Madrid in that year. The Franciscan fathers were the teachers, and the children were taught, in addition to non-agricultural subjects, "the use of the horse, the cow, and the sheep; they followed the plow and sowed the seed with their own hands, supplemented the primitive practices with the more scientific and fruitful methods of agriculture brought from the Old World."

Agitation for agricultural education in the United States began in the middle of the eighteenth century. In 1751 William Smith issued a prospectus designed as a model for colleges in which he provided for the chemistry of agriculture. His plan was carried out to some extent in Philadelphia Academy, now the University of Pennsylvania. Animal husbandry

and commerce were mentioned in the original prospectus of King's College (Columbia University), dated May 31, 1754, and agriculture and merchandise in the "Laws and Orders" adopted by the governors June 3, 1755. A professorship of botany and agriculture was established in 1792, and Samuel Latham Mitchill, M.D., LL.D., was elected to the position. In describing a summer course in botany Dr. Mitchill says: "An attempt is made by the professor, who is a practical farmer, to elucidate and explain the economy of plants, and affinity to animals, and the organization, stimuli, life diseases, and death of both classes of beings. The physiology of plants . . . is therefore particularly enlarged upon, as connected with garden and farming." In 1801 the Massachusetts Agricultural Society started a subscription which resulted in the establishment of a professorship of natural history in Harvard College in 1804. The Bussey Institution was founded by a bequest made in 1842 to Harvard College for the purpose of teaching agriculture, but was not opened until 1870. Early schools of agriculture include a school established, in 1825, at New Harmony, Ind., by William McClure in connection with the socialistic experiment known as the New Harmony movement. The Oneida Manual Labor Institute at Whiteboro, N. Y., established by George Washington Gale in 1827, gave instruction in carpentry and agriculture until its close in 1834. Dummer Academy, Newbury, Mass., in 1824; the Derby Agricultural School, Derby, Conn., 1826; Andover Theological Seminary, Andover, Mass., 1838; and Westboro Academy, Westboro, Mass., 1856,—all attempted in the years indicated, though unsuccessfully, to include agriculture as a regular part of their curricula. The Farm School, Thompson's Island, Boston, has given instruction in agriculture since 1833. Work of recognized scientific merit was inaugurated at the Sheffield Scientific School, Yale, in 1848, by the establishment of a chair of agricultural chemistry and vegetable and animal physiology, under John P. Norton. His pupil and successor was Samuel W. Johnson, the well-known author of *How Crops Grow*, who for many years was a leader in the movement for agricultural education. Associated with him as professor of agriculture was William H. Brewer, who was also a student under Professor Norton and was identified with agricultural schools established in New York prior to 1860. The Gardiner Lyceum, begun in 1823 in Maine with the aid of a grant of money from the State, especially for the education of mechanics and farmers, had a professor of agriculture, a practical farm, and special short winter courses, and was successfully maintained for many years.

The New York Legislature passed acts in 1853 for a State agricultural college and an industrial school to be known as "The People's College." These institutions never became firmly established, but Amos Brown, the president of the People's College, was largely instrumental in securing national legislation favoring industrial education. Michigan in 1857, and Pennsylvania and Maryland in 1859, established agricultural colleges which grew to be permanent institutions.

Land-Grant Colleges. Scientific instruction in agriculture was put on a permanent basis by the Morrill Act of 1862. On Dec. 14, 1857, Justin S. Morrill introduced into the House of Representatives a bill "donating public lands to the several States and Territories which may provide colleges for the benefit of agriculture and mechanic arts." Though the bill was reported at first adversely, and after passage was vetoed by President Buchanan, it was reintroduced by Senator Morrill in modified form, passed by Congress, and approved by President Lincoln July 2, 1862. In its final form this land-grant act was a comprehensive measure providing for "the endowment, support, and maintenance of at least one college [in each State] where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and mechanic arts . . . in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life." For these purposes there were granted to the several States 30,000 acres of land for each member in Congress, the entire proceeds of the sales of which was to constitute a perpetual fund for the benefit of these institutions. The total amount received by the colleges established under this act was over $13,500,000 in 1912, and nearly 1,000,000 acres still remained to be sold, valued at approximately $5,000,000.

In their early history the courses in agriculture in these colleges met with many discouragements. In 1887 a new impetus was given to their development by the act of Congress (Hatch Act) giving each State $15,000 for an agricultural experiment station (see AGRICULTURAL EXPERIMENT STATION), which must ordinarily be a department of the land-grant college. In 1890 by a second Morrill Act these colleges received an immediate appropriation of $15,000 per State, increasing by $1000 each year for 10 years and thereafter $25,000 a year, to be applied only to instruction in agriculture, the mechanic arts, the English language, and the various branches of mathematical, physical, natural, and economic sciences. In 1906 the Adams Act was passed by Congress, giving each State an additional $15,000 a year for the experiment station. In 1907 the Nelson Amendment to the appropriation bill for the United States Department of Agriculture provided an immediate appropriation of $5000 to each State and Territory, an increase of $5000 each year for four years, and thereafter $25,000 annually for the benefit of the colleges of agriculture and mechanic arts, with the provision that "the said colleges may use a portion of this money for providing courses for the special preparation of instructors for teaching the elements of agriculture and the mechanic arts." Each State, therefore, receives in addition to the income of the Land-Grant Act of 1862, $50,000 annually from the Federal government for instructional purposes in agriculture and mechanic arts, and $30,000 for the experiment stations. The instruction funds are divided in 17 southern States between colleges for white students and institutions for colored students, usually on the basis of the white and colored school population, the negro institutions in these States receiving approximately 30 per cent of the appropriations. Large appropriations are also made to the colleges by the respective States for both maintenance and increase of plant, and the total income of the 67 institutions for the fiscal year ended June 30, 1912, was $25,967,130.45.

Excluding the separate institutions for the colored race, the colleges of agriculture are of three main types: (1) The Massachusetts Agri-

cultural College, which offers only agricultural courses; (2) the 24 colleges with additional courses in the mechanic arts; and (3) the 25 which are colleges, schools, or departments of State universities. The college course in all of these institutions is four years in length and leads to a bachelor's degree. The requirements for admission and graduation vary greatly, but 35 require as much as the equivalent of a four-years' high school course for admission. The United States Bureau of Education found that in 1912 the average amount of time required during the four years in the various subjects was as follows: English, 227 hours; mathematics, 132 hours; modern languages, 205 hours; social sciences, 162 hours; natural sciences, 815 hours; agriculture, 800 hours; rural engineering, 161 hours; and electives, 535 hours. The electives included options in agriculture, agricultural sciences, natural sciences, and the humanities.

In 1912 there were nearly 11,000 students in the four-year agricultural courses, an increase of 272 per cent in five years. Nearly all of these institutions also offer graduate work in agriculture and in agricultural sciences leading to the master's degree, and 10 of them to the degree of doctor of philosophy. In 1912 there were 109 graduate students working for advanced degrees. Secondary schools of agriculture in addition to the college work are maintained by 17 institutions; 16 maintain one- or two-year courses of college grade; 40 conduct short winter courses at the institution. Practically all of them maintain extension departments giving instruction in agriculture to adults through correspondence courses, farmers' institutes, and "movable schools of agriculture." At least 36 colleges provide opportunity for their students to prepare for teaching agriculture, and summer schools primarily for rural teachers are conducted by 34 of them.

Under the Acts of 1862 and 1890 there have been established one agricultural college in each of the 48 States, Porto Rico, and Hawaii, besides the 17 separate institutions for negroes. Together with the affiliated agricultural experiment stations, the Office of Experiment Stations of the United States Department of Agriculture, and the United States Bureau of Education of the Department of the Interior, these institutions are organized into the Association of American Agricultural Colleges and Experiment Stations. This association was formed in 1887 and has done much to stimulate the development of agricultural education and research. It conducts a Graduate School of Agriculture, this being a four-week summer school for graduate work held every two years. The first session was at the Ohio State University in 1902, the second at the University of Illinois in 1906, the third at Cornell University in 1908, the fourth at the Iowa State College in 1910, the fifth at the Michigan Agricultural College in 1912, and the sixth at the University of Missouri in 1914. Dr. A. C. True served as dean of all six sessions. Special subjects have been featured at different sessions.

None of the separate institutions for the colored race are doing work of college grade. They enrolled nearly 2200 students in agricultural courses in 1912. About one-half of them are giving extension instruction to adults, and three-fourths of them are conducting summer schools.

Several other colleges in the United States are giving instruction in agriculture. Among them may be mentioned Syracuse University, which in 1912 opened a department of agriculture, and Harvard University, which since 1870 has maintained the Bussey Institution, which gave undergraduate instruction in agriculture until 1908, and is now devoted to graduate instruction and research in applied biology. Approximately one-half of the State normal schools give elementary courses in agriculture, mainly for teachers who will be required to teach the subject in elementary schools. These courses are from six weeks to two years in length.

Special schools of agriculture of secondary or high-school grade other than those conducted by the agricultural colleges are maintained, supported in part by the State, in Alabama, Arkansas, California, Colorado, Georgia, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Nebraska, New York, North Carolina, Oklahoma, Pennsylvania, Vermont, Virginia, and Wisconsin. There are approximately 100 such schools. Departments of agriculture in high schools have been established in many States, although the movement has made most headway where encouraged by a special State aid, notably in Massachusetts, Kansas, and Minnesota. Both the special schools and the agricultural departments in high schools are vocational in purpose. Probably more than one-fifth of all the public high schools in the United States are giving courses in agriculture, varying from four weeks to four years in length. In 1911, 1800 high schools reported to the United States Bureau of Education a total of 37,000 pupils studying agriculture; 831 of these schools reported a one-year course; 360 a course which extended over two or more years.

Instruction in agriculture is required by State legislation in all the elementary schools of Alabama, Arkansas, California, Florida, Georgia, Iowa (after 1915), Louisiana, Mississippi, North Carolina, Oklahoma, Tennessee, West Virginia, and Wisconsin. It is required in the rural schools of Missouri, North Dakota, Ohio, and Texas.

The movement for teaching agriculture through boys' and girls' corn clubs and other agricultural clubs is popular and widespread, especially in the Southern States. The club work is in some instances a definite part of the work of the school, and in other instances it is fostered by other agencies.

United Kingdom. The first institution giving systematic instruction in the theory and science of agriculture was the University of Edinburgh, where a chair of agriculture was established in 1790. A State-supported school of agriculture, the Albert Agricultural College, was established at Glasnevin, Ireland, in 1838. The Royal College of Agriculture at Cirencester, England, was opened in 1845. A professorship of rural economy was established at Oxford University in 1796, discontinued for many years, and reëstablished in 1906. Among other institutions of higher education now offering systematic instruction in agriculture may be mentioned the university colleges of Reading, Leeds, Bangor, Manchester, and Aberystwith; the agricultural college of Harris Institute; West of Scotland Agricultural College; Armstrong College; Southeastern Agricultural College; Edinburgh and East of Scotland College of Agriculture; Royal College of Science, Dublin; Munster Institute, Cork; Durham College of Science;

Aberdeen and North of Scotland College of Agriculture, and the University of Cambridge. A professorship of agriculture was established at the last-named institution in 1899, and a special agricultural building, accommodating 100 students, was erected in 1910.

Financial aid for agricultural education is given by the government through the Board of Agriculture and Fisheries. In 1913 aid aggregating about $95,000 was given to 7 universities and university colleges, 7 agricultural colleges, and 4 special institutions, and about $35,000 was also available for farm schools under the county councils. There are also brief courses at migratory dairy schools, and day or evening lectures in agriculture, poultry-keeping, beekeeping, etc. About $60,000 per annum is expended for advisory work in agriculture, this supplementing the county funds for county agricultural advisers. Grants are also available under the Development Act of 1909 for agricultural education, research, farm institutes, etc.

Canada. The oldest and best known of the colleges of agriculture is the Ontario Agricultural College at Guelph, established in 1874. Other agricultural colleges are as follows: Manitoba Agricultural College at Winnipeg, Nova Scotia Agricultural College at Truro, and the agricultural colleges of the University of Saskatchewan at Saskatoon and the University of Alberta at Strathcona. In the Province of Quebec is the agricultural school at Anne de la Pocatière, a dairy school at St. Hyacinthe, and the Agricultural School at Oka now affiliated with Laval University. Macdonald College at St. Anne de Bellevue, near Montreal, now affiliated with McGill University, gives complete agricultural courses designed to prepare boys for farming. Agriculture is taught in many high and consolidated schools and in rural elementary schools.

Other British Possessions. In India the Imperial Agricultural College of India, endowed with $150,000 by Henry Phipps of Pittsburgh and receiving financial aid from the imperial treasury, is situated at Pusa and includes a college, experiment station, and cattle-breeding farm. The agricultural school at Cawnpore has been made into a college. The Agricultural College of Coimbatore was established in 1905, and the Agricultural College of Lyallpur, Punjab, in 1910. Agricultural instruction is also given at the College of Science at Poonah and in many institutions of lower grade.

In Australia there are agricultural colleges at Gatton, Queensland; Richmond, New South Wales; Roseworthy, South Australia; and Dookie and Longerenong, Victoria. Agricultural instruction is also given at the University of Melbourne, in agricultural high schools, and by traveling experts attached to the Colonial Department of Agriculture. In New Zealand is the Canterbury Agricultural College at Lincoln; and in Cape Colony a school of agriculture at Elsenburg, as well as other institutions.

Belgium. The system of agricultural education includes the following institutions: *Colleges*—The State School of Veterinary Medicine at Brussels, the Agricultural Institute at Gembloux, and the Agronomic Institute of the University of Louvain. *Secondary Schools*—Three separate agricultural schools located at Carlsbourg, La Louvière, and Huy, and 16 agricultural schools conducted as departments of other educational institutions; courses in agronomy in royal athenæums; State schools of horticulture at Ghent and Vilvorde, and private subsidized schools of horticulture at Mons, Liége, Tournai, and Carlsbourg. *Agricultural Schools for Women*—One higher agricultural school in connection with the Institute of the Sacred Heart and Immaculate Conception at Heverlé, and 10 secondary schools. In addition popular instruction is given in primary agricultural trades schools, also in itinerant schools for adults.

Denmark. The Royal Veterinary and Agricultural College at Copenhagen is a high-grade college supported in part by the Danish government. There are approximately 45 agricultural schools of secondary grade, one-third of which are separate institutions, the other two-thirds being associated with high schools. Only persons of from 18 to 25 years of age who have had at least one year's experience farming are admitted. Practically all the public high schools have given courses in agricultural science since their establishment. Agriculture is also taught in all the common schools.

Germany. Professorships in the agricultural sciences are maintained at many of the universities, e.g., Königsberg, Breslau, Halle, Göttingen, Leipzig, Rostock, and Jena, and approximately 2 per cent of the students are enrolled in agricultural courses. Other institutions teaching agriculture include the Agricultural High School of Berlin, the Technical High School of Munich, the Forestry Academy at Tharandt, and the Agricultural Academy at Bonn. There are 18 agricultural intermediate schools aided by the State, and many lower agricultural institutions, including farm and winter schools giving practical courses for farmers and farm boys.

France. The head of the French system of agricultural education maintained under the auspices of the national government is the *Institut National Agronomique* at Paris, in which instruction of university grade is given in agricultural science, supplemented by laboratory and field practice. There are three national schools of agriculture in which theoretical and practical instruction are combined, located at Grignon, Rennes, and Montpellier. A large number of secondary agricultural schools provide theoretical and practical instruction for the children of farmers, who at the same time perform all the work necessary to carry on the school farms. In some of the schools general agriculture is taught; others are devoted to special lines, such as viticulture, dairying, etc.

Since 1879 instruction in the elements of agriculture, horticulture, and natural history has been obligatory in the normal and primary schools of France. In each department of the country a professor of agriculture is appointed to prepare a course of instruction in agriculture for the normal schools, to hold farmers' meetings, and to maintain model fields for demonstrations. Chairs of agriculture have been established in many lyceums and colleges throughout France. The University of Toulouse has recently established an agricultural institute, giving a two-year practical and scientific course in agriculture. Special schools include the dairy schools at Mamirolle and Surgères, the school of agricultural industries at Douai, the school of horticulture at Versailles, the poultry husbandry school at Gambias, the school of horse breeding at Le Pin, and a school of agriculture at Hennebont.

Other European States. Sweden has agricultural colleges at Ultuna and Alnarp, about 30 secondary schools, several dairy schools, and a corps of traveling instructors. Norway has an agricultural college at Aas and several secondary schools.

In Austria in 1911 there were 219 agricultural and forestry institutions, mainly of secondary and elementary grade or winter agricultural schools. Instruction is given to soldiers, as in several other European countries. Hungary maintains the Royal Hungarian Horticultural School at Budapest and the Agricultural Academy at Magyar-Ovar. Italy has agricultural colleges at Milan and Portici and about 30 general and special schools of secondary grade. Spain maintains educational institutions at Seville, Motril, Valladolid, Saragossa, Madrid, and other points.

The Russian system of agricultural education is organized for the most part under the Ministry of Agricultural and Imperial Domains. It includes agricultural institutes at the universities of Kazan, Kiev, and Moscow, similar institutions at Novoya Alexandria, Riga, St. Petersburg, and Mustiala (Finland), secondary schools, and elementary courses in public schools.

Other Countries. Nearly all the Central and South American countries now maintain agricultural schools, the most comprehensive systems having been developed in Argentina, Chile, and Brazil. Japan has several agricultural colleges, and schools have recently been established in Manchuria, Korea, and the Philippines. In fact, there is hardly a civilized country without provision for agricultural education.

AGRICULTURAL EXPERIMENT STATION. An institution, or department of an institution, devoted to scientific and practical investigations for the benefit of agriculture, the inspection of materials, animals, and plants used in or injurious to agriculture, and the dissemination of information on the theory and practice of agriculture. They grew out of the chemical studies of such men as Liebig in Germany, Boussingault in France, and Lawes and Gilbert in England during the first half of the nineteenth century. Systematic investigations in agriculture were begun by Lawes and Gilbert at Rothamsted, England, in 1843. The first experiment station organized as a public institution was established in 1851 at Möckern, near the city of Leipzig, Germany, and under the influence of Leipzig University. In the United States the first stations were established at Wesleyan University, Middletown, Conn., by the State of Connecticut, in 1875, under direction of W. O. Atwater, and about the same time at the University of California, Berkeley, Cal., by the university, under direction of E. W. Hilgard. Previous to this, agricultural investigations had been carried on at Yale University under Professors S. W. Johnson and William H. Brewer, at the Bussey Institution of Harvard University by F. H. Storer, and at agricultural colleges in several States. Agricultural experiment stations are now maintained in nearly all the countries of the world and are usually under the patronage of general or local governments.

Organization. In the United States Federal aid aggregating $1,440,000 per annum is divided equally among the States for the maintenance of experiment stations. The Hatch Act of 1887 provides for $15,000 per State per annum for carrying on original researches or verification experiments relating to agriculture, and the Adams Act of 1906 a like amount in addition, but restricted to original investigation. For the fiscal year ended June 30, 1912, $2,628,240.09 was also available from State governments and other sources. The total number of stations was 65, each State having at least one station. They employed 1574 persons in administration and inquiry, and issued that year 719 annual reports and bulletins, which were sent through the mails under frank to nearly 1,025,000 addresses. With few exceptions they are departments of the agricultural colleges established under the land-grant act (Morrill Act) of 1862 and are independent of each other as regards the planning and conduct of their operations. They are united in a national system through the Association of American Agricultural Colleges and Experiment Stations and the Office of Experiment Stations in the United States Department of Agriculture. This office exercises supervision of their expenditures from the national fund and gives them advice and assistance in many ways. It issues a monthly list of their current publications, summarizes the accounts of their work and that of kindred institutions throughout the world in the periodical known as the *Experiment Station Record*, and until 1913 gave popular *résumés* of their investigations in the *Farmers' Bulletin* series of the department, under the general title of *Experiment Station Work*. It also directly manages stations in Alaska, Hawaii, and Porto Rico, for each of which the national government appropriated $30,000 in 1913, and in Guam, for which the appropriation was $15,000.

Function. The operations of the stations cover a wide range of scientific and practical work relating to every branch of agriculture and horticulture and including original investigations, verification, and demonstration experiments, studies of natural agricultural conditions and resources, inspection and control service, and dissemination of information. Most of the stations are keeping meteorological records, and several are making special studies of problems relating to meteorological phenomena and climatic conditions. Forty-one are investigating soils, their geology, physics, and chemistry, or conducting soil tests with fertilizers or in other ways. Eighteen stations are studying questions relating to drainage and seepage, or to irrigation in the field or greenhouse, and also irrigation of orchard, garden, or farm crops, and five are taking up other rural engineering problems. All the stations are studying the more important crops, either with regard to their composition, nutritive value, methods of manuring and cultivation, and the best varieties adapted to individual localities, or with reference to systems of rotation.

Forty-eight stations are studying different methods of feeding and breeding animals. Thirty-four stations are investigating subjects relating to dairying, including the chemistry and bacteriology of milk and cream, buttermaking, or the construction and management of creameries, and 24 have work with poultry. Forty-six stations are doing chemical work, and often are studying methods of analysis. Bacteriology is taken up by 22 stations. The same number are making investigations in systematic and physiological botany. Forty-three are studying plant breeding, and 41 the diseases of plants and methods for their eradication.

Fifty-one stations work to a greater or less extent in horticulture, testing varieties of vegetables and large and small fruits, and making studies in varietal improvement and synonymy.

Thirteen stations have undertaken operations in forestry. Thirty-nine stations investigate injurious insects with reference to their restriction or destruction. Forty stations study animal diseases and the methods for their prevention or cure. One or more stations have made investigations on miscellaneous subjects, such as the following: Dry farming; economic zoölogy; food and nutrition of man; bee-keeping; technology of wine, olive oil, cider, and vinegar; preservation of fruits and vegetables; the draught of farm implements; road-making; floriculture; the manufacture of beet, cane, sorghum, and maple sugar; home economics; oyster culture, etc.

Many of the stations also have a considerable amount of inspection work, 18 dealing with fertilizers, 14 with feeding stuffs, 5 each with nursery stock, insecticides and fungicides, seeds, and creamery glassware, 6 with foods and drugs, and 1 with paints. All of them give much attention to the dissemination of their results, many of them, in addition to publications, addresses, and correspondence, operating sub-stations and demonstration farms. Five have organized sections to coöperate with farmers.

Latin America. Experimental and demonstration work is under way in most Latin-American countries. Mexico has established 16 stations or test farms, Brazil 28, Argentina 8, and Chile 4. Other countries represented are Cuba, Dominican Republic, Honduras, Costa Rica, Salvador, British Guiana, Peru, Paraguay, and Uruguay.

British Empire. The Development Act of 1909 made available $2,500,000 annually for five years for economic development, much of which is being used for aiding agriculture. A system of research institutes is being developed by grants to existing institutions. Thus plant physiology is fostered at the Imperial College of Science and Technology, plant pathology at the Royal Botanical Gardens (Kew), plant breeding at Cambridge University and the John Innes Institution, fruit growing at Bristol University, animal nutrition at Cambridge, animal pathology at the Royal Veterinary College, dairying at University College (Reading), economics of agriculture at Oxford University, and plant nutrition and soil problems at the Rothamsted Experimental Station. The Rothamsted station, established in 1843 by Sir John B. Lawes and maintained chiefly by private funds, is recognized as one of the foremost in the world. Agricultural researches are also carried on at most of the agricultural colleges and under the auspices of the Board of Agriculture, the Royal Agricultural Society of England, the Bath and West and Southern Counties Society, and a number of county education committees and councils.

In Scotland similar work is done by the Royal Highland and Agricultural Society of Scotland, the Agricultural Research Association of the Northeastern Counties, the Royal Botanic Garden at Glasgow, Mareschal College of Aberdeen University, and the Glasgow and West of Scotland Technical College; in Ireland, by the Department of Agriculture and Technical Instruction, Royal Dublin Society, Glasnevin Agricultural College, and Trinity College Botanic Gardens (Glasnevin); in Wales, by the University Colleges of Wales and North Wales. In Canada the principal stations are the Central Experimental Farm at Ottawa, with 16 branches in the various provinces, and many sub-stations, test farms, etc., and the station at the Agricultural College of Guelph, Ontario. In the British West Indies stations for the improvement of sugar-cane are maintained on Barbados, Antigua, and Trinidad, and botanical stations on these and several other islands. In South Africa there is a government laboratory and herbarium at Cape Town, and stations at the agricultural school at Elsenburg and in Rhodesia. In India the Agricultural Institute at Pusa is the head of a system of provincial stations and a large number of sub-stations. Australia and New Zealand have about 50 stations.

Other Countries. Germany has over 100 stations, many of which are connected with universities. A considerable number of stations maintain inspection and control of fertilizers, feeding-stuffs, and seeds; others are for investigations in special subjects, such as brewing and distilling, milling, animal chemistry or physiology, veterinary science, dairying, plant diseases, and plant physiology. Among the most important German stations are those at Berlin, Halle, Bonn, Breslau, Darmstadt, Munich, Göttingen, Bernburg, Möckern, Posen, and Tharandt. France has about 100 stations and laboratories, of which the best known are those at Grignon, Juvisy, Montpellier, Paris, and Versailles. Austria, Belgium, Denmark, Holland, Hungary, Italy, Switzerland, Norway, Sweden, Russia, and Japan have from 10 to over 100 stations each. Spain, the Philippines, Greece, Portuguese and German East Africa, Belgian Congo, Gold Coast, and China have organized stations within the last 10 years. In 1910 a station was established by American Jews at Haifa, Palestine.

The total number of stations in the world is about 1000. An account of those in the United States was issued by the Office of Experiment Stations as *Bulletin 80* (1900), and similar data for those in other countries as *Bulletin 112* (1904). Subsequent progress is summarized yearly in the annual reports of the office.

AGRICULTURAL LA'BORERS. See LABOR PROBLEM; GANGS, AGRICULTURAL.

AG'RICUL'TURE (tilling of land, Lat. *agri*, gen. of *ager*, field + *cultura*, tilling, cultivation). In a broad sense of the word, the science and art of the production of all plants and animals useful to man. More or less intimately connected with agriculture itself has been the preparation of its products for man's use. Again, the spinning of fibres and the weaving of cloth, the tanning of leather, the making of butter, cheese, wines, cider, vinegar, etc., have been largely done by farmers. Gradually, however, these occupations have been specialized and removed wholly or in part from the farm. Thus, the production of forest trees has been specialized as forestry, and the production of fruits, vegetables, and ornamental plants has formed the subject of horticulture. Such occupations as breeding live stock, raising poultry, bee-keeping, and fish culture are often also pursued independently of general agriculture. The term "agriculture" has, therefore, been gradually restricted to the production of a limited group of plants and animals, such as may be brought together on single farms in a system of mixed

husbandry. In the present article the term "agriculture" will be used in a somewhat broad sense, and the sketch will be confined to a brief outline of the historical development of agriculture, general statistics of a few of the more important agricultural products, and references to parts of the more general literature of agriculture. Information regarding particular plants and animals, or special agricultural industries, may be found in other articles in this ENCYCLOPÆDIA.

The Earliest Agriculture. Agriculture began in prehistoric times, when primitive man first began to select particular plants in his immediate environment as preferable to others for his use as food or for making his clothes, and when he first directed his efforts toward promoting the growth of plants. Whether these attempts preceded those to capture and confine animals, with a view to employing them as beasts of burden, or to using their meat, milk, or skins, we do not know. It is, however, clear that while the migratory habits of savage tribes must have tended to hinder anything like systematic cultivation of the soil, they probably did not prevent the domestication of animals.

The practices of some aboriginal tribes at the present time indicate that efforts to promote the growth of useful plants by the removal of other plants growing among them antedates the planting of seeds. Similar evidence points to the beginning of agricultural implements in the use of pointed and forked sticks to scratch the soil or remove obnoxious vegetation. The union of two such sticks with a leathern thong made a rude mattock or hoe, and a larger implement of the same kind formed the primitive plow, which was drawn, very likely, at first by men and afterward by domesticated animals. The great burden of agricultural labors was in those early ages undoubtedly thrown upon woman, as has been the case among the tribes of North American Indians, whose men have devoted themselves almost exclusively to the chase and to war. It is interesting to observe that severe military requirements still necessitate the employment of women in field labor on the Continent of Europe.

Egyptian Agriculture. The records preserved on ancient monuments allow us to trace the history of agriculture in Egypt back to at least 3000 B.C. At that early time various animals had already become domesticated, and the growing of crops for man and beast by a regular system of tillage and irrigation had been united with the feeding of large numbers of animals on the ranges. There was, however, no fixed distinction between wild and domesticated animals, and with certain kinds of animals the limits of domestication had not been definitely settled. The land and live stock were very largely the property of the royal, priestly, and military classes; the care of animals and the performance of farming operations were in the hands of hired laborers or slaves. Agriculture was, however, a more honorable occupation than trading or the mechanical arts. Herdsmen and fishermen were in the lowest class; swineherds especially were despised. Cattle, sheep, goats, and swine were kept, often in large herds and flocks. The cattle belonged to the same species as the present cattle of India. Both bulls and cows were used for labor, but the flesh of the males only was eaten. Sheep were kept for both wool and milk (from which cheese was made), but do not appear to have been often used for food. Goats seem to have furnished the principal milk supply of ancient Egypt. Swine were raised in large numbers, though they were considered unclean and were forbidden food except on certain days or for the priests. The donkey and camel were the principal beasts of burden from prehistoric times. The donkey was probably first domesticated by the ancient Egyptians, being taken from the wild asses which came from their home at the headwaters of the Nile. Horses were brought into Egypt about 1900 B.C., when the Shepherd Kings from Asia conquered the country. The stallions only were used for war and for shows. They were kept in stables and fed on straw and barley. Water fowls, especially geese, were abundantly raised. Breeding of animals by selection was customary, as well as branding them for identification. "When the Nile overflowed, animals of all kinds were placed upon artificial raised ground and fed upon wheat straw and leguminous fodder raised for the purpose."

Crops were grown with the aid of the alluvial deposits annually made by the overflowing Nile and of irrigation to supply the lack of rainfall. Irrigation water was taken from the Nile and distributed through numerous canals and ditches. The water was raised to the top of the river bank by handsweeps such as are often used on farms to-day for raising water from shallow wells, or by means of a vessel held with straps between two laborers, who pulled against each other in lifting the water. In some cases seed was sown after the Nile flood without preparation of the land and was trodden in by animals. Generally the plow or the hoe was used. The plow consisted of a wooden plowshare, double handle, and draught pole or beam. "The beam and stilt were fastened together by thongs or by a twisted rope, which kept the share and beam at a proper distance and helped to prevent the former from penetrating too deeply into the earth." The plow was drawn by two bulls or cows, yoked by the shoulders or attached by the horns. Generally, one man held the plow and another drove the animals, but sometimes one man performed both duties. The hoe was made of wood and consisted of a rounded or pointed blade attached to a handle by a twisted thong. Other tillage implements sometimes used were the harrow and the roller. The cereals grown were bearded wheat, six-rowed barley, durra (*Andropogon sorghum*, var.), and millet (*Panicum miliaceum*). The seed was sown broadcast; the wheat and barley in November, after the subsidence of the Nile flood, and the durra either at that time or in April. Wheat was harvested in March, barley in April, and spring durra in July. "Wheat and barley were headed with a toothed sickle, or cut lower down and bound into sheaves." The grain was trodden out by donkeys or oxen on earthen threshing-floors constructed in the open field, where the chaff was fanned out by the wind. Granaries, often built of the Nile mud, were used for storage. Durra was pulled up by the roots, and the seed was removed with a comb-like stripper similar to that sometimes used now for removing broom-corn seed. Flax was raised from prehistoric times for its fibre, from which the clothing of the ancient Egyptians and the wrappings of the mummies were largely made. It is improbable that cotton was grown in

Egypt in very ancient times, though it seems to have been introduced there from the East previous to the beginning of the Christian era. Lentils, lupines (*Lupinus ternis*), onions, garlic, and radishes were commonly raised vegetables. The horse bean (*Vicia faba*), chick pea (*Cicer arietinum*), and bitter vetch (*Lathyrus sativus*) were also probably raised. For fruits the Egyptians had grapes, olives, figs, pomegranates, and dates. Other cultivated plants were the watermelon and castor-oil plant.

Babylonia. Of Babylonian agriculture there are few records. As in Egypt, it supported a dense population. The Euphrates overflowed, but did not do the work of the Nile. In all the region irrigation turns desert lands into fruitful fields. Of such fields Herodotus said: "This is of all lands with which we are familiar by far the best for growth of corn. When it produces its best it yields even three hundred fold. The blades of wheat and barley grow there to full four fingers in breadth; and though I well know to what a height millet and sesame grow, I shall not mention it, for I am well assured that to those who have never been in the Babylonian country what has been said respecting its productions will appear incredible."

Palestine. The Scriptures are full of allusions to the operations of the husbandman in Palestine, as well as in Egypt. The operations in the two countries necessarily formed striking contrasts, the crops in the former being dependent on the rains for growth, in the latter upon the inundations of the Nile. The Hebrews, before their sojourn in Egypt, had been a semi-pastoral people, and they must have learned something of Egyptian agriculture during the years of bondage. Their laws were those of an agricultural people. Land was practically inalienable. Extensive plains of fertile soil yielded the finest wheat. The hill-sides were covered with vines and olives, often planted in terraces formed with much labor to afford a large mass of soil in which the plants might flourish in the almost rainless summer. The valleys were well watered and afforded pasture for numerous flocks. Of the smaller cultivated plants, millet was the chief summer crop, but it was cultivated to only a limited extent, being confined to those spots that could be artificially watered. Wheat and barley were the chief cereals, as the winter rains were sufficient to bring them to maturity.

Greece. From the Grecian literature covering the period from 1000 B.C. to the conquest of Greece by Rome, 146 B.C., we get comparatively little definite agricultural information. In addition to the animals used in Egypt, mules were grown and used for labor. In winter, animals were housed. Swarms of bees were commonly kept. Wheat and barley were the cereals, and hemp, as well as flax, was raised. The fruits of Egypt, except the date palm, were grown, and in addition, cherries, plums, almonds, pears, apples, and quinces. The list of vegetables is also lengthened and includes turnips, beets, cabbage, lettuce, chicory, garden peas, and kidney beans. The common lupine (*Lupinus albus*) took the place of the species grown in Egypt and is said to have been used for green manuring. It is asserted that the Greeks introduced the use of manure to promote the growth of crops.

Rome. Roman agriculture has received special attention because so much was written about it by the Romans themselves, and because they carried it into other countries, where it modified or dominated agricultural customs. When Rome was only a colony on the Tiber, land was divided among the citizens in small allotments. There was a domain of public land, which was continually extended by the conquests of neighboring States and the partial confiscations that followed. Although land in the conquered territory was sometimes granted to the poorer citizens, there were large tracts of public lands that were either cultivated or allowed to remain in pasture. The common conditions were that the occupants paid one-tenth of the produce of the corn lands, one-fifth of the produce of vines and fruit trees, and a moderate rate per head for cattle pastured. The occupants were merely tenants at will, and theoretically the State could resume or sell the lands at any time. Yet the right of possession was good against all until the lands had been resumed; and in process of time there came to be families so long in possession that they could not be dispossessed. Only the wealthy had the cattle or slaves that made such occupation possible. The burdens upon these occupiers of the public lands were much less than those upon the small farmers who owned their farms. Thus, at least two classes of cultivators were in existence, the small proprietors and the wealthy tenants holding the lands of the State. An addition to the strife between these two classes was the pressure brought to bear in the interest of the landless. Even after the Romans became masters of all Italy, little more than four acres was assigned to each citizen, and the domain lands increased enormously. Attempts were constantly made to restrict the extent of land that could be occupied by the wealthy, but generally without effect. (See AGRARIAN LAW.) A great deterioration and a consequent agricultural change took place during the century that followed the first Punic War (ended B.C. 241). The place of the small farmer was taken by the planter, who cultivated a great extent of territory, using slave labor. The small proprietors either sold their no longer profitable farms or were driven from them by the large land-holders. In Sicily, the first province, and in the others successively, the ownership of the land was vested in the Roman people. From these provinces came the tribute of grain that made grain-raising unprofitable in Italy. Hence the large estates were gradually given over to the keeping of flocks and the raising of cattle. Among the Roman writers upon agriculture were Varro, Columella, and Pliny. Earlier than these in time and more celebrated was Cato the Censor (died 149 B.C.), who gives us not only the most minute particulars regarding the management of the slaves on his large Sabine farm, but also all the details of husbandry, from plowing to the reaping and threshing of the crop.

Horses, asses, mules, cattle, sheep, and swine were raised by the Roman farmers, and much attention was given to the breeding of animals for special purposes. Castration was customary, and oxen were the principal work animals used on the farm. Mules were extensively used, especially as beasts of burden. The milk of sheep and goats was generally used for drink and also for making cheese. Columella describes a method of making and preserving cheese and says that the milk used in cheese-making was curdled in various ways, but commonly with a lamb's or kid's rennet. Poul-

try culture was an elaborate industry, and included the raising of hens, geese, ducks, teals, pigeons, turtle-doves, swans, and peacocks. Much attention was also given to fish culture, and such animals as hares, snails, and dormice were raised in considerable numbers. Wheat was the most important cereal crop cultivated by the Romans, and both smooth and bearded varieties were raised. Six-rowed and two-rowed barley, too, was grown to a considerable extent. Millet was grown to some extent. Oats and rye were introduced in comparatively late times. Land given to grain was fallowed for the whole of every alternate year. One-third of the fallow was manured and sown with some green crop as cattle food. Fallow received from four to five furrowings before the wheat was sown in the fall. The crop of wheat ripened about the middle of June, but the summers were too dry for the raising, with certainty, of millet and other summer crops. Alfalfa (lucerne), common vetch (*Vicia sativa*), bitter vetch, and chick pea were grown for fodder. Hemp, flax, beans, turnips, and lupines also are mentioned as occasionally cultivated. To the list of fruits and vegetables produced in ancient Egypt and Greece the Romans added apricots, peaches, melons, and celery. Meadows were carefully prepared, and rotation of crops was practiced to a certain extent. The soil was thoroughly cultivated with the plow and harrow or the hoe and rake; blind and open drains were used; in some regions irrigation was employed. Manures of different kinds were abundantly used, and various methods for their preservation and distribution were elaborated. Wheat and barley were usually reaped with a sickle, but sometimes they were pulled up by the roots, or the heads were cut off with shears. They were threshed with flails or with a board studded with iron spikes or sharp flints, which was drawn over the straw, or by trampling with cattle or horses. The Romans carried their agriculture into the ruder countries conquered by them. The vine growing wild in Sicily was carried into Gaul, where it was acclimated with difficulty. To the rude Britons the Romans taught agriculture so successfully that before the period of occupation was over they were exporting large quantities of grain.

The Dark Ages and the Middle Ages. The deterioration of Roman agriculture was accelerated by the overthrow of the Roman Empire. The conquering nations had advanced but little beyond the pastoral stage. During the following period of the Dark Ages the two influences working for the benefit of agriculture in western Europe were the Saracens in Spain and the religious houses in the other countries. The Saracens irrigated and tilled with untiring industry. They introduced the plants of Asia and Africa; cultivated rice, cotton, and sugar, and covered the rocks of southern Spain with fruitful vines. In general, throughout western Europe land was cheap and many worthless tracts were given to the Church. In some of the religious orders labor with the hands was imposed upon the members. They studied the works of the Roman writers upon agriculture and soon had the best cultivated lands in those countries through which their influence extended. Charlemagne encouraged the planting of vineyards and orchards. On the whole, the Crusades helped the agriculture of western Europe. In the latter part of the Middle Ages the people of the low countries of western Europe came to be as distinguished for their agriculture as for their commerce and manufactures. They plowed in green crops; the people of Holland developed dairying; the Flemings gained the reputation of being the oldest practical farmers. Also in the plain of northern Italy, watered by the Po, agriculture was in an advanced condition. A large part of it, of great natural fertility, drew forth the praises of Polybius, who visited it about 50 years after it came into the hands of the Romans. In the thirteenth and fourteenth centuries, under the influence of irrigation, the region became a garden, supporting a large population and exporting grain. In the England of the same period the agriculture showed alternations of indolence and bustle, of feasting and semi-starvation. In August, 1317, wheat was 12 times as high in price as in the following September.

By the beginning of modern history, the fruitful lands of western Asia and southeastern Europe, swept by wars and desolated by conquest, had been placed under the ban of the Turk. The conquest of the Moors in Spain and their subsequent expulsion caused an injury to the agriculture of the peninsula which has not been repaired. The discovery of the New World showed two grades of agriculture carried on by those who had never seen the horse and were practically without domestic animals. Even the careful tillage of the ancient Peruvian had no influence upon Europe and little upon the America of succeeding centuries. The great contribution of America to the world's agriculture was the three plants, the potato, tobacco, and Indian corn or maize.

England. In the sixteenth century agriculture in England became more profitable, inclosures were made, and the rights of common were greatly restricted. Turned from the former wool exportation, the farmers began to raise wheat in large quantities to be sent out of the country. A law in the middle of the century practically prevented grain exportation and turned wheat lands into pasturage. The resulting high price of food and the destitution on the part of laborers brought another reaction and a replowing of grazing lands. The sixteenth century saw the end of the villeinage. In 1595 laborers without food during the summer months worked six days for a bushel of wheat, four days for a bushel of rye, and three and one-half days for a bushel of barley. Hops became an important crop. Gardening, greatly neglected in the first part of the seventeenth century, received due attention in the latter part. Deep drainage, too, began to be talked about. From the middle of the seventeenth century to the nineteenth, England looked to Flanders for the perfection of careful tillage. From the Flanders of the seventeenth century Sir Richard Weston brought turnips and red clover, and Arthur Young afterward called him a greater benefactor than Newton. By the end of the century turnips and clover were extensively cultivated in alternation with wheat. The cultivation of grasses was begun in this century with the introduction of perennial rye grass. White clover was introduced in 1700, and timothy and orchard grass came to England from America about 1760. The eighteenth century saw revolutions in English farming. One came when Lord Townsend established the Norfolk system. Under this system of first, wheat; second, turnips; third, barley; fourth,

clover and grass, one-half of the land was constantly under grain crops and the other under cattle-grazing. Large numbers of sheep and cattle were fattened on the turnips, and the consumption of roots on the land increased the yield of the barley. The Norfolk system was a success from the beginning. The rental of certain farms increased fivefold, and farmers in special cases made handsome fortunes. Susceptible of many modifications, it has had much to do with the improved agriculture of England. Beans, peas, and vetches were generally grown, often in mixtures with wheat or oats. Hemp was grown for rope-making. The common vegetables were onions, leeks, mustard, and peas, and among the fruits were apples, grapes, cherries, pears, and plums.

Another revolution came from the breeding experiments of Bakewell, commenced in 1760. To mention a single point, it had taken three or four years to prepare sheep for the market; those bred by Bakewell were prepared for the market in two years. Besides making a reputation and a fortune for himself, he made for others a way since followed in breeding. Jethro Tull, whose book on *Horse-hoeing Husbandry* appeared in 1733, was almost in touch with the methods of the nineteenth century. His theory was that seeds should be sowed in drills, and the spaces between the drills kept thoroughly cultivated. He invented a drill and a horse-hoe. He did not succeed in obtaining phenomenal crops, but successful modifications of the method have since been made.

North America. More agricultural progress had been made prior to the coming of the white man than is commonly supposed. Most of the Indians east of the western plains lived in settled villages and cultivated the soil. Indian corn was the chief food-stuff, and fully 1,000,000 bushels of ear corn were raised annually. Beans, squashes, pumpkins, sunflowers, tobacco, and gourds were among the 25 crops under cultivation. The Indians practiced seed selection, combated weeds, and sometimes manured their land with fish, shells, etc. In prehistoric times agriculture was carried on in the southwest with the aid of extensive reservoirs and dams, from 250,000 to 300,000 acres being irrigated in the Salt River valley alone. Hand irrigation is still practiced by the Pueblo Indians, who have raised cotton for hundreds of years.

The white colonists had much to discourage them as agriculturalists, and progress was slow. The land had for the most part to be cleared of forests. In New England the rigorous winters and stony soil were additional handicaps. From the Indians the settlers learned how to raise corn (maize), breaking the soil with a hoe and manuring with fish. Corn was the great product to be depended upon, although other grains were cultivated, and cattle and sheep increased slowly, fed first upon the native grass, then upon timothy, which was found to be specially fitted for New England soil. Enough flax was grown in 1642 to supply domestic needs in Massachusetts.

The Southern colonists, although more favored by nature, made less actual progress than those of the North. Tobacco for export to England became the most profitable crop, virgin land being cleared and abandoned when its fertility waned. Live stock flourished, and an export trade to New England began in 1640. Cotton became a marketable product in 1620, although comparatively undeveloped until the invention of the cotton gin in 1793. Then began the reign of cotton, with a reliance upon slave labor, a demand for fresh fields, and a disregard of careful tillage. Early in the century the importation of the Spanish merino sheep changed the farming of the North and greatly increased the production of wool.

The Nineteenth Century. In the nineteenth century the progress of agriculture was profoundly affected by great general causes, some of which exerted a world-wide influence. Among these were: (1) the application of science to the improvement of agriculture; (2) the revolution in transportation methods through the use of steam power on land and sea; (3) the rapid opening of vast areas of new land in North and South America, Australia, and Africa to settlement, cultivation, and grazing; (4) the invention and extensive use of labor-saving machinery as applied to agriculture; (5) the abolition of serfdom and slavery; (6) the specialization of agricultural industries; (7) the organization of the distribution of agricultural products, and their use in manufactures in accordance with the modern business principles governing the organization of other great industries; (8) the establishment of governmental agencies for the promotion of agriculture; (9) the voluntary coöperation of farmers through numerous associations; and (10) the wide dissemination of public documents, and farmers' meetings. Scientific studies and experiments for the benefit of agriculture began with the development of agricultural chemistry early in the century, with its practical applications in the manuring of crops, the use of commercial fertilizers, etc. In more recent years a wide range of successful research on behalf of agriculture has been developed with the aid of the biological sciences, and in the closing years of the nineteenth century investigations in agricultural physics assumed great importance. The marvelous success of scientific effort, largely under government patronage, is one of the notable achievements of that century. Organized scientific research for the benefit of agriculture through experiment stations and kindred institutions became a regular and permanent agency for the advancement of this art.

The vital interest of the whole community in the success of agriculture as the great basal industry was distinctly recognized during the nineteenth century by the widespread establishment of governmental agencies for its promotion. Agriculture has now a definite place in the ministries of almost all the civilized nations of the globe. In the United States the Federal government maintains a Department of Agriculture, whose chief officer has had a seat in the President's cabinet since 1889 as the Secretary of Agriculture. Practically all of the States, too, have departments, boards, or commissioners of agriculture. Great Britain has a Board of Agriculture and Fisheries, organized in 1889, and a Development Commission, appointed in 1910. See AGRICULTURAL EXPERIMENT STATION; AGRICULTURE, UNITED STATES DEPARTMENT OF.

Agricultural Machinery. One of the features of the agricultural history of the past 50 years has been the extensive introduction of machinery. Sowing machines, cultivators, and

all the machines that displace the hoe are of comparatively recent invention. As early as 33 A.D., according to Pliny, the Gauls used a cart with projections in front which cut or tore off the heads of grain; but until recent times little effort was made to invent or introduce labor-saving machinery, owing to popular prejudice. The threshing machine was not invented until 1786, and though an attempt was made early in the century to construct reaping machines, but small success was won until the time of Bell, Hussey, and McCormick. (See REAPERS; REAPING.) In the hay harvest horse power is applied by means of the mowing machine, the hay-tedder, the rake, and machines for loading and unloading the hay. Another class of machines, as, for example, the one for threshing, deal with the gathered crops. The use of a system of machinery like that applied to dairying has made great changes in certain lines of agriculture. From horse power, too, there has been a partial change to power furnished by the steam, internal combustion, or gasolene engine, or, under special conditions, the windmill and electric motor. Even the small modern farm usually has something of the kind available for pumping water, filling the silo, running the cream separator and churn, etc., and the agricultural tractor and power-operated plows and harvesting machinery are becoming common in regions where farming is on an extensive scale. Improved farm machinery in America has made possible the rapid settling of the new States and the successful gathering of their immense harvests. (See HARVEST AND HARVESTING; FARM IMPLEMENTS; IMPLEMENTS, AGRICULTURAL; THRESHING AND THRESHING MACHINES; PLOW, PLOWING.) The Department of Agriculture found that the amount of human labor required to produce a bushel of wheat was on an average only 10 minutes in 1896, as compared with 3 hours and 30 minutes in 1830, and the cost of the human labor required to produce this bushel of wheat declined from 17¾ cents to 3⅓ cents.

System in Farming. There is a movement in agriculture to provide for local demands, to take advantage of growing centres of population, to strive for excellence and exact system in place of haphazard methods. The evaporator has broadened the fruit market. The canning industry has utilized fruits and vegetables and saved the agricultural balances in sections. Cold storage, rapid transportation, and the refrigerator car have reduced risks and shortened apparent distances. New Zealand is in the markets of London. Canada and the United States have a profitable apple trade with England. The expenses of transportation have been reduced to a fraction of the previous cost, and thus the wheat lands of Saskatchewan have been laid alongside those of both New England and old England, with gain for the one and with loss for the others. In dairying there has been one of the triumphs of recent agriculture. Specialization, with scientific method and improved machinery, has brought excellence without destruction of the market. Carried on largely as coöperative undertakings, creameries and cheese factories (see DAIRYING) have increased in Europe and America. A large industry in England, dairying on the coöperative basis has been on the increase in France. The Netherlands, famous for its careful agriculture, is a leading dairy country. Switzerland and Canada export large quantities of cheese. Denmark no longer competes for the wheat trade, but has become one of the most successful of dairy countries, exporting immense quantities of high-grade butter to England.

Twentieth Century Agriculture. The census of 1920 showed a total farm area in the United States of 955,883,715 acres, as compared with 878,798,325 acres in 1910. The area of improved land in farms in 1920 was 503,073,007 acres, as compared with 478,451,750 acres in 1910. The total farm acreage, therefore, showed an increase of 8.8 per cent, and the improved acreage an increase of 5.1 per cent during the decade. Considerable areas of unimproved land in certain of the mountain States used mainly for grazing were added to the farm acreage. The total number of farms in the United States in 1920 was 6,448,343, an increase during ten years of 86,841, or 1.4 per cent. The latter is considerably less than the increase in the rural population, indicating that a considerable number of tracts were not being operated by reason of the scarcity of labor and hence were not returned as farms. The increase in the number of farms was also less than the increase in the total acreage or the acreage of improved land in farms, which is reflected in the greater average number of acres per farm. This average acreage per farm was 148.2, as compared with 138.1 in 1910, while the average farm in 1920 contained 78 acres of improved land, as compared with 75.2 acres ten years previously. The aggregate value of all farm property in 1920 was $77,924,100,338, representing an increase of over 90 per cent in the decade. This large increase in value was less than that between 1900 and 1910, which amounted to over 100 per cent. The average value of farm land per acre rose from $32.40 in 1910 to $57.36 in 1920. While there was a considerable increase in the percentage of farms operated by tenants, this increase was not so great as that shown in preceding decades.

Statistics of rural population show that the trend from the country to the city became greatly accelerated between 1910 and 1920, and that for the first time in the country's history more than half the entire population (51.4 per cent) were living in urban territory. While the total population showed an increase of nearly 15 per cent during the decade, the increase in rural territory was only 3.1 per cent. These facts caused no little concern as showing a trend away from agriculture. The Federal Department of Agriculture has shown that the population is increasing more rapidly than the food supply, and that at the present rate the United States may cease to become a food exporting nation within from fifteen to twenty-five years. Increasing land values lead to increased attention in the improvement of land to bring it under cultivation.

The spread of the much-dreaded cotton boll weevil in the South had extended to the Atlantic Coast States by 1920 and now affects nearly the entire cotton growing region. To it has been added the menace of the pink boll worm appearing in Texas but held in check by rigid quarantine. Considerable success has been met with in raising cotton under weevil conditions by employing earlier varieties, cleaner methods, and machine dusting with arsenate of lead. The spread of the weevil has brought marked changes in southern agriculture, compelling diversification of crops and the introduction of

live stock farming. The eradication of the cattle tick has favored the latter, encouraging the development of higher grade cattle and dairy stock. The immense flocks and herds grazing on the open ranges of the West have been largely replaced by fields of alfalfa, durum wheat, and other special crops adapted to irrigation or dry farming conditions; and this has forced changes in the meat-producing industry which have tended to increase the cost of production and the retail prices.

Probably at no period in the history of agriculture has more rapid progress been made in the improvement of the industry through the agency of scientific effort. This has taken the form of investigation of methods and practices to determine their logical basis, and has suggested many important innovations. The period became the era of so-called scientific farming. Important improvements were made in the selection, development, and adaptation of all sorts of cultivated crops, and a great amount was done in the introduction of plants and trees from other countries. In the vicinity of large cities market gardening has been a profitable branch of agriculture and its success has been the culmination of intelligent and progressive methods. "Truck farming" has also greatly developed in places remote from the markets, being specialized in sections adapted to particular crops or to winter production. A large part of the vegetables consumed in the great American cities come from places 500 to 1500 miles distant. According to the census reports for 1920, nearly a million and a half acres are given over to vegetable growing on a considerable scale, not including Irish and sweet potatoes, the value of the product being more than $193,000,000. The South Atlantic and Gulf States have become especially interested in truck farming which under favorable conditions has proved quite profitable. Among field crops the development of rice culture, of sugar beet growing, the raising of non-saccharin sorghums, and a wide range of forage crops for special conditions are noteworthy. Fruit raising has become a more highly specialized and efficient branch, and poultry raising, bee-keeping, and the improvement of the kind of live stock kept by farmers have made great advances.

In the West irrigation has been employed since 1880 on a large scale in reclaiming land within the arid belt, a region extending from the center of Kansas and Nebraska to the furthermost Pacific Coast Range of mountains. In that region of scanty rainfall no less than 13,738,485 acres had been brought under irrigation by 1909, while nearly twenty million acres were irrigated in 1919, producing crops valued at more than eight hundred million dollars. The irrigated area showed an increase of 33 per cent in the decade, and the total area to which existing enterprises were capable of supplying water in 1920 was 26,020,477 acres. These figures indicate the rapid development of irrigation works and the extent to which they are being utilized. Under the National Reclamation Act reservoirs and other irrigation works were constructed by the government capable by 1920 of supplying water to 1,634,000 acres. The total area under the projects in hand is 3,300,000 acres. Irrigated agriculture has also been developed on an extensive scale through private enterprises. Moreover, improved methods of cultivation are making it possible to grow crops under "dry farming" (i.e., without irrigation) on thousands of acres until recently considered irreclaimable. The success of irrigation in the West has led to a considerable movement in the humid regions to reclaim large areas of unproductive land by drainage, to which the national government has given some assistance. Of the total farm area, 5.5 per cent is provided with artificial drainage and nearly forty million acres of additional farm land is in need of drainge to make it suitable for growing crops. Operating drainage enterprises under way early in 1920 included approximately sixty-five and a half million acres. Much attention was also being given to preparing the extensive cut-over areas for farming, with considerable development in that direction. See IRRIGATION; DRAINAGE; ARTESIAN WELL.

The Commission on Country Life, appointed by President Roosevelt, reported in 1908, calling forceful attention to the condition of agriculture and country living, the handicaps and needs and the importance of a more favorable public policy. While there was no immediate national response to the recommendations of this report, it had a very profound influence in directing attention to the fundamental industry and the people living under it, and various proposals for improvement were soon brought forward. The result was a series of national laws of great benefit to agriculture. The first of these measures to be culminated was the Agricultural Extension Act providing for personal aid and instruction of the farmers and their families, largely through demonstrations conducted among them. This act was passed in 1914 and provided an annually increasing appropriation, to be distributed in proportion to the rural population of the States and to be substantially met by similar contributions from the States or local communities. The work is carried on coöperatively between the United States Department of Agriculture and the State colleges of agriculture. Under it an extensive and highly effective system of "county agents" has been provided with an organization at the colleges to help in supplying expert information to these agents, developing plans for their activities, and administering the work. In the fiscal year 1921–22 $18,500,000 was allotted to this work in the United States by the Federal and local authorities. There were engaged in it 2421 county agents, 959 home demonstration agents, and 327 boys' and girls' club agents, making together with specialists and others a total of 3700 extension workers.

A second highly important piece of legislation was the Federal Farm Loan Act providing for a system of rural credit, which has brought a large measure of financial relief. The act established a Federal Farm Loan Board with a system of farm loan banks authorized to make loans on farm real estate with repayment under an amortization plan. The farm loans under this act have aggregated many millions of dollars up to the full capacity of the banks, and following the war the capital of these banks was increased by about one hundred million dollars.

Two other important measures were the Grain Standards Act and the Warehouse Act, both passed in 1916. The former empowers the Department of Agriculture to establish official standards and provides for inspection of grain shipped by grade in interstate or foreign com-

merce. It is designed to secure for producers the proper grading of their grain and afford greater security in buying and selling, thus simplifying the relations between producer, dealer, and consumer. The United States Warehouse Act established a standard warehouse receipt for cotton, grain, wool, tobacco, and flaxseed, and provided a voluntary system for the Federal licensing of bonded warehouses and warehouse men. Under the act nearly 600 warehouses have been licensed by the Department of Agriculture, including those for cotton, grain, wool, and tobacco. The effect is to make warehouse receipts more easily and widely negotiable as collateral for loans to assist in financing crops. Attempts to control speculation in agricultural products and secure a more equitable price to producers resulted in placing packing houses and stock yards under government supervision, and regulating trading on grain exchanges. The Cotton Futures Act also aimed at minimizing speculative manipulation of the market.

The system of agricultural instruction developed in the United States was supplemented in 1917 by the Agricultural Vocation Act authorizing appropriations on an ascending scale to aid the States in the teaching of agriculture and the industries in secondary schools. The agricultural colleges grew rapidly in influence and appreciation and in most of the States received greatly increased appropriations for the development of their facilities and their work. Rural free delivery of mail and the parcel post, rural telephones, the automobile, and a nation-wide improvement of roads have contributed to decrease the isolation of country life, and business men, editors, churches, etc., are joining hands with the farmer as never before to promote rural improvement as the foundation of American prosperity.

In this period American agriculture the country over had very largely emerged from the pioneer and exploitation stage in which land had little value and labor was the principle element, to the stage in which production per man was the standard. Attention began to be given to the cost per unit of production and statistics gathered by the Federal government. The production per man was said to be larger than that in any European country. At the same time there was a very marked upward trend in yield per acre, as shown by the United States Department of Agriculture. From 1890–1918 the acre-yield of wheat increased 25 per cent, of corn 10 per cent, of oats 24 per cent, and of potatoes 33⅓ per cent, taken the country over. But despite this, it was estimated that only about 15 per cent of the land in cultivation is yielding reasonably full returns. The aim is to bring up the balance by applying scientific knowledge and improved practices.

A great amount of attention was directed to marketing, distribution, the organization of farmers, and the economics of agriculture. The latter subject came into prominence more particularly in connection with farm management studies, and interest in it soon became widespread. The lack of system and economy in getting farm products from the producer to the consumer and the enormous differential between what the producer received and the retail price the purchaser paid for farm products contributed interest to the subject of coöperation in the buying and selling of farm products and supplies. Coöperative organizations grew steadily, and organization among the farmers to promote and protect their interests in various directions made rapid growth and found effective means of expressing itself. The American Farm Bureau Federation which developed out of the agricultural extension work in the States grew to a membership of approximately a million and became a great force. In European countries coöperation also steadily developed in extent and variety.

Other Countries. Change in the agriculture of Europe in the early part of the twentieth century was less striking than that in the United States. The traditions and conditions surrounding European agriculture were so firmly established as to make change relatively slow. New crops had, however, been gradually introduced, and from the standpoint of the applications of science the development was rapid in most countries. The cultivation of the sugar beet became a prominent industry in Germany, Austria-Hungary, and Russia, these three countries growing nearly two-thirds of the world supply. The vine continued to be of importance in all the Mediterranean region and in favored localities like those along the German Rhine. The area given to grape growing reached some ten million acres in Italy and about four million acres in France. France during its progress from the Revolution became one of the richest of agricultural countries, and previous to 1874 was the greatest wheat-producing country in the world. It is noted for its small farms and thrifty agricultural class, more than half of whom are landowners.

Germany, the greatest potato-producing country of the world, also had a varied agriculture. For years it had pursued a policy of encouraging and safeguarding that industry, leading the world in its agricultural investigation, instruction and favorable consideration. The growing of food was looked upon as a measure for the common good and was a part of its campaign for supremacy. Great Britain, on the other hand, had no settled agricultural policy and gave little attention to promoting the industry, its policy being to import its food in large measure. Two-thirds of the total area of cultivated land was in permanent grass and pasture, as this was found to give the most stable returns in the face of fluctuating policy. The laying down of grass had been going on for a considerable period. In England and Wales the plowed area decreased about 26 per cent in the 40 years prior to 1914. There was also a steady reduction in the number of large farms or estates, while the number of small holdings greatly increased. The large farms continued to occupy a very considerable portion of the land, the small holdings of 50 acres or less constituting only about 15 per cent of the agricultural land as late as 1913.

The garden of Italy is the Lombard Plain with its more than 1,600,000 acres of irrigated land and its thorough system of cultivation. Besides large crops of wheat, maize, grapes, and olives, Italy produces great quantities of lemons and oranges and has some half million people engaged in raising silkworms. In Spain, despite over three million acres each in grapes and olives, besides a considerable production of cereals and oranges, agriculture largely looks backward to the time of the Moor.

China, with an agriculture only slightly

changed from legendary times, and Japan are countries in which rude implements are overbalanced by irrigation, garden-like cultivation, and the most scrupulous care to conserve soil fertility and utilize every particle of human or animal waste or other material of fertilizing value. With rice as the principal food product, these countries support a dense population, have a considerable variety of crops, and together with India and Asiatic Russia are increasing factors in computing the world's supply. Egypt under the guidance of England is producing large amounts of sugar and a high grade cotton. The extensive irrigation systems have increased the area of production and enabled diversification.

Australia has already developed beyond the pastoral stage, and besides cattle and sheep is exporting dairy and fruit products, meats, wool, and cereals. The land under cultivation in Australia had increased by 1911 to nearly twelve million acres. For the ten years preceding that date the increase had been considerably more rapid than that in population. Western Canada with its virgin fields is becoming an important source of cereal supply. In South America Argentina is an important factor in the world's agricultural market, with its wheat, corn, wool, and cattle; and Brazil holds a leading place in the production of coffee. In both of these countries the government is giving considerable attention to the improvement of agriculture and the establishment of schools and colleges for the industry. In Central America, including Mexico, the raising of cattle and sheep has become a large industry and the exports of coffee, cacao, bananas, and sugar are important. The West Indies and Hawaii produce large quantities of cane sugar and tropical fruits.

There have been great strides in the agriculture of South Africa and the Transvaal. The large farms in the latter country are being cut up, and corn culture has developed more rapidly than any other crop.

Rural depopulation has become a most serious problem in Europe, and the related world-wide farm labor question has been of scarcely less importance. The depopulation problem was the principal topic for discussion at the Tenth International Congress of Agriculture in 1913. It has caused concern in France where the number in agricultural pursuits has steadily decreased. Rural depopulation has also been going on in Germany, and the farm labor supply in Great Britain has shown a large decrease. Efforts have been made in most European countries to remedy the situation by breaking up the large estates into small holdings and selling these under a system of deferred payments. In England the county councils have been given special powers in the acquiring and allotting of land for small holdings, and the number of such holdings is steadily increasing.

Agriculture During and Following the World War. The period of the World War brought radical and far-reaching changes in the agricultural affairs of the United States and the warring countries. Production rose to a preëminent position, second only to the military and naval operations as an element in the national defense. The problem of maintaining and in some cases increasing the production of food for man and beast taxed to the utmost the farming resources of the countries at war, and shipping difficulties in case of remote agricultural countries placed an unusual responsibility on the United States. As the war continued the necessity became apparent in all countries of providing for the continuance of agriculture on the highest possible plane—of maintaining the fertility of the land, avoiding waste of all kinds, and preventing the depletion of live stock.

The country most dependent on food importations was the United Kingdom which prior to the war produced only 27 per cent of its food requirements in edible grains, 53 per cent of meats, 62 per cent of dairy products, and 21 per cent of fruits. Germany, on the other hand, was producing about 82 per cent of the edible grains required, 93 per cent of meats, 92 per cent of dairy products, and half of its fruits. France grew 92 per cent of its total food requirements, Belgium 57 per cent, Austria-Hungary 98 per cent, and Russia 110 per cent. The United States was not properly classed as a surplus producer, as it was as large an importer as an exporter of food products, taking into account sugar, tea, coffee, nuts, etc. Grain production was 25 per cent in excess of the amount used at home.

Early in the war various measures were adopted in Europe to conserve food supplies and to encourage production on a liberal scale. The feeding of bread grains to live stock was largely restricted or prohibited, the amount of grain used for brewing and distilling was cut down, and closer milling of cereals was required, the addition of potato flour or other substitutes being permitted in some countries. Non-essential crops like tobacco were prohibited, and bulb growing and hop raising much reduced.

In Germany the whole question of production was systematized and brought under governmental regulation. In France also organization was carried to a high degree. Laws permitted neglected land to be taken over by the communes, the government subsidized the purchase of expensive labor-saving machinery by co-operative societies or communes, and bounties were offered and prices guaranteed for essential products. In Great Britain the seriousness of its position was early realized and was intensified when the U-boats became active. The plowing up of grass land and pastures, and the increase in acreage under wheat was first urged and later enjoined. This met with much objection in the absence of a well-defined permanent agricultural policy but it was stimulated by government guarantee of price for cereals, by appeals to patriotism, and later by compulsory measures where necessary.

The world's wheat crop of 1915 greatly exceeded that of any previous year, more than half the increase being ascribed to an expansion of wheat growing in non-European countries. The United States crop was the largest ever raised, passing the billion bushel mark for the first time and representing about one-fourth of the entire world's production. This was in response to the appeal from Europe and to increasing prices. Wheat export to Europe which was less than one hundred million bushels before the war jumped to two and three times that amount. In Great Britain, where the largest wheat crop for many years was raised in 1915, three-fourths of the wheat supply had to be imported. In 1916 the crops of wheat, barley, oats, and maize in the northern hemisphere were decidedly less

than in 1915, causing prices to rise and anxiety to increase. Government regulation was further extended. The guaranteeing of prices became more widespread and in a number of countries the authorities were empowered to control cultivation, organize labor supply, and otherwise stimulate production. Great Britain enacted a comprehensive measure in 1917 known as the Corn Production Act, guaranteeing wheat prices for a period of six years and a minimum wage for agricultural laborers. A live agricultural policy put into effect in that country under the Defense of the Realm Act enabled the taking over of waste lands and commons, compelling the breaking up of grass land and the use of the cultivated land in accordance with the needs of the country under penalty of its being taken over by local authorities. It was estimated that in 1917 an additional million acres of land was put under the plow in Great Britain.

When the United States entered the war in 1917 the selective service law included agriculture among the industries for which exemption could be claimed. A strong nation-wide appeal was made to the farmers through systematically organized channels to do their utmost in growing food for the Allies. The United States Food Administration fixed the price of the 1917 wheat crop at $2.20 for No. 1. While the wheat crop of that year was light, the aggregate of all cereals in the United States was an increase of approximately a billion bushels over the previous five-year average. In most of the allied countries the production of cereals fell off materially, showing that Europe was fast declining in food-producing power. For 1918 a definite agricultural programme was adopted by the United States for the first time in history, the aim being a billion bushels of wheat, and the acreage allotted among the States, the agricultural extension forces and other local agencies carrying forward the campaign. Climatic conditions were adverse over considerable sections but the wheat production amounted to 917,100,000,000 bushels, greatly in excess of the two previous years, and the cultivation of other leading crops represented an increase of many million acres over the prewar period. Canada responded with the largest record for all food crops except corn, but drouth cut the production in the prairie provinces.

In Great Britain the official programme called for the plowing up of nearly 2,400,000 acres of permanent and temporary grass, the amount being prorated by counties. The acreage of wheat, barley, and oats in 1918 was the highest ever recorded in British agriculture, and that of potatoes the largest since 1872. It was estimated that the 1918 harvest would provide 40 weeks' supply of bread stuffs for the entire population of the United Kingdom at the prevailing scale of milling and consumption. England and Wales produced 52 per cent more wheat than in the ten years preceding the war, 41 per cent more oats, 150 per cent more rye, and 50 per cent more potatoes, showing the result of the more favorable use of the land. This was a remarkable achievement for a country which prior to the war imported all but about 27 per cent of its edible grain requirements. It was done in the face of great labor shortages and unusual difficulties in securing fertilizers, feed for stock, gasoline for tractors, etc. In France the wheat crop showed an increase of about 25 per cent over 1917, but the crop had dwindled with the war and even with the increase was much below the normal for that country. In spite of its strenuous efforts, the man power of the country was so reduced that it was unable to maintain its normal food production.

With the progress of the war the labor problem became increasingly acute in all countries. Labor campaigns were instituted, prisoners of war were pressed into service, in many cases with good results; and large numbers of soldiers were furloughed to aid in seeding and harvesting. Anti-loafing laws were passed in several countries, and "work or fight" was the slogan. Women became an increasing factor in farming and strong appeals were made for them to go into training. By 1918 it was said that over three hundred thousand women workers were engaged on the land. High tribute was paid to the women of France who by common testimony made a splendid showing of service "in the trench which is the furrow." In the United States, colleges closed early that students might work on the land. Boys' working reserves were organized which rendered much aid to farmers in light work, and a women's land army of America was trained. During the harvest volunteers from town went into the fields in the Central West for part time to aid in gathering the crops.

Plans for a Great Liberty Wheat Harvest in the United States for 1919 were made in the fall of 1918, the response being nearly fifty million acres of fall wheat, the largest in the nation's history and three million more than called for. The spring wheat area brought the total wheat area up to nearly thirteen million acres greater than any previous record. Although the season was not favorable for the spring crop, the wheat production amounted to 941,000,000 bushels, the second largest in history. The total area sown to leading cereals in the crop year 1919 was 33,000,000 acres greater than the pre-war average for 1910–14, and produced 635,000,000 bushels more than that average. At prevailing prices the value of all crops in the United States in 1919 was estimated at $15,873,000,000, compared with the pre-war average of $5,827,000,000, due in part to the higher prices. The world crops in 1919 were large, especially those of corn, rye, barley, rice, and potatoes.

Following the Armistice the United States Department of Agriculture recommended a reduction in wheat of about 15 per cent and advised safe farming. The harvest, however, was the largest but one in history, 13 per cent above the five-year pre-war average for the ten principal crops combined. It met a falling market, with the worst slump in the history of grain prices. It was followed by the most severe agricultural depression in history, sharing in the general business conditions of the country. Congress revived the War Finance Corporation to aid local banks in carrying farmers and marketing crops, and an emergency tariff favorable to agriculture was passed. During this period the agricultural bloc in Congress became very active in securing remedial legislation, making the strength of the farmer vote more apparent than it had ever been before in the national agriculture. A joint Congressional Commission of Agricultural Inquiry made a thorough investigation of conditions surrounding agriculture and rendered a report emphasizing the importance of the industry and the maintenance of its welfare, and suggesting vari-

ous remedial measures, largely of economic nature. The seriousness of the situation led to the calling of a national agricultural conference early in 1922, the first of its kind, with representatives from various branches of the industry, which voiced the conditions and needs of agriculture and crystallized these in proposals for legislation, reduction of freight rates, and other measures. Gradually, however, as the business of the country improved, the conditions became more normal and farmers were able to market their crops to better advantage.

In Great Britain there was much agitation for a more favorable agricultural policy, and a Royal Commission drafted a report embodying a programme which included government guarantee for wheat and oats and fixed minimum wages for farm labor. This report, however, was never embodied in law, the portion of the corn production act providing for price guarantees was repealed, and after the Armistice public interest waned. Great disappointment followed among agricultural people and others who had come to realize the importance of the industry as a national asset. The increase in cultivated area which had been brought about during the war began to decline and was soon some three million acres behind the standard of 1870. There was unprecedented sale of land, willingness to dispose of it being due in part to the social upheaval, taxation, high interest rates, and uncertainty as to the future of farming.

France came back rapidly after the war. In less than two years after the Armistice nearly 50 per cent of the devastated land was cleared and put under cultivation, and by 1921 90 per cent was reported in use. Restoration in Belgium progressed favorably. The principle of compensation by the State for farmers for war losses was fully recognized in France and Belgium. There was radical confiscation of the land in Soviet Russia, and various measures for breaking up large estates in Germany, Poland, Rumania and several other countries. In several of the more backward agricultural countries of Europe there was a general movement to modernize farming and put it on a more advanced plane of efficiency.

The table on the opposite page, prepared from the *Year Book* of the United States Department of Agriculture, shows the production of the principal agricultural crops of different countries for the year 1920, as far as available. Although the returns are not complete for all the countries, they furnish interesting data regarding the relative agricultural production of different regions, subject, of course, to their failure in some cases to return to wholly normal conditions:

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AGRICULTURAL PRODUCTS OF COUNTRIES NAMED, 1920

Country	Million Bushels						Thousand Bales	Million Pounds		Thousand Tons
	Wheat	Corn	Oats	Barley	Rye	Potatoes	Cotton*	Rice*	Tobacco*	Sugar†
North America:										
United States	787.	3,232.	1,526.	202.	69.3	430.5	11,421.	1,189.	1,454.7	1,905.
Canada	263.2	14.3	530.7	63.3	11.3	133.8	....	....	28.	....
Cuba	.....	....	....	....	....	....	....	....	....	4,183.
Mexico	15.	....	....	....	....	....	....	....	....	103.
South America:										
Argentina	214.	258.7	57.	10.3	....	....	....	....	....	248.
Brazil	....	....	....	....	....	....	644.	....	53.9	580.
Chile	22.	1.7	2.5	4.1	....	10.9	....	....	....	....
Peru	....	....	....	....	....	....	....	....	....	392.
Uruguay	5.4	2.8	1.7	4.*	....	....	....	....	....	....
Paraguay	....	....	....	....	....	....	....	....	35.2	3.
Europe:										
Hungary	29.	48.3	23.	20.	16.5	71.6	....	....	....	....
Belgium	8.	....	27.	3.7	13.7	57.	....	....	23.9	151.
Bulgaria	41.	39.6	9.7	14.	8.9	2.	....	5.5	....	13.
Czecho-Slovakia	24.4	6.3	55.8	38.6	33.4	80.*	....	....	....	524.
Denmark	7.	....	47.3	23.5	12.6	53.*	....	....	....	176.
Finland	....	....	24.5	5.	9.1	17.8	....	....	....	....
France	230.4	16.8	291.	35.4	33.2	379.	....	....	29.3	170.
Germany	79.	....	237.6	87.7	189.5	750.9	....	....	....	808.
Greece	13.3	....	4.	7.1	1.3	....	....	....	57.2	....
Italy	141.3	86.7	24.2	5.8	4.5	51.4	....	662.3	21.	185.
Jugo-Slavia	64.7	86.5	28.6	20.6	18.1	38.5	....	....	....	2.
Netherlands	6.6	....	24.3	2.8	14.2	91.3	....	....	....	252.
Norway	1.	....	15.1	5.4	1.	30.8	....	....	....	....
Roumania	41.8	93.	37.2	48.2	5.7	3.2	....	....	26.5	1.
Poland	25.6	....	128.	40.3	82.	703.2	....	....	....	496.
Spain	138.7	27.7	37.7	90.5	27.8	104.8	....	411.8	....	227.
Sweden	11.	....	66.2	11.1	24.9	60.3	....	....	....	160.
Switzerland	3.6	.3	3.1	.6	1.6	28.3	....	....	....	10.
United Kingdom:										
England	52.	....	78.8	47.8	....	113.4	....	....	....	....
Wales	1.2	....	7.3	2.8	....	46.2	....	....	....	....
Scotland	2.	....	41.2	7.8	....	3.7	....	....	....	....
Ireland	1.4	....	65.4	7.5	....	74.1	....	....	....	....
Asia:										
British India	376.8	....	....	....	....	....	4,743.	80,003.8	....	3,361.
Cyprus	3.	....	....	3.5	....	....	....	....	....	....
Japanese Empire	28.	....	....	95.8	....	47.3	....	23,592.	107.5	....
Formosa	....	....	....	....	....	....	....	....	....	322.
Java	....	....	....	....	....	....	....	....	....	1,496.
Philippine Islands	....	....	....	....	....	....	....	1,976.8	124.5	467.
Africa:										
Algeria	13.9	.3	5.8	14.	....	1.	....	....	31.6	....
Egypt	27.2	....	....	7.5	....	....	999.	606.8	....	101.
Tunis	4.7	....	1.5	3.2	....	....	....	....	....	....
Mauritius	....	....	....	....	....	....	....	....	....	267.
Natal	....	....	....	....	....	....	....	....	....	168.
South Africa	6.6	43.	7.5	1.2	....	3.6*	3.	....	12.4	....
Uganda	....	....	....	....	....	....	29.	....	....	....
Australia	46.8	....	....	....	....	9.7*	....	....	....	170.
New Zealand:	4.1	....	7.*	.7	....	....	....	....	....	....
Fiji	....	....	....	....	....	....	....	....	....	67.

*Crop of 1919. †Campaign 1919–20.

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Bulletin (Barbados). South America: *Revista Zootechnia* (Buenos Aires). Great Britain: *The Agricultural Gazette* (London); *Farmers' Gazette* (Dublin); *Field, Farm, and Garden* (London); *Gardeners' Chronicle* (London); *Mark Lane Express* (London); *Scottish Farmer* (Glasgow). Canada: *Journal of Agriculture and Horticulture* (Montreal); *Farmers' Advocate* (Winnipeg). France: *Journal d'Agriculture Pratique* (Paris); *Vie Agricole et Rurale* (Paris). Germany: *Deutsche Landwirtschaftliche Presse* (Berlin); *Fühling's Landwirtschaftliche Zeitung* (Leipzig). Austria: *Wiener Landwirtschaftliche Zeitung* (Vienna). Italy: *Il Coltivatore* (Casale Monferrato). Spain: *El Progreso Agricola y Pecuario* (Madrid). Australia: *Agricultural Gazette of New South Wales* (Sydney); *Queensland Agricultural Journal* (Brisbane); *Journal of the Department of Agriculture of South Australia* (Adelaide); *Agricultural Journal of the Union of South Africa* (Cape Town); *Indian Agriculturalist* (Calcutta).

AGRICULTURE, UNITED STATES DEPARTMENT OF. The department was established as a separate branch of the government in 1862. It grew out of a voluntary distribution of seeds, begun by the Commissioner of Patents in 1836. In 1839 Congress made an appropriation of $1000 "to be taken from the Patent Office fund for the purpose of collecting and distributing seeds, prosecuting agricultural investigations, and procuring agricultural statistics." Small amounts were thus drawn from that fund annually (except in 1840, 1841, and 1843) up to 1854, when the whole amount was reimbursed and a separate appropriation was made for the agricultural work of the Patent Office. That year an entomologist was employed, and in 1855 a chemist and a botanist were added to the staff, and a propagating garden was begun. After separation from the Patent Office, the chief officer of the department was styled Commissioner of Agriculture. He was not a member of the President's cabinet until 1889, when he became Secretary of Agriculture. The first Commissioner was Isaac Newton of Pennsylvania, and the first Secretary, Norman J. Colman of Missouri, who was also the last Commissioner. The succeeding secretaries have been Jeremiah M. Rusk of Wisconsin, J. Sterling Morton of Nebraska, James Wilson of Iowa (1897–1913), David F. Houston of Missouri, Edwin T. Meredith of Iowa and Henry C. Wallace of Iowa.

In recent years the activities of the department have been greatly enlarged and extended. It is conducting fundamental research in nearly every phase of crop and live stock production and marketing, and is actively studying the broad economic problems in the field of agriculture. It is supervising the expenditure of Federal funds which have made possible the greatest road building programme ever undertaken in history, by far the most extensive system for aiding farmers and their families directly through agricultural extension, and a nation-wide system of agricultural experiment stations. It is administering the national forests comprising upwards of 155,000,000 acres of land; and it is enforcing more than thirty regulatory laws for the health, safety, and advantage of the public. Its personnel numbers more than 18,600 persons. In addition to the Secretary there is an Assistant Secretary, a Director of Scientific Work, and eleven bureaus, each presided over by a chief, together with several smaller units. Its funds for the fiscal year, ending June 30, 1922, aggregated $36,404,259. Its main buildings are in Washington, but though augmented by the completion in 1908 of two four-story wings of a proposed huge departmental building at a cost of $1,500,000, accommodate only a fraction of its activities. Its equipment also includes several farms located in Maryland and Virginia, comprising over a thousand acres of land, together with smaller tracts in various parts of the country, and numerous branch offices and laboratories at important points. The department library of 159,000 books and pamphlets is considered the largest agricultural library extant.

As defined in the act of establishment, the duties of the department are "to acquire and diffuse among the people of the United States useful information on subjects connected with agriculture in the most general and comprehensive sense of that word, and to procure, propagate, and distribute among the people new and valuable seeds and plants." The present functions of the department may be classed as (1) administrative and regulatory, (2) advisory, (3) investigational, and (4) informational. With the progress of agricultural science it has become one of the greatest scientific establishments in the world. Much attention is given to disseminating the results of its investigations in both popular and technical form. In 1920 the department issued 5892 publications of which 61 were farmers' bulletins. It distributed 45,237,747 copies of its publications. Many of these were technical reports of scientific investigations in limited editions, while others were of more widespread public interest. In addition to those sent free its publications are sold by the Superintendent of Documents. The *Year Book* (edition 500,000 copies) and the series of *Farmers' Bulletins* are largely distributed through members of Congress. Monthly lists of publications of the department and the State experiment stations are sent free to all applicants. Periodical publications of the department are the *Journal of Agricultural Research, Experiment Station Record, Monthly Weather Review, Weather, Crops, and Markets*, and *The Official Record*, a house organ. The department has an extensive and varied correspondence, and conducts a press service for the dissemination of matter of immediate interest.

The present organization and main lines of work of the department are shown in table:

ORGANIZATION AND WORK OF UNITED STATES DEPARTMENT OF AGRICULTURE, 1922

Bureau or Division	Scientific and Technical Work	Administrative Work
OFFICE OF THE SECRETARY.		Supervision of all public business relating to the agricultural industry; formulation and establishment of general policies to be pursued by the various branches; appointment and supervision of department officers and employees; care of department grounds, buildings, supplies, and other property; direction of legal work of the department.

Bureau of Division	Scientific and technical work	Administrative work
WEATHER BUREAU.	Researches in climatology and meteorology, including investigations in solar radiation, seismology, and the dynamics of the atmosphere.	Forecasting weather, warnings against storms, frosts, and floods; reporting temperature and rainfall conditions for agricultural interests; collection of information on stages of water along navigable rivers, and the issue of flood warnings; collection and determination of marine intelligence for the benefit of commerce and navigation.
BUREAU OF ANIMAL INDUSTRY.	Researches on animal diseases, their control and eradication, including chemical, bacteriological, and zoological investigations; investigations in dairying, animal breeding, and feeding.	Inspection of import and export animals and vessels for their transportation; supervision of interstate movement of cattle, and inspection of live stock and their products after slaughter for food consumption; eradication of Texas fever, scabies, and other animal diseases, suppression and control of tuberculosis and hog cholera, supervision of serums prepared for use with animals; management of experimental farms at Beltsville and Bethesda, Md.
BUREAU OF PLANT INDUSTRY.	Researches in economic botany, physiology, and diseases of plants and forest trees; plant breeding; soil bacteriology, soil fertility, plant nutrition, bio-physics, acclimatization and adaptation. Studies of agriculture under dry land, irrigation and other conditions; collection and testing of seeds and plants from foreign countries.	Eradication of citrus canker and of the barberry bush; enforcement of seed importation act; purchase of seeds for distribution largely through members of Congress; care of department park and conservatorics; management of Arlington Experimental Farm, and other tracts.
BUREAU OF CHEMISTRY.	Researches in agricultural chemistry, bacteriology, and physiology, especially as relate to foods, drugs, water, leather, paper, feeding stuffs, insecticides, and fungicides; drying and dehydrating fruits and vegetables; studies of carbohydrates, fats, and proteins in agricultural plants and products.	Inspection and enforcement of the U. S. Food and Drugs Act, miscellaneous analyses for the department, testing supplies for other departments.
BUREAU OF SOILS.	Investigation, classification, survey, and mapping of soils; studies in soil chemistry and physics; investigations of fertilizer resources, improvement of existing methods of manufacture, etc.	

Bureau of Division	Scientific and technical work	Administrative work
STATES RELATIONS SERVICE.	Collection and dissemination of information regarding agricultural education and research in the United States and abroad; preparation of *Experiment Station Record;* conduct of experiment stations in Alaska, Hawaii, Porto Rico, Guam and Virgin Islands; investigations on food and nutrition of man and in home economics.	Supervision of work and expenditures of agricultural experiment stations in the United States, and of agricultural extension conducted in coöperation with the State agricultural colleges.
FOREST SERVICE.	Researches on forest conditions, forest management methods of utilization; the mechanical and physical properties of wood, and processes of manufacturing forests products.	Administration of the national forests and their economic management, including fire protection, timber sales, grazing control, reforestation, and water power uses; coöperation with States in fire protection of headwaters of navigable streams.
BUREAU OF ENTOMOLOGY.	Researches on insects affecting agriculture and forestry, including means of repression of insects injurious to crops, animals, and man; introduction of beneficial insects; promotion of apiculture.	Supervision of quarantine to prevent spread of gypsy and brown tail moths, cotton pink boll worm, Mediterranean fruit fly, and other pests.
BUREAU OF BIOLOGICAL SURVEY.	Studies on the distribution of animals, food habits of birds and mammals, experiments in fur farming; means for control or eradication of injurious animals; improvement of reindeer herds in Alaska.	Administers laws regulating the importation of foreign birds and animals; protection of game by control of inter-State trade, and of migratory and insectivorous game birds; control of injurious mammals in national forests and other public domain; supervision of national big game and bird reserves.
BUREAU OF PUBLIC ROADS.	Collection and dissemination of information regarding road construction and management; tests of road materials; experiments in irrigation, drainage, and agricultural engineering.	Administers the operation of the Federal Aid Road Act, for road construction in coöperation with the States; survey, construction, and maintenance of roads in and adjacent to national forests.
BUREAU OF AGRICULTURAL ECONOMICS	Studies of market conditions; sources of supply, transportation and storage of farm products; grading, standardizing, packing, and shipping farm products; coöperative marketing and purchasing of farm supplies; the economics of agriculture; farm management studies, including cost of production; collection of data on crop conditions with estimates of production in the United States and foreign countries.	Enforcement of Cotton Futures Act, Grain Standards Act, and Standard Container Act; administration of the Warehouse Act.

Bureau of Division	Scientific and technical work	Administrative work
Division of Publications.		Supervision of department printing and illustrations, editing of publications, especially the *Year-book;* distribution of publications.
Division of Accounts and Disbursements.		Supervision of fiscal affairs of the department.
Library.		Supervision of department library, preparation of cards for department publications for printing by Library of Congress.
Federal Horticultural Board.		Administers the act for inspection and quarantine of diseased or infested plants.
Insecticide and Fungicide Board.		Administers the act for inspection of insecticides and fungicides.

AG'RIGEN'TUM (Lat. name for the Gk. *'Ακράγας, Akragas*). The modern Girgenti, a town on the southern coast of Sicily, in lat. 37° 17′ N., and long. 13° 28′ E., founded by a colony from Gela (582 B.C.), once one of the most important places in the island. During the sixth and fifth centuries B.C., under various rulers, among them the tyrant Phalaris (q.v.) and Theron (q.v.), it rose to great power and splendor, having a population of 200,000. In allusion to its splendor and luxury an old proverb described its inhabitants as building as if they were going to live forever and eating as if they were going to die to-morrow. In 405 B.C. it was pillaged by the Carthaginians and never fully regained its power. After its colonization by Timoleon with Lucanian settlers (338 B.C.) it recovered some of its former importance, but was sacked by the Romans, 261 B.C., pillaged a second time by the Carthaginians, 255 B.C., and submitted to the Romans in the Second Punic War, 210 B.C. Though only a city of the second rank under the Romans it was still important as a center of agriculture and commerce, exporting farm products, textiles, and sulphur. It had originally, owed its wealth especially to the trade in wine and oils with Carthage. During the Middle Ages the inhabitants were obliged to take refuge further inland on account of the insecurity of the Coasts. From 825 to 1086 A.D. it was in the possession of the Saracens, from whom it was conquered by Count Roger Guiscard. The modern Girgenti had (1901) 25,024 inhabitants and is the capital of the province of the same name. The site is celebrated for its picturesqueness, consisting of a high ridge with two summits, affording a strong natural defence. The modern town is on the westernmost summit. The eastern summit is known as the Rock of Athena. The ancient walls can still be traced, and there are a number of picturesque remains of temples and other buildings of the Greek period. The best preserved are the temple of Concord and the so-called temple of Hera Lacinia; the largest is the unfinished temple of Zeus. There are ruins also of an imposing Greek theatre. It was the birthplace of Empedocles (q.v.), who was said to have framed its constitution. See Girgenti. Consult, J. Schubrig, *Historische Topographie von Akragas* (Leipzig, 1870); Koldewey and Puchistein, *Die Griechischen Tempel in Unteritalien und Sicilien* (Berlin, 1899); also works cited under Girgenti.

AG'RIMONY (Lat. *agrimonia*, for Gk. *ἀργεμώνη, argemōnē*, a kind of poppy). The common name of the genus *Agrimonia*, which includes about 15 species, and belongs to the family Rosaceæ. The common agrimony (*Agrimonia eupatoria*) is a native of Europe, and is represented in the United States by closely allied species growing in borders of fields, on waysides, etc. The plants are perennial herbs, with pinnate leaves, clusters of yellow flowers, and a calyx-tube with hooked bristles in the throat. The original species (*Agrimonia eupatoria* of Europe), like its American relatives, has a pleasant, slightly aromatic smell, and is bitter and styptic. A decoction of it is used as a gargle; the dried leaves form a kind of herb tea, and the root has some celebrity as a vermifuge.

AGRIP'PA. See under Herod.

AGRIPPA, Marcus Vipsanius (63–12 B.C.). A Roman general and statesman. Though not of high birth, through his own talents he rose to an exalted position. He first married Marcella, the niece, and then Julia, the daughter, of Octavianus (Augustus) He was eminent both in war and in peace; and as a general, counselor, and friend of the Emperor, did good service to him and to the Roman State. As a general, especially by his naval victories between Mylæ and Naulochus, in Sicily, 36 B.C., he laid the foundation for the sole dominion of Octavianus and commanded his fleet in the battle of Actium (q.v.). He was generous, upright, and friendly to the arts; Rome owed to him the restoration and construction of several aqueducts, and the erection of the Pantheon, besides other public works of ornament and utility. By his first wife he had a daughter Vipsania, the first wife of Tiberius, afterward Emperor; by Julia he had two daughters, Julia and Agrippina (q.v.), wife of Germanicus (see Germanicus Cæsar), and three sons, Gaius Cæsar, Lucius Cæsar, and Agrippa Postumus.

AGRIPPA VON NITTESHEIM, Henricus Cornelius (1486–1535). A cosmopolitan physician, philosopher, and writer, whose genius and learning had a tinge of quackery. He was born at Cologne, Sept. 14, 1486. At the age of 20 he was sent by Emperor Maximilian on a diplomatic mission to Paris. At 23 he was teaching theology at Dôle, in the Franche-Comté. Here he attacked the monks, who replied with an accusation of heresy. In 1510 he reëntered the diplomatic service, and the next year he attended, as theologian, the schismatic Council of Pisa. In 1515 he lectured at Pavia, where he received a doctor's degree in law and medicine; then, after some years in diplomatic service, he became involved once more in controversy with the Church, for his bold defense at Metz of a woman accused of witchcraft. He practiced medicine at Geneva, Freiburg, and Lyons, and, under pressure of poverty, composed a keen Latin satire on the existent state of science, *A Declamation on the Uncertainty and Vanity of the Sciences and Arts, and on the Excellence of the Word of God* (*De Incertitudine et Vanitate Scientiarum*, etc.) (1527), which furnished new occasion for malicious accusation. In 1529 he quarreled with the Queen-mother Louise of Savoy, and left Lyons for the Netherlands, to become historiographer of the Emperor Charles V, of whose reign he wrote a history. His salary was unpaid, and he was imprisoned and finally banished

from Cologne for debt. He found a brief refuge at Grenoble, where he died, Feb. 18, 1535, only to be pursued in the grave by a spiteful epitaph from his Dominican enemies. Agrippa was a man of clear sight and keen wit; but he lacked stability, seriousness, and discretion. Though engaged in controversy with the monks, he remained a Catholic. His *Works* appeared at Lyons in two volumes (1550). They are analyzed in Henry Morley's appreciative *Life of Agrippa* (London, 1856). Noteworthy are Agrippa's *De Occulta Philosophia* (1510), which gives an account of the Cabbala (q.v.) and defends magic; and *De Nobilitate et Præcellentia Faminei Sexus* (1532). The latest life of Agrippa is that of Prost, *Corneille Agrippe* (Paris, 1881).

AG'RIPPI'NA. 1. The daughter of M. Vipsanius Agrippa (q.v.) and Julia, daughter of Augustus. She was one of the most heroic and virtuous women of antiquity. She was married to Germanicus (see GERMANICUS CÆSAR), whom she accompanied in all his campaigns. Tiberius, who hated her for her virtues and the esteem in which she was held by the people, banished her to the island of Pandataria, near Naples, where she voluntarily died of hunger (33 A.D.). 2. The daughter of the last mentioned (c.15–59 A.D.), and one of the most detestable women that ever lived. In her second widowhood she induced the Emperor Claudius, her own uncle, to marry her and caused his daughter, though she was already promised to another, to be betrothed to her son Nero. In order to bring the latter to the throne, she ruined many rich and noble Romans, excluded Britannicus, the son of Claudius by Messalina, from the succession, and finally poisoned the Emperor, her husband. She then endeavored to govern the Empire through her son Nero, who was proclaimed Emperor; but, her ascendency proving intolerable, Nero caused her to be put to death (59 A.D.). She enlarged and adorned her native city, Cologne, which received from her the name of Colonia Agrippinensis.

AG'ROPY'RON (literally, field-wheat. Gk. *ἀγρός, agros*, field + *πυρός, pyros*, wheat). A genus of grasses including about 50 species, most of which are perennials. A number are native to the western United States, where they are commonly known as wheat grasses and are held to be valuable for pasturage. Other species are common to Europe and the eastern United States, where *Agropyron repens*, often called couch grass and twitch grass, is a pest to agriculture. It has a long rhizome that roots at the nodes, and if plowed or harrowed it merely breaks up into new plants. Therefore it is hard to eradicate. Upon the western ranges, however, it is deemed a good hay grass. The habits of the plants enable them to withstand drought, a characteristic that commends them in the large stock regions. Some of the valuable species are *Agropyron caninum*, bearded wheat grass; *Agropyron divergens*, wire bunch grass; *Agropyron pseudo-repens*, western couch grass; *Agropyron spicatum*, western wheat grass; and *Agropyron tenerum*, slender wheat grass. In Australia *Agropyron scabrum* is considered a good winter grass. Some of the species, as *Agropyron repens*, are recommended as binder grasses for railroad embankments and other places liable to washouts. The root stalks of *Agropyron repens*, well known in medicine under the name Radix graminis, have diuretic and aperient properties.

AGTELEK, ŏg'tĕ-lĕk, or **AGGTELEK.** A village of Hungary, in the county of Gömör, about 40 miles west-southwest of Kaschau. It is known for its remarkable stalactite cavern, called *Baradla* (steaming-place), the largest in the world after the Mammoth Cave in Kentucky. It is entered through an opening scarcely 3 feet high by 5 feet wide. It consists of a labyrinth of caverns communicating with one another, whose combined length is more than 5 miles. The largest of them is over 900 feet long and more than 90 feet in height and breadth. Many of the stalactitic formations are of singular and fantastic shape, giving rise to the names borne by some of the grottoes, such as the Cathedral, Paradise, Flower Garden, etc.

AGUA, ä'gwȧ. A South American toad (*Bufo marinus*) ranging from the Antilles to Argentina. It is the largest toad known, being sometimes 8 inches long, the skin dark brown and rough with warty glands. The voice of the male is a loud, snoring bark. It became a pest a few years ago in Jamaica, where it was introduced in 1844 as an enemy to the rats, which were devouring the sugar-cane. It multiplied excessively and, although it destroyed young rats, became a nuisance by its numbers, nocturnal bellowings, and destruction of groundbirds, chickens, and eggs. It has since become less numerous and troublesome. See illustration on Colored Plate accompanying TOAD.

AGUA, VOLCÁN DE, vōl-kän' dā ä'gwȧ. A volcano in southern Guatemala, Central America (Map: Central America, B 3). It is over 12,000 feet high, and has a crater about 90 feet in diameter, from which streams of hot water are occasionally ejected, whence its name. Northwest of Agua are situated the volcanoes of Pacoya and Fuego. The old town of Guatemala was destroyed in 1541 by the hot-water eruption of Agua.

AGUADA, ä-gwä'dȧ. A village in the northwestern part of Porto Rico near the shore of Aguadilla Bay. It was founded in 1511 and claims to be the oldest settlement on the island. Tradition says that Columbus landed here in 1493. The town contains churches and schools and is surrounded by excellent farm land. The raising of sugar-cane is the most important industry. The hurricane in 1899 wrought great havoc in the neighborhood. Pop., 1910, 909.

AGUADILLA, ä'gwä-dē'lyȧ. The chief town of the municipality of the same name (pop., 1910, 21,419), situated on the western coast of Porto Rico (Map: Porto Rico, A 2). It has a fine bay, contains an old church and a fort, and is famous for its fruits and flowers. Coffee, cocoanuts, sugar, and tobacco are grown and exported, and rum is distilled. It was founded in 1775 and unsuccessfully attacked by the British in 1797. Pop., 1899, 6425; 1910, 6135.

AGUADO, ä-gwä'dō, ALEJANDRO MARÍA, MARQUIS DE LAS MARISMAS DEL GUADALQUIVIR (1784–1842). A celebrated Spanish financier of Jewish descent. He was born in Seville, and in Paris became one of the wealthiest bankers of modern times. During the Spanish War of Independence he fought with distinction with those who supported Joseph Bonaparte. Exiled in 1815, he went to Paris and engaged in the Cuban and Mexican trade and in banking. Beginning in 1823, he negotiated four Spanish loans, thus saving Spain from bankruptcy. In return, Ferdinand VII ennobled him and gave him mining and other concessions. He was

naturalized in France in 1828, and at his death left a fortune of more than 60,000,000 francs and a splendid collection of pictures.

AGUARA, ä'gwâ-rä', or **GUARA,** gwâ-rä' (native name). A Brazilian native name confusingly applied in books to various South American animals, perhaps most strictly to the crab-eating dog (*Canis cancrivorus*) of Guiana. In the valley of the Rio de la Plata Azara's fox-dog is called "Aguará chay," and the maned wolf "Aguará guazu." See Fox Dog; Maned Wolf.

AGUAS BUENAS. An inland village in the east central part of the island of Porto Rico, 14 miles south of San Juan. There are three interesting caves within the confines of the village and excellent coffee and fruit farms in the environs. Pop., 1899, 1309; 1910, 1166.

AGUAS CALIENTES, ä'gwâs kä'lê-ĕn'tâs. An inland State of Mexico bounded by the State of Zacatecas on all sides except the south and southeast, where it is touched by the State of Jalisco. It is one of the smallest States in the Republic (area, 2969 square miles), but its excellent climatic and rainfall conditions make it an important farming and grazing district. Gold, silver, iron, lead, and copper are mined. Pop., 1910, 120,511.

AGUAS CALIENTES (Sp. Hot Springs). The capital of the State of Aguas Calientes, 300 miles northwest of Mexico City (Map: Mexico, H 7). It is situated on a plateau 6000 feet above sea level and is the point of intersection of the roads from Mexico to Sonora and Durango and that from San Luis Potosí to Guadalajara. It is the distributing centre of the State, the principal local manufactures being tobacco and pottery. There are also tanneries, distilleries, and cotton mills, and the National Railway shops are located here. Copper, lead, and silver bullion, and hides are exported to the United States. It is the scene of a great fair, held at Christmas time each year, and lasting two weeks. The numerous hot springs of the surrounding district give the town its name. Pop., 1900, 35,052; 1910, 45,198.

A'GUE (Fr. *aigu,* from Lat. *acuta, febris,* acute, violent fever), *Febris intermittens.* The common name for intermittent, or malarial, fever. A paroxysm of ague is composed of three stages. In the first, a cold sensation creeps up the back and spreads over the body; the patient shivers, his teeth chatter, his knees knock together; his face, lips, ears, and nails turn blue; he has pains in his head, back, and loins. During this stage the temperature rises to 102° or even to 105° F. This condition is succeeded by flushes of heat, the coldness gives place to warmth, and the surface regains its natural appearance. The warmth continues to increase, the face becomes red and turgid, the head aches, the breathing is deep and oppressed, the pulse full and strong. The temperature ranges from 103° to 105° F. In the third stage the skin becomes soft and moist, the pulse becomes normal, a copious sweat breaks from the whole body, the temperature falls, and the patient generally sleeps.

These paroxysms occur at regular intervals. The interval between them is called "an intermission." When they occur every day, the patient has *quotidian* ague; every second day, *tertian;* and when they are absent for two days, *quartan.* There is a *double quotidian* form, in which there are two complete paroxysms in every 24 hours. See Malaria and Malarial Fever; Intermittent Fever.

AGUE-CHEEK, Sir Andrew. A delightful old simpleton in Shakespeare's *Twelfth Night,* who fears that "beef hath done harm to his wit." He is, however, "old in nothing but understanding" and joins in the dance and song "Which is the Properest Day to Drink?" with the zest of a young man.

AGUESSEAU, à'ge-sō', Henri François d' (1668–1751). A distinguished lawyer and chancellor of France, pronounced by Voltaire the most learned magistrate that France ever possessed. He was born at Limoges, in the department of Haute-Vienne. He received his earliest education from his father, and, devoting himself to the study of law, became *avocat-général* at Paris in 1690, and at the age of 32, *procureur-général* of the *Parlement.* While holding this office he effected many improvements in the laws and the administration of justice. A steady defender of the rights of the people and of the Gallican church, he successfully opposed the decrees of Louis XIV and the Chancellor Voisin in favor of the papal bull *Unigenitus* (q.v.). During the regency he became Chancellor, but after a year (1718) fell into disgrace through opposing Law's system of finance, and retired to his country seat at Fresnes. Returning to office in 1720 he endeavored to force the *Parlement* to register the bull, but nevertheless he was exiled a second time for his opposition to Cardinal Dubois. In 1727 he was recalled to the office of Chancellor, in which he remained till 1750. His works have been published in 13 volumes (Paris, 1759–89, 1819); *Lettres inédites* (Paris, 1823). Consult Monnier, *Le Chancelier d'Aguesseau* (Paris, 1864); Ingold, *Le Chancelier d'Aguesseau et l'Oratorie* (Paris, 1879).

AGUILAR, ä'gê-lär', Grace (1816–47). An English writer of Jewish parentage. She was born at Hackney and first became known by two works on her own religion, *The Spirit of Judaism* (first published in America, 1842) and *The Jewish Faith* (1846), in the former of which she attacked the formalism and traditionalism of Judaism and insisted on its spiritual and moral aspects. She also wrote much fiction, more or less of a religious character, of which only the most popular story, *Home Influence* (1847, and about 30 subsequent editions), was published during her lifetime. The further titles include *A Mother's Recompense* (1850), *The Vale of Cedars* (1850), and *The Days of Bruce* (1852).

AGUILAR DE LA FRONTERA, à'gê-lär' da la frŏn-tä'rä. A city of Andalusia, Spain, in the province of Cordova, occupying the summits and slopes of four low hills on the left bank of the Cabra, an affluent of the Genil, 26 miles south-southeast of Cordova (Map: Spain, C 4). The surrounding country is very fertile and abounds in vineyards and orange groves. All the houses of the Plaza Nueva, one of the principal squares of the city, are of three stories. Aguilar is remarkable for the whiteness of its buildings and the cleanliness of its streets. It has a fine parish church, a monastic church containing examples of many famous Spanish masters, and a dismantled castle, which was a stronghold on the Moorish frontier. The city has had an interesting history and at present belongs within the domains of the Duke of Medinaceli. The chief trade is in oil, wines,

grain, fruits and garden truck of all kinds. There are factories of brandies, liqueurs, chocolate, wax, chalk, soap, and plaster, and electrical plants. There are pasture lands and salt springs in the neighborhood. Pop., 1900, 13,311; 1910, 12,637.

AGUILAR Y CORREA, Antonio, Marqués de la Vega de Armijo (1824–1909). Spanish statesman and diplomat. Born in Madrid, he studied law in the universities of Seville and Madrid, and in 1855 became prominent in politics, associating himself with O'Donnell in the party called the *Unión liberal.* His first official position was that of Civil Governor of Madrid, which he used to make an active campaign against gambling and prostitution. This position he resigned in order to become successively Minister of Public Works and Minister of the Interior, in both of which positions he rendered important service. At the downfall of the *Unión liberal,* June 22, 1866, he worked for the success of the revolution, and when it had succeeded he helped in a monarchical manifestation. The Marqués was a member of the *Cortes constituyentes,* as representative of the province of Cordova. In 1873 he was sent as Ambassador of Spain to the French Republic, where he did important work in frustrating the plans of the Carlists on the frontier. After the restoration he recognized Alfonso XII, and took a seat in the Cortes, in the Centre group, which later affiliated with the Constitutionals. Under the latter he became Minister of State and accompanied Alfonso XII on his journey to foreign countries. In 1883 he passed to the opposition, and in 1884 was elected *Concejal* for Madrid. Upon the death of Alfonso XII his party returned to the government, and Vega de Armijo was elected Deputy for Madrid and for Lucena. In 1889 he was Deputy for Jetafe and became Minister of State for a year, when his party fell from power. Late in 1892, under the Presidency of Sagasta, he received for a third time the portfolio of the Department of State, which he resigned in April, 1893, in order to be elected, in May, 1893, President of the Congress, a post which he held until the fall of Sagasta in March, 1895. In July, 1898, he was elected President of the Congress of Deputies. Aguilar y Correa was a member of the Real Academia de Ciencias Morales y Políticas and the Real Academia de la Historia, and during the last years of his life, despite his great age, he was Director of both of them, while continuing his activities in politics.

AGUILAS, ä'gê-lâs. A seaport town of southern Spain (Map: Spain, E 4). It is situated in the province of Murcia, 37 miles southwest of Cartagena, on the Aguilas-Lorca-Murcia Railway. It has a good harbor, and its port forms the chief outlet for the mineral and agricultural products of the surrounding country. It imports coal and contains several smelting works. Pop., 1900, 15,753; 1910, 15,967.

AGUILERA, ä'gê-lā'rà, Ventura Ruiz (1820–81). A Spanish lyric poet, called "the Spanish Béranger." He was born at Salamanca and in 1843 went to Madrid to study poetry and political journalism. Here he occupied important official positions under the liberal ministries. The journals edited or controlled by him were characterized by bold ideas and keenness of criticism; and in these, as also in his *Satyras* and in the poems entitled *Ecos Nacionales,* he endeavors to arouse the masses to a sense of their national dignity. His most important works are the collections of poems entitled *Elegias* (1862); *Armonías y cantares* (1865); *La Arcadia moderna;* and *Leyenda de nochebuena* (1872). Several collections of his prose writings, which consist mostly of short novels, have been published. An edition of his complete works appeared at Madrid in 1873, and selections from his poems were published under the respective titles, *Inspiraciones* (1866), and *Poesías* (1880).

AGUINALDO, ä'gê-näl'dô, Emilio (1870—). The leader of Filipino insurrections against Spain and the United States. A Chinese mestizo of Chinese and Tagolog parentage, he was educated, first, in his native town and afterward at the College of San Juan de Letrán and the University of St. Thomas in Manila. At this institution, which is conducted by Dominican friars, he remained for four years. In course of time he became *gobernadorcillo,* or mayor of Cavité Viejo, and was acting as such upon the outbreak of the insurrection in August, 1896. Owing to his prominent participation in this uprising, he went to Hong Kong, consenting to a permanent exile from the islands on condition of a large payment on the part of Spain. In 1898 he returned to Manila, for the avowed purpose, it was said, of aiding the United States in the war against Spain, and immediately after the battle of Manila organized an insurrection, which soon assumed proportions unparalleled in the history of the archipelago. In this movement he displayed great ability and extraordinary personal magnetism. In 1899 he assumed the offensive against the United States, beginning operations by an attack upon Manila, February 4–5, in which he was unsuccessful. During 1899 there were a number of severe engagements. Finally, the native troops were so hard pressed by the Americans that Aguinaldo, after repeatedly removing his capital, was compelled to flee to the mountains. Here the fighting was continued with varying success until March 23, 1901, when Aguinaldo was captured by Brigadier-General Frederick Funston at Palawan, province of Isabella, Luzon, and brought to Manila. On April 19, 1901, he formally took the oath of allegiance to the United States, and retired from public life. Wildman, *Aguinaldo* (Boston, 1901); Philippine Information Society, *Publications and Facts about the Filipinos* (Boston, 1900–01); Turot, *Les Hommes de Révolution; Aguinaldo et les Philippins* (Paris, 1900).

AGUIRRE, â-gēr'râ, Lope de (c.1507–61). A Spanish explorer in Peru, known as the "traitor" and "tyrant." He was born in Oñate, in the province of Biscay, and came to America at an early age. He was in Peru during the period of the insurrections which followed the subjugation of the Incas and took an active part in most of them. The turbulent spirits who survived these repeated uprisings were finally influenced to join an expedition to search for El Dorado under Pedro de Urzúa. They crossed the Andes and started down the head waters of the Amazon in the early summer of 1560. Aguirre brought about the death of Urzúa and gained great influence over Fernando de Guzmán, Urzúa's successor. He then forced his companions to renounce their allegiance to Spain and to recognize Guzmán as King of Tierra Firme and Peru. He determined to abandon the search for El Dorado and return to Peru, con-

quer that country, and establish an independent kingdom there. Shortly afterward the newly made King opposed some of his plans, and Aguirre thereupon murdered him, together with his closest friends. Continuing down the Amazon, Aguirre made his way by one of that river's tributaries to the Orinoco, where he built large vessels, in which he sailed to the island of Margarita. He was forced, however, to abandon the plan of fighting his way across Panama and to Peru. Instead, he landed on the coast of Venezuela, marched inland, and was brought to bay and killed at Barquisimeto, early in November, 1561. His last act was to kill his own daughter with a poniard. In a letter addressed to King Philip II he declared that he had killed 20 persons during the voyage down the Amazon, and the recorded list of those he ordered murdered is more than 60, including women and priests.

Bibliography. Simon, *The Cruise of the Traitor Aguirre*, translated by Markham and Bollaert, chap. xi, Hakluyt Society Publication No. 28 (London, 1861). This account of the expedition was derived from members of the party. Consult also Bandelier, *The Gilded Man* (New York, 1893), and F. J. Vergara y Velasco, *Nueva Geografía de Colombia* (Bogotá, 1902).

AGUJA, ä-gōō'hä (from the Spanish *aguja*, a needle or bodkin). A large, voracious garfish (*Tylosurus fodiator*) of the coast of western Mexico, held in great dread by fishermen. The name (also spelled *agujon*) is extended to various related species of the West Indies and neighboring coasts. See NEEDLEFISH.

AGULHAS, ä-gōō'lyäs, or ä-gŭl'äs, CAPE. (Portug. needles.) The most southern point of Africa, about 100 miles east-southeast of the Cape of Good Hope, in lat. 34° 51′ S., long. 19° 55′ E., with a lighthouse erected in 1849 at an elevation of 52 feet (Map: Cape Colony, F 9). To the south of it lies the **Agulhas Bank,** which extends along the southern coast of the province of the Cape of Good Hope for a distance of over 400 miles from the Cape to Algoa Bay. To the south-southeast of Cape Agulhas it attains its maximum breadth, about 180 miles. It abounds in marine life, and its fisheries yield a sufficient supply for export.

AGULHAS CURRENT. A warm current forming the southern continuation of the Mozambique current, an offshot, between Madagascar and the coast of Africa, of the circulatory current system of the south Indian Ocean. As such it is considered to begin at 30° S. lat. off the coast of Natal; it flows southwestward along the coast of South Africa to Cape Agulhas (whence its name), where it is deflected to the southeast by the cold eastward-flowing West Wind Drift.

AGUSAN, ä-gōō'sän. Important river of the island of Mindanao, Philippines. It rises on the north slope of Tagnibay Mountain and flows almost due north. Throughout a total length of 156 miles it drains the valley of Surigao, which is 40 to 50 miles wide. In its flow to the sea it passes through a chain of lakes—Sadocun, Dagun, and Pinayat being the most important—and finally empties into Batuan Bay. The town of Batuan is at its mouth.

AGUSTIN, ä'gōōs-tēn'. See ITURBIDE, AGUSTIN DE.

AGUSTINA, ä'gōōs-tē'nä (?–1857). The "Maid of Saragossa." A *vivandière* in the Spanish army. She distinguished herself during the siege of Saragossa (1808–09) by heroic participation in several severe encounters with the French. Once she snatched the fuse from a falling cannonier and fired the gun at the enemy, gaining by this act the name of "La Artillera." She was made sub-lieutenant in the Spanish army and presented with many decorations. Byron sings her praises in *Childe Harold* (Canto i, 54–56).

AGUTAINO, ä'gōō-tī'nō. A christianized Malay people living on Agutaya, one of the Cuyo Islands. See PHILIPPINES.

A'HAB (Heb. father's brother). King of Israel, c.872–851 B.C., the son and successor of Omri (q.v.). The story of his reign (1 Kings xvi. 29; xxii. 40) is told at greater length than that of any other monarch in Israel. In the opinion of many students it is derived from two different sources—one representing the prophetic attitude, the other a patriotic admiration of Ahab's courage and vigorous policy by which he succeeded in checking the advance of the Aramaic kingdom of Damascus and even the power of Assyria. Not only did Ahab hold Barhadad (q.v.) at bay, but he retained through half of his reign control over Moab, as the inscription of Mesha of Moab (see MOABITE STONE) testifies. These campaigns were waged against Damascus. In the first two Ahab was successful. In the interval between the second and the third, Ahab joined forces with Barhadad and a number of other Syrian kings to resist the attack of Shalmanezer III (860–825 B.C.). The latter, in his monolith inscription, mentions Ahab and estimates the contingent furnished by him at 2000 chariots and 10,000 soldiers, and the combined forces at 3940 chariots, 1900 horsemen, 62,900 infantry, and 1000 camels. The battle was fought at Karkar on the Orontes, and Shalmanezer III claims to have gained a victory. There is not a word, however, in any of his accounts, of plunder, of tribute, or of extension of Assyrian territory, so that some Assyriologists think that Shalmanezer actually suffered a defeat. Some time after this battle Ahab's relations with Barhadad became again hostile, and he finally combined with Jehoshaphat, King of Judah, in a movement to crush Damascus. But the allies were defeated, and Ahab himself fell in the battle of Ramoth Gilead (c.851 B.C.). He was married to Jezebel (q.v.), daughter of Ethbaal, King of Tyre (see Josephus, *Ant.* viii, 13, 1). Like Solomon, he built for his Queen a sanctuary to her god, Melkart, all the more readily as she had been a priestess herself in Sidon. That Ahab did not regard this act as hostile to Yahwe is shown by the fact that their children bear names in which Yah or Yaho appears as an element (Jehoram, Ahaziah, Athaliah). But in the eyes of a jealous Yahwe prophet like Elijah (q.v.) such conduct seemed reprehensible. The story of the struggle between the King and the prophet (1 Kings xvii–xix) is embellished with many incidents intended to bring out the superiority of Elijah and to present Ahab in an unfavorable light. While it would be unfair to regard him as a wicked king, it must be admitted that he was probably guided by political more than by religious considerations in his various acts. His generosity in dealing with Barhadad after the battle of Aphek (q.v.), so severely censured by a Yahwe prophet (1 Kings xx. 35), was no doubt due in part to his appreciation of the danger to both threatening from Assyria. Whether the severest charge brought

against him, his acquiescence in a judicial murder of Naboth (q.v.), is well founded, may be seriously questioned. There is much that seems highly improbable in the story, notably the part taken by Jezebel and the elders of Jezreel. Naboth having met with a violent death, and Ahab's desire for his vineyard being known, the King was naturally accused of the murder, and the responsibility was subsequently shifted to the foreigner. In course of the excavations undertaken by Harvard University at Samaria in 1908–10 the walls of the palace built by Omri and greatly enlarged by Ahab on the west and the south were unearthed. An alabaster vase was found bearing the name of Osorkon II, of Egypt (c.920–891 B.C.), which may have been brought to Samaria in the time of Omri or Ahab. Over 70 potsherds were also found inscribed with ink, dated in various years of the King's reign. They probably come from Ahab's time, but his name does not appear on any of them. Consult the histories of Israel by Stade (1887); Guthe (1899); Kittel (2d ed., 1909–12); Wellhausen (6th ed., 1907); Rogers, *Cuneiform Parallels to the Old Testament* (1912, pp. 288 ff.); Reisner in *Harvard Theological Review* (1900, pp. 248 ff.); Lyon, *ibid.* (1909, pp. 102 ff.; 1911, pp. 136 ff.); Vincent in *Revue Biblique* (1911, pp. 125 ff.); Abel, *ibid.* (1911, pp. 286 ff.).

AHANTA, ȧ-hän'tȧ. A portion of the British colony of Gold Coast in West Africa, formerly belonging to the Dutch, who founded the settlement of Axim.

AHASUERUS, ȧ-hăz'ū-ē'rŭs. The name of Xerxes (485–465 B.C.) in the Book of Esther. It is the Latinized form of Heb. Achashwerosh, which occurs in Babylonian inscriptions as Akhshiwarshu, Akhshiyarshu, and Khishiarshu. In Dan. ix. 1, it appears as the name of the father of Darius the Mede, who received the kingdom after Belshazzar, the son of Nebuchadnezzar and Chaldæan King, had been slain (v. 30; vi. 1). From contemporary inscriptions we know that Belshazzar was not the son of Nebuchadnezzar and not a Chaldæan King, but the son of Nabunaid, the last King of Babylon, who was overthrown by Cyrus in 539 B.C. Darius the Mede has no place in history. In Tobit xiv. 15 Nineveh is said to have been destroyed by Nebuchadnezzar and Ahasuerus. Neither of those kings reigned when Nineveh was destroyed by Nabopolasar and Cyaxeres. See XERXES.

AHASUERUS. 1. The name of the *Wandering Jew* (q.v.), according to one legend. 2. The title of a drama by Edgar Quinet (published 1833) based on the same story.

A'HAZ (Heb. he supports). Son of Jotham, and twelfth King of Judah (c.735–715 B.C.). His rule was marked by disturbances, conflicts with surrounding nations, and innovations in religious rites. Early in his reign Pekah, King of Israel, and Rezin, King of Damascus, sought to place upon the throne of Judah Ben Tabel, probably a Damascene prince. They approached Jerusalem and probably laid siege to the city, but did not take it. On this occasion Ahaz was told by the prophet Isaiah not to fear these kingdoms, since the real danger threatened from Assyria (Isa. vii; 2 Kings xvi. 3). Incursions were made by the Edomites, to whom Ahaz was forced to give up the important city of Elath on the Gulf of Akabah (q.v.). Ahaz asked help of Tiglath-pileser IV, King of Assyria (2 Kings xvi. 7; 2 Chron. xxviii. 16–22), who drove out the invaders, but took heavy toll from Ahaz, compelling him to appear at Damascus as a vassal. While there, Ahaz saw an altar and ordered Uriah, the high priest, to build one like it. On this Ahaz made sacrifices. He also made various changes in the temple service, sacrificed to Syrian deities, and caused his son to pass through the fire. Isaiah (chap. ii–v) furnishes a sad picture of conditions prevailing in Judæa in the days of Ahaz: frivolity, perversion of justice, avarice, oppression, besides infidelity toward Yahwe, being among the charges brought by the prophet against the King and his court. Yet, at the close of his reign, Isaiah contrasts the peace enjoyed by the poor of Yahwe's people with the heavy punishment meted out by Assyria on the Philistine cities. His name appears on the Assyrian monuments under the form Ya-u-ha-zi, from which the conclusion seems justified that the full name of the King was Jehoahaz ('Yahwe supports').

A'HAZI'AH (Heb. Yahwe supports). The name of two kings mentioned in the Bible. 1. The son and successor of Ahab, and eighth King of Israel (c.851–849 B.C.). On his accession the Moabites revolted, refusing to pay tribute, and before he could make preparations to go against them, he fell from a window of his palace. He sent messengers to the god Baal Zebub of Ekron to know the result of his injuries, but the messengers met Elijah, the prophet of Yahwe, on the way, who sent them back with word that the King would surely die (2 Kings i). Upon his death Joram, his brother, came to the throne. 2. Son of Jehoram and of Ahab's daughter, Athaliah (2 Kings viii. 25–27), the sixth King of Judah (c.844–843 B.C.). He is called Jehoahaz in 2 Chron. xxi. 17. Azariah, in 2 Chron. xxii. 6, is an error in transcription, as the Greek version shows, which has Ahaziah. He took part with his uncle, Jehoram, of Israel, in the latter's campaign against Hazael, King of Syria, in which the two kings were defeated (2 Kings viii. 28–29; 2 Chron. xxii. 5). Ahaziah was soon after slain by Jehu (842 B.C.) (2 Kings ix. 27; 2 Chron. xxii. 7–9), after a reign of only one year (2 Kings viii. 26; 2 Chron. xxii. 2).

AHEAD'. See BEARING.

AHENOBARBUS. See AENOBARBUS.

AHIMELECH, ȧ-hĭm'ē-lĕk (Heb. brother of the king). A priest who, according to 1 Sam. xxii. 11, was the son of Ahitub. Some scholars are of the opinion that he is identical with Ahijah, who is also spoken of as a son of Ahitub (1 Sam. xiv. 3), as melek, 'king,' being a title of Yahwe, is used interchangeably with *Jah*. When David, warned by Jonathan, fled from Saul, Ahimelech, at Nob, fed him with the shewbread, gave him the sword of Goliath, and assisted him to escape (1 Sam. xxi. 1–10). For this offense Saul put Ahimelech and his whole priestly household to death, only one man, Abiathar, escaping (1 Sam. xxii. 11–20).

AHITH'OPHEL. A native of Giloh, in Judæa; Privy Counselor of David, and probably grandfather of Bathsheba (2 Sam. xi. 3; xxiii. 34). He was trusted implicitly by David, as well as by Absalom, whose revolt he joined (2 Sam. xvi. 23; xv. 12). It was by his advice that Absalom took possession of David's concubines and thereby laid claim to the throne. Hushai, "David's friend," also counseled Absalom, but with a view to helping David (2 Sam. xvi. 16; xvii. 16), and his counsel of delay prevailed over Ahithophel's plan of quick action (2

Sam. xvii. 1–14). Hereupon Ahithophel, in despair, went home, put his household in order, and hanged himself (2 Sam. xvii. 23). The meaning of his name is uncertain, and there is some doubt about the accuracy of its transmitted form.

AHLFELD, äl'fĕlt, JOHANN FRIEDRICH (1810–84). A Lutheran pulpit orator. He was born at Mehringen, Anhalt; studied at the University of Halle (1830–33); taught and preached in various places till in 1847 he became pastor in Halle, whence in 1851 he went to the Nicolaikirche in Leipzig. There, till his resignation in 1881, he wielded a great spiritual influence as a leading evangelical. He died in Leipzig. He published several volumes of sermons. Consult his *Life* (Halle, 1885).

AHLGREN, äl'grĕn, ERNST, pen name of VICTORIA MARIA BENEDICTSSON, *née* BRUZELIUS (1850–88). A Swedish author. She was born at Domme, near Trelleborg (Scania) and in 1871 married Christian Benedictsson, postmaster of Hörby. In consequence of illness and of great worry, she committed suicide at Copenhagen, whither she had gone in 1888. Her collection of novels, entitled *Från Skåne* (1884), and the satirical narrative *Penningar* ('Money,' 1885; 2d ed., 1889) soon made her name known favorably throughout Sweden, where she was afterward regarded as the most distinguished among the younger woman writers. Her works are characterized by marked simplicity of style and a powerful and artistic description of life. Among them may be mentioned *Fru Marianne* (1887; 2d ed., 1890); *Folklif och Små Berättelser* (1888); *Berättelser och Utkast* (1888); *Romeos Julia,* a drama (1888); *Final,* a drama (in collaboration with A. Lundgård, 1885). Consult Ellen Key, *Ernst Ahlgren, Några Biografiska Middelanden Stockholm* (1889).

AHLQUIST, äl'kvĭst, AUGUST ENGELBERT (1826–89). A Finnish philologist and poet, professor of Finnish literature at Helsingfors, where he had studied philosophy and philology. He was distinguished for ethnographic investigations, especially of the dialects and races of the Ural-Altaic family. In 1847 he started a Finnish journal (*Suometar*). He translated some of Schiller's works into Finnish and wrote poems. He traveled extensively through northern Russia and western Siberia to study the customs and languages of their inhabitants. The results of these observations he embodied in his most important original works: *Wotish Grammar* (1855); *An Attempt at a Moksha-Mordwinian Grammar* (1861); *The Structure of the Finnish Language* (1875).

AHLWARDT, äl'värt, HERMANN (1846–1914). A German politician and anti-Semitic agitator. He was born at Krien, Prussia, and about 1890 joined the anti-Semitic movement. He published a number of writings under the titles of *Der Verzweiflungskampf der Arischen Völker mit den Juden* (1890); *Eid eines Juden* (1891); *Jüdische Taktik* (1892); and *Judenflinten* (1892), in which last-mentioned pamphlet he declared that Ludwig Löwe & Co. had furnished worthless guns to the army and had been hired by the *Alliance Israélite* to cheat the German government. These charges were declared by Chancellor von Caprivi to be false, but the popularity of the agitation steadily increased; and Ahlwardt was elected deputy to the Reichstag in 1892 and reëlected in 1893. He visited the United States in 1895, for the purpose of establishing an anti-Semitic propaganda here, but failed of his object.

AHLWARDT, WILHELM (1828–1909). A German orientalist. He studied Oriental languages at Greifswald, his native city, and at Göttingen, and afterward devoted himself to an analytical investigation of the Arabic manuscripts in the libraries at Gotha and Paris. He became second librarian and professor of Oriental languages at the University of Greifswald in 1861. The following are a few of his more important works on Arabic philology and literature: *Ueber Poesie und Poetik der Araber* (1856); *The Divans of the Six Ancient Arabic Poets* (1870). He also edited the following works by Arabic authors: *Elfachri Geschichte der islamischen Reiche . . . von Ibn Ettigthaqa* (1860); *Chalef Elahmar's Kasside* (1859); *Diwan des Abu Nowas* (1861); and *Sammlungen alter arabischer Dichter* (3 vols., 1902–03). He catalogued the Arabic MSS. in the Berlin Royal Library (in general catalogue, 10 vols., 1887–1900).

AHMADABAD, ä'mâ-dâ-bäd' (for derivation, see ABAD). The chief town in the district of the same name, in the presidency of Bombay, India, situated on the left bank of the Sabarmutti, 309 miles by rail north of Bombay, in lat. 23° N., long. 72° 36′ E. (Map: India, B 4). It was founded in the year 1412, on the site of the ancient Ashawal, by Ahmed or Ahmad Shah, and in 1818 came under British rule. It was famous for its manufacture of rich fabrics of silk and cotton, articles of gold, silver, steel, and enamel, industries still carried on, and to which may be added the manufacture of paper shoes and superior pottery. It has recovered much of its extensive trade in indigo, cotton, and opium. It was formerly one of the largest and most magnificent capitals in the East, the centre of Oriental art, and its architectural relics are splendid, even in the midst of decay. The Jumna or Juma'ah Masjid, or great mosque, rises from the centre of the city, and is adorned by two superbly decorated minarets. Its domes are supported by lofty columns, regularly disposed, and the concave of these cupolas is ornamented with mosaic and fretwork. The pavement is of the finest marble. The mosque of Sujaat Khan and the modern Jain temple of Seth Hathi Sinh are extremely beautiful. There is likewise an ivory mosque, so named from the circumstance that, although built of white marble, it is lined with ivory, and inlaid with a profusion of gems, to imitate natural flowers, bordered by a silver foliage on mother-of-pearl. There are also the Fire Temple and the Tower of Silence of the Parsis. Ahmadabad once abounded in gardens, and there were aqueducts, reservoirs, etc. The city walls, built in the fifteenth century, which had become very dilapidated, were repaired in 1834, and a system of water works was installed. There are a number of educational institutions located here, the most important being Rat Guza College. Pop., 1891, 148,400; 1901, 185,889; 1911, 216,777.

AHMADABAD. A district of Bombay (q.v.), British India (Map: India, B 4). Area, 3824 square miles. Pop., 1911, 827,809.

AH'MED, PRINCE. In the *Arabian Nights,* a favorite of the good fairy Pari-banou, by whom he was given a tent which could shelter a whole army and yet could be folded up and put in one's pocket. The same fairy gave him also the apple of Samarcand, which was a cure for all diseases.

AHMED äн′mĕd, or **ACHMET,** äк′mĕt, VEFIK PASHA (1818–91). A Turkish statesman, born in Constantinople and educated in Paris. His historical and statistical researches appeared in *Salaamé*, an annual of the Ottoman Empire begun in 1847. He was intrusted by the Porte with many important missions abroad and was President of the Council and Minister of the Interior at the conclusion of the Treaty of San Stefano (1878). He did much to acquaint his countrymen with French literature by his admirable translations of the plays of Molière and others. He also translated parts of Schiller and Shakespeare into Turkish.

AHMED IBN HANBAL. See IBN HANBAL.

AHMED KHAN, kän *or* kän. See MONGOL DYNASTIES.

AHMED MIRZA (1898—). A Shah of Persia, who succeeded his father Mohammed Ali (q.v.) on the latter's deposition from the throne on July 16, 1909. He was the second son of Mohammed, and seventh in the Kadjar line of ruling princes. Although not the eldest son, he was nominated heir-apparent by his father because the mother of his elder brother was not of the Kadjar, or royal line. On account of his youth when he ascended the throne, as well as by reason of the troubled condition of affairs in Persia (q.v.), he did not rise to be much more than a figure-head in the government.

AHMEDNAGAR, ä′mĕd-nŭg′ŭr, or **AHMEDNUGGUR** (Skr. *nagara*, city). A large town in the presidency of Bombay, India, situated 64 miles northeast of Poona, in lat. 19° 6′ N., long. 74° 46′ E., on a branch of the Great Indian Peninsular Railway (Map: India, B 5). It was founded by Ahmad Nizam Shah late in the fifteenth century and became a splendid and populous city. Although it was devastated by incessant wars, relics of its former magnificence are to be seen in many fine specimens of Moslem architecture. It was noted for the weaving of carpets, but the manufacture of silks, cottons, brass, and copper utensils has to a great extent superseded this industry. The city is surrounded by an earthen wall, and is guarded by a fort half a mile to the east. The houses are mostly built of sun-dried brick. It has a good water supply, conveyed by means of aqueducts. The city was taken by the British under General Wellesley in 1803 and came under British rule in 1817, since when it has regained much of its former prosperity. Several places in India bear the same name. Pop., in 1901, 42,032; in 1911, 42,940.

AHMEDNAGAR. A district of Bombay (q.v.), British India (Map: India, B 5). Area, 6613 square miles. Pop., 1911, 945,305.

AHMED SHAH, äн′mĕd shä (1724–73). Ameer of Afghanistan from 1747 to 1773. He was hereditary chief of the Abdali tribe and held a command in Nadir Shah's cavalry until the latter's assassination (1747), when Ahmed went to Afghanistan, changed the name of his tribe to Durrani, and was accepted as their ruler by the Afghan chiefs at Kandahar. He was a warlike ruler and accumulated great wealth, including the famous Kohinoor diamond. He captured Lahore in 1748 and conquered Kashmir, and in 1756 defeated the Great Mogul and took and sacked Delhi. His conquests introduced rebellion and disorder into the Mogul Empire. He defeated the Sikhs and Mahrattas at Panipat, Jan. 6, 1761, but was finally obliged to yield the Punjab.

AHMED TEWFIK, PASHA (1843—). A Turkish diplomat. He served in the army and then entered the diplomatic service, becoming Minister at Athens in 1882, Ambassador at Berlin in 1884, and Minister of Foreign Affairs from 1895 to 1899. Under the new régime he was again Minister of Foreign Affairs from July, 1908, to February, 1909, and Grand Vizier for a short time in the latter year.

AHMES, ä′mĕs, or **AAHMESU,** ä′me-sōō. An Egyptian scribe, who lived before 1700 B.C. He wrote *Directions for Obtaining the Knowledge of all Dark Things*. This work was not original with him. It was copied from an older treatise, dating from about 2500 B.C. It is important as one of the earliest satisfactory accounts of ancient Egyptian mathematics. It has been translated by Eisenlohr, *Ein mathematisches Handbuch der alten Aegypter* (Leipzig, 1877). See ALGEBRA; ARITHMETIC.

AHN, än, JOHANN FRANZ (1796–1865). A German grammarian and educationist. He was born at Aix-la-Chapelle, was for a time a merchant, but studied mathematics and modern languages, and was for many years a teacher in Neuss. He wrote many manuals for teaching languages, his method of instruction being an extension of that of Seidenstücker. His *Practical Method for a Rapid and Easy Acquisition of the French Language* (*Praktischer Lehrgang zur Schnellen und Leichten Erlernung der französischen Sprache*, 1834) has passed through more than 200 editions and been extensively imitated.

AHNFELDT, än′fĕlt, ARVID WOLFGANG NATHANAEL (1845–90). A Swedish littérateur, born at Lund. He studied art at Lund and Upsala and was for some time an official in the royal library at Stockholm. In 1881 he was appointed editor of the journal *Ur Dagens Krönika* and was also associate editor of the liberal *Aftonblad*. He published a number of important monographs, such as those on *Almqvist* (1876) and *Crusenstolpe* (1880), a *Verldslitteraturens Historia* (1875–76), and other works.

AHOY′ (*a* + *hoy*). A nautical form of hail. Its original signification is said to have been "stop," and it still partakes of that meaning in a modified sense. It is used as a hail to passing boats, vessels, and implies that communication with them is desired. The common form of usage is "boat ahoy," "ship ahoy," "steamer ahoy," etc.

AHRENS, CARL (1866—). A Canadian landscape painter. He was born in Winfield, Ontario. He studied art in New York City under William Chase, Edward Elwell, and George Inness and soon won emphatic recognition at various art exhibitions in Canada, some of his pictures being bought by the Ontario government. He was associated with Elbert Hubbard for three years in the Roycroft community at East Aurora, N. Y., after which he went to southern California. His pictures of the ruins of the old Spanish missions there attracted attention. He returned to Canada in 1907. His paintings are distinguished for their atmospheric effects. Among the best known are "Cradled in the Net" (exhibited at Chicago World's Fair), "The House in the Clearing," "Passing Showers," "The Woodcutters," "The Glow in the Woodland," and "The Coming Storm."

AHRENS, ä′rens, HEINRICH (1808–74). A German writer on law, philosophy, and psychology. He studied at Göttingen and was concerned

in the political troubles in 1831, by reason of which he was forced to flee to Paris. In 1834 he became professor of philosophy at Brussels. He was a member of the Frankfort Parliament of 1848, and on the committee to draft a new German constitution. In 1850 he was chosen professor of legal and political science at Gratz, and in 1859 was called to a similar chair at Leipzig. For a number of years he represented the Leipzig University in the First Saxon Chamber. Among his works are: *Cours de psychologie* (1837–38); *Cours de droit naturel* (1838); *Die juristische Encyklopädie* (1855–57). The two last-named works have been republished in several languages.

AHRENS, Heinrich Ludolf (1809–81). A celebrated German philologist, born at Helmstedt. He studied at Göttingen, where he began his career as *privat-docent* in 1829, but left Göttingen in the following year to accept a position at Ilfeld, where he remained for 14 years. In 1849–79 he was director of the lyceum at Hanover. He devoted himself especially to the Greek dialects, and may be said to have laid the foundation of their scientific study. His chief publication was *De Græcæ Linguæ Dialectis* (Göttingen, 1839–43). He published also, in 1855–59, a two-volume edition of the Greek bucolic poets, Theocritus, Bion, and Moschus.

AHRIMAN, ä'rĭ-mȧn. The ancient Persian devil, a personification of the evil spirit and principle of evil, the idea which answers in the Zoroastrian religion to Satan in Judaism and Christianity. He is represented as the head and chief of the powers of darkness and sin, and he has legions of demons about him. Next to him are ranged six arch-fiends, the chief of whom is Aēshma, the Daēva, or 'demon of fury,' corresponding, according to the majority of scholars, to the name Asmodeus (q.v.). Ahriman's name appears in the Avesta as *angra mainyu*, or *aisra mainyu*, Persian, *ahriman*—whence our spelling of the word. The term *mainyu* means 'spirit,' and *angra*, 'oppressing'; the title *angra aisra* is uncertain, but it is presumed to signify 'injury, opposition, antagonism.' Ahriman is the spirit of opposition, antithesis, and antagonism to the Persian god Ormuzd (q.v.). The two spirits severally represent the kingdom of light, goodness, and life, and the kingdom of darkness, evil, and death. The relation of the one spirit to the other, especially of Angra Mainyu, as the maleficent spirit, to Sponta Mainyu, or the beneficent spirit, has been frequently discussed. Consult Darmesteter, *Ormuzd et Ahriman* (Paris, 1877), and Jackson, "Die iranische Religion" in Geiger and Kuhn's *Grundriss der iranischen Philologie*, vol. ii (Strassburg, 1896–1904).

AHU, ä'hōō. The name in Persia of the common Asiatic gazelle. See Gazelle.

AHUATLE, ä'ōō-ät'l (Mexican). A preparation for food of the eggs of a Mexican species of ephydrid fly, which is formed into a paste mixed with hens' eggs and then fried. For further information, see Ephydra; Fly.

AHULL' (*a* + *hull*). A maritime term, used to denote the position of a ship when all her sails are furled and her helm lashed on the lee side; in such a position she lies nearly with her side to the wind, but with the head turned a little toward the direction of the wind, and is said to *lie ahull*.

AHUMADA, ä'ōō-mä'dȧ, Don Pedro Girón, Marqués de las Amarillas, Duke of (1788–1842). A Spanish general and statesman, born at San Sebastian. He was appointed an officer in the Royal Guards in 1806, and during the war against the French rendered important services as chief of the general staff of the Spanish army. Upon the outbreak of the revolution of 1820 he was appointed Minister of War, but soon retired because of the opposition of the Radicals. He was appointed by Ferdinand VII a member of the Council of Regency during the minority of Isabella, and in 1835 accepted the Portfolio of War under the premiership of Toreno. He soon resigned, and went to Bordeaux in 1836, but subsequently returned to Madrid.

AHURA MAZDA, ȧ-hōō'rȧ mäz'dȧ. See Ormazd.

AHWAZ, ȧ-wäz'. A small village, once a residence of the Persian rulers, situated on the river Karun, about 45 miles south of Shuster (Map: Persia, C 5). Near Ahwaz are the ruins of the old town, lying along the river for a distance of over 10 miles. There are still to be seen ruins of an old castle of gigantic proportions, and some other evidences of former splendor. In the third century Ahwaz was the chief city of a province of the same name, and under the subsequent rule of the Arabs it became an important commercial centre, reaching the height of its prosperity in the twelfth and thirteenth centuries. A concession to navigate the Karun from the Persian Gulf to Ahwaz was granted to a British company which runs a steamer on the river, and which has made extensive highway improvements between this town and Ispahan. Pop., about 1600.

AI, ä'ĭ (Heb. hāai, the stone heap). A city of the Canaanites, 12 miles north of Jerusalem. It is mentioned in the narrative about Abraham (Gen. xii. 8), where its situation is defined as east of Bethel. When the Israelites came into Canaan, they made an unsuccessful attack on Ai (Josh. vii. 5), but on the second attack the city was taken (Josh. viii) and destroyed. (See Achan.) Isaiah (Isa. x. 28) mentions the city under the name of Ayyath, so that it must have been rebuilt. After the captivity it was inhabited by the Benjaminites (Ezra ii. 28; Neh. vii. 32). The modern site is Khirbet Haiyân, also called Khirbet el Kudêrah. Ruins of Ai existed in the time of Eusebius and Saint Jerome. The pools, cisterns, tombs, and other ancient remains at Khirbet el Kudêrah have been especially described by Guérin, *Description de la Judée* (Paris, 1869, iii, pp. 57 ff.); Conder, *Palestine Exploration Fund Memoirs* (ii, 372; iii, 20 ff.), and Sellin, *Mitteilungen und Nachrichten des Palästina Vereins* (1899–1900).

AI, ä'ĭ. The onomatopoetic name of the three-toed sloth. See Sloth.

AI, ä'ē, or **AHYU,** ä'ô. A Japanese salmon (*Salmo altivelis*), remarkable for going down some rivers to spawn in the sea, and ascending other rivers annually to spawn near their sources.

AICARD, ȧ'kär', Jean François Victor (1848—). A French author born at Toulon. He made his first appearance in literature with the drama *Jeunes croyances* (1267). His works, which are in general distinguished by a finished style, include *Au clair de la lune* (1870), a one-act comedy in verse; *Les rébellions et les apaisements* (1871); *Poèmes de Provence* (1874) and *La chanson de l'enfant* (1876), both of which were crowned by the Academy; *Miette et Noré* (1880); *Lamartine* (1883); *Jésus* (1896, 1912), a lyrical epic; *Tata* (1901, 1910); *L'âme d'un*

enfant (1903), idealistic tales; the plays: *Légende du cœur* (1903); *Benjamine* (1906); *L'illustre Maurin* (1908); *Maurin des Maures* (1908). His most popular play is *Le Père Lebonnard* (1890). In 1913 he published *Hollande; Algérie.* He became an Academician in 1909.

AID (Fr. *aide,* from Lat. *ad,* to + *iuvare,* to help). In feudal times, a term denoting a payment in money made to the suzerain on certain occasions. The term is a translation of the Latin word *auxilium.* In theory it was a free grant made in exceptional cases. But the cases soon came to be fixed by custom. In England "the three chief aids" were paid (1) for the lord's ransom when in captivity; (2) for the expenses of making the lord's eldest son a knight; (3) for the dowry of the lord's eldest daughter. These were levied upon all classes of freehold tenants in England—upon those holding in free and common socage (q.v.), as well as upon the holders of knights' fees (q.v.)—and continued to be nominally due and exigible until abolished by Parliament, 12 Car. II, c. 24 (1660), though they had gradually fallen into disuse and were probably even then practically obsolete. In France a fourth chief aid was demanded for the expenses of the suzerain when he went on a crusade. The obligatory aids varied, however, by custom from province to province on the Continent and might be demanded for various unusual expenses to which the lord might be put. See FEUDALISM; TENURE.

AIDA, ä-ē'dä. An opera by Verdi (words by Ghislanzoni), first played at Cairo, Egypt, Dec. 24, 1871, at the inauguration of the Khedive's new theatre. The scene of it is laid in ancient Egypt.

AIDAN, ā'dən, SAINT (?–651). First bishop of Lindisfarne. He was one of those distinguished monks of the early Scotch-Irish church who were received into the calendar of saints without the ceremony of canonization. In early life he was a monk in Iona, the famous island off the Scotch coast. Oswald, the celebrated King of Northumbria, requested the community of Iona to send to his court one of their brethren who would teach the Christian religion to his people. The first person sent was a certain Cormac, who was too dogmatic and intolerant to be a successful missionary. On his return to report to the synod his failure, Aidan, who possessed the patience, geniality, and popular manners fitted for the task, was consecrated bishop (635) and sent forth. Through his success, he left a great reputation as the earliest promulgator of Christianity in the northern districts. He died at Bamborough, Aug. 31, 651. The day of his feast is August 31. For his biography, consult Fryer, *Aidan, the Apostle of the North* (London, 1884).

AID-DE-CAMP, ād'dē-kămp' (Fr. camp assistant), or **AID.** A military officer serving on the staff of a commanding general officer. In time of war it is a position of grave responsibility, as shown by the terrible mistake which led to the brilliant but foolish light cavalry charge of the British in the Crimean War of 1854. It is also a position involving much danger, as may be seen from the nature of the duties performed. On active service the aid-de-camp is in close confidential touch with the general officer to whom he is attached, and when necessary acts as his military secretary. On the battle-field he carries all orders from the general in command to the commanding officers of the various arms, and must of necessity be alert, quick-witted, resourceful, and prompt, giving his message in the plainest and most unmistakable form. Wherever possible, such orders must be delivered in writing. In European nations an appointment of aid-de-camp, particularly if on the staff of the ruler or a member of the ruling family, carries much social as well as military prestige, while in all services it is a much coveted and much sought appointment. In the United States a lieutenant-general is allowed to have two aids (lieutenant-colonels) and a military secretary; a major-general, three aids (either captains or lieutenants); and a brigadier-general, two aids (lieutenants). Before an officer below the rank of major can receive such appointment, he must have served at least two of the six preceding years with his troop, battery, or company. The appointment is for four years and may not be exceeded.

AIDÉ, ā'ē'dā', CHARLES HAMILTON (1830–1906). An English poet and novelist. He was born in Paris, the son of a Greek diplomatist. His mother was a daughter of Admiral Sir George Collier. He was educated at Bonn, served seven years in the British army, retired in 1853 with the rank of Captain, and then devoted himself to literature. Among his poems are *Eleanore* (1856) and *Songs without Music* (1882). His novels include *Rita* (1856); *Confidences* (1859); *Passages in the Life of a Lady* (1887); *Elizabeth's Pretenders* (1895), besides about 15 others. As a ballad writer he is known by *The Danube River* and *Remember or Forget.* A volume of his collected poems was published in 1903, and after his death appeared his last novel, *The Chivalry of Harold* (1907). Aidé was remarkable for his versatility; he wrote plays as well as novels and verse, and was an amateur artist.

AIDENN, ā'dən. A collateral form of Eden, Paradise, from the Arabic *Adn,* used by Poe in *The Raven,* on account of the rhyme.

AIDE-TOI ET LE CIEL T' AIDERA, ād twä' ā le syĕl tā d'rā' (Fr. Help thyself, and Heaven will help thee). The cry of certain French political writers to the middle classes about the year 1824. It became the watchword and title of a society having for its object to agitate the electoral body in opposition to the government. This, however, was to be done by means strictly legitimate, chiefly by correspondence and political publications. Most of its founders and active members belonged to the party of *Doctrinaires* (q.v.), as Guizot, who was president for some time, Duchâtel, Duvergier de Hauranne, Dubois, Rémusat, Thiers, Cavaignac, etc. *Le Globe* was the organ of the association, and afterward *Le National.* The society had a great share in bringing about the revolution of July, 1830, and was at first countenanced by the new government; but after a short time it was dissolved (1832).

AIDIN, ī-dēn', or GUZEL-HISSAR. An important town in the Turkish vilayet of Smyrna (21,583 square miles; pop. (est.), 2,500,000), in Anatolia. It is on the river Meander, about 56 miles southeast of Smyrna, with which it is connected by rail (Map: Turkey in Asia, B 4). It is picturesquely situated near the ruins of ancient Tralles, and has well-shaded streets, fine bazaars, Greek religious edifices, and a number of Turkish mosques. It has an extensive trade in figs and cotton, and manufactures leather and sweetmeats. In 1899 the town suffered severely

from an earthquake. Its population is about 36,000.

AID'-MA'JOR. An adjutant in the French army. See ADJUTANT.

AIGNER, å'nyâ', JOSEPH MATTHÄUS (1818–86). An Austrian portrait painter. He was born at Vienna, and during the revolution of 1848 he was Commandant of the students' legion in Vienna, for which he was condemned to death when the city was taken by the imperial troops. Pardoned at the intercession of his friends, he renewed his art studies under Rahl. Until his surprising death by suicide in 1886, he was one of the most popular portrait painters of Austria. Most interesting of his portraits are those of the poet Lenau and the Russian General von Danielos, painted in the madhouse in which they were confined. Other good examples are those of the Emperor Franz Joseph, Empress Elizabeth, the poet Grillparzer, the Wertner family group of nine, and his own portrait. His work is characterized by broad technique and warm color.

AIGRETTE, ā'grĕt *or* å-grĕt', French for a small white heron or egret. (See EGRET.) Hence, a plume or erect ornament of feathers, originally the long filiform tuft of feathers that spring from the back of the egret in the breeding season, and arranged to adorn the hair, a bonnet, headdress, or helmet, or something similar to this, especially when jeweled. "A small bundle of these feathers has been used among Eastern nations as an ornament, and worn in the front of the turban, caftan, or other headdress by personages of high rank, being occasionally mounted with, or its form imitated by, precious stones; and the gift of an egret so bejeweled has been one of the most distinguished marks of honor that could be bestowed by an Oriental ruler upon a favorite minister or successful leader." The fashion has spread to western nations and given rise to various decorations on military hats and for women's hair and bonnets. The demand of millinery, indeed, during the last quarter of the nineteenth century caused such inroads upon the breeding colonies of white herons in all parts of the world that these birds are everywhere greatly diminished in numbers, and in some regions, as in Florida, are almost exterminated. As the desired plumes grow only during the breeding season, the killing of a bird for their sake usually means the death of a family and the rapid depopulation of the colony. From this point of view, and remembering that great cruelty is likely to accompany the obtaining of the plumes, the statement of the annual sales of aigrettes in London and other great markets is appalling to all persons of a humane mind and delicate taste.

The reduction in the number of birds throughout the world, together with considerable protective legislation in various countries, has greatly reduced the amount of aigrettes annually auctioned at the feather sales and has increased the value of these plumes until a single ounce has brought 225 shillings ($54) in the London market.

AIGUEBELLE, ĕg'bĕl', PAUL ALEXANDRE NEVEUE D' (1831–75). A French naval officer who entered the Chinese army. He distinguished himself against the Tai-Pings in 1862–64, commanded the Franco-Chinese corps, and captured Hang-Chow-Foo, for which service he was made a mandarin of the first class. He established the arsenal at Fu-Chow-Foo and taught the Chinese to construct European vessels, the first Chinese man-of-war being launched under his supervision in 1869. In that year he was made grand admiral of the Chinese fleet.

AIGUES-MORTES, ĕg'môrt' (anciently Lat. *Aquæ Mortuæ*, Dead Springs). A small town in France (pop., 1906, 3899; 1911, 3900), in the department of Gard, 21 miles southwest of Nîmes (Map: France, S., J 5). It is situated in an extensive marshy region impregnated with sea salt, and is about 3 miles from the Mediterranean, with which it is connected by a canal. There are extensive vineyards in the vicinity, all of which can be watered by means of fire pumps. The town claims to have been founded by Marius, but it is altogether likely that it owes its origin to St. Louis, who sailed from here on his crusades in 1248 and 1270. Philip the Bold, his son, in 1272 began to surround the town with fortifications which are now among the chief points of interest in France, surpassing even those of Carcassonne and Avignon.

AIGUILLE, å-gwēl' (Fr. a needle). The name given to certain sharp mountain peaks in the Alps often covered with ice and snow and so called from their resemblance to needles. Around Chamounix a number of the peaks bear this name. The term is applied also to an instrument used by engineers to pierce a rock for the injection of gunpowder in blasting.

AIGUILLETTES, ā'gwĭl-lĕts' (from Fr. *aiguillette*, a point, pointed tag; dimin. of *aiguille*, needle). A detachable portion of the military dress uniform consisting of bullion, silk, woolen or cotton cords and loops, and worn on the shoulder. In the United States army aiguilletes are worn by officers of the General Staff Corps, by officers of the Adjutant-General's department, the Inspector-General's department, the officers of the Bureau of Insular Affairs, the aids-de-camp to general officers, and regimental, and artillery district adjutants, adjutants of engineer battalions, military attachés, adjutant of United States Army, and aids to the President of the United States. By the Chief of Staff and the aids to the President aiguillettes are worn on the right shoulder, by all others on the left shoulder. For commissioned officers aiguillettes are made of gold-wire cord, according to a sealed pattern kept in the office of the Quartermaster-General.

Aiguillettes are worn by naval officers who are acting as personal aids to the President and the Secretary of the Navy, aids at the White House, members of the personal staff of a flag officer, aids to commandants of navy yards or naval stations, aid to the Superintendent of the Naval Academy, and naval attachés. They are worn on the right side by the aid to the President and the aids at the White House; on the left side by all others.

AIGUILLON, å'gwê'yôn', ARMAND DE VIGNEROT DUPLESSIS RICHELIEU, DUC D' (1720–82). A French statesman, Minister of Foreign Affairs under Louis XV (1771–74). He became Governor of Brittany in 1754. Together with Mauplou and Terray, he formed part of the famous and scandalous *Triumvirat;* his despotic administration of his province finally brought upon him the condemnation of the Parliament of Rennes. But Madame du Barry, the mistress of Louis XV, not only saved him from punishment, but finally brought about his promotion as Minister. He was entirely incompetent, and Louis XVI replaced him by Vergennes.

AIJALON, ā′jȧ-lŏn. See AJALON.

AIKAWA, ī-kä′wȧ. A town of Japan, on the western coast of the island of Sado (Map: Japan, F 4). It is poorly built, and its importance has greatly diminished because of the lessened production of gold and silver mines situated close to it. The Governor of the island resides in Aikawa. Pop., 1912, about 13,000.

AIKEN, a′ken. A city and the county-seat of Aiken Co., S. C., on the Southern Railway, 17 miles east of Augusta (Map: South Carolina, C 3). It is situated in an agricultural and pine forest region, the dryness and comparative mildness of its climate combining to make Aiken a health as well as a popular pleasure resort. Aiken is the seat of Aiken Institute; St. Angela's Academy, for white students; the Schofield Normal and Industrial School; and the Robertson Training School, for negroes. It was first incorporated in 1835 and is governed under a charter of 1890, revised in 1897, which provides for a mayor, elected biennially, and a city council, composed of a mayor and six aldermen. The water works and sewage system are owned by the municipality. Pop., 1890, 2362; 1900, 3414; 1910, 3911.

AIKEN, WILLIAM (1806–87). An American legislator. He was born in Charleston, S. C., and graduated at the College of South Carolina (1825). After serving in the State Legislature (1838–43), he was Governor of South Carolina (1844–46), and was a Democratic Representative in Congress from 1851 to 1857, during which time he lacked only one vote of becoming Speaker of the House of Representatives. He opposed both nullification and secession and after leaving Congress took no active part in politics, except in 1866, when he was again elected to Congress, but was not admitted to a seat. The town and county of Aiken, S. C., were named after him.

AIKIN, JOHN, M.D. (1747–1822). An English physician and author. He had only moderate success as a physician, but gained considerable reputation as a scholarly writer. With his sister, Mrs. Barbauld, he published *Evenings at Home* (6 vols., 1792–95), together with a number of biographical works, including *General Biography* (10 vols., 1799–1815). He edited the *Monthly Magazine* (1796–1807) and *Dodsley's Annual Register* (1811–15). He wrote also *Essays on Song Writing* (1810); *Vocal Poetry* (1810); and *Memoirs of Oliver Goldsmith.* Consult *Memoirs of John Aikin, M.D.* (Philadelphia, 1824), by his daughter, Lucy Aikin.

AIKIN, LUCY (1781–1864). An English writer, daughter of John Aikin, and his assistant in much of his work. She wrote one novel, *Lorimer* (1814), but her reputation rests on her series of court memoirs, beginning with *Memoirs of the Court of Elizabeth* (1818), and on her *Life of Addison* (1843). She also wrote memoirs of her father and of her aunt, Mrs. Barbauld.

AILANTHUS, ā-lăn′thŭs, or **AILANTUS,** ā-lăn′tŭs (Latin form of Amboyna, *ailanto,* 'tree of heaven'). A lofty, spreading tree (*Ailanthus glandulosa*), of the family Simaroubaceæ, a native of China, but now frequently planted to shade public walks in the South of Europe, in England, and in North America. The flowers of the male plant have a disgusting odor. The leaves resemble those of the ash. The tree flourishes on light soils and is hardy enough to endure even the climate of the North of Scotland. It has been somewhat extensively planted in the United States. The tree is easily propagated by suckers and cuttings of the roots. The wood is fine-grained, satiny, and suitable for cabinet making. *Ailanthus imberbiflora* and *Ailanthus punctata* are among the important timber trees of Australia. Another species, *Ailanthus excelsa,* is common in India. The genus Ailanthus has been recognized by fossil fruits and leaves in Tertiary beds of Europe and North America.

AILANTHUS MOTH. A large, hardy, silk-spinning moth (*Philosamia cynthia*), introduced from China into the United States on the ailanthus tree. The caterpillar may be identified by its rows of tufts of white hairs. The moth which has become common near several of our cities has a spread of wings of 5 inches, and is of a general olive-brown ground color, with a whitish lunate discal spot and a white and purplish transverse bar on each wing.

AILETTE, ā-lĕt′ (Fr. little wing). An appendage to the armor worn by knights on each shoulder. At first they were plates of iron especially to protect the shoulders. Later they were not intended primarily for defense, as is evident from the fact that most of them stood up straight in the air. They came to be made in various forms and frequently bore the heraldic device of the knight. Epaulets are sometimes said to have been derived from these.

AILLY, ȧ′yē′, PIERRE D', or PETRUS DE ALLIACO (1350–1420). A French theologian. He studied theology in Paris, where, in 1380, he became a doctor of the Sorbonne. He was leader of the Nominalists, asserted that the Church rests on Christ, not on Peter, and derives its authoritative teachings from the Scriptures, not from canon law. He became grand master of the College of Navarre, Paris, in 1384, and in 1389 confessor and almoner to Charles VI, and the same year Chancellor of the University of Paris. His defense, two years previous, of the Immaculate Conception won him the epithets "Eagle of France" and "Hammer of Heretics." He became Bishop of Le Puy, 1395, and of Cambrai in 1397. He induced the calling of the Council of Pisa, of which he was an active member. He was made Cardinal by John XXIII (1411), and was sent as Legate to Germany in 1413. He was prominent in the Council of Constance, 1414–18, furthering the condemnation of Huss and Jerome of Prague, but strenuously advocating reform in the Church; maintaining the authority of councils over that of popes, and aiding in the election of Martin V in place of three rival popes. He was afterward made Papal Legate at Avignon until his death. His writings are numerous. Among them is an attempt to harmonize astronomy and theology. For his biography, consult P. Tschackert (Gotha, 1877) and L. Salembier (Lille, 1886).

AILSA CRAIG, āl′sȧ krāg. A small island off the west coast of Ayrshire, Scotland (Map: Scotland, C 4). It is only 2 miles in circumference and rises to a height of 1114 feet above the sea. It terminates in high cliffs on the northwest and contains some springs near its summit. It is well known for its columnar form and has a lighthouse, erected in 1836.

AIMAK, ī-mäk′. A term of Mongolian origin signifying 'clans,' or 'tribe,' and, with the prefix *char* ('four'), employed as a designation for a number of tribes inhabiting the central and northwestern part of Afghanistan. Little is known concerning them except that they are a Mongo-

lian people dwelling in the midst of an Aryan population, and speaking a language that seems closely related to the Kalmuck, though largely influenced by the Persian. According to some authorities the four principal tribes of the Aimak are the Jamshidi, the Firozkohi, the Taimani, and the Hazaras; others make a definite distinction between the Aimak and the Hazaras, characterizing the former as Sunnite Mohammedans and the latter as adherents in the main of the Shiite sect. Macgregor, *Central Asia* (Calcutta, 1871), substitutes the Saidnat for the Hazaras and estimates the total number of the Aimak at 250,000, describing them as semi-nomadic in their habits and excellent fighters. They are supposed to be descendants of Turkish-Tatar tribes which under Hulaku Khan overthrew the Persian Caliphate in the middle of the thirteenth century.

AIMARA, ī-mä'rȧ. Any of many large carnivorous fishes of South America, especially common in the Amazonian rivers, some 20 species of which form the heterognathous family Erythrinidæ and the genus Macrodon. They are also called trahiras.

AIMARD, ā'mär', Gustave (1818–83). A French novelist. He shipped to America as a cabin-boy, spent 10 years among the Indians of the western prairies, and traveled in Spain, Turkey, and the Caucasus. In 1848 he was in Paris and an officer of the Garde Mobile. At the time of the Franco-German War he organized, and for a while commanded, the so-called "francs-tireurs of the press." He is sometimes called "the French Fenimore Cooper." He published many adventure stories, for the most part improbable but interesting. The list, many volumes of which have been translated into English, includes *Les trappeurs de l'Arkansas* (1858), *Le grand chef des Aucas* (1858), *Les pirates de la prairie* (1859), *La forêt vierge* (1870), and *Les scalpeurs blancs* (1873).

AIME-MARTIN, ā'mā'mär'tăn', Louis. See Martin, Louis Aimé.

AIMOIN, ā'mwăn' (c.960–c.1010). A French chronicler, born at Villefranche de Longchapt. He became a monk in the monastery at Fleury. His works include *Historia Francorum* (edited by G. Waitz and published in *Monumenta Germaniæ Historica: Scriptores*, vol. xxvi), his best-known work; *Vita Abbonis, Abbatis Floriacensis;* and *Miracula Sancti Benedicti* (books ii and iii). The two latter works were published by J. Mabillon in *Acta Sanctorum Ordinis Sancti Benedicti* (1668–1701).

AI'MON. See Aymon.

AIM'WELL. 1. A character in Farquhar's (q.v.) comedy, *The Beaux' Stratagem.* 2. A character in Shirley's *The Witty Fair One* (q.v.).

AIN, ăn. A river in eastern France, which rises in the Jura Mountains. It flows south-southwest through the departments of Jura and Ain, and after a course of about 120 miles falls into the Rhone, 18 miles above Lyons (Map: France, S., K 2). It is used for floating timber and admits of navigation down stream only.

AIN. A frontier department of France, separated from Switzerland and Savoy by the Rhone (Map: France, S., K 2). Crêt-de-la-Neige (5635 feet) and Mont Reculet (5627 feet), the highest peaks of the Jura Mountains, are in the eastern part. In the south and west there are extensive marshes. The soil produces bituminous limestone, from which Seyssel asphalt is made. At one time there were as many as 2000 artificial lakes in this region, where fish breeding was carried on, but many of these have been drained and the basins turned into farm land. Capital, Bourg. Area, about 2250 square miles. Pop., 1911, 342,482.

AINGER, ān'jĕr, Alfred (1837–1904). An English clergyman and writer. He was born in London and was educated at King's College and at Trinity Hall, Cambridge. He was ordained priest in 1863 and three years afterward was appointed reader of the Temple Church, a position which he held until 1894, when he succeeded Dean Vaughan as Master of the Temple. He became a canon of Bristol and chaplain-in-ordinary to Queen Victoria in 1896 and to King Edward in 1901. As an author, he is best known for his editions of *Lamb's Collected Works* his *Biography of Charles Lamb* (*English Men of Letters* series, 1882); his *Life and Works of Charles Lamb* (12 vols., 1899–1900); and *Crabbe* (1903). Following his death, H. C. Beeching edited a volume of his sermons under the title *Gospel of Human Life* (1904) and his *Lectures and Essays* (2 vols., 1905). Consult Edith Sichel, *Life and Letters of Canon Ainger* (1906).

AINMILLER, īn'mĭl-ĕr, Max Emanuel (1807–70). A German designer of stained glasses, the principal reviver of this art in the nineteenth century. He was born at Munich, Feb. 14, 1807, and at first studied architecture and decoration in the Munich Academy under Gartner and was then appointed designer in the Royal Manufactory of Porcelain at Nymphenburg. When the Royal Manufactory of Stained Glasses was organized at Munich, he was made inspector of the institution and afterwards became its head. By his technical improvements he revived the ancient art of stained glasses, achieving a variety of color not hitherto attained. He was also the first to design stained glasses on panels, thereby founding an interesting variety of this art. He usually contributed the general design and the decorative features, leaving the figures to important contemporary artists. His principal works include the windows of the cathedrals of Regensburg, Cologne, and Speyer, and of the Aukirche in Munich; also the University Church at Cambridge, St. Paul's Cathedral, London, and the Cathedral of Glasgow—the last being the most extensive of his works. Though excellent for their time, these works are hard and cold in color compared to the best productions of the present day. In many of his works he was assisted by his son Heinrich (1837–92), who was also an artist of note. The elder Ainmiller also painted interiors of mediæval churches, showing minute architectural knowledge, but poor color.

AINO, ī'nō, *or* **AINU,** ī'nōō (men of Aiona, their reputed ancestor, or possibly a corruption of *inu*, dog, contemptuously applied to them by the Japanese). An aboriginal people, now numbering some 18,000 souls, in northern and eastern Yezo, the southern part of Saghalien, and the southern Kuriles (all but 1500 live on Yezo). They inhabited once a great part, if not all, of the Japanese Archipelago and were the first race to dwell there, unless the so-called "pit-dwellers" of Yezo and Saghalien were, as Hitchcock (1890) suggested, driven out by them when they intruded into this area from their former home on the adjoining Asiatic coast many centuries B.C., as the archæological remains (shell heaps, stone implements, pottery, etc.) in Japan indicate. The retreat northward of the Aino is noted in Japanese chronicles referring to the

"barbarians." The physical characteristics of the Aino—short stature, flattened humerus and tibia, heavy beards, and general hirsuteness (much exaggerated by travelers), lighter skin, dolichocephaly and brachycephaly, somewhat regular features, and non-savage looks—have given rise to theories of relationship with almost every known race. Brinton (1890) allies them with the Giliaks of the Amur; Deniker (1900) considers them *sui generis;* Keane (1896) and Baelz (1901) believe them to have been originally of the Caucasian (white) race. The last, who has studied the Aino at first hand, is of the opinion that they are the extreme eastern branch of a race related to the Caucasian stock, once occupying much of northeastern Asia, but split into two sections by the inroads of the Mongol-Turkish peoples at a very remote date, a view which has a good deal to commend it. But the Aino are not a uniformly pure type, as the differences between those of Yezo and of Saghalien show. The linguistic, geographical, and mythological researches of B. H. Chamberlain (1887) and Batchelor (1882–94) prove both the uniqueness of the Aino tongue and the great influence upon Japanese life exerted by that people in times past. Driven northward from their ancient habitat in southwestern and central Japan, they have left their names on the natural features of the archipelago. Their language is simple and harmonious and resembles the Japanese in structure, but is quite distinct in vocabulary. It has been reduced to writing only recently. The Rev. John Batchelor has compiled an Aino grammar and dictionary and translated the New Testament into the tongue. The Aino religion, originally a rather primitive nature-worship, with the cult of the bear especially prominent, and their folk-tales, have evidently received some additions from Japanese sources in historical times. In the last few years some of the Tsuishikari Aino have become Buddhists of the Monto sect, and a few others in the region of Piratori have become Protestants. A good account of the Aino (with bibliography) was published by Professor Hitchcock in the *Report of the United States National Museum* for 1890. An important discussion of them is to be found in the anthropological studies of Koganei (1893–94), and Landor's *Alone with the Hairy Ainu* (1893). Baelz, in the *Verhandlungen der Berliner Gesellschaft für Anthropologie* for 1901, considers that the amount of Aino blood in the Japanese outside of Yezo has been much underestimated. He notes also the increasing intermixture of Japanese and Aino and foresees the ultimate disappearance of the latter, not by extinction, but by natural amalgamation with the former. This amalgamation is favored by the gradual abandonment of ideas about their alleged mental inferiority. (See JAPAN, paragraph *Ethnology.*) In addition to the works cited in the text, consult: Griffis, *The Mikado's Empire* (New York, 1876); Siebold, *Ethnologische Studien über die Aino* (Berlin, 1881); Bird, *Unbeaten Tracks in Japan* (London, 1885); Chamberlain and Batchelor, *Aino Studies* (Tokio, 1887); MacRitchie, *The Ainos* (London, 1892); *Transactions of the Asiatic Society of Japan* (Yokohama, 1874–98); Batchelor, *The Ainu and their Folk-lore* (London, 1901); Chamberlain, in *Journal of Race Development* for 1912–13.

AINSLIE, ānz'lī, HEW (1792–1878). A Scottish-American poet, born at Bargeny Mains, Ayrshire. While a clerk in the register house at Edinburgh, he acted as amanuensis to Prof. Dugald Stewart. He emigrated to the United States in 1822, and joined for a year Robert Owen's venture at New Harmony, Ind. (See HARMONISTS.) He subsequently went into business. His numerous dialect poems had extended his reputation to Scotland, where he was enthusiastically received by literary folk in 1864. These poems, many of which were highly esteemed by Sir Walter Scott, were collected and edited by a friend, W. Wilson (1855). Some of them are also to be found in Wilson's *Poets and Poetry of Scotland* (1876). Consult T. C. Latto, *Memoir of Hew Ainslie* (1892).

AINSWORTH, ānz'wûrth, FREDERICK CRAYTON (1852—). An American soldier, born at Woodstock, Vt. He was appointed assistant surgeon, United States army, in 1874, and in 1891 major and surgeon. In 1899 he was promoted to be colonel and Chief of the Record and Pension Offices, and in that capacity introduced the index record-card system, by means of which the history of every soldier is made readily available. By his systematic management he saved annually half a million dollars in clerk hire. He was made a major-general and military secretary in 1904, and three years later his rank was changed to that of adjutant-general of the United States army. He was the first man to hold that important office who had not previously served in command of troops. His arbitrary rulings in refusing the use of war records to historical scholars led to his retirement in 1912.

AINSWORTH, HENRY (1571–1623). An English scholar and divine. He was driven from England by proscription in 1593 because he was a Brownist, and lived in poverty in Amsterdam until, in 1596, he became teacher in the church there of the Brownists. Though never forward, he was the most steadfast, resolute, and cultured champion of the principles of civil and religious freedom represented by the nonconformists in Great Britain and America. While fighting for freedom from hierarchical tyranny, Ainsworth pursued his Hebrew studies, and for a long time biographers had two Henry Ainsworths—one the learned rabbinical student, the other the archheretic and leader of the Separatists; but the two were one man. His most notable work is *A Defense of the Holy Scriptures, Worship, and Ministry used in the Christian Churches separated from Anti-Christ, against the Challenges, Cavils, and Contradictions of M. Smythe in his Book entitled "The Differences of the Churches of the Separation"* (Amsterdam, 1609). He wrote notes on all the books of the Pentateuch, the Psalms, and Solomon's Song. There is a story, not probable, that he was poisoned by Jews. See W. E. A. Axon, *H. Ainsworth, the Puritan Commentator* (Manchester, 1889); J. H. Shakespeare, *Baptist and Congregational Pioneers* (Philadelphia, 1907).

AINSWORTH, ROBERT (1660–1743). An English lexicographer, author of a Latin dictionary which was once extensively used. He was born near Manchester and taught school in London. He began his dictionary in 1714; it was first published in 1736 under the title *Thesaurus Linguæ Latinæ Compendiarius.* In it he still rejects the "English" pronunciation.

AINSWORTH, WILLIAM FRANCIS (1807–96). An English physician, geologist, and traveler. He was born in Exeter and graduated in medicine at Edinburgh in 1827. He

then traveled in France and prosecuted geological investigations in the Auvergne and Pyrenean mountains. On his return in 1828 he conducted the *Journal of Natural and Geographical Science* and delivered lectures on geology. In 1835 he was attached as physician and geologist to the Euphrates expedition under Colonel Chesney, and returned home in 1837 through Kurdistan, the Taurus, and Asia Minor, visiting the latter again the following year. He published *Researches in Assyria* (1838). He also published *The Claims of the Christian Aborigines in the East* (1843); *Travels in the Track of the Ten Thousand Greeks* (2 vols., 1844); *The River Karun an Opening to British Commerce* (1889).

AINSWORTH, William Harrison (1805–82). An English novelist, born at Manchester. His creative fancy began early to show itself in ballads and tales, which appeared in the local newspapers and in contributions to the *London Magazine* and other periodicals. He first studied law; but, tiring of that, he began a publishing business in London, which did not succeed. His first novel was *Sir John Chiverton* (1826); his second, *Rookwood* (1834), was very favorably received. *Crichton* (1837) and *Jack Sheppard* (1839) followed soon after. He edited *Bentley's Miscellany* for a time; in 1842 began his own *Ainsworth's Magazine*, and from 1853 edited the *New Monthly Magazine*. Some of his other works are: *The Tower of London* (1840); *Guy Fawkes* (1841); *Lancashire Witches* (1848); *Star Chamber* (1854); *Cardinal Pole* (1863); *John Law, the Projector* (1864); *The Spanish Match* (1865); *Merrie England* (1874); and *Beau Nash* (1880). He wrote 41 volumes in all. All his works, and particularly his earlier ones, were remarkably popular in England. Their publication began when the inane "fashionable novel" was the staple, and they presented an agreeable contrast. The historical element, together with the scenery of his native country, is prominent in most of them. Analysis of character or motives has no place in his works; his strength is in the vividness and directness with which he realizes scenes and incidents, and he is to be reckoned among the so-called picaresque writers, from his admiration of bandits, highwaymen, and thieves, as in *Rookwood*, where Dick Turpin is the hero. Consult Laman Blanchard, *Memoir of William Harrison Ainsworth.*

AINTAB, īn-täb′. A town in the Syrian vilayet of Aleppo, Asiatic Turkey, situated about 65 miles north of the city of Aleppo on the southern slope of Mount Taurus (Map: Turkey in Asia, G 4). It is an important military post and is well fortified. It carries on an extensive trade in leather and cotton, and lies on the route leading from Aleppo to Armenia. Much wine is also produced. The city was burned down late in the nineteenth century, but has since been rebuilt. Its population is about 43,000, and consists, to a great extent, of Armenian and Greek Christians.

AI′NU. See Aino.

AIR, ä-ēr′, or **ASBEN.** A mountainous region in the southern part of Sahara, situated between 17° and 20° N. lat. and 7° and 10° E. long. It is the most important centre of population in the desert. The palm, fig, and mimosa yield abundant fruit; the camel and zebra are raised on the pastures. The mountains are of granite and basalt, and some of the peaks are nearly a mile high. There are no permanent rivers, but the numerous ravines fill with water during the rainy season and overflow the valleys. The great caravan which makes its annual passage between Belma and Hansa stops at the numerous watering-places in this region. The country is ruled by a native sultan, and the population, estimated at about 100,000, consists chiefly of Tuaregs. The capital is Agades (q.v.), but Tintellust (60,000 inhabitants) is the chief centre of population.

AIR (Lat. *aër*, Gk. ἀήρ, *aēr*, from ἄειν, *aein*, to blow). The mixture of gases forming the atmosphere of the earth. It consists essentially of 79.03 parts of nitrogen and 20.97 parts of oxygen, with varying small quantities of carbonic acid, ammonia, ozone, argon, helium, neon, krypton, xenon (qq.v.), and aqueous vapor. Certain chemical compounds, as common salt, ammonium nitrate, etc., as well as minute particles of animal, vegetable, and mineral matter, are also frequently found in the air. Early chemists called all gases airs. The chief properties of air and the phenomena they give rise to may be found treated under Atmosphere; Aërodynamics; Aërostatics; Aëronautics; Barometer, etc.

AIR in music. A succession of single tones arranged in rhythmical groupings, so that they are readily apprehended by the ear as melody. The term is also used to denote the principal phrase or melody (generally the highest voice) as distinguished from the accompanying voices. In such expressions as "national air," "operatic air," it denotes the entire composition. Composers of all nationalities have shown a decided fondness for employing the French word in such titles as *air de ballet, de violon; air triste, mélancolique*, etc., for compositions in which decidedly melodious phrases are written for a solo voice or instrument, to which the other instruments furnish a mere accompaniment of sustaining chords or figuration. During the sixteenth and seventeenth centuries the term was used in England in a restricted sense to denote a lively, cheerful strain. As a technical term synonymous with "aria" (q.v.) the word is becoming more and more rare.

AIR BLAD′DER OF FISH′ES. See Fish.

AIR BRAKE. A brake worked by compressed air, which is extensively applied to railway cars in the United States and also to a less extent in other countries. Air brakes are also used on street railway cars. The air brake in its first form was invented by George Westinghouse, Jr., an American engineer, in 1869 and is known as the straight air brake. This brake consisted of an air pump, a main reservoir, and an engineer's valve on the locomotive, and of a train pipe and brake cylinder on each car. The air pump served to keep the main reservoir filled with air under pressure, and the brakes were applied by throwing the engineer's valve so as to allow the air from the main reservoir to enter the train pipe and thence into the brake cylinders on the cars, thus forcing the pistons out and applying the brakes on each car. The train pipe of one car was connected to that of the next by flexible hose, with a coupling between cars. This form of brake had several objections, the more important of which were that the brakes on the forward cars were applied so much sooner than those on the rear cars that the rear cars bunted up against the forward cars, causing shocks and damage; and in case a hose burst or a coupling parted, the air pressure would escape without setting the brakes. These objections to the straight air brake led Mr. Westing-

house to invent, in 1872, the automatic air brake. In this brake each car was equipped with an auxiliary reservoir and a triple valve in addition to the train pipe and brake cylinder. The triple valve was located at the junction of the train pipe and the two pipes leading to the brake cylinder and to the auxiliary reservoir. The principle of operation of this improved brake is as follows: Air pressure is maintained in the auxiliary reservoirs and in the train pipe at all times when the brakes are not applied, the pressure in the train pipe being exactly equal to that in the reservoirs, and there being no pressure in the brake cylinder, owing to the fact that as long as the train pipe and auxiliary reservoir pressures are equal, the triple valve is held in a position closing the air inlet to the brake cylinder. To apply the brakes, the equilibrium between the train pipe and the auxiliary reservoir pressures is disturbed by allowing air to escape from the train pipe; as soon as this is done, the excess air pressure in the auxiliary reservoir throws the triple valve so that it admits pressure from the reservoir into the brake cylinder and applies the brakes. To release the brakes, air pressure is retained in the train pipes by admitting air to it from the main reservoir on the locomotive. This gives an excess pressure in the train pipe above the pressure in the auxiliary reservoir, which throws the triple valve so as to close the inlet to the brake cylinder and open the inlet to the auxiliary reservoir from the train pipe, thus allowing the two to attain equal pressures again. To permit air to escape from the train pipe and thus apply the brakes, there is the engineer's valve previously mentioned, and also a conductor's valve on each car, the latter being used only in case of emergency. It is evident also that should a break occur in the train pipe, or its hose connections, through any accident, the pressure is relieved and the brakes are applied automatically.

It will readily be appreciated from what has been said that the triple valve is an exceedingly important part of the mechanism of the automatic air brake. It performs three duties: (1) Charges the auxiliary reservoirs; (2) applies the brakes; and (3) releases the brakes. These duties are, moreover, performed automatically, and, as experience has shown, with almost absolute certainty as long as the valve mechanism is kept in good order. The triple valve is, however, not the only automatic feature of the air brake. The operation of the air pump is controlled automatically by a pump governor, which shuts the steam off from the air pump as soon as the pressure in the main reservoir has reached a certain amount, and admits it again when the pressure falls below this amount. There is also an automatic contrivance for closing the ends of the coupling hose when they are disconnected; this valve opens automatically when the hose is coupled.

The plain automatic air brake was obviously a vast improvement over the straight air brake. Its chief objection was that in an emergency application on a long train the forward brakes were applied so much sooner than those in the rear that the slack of the train ran ahead and often did great damage. To remedy this objection Mr. Westinghouse invented, in 1887, the quick action triple valve, by which the application was so much hastened at the rear of the train that the slack had no chance to run ahead. The quick action automatic air brake is a plain automatic brake in which the great improvement is from an emergency or safety standpoint, and the present quick action automatic brake is equipped with the quick action triple valve. This valve is identical with the plain triple valve as far as service operations are concerned, but differs from it in emergency, in that it automatically vents air from the brake pipe locally on each car. The rapid brake pipe reduction thus resulting is transmitted to the next triple valve, and from it serially in the same manner to all the valves in the train, thereby reducing the time of full emergency application to about one-sixth of what is possible with the plain triple valves on a 50-car train. This also permits of a higher braking power for emergency than for service applications.

The very high passenger train speeds of recent years led Mr. Westinghouse, in 1897, to place on the market a high speed brake. This brake is designed to use very high air pressure when the brake is applied with the train at full speed, which pressure is gradually reduced by an automatic reducing valve on the brake cylinder as the speed diminishes.

The standard form of brake equipment for American railroad trains is the quick action automatic brake for freight cars, the P. C. passenger brake equipment for passenger cars, and the E. T. locomotive brake for both freight and passenger locomotives. Every type of brake equipment on a locomotive, of course, can be used for any type of air brake equipment on cars in a train. The distinctive departure from the quick action type of brake in the P. C. type is a modification of the triple valve known as a control valve. This control valve consists of four elements: the equalizing portion, which is the portion directly affected by variations in brake pipe pressure and controls, either directly or indirectly, the desired charging of the reservoirs, the application of the brake, whether in service or emergency, and the release of the brake; the application portion, which controls the flow of air only from service reservoir to service brake cylinder and the release of the same and has nothing to do with the emergency reservoir or the emergency brake cylinder; the emergency portion, which contains a double piston and slide valve which controls the flow of air from the emergency reservoir to the emergency cylinder and the release of the same to the atmosphere; and the quick action portion, which corresponds in general to the quick action portion of a triple valve and operates only when an emergency application of the brakes is made, vents brake pipe air to the atmosphere locally on each car, and closes the vent to the atmosphere automatically after the desired brake pipe reduction has been made.

The E. T. locomotive equipment consists of an air compressor, the main reservoir, a duplex compressor governor (to control compressor when the pressures for which it is regulated are obtained), a distributing valve, two brake valves (the automatic to operate locomotive and train brakes, and the independent to operate locomotive brakes only), a feed valve (to reduce the brake pipe pressure), a reducing valve and gauges, brake cylinders, dirt collectors, hose coupling and fitting, etc. The differences between the E. T. and the quick action are in general that, instead of a triple valve and auxiliary reservoir for each of the engine and tender equipments of the quick action, the E. T. has the distributing valve which is made to supply all brake cylinders. The distributing valve consists

of two portions, the equalizing portion and the application portion, and is connected to a double chamber reservoir. The equalizing portion and the pressure chamber of the double chamber reservoir are used in automatic applications only. Reductions of brake pipe pressure cause the equalizing valve to connect the pressure chamber to the application chamber and cylinder, allowing air to flow from the former to the latter. The principle embodied in the quick action triple valve, by which it gives a high braking power in emergency applications and a sufficiently lower one in full service applications to provide a protection against wheel sliding, is accomplished by cutting off the application chamber from the application cylinder in all emergency applications, which gives a smaller volume that has to be filled from the pressure chamber and a correspondingly high brake cylinder pressure.

With the introduction of electric locomotives it was necessary at first only to have a motor-driven air compressor instead of the steam compressor in use on steam locomotives. An important development, however, of the air brake, tried out on the Pennsylvania Railroad for application to steam trains, was an adaptation of the air brake equipment used on the Hudson & Manhattan electrically operated trains, known as the electro-pneumatic system. This system consists of a combination of the latest form of pneumatic service and emergency apparatus, with electric control for either operation. While the electric control is used normally, the pneumatic is held in reserve without its efficiency being impaired. Two brake cylinders, a supplementary reservoir, a control valve and the engineer's brake valve, in addition to the usual cut-out cocks, complete the brake equipment. A single control valve performs automatically all the functions of the triple valve, and in addition provides for maintaining the pressure in both brake cylinders constant against leakage. For further and more technical information on this subject, see Blackall, *Air Brake Catechism* (New York, 1911); Synnestvedt, *Air Brake Diseases* (New York, 1900); Dukesmith, *Modern Air Brake Practice* (Chicago, 1904); instruction pamphlets published by the Westinghouse Air Brake Company, Pittsburgh, Pa; also *Proceedings Master Car Builders' Association.*

AIR CELLS, or **AIR SACS.** See Bird.

AIR COMPRES'SOR, or **AIR PUMP.** A machine for compressing air. This may be made more definite by defining compression to be the act of making a greater weight of air occupy the same volume as before; or making the same weight of air occupy a less volume. This must be accompanied in either case by an increase in its elastic tension or pressure. When released from the containing reservoir or vessel, the air tends to resume its volume at the pressure and temperature of atmospheric air.

Compressed air is used for a multitude of purposes in the arts and in manufacturing, and to catalogue all of its uses would require a great amount of space. The simplest form of air pump is the little apparatus for inflating bicycle tires, with which nearly every one is familiar. These bicycle pumps are made both single and double acting, the single-acting pump being the simplest form of air compressor. Compared with the enormous air-compressing machines used in shops and mines, this little device seems almost too trivial to merit notice, but by carefully observing its actions and their effects there are brought to our attention several phenomena which are important facts in air compressing on a large scale. One of these phenomena is the power required to pump against the elastic resistance or tension of the compressed air in the nearly inflated tire; the second and more important is the fact that a very perceptible development of heat results as the pumping proceeds. The bearing of both these observations will appear in further treatment. For the present it need only be observed that hand air pumps of the simple form indicated are used for a variety of purposes where only a small amount of compressed air is required. Where a somewhat larger volume of air is required, hand pumps provided with fly-wheels and operated by one or more men by means of cranks, are employed. From these large hand pumps the progress to power air compressors is of degree, not of kind.

The air pump was invented by Otto von Guericke of Magdeburg, Germany, about 1654. In 1753 Holl used an air engine for raising water by air pressure on its surface, and in 1788 Smeaton invented a pump for use with diving apparatus. In 1851 compressed air was used by William Cubitt for bridge work, and a little later it was used by Brunel for the same purpose. In 1852 Colladon patented the application of compressed air for driving machine drills in tunnel construction. Sommeiller developed Colladon's idea, and constructed an air-compressing plant for the Mont Cenis Tunnel work. The Sommeiller compressor was operated as a ram, utilizing a natural head of water to force air at 80 pounds pressure into a receiver. The column of water contained in a long pipe on the side of the hill was started and stopped automatically by valves controlled by engines. The weight and momentum of the water forced a volume of air with such a shock against a discharge valve that it was opened, and the air was discharged into the tank. The valve was then closed and the water checked, and a portion of it was allowed to discharge and the space to fill with air, which was in turn forced into the tank. The injection of water in the form of a spray into the compressor cylinder was first introduced on the St. Gothard Tunnel work begun in 1872. The first compressor used in America was developed by Thomas Doane, the chief engineer of the Hoosac Tunnel, and was employed on that work. This compressor had four single acting cylinders and was cooled by the injection of water through the inlet valves into the cylinders. These early compressors are of historical interest only at the present time. As the necessity for compressed air power grew, inventors turned their attention to the design and construction of compressors which would combine efficiency with light weight and economy of space and cost. As the result of this work, the modern air compressor has been developed.

The simplest form of power air compressor is the air brake pump, with which practically every American locomotive is equipped. In this pump, it will be readily understood, the main considerations are economy of space, light weight, and absolute reliability of action; economy of steam consumption being quite a secondary matter. A 9½-inch air brake pump, for example, will give 1.85 cubic feet of air at 90 pounds pressure, with a consumption of 1 pound of steam at 140 pounds pressure, while a two-stage Corliss air compressor will give 13.7 cubic feet of air at 90 pounds pressure with the same steam consumption. The

AIR BRAKE

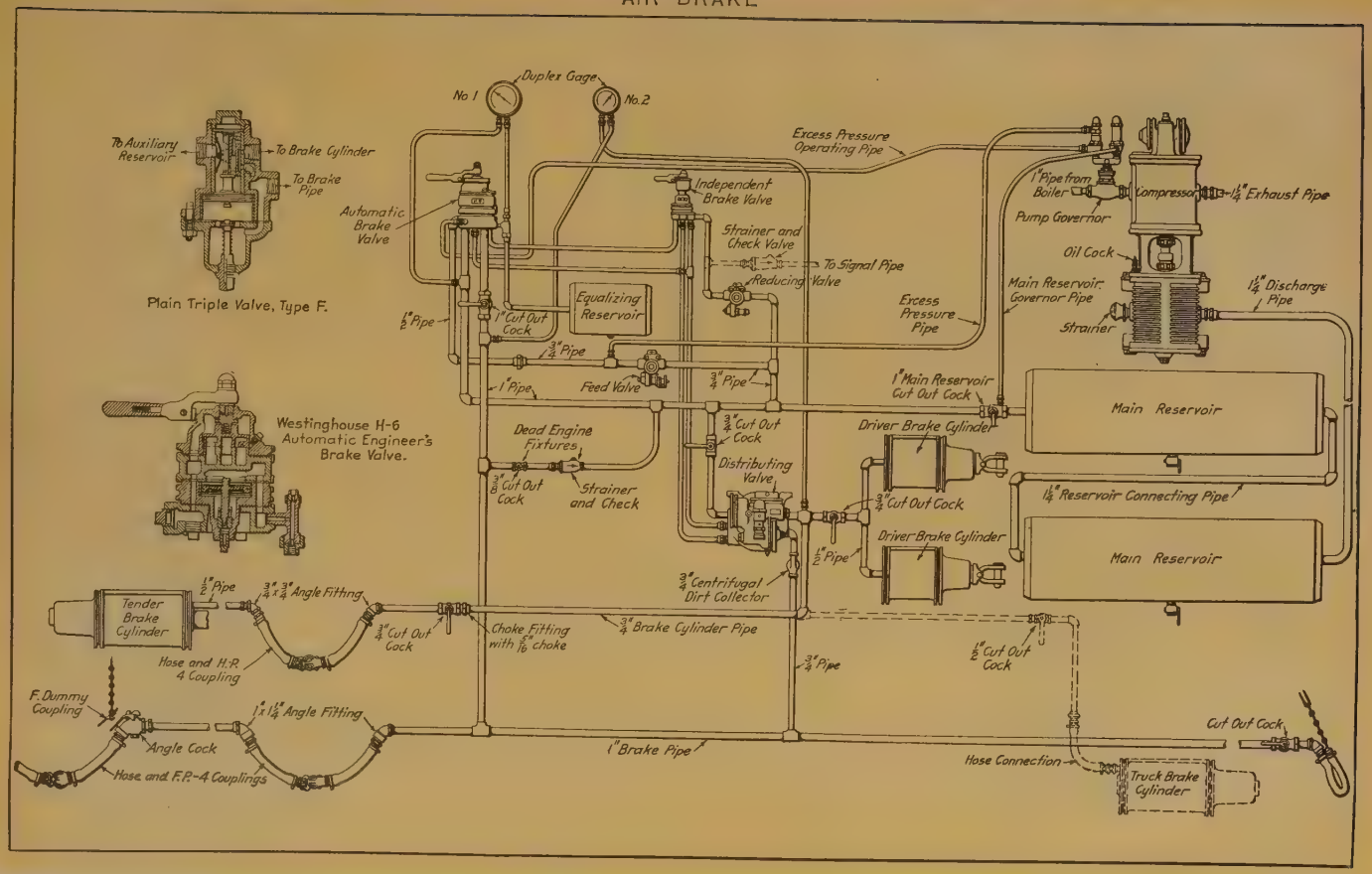
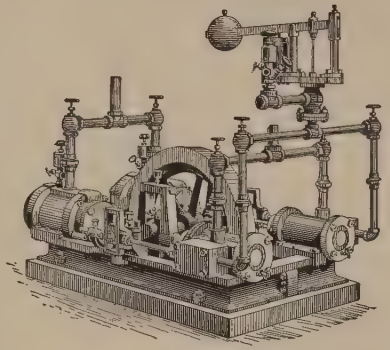


DIAGRAM SHOWING ARRANGEMENT OF WESTINGHOUSE E. T. (ENGINE AND TENDER) AIR BRAKE EQUIPMENT



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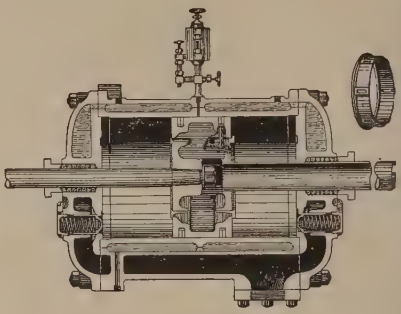

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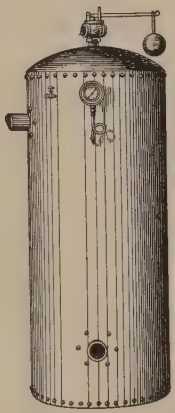

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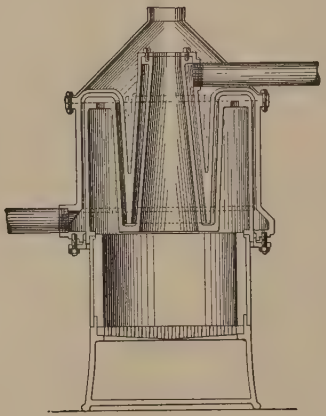

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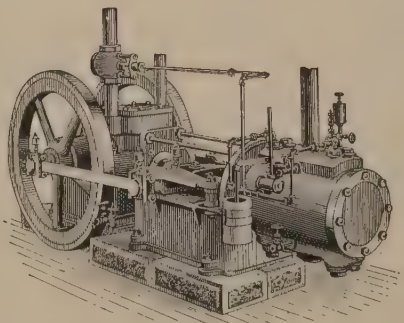

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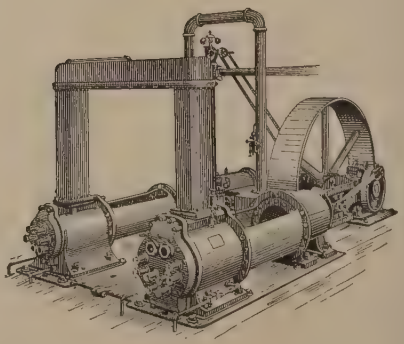

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1. DIRECT ACTING FLY-WHEEL COMPRESSOR, with yoke mechanism.
2. PISTON-INLET AIR COMPRESSOR CYLINDER, showing water-jacket.
3. STEEL CYLINDRICAL AIR RECEIVER, with safety relief valve.
4. COAL-FIRE AIR REHEATER, to reheat air before expansion.
5. SINGLE AND SIMPLE STEAM-DRIVEN AIR COMPRESSOR.
6. COMPOUND STEAM TWO STAGE AIR COMPRESSOR, with intercooler.

standard air brake has a steam cylinder and an air cylinder of the same size, viz., 9½ inches diameter and 10-inch stroke, set vertically one above the other, with a common piston rod. See AIR BRAKE.

It has been stated above, in referring to the bicycle pump, that air is heated by compression. The equivalent of the mechanical work done in the compression appears in the form of heat in the compressed air in a storage tank and will be given out again when the air expands. As heat causes air to expand, a cubic foot of hot air, at, say, 75 pounds pressure, will decrease in volume when cooled, and thus bring about a reduction in pressure to something less than 75 pounds. Evidently, therefore, a loss of work done in compression results from the heating of the air, unless it is used at once as hot air; and this is usually inconvenient. The amount of the loss is estimated at 21.3 per cent of the total work done in compressing air to 75 pounds pressure. To save this loss, compressors are designed with some form of device for keeping the air cool during compression. Two systems are used, by which it is attempted to keep the air cool during compression, and these systems divide air compressors into two classes, as follows: (1) Wet compressors which introduce water directly into the cylinder during compression, (*a*) in the form of a spray, and (*b*) by the use of a water piston; (2) Dry compressors, which admit no water directly into the cylinder, but have the cylinder surrounded by a jacket, into the space between which and the cylinder walls water is forced and kept in circulation. The water piston compressor is now seldom used. Cooling by the water spray injection gives the most efficient results as far as cooling the air is concerned, but it has so many objections, from the moisture which it carries, that it has been found to be the best practice to use the less efficient but vastly more simple water-jacket system and endure the loss of heat which might be saved by using water spray injection. Accordingly, most air compressors are nowadays provided with a water-jacketed air cylinder for cooling the air during compression.

Vertical air compressors have the steam cylinders placed vertically above the air cylinders; horizontal compressors have the steam and air cylinders placed horizontally one ahead of the other. Direct air compressors have the steam and air piston on the same piston rod, so that the thrust of the steam piston gives a direct thrust on the air piston; indirect acting compressors transfer the thrust of the steam piston by means of cranks and gearing to the air piston rod. A single-acting compressor is one which compresses air on the forward stroke of the air piston only, the back stroke doing no useful work; a double-acting compressor compresses air on both the forward and back strokes of the air piston. A two-stage compressor partly compresses the air in one cylinder, from which it is passed to a second cylinder, where it is further compressed. Generally, the air in passing from the first to the second cylinder passes through an inter-cooler, where it is cooled by water. Three-stage and four-stage compressors are sometimes employed for high pressures. A duplex air compressor consists of a right-hand steam and air cylinder and a left-hand steam and air cylinder, each side being capable of being run separately, or the two sides can be run together. A duplex compressor may have either the air cylinders or the steam cylinders, or both air and steam cylinders compounded. Air compressors may have the steam cylinders replaced by an electric motor driving a crank-shaft, or the crank-shaft may carry a pulley so that they may be operated by a belt, or by a water wheel obtaining power from a head of water.

Whatever the form of compressor which is used, the mechanical action in compressing the air is that of a piston working in a cylinder, exactly as in the case of a bicycle pump. As each cylinderful of air is compressed, it is forced into a sheet-steel tank called a receiver. This receiver is best cylindrical in form, and serves as a reservoir of compressed air for supplying the machine which is operated by air pressure. The receiver is often provided with an arrangement for cooling the contained air by water. While it is advantageous, for the reason given above, to keep the air as cool as possible during compression, heating it is an advantage, as soon as it leaves the receiver, for the reason that by this heating its volume or its pressure is increased. So important is this advantage, theoretically, that devices called reheaters are often employed to heat the air just before it passes to the motor or the tool which it operates. Reheaters are made in many forms, the usual one being a kind of stove or oven through which the air passes by means of a spiral pipe or some other arrangement which allows it to be quickly heated. The utilization of compressed air for transmitting power or available energy from the compressor and reservoir to the point where power or motion is to be developed is as wide as the industries. It is clean, easy to control and manipulate, leakage is innocuous, and there is no danger from fire. It is a rival of the transmission of power by electric wires, where the motion desired is a reciprocating one or to be effected by a pressure over an area, as with a piston working a cylinder. It is reliable and not subject to short circuits or loss of its potential energy. This fits it for train-brakes, switch and signal systems, riveters and rock-drills, and for use in the foundry. It is conveniently, cheaply, and cleanly stored: this fits it for use in mines and other transportation problems; it is free from the danger of sparks in combustible atmospheres. Where air is itself required in the processes, as in aërating, oil and fuel burners, spraying, cleansing, pumping, etc., it has no substitute.

Power cannot be carried in air pipes over the distances possible with the electric system on account of pressure losses by friction, unless a size of pipe is used which is prohibitory from its cost and trouble with its joints. Air can be used in ice-making or the production of cold, by cooling the compressed air at a high pressure and allowing it to expand in an air engine, dropping its temperature as it does so. Air can be liquefied by compressing it at very low temperatures.

For the great majority of industrial uses an air pressure below 75 pounds per square inch is ample, but for charging the tanks of compressed-air locomotives, for liquefying gases, etc., much higher pressures are required. The highest known pressure to which air has been compressed is 4000 atmospheres (about 60,000 pounds) per square inch, but this was a laboratory experiment. The safe limit of pressure for use in the arts to-day is largely determined by the strength of the retaining vessel or reservoir, and has reached its limit at about 3000 pounds per square inch. To obtain these great pressures specially

designed air compressors have to be constructed, and great trouble is experienced from the cold resulting from the fall of temperature in expanding to atmospheric pressure.

For a concise and readable history of air compressors and of the use of compressed air, consult Saunders, *Compressed Air Production* (New York, 1902), or Hiscox, *Compressed Air and its Applications* (New York, 1901); for a somewhat more technical discussion of the production and use of compressed air, F. Richards, *Compressed Air* (New York, 1895); for practical use of compressed air especially in mine service, Peele, *Compressed Air Plant* (2d ed., New York, 1910). Consult also, Harris, *Compressed Air: Theory and Computations* (New York, 1910), and Thorkelson, *Air Compression and Transmission* (New York, 1913). The most thorough work in English on the theories involved in the use of compressed air is Weisbach's *Mechanics of Air Machinery* (New York, 1905).

AIR CUSHION, kŭsh'ŭn. A mattress or cushion composed of a bag or sack of air-tight fabric, which can be inflated, and which possesses many advantages of comfort, cleanliness, and portability. Air-beds were known as early as the beginning of the eighteenth century, but, being made of leather, were expensive, and it was only after the invention of air-tight or rubber cloth that they could be constructed at a moderate cost. An air-bed consists of a sack in the form of a mattress, which may be divided into a number of compartments, each air-tight, or it may have a single compartment with the walls tied to each other to preserve its shape when inflated. The bed is supplied with a valve, or valves, through which the air is blown in by a bellows or an air pump. They are especially valuable in many cases of sickness and for use by camping parties. Air-inflated pillows are made to go with the mattresses. The air-cushion is another contrivance of the same kind, the layer of rubber being securely pasted or cemented to a layer of strong cloth, the cloth giving strength and the rubber impenetrability. Air cushions are specially useful on yachts and canoes, where they may be used also as life-preservers on account of the buoyancy. The chief drawback to these contrivances is their liability to being spoiled by a rent or a puncture.

AIRD, Sir John (1833–1911). An English engineer who, after the completion of his education, became associated with his father, a contractor in large undertakings. When he was only 18 years of age, John Aird was entrusted with a considerable amount of important work in connection with the Exhibition of 1857. He afterwards built many large gas and water-works plants in England and elsewhere. His most famous achievement, however, was the building of the great Assuan Dam (q.v.), of which Sir Benjamin Baker (q.v.) was the engineer. The firm of John Aird & Co., which had contracted in 1898 to build not only the dam but also the Assiut Barrage (see Assiut) within five years, finished the task in 1902, 12 months earlier than had been stipulated. Aird was returned in 1887 as a member of Parliament in the Conservative interest from North Paddington and held this seat until 1905. He was made a Baronet in 1901, and was decorated by the Khedive of Egypt with the Grand Cordon of the Medjidie, in recognition of his work at Assuan.—Sir John Aird, his son and successor, was born in 1861. He also was eminent as an engineer and builder. He took part in the construction of the Assuan Dam and Assiut Barrage and was decorated with the Imperial Order of the Osmanie, second class.

AIRD, ârd, Thomas (1802–76). A Scottish poet of considerable talent. He was born at Bowden, in Roxburghshire, was educated at the University of Edinburgh, and gained the friendship of many distinguished men, especially John Wilson, who always spoke of him in very high terms. In 1835 he became editor of *The Dumfries Herald*, a new journal, started on conservative principles, an office which he filled till 1864. His works are not so well known as they deserve to be, from their intrinsic merit. In spite of very warm praise from Carlyle and others, they have failed to secure a large measure of public approbation. *The Devil's Dream* is perhaps an exception to the rest, for it is both well known and admired. There is something almost Dantesque in the stern, intense, and sublime literalness of the conception. Whether the scenes are on a large scale, as in *The Devil's Dream*, or minute, as in *The Summer's Day*, there is the same clear, vigorous, and picturesque word-painting. In 1827 Aird published *Religious Characteristics*, a piece of exalted prose-poetry; in 1830, *The Captive of Fez;* in 1845, *The Old Bachelor*, a volume of tales and sketches; in 1848, a collected edition of his poems, a second edition of which appeared in 1856, and in 1852 he edited the select poems of David Macbeth Moir (the "Delta" of *Blackwood's*), prefixing a memoir. See his life and poems, edited by J. Wallace (1878).

AIR DRAINAGE. See Frost.

AIRD'RIE (Gadhel. Smooth Height; from *aird*, height). A town in Lanarkshire, Scotland, 11 miles by rail east of Glasgow (Map: Scotland, D 4). The highroad between Edinburgh and Glasgow intersects it and forms its principal street. It has risen rapidly, was incorporated in 1821, and is now one of the most flourishing inland towns in Scotland. Little more than a century ago it consisted of a solitary farmhouse or two, but the abundance of iron and coal found in the vicinity has given its industries an immense impetus. In addition to foundries, there are cotton-weaving establishments and paper mills. When the Free Library Act was passed, Airdrie was one of the first towns to adopt its provisions. Pop., 1891, municipal borough, 19,135; 1901, 22,288; 1911, 24,388.

AIRE, âr, or **AIRE-SUR-L'ADOUR,** âr'-sŭr'lâ'dōōr'. A town of the department of Landes, France, situated on the slope of a hill on the left bank of the Adour, 112 miles south of Bordeaux (Map: France, S., D 5). It has been the seat of a bishopric since the fifth century, and its cathedral of St. Wolfram is a fine example of flamboyant Gothic, begun by Cardinal Georges Antoine, under Louis XII, but, in restoration and completion, finished in a mean and paltry style. Aire has also a college and a library. Its industries are not considerable, but tanyards and hat factories give employment to most of its inhabitants. Pop., 1896, 2434; 1901, 2247; 1906, 4303; 1911, 4025.

AIRE, or **AIRE-SUR-LA-LYS,** âr'sŭr-lâ-lēs'. A town of the department of Pas-de-Calais, France, on the Lys and at the junction of three canals, 30 miles southeast from Calais (Map: France, N., H 2). The town is fortified and well built, though situated in a low, marshy region. Its chief buildings are the handsome Gothic

church of St. Peter, dating from the fifteenth century, the Hôtel du Baillage or Corps de Garde of the sixteenth century, the Hôtel de Ville, and extensive barracks. France acquired possession of Aire in 1713. It has flour mills, various domestic manufactures, and a trade in agricultural products. Pop., 1901, 8458; 1906, 7999; 1911, 8247.

AIREDALE TER'RIER, ār'dāl. See TERRIER.

AIR EN'GINE. See AIR COMPRESSOR; COMPRESSED AIR ENGINE and CALORIC ENGINE.

AIR GUN. An instrument somewhat resembling a sporting rifle, designed to discharge darts or bullets by the elastic force of compressed air. As ordinarily made, an air gun consists essentially of an air chamber or reservoir, usually located in the stock; of a condensing syringe for pumping air into the reservoir, and of a valve operated by a trigger, which admits the compressed air from the reservoir to the barrel behind the bullet. In some weapons of this sort a pressure of as much as 500 pounds is secured in the reservoir. Usually only a portion of the air in the reservoir is used for a single shot, and therefore a number of shots may be fired without recharging the reservoir simply by releasing the pull on the trigger immediately and thus closing the valve between the reservoir and barrel after a small portion of the air has escaped. This permits repeating air guns to be made similar in the mechanism for inserting the bullets to repeating fire-arms. Obviously, the pressure in the reservoir decreases with each discharge of air, and therefore each succeeding bullet is discharged with less force than the preceding one. At best, the force with which a bullet is discharged from an air gun is much less than is given by gunpowder. Sometimes air guns are made in the form of canes or walking sticks, which, like sword canes, are carried for purposes of personal defense in sudden emergencies. The range of an air gun of the ordinary kind is from 180 to 250 feet. The air gun was known in France over two centuries ago, and the ancients were acquainted with a device by which air acted on the short arm of a lever, the longer arm of which was used to propel a bullet. In 1886 Lieut. E. L. Zalinski of the United States army invented a pneumatic gun for throwing projectiles filled with dynamite; and later the *Vesuvius* was built for the United States navy and equipped with three of these guns. This vessel was used during the blockade of Santiago Harbor in the Spanish-American War of 1898. During the Brazilian civil war of 1893 the *Nictheroy* was equipped with a pneumatic gun 50 feet long and of 15 inches calibre. The conclusions of experience with both sets of guns was that the range of the gun was too small and the accuracy of its fire insufficient to make it a serviceable weapon on shipboard. The Sims-Dudley pneumatic gun used by the insurgents in Cuba was a field piece having a range of from 2600 to 3600 yards. It consisted of a lower, or combustion, tube 7 feet long and 4½ inches in diameter, and an upper tube, or barrel, 20 feet long and 2½ inches in diameter, mounted on a regular field-gun carriage. A cartridge inserted into the breech of the combustion chamber, and containing a 7 to 9 ounce charge of smokeless powder, is fired; this compresses the air in the lower chamber so that it passes into the upper tube or barrel behind the projectile and forces it out. The projectile was a light casing filled with explosive gelatine, fired by a time fuse, or by a contact fuse upon striking.

AIR METER. A special form of anemometer designed to measure the flow of air in mine shafts, ventilating ducts, galleries, chimneys, etc. See ANEMOMETER.

AIROLO, ī-rō'lō (in German, EBIELS). A village in Switzerland, in the canton of Ticino, on the Upper Ticino, 3755 feet above the sea, 66 miles south of Lucerne, at the south end of the St. Gothard Pass and of the St. Gothard Railway Tunnel (q.v.) (Map: Switzerland, C 2). On Sept. 17, 1877, it was nearly destroyed by fire, but later was rebuilt in stone. Dec. 27–28, 1898, it was partially destroyed by an avalanche. The town is safeguarded against further disaster of this nature by the erection of embankments and the regulation of the courses of mountain streams. The inscription, "Suvarov Victor," that was carved in the rocks to commemorate the victory here of the Russians over the French, Sept. 13, 1799, is now obliterated. Pop., 1900, 1628; 1910, 1696.

AIR PLANT. See EPIPHYTE.

AIR PORT. See SHIPBUILDING.

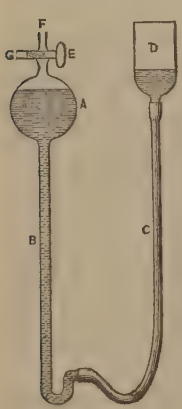
AIR PUMP. An instrument for removing the air from a vessel. These pumps may be divided into two classes, mechanical air pumps and mercurial air pumps. The mechanical air pump was invented by Otto von Guericke about 1654, and a specimen of his early apparatus is shown in Fig. 1 of the accompanying page illustration. In Fig. 2 is illustrated a modern simple air pump whose essential part is a hollow brass or glass cylinder, in which an air-tight piston is made to move up and down by a rod. From the bottom of the cylinder a connecting tube leads to the space which is to be exhausted, which is usually formed by placing a bell-glass, called the receiver, with edges ground smooth and smeared with lard, on a flat, smooth plate or table. When the piston is at the bottom of the barrel and is then drawn up, it lifts out the air from the barrel, and a portion of the air under the receiver, by its own expansive force, passes through the connecting tube and occupies the space below the piston, which would otherwise be a vacuum. The air in the receiver and barrel is thus *rarefied*. The piston is now forced down, and the effect of this is to close a valve placed at the mouth of the connecting tube and opening inward into the barrel. The air in the barrel is thus cut off from returning into the receiver, and as it becomes condensed forces up a valve in the piston, which opens outward and thus escapes into the atmosphere. When the piston reaches the bottom and begins to ascend again, this valve closes; and the same process is repeated as at the first ascent. Each stroke thus diminishes the quantity of air in the receiver; but from the nature of the process it is evident that the exhaustion can never be complete. Even theoretically there must always be a portion left; and practically the process is limited by the elastic force of the remaining air being no longer sufficient to open the valves. The degree of rarefaction is indicated by a gauge, on the barometer principle.

As this air pump only withdraws the air at the rate of one cylinder full for a double stroke of the piston, pumps with two barrels are frequently used, in which case the pistons are each attached to the same handle, but each moves in an opposite direction to the other, the object being to double the work done at each stroke of

the handle. Such a pump is illustrated in Fig. 5 of the page plate. A large number of modifications of this type of pump have been invented, all of which are the same in general principles. There are several reasons why such pumps do not continue the process of rarefaction indefinitely, but after a certain stage their effects cease and the tension of the air undergoes no further change. Leakage at various joints in the pump is one limiting cause to the action of the machine. As the exhaustion proceeds the leakage is faster on account of the reduced pressure in the receiver, and finally a limiting point is reached when the inflow and outflow are equal and no reduction in the tension of the air takes place. Another limit to the action of this machine is caused by the fact that there must always be some space between the bottom of the piston and the lower end of the cylinder, which is untraversed by the piston.

A greatly improved type of mechanical air pump, known as the Geryk, in which the piston and valves are always covered with a quantity of oil, so that the pump has virtually a liquid piston and liquid valves, has recently come into wide use for commercial and laboratory purposes. The oil used in the cylinder must have a very low vapor tension, which requirement is met by oils of high boiling point. With a pump of this sort, having two cylinders working in series, a vacuum of 1/500,000 of an atmosphere may be rapidly obtained. In the Rose air pump the piston rod is eliminated, as an iron piston moved by electro-magnets oscillating outside of the pump is employed.

For the production of very high degrees of exhaustion, the more slowly working mercurial air pump is used. The principle of the mercurial air pump was first known in the seventeenth century, when Torricelli showed how to produce a vacuum by filling a tube over 30 inches long and closed at one end, with mercury, and then inverting the tube, with the open end temporarily closed, in a vessel containing the same liquid. The mercury in the tube then descends to a height equal to that of the barometer above the level of the mercury in the lower cup, and a vacuum is left in the top of the tube. This is always alluded to as a Torricellian vacuum, and is found in the ordinary barometer. In 1855 Geissler invented a mercurial air pump in which the vacuum is produced by connecting a receiver with a Torricellian vacuum. The original form of Geissler's pump is shown in the accompanying diagram, which will serve to illustrate the principle of the operation of pumps of this class, though they have received numerous modifications and improvements. In most mercury pumps the parts are made of glass, the connections being made with rubber tubing. In the diagram, *A* is a large bulb, *B* is a tube about 3 feet long, *C* a rubber tube uniting the lower end of *B* with the vessel *D*, which is open on top. *A* can be connected with either of the tubes *G* or *F*, but not with both at once, or it can be shut off from both. The receiver to be exhausted is connected with *G*, and *F* leads to the open air. Enough mercury is used to fill *A*, *B*, *C*, and *D*, as shown, and the vessel *D* is capable of being raised or lowered. The operation of the pump is as follows: Suppose the vessel *D* is raised a little higher than *A*, as in the figure. The mercury will flow into the bulb *A*, which it fills if the cock *E* is turned so as to connect *A* with the outside air, *F*. The cock is then turned so as to connect *A* through the tube *G* with the vessel to be exhausted, the air in which at this stage is at atmospheric pressure. *D* is then lowered, and the level of the mercury in *A* is lowered in consequence, the mercury running down *B* and *C* to *D*. As the mercury in *A* descends, air is drawn from the receiver through *G* into *A*, so when the mercury has descended below *A* the whole space is filled with the air drawn through *G*, which, having expanded from the receiver attached to *G*, is at less than atmospheric pressure. The cock *E* is then turned so as to cut off communication between *A* and *G*. *D* is then slowly raised, and the mercury flows gradually back into *A*, compressing the air above it until it is at atmospheric pressure. At this point the cock *E* should be turned to connect *A* with the outside air *F*, and as *D* continues rising the mercury continues to drive out all the air at *F*, until the bulb *A* is filled with mercury to the cock *E*, which is then closed so as to cut off all communication with *A*. When *D* is again lowered, the mercury does not begin to fall in *A* until *D* is about 30 inches below *A*. It then begins to descend, leaving a Torricellian vacuum above it, and *D* is lowered until *A* is empty. The cock is then turned so as to connect *A* with the receiver through *G*, and the remaining air in that vessel expands and fills *A*. The cock *E* is next turned off, *D* is raised, and the mercury rising in *A* compresses the air above it until it is let out at *F* by turning the cock. By repeating this operation a sufficient number of times a vacuum is gradually produced in the receiver connected to *G*. When the operation is nearly finished, great care must be taken not to raise the vessel *D* too rapidly, or the impact of the mercury against the top of the bulb *A* will break the apparatus. It will also be seen that when the vacuum is nearly reached the mercury in *A* will be at the top of the bulb when *D* is about 30 inches below. If the valve should be turned to *F* at this point, the inrush of air would drive the mercury down. Therefore no communication between *A* and *F* must be made until *D* has been raised on a level with *E*, and no communication between *G* and *A* must be made until *D* is lowered 30 inches again, otherwise mercury will run through *G* into the receiver which is being exhausted.

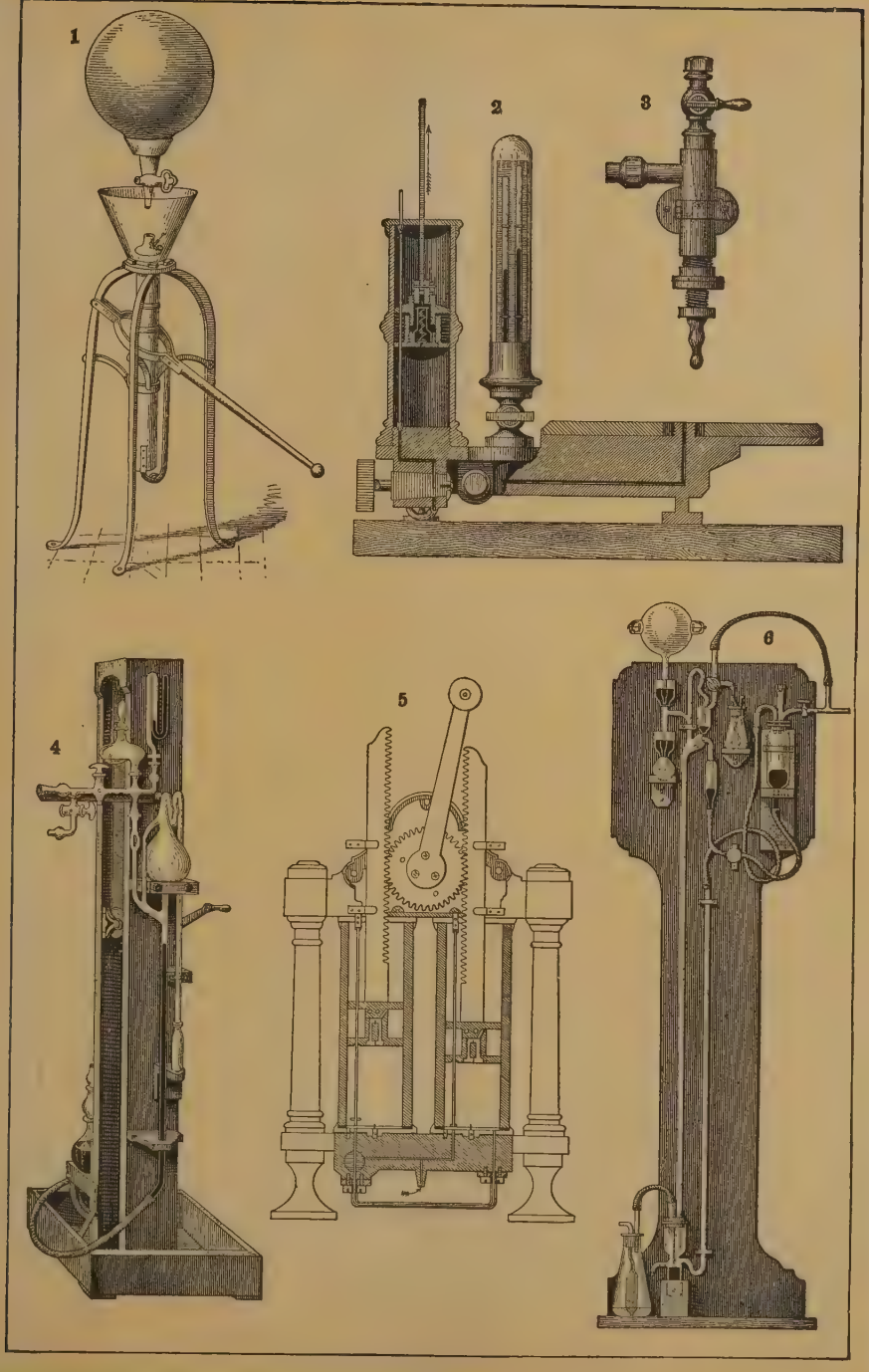


GEISSLER PUMP.

The Geissler pump just described may be taken as the type of mercury pumps, which are classified as upward driving, and, while a number of improvements in details have been introduced, making them of a more practical type for factory use, these pumps all operate on the principle of connecting the receiver to be exhausted with Torricellian vacuum.

Sprengel brought out his well-known form of mercury pump in 1865, and the diagram shows it in its simplest form. The Sprengel pump is a general type of what are classified as downward-driving pumps. *A* is a funnel having a stop-cock

AIR PUMPS



1. APPARATUS OF OTTO VON GUERICKE with water receptacle at base removed.
2. SECTION OF SIMPLE AIR PUMP.
3. BUNSEN WATER PUMP.
4. MERCURIAL AIR PUMP, Töpler-Hagen form with improvements.
5. MECHANICAL AIR PUMP, with two vertical cylinders.
6. SELF-ACTING SPRENGEL MERCURIAL AIR PUMP, with auxiliary water pump.

C, and *B* is a tube of small bore, called the shaft or fall-tube. The receiver to be exhausted is connected to the tube *G*, which branches off from near the top of the shaft. The tube *B* terminates very close to the bottom of the vessel *D*, which is provided with a spout *F*, as shown, leading to the cup *E*. The distance from the branch *G* to the top of the mercury in the vessel *F* must be at least 3 feet. *A* is filled with mercury, which flows down the shaft *B*, the rate of flow being regulated by the cock *C*, so that a very small stream is allowed to fall. This mercury in falling breaks up into short lengths, between which are small columns of air which flow in at the junction of *G* with the shaft *B*. The weight of the mercury forces these short columns of air down the shaft *B* to the mercury in *D*, from the surface of which they escape. The mercury as it runs into the cup *E* must be poured back into the funnel *A*. This operation continues until no more air is carried down with the mercury. When the vacuum is nearly completed, the mercury in the fall-tube will fall with a sharp, rattling noise, showing that there is not enough air carried down with it to act as a cushion.

SPRENGEL PUMP.

With all kinds of mercury pumps, however, it is necessary to continue the operation for a considerable time after the receiver is apparently exhausted. Even when no more air appears to be carried on by the pump, the vacuum will improve as the operation continues. The reason for this is that the air sticks to the surface of the glass, forming a sort of coating, which is swept off the surface by the pump, but very slowly. The simple form of Sprengel pump is better than the simple Geissler pump, but is not well suited to factory work on account of the slowness of its action. The drawback is overcome, to a great extent, by supplying the pump with a number of fall-tubes, which act together as a single one. For example, if six fall-tubes are used, the work of removing most of the air is done in one-sixth of the time required by a single pump. After the greater part of the air is removed, however, the time taken to produce a good vacuum is not nearly so much reduced, and it is chiefly in the early part of the operation that the saving of time is effected. Another drawback to all mercury pumps is their liability to breakage, even with the most careful usage. In the Sprengel pump, owing to the continual hammering of the mercury, the fall-tubes are very often broken, even after only a very short usage. A method is in use with both of these forms of pumps which consists of exhausting into a partial vacuum instead of into the atmosphere. This is accomplished by inclosing the part of the apparatus where the air is expelled in a chamber which is kept at a partial vacuum by means of a mechanical or water air pump. By this means the mercury pump will work against a pressure much less than the atmospheric pressure, and consequently the fall-tubes and the height to which the mercury must be raised can be very much reduced, while the air is much more readily drawn down and out of the fall-tubes.

In factory work the raising of the mercury from the lower to the upper level of the pumps is done mechanically and not by hand. It may be raised by a force-pump, or in small buckets on an endless chain, or by air pressure. The latter may be simply atmospheric pressure, and the mercury is raised by being broken up into small lengths with air spaces between, like a Sprengel pump working upward into a vacuum chamber. The illustrations show modern forms of mercury pumps. In an improved form of Sprengel pump designed by G. W. A. Kahlbaum a steel gun-barrel replaces the glass fall-tube. This avoids the electrification of the glass by the friction of the falling mercury, and with the other improvements introduced enables a higher vacuum to be attained than ever previously. In this way, in 1901, he was able to obtain a degree of exhaustion corresponding to a pressure of .0000018 millimeters of mercury, which at that time was considered the best on record.

For much experimental work it is necessary to employ some form of continuous running air pump in order to maintain a satisfactory vacuum, and a rotary arrangement of the mercury pump has been found useful in most cases. Such a device was first developed by Schultze-Berge and underwent numerous modifications; that of Kaufmann, brought out in 1905, while fragile and complicated, was very efficient. Here the mercury is contained in an inclined spiral tube which is rotated so that at each revolution a fraction of the air in the vessel under exhaustion is cut off.

Later important improvements in air pumps were due to Dr. W. Gaede. One of his pumps consisted of an outer and closed drum half filled with mercury, which rotated a second drum divided into chambers connected with the vessel to be exhausted. As the drum is rotated, the chambers are filled alternately with gas and mercury, the former being displaced into the outer space between the two drums and there cut off by the mercury. This machine has been aptly compared to a form of gas meter where the moving gas affects the rotation of the mechanism, only in the rotary pump the gas is set in motion by the rotation of the drum. It is necessary with this pump first to make a rough exhaustion by preliminary pumping, so that the difference of pressure between the outside and inside of the rotating drum is not sufficient to drive the gas back into the drum.

Dr. Gaede also designed a mechanical pump which departs radically from the Guericke principle, as it maintains at all times an open connection between the vessel to be exhausted and the delivery pipe. It is known as a molecular air pump and consists of a rapidly rotating cylinder which serves to drag the gas along by the movement of its surface within a slightly larger cylinder so that a difference of pressure is established between two openings on opposite sides but connected by a slot. In actual construction a grooved cylinder is used with a tongue projecting into the groove, and a number of grooves are employed, the apparatus being compounded so that the low-pressure side of one groove is the high-pressure side of the previous one. Preliminary exhaustion is required with this pump, but it works as well with vapors as it does with gases, and no drying is required. At a speed of 12,000 revolutions per minute a vacuum corresponding to .0000002 (2×10^{-7} millimeters of mercury was obtained, which at the time became easily the best record for exhaustion. The higher the speed the greater the

exhaustion. The mechanical air pump works ten times faster than the rotary mercurial air pump and puts at the command of the investigator the very highest vacua.

The degree of exhaustion obtained with various types of air pumps may be seen from the accompanying table, compiled by Andrade in 1913 and published in *Nature* with an article on "Modern Air Pumps."

TABLE OF COMPARATIVE EXHAUSTION OBTAINED WITH VARIOUS TYPES OF AIR PUMPS

Pump.	Pressure in millimeters of mercury.
Water pump	10.
Ordinary piston pump	1.
*Older Geissler pump	.1
*Newer Geissler pump	.01
*Sprengel pump	.001
*Modified Toepler pump	.00001
Kahlbaum's automatic mercury pump	.000002
Geryk oil-filled pump	.0002
Gaede rotary mercurial pump	.00001
Gaede molecular pump	.0000002

The water pump invented by Bunsen is a simple form of apparatus that is found generally in physical and chemical laboratories and adequately answers when too high a degree of exhaustion is not required. It consists of a tube attached to a faucet or other supply of water under pressure, through which water empties into a chamber provided with two outlets. From one of these the water flows out, carrying with it the air from the vessel to be exhausted, which is connected with the second tube. In its original form this piece of apparatus was made of glass and rubber tube, but with metallic parts that allow it to be connected to an ordinary faucet. It is extensively used in laboratories. The page illustration (Fig. 3) shows one form of such a water pump.

Bibliography. Descriptions of air pumps of various forms are to be found in all the large treatises on physics, including those of Ganot, Deschanel, Müller-Pouillet, and Winkelmann (1886), the two last named (in German) giving a complete account of the most important types of apparatus of this class. In the *Journal of the Society of Arts*, vol. xxxvi (London, 1888), there is an interesting and valuable article on "The Development of the Mercurial Air Pump," by S. P. Thompson, in which the various forms of this instrument are described. This has been reprinted in book form. For the most recent achievements in air pumps and high-vacua apparatus the reader is also referred to the columns of the *Annalen der Physik und Chemie*, *Berichte der Deutschen Physikalischen Gesellschaft*, *Physikalische Zeitschrift*, *Zeitschrift für Instrumentenkunde*, *American Journal of Science*, and *Science Abstracts*. For AIR COMPRESSORS, see under that title.

AIR RESIST'ANCE OF A PROJECTILE. See BALLISTICS.

AIR SHIPS. See AËRONAUTICS.

AIRY, âr'ĭ, Sir GEORGE BIDDELL (1801–92). An English astronomer. He was born at Alnwick, Northumberland, and graduated at Trinity College, Cambridge, in 1823. In 1825 he discovered the optical defect of astigmatism and provided a corrective for it. He was elected to the Plumian professorship at Cambridge in 1828 and intrusted with the management of the Cambridge Observatory, the results of his labors being published in the compilation entitled *Astronomical Observations* (9 vols., Cambridge, 1829–38), which became the model of all analogous works since published in Great Britain. In 1835 he succeeded Pond as royal astronomer of the Greenwich Observatory, where he introduced or perfected numerous astronomical instruments, devised clearer and quicker methods of calculation, and instituted valuable researches in magnetism, meteorology, and photography. One of his most important achievements was the establishment of a mechanical device in the form of magnets and iron, whereby the disturbance of the compass in iron-built vessels can be rectified. It was he, also, who conducted the astronomical observations preparatory to the definition of the boundary between Canada and the United States. Among the works written by this distinguished scientist during his exceptionally long and useful career, the following are especially noteworthy: "Gravitation," for the *Penny Cyclopædia*, also published separately (1885); *Mathematical Tracts on Physical Astronomy* (4th ed., 1858); *Ipswich Lectures on Astronomy* (4th ed., 1858); *Treatises on Errors of Observation* (1861); *Sound* (1869); *Magnetism* (1870); "Trigonometry," "Figure of the Earth," "Tide and Waves," in *Encyclopædia Metropolitana*.

AISHA. See AYESHAH.

AISLE, īl (Fr. *aile*, wing, from Lat. *ala*, contracted from *axilla*). One of the longitudinal divisions in a building divided internally by parallel rows of columns or piers. In strictest parlance, the term should apply only to the lateral divisions on either side of a central division which is usually broader and higher than the others; but in general usage these are called the "side aisles," and the central division the "central aisle." On the other hand, the term "nave," often applied to the whole of the central aisle, strictly belongs only to that part of it west of the chancel or transepts. (See NAVE.) The intersection of the central aisle of the nave and choir with that of the transept is called the "crossing." The hypostyle halls of Egyptian temples offer the earliest examples of aisled construction; that at Karnak having eight aisles on either side of the central aisle. A few of the Greek temples (e.g., the Parthenon at Athens, temple of Poseidon at Pæstum) were three-aisled. It was the Romans, however, who developed a distinctive architectural treatment for aisled structures, in their basilicas or public halls. In these the central aisle was made much wider and higher than the side aisles, and lighted by a row of windows on either side above the side-aisle roofs; this is called a "clearstory," of which the prototype is seen in the hall at Karnak already mentioned. Some of the Roman basilicas were five-aisled (i.e., with two side aisles on either side of the central aisle), as the Julian and Ulpian; more often they were three-aisled. See BASILICA.

The mediæval type of Christian church west of the Byzantine Empire was derived from the Roman secular basilica, both in plan and, in the earlier centuries, in construction also, with the addition of a transept or transverse arm or aisle in front of the sanctuary or chancel. The intro-

* These values are taken from Winkelmann's *Handbuch der Physik*, vol. i, and are to be considered rough, but afford some comparison of the degree of exhaustion to be obtained with the various types. The compiler states that it is very doubtful whether Kahlbaum's pump can give better vacuum than Gaede's mercury pump, the figure for which is given by the Physikalisch-Technische Reichsanstalt.

duction of vaulting in the Romanesque period (tenth to twelfth centuries), applied at first only to the side aisles, but later also to the central aisle of nave and choir, operated to change completely the aspect, construction, and proportion of all the aisles, but without affecting the fundamental plan. (See CHURCH.) In the Gothic period (twelfth to sixteenth centuries) the height of all parts was greatly increased, and the clearstory, especially in France, made more important; one, and in some cases two, side aisles were continued around the apse to form ambulatories (see AMBULATORY); and the outer aisles of the choir, sometimes also of the nave, flanked with chapels. The cathedral of Antwerp has seven aisles; those of Cologne, Milan, Seville, Paris, Bourges, the great church of St. Sernin at Toulouse, and some others have five aisles; Rheims, Chartres, Amiens, and Beauvais have five-aisled choirs; the great majority of Gothic churches and many Renaissance churches have three aisles. Many transepts are without side aisles; some English cathedral transepts have only one side aisle, as at Salisbury: a few churches carry the side aisle entirely around the transepts, as St. Sernin at Toulouse and San Spirito at Florence.

The side aisles next the central aisle are in many cases two-storied, the upper story forming a spacious gallery on either side, as in Notre Dame, Paris, and in some of the Roman Christian basilicas (Sant' Agnese fuori le Mura). In Bourges Cathedral the inner aisles are of the height of two stories, having clearstory windows above the roofs of the outer aisles, but are without galleries.

The term is often applied, in common usage, to the passages between sections of seats in halls and churches; in this sense it appears to be derived from the French word *allée*, a passage.

AISNE, ān. A river in north France, a tributary of the Oise. It rises in the Forest of Argonne, flows northwest for the first two-fifths of its course, and then west to its junction with the Oise above Compiègne (Map: France, N., J 3). Its length is 170 miles, of which over three-fifths are navigable, either directly or by means of a canal parallel to its course. It is connected with the Meuse and Marne rivers by canals.

AISNE, ān. A department on the Belgian frontier of France (q.v.), formed of parts of the old Picardie, Brie, and Ile-de-France (Map: France, N., J 3). There are many navigable rivers, and the fertile soil is well adapted to agriculture and pasturing. The surface is rolling, and there are some forests. Manufactures are extensive. Capital, Laon. Pop., 1911, 530,226.

AISSE, ā'ĕ-sā', or **HAIDEE,** MADEMOISELLE (1694?–1733). A French writer, born in Circassia. She was taken captive by a Turkish marauding expedition and about 1698 was bought at the Constantinople slave market by the Comte de Ferriol, the French ambassador. She was educated at Paris, where she was subsequently a prominent figure in many salons. Her letters to Madame Calandrini were first published in 1787, with notes by Voltaire. In 1847 a critical edition was published by M. J. Ravenel, with a study by Sainte-Beuve. A still later edition is that with a study by Eugène Asse (1873). See also the essay by Edmund Gosse in his *French Profiles* (London, 1905).

AISTULF, ās'tŭlf, or **ASTOLF,** ăs'tŏlf (died 756). A King of the Lombards. He succeeded Rachis, who entered a monastery in 749. In 751 he seized Ravenna and soon after attempted to capture Rome. The Pope, unable to get aid from the Emperor at Constantinople, went to implore assistance from Pepin (q.v.). The latter, in 754, invaded Italy, defeated Aistulf, and forced him to promise to give up the conquered territory. This Aistulf did not do, but in January, 756, laid siege to Rome. Pepin again went to aid the Pope, besieged Aistulf, who had left Rome on learning of Pepin's advance, in Pavia, and forced him to surrender the Exarchate of Ravenna. (See DONATION OF PEPIN.) The dates, which were disputed, are discussed in Gregorovius, *City of Rome in the Middle Ages*, vol. ii (London, 1896).

AITKEN, āt'kĕn, ROBERT (1734–1802). A Scotch-American printer and bookseller. He was publisher of the *Pennsylvania Magazine*, or *American Monthly Museum*, in 1775 and 1776, and in 1777 was imprisoned as a sympathizer with the Patriot cause. At a considerable loss he printed the first American edition of the Bible (1782), which since has become very rare. He is supposed to have written *An Inquiry Concerning the Principles of a Commercial System for the United States* (1787).

AITKEN, ROBERT GRANT (1864—). An American astronomer, born at Jackson, Cal., and graduated from Williams College in 1887. He became successively instructor in mathematics in Livermore College, Cal. (1888); professor of mathematics and astronomy at the University of the Pacific (1891); and astronomer at the Lick Observatory (1895). For several years, also, he lectured on astronomy at the summer session of the University of California. He was a member of the Lick Observatory Eclipse Expedition to the Flint Islands in 1898. As a recognition of Aitken's discovery of over 2400 double stars, the Academy of Sciences of France awarded him the Lalande prize in 1906. He became a member of many astronomical and other scientific societies. From 1897 to 1908 he edited the publications of the Astronomical Society of the Pacific, becoming known also as a contributor to American and German astronomical journals.

AITKEN, Sir WILLIAM MAX (1879—). A British capitalist and politician. He was born in Newcastle, New Brunswick, Canada, and educated in the public schools. He began his business career in Halifax, Nova Scotia, but in 1907 removed to Montreal, where his ability as a financier and organizer of industrial combinations soon made him prominent. In 1910 he removed to London, England, where he became a director in several capitalistic enterprises. In Canada he was an ardent Conservative and Imperialist, and he continued his political activity in England, actively supporting the Unionists. He was elected member of Parliament for Ashton-under-Lyne in 1910 and was knighted in 1911.

AITKEN, WILLIAM HAY MACDOWALL HUNTER (1841—). A Church of England preacher, born in Liverpool, Sept. 21, 1841; B.A., Oxford, 1865, M.A., 1867. Since 1877 he has been general superintendent of the Church of England Parochial Mission Society, which he founded in 1876. He is one of the most eminent and successful of revival preachers. His publications consist of sermons. In 1900 he was appointed canon of Norwich.

AIT'KENITES. In the Church of England,

the partisans of Robert Aitken (1800–73), a clergyman who had been for a time a Wesleyan and who, after 1840, having returned to the Established Church, desired to combine with its ecclesiastical practice certain views of the Methodists, especially in regard to conversion.

AITKIN, Robert I. (1878—). An American sculptor. He was born in San Francisco and studied for a year with Douglas Tilden, receiving the gold medal of the Mark Hopkins Art Institute of that city. Though but 18 years of age, at the advice of his teacher, he established a studio of his own. His earliest commissions were the bronze portals of the Charles H. Crocker mausoleum and the spandrel of the Spreckels music pavilion in Golden Gate Park. Among his other works in San Francisco are the Dewey monument in Golden Gate Park and the statue of Hall McAllister in front of the city hall. He afterwards spent several years in Paris, where his "Athlete" (1807) won great success, and where he began his ambitious but still uncompleted composition, "To Those Born Dead." On his return to America he established himself in New York. Among his later works are the busts of David Warfield, George Bellows, Augustus Thomas, and ex-President Taft (1910); "The Flame" (1908) which won the prize for sculpture and made him an associate of the National Academy; "A Creature of God till now Unknown," carved directly from the marble without previous study; "Michelangelo at work upon his statue of the Day" (1912). His latest works include a bronze bust of Professor Shaler of Harvard and the doors for the mausoleum of the late John W. Gates in New York. Aitken is unrivaled among the younger American sculptors in strength and originality of conception and technique.

AITON, ā'ton, William (1731–93). A Scotch botanist. He was trained as a gardener, and in 1754 became assistant to Philip Miller, superintendent of the garden at Chelsea. In 1759 he was made director of the royal botanical gardens at Kew, which he rendered the richest in existence, and held the place until his death. In 1793 he published his excellent work, *Hortus Kewensis, or a Catalogue of the Plants Cultivated in the Royal Botanical Gardens at Kew.* This was re-edited by his son and successor in office, William Townsend Aiton.

AIVALIK, ī'vâ-lēk', or **AIWALYK.** A seaport town on the western coast of Asia Minor, on the Gulf of Adramyti, opposite the island of Mitylene (Map: Turkey in Asia, B 3). It has a large trade in oil and grain, and many of the inhabitants are engaged in fishing. Its harbor is extensive, but the entrance is very shallow. The town suffered terribly at the hands of the Turks at the beginning of the nineteenth century, but has recovered since and is now of considerable importance. Its population, estimated at 25,000, is almost exclusively Greek.

AIVAZOVSKI, ī'vâ-zŏf'skē, Ivan Konstantinovitch (1817–1900). A Russian marine and landscape painter. He was born in Feodosia, in the Crimea, of Armenian descent, was admitted as an imperial pensioner to the Academy of Art at St. Petersburg, and completed his studies at Rome. He traveled widely, especially in Russian and Turkish dominions, making studies for his 4000 pictures. Best known of Russian marine painters, he constantly enjoyed the imperial patronage, but to present-day criticism his color often seems glaring and violent, his effects pyrotechnic. His best works include: "Sunrise on the Black Sea" (1850); "Creation," "Deluge," and several others, now at the Hermitage at St. Petersburg (1865); "Sea Fights at Revel, Viborg, and Tchesme," "Wreck of the Frigate Ingermannland," "Peter the Great at Krasnaya Gorka" (all at the Winter Palace, St. Petersburg); "View of Constantinople," "Calm Sea," and "Naples by Moonlight" (Academy of St. Petersburg); "Solar Eclipse" (Geographical Society, St. Petersburg); "Lighted Castle on the Sea" (Peterhof); "Calm Sea by Moonlight," "Monastery of St. George" (Moscow Museum).

AIWALYK. See Aivalik.

AIX, āks *or* âs (anciently Lat. *Aquæ Sextiæ,* Springs of Sextius). A town of France, formerly the capital of Provence, now the capital of an arrondissement in the department of Bouches-du-Rhône (Map: France, S., K 5). The principal buildings of the town are the Palais de Justice, the Hôtel de Ville, and the cathedral of St. Sauveur. The cathedral dates from the eleventh century and is a fine example of Romanesque architecture. The Palais de Justice was not completed until 1831 and is in the Renaissance style. The town is very bright and cheerful in appearance, and its many squares and parks enliven every quarter. Aix is famous for its springs and natural fountains. That of the Rotunda is decorated with statues of Justice, Agriculture, and Art; another fountain is surmounted by a statue of René of Anjou, the patron of troubadours. It is the work of David d'Angers. There is a museum of antiquities containing valuable Gallic, Roman, and Christian remains. The town has a university in conjunction with Marseilles (see Aix, Facultés d'), as well as an academy of sciences. Its library is famous in southern France, and contains about 150,000 printed works and over 1200 manuscripts; among the latter are many letters of Mary Stuart. There are also a school of art, and a picture gallery, in which are examples of Granet, the great architectural painter, who was a native of Aix. The industry of the town consists chiefly in the cultivation of the olive, in cotton-spinning, leather-dressing, and trade in oil, wine, almonds, etc. The warm springs are slightly sulphurous, with a temperature from 90° to 100° F., clear and transparent, with a slightly bitter taste. They have the reputation of improving the beauty of the skin.

Aix was in Roman times Aquæ Sextiæ, from Caius Sextius Calvinus, who in 123 B.C. headed the Roman colony which had been formed to defend the Greeks of Marseilles against the Salluvii. The field on which Marius defeated the Teutones and Ambrones, in 102 B.C., lies in the plain between Aix and Arles. In the Middle Ages, under the counts of Provence (see René), Aix was long a centre of art and learning. With the rest of Provence, Aix fell to the French crown in 1487, and from 1501 to 1789 it was the seat of the Parlement of Provence. Communal population, 1901, 29,418; 1911, 29,836, including agglomerated population, 19,462, scattered, 5466, counted aside, 4908.

AIX, or **AIX-LES-BAINS,** -lā'băn' (Fr. the Bath Waters or Springs; see below). A small town of Savoy, France, in a delightful valley near Lake Bourget, 7 miles north of Chambéry and 18 miles by rail north of Marseilles (Map: France, S., K 3). It has an altitude of 850 feet. Its celebrity as the source of medicinal waters dates from its occupation by the Romans, who

gave it the name of Aquæ Gratinæ and built splendid baths there. Among its remains are the Arch of Campanus and the ruins of a temple and of a *vaporarium*. The resort was neglected during the Middle Ages, but began to be frequented again in the seventeenth century, and it is now a fashionable watering-place. The two hot springs are of sulphurous quality and of a temperature above 100° F. The water is used both for drinking and for bathing. There are several schools, colleges, and museums. Flour milling and the manufacture of hats, oil, and confections are among the industries of the town. Pop., 1901, 5349; 1906, 8679; 1911, 8934.

AIX, Facultés d', fȧ'kul'tȧ' dȧks' *or* dȧs', or Académie, ȧ'kȧ'dȧ'mē'. Schools of law and theology existed at Aix perhaps at the beginning of the thirteenth century. They were organized in 1409 by Papal bull into the University of Aix, which represented Provençal learning, if not literature, during most of its existence from its foundation until its dissolution in 1789 and reorganization under Napoleon in 1806, after which for nearly a century it was an academy of the University of France. The present University of Aix-Marseilles has faculties of law and literature at Aix, and faculties of science, medicine, and pharmacy, and the free faculty of law at Marseilles. There are over 1200 students.

AIX-LA-CHAPELLE, -lȧ-shȧ'pĕl', Ger. Aachen (named from its springs, Lat. *Aquæ*, and the palace chapel). A city of the Prussian Rhine Province, and capital of the government district of the same name, situated in a valley near the river Wurm, about 40 miles west of Cologne, at the Dutch and Belgian frontiers (Map: Prussia, B 3). The city is divided into the inner or old town, the outer or new town, and Burtscheid (incorporated with it in 1897). The streets are generally broad and well paved. Among the principal ones are the Theaterstrasse, Hochstrasse, and Wilhelmstrasse. The most important public squares are the Marktplatz, with the bronze statue of Charlemagne, the Münsterplatz, and the Kaiserplatz, with a large, handsome fountain. Its private houses are for the most part handsome modern buildings and give the city a thoroughly modern appearance. With the exception of its two or three public buildings and churches, little of the ancient town remains. Its former ramparts have been leveled and turned into promenades, and only two of its old gates remain standing. Foremost among the public buildings of interest is the cathedral, a most striking specimen of various styles of ecclesiastical architecture. The oldest portion, which probably dates from the year 796 A.D., is an octagonal chapel, surrounded by a gallery and surmounted by a cupola built in the Byzantine style. A stone slab in the floor marks the traditional burial place of Charlemagne, but the supposed bones of the Emperor are preserved in a shrine in the Hungarian Chapel north of the octagon. Above the slab hangs an immense chandelier of gilded copper, presented by Frederick Barbarossa in 1168. The choir, dating from the fourteenth century and built in the Gothic style, marks the second period of construction. The Hungarian Chapel, built in the early part of the eighteenth century, contains the sacred relics, which are exhibited to the populace every seven years. The other churches of great age are those of St. Foillan and St. Paul, with fine stained glass windows. In the Marktplatz stands the Gothic Rathhaus, built (1353–70) on the site of Charlemagne's palace, and containing the famous coronation hall (143 feet by 61 feet) of the German emperors, decorated with frescoes depicting scenes from the life of Charlemagne. The Rathhaus is flanked by two towers, one of which, the Granusturm, dates from the thirteenth century. These towers, nearly destroyed by fire in 1883, were restored in 1902.

The city's affairs are directed by a municipal council of 30 members and an executive board of five. Aix-la-Chapelle has an excellent system of sewers, which carry the refuse into the river. The city has owned and operated since 1880 large water works, which net it annually about $35,000. The gas works are in the hands of private companies which pay the city a tax of about half a cent for each cubic meter sold for lighting purposes and about a quarter of a cent on each cubic meter sold for cooking purposes. The city owns an electric-light plant, which, however, is leased to a private company. Aix-la-Chapelle has several parks and promenades, including a municipal botanical garden. Its educational institutions include free gymnasia, a splendidly equipped technical high school, an industrial high school, an art school, a teachers' preparatory school, and a deaf and dumb school. There are six public libraries, including the municipal library, containing about 100,000 volumes. The commerce of Aix-la-Chapelle is of considerable importance. Its principal industry is wool-spinning and the manufacture of cloth, which is exported to all parts of the world. There are also important manufactures of needles, glass buttons, knives, umbrellas, soap, cement, bells, pottery, and crockery. Aix-la-Chapelle is advantageously situated as a commercial centre, being on the Prussian State Railway and on the line to Antwerp. Local traffic facilities are afforded by electric street railway lines within the city, connecting it also with many of the neighboring towns. The hot sulphur springs of Aix-la-Chapelle are celebrated for their curative properties in rheumatism and gout. They are frequented yearly by about 20,000 visitors. The principal spring is the Kaiserquelle, with a temperature of 136° F. In 1890 the population of Aix-la-Chapelle was over 103,000; in 1900, 135,235; in 1905, 144,095; in 1910, 156,143.

Aix-la-Chapelle was called Aquisgranum by the Romans, who frequented the place on account of its warm springs. Under the Frankish emperors it enjoyed great prosperity. Pepin erected here in 765 a palace in which probably Charlemagne was born. The latter made the city his home and lavished favors upon it. From the coronation of Louis the Pious in 813 until that of Ferdinand I in 1531, the German kings were crowned in Aix-la-Chapelle, and 17 imperial diets assembled there. Prior to the Reformation Aix-la-Chapelle was one of the most flourishing of the free imperial cities of Germany. The removal of the coronations to Frankfort-on-the-Main (beginning with that of Maximilian II in 1562) marked the end of a city's splendor, while the religious troubles of the sixteenth and seventeenth centuries and a disastrous fire in 1656 hastened its decline. In 1793 it was taken by the French, but was ceded to Prussia in 1815. Consult: Stübben, "Aachens Bebaungsplan und Bauliche Zukunft," in the *Deutsche Bauzeitung* (Berlin, 1880); Drapeyron, "Aix-la-Chapelle et Charlemagne," in the *Revue de Géographie*, vols. xlv, xlvi (Paris, 1899); "Re-

formationsgeschichte Aachens," in the *Historische Politische Blätter*, vol. cxxviii (Munich, 1901).

Treaties of Peace, and Congress of Aix-la-Chapelle. The first peace of Aix-la-Chapelle ended the war carried on between France and Spain for the possession of the Spanish Netherlands, known as the War of Devolution. On the death of Philip IV Louis XIV laid claim to a large portion of those territories in the name of his wife, Maria Theresa, the daughter of Philip, urging the law of succession prevailing in Brabant and Namur respecting private property. The victorious progress of Louis was checked by the triple alliance between England, Holland, and Sweden, and a treaty of peace was concluded at Aix-la-Chapelle, May 2, 1668, by which France retained possession of the fortresses of Charleroi and Lille, which she had already taken, but gave back Franche Comté to Spain.

The second peace of Aix-la-Chapelle concluded the War of the Austrian Succession (Oct. 18, 1748). (See SUCCESSION, WARS OF.) In general the possessions of the several States remained as before the war. Austria ceded Parma, Piacenza, and Guastalla to the Spanish infante, Philip; and the possession of Silesia and Glatz was guaranteed to Prussia. The privilege of the Assiento Treaty (q.v.) was confirmed to Great Britain for four years, and the pretender was expelled from France. Owing chiefly to the exertions of her minister, Kaunitz, Austria came off with but small sacrifice and obtained a ratification of the Pragmatic Sanction (q.v.) from the signatory powers.

The Congress of Aix-la-Chapelle was held in 1818, for regulating the affairs of Europe after the Napoleonic wars. The emperors Alexander I of Russia and Francis I of Austria and King Frederick William III of Prussia were personally present. The plenipotentiaries were Metternich, Castlereagh, and Wellington, Hardenberg and Bernstorff, Nesselrode, and Capo d'Istrias, with Richelieu on the part of France. France was admitted to take part in the deliberations as one of the five great powers of Europe, who proceeded thereupon to sign a protocol announcing a policy known as that of the "Holy Alliance" (q.v.). An important result of the Congress achieved by Richelieu was the immediate evacuation of France by the foreign forces. Consult De Broglie, *La paix d'Aix-la-Chapelle* (Paris, 1892).

AIZANI, ī-zā'nī, or **AZANI,** ȧ-zā'nī. A city in Phrygia, near Bithynia. In 1824 its remains were found by the Earl of Ashburnham, about 30 miles southwest of Kutaieh. There were a temple of Zeus, a theatre, a stadium, and a gymnasium. The theatre is in good preservation, with a diameter of 185 feet; it had 15 rows of marble seats. The Rhyndacus (now Adranus) rises near the site of Azani and passes through it; it was crossed by two white marble bridges, each of five semicircular arches. Tombs, Roman coins, and inscriptions have been found. The city is mentioned by Strabo.

AJACCIO, ȧ-yät'chô. The capital of the French department of Corsica, comprising the whole of the island (Map: Southern France, Corsica, L 7). It is a seaport with a well-sheltered harbor and stands on the west coast, in a fertile belt of land known as Campo d'Oro. Its cathedral dates from 1585. Napoleon was born in Ajaccio, Aug. 15, 1769, and the house is still standing. A marble statue of the First Consul is seen in the main square. Pozzo di Borgo was also a native of Corsica. The chief industries are the anchovy and pearl fisheries and shipbuilding, and trade in excellent wine and olive-oil, which the region produces in abundance. The harbor is protected by a strong fort. Pop., 1901, 21,779; 1906, 22,264; 1911, 19,227. Consult O. Joanne, *Ajaccio et ses environs* (Paris, 1899).

AJALON, ăj'ȧ-lŏn, or **AIJALON,** ā'jȧ-lŏn (R. V.). A town in ancient Palestine, 14 miles northwest of Jerusalem, where Joshua is said to have commanded the moon to stay its course till he had finished his battle (Josh. x. 12). It belonged to the territory allotted to Dan (Josh. xix. 42), but this tribe could not keep it from the Amorites, who held it in the pre-monarchial period (Judges i. 35). Rehoboam fortified it (2 Chron. xi. 10), but in Asa's days it passed into the hands of the Philistines (2 Chron. xxviii. 18). It is mentioned in the Amarna letters (fourteenth century B.C.) under the form Aialuna. The modern village of Yalo represents the ancient site.

AJAWA, ȧ-jä'wȧ. A Bantu tribe of Portuguese East Africa, described by Livingstone. They have acquired some culture from contact with the Arabs. Cannibalism still exists among them, and at the funeral of a chief women are sacrificed; though they are accounted intelligent, industrious, and enterprising, a manly and independent tribe of blacks superior to others in this region.

A'JAX (Lat. form of the Gk. *Aïas, Aias*). The name of two of the Greek heroes of the Trojan War. One of them was called Ajax the Less, or the Locrian, being the son of Oïleus, King of the Locrians. At the head of 40 Locrian ships he sailed against Troy and was one of the bravest of the Greek heroes; in swiftness of foot he excelled all except Achilles. When Cassandra fled to the temple of Athena, after the taking of Troy, it is said that Ajax tore her from it by force and dragged her away captive. Others make him even violate the prophetess in the temple. Though he exculpated himself by an oath when accused of this crime by Ulysses, he did not escape the vengeance of the goddess, who caused him to be engulfed in the waves on his voyage toward Greece.

The other Ajax, called by the Greeks the Greater, was the son of Telamon, King of Salamis, and grandson of Æacus. He sailed against Troy with 12 ships, and is represented by Homer as, next to Achilles, the bravest and the handsomest of the Greeks. After the death of Achilles, Ajax and Ulysses contended for the arms of Achilles; and when the prize was adjudged by the Greek chieftains to Ulysses, Ajax in a fit of insanity slew the Grecian flocks, fancying he was slaying his enemies. On recovering his reason he threw himself on his sword. Sophocles, in the tragedy of *Ajax* (well edited by Jebb, Cambridge, 1896), attributes his madness to the intervention of Athena, champion of the Greek host. See TROJAN WAR.

AJMERE, ȧj-mēr'. An ancient city of Rajputana, India, the capital of the British province of Ajmere-Merwara, 228 miles west of Agra (Map: India, B 3). It is situated in a picturesque and rocky valley at the foot of the mountain of Taragurh, on whose summit there is a fort commanding the city. Another means of defense is an encircling stone wall, which has five lofty and handsome gateways on the west

and north. Most of the streets are narrow and dirty, but some of them are spacious and contain fine residences, besides mosques and temples of massive architecture. The Daulat Bagh, or 'Garden of Splendor,' is now the residence of the British commissioner of the province. The tomb of the Mussulman saint, Kwajah, within the town, is held in great veneration, and pilgrimages are made to it even by Hindus. In October a great annual fair is held in honor of the saint, at which presumed miracles are wrought. The Emperor Akbar journeyed to it from Agra on foot in 1570, in fulfillment of a vow before the birth of his son, Jehangir. Ajmere has manufactures of oil, cotton cloths, celebrated dyeing establishments, and a trade in opium and salt. It is the seat of Ajmere College and of Mayo College, an institution opened in 1875 for the instruction of the Rajputana nobility. The Anasagar, a large artificial lake to the north of the city, supplies it with water. Ajmere dates from about 145 A.D. It came under British rule by purchase in 1818. Pop., 1891, 68,800; 1901, 73,839; 1911, 86,222.

AJMERE-MERWARA, -mär-wä'rä. A province of British India. It is situated in Rajputana, between 25° 30′ and 26° 45′ N. lat. and between 73° 53′ and 75° 22′ E. long. (Map: India, B 3). It occupies an area of 2711 square miles. Its location on the arid eastern slopes of the Aravalli Range (q.v.) and within the zone of uncertain rainfall renders it ill suited to agriculture and makes it subject to famine, the two in the last decade of the nineteenth century being especially severe. By irrigation it has been brought to some degree of productivity, and it yields cotton, wheat, and other food grains, and oil seeds. Iron and a few other metals are found in small quantities. Pop., 1891, 542,358; 1901, 476,912; 1911, 501,395. The inhabitants are mostly Hindus, the number of Mohammedans being about 81,000, and of Jains, 20,300. The Christians number 5400. The capital is Ajmere (q.v.).

AKABAH, ä'kä-bä. A town 2½ miles from the head of the Gulf of Akabah. Its exact location is 29° 30′ N., 35° E. (Map: Asia, C 6). The ancient name was Aila, Aelana, or Elath (q.v.). Ahmed ibn Tulun (see TULUNIDS) built a new road across the mountain north of the gulf, which was called Akabat Aila; hence the name Akabah gradually took the place of Aila. The town was conquered by Baldwin I in 1116, taken by Saladin in 1171, and recaptured by Rainaud de Chatillon (q.v.), Lord of Montreal (Shobek) in 1181. It soon returned to the Ayyubid rulers and remained a port of the province of Kerak during the Mamluk period. To-day it belongs to Hejaz (q.v.). Strategically it has always been an important point; and its fortress has been a protection to the pilgrims going to Mecca. In 1841 it was recognized by Turkey as part of Egypt, but in 1892 Turkey resumed possession of it. Early in 1906 the Turks occupied Taba 8 miles south of Akabah (see EZION GEBER), but retired at the request of Great Britain, and a commission determined the boundary line so as to give Akabah to Turkey but include Taba within Egyptian territory. There is telegraphic connection with Maan-Damascus, and a branch line goes from Akabah to the Mecca railroad since 1906. See Musil, *Arabia Petræa*, vol. ii, 1907, p. 256, and article "Aila" in *Enzyklopædie des Islam* (1909).

AKABAH, GULF OF. (Ancient Sinus Ælaniticus.) The eastern of two inlets on the north end of the Red Sea, separating the Sinaitic peninsula from Arabia proper. It is about 100 miles long and 12 to 17 miles wide and forms part of the great rift valley, or structural depression, which extends from the Jordan River-Dead Sea depression in Palestine to Lake Tanganyika and Nyassa in Africa. At its head lies the port of Akabah.

AKAKIA, ä'kä'kē-ä', LE DOCTEUR. The name of a noted French physician of the sixteenth century (Martin Akakia, Grecized from the French name *sans-malice*), borrowed as a pseudonym by Voltaire in his *Diatribe du Docteur Akakia*. This was a brilliant satire, covering with ridicule Maupertuis and the Berlin Academy, of which he was president. King Frederick II, however, had it publicly burned (1752).

AKAMAGASEKI, ä'kä-mä'gä-sä'kē. See SHIMONOSEKI.

AKASHI, ä'kä-shē'. A town of Japan, in the prefecture of Hiogo, situated on the northern coast of the Inland Sea, and giving its name to the passage between Honshiu and the island of Awaji (Map: Japan, D 6). It is a station on the Sanyo Railway, and it lies 12 miles east of Kobé. The district is famous throughout Japan for its scenery, and it is a popular resort. The town contains a Shinto temple in honor of the ancient poet Kaki-no-moto-no-Hitomaro, and the remains of a moat and a large castle. Its meridian is used for the standard time of Japan. Pop., 1898, 21,196.

AKBAR, äk'bēr; *Hind. pron.* ŭk'bēr (Ar. very great), properly JALAL-UD-DIN MUHAMMAD (1542–1605). Emperor of Hindustan, the greatest Asiatic monarch of modern times. His father, Humayun, was deprived of the throne of Delhi by usurpers and fled to Persia. On the way thither, in the town of Amerkote, Akbar was born in 1542. Humayun recovered the throne of Delhi in 1555, after an exile of 12 years, but died within a year. The prince of 14 at first committed the administration to Bahram Khan as regent minister, but finding this authority degenerating into tyranny, he shook it off by a bold stroke and took the power into his own hands (1560). At this time only a few of the many provinces once subdued by the Mongol invaders were actually subject to the throne of Delhi; in 10 or 12 years (1568–76) Akbar's empire embraced the whole of Hindustan north of the Deccan, aided by Abu-l Fazl. The wisdom, vigor, and humanity with which he organized and administered his vast dominions are unexampled in the East. He promoted commerce by constructing roads, establishing a uniform system of weights and measures and a vigorous police. He exercised the utmost vigilance over his viceroys of provinces and other officers, to see that no extortion was practiced and that justice was impartially administered to all classes of his subjects. For the adjustment of taxation, the lands were accurately measured, and statistics were taken, not only of the population, but of the resources of each province. He also forbade child-marriage, permitted the remarriage of widows, and endeavored to stop the practice of suttee. In politics, however, his main endeavor was to fuse the Mussulmans and the Brahmins. In religion Akbar was exceedingly liberal, largely on account of the influence of the vizier Abu-l Fazl. He was fond of inquiries as to religious beliefs

and invited Portuguese missionaries from Goa to his court to give an account of the Christian faith. Literature received the greatest encouragement. Schools were established for the education of both Hindus and Mohammedans; and numbers of Hindu works were translated from Sanskrit into Persian. Abu-l Fazl (q.v.), the able minister of Akbar, has left a valuable history of his master's reign, entitled *Akbar Nāmah* ('History of Akbar'); the third volume, containing a description of Akbar's empire, derived from the statistical inquiries above mentioned, and entitled *Ayin-i-Akbarī* ('Institutes of Akbar'), has been translated into English by Gladwin (3 vols., Calcutta, 1786, and London, 1800), and by Blochmann and Jarett (3 vols., Calcutta, 1873–94). Akbar's latter days were embittered by the death of two of his sons from dissipation and by the rebellious conduct of the third, Selim (known as Jehangir), who succeeded his father in 1605 and was suspected of being the cause of his death. Consult Malleson, *Akbar*, Rulers of India Series (Oxford, 1891–1901); Garbe, *Kaiser Akbar von Indien* (1909); id., "Akbar, Emperor of India," in the *Monist*, vol. xix (Chicago, 1909), and Modi, *Parsees at the Court of Akbar* (1903). See INDIA.

AKED, CHARLES FREDERICK (1864—). An Anglo-American clergyman and writer, born and educated at Nottingham. After acting for several years as auctioneer to the sheriff of Derbyshire, he decided to prepare for the ministry and entered the Midland Baptist College. In his earlier pastorates at Syston (1886) and St. Helen's and Earlestown (1888), he became locally known as an able preacher, but his reputation as one of the most eloquent public speakers in the United Kingdom was gained during his service at Pembroke Chapel, Liverpool. Under his ministry, beginning in 1890, this parish became one of the largest in England. As one of the founders of the "Passive Resistance League," designed to oppose the Boer War, Dr. Aked was for a time very unpopular in England. He became widely known as a lecturer, especially in the United States, which he had visited many times before accepting, in 1907, a call to the pastorate of the Fifth Avenue Baptist Church. While his pastorate in New York cannot be said to have been unsuccessful, he found conditions so uncongenial as to induce him to remove to San Francisco in 1911 to become pastor of the First Congregational Church. He became an American citizen in 1913. The degree of D.D. was conferred upon him by Brown University (1907). Besides numerous pamphlets on religious and social subjects, his published writings include *Changing Creeds and Social Struggles; The Courage of the Coward* (1905); *A Ministry of Reconciliation* (1907); *Mercies New Every Morning* (1907); *Wells and Palm Trees* (1908); *Old Events and Modern Meanings* (1908); *The Lord's Prayer: Its Meaning and Message for To-day* (1910).

AKEE, ȧ-kē′ (native name, its scientific name being *Blighia sapida*). A fruit tree of the family Sapindaceæ, a native of tropical Africa, introduced into Jamaica in the latter part of the seventeenth century. It grows to a height of 25 feet or more, with numerous branches and alternate pinnate leaves resembling those of the ash. The flowers are small, white, on axillary racemes; the fruit is about the size of a goose's egg, with three cells and three seeds, and its succulent aril has a grateful subacid flavor. The fruit is little inferior to a nectarine. Boiled down with sugar and cinnamon, it is used as a remedy for diarrhœa. The distilled water of the flowers is used by negro women as a cosmetic. The akee sometimes produces fruit in hothouses in Great Britain. In order to obtain this the roots should be cramped in pots. The Aki of New Zealand is a totally different plant, *Metrosideros buxifolia*, of the family Myrtaceæ.

AKEL'DAMA. See ACELDAMA.

À KEM'PIS, THOMAS. See KEMPIS, THOMAS.

AKENE′. See ACHENE.

A′KENSIDE, MARK (1721–70). An English author of considerable celebrity in his own day, on account of his didactic poem, the *Pleasures of the Imagination*, and some medical works. He was born at Newcastle-on-Tyne, where his father was a butcher. Being intended for the Presbyterian church, he was sent to study theology at Edinburgh, but soon abandoned it for medicine. He graduated as a physician at Leyden in 1744, and practiced at Northampton, then at Hampstead, and finally in London. His success as a practicing physician was never very great, owing, it is said, to his haughty and pedantic manner. He died in London, soon after being appointed one of the physicians to the Queen. At Leyden he had formed an intimacy with Jeremiah Dyson, and this rich and generous friend allowed him £300 a year. Some of his medical treatises, as that on dysentery, won for him distinction as a specialist. His later poetry, consisting chiefly of odes and hymns, did not attain the same reputation as his *Pleasures of the Imagination*, which was completed in his twenty-third year. In *Peregrine Pickle*, Smollett satirically sketched the character of Akenside under that of the pedant who undertakes to give an entertainment after the manner of the ancients. Akenside, who practiced blank verse and the Spenserian stanza, was one of the pioneers among the romantic poets. He became dissatisfied with his juvenile production and before his death had written a portion of a new poem on the same subject. Both poems were published in the complete edition of his works in 1772. For his biography consult Bucke (London, 1832) and Dyce (London, 1866); and also Beers, *English Romanticism in the Eighteenth Century* (New York, 1899).

AKERBLAD, ä′kĕr-blȧd, JOHANN DAVID (1763–1819). A Swedish Orientalist and learned epigraphist. He was secretary of the Swedish embassy to Constantinople, whence he went to Jerusalem and the Troad in 1792–97. Later (1800) he was chargé d'affaires at Paris, but spent his last years in Rome. He published *Inscriptionis Phœniciæ Oxoniensis Nova Interpretatio* (1802) and *Lettre sur l'inscription égyptienne de Rosette* (1802).

AKERS, ā′kĕrz, BENJAMIN (PAUL) (1825–61). An American sculptor. He was born in Sacarappa, Me., July 10, 1825, and died at Philadelphia, Pa., May 21, 1861. While in his father's sawmill he made toys and turned his original designs into ornamental woodwork. He tried to be a printer, then essayed to paint, but later turned to sculpture, and studied plaster-casting with Thomas Carew of Boston. In 1850 he opened an atelier in Portland, Me., with the painter Tilton. Among his early works are busts of Longfellow and other celebrities, the proceeds from which enabled him to pass a year in study at Florence. On his return he

modeled busts of President Pierce, Edward Everett, Sam Houston, and other celebrities at Washington. In 1855 he opened an atelier at Rome, where he became the centre of American art circles. Hawthorne refers to his colossal bust of "Milton" and "Pearl-Diver" in the *Marble Faun;* and it is said that the character of Kenyon in that book is drawn from the personality of the young sculptor. At Rome he carved his "Una and the Lion," "Girl Pressing Grapes," "Isaiah," and other works. He remained in Europe until, in 1860, failing health drove him home for a last vain endeavor to recover his strength. His character was singularly attractive and pure. His art, like other classicist sculpture of the period, lacks power and virility.

AKERS, Elizabeth Chase Allen. See Allen, Elizabeth Chase.

A'KERSHEM, Miss Sophronia. An unlovely character in Dickens's *Our Mutual Friend.* She becomes the wife of Albert Lammle (q.v.).

AKHALTSIKH, ä'käl-tsēk'. The chief town of a district in the government of Tiflis, Russian Armenia, about 95 miles west of Tiflis, and 1450 miles by rail southeast of Moscow, on the banks of the Poskhov-Tchai, an affluent of the Kur (Map: Russia, F 6). It is situated in a valley of the Keldir Mountains, 3376 feet above sea level. The river running through it divides the town into the old town and citadel, on the left bank, and the new town on the right. It is well protected by a fortress built upon an almost inaccessible height. The climate is salubrious, although the winters are very severe and the summers exceedingly hot. The surrounding scenery presents a view of wild, rugged beauty, enhanced by the numerous gardens encircling the town. The mosque of Sultan Ahmed, built on the model of St. Sophia in Constantinople, has a library attached to it which was considered to be one of the most valuable in the East. The Russians carried off a great part of its most valuable treasures to St. Petersburg. The manufacture of small arms and weapons and silver filigree work is carried on in the town, and an active trade with various places on the Black Sea is maintained. Coal is mined in the vicinity. About 16 miles to the northwest of the town are the well-known Abas-Tumansk mineral springs. Deposits of lignite are found in the neighborhood. Akhaltsikh was anciently called Keldir, or Chaldir. Once a considerable mart for trading in Christian slaves, it has, since its occupation by Russia, become a Christian town. Eighty per cent of its population are Armenians and 10 per cent Jews. It is the seat of an archbishopric of the Greek church. In 1828, when the Russians took possession of it, it had a population of 50,000, but it has decreased since, so that at the time of the taking of the last census, in 1897, there were only 15,300 inhabitants.

AKHISSAR, äk'hĭs-sär' (anciently Lat. *Thyatira,* Gk. Θυάτειρα, *Thyateira*). A town in the Turkish vilayet of Smyrna, Asiatic Turkey, situated 52 miles northeast of Smyrna, on somewhat elevated ground in the valley of the Hyllus (Map: Turkey in Asia, B 3). The streets are paved with carved stone, and other relics of antiquity abound, but there are no ruins of ancient buildings. Cotton goods are exported, but the town is celebrated for its dyes. The town is situated on the Monissa-Soma Railway. Its population is estimated at from 12,000 to 22,750.

AKHMIM, åĸ-mēm', or **EKHMIM,** ĕĸ-mēm'. A city of some 10,000 inhabitants, on the right bank of the Nile, in Upper Egypt (Map: Egypt, E 6). It occupies the site of the ancient Chemmis, or Panopolis, the seat of worship of the harvest god Min, an ithyphallic deity whom the Greeks identified with Pan. In Christian times the city became an important religious centre, and many converts congregated in the vicinity. Nestorius, patriarch of Constantinople, whose heresy was condemned by the Council of Ephesus, 431, died in banishment at Panopolis.

AKHTAL, äk-täl', Ghiyath b. Salt b. Tarika al. A Christian Arabic poet, born in Hira about 640 A.D. His mother, Laila, belonged to the Christian tribe Yad. He proudly refused to change his faith, as others did, "from hunger rather than from conviction." His religion possibly shows its influence in his comparative freedom from obscene language; it allowed him to indulge his appetite for wine as a protest against the Moslem prohibition and as a means of gaining inspiration. He was a court poet to the Umayyad rulers in Damascus. If he had not been a Christian, he would no doubt have been regarded as the greatest poet of the Umayyad period; even with this serious drawback he is by general consent accorded a place with Jarir and Farazdak. He died about 710 A.D. See H. Lammens, *Le chantre des Omiades: notes biographiques et littéraires sur le poète arabe chétien Akhtal* (Paris, 1895).

AKHTYRKA, åĸ-tĭr'kå. A town of European Russia, in the government of Kharkov, 72 miles northwest of Kharkov and 520 miles south of Moscow (Map: Russia, D 4). It is situated on a small river of the same name, an affluent of the Dnieper, in a rather low valley which is subject to frequent inundation so that at times communication becomes very difficult. It has a lively trade with the great pilgrim crowds attracted there by the famous Akhtyr image of the Holy Virgin which is kept in the cathedral, and by the Trinity cloister, situated on the outskirts of the town. Some manufacturing is carried on in textiles and boots and shoes, and a great annual fair is held. A considerable commerce is also carried on in grain and cattle. The surrounding country is fertile, and excellent fruit is grown. The town was founded by the Poles in 1641 and acquired by the Russians in 1647. Pop., 1912, about 25,000.

AKHUND OF SWAT, å-kōōnd', swät, The (1794–1874). A Mohammedan saint, who exercised great influence and had almost unquestioned authority over Mohammedans all over Central Asia. His residence in the mountainous country of Swat, on the borders of India and Afghanistan, was the resort of numerous pilgrimages to consult him on questions of every kind. For half a century the English government assiduously watched this man, who possessed a power which no other person in Asia could pretend to wield; but the Akhund generally kept on friendly terms with the English.

AKIB, å'kēb', Le Rabbin. The pseudonym under which Voltaire published, in 1761, his *Sermon du Rabbin Akib—traduit de l'Hébreu.*

AKIBA BEN JOSEPH, å-kē'bå bĕn jō'zĕf. A famous rabbi and head of a rabbinical school at Bene-Barak, near Jaffa, and later at Ziphron, modern Zafron, near Hamath. He was born

c.50 A.D. and died as a martyr probably in 132 A.D. Although he began the study of the law at a comparatively advanced age, after having bitterly opposed the rabbis for years, he rose to a prominent position among the rabbis of his day by virtue of his learning and acumen, and many are the stories and legends told about his early struggles and final success. He seems to have been in Rome in 95 or 96 A.D. and made a visit to Nehardea in Mesopotamia sometime before 110 A.D. Akiba laid the basis of the "Mishna" by beginning the systematization of Jewish oral law, and his collection became known as the Mishna of Rabbi Akiba. His influence as a teacher upon the founders of the Mishna was also very great, and it was he likewise who, to a large degree, advanced the peculiar biblical exegesis which is a characteristic feature of Talmudic literature. His scholarship did not weaken Akiba's interest in the political affairs of the day. How far he was personally active in the great Jewish revolt against Rome in Hadrian's time cannot be determined. But it is certain that he saw in Bar Kokba (q.v.), or Bar Kozeba, the promised Messiah and applied to him the title 'son of the star' (Palestinian Talmud, Taanith iv, 68d). Legends gathered around the career of Akiba. He was put to death on account of his transgressing Hadrian's edicts against the practice and teaching of the Jewish religion, after several years of imprisonment, and bore the tortures to which he was subjected with great fortitude. His grave, shown at Tiberias, became a place of devout pilgrimage.

A-KIKUYU. See KIKUYU.

AKITA, ä'kê-tä, or **KUBOTA,** kōō'bô-tä. A town of Japan, the capital of the prefecture of the same name, situated on the western coast of Honshiu, near the Hachiro Lagoon, and on the right bank near the mouth of the Toshimagawa River (Map: Japan, G 4). It carries on a considerable trade in rice with Hakodate and has some manufactures of silk cloth and cotton crape. Pop., 1903, 34,350; 1908, 36,294. The prefecture of Akita is rich in minerals and woodland. Cattle raising, mining, and the manufacture of cloth are the principal industries. Its area is 4500 square miles, and in 1903 it had a population of 834,779.

AKKA, äk'kà. A pygmy tribe or race, now living within the confines of the Belgian Congo, with the Mangbettu (Monbuttu). Their discovery by Schweinfurth for the first time definitely established the stories of African pygmies by classical writers of antiquity, Du Chaillu's accounts having been set aside as too sensational to be believed. In height, the Akka average about 4 feet 6 inches; color, yellow brown; features, negroid. They are extremely retiring and do not mix with neighboring tribes, though usually they live near, and are under the protection of, the tall negroes. Their houses are dome-shaped, arranged in a circle, with the communal cooking fire in the centre. Though dwarfs in stature, they do not hesitate to attack large game with poisoned arrows, the python being their favorite quarry. Their food is principally nuts and berries. The Akka tribe presents a difficult ethnological problem, next to nothing being known of their language and customs. Consult: Schweinfurth, *Heart of Africa* (London, 1873); Deniker, *Races of Man* (London, 1900).

AKKAD, äk'kåd *or* äk'kăd. See ACCAD.

AKKERMAN, åk'ker-män'. Formerly a fortress, now the chief town of a district in the government of Bessarabia, Russia, at the mouth of the Dneister, 12 miles from the Black Sea and about 30 miles from Odessa (Map: Russia, D 5). The chief industry of the town is the raising of fruits, especially of grapes, there being no less than 2000 gardens within the city proper, besides numerous other beautiful ones which surround the town. An annual fair is held here during the month of December. The harbor is accessible to large steamers, and the town has regular steamship communication with Odessa, to which it exports fish, wools, wines, and salt, which is procured from lakes and marshes in the vicinity. Akkerman is the site of an ancient Roman town, possibly Alba Julia, which was destroyed and later rebuilt. Pop., 33,000.

AKKESHI, ä'kĕ-shē, or **AKISHI,** ä'kê-shē. A town of Japan, situated on the southern coast of Yezo, on the Akkeshi Bay (Map: Japan, J 2). It is famous for productive oyster beds and contains an oyster-canning establishment.

AK'KRA, or **AC'CRA.** The chief town of the district of the same name, in the British West African colony of the Gold Coast (Map: Africa, D 4). It has a salubrious climate, being separated from the interior of the colony by mountain chains. The number of Europeans is comparatively small, but the town bears strong marks of European influence. A railroad line connecting Akkra with Mangoase, 40 miles distant, is under construction. There are several churches, a bank, a club house, a number of European shops, and a government school for primary education, to which is attached a school of carpentry and woodwork. Pop., 1901, 14,842; 1911, 19,585.

AKMOLINSK, åk'mŏ-lyênsk'. A province of the General Government of the Steppe in Russian Central Asia. It extends from the Trans-Siberian Railroad in the north (55° N. lat.) to the Chu River in the south (45° N.). The northern and southern parts of the province are arid steppes mainly with interior basin drainage, i.e., water-courses having no outlet but ending in salt lakes. To these belong the Sary-Su and Chu rivers in the southern part, which is known as the Bekpak-Dala, or 'Hunger Steppe.' The central section is hilly and has deposits of copper, anthracite coal, and some gold; here lives the greater part of the sedentary population. The principal industries of Akmolinsk are the growing of flax and tobacco, cattle raising, fishing, and, in some localities, hunting. The deposits of coal, iron, copper, and the precious metals, have been but little developed. Area, 218,478 square miles. Pop., 1887, 463,400; 1911, 1,064,000, of which about half are nomadic Kirghiz. The capital is Akmolinsk, with about 10,000 inhabitants. It lies near the head of the Ishim River and is a great caravan centre, the most extensive trade being with Tashkiut and Bokhara. The most important town is Omsk.

AKOI'METOI. See ACŒMETÆ.

AK'RAGAS (Gk. Ἀκράγας). The ancient Greek name of the Sicilian city Girgenti. See AGRIGENTUM.

AKRI. See ACTIUM.

AK'RON. A manufacturing city, railroad centre, and the county-seat of Summit Co., Ohio. It is 35 miles south of Cleveland, on the Ohio Canal, and the Erie, the Baltimore and Ohio, the Pennsylvania, the Northern Ohio,

and the Akron, Canton and Youngstown railroads. The city is surrounded by a chain of lakes where hotels and amusement places have been established. Akron is now the largest rubber-manufacturing centre in the world, and the other industries of the city are of great variety. Among these are printing and lithographing, and the manufacture of iron, steel, sewer pipes, pottery, agricultural implements, furnaces, automobiles, and fishing tackle. Founded in 1825, Akron was incorporated as a village in 1835 and as a city in 1865. The rubber industry was started in 1869 by Dr. B. F. Goodrich, and the growth of the automobile business has been responsible for its enormous development. The government is vested in a mayor, president of the council, boards of public service and public safety, treasurer, solicitor, and auditor, all elected for two years. The city council has 11 members, three of whom are elected at large. The board of health consists of five members appointed by the mayor and council. The city's annual income amounts to about $900,000, of which about $400,000 is appropriated for education. Other chief items of expense are: fire department, $101,100; police department, $68,500. Akron is the seat of Buchtel College, formerly under Universalist control but now non-sectarian. The city maintains a library, a hospital, and owns its water works. One of Akron's notable points of interest is Portage Path, an old Indian trail between the Cuyahoga and Tuscarawas rivers. This trail was at one time part of the western boundary of the United States. Pop., 1870, 10,000; 1890, 27,601; 1900, 42,728; 1910, 69,667; 1920, 208,435. Consult S. A. Lane, *Fifty Years and Over of Akron and Summit County* (Akron, 1892), and *Akron Chamber of Commerce Year Book* (1913–14).

AKRON, University of. The Buchtel College.

AKSAKOFF, åk-sä'kôf, Ivan Sergeyevich (1823–86). A Russian writer and leader of the Panslavists, born in the government of Ufa. He studied in the school of jurisprudence at St. Petersburg and graduated in 1842, afterward entering the Moscow division of the Senate. In 1848 he entered the service of the Ministry of the Interior. Four years later he became editor of the Moscow *Sbornik*, which was soon suppressed. In 1855–56, during the Crimean War, he was in Bessarabia in command of the Serpukhoff detachment of the Moscow levy. He established the *Den*, a weekly paper published from 1861 to 1865, and the *Moskva*, a daily paper, which was established in 1867. This latter sheet was suppressed three times by the government within 22 months, these suppressions aggregating 13 months of that period. As chairman of the Slavic Philanthropic Society, he worked incessantly in the interest of a united state of all the Slavic nations. During the Russo-Turkish War he became the recognized leader of all those influences that brought about the War of Liberation of the Balkan Slavs, and his speeches in support of this cause had a world-wide circulation. The Moscow Slavic Committee was suppressed as a result of Aksakoff's bitter attacks, whereupon Aksakoff was banished from Moscow, but was permitted to return soon after. From 1880 until his death he published the weekly *Rus* in the interests of the Slavophil party. In December, 1885, he made a bitter attack on Russian diplomacy in Bulgaria, with the result that an official reprimand was issued against his paper. He was the best-known poet of the Slavophil cause. His complete works were published by his wife after his death. Consult A. N. Shtiglich, *Pamyate Ivana Sergyeevicha Aksakova* (St. Petersburg, 1907).

AKSAKOFF, Sergei Timofeyevitch (1791–1859). A Russian writer, born in the government of Ufa. Learning his letters at the age of four, he had read widely before he was 10, and was ready to enter the University of Kazan in 1804. On graduating from the university he entered the legislative commission at St. Petersburg, which he served for five years (1807–12). Beginning to write at the early age of 15, he led a busy literary life ever after. His works include the serio-humorous *Observations on Angling* (1847); *Memoirs of a Huntsman in the Government of Orenburg* (1852), with their continuation, *Tales and Memories of a Huntsman* (1855); and *The Family Chronicle* (1856), by some considered his best work, of which a second part appeared as *Bogrov's Childhood* (1858). A selection from his shorter writings was published in 1858.

AKSHEHR, äk-shĕ'h'r (Turk. White Town, ancient Gk. Φιλομήλιον, *Philomēlion*). A city in the Turkish vilayet of Konieh, Asia Minor, situated on the Scutari-Konieh border, south of the Lake of Akshehr, about 60 miles by rail from Afiun-Kara-Hissar (Map: Turkey in Asia, D 3). It lies at the foot of the Sultan-Dagh in a fruitful and well-watered region, has a considerable trade, and manufactures carpets. Pop., about 15,000.

AKSU, åk-sōō'. A town of eastern Turkestan, situated in lat. 41° 7′ N. and long. 81° E., 260 miles northeast of Yarkland, west of the river Aksu, at an altitude of over 3000 feet (Map: Asia, H 4). It is surrounded by a strong wall and is of considerable strategic importance. It is a meeting-place for the caravans from Russia, China, West Turkestan, Kashmir, and India. The inhabitants are engaged chiefly in the manufacture of metal ware, tobacco, and cotton and leather goods. Copper and lead deposits are near by. In 1716 Aksu was nearly destroyed by an earthquake. In 1867 it was taken by the Khan of Kashgar, but was recaptured by the Chinese in 1877. Its population is about 20,000.

AKYAB, åk-yäb'. A town of Burma, India, the chief seaport of the district of Akyab or Arakan proper, and the capital of the province of Arakan (Map: Asia, J 7). It is situated on the eastern side of the island of Akyab, at the mouth of the Kuladan River, in lat. 20° 7′ N., 190 miles southeast of Calcutta. The houses are well built, the streets broad and regular, and it has a fine and well-protected harbor. The chief article of export is rice. The United States is represented by a consular agent. Its rise from a fishing village dates from its selection as a port and the capital of the province in 1826. Pop., 1901, 35,680; 1911, 37,893.

AL, äl. The article in the Arabic language. The pronunciation of the initial vowel is vague, so that the article vacillates between *al* and *el*. Before dentals, sibilants, and liquids, the *l* sound is assimilated to the following consonant, so that, e.g., *al-shams* ('the sun') becomes *ash-shams* in pronunciation, though *al* is still written and it is now customary to print it as well.

The initial vowel is frequently elided when the word preceding the vowel ends in a vowel, e.g., *Abu'l-Feda* for *Abu-al-Feda*. The Arabic article appears in such English words as algebra, alchemy, alcove, and Alhambra, which are directly derived from the Arabic.

ALA. In anatomy and biology any wing-like process or formation, e.g., the *ala nasi*, or lateral wing of the nostril; the alæ of the ethmoid bone; the alar ligaments of the knee. In botany, the side petals of a papilionaceous flower.

ALABAMA, ăl'ă-bă'mâ *or* -băm'â. A river formed by the junction of the Coosa and Tallapoosa rivers, about 10 miles north of Montgomery, Ala. (Map: Alabama, B 4). Its general course is westward to Selma, thence southwestward to about 50 miles north of Mobile, where it meets the Tombigbee, and with that stream forms the Mobile River. It is 320 miles long and navigable from its mouth to Montgomery, nearly its entire length.

ALABAMA, known as the "COTTON STATE." One of the Gulf States of the American Union, situated between lat. 30° 10′ and 35° N., long. 84° 53′ and 88° 30′ W. It is bounded on the north by Tennessee, on the east by Georgia, on the south by Florida and the Gulf of Mexico, on the west by Mississippi; length, about 336 miles from north to south; average width, 175 miles; total area, 51,998 square miles, of which 719 square miles is water (Map: United States, J 4). Alabama, by the revised areas of 1910, ranks as the eighteenth State in the Union in population, the twenty-seventh in size, and ninth in order of admission.

Topography. The southern extremity of the Appalachian mountain system extends into the State from northern Georgia in a series of low parallel ranges. Of these, Raccoon and Lookout mountains are the most prominent, but do not attain any great elevation. They are flat-topped ridges, about 1600 feet in elevation at the Georgia line, gradually lowering to the westward, the Raccoon Mountains extending in a very low range (called Sand Mountains) well across the State, while Lookout Mountain terminates abruptly after reaching a distance of about 60 miles within the State. To the southeast of these ranges lies the comparatively level Piedmont region. To the southwest, at the very terminus of the mountain system, is the low-lying Cumberland plateau—the coal fields of Alabama. On the north of all these are the lower lands of the Tennessee valley. The whole region just described includes the northeast two-fifths of the State. The remainder, the southwest three-fifths of the State, constitutes the coastal plain, which slopes gradually from an elevation of about 600 feet to sea level.

Climate and Soil. Excepting in the lowland along the rivers, the climate is very healthful, particularly in the north. Extremes of temperature are rare, the mean temperature for January being 42.9° and for July 83.9°. The summer heat is tempered by winds from the gulf. Snow falls occasionally in January and February, but rarely in the south; the frost limits at Montgomery are October 10 and April 25. The prevailing winds for the whole year are from the south and southwest.

The average temperature and rainfall in the north are 59.70° and 54 inches respectively, gradually increasing to 66.60° and 63 inches in the south.

The valley of the Tennessee has chiefly a deep red calcareous soil, utilized for the cultivation of cereals; that in the metamorphic region is a red or gray loam with clay subsoil; in the coal regions it is sandy, with sand or clay subsoil; the north or middle divisions are bordered by a wide belt of red or yellow loam over stratified rocks and pebbles and are heavily wooded; the cotton belt has a heavy black calcareous soil from 2 to 20 feet deep, forming a portion of the so-called "black belt" of the Southern States. South of this, brown and red clay loams predominate. In the extreme southern countries the soil is light and sandy. Swamp land occupies considerable areas in various parts of the State.

Geology. The stratified rocks represent every formation occurring in the Appalachian region. There are three geological divisions of Alabama, viz.: The northern, containing most of the State north and west of a line from the northeast corner of the State through Birmingham nearly to Tuscaloosa, and including the great Tennessee valley, in which the rock masses belong to the Sub-carboniferous limestones and the Coal measures; their strata are approximately horizontal. Adjoining this on the east is the middle region, bounded by a line drawn from Tuscaloosa through Centreville, Clanton, and Wetumpka to Columbus, Ga. This includes (1) the metamorphic region, with altered and crystalline sediments of Silurian or preceding ages—quartzites, marbles, granites, and gneisses; the strata in many places disintegrated into masses of stratified clay and interlaminated with quartz seams. (2) The Coosa valley, with prevailing calcareous rocks. (3) The Coosa and Cahaba coal fields, their strata consisting of sandstones, conglomerates, shales, and coal beds, tilted and unequally de-graded. This division contains some of the highest land in the State. The southern division, south and west of these limits, including the cotton belts, consists largely of drift deposits irregularly stratified over the eroded surface of Cretaceous and Tertiary rocks. Clarke County, between the Alabama and Tombigbee, is rich in fossil remains of the Tertiary age.

Mineral Resources. The southern limit of the mineral region may be indicated by a line passing through Pikeville, Tuscaloosa, and Wetumpka to Columbus, Ga. Within this area are the comparatively insignificant gold deposits of Tallapoosa County, and three fields of bituminous coal over 8660 square miles in extent, named from the rivers that drain them—the Warrior, the Cahaba, and the Coosa. Cannel, free-burning, lump, coking, gas, and other coals of superior quality are found. There are extensive beds of iron ore, including red hematite, limonite, black-band, magnetic, and specular; and the Choccolocco, Anniston, Coosa, Cahaba, Birmingham, and other valleys are noted for the abundance of their iron ore. Among other mineral products are asbestos, asphalt, copper, corundum, emery, fire clay, graphite, granite, lithographic stone, manganese, white and variegated marble, marl, red ochre, phosphates, bauxite, pottery and porcelain clays, salt (in the southwest), slate, soapstone, and small amounts of silver and tin. Natural gas has also been discovered, but the supply is inconsiderable.

Mining.—The utilization of the mineral resources of Alabama is, perhaps, the most remarkable feature of the industrial progress of the South in the last decade. Though it was long known that there were vast quantities of

TENNESSEE
LAUDERDALE
LIMESTONE
MADISON
JACKSON
COLBERT
Florence
Tuscumbia
Sheffield
Huntsville
Decatur
New Decatur
FRANKLIN
Russellville
LAWRENCE
MORGAN
Moulton
MARSHALL
DE KALB
Albertville
Fort Payne
MARION
WINSTON
CULLMAN
CHEROKEE
ETOWAH
Attalla
Gadsden
Pleasant City
BLOUNT
Oneonta
Pledmont
WALKER
Jasper
CALHOUN
Anniston
ST. CLAIR
Ashville
CLEBURNE
Heflin
Birmingham
Woodward
JEFFERSON
Talladega
TALLADEGA
Bessemer
Wedowee
RANDOLPH
LAMAR
FAYETTE
PICKENS
TUSCALOOSA
Tuscaloosa
Brookwood
SHELBY
CLAY
Montevallo
Columbiana
Bloctón
GREENE
COOSA
CHAMBERS
Lafayette
Tupelo
Fulton
Okolona
Aberdeen
Muldon
West Point
Columbus
Starkville
Artesia
Brooksville
Macon
Shuqualak
Boonville
Baldwin
Ripley
Corinth
Iuka
Riverton
Florence
Tuscumbia
Sheffield
Huntsville
Decatur
Russellville
Jasper
Oneonta
Gadsden
Anniston
Talladega
Birmingham
Tuscaloosa
Selma
Montgomery
Eufaula
Dalton
Ringgold
Blueridge
Springplace
Ellijay
Calhoun
Summerville
Lafayette
Rome
Cedartown
Rockmart
Marietta
Dallas
Buchanan
Douglasville
ATLANTA
Carrollton
Fairburn
Jonesboro
Fayetteville
Newnan
Franklin
Greenville
Woodbury
Harris
Lanett
Roanoke
Wedowee
Talladega
Jasper
Canton
Waleska
Tallapoosa
Waco
Hopewell
Bremen
Cordova
Carbon Hill
Sumiton
Graysville
Fultondale
Leeds
Trussville
Pell City
Ashland
Clay
Ashland
Wadley
Rock Mills
Zebulon
Lineville
Wedowee
Roanoke
Milltown
Fivepoints
Lafayette
Dadeville
Alexander City
Jacksons Gap
Tallassee
Wetumpka
Prattville
Montgomery
Selma
Eufaula
Union Springs
Troy
Greenville
Evergreen
Brewton
Andalusia
Opp
Florala
Geneva
Dothan
Headland
Abbeville
Ozark
Enterprise
Elba
Samson
Geneva
Hartford
Ashford
Dothan
Columbia
Gordon
Webb
Cottonwood
Ashford
Headland
Abbeville
Ozark
Enterprise
Elba
Samson
Geneva
Hartford
Ashford
Dothan
Columbia
Gordon
Webb
Cottonwood
Chattahoochee
Tombigbee R.
Black Warrior R.
Coosa R.
Tallapoosa R.
Chattahoochee R.
Flint R.
Conecuh R.
Pea R.
Choctawhatchee R.
Escambia R.
Perdido R.
Alabama R.
Tombigbee R.
Black Warrior R.
Coosa R.
Tallapoosa R.
Chattahoochee R.
Flint R.
Conecuh R.
Pea R.
Choctawhatchee R.
Escambia R.
Perdido R.
A
B
C
D
E
1
2
3
4
88°
87°
86°
85°
35
34
33

ALABAMA
SCALE OF STATUTE MILES
0 10 20 30 40 50 60 70
SCALE OF KILOMETERS
0 10 20 30 40 50 60 70 80 90 100
County Towns
Railroads
GULF OF MEXICO
Mississippi Sound
Pensacola Bay
Choctawhatchee Bay
Longitude 87° West from 86° Greenwich
A B C D E
3 4 5
SUMTER
PERRY
MARION
AUTAUGA
ELMORE
TALLAPOOSA
CHILTON
COOSA
MONTGOMERY
MACON
TUSKEGEE
PHOENIX
GIRARD
DALLAS
LOWNDES
BULLOCK
RUSSELL
MARENGO
WILCOX
CHOCTAW
BUTLER
CRENSHAW
PIKE
BARBOUR
EUFAULA
CLARKE
GROVE HILL
MONROE
CONECUH
COVINGTON
COFFEE
DALE
OZARK
HENRY
WASHINGTON
ESCAMBIA
GENEVA
HOUSTON
DOTHAN
MOBILE
BALDWIN
Mobile
Whistler
Bay Minette
Stockton
Perdido Sta.
Flomaton
Pollard
Bradley
Florala
Opp
Andalusia
Brantley
Troy
Montgomery
Selma
Prattville
Autaugaville
Tallassee
Wetumpka
Tuskegee
Phenix
Girard
Columbus
Eufaula
Clayton
Georgetown
Cuthbert
Dawson
Fort Gaines
Albeville
Morgan
Arlington
Bakely
Columbia
Colquitt
Gordon
Bainbridge
Marianna
Blountstown
Bristol
River Jo.
Quincy
Dothan
Cowarts
Ashford
Taylor
Malvern
Harper
Grafton
Cottonwood
Herndon
Crosby
Zoe
Graceville
Chipley
Ozark
Clintonville
Elba
Newville
Hateburg
Headland
Midland City
Newton
Douglas
Daleville
Enterprise
Ariton
Java
Victoria
Adair
Hawkville
Kinston
Glenwood
Courtville
Tenmile
Elamville
Billardsville
Abbeville
Louisville
Clio
Osteson
Belcher
Bakerhill
Troy
Banks
Pronto
Brundidge
Pinckard
Henderson
Shelbiana
Petrey
Luverne
Patsburg
Youngblood
Ansley
Shady Grove
Linwood
Perote
Joiner
Horning
Gaines
Whitecap Spr.
Cottonhill
Blue Spr.
Notasulga
Shorter
Mistead
Carrville
Loachapoka
Lafayette
Chewacla
Salem
Smiths Sta.
Mount Mill
Panola
Panoche
Hurricane
Bromley
Stapleton
Bend
Gatewood
Preston
Daphne
Belforest
Rosinton
Robertsdale
Fairhope
Volanta
Silverhill
Montrose
Stockton
Barnwell
Wharf
Marlow
Point Clear
Battles
Stumbole
Lillian
Swift
Magnolia Spr.
Perdido Beach
Oak
Josephine
Bon Secour
Gulf Shores
Dauphin Id.
Palmetto Beach
Pensacola
Milton
Bluff Springs
Jay
Flomaton
Bratt
Molino
Barrineau Park
Century
Walnut Hill
Bellview
Gonce
Ebro
Vernon
Chipley
Caryville
Bonifay
Esto
Noma
Ponce de Leon
Westville
Argyle
Caledonia
Lockhart
Florala
Haynesville
Lowndesboro
Hope Hull
Snowdown
Fitzpatrick
Thompson
Suspension
Enon
Gurry Oak
Tutherford
Pittview
Union Springs
Panther
Sprague
Legrand
Sharon
Oakwood
Bughall
Threenotch
Dames
Comer
Harkinsville
Howe
Lumpkin
Preston
Highland
Cottonton
Coleridge
Glenville
Vaucha
Jernigan
Tuskegee
Notasulga
Shorter
Mistead
Carrville
Loachapoka
Lafayette
Chewacla
Salem
Smiths Sta.
Mount Mill
Panola
Panoche
Columbus
Girard
Phenix
Tuskegee
Ubland
Brickyard
Marvyn
Hilltr
Uchee
Heard
Jupiter
Mitchell
Cusseta
Buenavista
Owlchee
Lenlo
Ellerslie
Hatchechubbee
Hurtsboro
Baroom
Davis
Armstrong
Wheelersand
Cowarts
Ashford
Taylor
Malvern
Harper
Grafton
Cottonwood
Herndon
Crosby
Zoe
Graceville
Chipley
Marianna
Bainbridge
Blountstown
Bristol
River Jo.
Quincy
Ochlockonee R.
Apalachicola R.
Chattahoochee R.
Flint R.
Pea R.
Conecuh R.
Escambia R.
Choctawhatchee R.
Yellow R.
Perdido R.
Escambia Bay
Choctawhatchee Bay
Pensacola Bay
Mississippi Sound
GULF OF MEXICO
L.L. PCATES ENGR'G CO., N.Y.

iron and coal in the State, it was not until a comparatively recent period that the mining of these minerals on a large scale was undertaken. Thus the value of the bituminous coal mined in the State in 1886 was but $2,500,000. In 1900 it had risen to $10,000,000, in 1905 to $14,875,000, and in 1910 to nearly $20,000,000. The increase in the iron-mining industry is quite as striking. In 1880, 171,000 long tons of iron were mined; in 1905 the production had increased to 4,257,000 tons, and the State ranked third in the production of iron ore.

These conditions are reflected in, and are chiefly responsible for, the great development of the manufacturing industries of the State. See *Manufactures.*

As indicated above, coal and iron constitute the chief mineral resources. The coal is bituminous, and a considerable portion of it is used in the manufacture of coke, in the production of which Alabama is surpassed in quantity only by Pennsylvania.

The statistics of the thirteenth census, which are for the calendar year 1909, show the following facts in regard to the mining of coal in the State. In that year there were 167 coal mines in Alabama; the capital invested was $19,632,647; the production was 6,515,922 tons, valued at $8,125,811, and the wage-earners employed numbered 20,914. In the manufacture of coke 2,396,543 tons of coal were used. Since 1909 the production of coal has showed a remarkable increase. In 1910, according to the figures of the United States Geological Survey, there were mined 15,018,965 tons, and in 1912, 16,100,600 tons. In the production of coke, as noted above, the State ranks second. The output in 1912 was 2,975,489 short tons, valued at $8,098,412, compared with 2,761,521 tons, valued at $7,593,594 in 1911.

To the remarkable increase in the production of the iron mines of the State is due the wonderful advance of Birmingham and other cities as industrial centres. The greater part of the iron mined is red hematite. The State ranks third in the amount of ore produced; it is surpassed only by Minnesota and Michigan. According to the thirteenth census, the value of the iron ore in 1909 was $4,939,149, and the statistics of the Geological Survey show a production in that year of 4,321,252 tons. The marketed production in 1912 was 4,563,603 tons, valued at $5,734,371. In 1909 there were 25 operators of iron mines, and the wage-earners employed in the mines numbered 5666. In the manufacture of pig iron Alabama ranks fourth. There were produced, in 1912, 1,987,753 tons, valued at $21,371,053, compared with 1,617,150 tons, valued at $17,379,171 in 1911. The pig iron output has decreased somewhat since 1905, as a result of industrial and other causes. In that year the output was valued at $22,680,000. Other important mineral products of the State are limestone, bauxite, and graphite, which are mined in Cherokee County. Clay products, sandstone, and mineral waters also have a considerable value. Petroleum has been found in the western section of the Warrior coal fields, at Fayette; wells have been driven, but oil has not been produced in quantities sufficient to justify extensive exploitation of the field.

The total value of the mineral products of the State in 1909 was $24,350,667. The wage-earners in the mines numbered 30,795, and the capital invested was $85,081,804.

Fisheries. In 1908 the total value of the product of fisheries in Alabama was $387,220. By far the most important branch of this industry is the oyster-fishing, and there were 536,300 pounds of oysters taken, valued at $168,870. Other fisheries of some importance were red snappers, mullets, catfish, and shrimps. The number of independent fishermen was 787, with 61 boats.

Agriculture. Alabama, like most of the other Southern States, is preëminently agricultural. The soils suitable for cultivation are extremely varied. They range from dark, mucky loams along the immediate coast line, to sands, sandy loams, fine sandy loams, and heavy clay soils throughout the more inland regions.

During the decade 1900 to 1910 the increase in the number of farms slightly exceeded the increase in the population. There were, in the latter year, 262,901 farms, compared with 223,220 in 1900, or an increase of 17.8 per cent. The increase in the population in the same period was 16.9 per cent. (See *Population*, below.) Of the total land area of 32,818,500 acres the land in farms in 1910 comprised 20,732,312 acres, a gain of 46,885 acres in the decade. The farm lands improved in 1910 amounted to 9,693,581 acres. The average acres per farm in 1910 were 78.9 and in 1900 92.7.

The total value of farm property in the State in 1910 was $370,138,429. This includes land, buildings, and live stock. The corresponding value in 1900 was $179,399,882. This shows an increase of 106.3 per cent in the decade. The average value of all property per farm in 1910 was $1408, and, in 1900, $804. The average value of land per acre in 1910 was $10.46 against $4.84 in 1900, an increase of 116.1 per cent in the decade.

The tendency to lease farms to tenants or on shares, which is common in some Southern States, is characteristic of Alabama. Of the 262,901 farms in the State in 1910, 158,326 were operated by tenants, and 104,575 by owners or managers. That this tendency is increasing is shown by the fact that, while the total number of farm operators increased 93.5 per cent in the decade 1900–1910, the number of tenants increased 148.7 per cent. The arrangements of lease differ; of the total number in 1910, 67,352 were shareholders, 2428 share-cash tenants, and 83,300 cash tenants.

The relative amount of land cultivated by white and colored farmers in Alabama is of great interest. In 1910, out of a total of 20,732,312 acres in farms, 15,640,877 acres were owned or operated by white farmers, and 5,019,435 by colored farmers. It is significant that while the acreage owned or operated by white farmers decreased from 15,965,260 in 1900 to 15,640,877 in 1910, the acreage owned or operated by colored farmers increased from 4,720,167 in 1900 to 5,019,435 in 1910. The greater number of colored farmers cultivate the property as tenants. Colored owners in 1910 held 1,466,719 acres, while 3,607,234 acres were under tenancy. That negro ownership of farm lands is increasing, while ownership by white farmers is decreasing, is shown by the fact that white ownership in 1900 was 12,348,537 and, in 1910, 11,813,387, while colored ownership increased from 1,216,813 in 1900 to 1,466,719 acres in 1910. Of the 103,929 farms owned in 1910, 74,504 were free from mortgage, 27,457 were mortgaged, and the status of 1908 was unknown. The propor-

tion of farms free from mortgage decreased from 80.8 per cent in 1900 to 73.1 per cent in 1910.

The greater number of farms in the State, for both white and colored, average from 20 to 49 acres. Farms of this size comprise over two-fifths of the entire farm area in the State; one-fifth are from 50 to 99 acres, and about one-eighth from 100 to 174 acres. Thus more than three-fourths of the farms of the State are between 20 and 174 acres.

Of the farmers in Alabama in 1910, 152,458, or 58 per cent, were white, and 110,443 were non-white. Of the non-whites, all but 56 were negroes.

The total value of live stock on the farms of the State in 1910 was $65,595,000. This includes domestic animals, poultry, and bees. The cattle numbered 932,428; horses, 135,636; mules, 247,146; swine, 1,266,733; sheep, 142,930, and goats, 79,347. The fowls of all kinds numbered 5,028,104. On Jan. 1, 1913, there were in the State 146,000 horses, 270,000 mules, 931,000 cattle, 132,000 sheep, and 1,146,000 swine.

The acreage, production, and value of the principal crops in 1909 and 1912 are given in the following table. The figures for 1909 are from the thirteenth census, and those for 1912 from the United States Department of Agriculture.

		Acreage	Prod. Bu.	Value
Corn,	1912	3,150,000	54,180,000	$44,120,000
	1909	2,884,824	34,072,032	30,927,210
Wheat,	1912	30,000	318,000	359,000
	1909	13,665	113,953	120,873
Oats,	1912	260,000	5,200,000	3,224,000
	1909	257,276	3,251,146	2,117,703
Potatoes,	1912	15,000	1,215,000	1,094,000
	1909	14,486	1,128,564	884,497
Hay,	1912	209,000	261,000 *	3,811,000
	1909	238,656	251,403	3,357,132
Tobacco,	1912	300	225,000 †	79,000
	1909	211	90,572	14,892
Cotton,	1912		1,330,000 ‡	
	1909		1,129,527	74,205,236

* tons † pounds ‡ bales of 500 pounds each

The value of the cotton crop in 1909 was over twice the aggregate value of all the other crops combined. The total acreage of the combined cereals was, in 1909, slightly more than three-fourths as great as that of cotton, and their value about two-fifths as great.

In addition to the crops noted above, the State produces others of value. The peanut crop in 1909 was valued at $1,490,654. Sweet potatoes and yams were valued at $3,578,710, and cotton-seed at $12,803,196. The growing of orchard fruits and small fruits is of considerable and increasing importance. The former, in 1909, were valued at $1,818,508, and the latter at $165,386. Of the orchard fruits, apples are of the greatest importance, and of the smaller fruits, strawberries. Figs, oranges, and grape-fruit are grown, but of these only the first is important. The figs produced in 1909 were valued at $80,960. The production was 1,773,126 pounds.

Forest Products. There were, in 1909, 107,985 farms which reported forest products. These include firewood, material for fences, logs, railroad ties, telegraph and telephone poles, materials for barrels, bark, and naval stores. The total value of these products in 1909 was $6,308,151, compared with a value of $2,494,452 for the product of 1899, an increase of 152.9 per cent. Of the value in 1909 $3,827,481 was reported as that of products used or to be used on the farms themselves, $1,899,341 as that of products sold or for sale, and $581,329 as the amount received for standing timber.

Manufactures. The rapid growth of the manufacturing industries of the State in the last 30 years has been due largely to the development of its rich mineral resources, particularly in the northern part, known as the "Birmingham district." The close proximity of the coal fields of this district to its iron mines has made the iron industry very prosperous, while the great abundance of available coal and extensive forest resources have given a marked impetus to other manufacturing industries.

The importance of the iron industry, as a whole, is due to the exploitation of the rich deposits of iron, coal, and limestone which are found in close proximity in the northern part of the State. These favorable conditions are conducive to the production of pig iron at a relatively low cost.

In 1909 lumbering was the most important single industry, from the standpoint of value of product, value added by manufacture and the number of wage-earners.

During the period from 1899 to 1904 the growth of the industries related to the manufacturing of cotton was remarkable. The number of establishments increased 48.4 per cent, and the value of the product 105.6 per cent. Although the percentages of increase were smaller during the period from 1904 to 1909, the figures indicate a continued development, as the table will show. It is interesting to note that from 1899 to 1904 the percentage of increase in the value of product was higher than that in the value added in manufacture, while in the period from 1904 to 1909 the rate of increase in value added by manufacture was far greater than that shown for value of product. This is due partly to the enormous rise in the price of cotton during the former period and partly to the manufacture of a better grade of goods during the latter period.

The great importance of the coke-making industry is due to the abundant supply of coal suitable for coking purposes and to the demand for coke for fuel in the manufacture of iron and steel.

The table below shows the essential details of the industries in the State whose product in 1909 was valued at more than $1,000,000. The corresponding data for 1904 are also given.

As will be seen from this table, the total number of wage-earners engaged in the manufacturing industries of the State in 1909 was 72,148, compared with 62,173 in 1904. In 1909 the male wage-earners numbered 65,686, and the female 6462. There were 3653 wage-earners under 16 years of age, and of these 1380 were females. The greater number of children under 16 years of age are employed in the industries related to the manufacture of cotton goods. Of a total number of 12,734 wage-earners employed in these industries in 1909, 18.7 per cent were under 16 years of age.

There are seven cities in the State that are important manufacturing centres. These are Birmingham, Bessemer, Mobile, Montgomery, Anniston, Selma, and Gadsden. Of these Birmingham is by far the most important. The growth of this city in the decade 1900–1910 is

one of the most remarkable instances of rapid increase of population on record. (See *Population*, below.) There were, in 1909, 8999 wage-earners in Birmingham, compared with 3987 in 1904. The value of the products of its industries was $24,128,214 in 1909, as against $7,592,958 in 1904. The causes for this phenomenal growth are noted above.

Transportation and Commerce. Alabama has excellent facilities for transportation by both land and water routes. The Alabama and Tombigbee rivers and their tributaries afford means for inland navigation, while the Tennessee, which sweeps across the northern part of the State, is navigable to Chattanooga, Tenn., and for small craft as far as Knoxville. Mobile is one of the most important ports on the Gulf of Mexico, and, in addition, the ports of New Orleans and Pensacola in neighboring States are easily accessible. The State has more miles of navigable rivers than any other in the South, but improvement and development have been slow. In 1907 the Mobile Basin and Tennessee River Association was organized to work for the improvement of Alabama waterways. The United States government began in 1910 to make extensive changes in the Alabama and Coosa rivers to Wetumpka, and on the Warrior and Tombigbee rivers.

The railway mileage of the State in 1912 was 5295 against 4752 in 1906. Nearly every trunk line in the South passes through Birmingham. In 1907 the Legislature passed many stringent measures designed to regulate and control the railways passing through the State, and attempts to enforce some of these led to a conflict of authority between the State and Federal governments. There is a State Railroad Commission, which, among other things, has the power of general supervision of railroad rates. Mobile is the only seaport. Much of the cotton for export and coastwise shipment goes to Savannah, and most of the lumber to Pensacola.

Banks. There were in the State on Dec. 2, 1912, 324 banks of all classes. The national banks numbered 85, with a capital of $9,700,000, deposits of $35,935,708, and total resources of $66,942,019. There were 11 savings banks, with 24,925 depositors, and deposits aggregating $2,652,784, and 214 State banks with a capital of $10,073,390, and savings deposits of $6,541,489.

Finance. The bonded debt amounts to $9,057,000, about half of which was created during the reconstruction period, known as the "carpet-bag" régime. Of this debt $8,103,000 was refunded in 1906, $7,137,000 matures July 1, 1956, and bears interest at the rate of 4 per cent; the balance, $966,000, matures Jan.

COMPARATIVE SUMMARY MANUFACTURES FOR 1909 AND 1904

INDUSTRY	Census	Number of establishments	PERSONS ENGAGED IN INDUSTRY: Total	Proprietors and firm members	Salaried employees	Wage-earners (average number)	Primary horse-power	Capital	Salaries	Wages	Cost of materials	Value of products	Value added by manufacture
								Expressed in thousands					
STATE—All industries	1909	3,398	81,972	3,769	6,055	72,148	357,837	$173,180	$6,565	$27,284	$83,443	$145,962	$62,519
	1904	1,882	67,884	1,948	3,763	62,173	293,185	105,383	3,867	21,878	60,458	109,170	48,712
Bread and other bakery products	1909	83	773	94	105	574	334	898	93	248	1,073	1,725	652
	1904	52	585	59	51	475	251	473	42	161	666	1,110	444
Brick and tile	1909	71	1,500	56	91	1,353	5,127	1,942	100	434	288	1,135	847
	1904	63	1,178	60	74	1,044	3,360	1,033	72	301	204	847	643
Cars and general shop construction and repairs by steam-railroad companies	1909	21	6,610	.....	302	6,308	4,928	4,732	313	3,372	3,775	7,528	3,753
	1904	16	5,740	.....	239	5,501	3,125	2,104	235	2,993	3,306	6,681	3,375
Coke	1909	35	2,800	.....	220	2,580	5,766	17,770	226	1,283	6,371	8,843	2,472
	1904	24	2,272	.....	107	2,165	3,075	3,425	96	924	3,997	6,175	2,178
Cotton goods, including cotton small wares	1909	51	13,041	.....	310	12,731	42,637	30,954	460	3,454	14,373	22,212	7,839
	1904	46	11,740	1	259	11,480	27,505	24,758	343	2,458	12,011	16,760	4,749
Fertilizers	1909	42	1,473	12	228	1,233	4,484	8,507	305	392	4,264	6,423	2,159
	1904	19	636	6	79	551	1,485	3,051	68	153	1,606	2,341	735
Flour-mill and grist-mill products	1909	72	315	84	63	168	3,559	1,080	51	57	2,405	2,779	374
	1904	40	230	42	29	159	2,124	372	20	54	1,556	1,750	194
Foundry and machine-shop products	1909	102	6,462	67	497	5,898	9,859	11,984	662	2,958	6,227	11,550	5,323
	1904	71	4,943	43	311	4,589	5,376	6,192	426	2,133	4,588	8,840	4,252
Iron and steel, blast furnaces	1909	19	4,325	.....	542	3,783	106,189	23,816	740	2,077	15,477	21,236	5,575
	1904	19	5,216	.....	262	4,954	101,048	19,326	321	1,939	11,012	16,646	6,349
Lumber and timber products	1909	1,819	25,927	2,387	1,131	22,409	102,527	24,442	1,168	7,259	9,145	26,058	16,913
	1904	666	17,751	836	780	16,135	55,512	14,164	814	5,546	5,195	18,279	13,084
Oil, cottonseed, and cake	1909	71	1,984	13	353	1,618	17,215	7,202	334	437	7,075	9,178	2,103
	1904	58	1,698	17	281	1,400	12,883	5,169	254	381	4,554	5,769	1,215
Printing and publishing	1909	274	1,955	299	539	1,117	1,092	2,010	462	650	666	2,768	2,102
	1904	241	1,462	269	278	915	712	1,469	245	469	432	1,947	1,515
Turpentine and rosin	1909	175	3,965	255	191	3,519	384	1,397	125	906	486	2,472	1,986
	1904	144	3,342	229	194	2,919	151	767	99	745	511	2,434	1,923

1, 1956, and bears interest at the rate of 3½ per cent. Interest on both sums is payable semi-annually, on the first days of January and July of each year. The remainder of the bonded debt, $954,000, matures in 1920 and bears interest at the rate of 4 per cent, payable semi-annually, on the first days of January and July. No provision is made for the final extinction of this debt. New debts can be incurred only for purposes of repelling invasion or suppressing insurrection. Valuation of property has increased from $130,000,000 in 1880, and $383,420,000 in 1906, to $566,807,488 in 1912. The tax rate is limited to 65/100 of 1 per cent (6½ mills on the dollar), on the value of taxable property for State purposes, and ¾ of 1 per cent for county purposes. Of the levy for State purposes, 30 cents on $100, by constitutional provision, is applied to the support of common schools, and the remaining 25 cents is applied to general purposes, including pensions to indigent surviving Confederate soldiers and the widows of Confederate soldiers, support of State high schools and colleges, salaries, and other expenses. The net receipts for the fiscal year ending Sept. 30, 1912, from all sources, were $6,061,236.68, and net disbursements for the same period $5,906,255.56. The principal sources of revenue are: tax on property and polls about 60 per cent; license about 22 per cent; and earnings of convicts about 18 per cent. Of the disbursements, about 50 per cent was expended for schools, colleges, and eleemosynary institutions; about 16 per cent for pensions to indigent surviving Confederate soldiers and widows of deceased Confederate soldiers; about 10 per cent for maintenance of the convict department; about 6 per cent for interest on the bonded debt; about 2 per cent for feeding and removing State prisoners; and the remaining 16 per cent was expended for miscellaneous subjects, including salaries of heads and employees of State departments, and expenses of same, State judiciary, State national guard, etc. The balance, Oct. 1, 1912, was $262,052.38.

Education. The condition of public education in Alabama has been unsatisfactory since the close of the Civil War. The causes are many: some are local and indicate conditions which will be remedied. There is no compulsory education law in the State, and those who are in charge of the schools have no means of compelling attendance. The large proportion of negroes in the State adds another difficulty to the problem. These causes have resulted in a percentage of illiteracy in Alabama that is exceeded in but two other States, South Carolina and Louisiana. In 1910 the illiterates numbered 352,710, or 22.9 of the entire population. The percentage among the native-born whites was 10.1, while among the negroes it was 40.1. That conditions are improving, however, is shown by the fact that the percentage among the native whites in 1900 was 15.2, and among the negroes 57.4. The percentage for the entire population in 1900 was 34.

According to the thirteenth census, the school population, ages 6 to 20, in 1910 was 750,357, while those attending school numbered 385,449. Of those attending school 244,992 were white and 133,191 were negro. According to statistics supplied by the State Superintendent of Public Instruction the school population of the State in 1912 was 727,297. The white children numbered 399,273 and the colored 328,024. The number enrolled in the schools was 446,301, and of these 299,844 were white and 146,547 were colored. In schools for white children were 7972 teachers, and in those for colored children, 2907. The average yearly salary for white teachers was $376 and for colored $160. The total amount expended for teachers' salaries, including county superintendents, aggregated $3,703,711.

There is no legal provision for taxation for educational purposes in the State, but each county is allowed, under the constitution, upon a vote of 60 per cent of the people, to levy a tax of 1 mill or 10 cents on each $100 of property, to obtain a supplemental school fund for the exclusive use of the county levying it.

In 1912 there were 2941 graded schools for white children in the State, and 814 for negroes. These graded schools form for the whites two-thirds, and for the negroes two-fifths of all the schools in the State. The teachers, especially those in colored schools, have heretofore lacked many qualifications. Recent legislation has, however, greatly improved and strengthened the teaching force. Successful efforts are being made to improve the condition of the elementary rural schools by grading, closer supervision, and the vitalizing of school work.

Forming a part of the educational system of the State are the University of Alabama (q.v.) at Tuscaloosa, the Alabama Polytechnic Institute (q.v.) at Auburn, the Alabama Girls' Technical Institute at Montevallo, normal schools at Florence, Jacksonville, Troy, Livingstone, Daphne for white teachers, and at Moundsville, Montgomery, Normal, and Tuskegee for negroes. There are also 9 district agricultural schools, and the Northeast Alabama Agricultural and Industrial Institute at Lineville. Private institutions are St. Bernard College at Cullman; Howard College at East Lake; Southern University at Greensboro; Birmingham College at Birmingham, Spring Hill College at Spring Hill, and 8 colleges for women. The work of the Tuskegee Normal and Industrial Institute (q.v.) is widely and favorably known.

Charitable and Penal. The State institutions comprise the Institution for the Deaf, Dumb and Blind, at Talladega; hospitals for the insane, at Tuscaloosa and Mount Vernon; a penitentiary, at Wetumpka; and nineteen branch prisons, where State convicts are kept. The State owns cotton farms and a cotton mill, where labor is performed by boys and women convicted of offenses by the courts. The convict system has undergone radical improvements, but prisoners are still leased to contractors. The Legislature of 1907 made provision for special courts for juvenile offenders, and at the session of 1911 the office of State prison inspector was created. At this session there was authorized, also, the construction of a reformatory for wayward and delinquent females and of a reform school for juvenile negro law breakers.

Religion. As in other portions of the South, the Baptists and the Methodists have the field almost to themselves. Among other denominations, the strongest are the Presbyterian, Catholic, Christian, and Episcopalian.

Population. The State has shown a steady increase in population, as will be seen from the tabulation by decades: In 1820, 127,901; 1830, 309,527; 1840, 590,756; 1850, 771,623; 1860, 964,201; 1870, 996,992; 1880, 1,262,505; 1890,

1,513,617; 1900, 1,828,697; 1910, 2,138,093; 1920, 2,348,174. The increase in the decade 1900–10 was 16.9 per cent, which was greater than the increase in any other of the East South Central Division of the States, which includes Kentucky, Tennessee, Alabama, and Mississippi. Alabama ranks eighteenth in population among the States. In 1840 her rank was twelfth, but she has gradually fallen back since that time. The population per square mile in 1910 was 41.7, as against 35.7 in 1900 and 29.5 in 1890.

That the population of the State is preponderantly rural is shown by the fact that in 1910 the rural population was 1,767,663, while the urban was only 370,491. There was, however, an increase of 55.9 per cent in the urban population in the decade 1900–10, while the rural population increased but 11.5 per cent.

The white population in 1910 was 1,228,832, while the negroes numbered 908,282. The white population in 1900 was 1,001,152, and the negro 827,307. The white population, as is true of most of the Southern States, is almost entirely native born. The foreign population in 1910 numbered only 19,286. Of the native white population in 1910, 597,894 were males and 579,565 were females, and there were 103.2 males to 100 females.

The negroes are centred largely in the cotton belt, where they find ready employment as laborers. In certain counties of this belt they outnumber the whites five to one, but in other counties outside the cotton belt these conditions are reversed. The negroes in the rural communities have, in recent years, shown a tendency to gravitate to the cities.

Cities. Birmingham is the largest city in the State, with a population in 1910 of 132,685. Its population in 1900 was 38,415, and the rate of increase in the decade was 245.4 per cent. Only two other cities in the United States increased more rapidly, and these were practically created during the decade. The other large cities are Mobile, 1910, 51,521; 1900, 38,469; Montgomery, the capital, 1910, 38,136; 1900, 30,346; Selma, 1910, 13,640; 1900, 8713; Anniston, 1910, 12,794; 1900, 9695; Bessemer, 1910, 10,864; 1900, 6358, and Gadsden, 1910, 10,557; 1900, 4282. There were 22 cities with a population of over 4000 in 1910, compared with 16 in 1900.

Government. The present constitution was adopted in 1901. The constitutional convention which met in that year devoted a great part of its deliberations to an attempt to evolve a law which would practically eliminate negro suffrage. The following provisions of the constitution accomplished this purpose: In order to register prior to Dec. 20, 1902, the applicant must have engaged in, or have been the descendant of one who has participated in, one of the following events: The War of 1812, the Mexican War, any war with the Indians, the war between the States, the war with Spain, or served with the forces of the Confederate States, or of the State of Alabama in the war between the States; and he must have been an individual of good character, and one who understood the duties and obligations of citizenship under a republican form of government. Since Jan. 1, 1903, the applicant for registration has been required to be able to read and write any article of the Constitution of the United States in the English language and be physically able to work, or to be able to read and write such article, and to have been engaged in some regular trade or occupation for the greater part of the 12 months next preceding the time he offers to register; or if he is unable to read or write, such inability must be due to physical disability; or the applicant must be the owner in good faith in his own right, or the husband of a woman who is the owner in good faith in her own right, of 40 acres of land situated in the State; or to be the owner or husband of the owner of real or personal property assessed at $300.

Any person guilty of criminal offense, including the selling, buying, or offering to sell or buy a vote, is debarred from voting. Each county has a board of registrars, consisting of three members who issue the certificates to those entitled to hold them. An amendment to the constitution may be secured by a two-fifths vote of each house, ratified by a vote of the people. A constitutional convention may be called when voted by a majority of each house and ratified by the people, and the power of such conventions in altering, revising, or amending is subject to no restrictions.

Legislative.—The legislative body consists of a Senate and a House of Representatives, the maximum limit of membership being 35 and 107 respectively. The number of Senators must not be more than one-third nor less than one-fourth that of Representatives. Senatorial districts are composed of contiguous undivided counties. Elections are held the first Tuesday after the first Monday in November of every fourth year, and the Legislature meets on the second Tuesday in the following January, the session being limited to 50 days. Members are paid $4 per day and traveling expenses. Revenue bills originate in the House and cannot be passed in the last five days of the session. The Legislature must provide for the revision of the statutes every twelfth year. One of the numerous legislative prohibitions prevents the State from engaging in or aiding in internal improvements, but in 1908 an amendment to the constitution became operative, limiting the prohibitions referred to as follows: "Provided that the State may under appropriate laws cause the net proceeds from the State convict fund to be applied to the construction, repair, and maintenance of public roads in the State, and the Legislature may make additional appropriations for that purpose."

Executive.—A governor, lieutenant-governor, attorney-general, State auditor, secretary of State, State treasurer, superintendent of education, and commissioner of agriculture and industries are elected every fourth year, at the time and place appointed for the election of members of the Legislature. None of these officers is eligible for reëlection, and the governor is not eligible to election or appointment to any office in the State, or to the Senate of the United States, during his term or within one year after the expiration thereof. The lieutenant-governor is ex officio president of the Senate, and succeeds to the office of governor in case that office becomes vacant. The attorney-general, secretary of State, and State auditor constitute a board of pardons, to hear petitions for pardons, commutation, or parole in cases of felony, and advise the governor thereon; but the decision of the governor does not need to conform with that of the board. The governor may veto any bill, or any item of an appropriation bill; but a majority vote of each house may override the veto of the gov-

ernor. A bill becomes law if the governor fails to pass upon it within one week after it has been submitted to him.

The Legislature of 1907 created a State Tax Commission, with power to act as a State Board of Equalization and to recommend improvements in the tax laws. The Legislature of 1911 created a banking department and the office of State prison inspector. The salary of the governor was raised at this session from $5000 to $7500, and an executive mansion was purchased. An appropriation of $100,000 for the improvement of the State Capitol at Montgomery was made. This was available in 1912–13. At this session a State board of arbitration and mediation for the settlement of labor troubles in coal mines was created, and the governor was authorized to appoint an inspector of coal mines for each 2,500,000 tons of coal.

Judiciary.—The judicial power of the State is vested in the Senate, sitting as a court of impeachment, a supreme court, circuit courts, chancery courts, courts of probate, such courts of law and equity inferior to the supreme court consisting of not more than five members, as the Legislature from time to time may establish, and such persons as may be by law invested with powers of a judicial nature. A circuit court, or a court having the jurisdiction of a circuit court, is held in each county of the State at least twice every year. The State is divided into five chancery divisions, with a chancellor for each division. The divisions are subdivided into districts, in each of which the chancellor holds court at least twice each year. Courts of probate exist in each county. Judges of the supreme, circuit, chancery, and probate courts are elected for a term of six years. For each judicial circuit a solicitor (prosecutor) is elected for a term of four years. Each precinct has two justices of the peace and one constable, excepting precincts lying within towns of over 1500 inhabitants, in which precincts the Legislature may establish inferior courts in lieu of the justices of the peace. The Legislature of 1911 created a State court of appeals of three members, elected for a six-year term at an annual salary of $5000. This court has final jurisdiction in certain cases.

Local and Municipal Government.—The commission form of government is mandatory in cities of the first class, of which Birmingham is the only representative; and for cities with a population from 25,000 to 50,000, of which the only one is Montgomery. In cities of the second class, population 50,000 to 100,000, it is permissive, but not mandatory. For cities of 1000 and over, this form of government is permissive, on petition and favorable vote. Provision is made for the recall of commissioners. Up to June, 1913, the cities of Birmingham, Mobile, Montgomery, Cordova, Hartsell, Huntsville, Talladega, Tuscaloosa, and Sheffield, had adopted this form of government. Both county and municipal corporations are limited in their taxing and debt incurring powers. Each county elects a sheriff who serves for four years and cannot be re-elected. One year's residence is necessary to secure a divorce, the principal causes for which are desertion (two years) and habitual drunkenness. Civil service regulations are provided for cities of over 25,000. The capital is Montgomery (q.v.).

Elections.—The State, like most other Southern States, has a system of primary elections. The party State committees have power to fix assessments on candidates, and are given other privileges, but in the main the elections are under State control. They must be held four months or more before the November elections, and on the same date in all parts of the State. These elections are for the State and county elective offices, representatives in Congress, and Presidential elections. The election of United States senators is, of course, governed by the Constitutional Amendment of 1912 providing for such elections. There are stringent laws against political contributions by corporations. The State has 12 votes in the Electoral College; prior to 1910 it had 11.

Militia.—The organized militia of Alabama, officially known as the National Guard, consists (1913) of 2581 men. The census of 1910 found 401,145 males of militia age. The National Guard is formed into one brigade, and consists of three regiments of infantry, two of 12 companies each and one of 10 companies, and two battalions of field artillery, composed of four batteries.

History. In 1540 De Soto passed through the territory now included in Alabama, and found it occupied by powerful Indian nations. Among them were the Alibamas, who gave their name to the country; the Chickasaws, the Choctaws, and the Creeks, together constituting the Muskhogean family; the Cherokees and Apalaches. Alabama was included under Carolina in the royal grants made by the Stuarts in 1629 and 1663, but no attempts at settlement were made by the English. In 1702 the French, under Bienville, removed from Biloxi Bay, where a fort had been built some years previous, and erected Fort Louis, on Mobile River. Mobile was founded in 1711 and until 1720 was the capital of Louisiana. In 1714 Fort Toulouse was built at the junction of the Coosa and Tallapoosa. The growth of the colony was hindered by disease and poverty; the Chickasaws remained hostile, and the English planted their trading posts in the wilderness north of Mobile. When France ceded her possessions east of the Mississippi to England, in 1763, Alabama north of 32° 40′ was added to the Illinois territory, and the part south of the line to West Florida. During the Revolution West Florida, which had by that time gained English and Scotch settlers, remained loyal, and in 1779–80 Spain took advantage of her own war with Great Britain to seize the province. After 1783 the United States, as the successor of England, claimed as far south as the thirty-first degree, but Spain continued to hold the territory south of 32° 40′ till 1798. Georgia claimed between 31° and 35° to the Mississippi, but sold her rights in 1802. In 1798 Congress organized the region included between the Mississippi River on the west, the Chattahoochee on the east, the thirty-first parallel on the south, and a line drawn from the mouth of the Yazoo into Mississippi Territory, and in 1804 extended its northern boundary to Tennessee; in April, 1813, the Mobile district was taken from the Spanish by the United States and annexed to Mississippi Territory.

Incited by the British, the Creeks and their allied tribes rose in 1812 against the whites, their atrocities culminating in the great massacre at Fort Mims, on the Alabama River, Aug. 30, 1813. General Jackson headed the forces sent against the Indians, and by his victories at Talladega and the Horse Shoe Bend of the Tallapoosa, 1813–14, forced them to surrender their territory west of the Coosa and south of We-

tumpka. In a number of subsequent treaties the Indians gradually abandoned the larger portion of their land, until, between 1830 and 1836, they were removed in a body west of the Mississippi River. (See CREEKS.) Mississippi was set off March 1, 1817, and on March 3 was formed the Territory of Alabama, with its seat at St. Stephens. The first Legislature met at Huntsville, Jan. 19, 1818, and the State was admitted to the Union Dec. 14, 1819. In 1820 the seat of government was removed to Cahaba, in 1826 to Tuscaloosa, and in 1847 to Montgomery. The people of Alabama were aggressive champions of territorial expansion for slavery purposes, and took a prominent part in the Mexican War. They entered very zealously into the secession movement, and early in December, 1860, urged the Southern States to withdraw from the Union. At Montgomery, on Jan. 11, 1861, an ordinance of secession was passed by a vote of 61 to 39—the minority representing the northern part of the State, where the Whig party had been especially strong. Forts Gaines and Morgan, at the entrance to Mobile Bay, were seized, and on January 21 the Senators and Representatives withdrew from Congress. Delegates from the seceded States met at Montgomery, February 4, and organized the Confederate government. A Confederate arsenal, foundry, and navy yard were soon established at Selma. In February and April of 1862 Federal troops occupied the Tennessee valley. In August, 1864, Farragut destroyed a Confederate fleet in Mobile Bay, and, aided by General Granger with a land force, reduced Forts Gaines and Morgan. In April, 1865, the Union forces took Selma, Tuscaloosa, Montgomery, and Mobile. A provisional government was established June 21, 1865, and a convention repealed the act of secession and altered the constitution. State officers and members of Congress were chosen; but Congress, in conflict with President Johnson, refused admission to the representatives from Alabama. By the reconstruction act of March 2, 1867, Alabama was included with Georgia and Florida in the third military district, under General Pope. In November a new constitution was framed, which received, February, 1868, 70,182 votes out of 71,817 cast, and though the majority of registered voters had remained away from the polls, Congress declared the constitution operative, and it continued in force till 1875, when a new constitution was adopted. On July 14, 1868, military rule ceased, and on Nov. 16, 1870, the State ratified the fifteenth amendment to the Federal Constitution. For a decade after the Civil War, Alabama suffered from maladministration. Party spirit ran very high, and elections were bitterly contested. The dishonesty of officials and the extravagant railway policy they pursued brought the State and the chief towns into serious financial difficulties. With the reorganization of the public debt in 1876 began an era of quiet and prosperity. Cotton and steel manufactures, lumbering, and the mining industries thrived enormously, and many large towns sprang up in the northern part of the State. Agricultural interests, by comparison, showed little growth. Educational progress did not keep up with economic development until the end of the nineteenth century. Since 1874 Alabama has been invariably Democratic.

The wave of prohibition sentiment which passed over nearly all the Southern States in the early years of the twentieth century included Alabama. The Legislature of 1907 passed local option measures which became effective Jan. 1, 1908. These resulted in the gradual elimination of the legalized liquor traffic in most of the 67 counties of the State and in a majority of the 500 towns. Attempts were made in several counties to have certain provisions of the local option act declared unconstitutional, but they were upheld by the Supreme Court of the State. In 1908 there was such an apparent demand for still more stringent prohibition measures that the Legislature was called in special session to pass additional laws. The result was a so-called State-wide prohibition bill, which made the whole State "dry" by legislative enactment on Jan. 1, 1909. Flaws which led to evasions in its enforcement were found in the administrative features of this law, and in July, 1908, the Legislature again met in special session to provide additional safeguards. The measure passed at this session has been called the most drastic prohibition act ever passed by any State. Officers were given authority to close any place where it was suspected that liquor was sold, and the burden of proof was placed on the defendants. All forms of liquor advertising were forbidden, and provision was made for the impeachment of any officer failing to enforce the law. The transportation of liquor from one person to another was forbidden. This provision, however, which was considered the strongest administrative feature of the law, was pronounced unconstitutional by the courts. The Legislature provided also for an election on an amendment providing for constitutional prohibition. The results of this election, held on March 19, 1909, showed a remarkable reaction against prohibition. The proposed amendment was defeated by over 27,000 votes. In the following year, 1910, State-wide prohibition suffered still other defeats. Emmett O'Neal made his campaign for governorship on a local option platform, while his opponent for the Democratic nomination, Col. H. S. D. Mallory, strongly advocated prohibition. O'Neal was nominated by a majority of over 15,000, and with him a majority of the members of the Legislature pledged to local option. As a result the Legislature of 1911 passed a law known as the Parks local option bill. This practically repealed the stringent measures passed in 1908–09. This law makes the county the unit in voting in the liquor question, and elections can be held only on the petition of 45 per cent of those voting at the previous election. Counties are also allowed to decide whether liquor shall be sold by a dispensary. The Anti-saloon League (q.v.) tested this law in the State courts in 1912, and it was pronounced constitutional. The Legislature of 1911 passed also a bill regulating the sale of liquor under licenses in incorporated places. The sale between the hours of 11 P.M. and 6 A.M. is forbidden, and the number of saloons is limited according to population. Under the Parks law 15 counties voted in 1911 and two in 1912. Nine voted for no license, seven for license, and one for a dispensary. These counties voting for license were, in general, those in which the larger cities of the State are situated.

The passage of unusually severe laws for the regulation of railways and other corporations by the Legislature of 1907 resulted in conflict between the State and Federal authorities on the question of State rights. For a discussion of this subject see STATE RIGHTS.

The deaths of Senators J. T. Morgan and E. W. Pettus in 1907 gave an opportunity for putting into effect the so-called Alabama Alternate Succession Plan. As both these Senators were aged men, at the primaries held in 1906 votes were cast for Senators to succeed them in the event of the death of one or both. John H. Bankhead was nominated to succeed Senator Morgan, and J. E. Johnston to succeed Senator Pettus. Senator Bankhead was reëlected in 1911 and Senator Johnston died in 1913.

On Aug. 10, 1909, the Legislature, in special session, ratified the income tax amendment to the Constitution, and was the first State legislature to take such action.

A decision relating to the alleged practice of peonage in the South, which is likely to be historic in that connection, was rendered in the United States Supreme Court in January, 1911. This decision overturned the Alabama law, which hitherto ruled in these cases. Alonzo Bailey, a negro, had a contract to work as a farm-hand at a wage of $12 per month. He received in advance $15. After working for a little over a month he stopped work, but did not refund the money. According to the Alabama law such refusal to work and refund the money was *prima facie* evidence of intent to defraud. The defendant is required to prove the contrary, but cannot testify directly as to his intentions. He is, therefore, practically convicted of fraud by stopping work and is heavily fined, and in lieu of payment is put to work without remuneration. This case was before the United States Supreme Court for several years. By the decision rendered in 1911 the Alabama law was declared unconstitutional.

Alabama is consistently Democratic in State and national elections. As noted above, Emmett O'Neal was elected governor in 1910. His term expires in 1915.

In the presidential election of 1908, Bryan received 74,370 votes and Taft 25,305. In the election of 1912 Wilson received 82,439 votes. Roosevelt, 22,689, and Taft, 9731. By the apportionment of 1910 Alabama has 10 Representatives in Congress, whereas previously there were but 9.

The following is a list of the governors of the State, and the parties to which they belonged:

TERRITORIAL GOVERNOR

William W. Bibb		1817–19

STATE GOVERNORS

W. W. Bibb	Democrat	1819–20
Thomas Bibb	"	1820–21
Israel Pickens	"	1821–25
John Murphy	"	1825–29
Gabriel Moore	"	1829–31
Samuel B. Moore	"	1831
John Gayle	"	1831–35
Clement C. Clay	"	1835–37
Hugh McVay	"	1837
Arthur P. Bagby	"	1837–41
Benjamin Fitzpatrick	"	1841–45
Joshua L. Martin	"	1845–47
Reuben Chapman	"	1847–49
Henry W. Collier	"	1849–53
John A. Winston	"	1853–57
Andrew B. Moore	"	1857–61
John G. Shorter	"	1861–63
Thomas H. Watts	"	1863–65
Lewis E. Parsons	Provisional	1865
Robert M. Patton	Republican	1865–67
Wager Swayne	(Military Governor)	1867–68
William H. Smith	Republican	1868–70
Robert B. Lindsay	Democrat	1870–72
David P. Lewis	Republican	1872–74
George S. Houston	Democrat	1874–78
Rufus W. Cobb	"	1878–82
Edward O'Neal	"	1882–86
Thomas Seay	"	1886–90
Thomas G. Jones	"	1890–94
William C. Oates	"	1894–96
Joseph F. Johnston	"	1896–1900
William J. Sanford	"	1900–01
William D. Jelks	"	1901–07
Braxton B. Comer	"	1907–11
Emmett O'Neal	"	1911–15
Charles Henderson	"	1915–19
T. E. Kilby	"	1919–

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ALABAMA, UNIVERSITY OF. A co-educational State institution established in 1831 at Tuscaloosa, Ala. It comprises a College of Arts and Sciences, a College of Engineering, schools of Law, Medicine, and Pharmacy, the last two at Mobile, and a summer school which in 1913 had 562 students, the total student registration for that year being 1214 with a faculty of 89. The University has a library of 30,600 volumes, grounds and buildings valued at $1,225,000, an endowment of $545,000, and an income of $162.500. President, G. H. Denny, Ph.D., LL.D.

ALABAMA CITY. A town in Etowah Co., Ala., 56 miles north of Birmingham, on the Louisville and Nashville, the Alabama Great Southern, the Nashville, Chattanooga, and St. Louis, and the Southern railroads (Map: Alabama, C 1). It is situated in an agricultural region producing corn, oats, cotton, wheat, and hay. Coal and red ore are also found in considerable quantities. The city has a large cotton mill and a steel company. Pop., 1900, 2276; 1910, 4313.

ALABAMA CLAIMS. A series of claims for indemnity made upon Great Britain by the United States, based upon the alleged omission of Great Britain to observe the obligations imposed by international law upon neutral nations with reference to their dealings with, and duties to, belligerents. The claims, in most particulars, arose from damages inflicted by vessels in the Confederate service which had been fitted out or built in English waters and allowed to sail thence. The Declaration of Paris (q.v.), adopted in 1856 by most of the nations of Christendom, had abolished privateering, and, though the United States was not a party to the convention, this decree had become a recognized principle of

international law. Moreover, both the United States and England had passed acts early in the century prohibiting the equipment of land or sea forces for the purpose of operating against the territory or commerce of a friendly nation, and making it the duty of the government to prevent such filibustering (Act of Congress of April 20, 1818, 3 Stats. at Large, 448; Foreign Enlistment Act, 59 George III, cap. 69). It was upon these acts and principles affecting international relations that the claims of the United States were founded.

The facts of the case were these: Following President Lincoln's call for volunteers, President Davis of the Confederate States offered letters of marque and reprisal (q.v.) to private vessels to prey upon the commerce of the United States. Prompt advantage was taken of this offer, and numerous privateers issued from southern ports to harry the New York and New England merchant marine. Meanwhile Queen Victoria had issued her proclamation of neutrality, forbidding her subjects to take part with either side, and directing her official servants to accord belligerent rights to both parties to the struggle. Equipment was forbidden the vessels of both belligerents. Notwithstanding this proclamation, and the repeated and urgent protests of the American Minister, Charles Francis Adams, the sympathy of British officials, especially in the colonial ports, with the Southern cause was notorious, and harbors like Nassau in the West Indies became the refuge of Confederate cruisers.

The history of the *Alabama* is typical of the more flagrant cases submitted to the tribunal of arbitration. She was built at Birkenhead, England, under circumstances of great suspicion. The attention of the British government was repeatedly called to the case, and finally some steps were taken by the authorities to detain the vessel; but "No. 290," as she was called, left port without register or clearance papers, July 29, 1862, and, taking on her equipment in the Azores from two English vessels, assumed the name *Alabama*, under which she became famous and set out on her career of destruction. In much the same manner the *Florida*, *Georgia*, *Shenandoah*, and various other cruisers eluded the watchfulness of British officials. Before her destruction by the *Kearsarge*, June 19, 1864, the *Alabama* is said alone to have captured and destroyed 70 vessels of the United States.

The first phase of the controversy appeared in 1862, in the negotiations between the American Minister, Mr. Charles Francis Adams, and Lord John Russell, with reference to the alleged violation of England's Foreign Enlistment Act (1819) by the *Alabama*, and the obligation of the English government to detain her. This the government finally agreed to do; but action was delayed three days because Sir John Harding, an important official before whom the papers had been laid, was suddenly seized with an attack of insanity. The Confederate captain availed himself of this respite and sailed from Liverpool one day before orders arrived for the retention of his vessel. As a result, an enormous loss was inflicted upon American shipping.

Was Great Britain responsible for this, and, if so, to what extent? The solution of this question was the most important problem of diplomacy left as a result of the Civil War. As early as 1865, steps were taken to determine a method of adjustment; but it was not till 1871 that a basis for adjudication was agreed upon, in the important Treaty of Washington, May 8. By this treaty it was stipulated that all claims known generically as the "Alabama claims" should be submitted to the decision of five arbitrators, one named by England, one by the United States, and one each by the King of Italy, the Emperor of Brazil, and the President of the Swiss Confederation. For the guidance of this court of arbitration, the Treaty of Washington laid down the important "three rules" defining the obligation of a neutral power to use "due diligence" to prevent the hostile use of its ports against a friendly nation. In accordance with this arrangement, the court met at Geneva, Dec. 15, 1871. The chairman of the court was Count Federigo Sclopis, the arbitrator named by the King of Italy; and the other members were Baron d'Itajuba, Brazilian Minister at Paris, Jacob Stæmpfli, for three terms President of the Swiss Confederation, Sir Alexander Cockburn, and Mr. Charles Francis Adams. The chief counsel for England was Sir Roundell Palmer, and the American counsel were William M. Evarts, Caleb Cushing, and Morrison R. Waite. The American case, however, was prepared by Mr. J. C. Bancroft Davis. Both the case and the counter-case were prepared and maintained with great ability and acumen, and the arguments were followed with marked interest. More than once, however, a premature termination of the proceedings was threatened by the insistence of the American counsel upon the fact that in estimating the indemnity not only direct damages should be considered, but also such indirect losses as had befallen citizens of the United States through the decrease of trade, the increase of insurance rates, the prolongation of the war, and the additional cost of the prosecution of the war caused by these cruisers. Finally, the claims of the United States for indirect damages were unanimously rejected, on the ground that the principles of international law did not sanction an award of compensation between nations upon claims of that indefinite character. On Sept. 14, 1872, the final award was signed, by which it was decreed that England had incurred no liability arising from the action of the *Sumter*, the *Nashville*, the *Georgia*, the *Tallahassee*, and the *Chickamauga*, or of their tenders, and by a vote of three to two that England had incurred no liability for the work of the *Retribution*. It was, however, determined, by a vote of three to two, that England was responsible for a portion of the acts committed by the *Shenandoah;* by a vote of four to one that England was liable for the results of all the operations of the *Florida;* and by a unanimous vote that England was responsible for all the depredations of the cruiser *Alabama;* and that liability also attached to the acts of the tenders of the *Florida* and the *Alabama*. The consideration of claims arising from the operations of other vessels was excluded for want of evidence. Instead of awarding specific damages apportioned against the several ships and among the several private parties injured, the court awarded a single sum of $15,500,000, as a full indemnity of all claims against Great Britain. This amount was accordingly paid in the following year. In order to determine the claims of private owners, and to distribute the fund among such claimants, Congress created, by the statute of June 23, 1874, a claims court by which judgments were rendered aggregating $9,315,753. A second and similar court was established by

the statute of June 5, 1882. The indirect results of this arbitration—which belong rather to the history of international law than to that of the case under consideration—were of even greater importance than its direct results. In strengthening the principle of arbitration as a means of settling grave international differences, in furnishing a high example of justice and disinterestedness in judging between nations, and in defining and elevating the conception of national responsibility, the Geneva tribunal rendered an incalculable service to humanity. The rules laid down for the government of the arbitrators and the court will be found under the title WASHINGTON, TREATY OF. For its permanent contributions to international law, see that title. The circumstances under which the case was submitted to arbitration, and its relation to other questions of difference between England and the United States existing at the time, are explained in the articles on ARBITRATION, INTERNATIONAL LAW, and WASHINGTON, TREATY OF.

Bibliography. For the most recent and complete work upon the Geneva arbitration, consult: J. B. Moore, *International Arbitrations*, pages 495–682 (Washington, 1898); and for a discussion of the claims courts, pages 4639–4685 of the same work; also Balch, *The Alabama Arbitration* (Philadelphia, 1900); Beaman, *The Alabama Claims and their Settlement* (Washington, 1871); Davis, *Mr. Fish and the Alabama Claims* (Boston, 1893); C. F. Adams, *Life of Charles Francis Adams* (Boston, 1900); D. H. Chamberlain, *Charles Sumner and the Treaty of Washington* (1902); for discussions of special phases of the subject, Bullock, *Secret Service of the Confederate States* (London, 1883); R. Semmes, *The Cruise of the Alabama* (London, 1864); and A. Sinclair, *Two Years on the Alabama* (Boston, 1895). For the British side of the controversy, consult Fitzmaurice, *Life of Granville* (1905). A remarkable collection of printed and manuscript official papers pertaining to the arbitration was made by Hon. J. A. J. Creswell and given to the Johns Hopkins University.

ALABAMA POLYTECHNIC INSTITUTE, originally the ALABAMA STATE AGRICULTURAL AND MECHANICAL COLLEGE. A college at Auburn, Ala., organized in 1872, under the Federal land grant act of 1862. The value of its grounds, buildings, and equipment in 1913 was $476,000, and its total income was about $71,000. It has a campus and forum of 304 acres. The library in 1913 contained 25,000 volumes; the faculty numbered 70 and the students 810, in preparatory, collegiate, chemical, and agricultural, pharmaceutical, and engineering courses.

AL'ABAN'DITE, or MANGANBLENDE. A black, sub-metallic mineral manganese sulphide. It often accompanies other ores of manganese, as at Tombstone, Ariz., and Snake River, Colo.

AL'ABASTER (Gk. *ἀλάβαστ[ρ]ος, alabast[r]os*, a box or casket of alabaster, the name of the mineral being *ἀλαβαστ[ρ]ίτης, alabast[r]ītēs*, which according to Pliny, *Nat. Hist.*, xxxvii, 10, 54, § 143, was derived from the Egyptian town Alabastron, where it was quarried). A name given to two kinds of white stone, chemically distinct, but resembling each other in appearance, and both used for ornamental purposes.

Alabaster proper is a white, granular, semi-transparent variety of gypsum (q.v.) or sulphate of lime. It occurs in various countries, but the finest is found near Volterra, in Tuscany, where it is worked into a variety of the smaller objects of sculpture, vases, timepiece stands, etc. Gypseous alabaster of good quality is also found in Derbyshire, England, and many ornamental articles are made of it at Matlock and other places. Small quantities of the material are obtained from Nova Scotia and at Lockport, N. Y. Being slightly soluble in water, it cannot be exposed to the weather; and its softness causes the surface easily to become rough and opaque. Nor is it generally found in sufficient masses for large works.

The other stone is a compact, crystalline carbonate of lime, deposited from water in the form of stalagmite, etc. It is distinguishable from the gypseous alabaster by its effervescing with an acid and by its greater hardness; real alabaster may be scratched with the nail. See GYPSUM.

ALABASTER, WILLIAM (1567–1640). An English divine, scholar, and poet, born at Hadleigh, Suffolk. He was educated at Trinity College, Cambridge, and in 1596, as chaplain to Robert, Earl of Essex, accompanied the expedition led by the latter against Cádiz. In Spain he was converted to the Roman Catholic faith; but having subsequently again become Protestant, he was appointed a prebendary of St. Paul's Cathedral and was presented to the living of Tharfield, Hertfordshire. "He was," says Fuller (*Worthies of England*), "an excellent Hebrician, and well skilled in cabalistical learning"; statements verified by such treatises as the *Apparatus in Revelationem Jesu Christi* (1607), placed on the *Index Librorum Prohibitorum* by papal authorities, and the *Commentarius de Bestia Apocalyptica* (1621), and by his *Lexicon Pentaglotton* (1637). By Anthony à Wood (*Athenæ Oxonienses*) he is hyperbolically styled "the rarest poet and Grecian that any one age or nation produced." His poetic reputation must depend largely on his Latin tragedy *Roxana* (1632), written in the Senecan manner and frequently presented in the hall of Trinity. This tragedy was referred to by Dr. Johnson (*Life of Milton*) as the only noticeable specimen of Latin verse of English authorship previous to the appearance of Milton's elegies.

ALACOQUE, ä'lä'kōk', MARGUERITE MARIE (1647–90). A French nun, whose visions gave rise to the adoration of the Sacred Heart of Jesus. She was born in Burgundy, July 22, 1647. She took the veil in the convent of the Order of the Visitation, at Paray-le-Monial, where she is said to have performed miracles, prophesied, made revelations, and held direct communication with God and the angels. She foretold the day of her death (Oct. 17, 1690) and cut the name Jesus Christ on her bosom with a knife. She was beatified by Pius IX in 1846.

ALACRANES, ä'lä-krä'nēs. A group of small islands, surrounded by dangerous reefs, on the Campeche Bank in the Gulf of Mexico, 90 miles north of Progreso, in the State of Yucatan, Mexico.

ALA-DAGH, ä'lä-däg' (Turk. Mottled Mountain). A mountain chain in Asiatic Turkey, over 11,000 feet high (Map: Turkey in Asia, K 3). The chief portion of the chain is above the basin of Lake Van, forming part of the watershed between the Caspian Sea and the Persian Gulf.

ALAD'DIN. The hero of the *Arabian Nights* tale of *Aladdin and the Wonderful Lamp*. He

is a poor boy in China, who, through a strange adventure, gets possession of an old lamp and ring of magical properties. A chance rubbing of the former calls to his service a mighty genius (*djinn*), the "slave of the lamp," who quickly brings him to wealth, and, having given him the princess for his bride, builds him a magnificent palace in a single night. Later the lamp is lost in the absence of Aladdin, through the trick of the African magician who had formerly owned it, and who now, as a peddler, offers the princess "new lamps for old." He by its agency carries off the whole establishment to Africa, but the "slave of the ring" enables Aladdin to follow, and in the end the magician is slain, the lamp recovered, and Aladdin, with his home and bride, returned to prosperity in China. "Aladdin's lamp" has become a proverbial expression.

ALADJA DAGH, ä-lä'jä däg. A mountain region of Russian Transcaucasia, occupying the eastern part of the province of Kars. It is noted as the place of a decisive engagement between the Russian forces under the Grand Duke Michael and the Turks under Mukhtar Pasha on Oct. 15, 1877. The Russians surrounded the Turkish force, which was entrenched at Aladja Dagh, with the result that a part of them fled toward Kars, while about 7000 surrendered. See RUSSO-TURKISH WAR.

ALAGOAS, ä'lä-gō'ăsh. A coastal state of Brazil in about 9° S. lat., formerly a district of the State of Pernambuco, which surrounds it on the north and west. Its southern and eastern boundaries are formed by the river São Francisco and the Atlantic Ocean, respectively. The area of Alagoas has been usually reported as 22,580 square miles, but a planimetric calculation by Padtberg returns 10,230 square miles. It consists of a coastal strip, about 45 miles wide, of low, marshy land with many lagoons, and a mountainous, forested interior. This region is hot and moist, but, in spite of fertile soil and abundance of water, the province is very sparsely settled, and agriculture is pursued on a limited scale, owing to the deadly climate and prevalence of cholera. The chief products are sugar, dye-woods, ipecac, tobacco, cotton, and coffee. Pop., 1890, 511,440; 1900, 642,249; 1906, 781,600; 1912 (est.), 790,000. Capital and chief port, Maceio (q.v.), which in 1908 had a population of 36,427. Consult *Recenseamento do estado das Alagoas* (Rio de Janeiro, 1898).

ALAGOAS. The former capital of the State of Alagoas, Brazil, situated on Lake Manguaba (Lagoa Manguaba) (Map: Brazil, K 5). Its chief trade is in hides, rum, sugar, cotton, and iron. Pop., 4000.

ALAI (ä-lī') **MOUNTAINS.** A mountain range of Russian Central Asia, in the territory of Ferghana, north of the Pamirs. It consists of a number of parallel ranges and is separated by the valley of the Kysyl-Su from the Trans-Alai chain. Its average altitude is nearly 16,000 feet, while a few peaks rise beyond 20,000 feet.

ALAIN DE LILLE, ä'lăN' de lēl' (1114?–1203?). A Flemish Cistercian monk, called "the universal doctor"; distinguished in philosophy, theology, history, science, and poetry. He was appointed bishop, but soon resigned to enter a monastery. He wrote chiefly in verse on alchemy, natural philosophy, and doctrinal subjects. There is confusion about his identity, and comparatively little is known of his life; but he received his name from Lille, in Flanders, probably his birthplace. His *Complaint of Nature*, translated from the Latin by Douglas M. Moffat, was published in New York in 1908. Consult M. Baumgartner, *Die Philosophie des Alanus de Insulis* (Münster, 1896).

ALAIS, ä'lĕ'. A town of the department of Gard, France, situated in a fertile plain on the right bank of the Gardon at the base of the Cévennes Mountains, 23 miles by rail northwest of Nîmes (Map: France, S., J 4). Alais is a very flourishing town, and owes much of its prosperity to the mineral wealth of the surrounding district, which produces coal, iron, lead, zinc, and manganese. The blast furnaces, mines, and factories of various kinds give employment to large numbers of men, and Gard may be justly called the Black Country of France. There is also an extensive trade in silk, glass, bricks and tiles. Pop., 1901, 24,940; 1906, 27,435; 1911, 29,831. There are here monuments to Florian, the novelist, and to Pasteur, who became famous after his studies of the silkworm disease then prevalent in Alais. Alais sided with the Protestants in the religious wars of the seventeenth century, and Louis XIII in person, accompanied by the Cardinal de Richelieu, besieged it, and having taken it in 1629, demolished its walls. Three years later, the Baron of Alais having taken part in the rebellion of Montmorency, the castle was destroyed. Protestantism still prevails to a considerable extent. Consult *Mémoirs et Comptes-rendus de la Société Scientifique et Littéraire d'Alais.*

ALAIS, PEACE OF. A treaty which ended the Huguenot wars in France. It was signed June 28, 1629, after the taking of Alais by the royal forces, La Rochelle having fallen by the policy of Richelieu the year before. By its terms the fortifications of the Protestant towns were razed and the Catholic worship reëstablished in them, but amnesty and freedom of conscience were granted to the rebels.

ALAJUELA, ä'lä-hwä'lä. The capital of the province of Alajuela, Costa Rica, 13 miles west of San José, and a little on the western side of the watershed between the Atlantic and the Pacific (Map: Central America, E 5). The city is prosperous, because of the neighboring coffee, banana, and sugar plantations and the large cattle ranches. Here many of the insurrections against the republic had their rise, notably the daring attempt in 1824 of the Spaniard José Zamora to bring the State once more under Spanish rule. Pop., 1903, 4860; 1911 (est.), 6000.

ALA-KUL, ä'lä-kōōl' (Kirghiz, Turk., Mottled Lake). A lake of Russian Central Asia in the government of Semiryechensk, near the Russo-Chinese frontier, in 46° N. lat. and 82° E. long. It lies to the east of Lake Balkash at an elevation of 720 feet above sea level in one of the depressions forming breaches in the mountain barrier which separates the high tablelands of Central Asia from the lowlands to the west. It is about 35 miles long and 25 miles wide and has an area of 790 square miles. Its average depth is 15 feet. The lake is fed mainly by streams rising in the Tarbagatai Mountains to the north, but, as it has no outlet, its waters are salty, and therefore fish are scanty. The name is sometimes also applied to the smaller similar lake to the northwest, more properly called Sassyk-kul, which lies in the same depression and is connected with Ala-kul

by a strip of marshy land. It has an area of 200 square miles.

ALALONGA, ăl'â-lŭn'gâ, or **ALILONGHI,** ăl'ĭ-lŭn'gĭ. See TUNNY.

ALAM, â-läm', ABU'L HAJJAJ YUSUF IBN SULAIMAN AL SHANTAMARI (1019–83). An Arabian philologist. He was born in Santamaria, Spain, taught for many years at Córdova, and died in Seville. He made a diwan, or collection of the best poems of the six foremost pre-Islamic poets (see ARABIC LANGUAGE AND LITERATURE) and wrote an excellent commentary on it. He also wrote a commentary to a part of Sibawaihi's grammatical work *Kitab.* The diwan was published by Ahlwardt, *The Divans of the Six Ancient Arabic Poets* (London, 1870). His commentary on Zuhair was published by Landberg, *Primeurs Arabes,* vol. ii (Leyden, 1889). Cf. Lyroff, *Zur Geschichte der Ueberlieferung des Zuhair-diwans* (Munich, 1892), and Brockelmann, *Geschichte der arabischen Literatur,* i, 309 (Weimar, 1898).

ALAMAN, ă'lâ-măn', LUCAS (1792–1853). An eminent Mexican statesman and historian. For a time he was a deputy of the colony in the Spanish Cortes, but in 1823, upon the downfall of Iturbide, returned to Mexico. As minister of domestic and foreign affairs under two successive administrations he developed industry, agriculture, and education. In 1834 he was director of the industrial commission appointed by Santa Anna, in whose dictatorial measures he subsequently (1853) took part. He wrote an extremely valuable *Historia de Méjico,* chiefly devoted to the nineteenth century (5 vols., 1849–52). His further publications include *Disertaciones sobre la Historia Mejicana* (1844–49).

AL'AMANCE, BATTLE OF. See REGULATORS.

AL'AMAN'NI. See ALEMANNI.

ALAMANNI, ă'lâ-măn'nê, LUIGI (1495–1556). An Italian poet. He was born in Florence and, like Dante, was destined to spend his best years in exile. The Alamanni were zealous partisans of the Medici, whose favor Luigi himself enjoyed until some fancied grievance led him to conspire against the life of the Cardinal Giulio de' Medici, later Pope Clement VII. Being detected, he fled, and eventually took refuge at the French court, where he stood high in favor with Francis I and afterward with Henry II. Except for a brief interval, when Florence threw off the yoke of the Medici and he returned home to urge, unsuccessfully, that the republic should seek the protection of the Emperor Charles V, Alamanni spent the remainder of his life in France, and there most of his poems were written. His collected works include translations, epigrams, plays, *La coltivazione* (Paris, 1546), a didactic poem in imitation of Vergil's *Georgics; Opere toscane* (Lyons, 1533), vigorous satires which have been imitated in English by Sir Thomas Wyatt; and two long poems based upon the Arthurian romances: *Girone il Cortese* (Paris, 1548), in 24 cantos, and the *Avarchide,* in 25, the latter being in structure the story of the *Iliad,* freely adapted to fit the siege of Avarco (the modern Bruges) and chiefly interesting as marking the transition from the complicated adventures of Ariosto's *Orlando Furioso* to the classic unity of Tasso. Alamanni's *Versi e prose,* edited with a biography, by P. Raffaelli, was issued in two volumes (Florence, 1859). Consult Hauvette, *Luigi Alamanni, sa vie et son œuvre* (Paris, 1903).

ALAMEDA, ăl'â-mā'dâ, *or* -mē'dâ. A beautiful residential city in Alameda Co., Cal. It is 6 miles across the bay from San Francisco, with which it is connected by ferries, and is on the Southern Pacific, the Western Pacific, and the Santa Fe railroads (Map: California, C 5). On account of its fine sandy beaches, the city is a popular bathing resort. It has well-paved streets, a good sewage system, a Carnegie library, five public parks, well-equipped playgrounds, municipal baths, and notably good schools. Alameda is in a rich agricultural region, producing a large amount and great variety of fruit and vegetables. It is the home of a large packers' association and a motion-picture company. Among its manufactures are aëroplanes, motors, pumps, and engines. The electric light plant is owned and operated by the city, and a splendid system of street lighting has been adopted. Alameda was incorporated as a city in 1885, since which date its growth has been rapid. In 1913 the city voted to adopt the commission form of government. Pop., 1890, 11,165; 1900, 16,464; 1910, 23,383; 1913 (est.), 26,000; 1920, 28,806.

ALAMINOS, ă'lâ-mē'nôs, ANTON DE. A Spanish pilot, one of the first to take vessels to the North American coast. He was born at Palos de Moguer, Spain. He accompanied Columbus on his second voyage to the New World. During the second decade of the sixteenth century he conducted Ponce de León, Hernández de Córdova, Francisco de Garay, and other voyagers who wished to reach the shores of the northern continent. In 1519 he was the first to take advantage of the current of the Gulf of Mexico. He is supposed to have been the author of the earliest detailed map of a part of what is now the United States, designed to show the limits of claims by discovery. This map was first printed by Navarrete, *Colección,* iii, 148 (Madrid, 1829).

ALAMO, ă'lâ-mō, THE. A Franciscan mission built within the present San Antonio, Texas (q.v.), about 1722, and occasionally used after 1793 as a fort. It consisted of a church, an inclosed convent yard about 100 feet square, a convent and hospital building, and a plaza covering about 2½ acres, and protected by a wall 8 feet high and 33 inches thick. In 1836, during the war for Texan independence, a remarkable conflict occurred here between a small company of Texans and Americans including Col. David Crockett and Col. James Bowie, who held the fort under Col. W. B. Travis, and some Mexicans who attacked it under Santa Anna (q.v.). After a bombardment lasting almost continuously from February 23 to March 6, a small breach was made in the walls, and early on the morning of the 6th the Mexicans assaulted in force. They were twice driven back with great loss, but scaled the parapet in the third attempt, and a desperate hand-to-hand conflict ensued, in which the Texans, though already greatly weakened by privations and fatigue, fought with the utmost valor until only five of their number remained alive. These were captured and, on Santa Anna's order, were killed in cold blood. Three women, two children, and a negro boy alone survived out of a garrison which, including a reënforcement of 32 men that arrived on March 1, had numbered about 180. The Mexican loss was probably 500, though Santa Anna, in his untrustworthy report, gave it as 70 killed and 300 wounded. "Remember the Alamo!" became a

THE ALAMO, SAN ANTONIO, TEXAS

war-cry of the Texans, who finally defeated and captured Santa Anna at San Jacinto (q.v.). In allusion to the heroism shown by the garrison, Alamo has been called "the Thermopylæ of America." In 1913 the city of San Antonio began to restore the Alamo. Consult: Williams, *Sam Houston and the War of Independence in Texas* (Boston, 1893); Potter, *The Fall of the Alamo* (Old South Leaflets); Zavala, *Story of the Siege and Fall of the Alamo* (San Antonio, 1911).

AL'AMOGOR'DO. A town and the county-seat of Otero Co., N. Mex., 86 miles north by east of El Paso, Texas, on the El Paso, Southwestern and the Alamogordo and Sacramento Mountain railroads (Map: New Mexico, F 3). It is the seat of the Southwestern Baptist College and of the New Mexico Institute for the Blind. Fruit-growing is an important industry of the surrounding region, and the town has an ice plant, stone and marble quarries, and copper, lead, zinc, and gold mines. Among the notable features of the town are the Marble and Alamo cañons, Queen of the Mist fountain, and Alameda Park. Pop., in 1913, about 2000.

ALAMOS, ăl'â-môs, or **REAL DE LOS** (râ-ăl'dā lōs) **ALAMOS** (Sp., the poplars or sycamores). A town in the State of Sonora, Mexico, 125 miles northwest of Sinaloa (Map: Mexico, E 4). The town is unimportant, but the region has many lead and copper deposits. Pop., 1910, 5736.

ALAMO'SA. A city, and the county-seat of Conejos Co., Colo., 112 miles by rail south of Pueblo, on the Denver and Rio Grande Railroad, and on the Rio Grande (Map: Colorado, D 4). Alamosa has a Carnegie library, an opera house, railroad shops, and a flour mill. It is in an agricultural and stock-raising region, producing alfalfa, hay, sugar beets, small grain, and sheep. The water works and sewage system are owned by the municipality. Pop., 1890, 973; 1900, 1141; 1910, 3013.

ALAN, ăl'an, William. See Allen, William.

AL'AN-A-DALE'. One of the companions of Robin Hood (see Hood, Robin) in the old ballads and in Scott's *Ivanhoe.* In the former he is a light-hearted young man, much addicted to the "chanting" of roundelays, whom Robin assists to elope with his love.

ÅLAND ISLANDS, ô'lân i'lândz, *or* ô'lân. An archipelago consisting of one large island and many small islands and rocks, about 300 in all, in the government of Abo-Björneborg, Finland, at the entrance of the Gulf of Bothnia (Map: Russia, B 2). The strait separating them on the west from the Swedish coast at Grisslehamn is known as Aland Bay (Aland Haf). The largest of the islands which gives its name (signifying 'land of streams') to the whole group, has an area of 247 square miles; the area of the whole archipelago is 550 square miles. About 90 of the group are inhabited. Pop., 1897, 23,752. Although these rocky isles are covered with but a thin stratum of soil, they bear Scotch fir, spruce, and birch trees and with proper cultivation produce barley and oats, besides affording subsistence to a hardy breed of cattle. The inhabitants, of Swedish origin, are skillful sailors, fishermen, and seal-hunters. These islands belonged formerly to Sweden, but were seized by Russia in 1809. Previous to this they had several times changed hands between these two powers. In 1717 the Swedes were defeated by the Russians in a naval engagement near Aland, the first important exploit of the Muscovite navy. The importance of these islands as a military position led to the construction, in the reign of the Emperor Nicholas I, of those strong fortifications at Bomarsund which, in August, 1854, were destroyed by the Anglo-French force, commanded by Sir Charles Napier and Baraguay d'Hilliers.

ALA'NI (Gk. 'Αλανοί, *Alanoi*). Nomadic tribes of Eastern origin who spread over Europe during the decline of the Roman Empire. They were first encountered by the Romans, apparently, when Pompey, in the Mithridatic War, led an expedition into the Caucasus. Nero, shortly before his death, planned an expedition against them; in Hadrian's time they threatened Cappadocia. In 276 A.D. they were checked by the Emperor Tacitus in their attempt to go eastward into Persia. The Huns gave them a severe defeat on the Tanaïs (now Don) toward the end of the third century (some writers put this defeat in 370), and then the Alani divided, some going east, but the larger portion joining their conquerors in an onslaught upon the Goths. With the Vandals and the Suevi the western Alani entered Gaul in 406 and later crossed the Pyrenees and founded settlements in Lusitania, where they lived for some time in peace. In 418 they were attacked by the Visigoths, their King was slain, and they became subject to Gunderic, King of the Vandals, losing completely their national independence. Later they served under the Visigothic King, Theodoric, but they sympathized with the Huns, and their desertion at Châlons (451) came near bringing defeat upon the Roman army. They were mentioned occasionally in later times. The eastern Alani seem to have kept their independence after the sixth century. In 1221 Genghis Khan defeated them, and they were so completely subjugated in 1237 by Batu Khan that their name disappeared from history. See *The Cambridge Mediæval History,* vol. i (New York, 1911).

AL-ARAF, ål-ä'râf. See Araf.

ALARCON, ä'lär-kōn', Hernando de (1466–1540). A Spanish general, born at Palomares de Huete in 1466; he died in Naples, Jan. 17, 1540. As a youth in his teens he saw service at the sieges of Alhama, Loja, and Coín; and for his gallantry in the uprising at Guéjar he was called before the Commander-in-Chief, Count de La Tendilla, and publicly complimented. The *Gran Capitan,* Gonzalo de Córdoba, took him for service in the Neapolitan War. His conduct in Seminara, Terranova, Cephalonia, and elsewhere caused the King to confer upon him the title of "Señor." For a while he was Governor of Tarentum. After a brief period of rest in Spain (forced upon him by the King as a result of certain gallantries in Naples that were not in the field of military activities), he was returned to Italy in command of a Spanish army and served with great daring and ability at the battles of Ravenna (where he was wounded and captured) and Pavia. After this battle he was placed in charge of Francis I, whom he accompanied to Madrid. There he guarded his royal prisoner despite all efforts at bribery, in the historic Torre de los Lujanes. For his conduct at Pavia and while in charge of Frances I, the Emperor, Charles V, conferred upon him the title of Marqués de Valle Siciliana. The delicacy of his treatment of Francis I marked him as the

proper custodian of Pope Clement VII, after the assault and capture of Rome, in 1527. At the age of 70 he was called to the conquest of Tunis, which he effected in a brilliant campaign. For this service he was rewarded with the Vice-Royalty of Sicily, which he soon asked permission to resign so that he might retire to Castelnuovo. He fell ill and died shortly afterward. See Diona, *Capitanes Ilustres* (1851).

ALARCON, HERNANDO DE. A Spanish-American navigator, and the first European to ascend the Colorado River. On May 9, 1540, he sailed, with two vessels, from Acapulco, with instructions from the Viceroy Mendoza to coöperate with the expedition under Vasquez Coronado, which had gone in search of the Seven Cities of Cibolo, in what is now New Mexico. Alarcón sailed to the head of the Gulf of California and completed the explorations begun by Ulloa in the preceding year, by satisfying himself that there was no open water passage between the Gulf and the South Sea, or Pacific Ocean. Subsequently he entered the Colorado River, which he named the Buena Guia. With two small boats he ascended the river for a considerable distance, making important observations of the natives. On the second voyage he probably proceeded past the present site of Fort Yuma. He learned that Coronado had reached Cibolo, but was unable to communicate with him. A map drawn by Domingo del Castillo, one of Alarcón's pilots, in 1541, is the earliest detailed representation of the gulf and the lower course of the river, of which it gives a very accurate idea. It was first engraved for the Archbishop Lorenzana in 1770 and is given in facsimile by Winsor, *Narrative and Critical History of America* (Boston, 1886). Consult Winship, "Coronado," in *Reports of Bureau of Ethnology* (Washington, 1895).

ALARCON, PEDRO ANTONIO DE (1833–91). A modern Spanish novelist and statesman, born at Guadix, in Granada. He began his professional career as a journalist and published the *Eco de Occidente* of Granada, founded *La Redención*, and after the outbreak of the revolution in 1854 edited for a time a radical satirical paper, *El Látigo*. But he soon withdrew from participation in politics and began the series of short stories and essays which afterward were collected into numerous volumes, such as *Cosas que fueron* (1882); *Amores y amoríos* (1875); *Juicios literarios y artísticos* (1873). His share in the Morocco campaign of 1859 bore fruit in his *Diario de un testigo de la guerra de Africa* (1860), a chronicle noteworthy for its vivid picturesqueness and stirring patriotism. For many years after this he took an active part in national affairs and served successively as Deputy, member of the Council of State, Minister to Norway and Sweden, and Ambassador to the Porte. In 1875 he was elected a member of the Royal Spanish Academy. Of his many later novels, *El escándalo* (1875), written in defense of the Jesuits, made the greatest sensation at the time and led him to write other novels with religious themes; among which *La pródiga* (1882) was popular for a while. But their fame was transitory, and he will be much longer remembered for his less pretentious stories and sketches, his *Historiatus nacionales*, his *El sombrero de tres picos* (1874), and *Elniño de la bola* (1880), studies of rustic manners, truly Spanish in their atmosphere, which show Alarcón at his best. His last volume was a brief account of his works, *Historia de mis libros* (1889), a sort of literary testament. His complete works were published in a set of 19 volumes in 1899.

ALARCON Y MENDOZA, ä'lär-kōn' ē mĕn-dō'sȧ, DON JUAN RUÍZ DE (1581?–1639). One of the greatest of the Spanish dramatists of the Golden Age. Born at Tlach, Mexico, he left America in 1600 in order to study law at Salamanca. In 1608 he returned to Mexico in the hope that he might secure a chair at the university. But he failed to do so, and returned to Spain in 1611, where he entered the service of the Marqués de Salinas. His first play, *El semejante de sí mismo*, performed in 1613, was not successful, but it drew attention and hatred upon him, so that Cristóbal Suárez de Figueroa was not at all alone when, with brutally frank reference to Alarcón's physical infirmities, he called the latter "a monkey disguised as a man, an impudent hunchback, a grotesque cripple." Lope de Vega, Mendoza, and others flayed him, whereas Tirso de Molina was friendly to him and collaborated with him. In 1626 he became a member of the Council of the Indies. In 1628 he published a volume containing eight plays, and in 1634 a second volume containing additional plays. Alarcón was the least prolific of all the great dramatists of Spain. He wrote less than did the others, and many of his works circulated under the names of others. But Alarcón took the pains, as did none of his contemporaries, to mull over his plays and polish both their versification and their general composition. Hence his work is more evenly balanced than is theirs. He is unequaled in his creation of characters and in his lofty moral intentions, although he never descends to sermonizing. Fitzmaurice-Kelly says of Alarcón: "There are Spanish dramatists greater than Ruíz de Alarcón: there is none whose work shows such constant perfection. . . . Lope and Calderón have written better plays, and many that are worse: no verse of Alarcón is unworthy of him." His importance is not limited to Spanish literature, for on his *La verdad sospechosa* ('Truth Suspected'), Corneille confessedly modeled his own *Le menteur*, the first great comedy in modern French literature. Among his other plays may be mentioned *Las paredes oyen* ('Walls have ears'), *El examen de maridos* ('The Examination of Husbands'), *El tejedor de Segovia* ('The Weaver of Segovia'), and *Ganar amigos* ('Winning Friends'). The most available edition of his works is that by Hartzenbusch in the *Biblioteca de autores españoles*, vol. XX (Madrid, 1852). Consult: Ticknor, *History of Spanish Literature* (Boston, 6th ed., 1888); Fitzmaurice-Kelly, *Littérature espagnole* (Paris, 1904); Fernandez-Guerra y Orbe, *Don Juan Ruiz de Alarcón* (Madrid, 1871).

ALARD, ȧ'lär', JEAN DELPHIN (1815–88). A French violinist. He was born at Bayonne, March 8, 1815, the son of an amateur violinist; studied in Paris under Habeneck and Fétis, and won the notice of Paganini when he appeared in concerts. In 1840 Alard succeeded Baillot as first violinist to the King, and in 1843 became professor of the violin at the Paris Conservatoire, a post he held until 1875. Sarasate (q.v.) was among his pupils. He was a representative of the modern French school of violin playing, composed nocturnes, duos, études, etc., for the violin, and was the author of an *Ecole*

du violon, which was adopted by the Conservatoire. He died in Paris, Feb. 22, 1888.

AL'ARIC (Goth., from *al*, all + *reiks*, ruler). The great chieftain of the Visigoths. He makes his first appearance in history in the struggle of the Goths against Theodosius (q.v.). In 394 A.D. he was leader of the Gothic auxiliaries of Theodosius in his war with the usurper Eugenius; but after the death of Theodosius he took advantage of the dissensions and weakness that prevailed in the Eastern Empire to invade (395) Thrace, Macedon, Thessaly, and Illyricum, devastating the country and threatening Constantinople itself. Rufinus, the Minister of Arcadius, appears to have sacrificed Greece in order to rescue the capital, and Athens was obliged to secure its own safety by ransom. Alaric proceeded to plunder and devastate Macedonia and Thessaly, but was interrupted by the landing of Stilicho (q.v.) in Elis with the troops of the West. Stilicho endeavored to hem in the Goths on the Peneus, but Alaric broke through his lines and escaped with his booty and prisoners to Illyricum, of which he was appointed governor by the Emperor, Arcadius (q.v.), who, frightened by his successes, hoped by conferring this dignity on him to make him a peaceful subject instead of a lawless enemy (396). In 401 he invaded Upper Italy; for the first time since the migration of the Teutones (q.v.) and the Cimbri barbarians now invaded Italy. Honorius, the Emperor of the West, fled from Rome to the more strongly fortified Ravenna. In 402 or 403 Alaric encountered Stilicho at Pollentia on the Tanarus; and soon after, the result of the battle of Verona forced him to retire into Illyricum. Through the mediation of Stilicho, Alaric concluded a treaty with Honorius (q.v.), according to which he was to advance into Epirus and thence attack Arcadius in conjunction with the troops of Stilicho. The projected expedition did not take place, yet Alaric demanded indemnification for having undertaken it, and Honorius, by the advice of Stilicho, promised him 4000 pounds of gold. When, after the death of Stilicho, Honorius failed to fulfill his promise, Alaric advanced with an army and invested Rome, which he refused to leave until he had obtained the promise of 5000 pounds of gold and 30,000 pounds of silver. But these negotiations, too, failed to produce any satisfactory result, and Alaric again besieged Rome (409 A.D.). Famine soon rendered it necessary that some arrangement should be made, and in order to do it the Senate proclaimed Priscus Attalus, the prefect of the city, emperor instead of Honorius. But Attalus displayed so little discretion that Alaric obliged him publicly to abdicate and renewed negotiations with Honorius. These also proved fruitless, and Alaric was so irritated at a perfidious attempt to fall upon him by surprise at Ravenna that he advanced on Rome for the third time. His victorious army entered the city Aug. 14, 410, and continued to pillage it for three days, though Alaric strictly forbade his soldiers to dishonor women or to destroy religious buildings. When Alaric quitted Rome, it was only to prosecute the conquest of Sicily and Africa, in order to gain control of their rich grain-lands. The occurrence of a storm, however, which his ill-constructed vessels were not able to resist, obliged him to abandon the project. He died, before the close of the year, at Consentia (Cosenza), in Bruttium. Legend says that in order that his body might not be discovered by the Romans it was deposited in the bed of the river Busentinus, which was temporarily diverted from its course, and that the captives who had been employed in the work were put to death. Rome and all Italy celebrated the death of Alaric with public festivities. Consult: Hodgkin, *Italy and her Invaders* (Oxford, 1885); F. A. Gregorovius, *History of Rome in the Middle Ages*, Eng. trans., vol. i (New York, 1892); R. Lanciani, *The Destruction of Ancient Rome* (Boston, 1899); *The Cambridge Mediæval History*, vol. i (New York, 1911).

ALARIC II. King of the Visigoths, 485–507. He succeeded his father, Euric. He was of a peaceful disposition and wished to live on friendly terms with the Franks. His dominions were very extensive. Besides Hispania Tarraconensis and Bætica, he possessed numerous rich provinces in Gaul and formed an alliance, which still further increased his power, with Gondeband and Theodoric, the latter of whom was his father-in-law and King of the East Goths. At length, however, he came into collision with the Frankish monarch, Clovis (q.v.), whose cupidity had been excited by the extent and the fertility of the territories over which Alaric II ruled. An excuse for breaking the peace which existed between the two nations was found in the fact that Alaric II was a zealous Arian. This circumstance had given great offense to many of his subjects, who were orthodox Catholics; and ostensibly to vindicate the true doctrine, the newly converted barbarian Clovis declared war against him. The result was fatal to Alaric II. He was slain by the hand of Clovis himself at Vouillé, near Poitiers, and his forces routed. Alaric II is said to have been indolent and luxurious in his youth; but this may simply imply that he was not fond of those sanguinary pleasures which captivated his savage contemporaries. He was tolerant in his religious convictions. Though an Arian, he did not persecute the Catholics. He enacted several useful statutes and kept a watchful eye on all parts of his kingdom. It was during his reign that the *Breviarium Alaricianum*, or Breviary of Alaric (q.v.), was drawn up. It is a selection of imperial statutes and writings of the Roman jurisconsults. Alaric II sent copies of it to all his governors, ordering them to use it exclusively. An edition of it was published by Hänel (Leipzig, 1849). Consult *The Cambridge Mediæval History*, vol. i (New York, 1911).

ALARIC COTTIN. Voltaire's nickname for Frederick the Great of Prussia, who was a great warrior, like Alaric, but a very indifferent poet, like the Abbé Catlin, a victim of Boileau's sarcasms.

ALARM' (Fr. *alarme*, It. *all'arme*, to arms, from Lat. pl. *arma*, arms). In military usage, a term which is not so important now as formerly. Originally an alarm was signified by the burning of a beacon, the ringing of a bell, beating of drums, or the firing of a gun. Now, in most instances, an alarm is transmitted by telegraph, telephone, signal lamps, and heliograph, among other devices. In military camps, army posts, or barracks there is generally an alarm or assembly post arranged, where the troops may assemble in response to calls of sudden emergency, such as fire, riot, or other unusual occurrence.

ALARM. A usually but not necessarily self-acting contrivance employed to call attention

to danger or accidents or to arouse persons from inattention or sleep. The common alarm-clock is a familiar example of such a device, and the electric burglar alarm is another. The simplest and most common arrangement of burglar alarm consists of an electric bell with wires leading to all parts of the windows, doors, and other parts of the building to be protected. The terminals of these wires are set in the framing of the windows and doors, so that if they are opened the action presses springs together and rings the bell in precisely the same way as by pressing the ordinary push-button. All special kinds of alarms for house protection consist of modifications in the method of making the contact suitable for special purposes, such as laying sheets of tin under the carpet to make contact with the wires when the carpet is stepped upon. Means are also generally introduced for indicating which window the signal comes from. This is done by leading the wires from each window separately through an annunciator, which shows through which wire, and consequently from which window, the signal came. The alarm will also sound if a window is carelessly left open. The entire alarm wiring of houses is also frequently connected with the police station by wire, so that it is notified of any tampering with the house in the absence of its occupant. Bank vaults and safes are also protected by numerous complicated mechanical and electrical devices which instantly give an alarm to watchmen or police officers of any disturbance due to tampering or attempted burglary. Automatic fire alarms are made in a variety of forms. A frequent arrangement consists of a string or a wire of very fusible metal supporting a weight whose fall sets in operation a train of mechanism which sounds a bell alarm. The weight is caused to fall by the burning or melting of the supporting string or wire. A rise in temperature by some device such as a thermostat or the operation of an automatic sprinkler system may also cause an alarm to be sounded at some central office. In factories and other buildings where there are many occupants fire alarms or gongs are usually required by statute to warn the workers, and this is supplemented by fire drills so as to enable them to leave the building without panic. (See FIRE ALARMS.) In steam boilers an alarm check valve, operating under the pressure of steam, is employed to give the alarm when the water-feeding apparatus ceases to work, or when the water falls below the point of safety. In many types of boilers a fusible plug is set into the crown sheet over the furnace; this plug remains intact as long as water covers such sheet, but melts should it become dry, allowing the steam to escape into the firebox and warn the engineer of the danger. Telegraph and telephone lines usually have some arrangement by which a break in the wires is indicated by a bell alarm. Railway lines have alarm-systems to notify engine-drivers or motormen that another train is on the section which they have just entered, or that a switch is set along. Fog bells, fog whistles, and whistling buoys are forms of alarms, and there are a great variety of other forms, such as alarm compasses, which are contrived to sound an alarm when the vessel deviates from its course; alarm funnels contrived to ring a bell when the liquid has reached a certain height in a cask which is being filled, and typewriter alarm bells which ring as the end of the line being written is approached.

AL'ARO'DIAN. A term derived from the Alarodii of the classical geographers and Herodotus, applied by Sayce and some other ethnographers and philologists to the linguistic stock represented especially by the Georgian among the numerous languages of the region of the Caucasus. The Alarodii dwelt about Mount Ararat and are supposed by some to be identical with the Urartu of the Assyrian inscriptions.

ALAS, ä'läs, LEOPOLDO (1852–1901). A Spanish journalist and novelist, and professor of law at the University of Oviedo. As a critic, he was noted for his intolerance of pretense and mediocrity and for the fearlessness with which he spoke his mind regarding men of established reputation. As a novelist, he produced an unimportant work, *Su único hijo* (1891), a volume of short stories called *Pipá*, and one serious novel, *La regenta* (1884–85), an analytical study of criminal passion, revealing a rare subtlety of observation. He was the author of a drama, *Teresa*. His knowledge of European literature was extensive. In journalism he was best known under the pseudonym of "Clarin." He wrote also concerning law and economics: *Relaciones de la Moral con el Derecho* and *Programa de Economía*. He left also an unfinished novel, *Esperaindeo*, which is still inedited.

ALAS'CANS. A designation of foreign Protestants in London in the time of Edward VI from the name of John à Lasco (or Laski), a Polish reformer and refugee, who in 1550 was appointed by the King as superintendent of the foreign congregation there.

ALAS'CO. In Scott's *Kenilworth* (q.v.), an astrologer, also known as Dr. Demetrius Doboobie, who aids the evil designs of Richard Varney against Amy Robsart.

ALASCO, ä-läs'kō, JOHANNES, or JAN LASKI (1499–1560). A Polish nobleman and traveler, born in Warsaw. He imbibed the doctrines of Zwingli at Zürich. He also knew Erasmus, who esteemed him highly, and in his will provided for the sale of his library to him. He returned to Poland, 1526, but left in 1536, on his declaration of Protestantism, and went to Frisia. There he preached Protestantism, but, anticipating persecution, he went to London, on Cranmer's invitation, and became superintendent of the congregation of the foreign Protestant exiles. On the accession of Mary, in 1553, he and all his congregation were banished. In 1556 he returned to Poland, where he died, at Pirchow, Jan. 13, 1560. He wrote many treatises and was one of the 18 divines who prepared the Polish version of the Bible. For his biography, consult H. Dalton (London, 1886).

ALASHEHR, ä-läsh'hĕ'h'r (Turk. Mottled City). A city in the Turkish vilayet of Aidin, or Smyrna, lying 83 miles east by south of Smyrna, on the northern slope of Mount Tmolus (Map: Turkey in Asia, C 3). It is surrounded by a partly ruined wall and contains eight mosques and five Greek churches. Remains of ancient sculpture are to be found. Alashehr is connected by rail with Manissa and is the seat of a Greek archbishop. There is considerable trade, and mineral springs in the vicinity attract invalid visitors. The population is estimated at about 25,000. Alashehr was founded by Attalus Philadelphus, King of Pergamos, about 200 B.C., and is supposed to be one of the "seven churches of Asia" mentioned in the Apocalypse.

ALAS'KA. A Territory of the United States and its largest outlying possession, forming a

jutting land mass at the northwestern extremity of North America. According to the revised survey of 1906 its total area is 586,400 square miles. The territory ceded by Russia in 1867 (see *History*), and known up to that time as Russian America, was called Alaska by William H. Seward, this being a corruption of the Aleut word *alak'shak* or *al-ay'ek-sa*, meaning 'a great country or continent.' It is bounded on the north by the Arctic Ocean, on the west by the Arctic Ocean, Bering Strait, and Bering Sea, on the south and southwest by the Gulf of Alaska and the Pacific Ocean, and on the east by Canada (Yukon Territory and British Columbia). The eastern boundary from the Arctic Ocean to Mount St. Elias (a distance of 650 miles) is the 141st meridian; thence southeastward to Portland Canal it is a sinuous line (see *Boundary Dispute*) about 660 miles in length. Alaska extends from 129° 58′ west to 172° 22′ east longitude, and from 51° to 71° 25′ north latitude. Approximately it falls between the same parallels as Scandinavia, and Juneau, its capital, is in about the latitude of Edinburgh. The meridian reached by the westernmost of the Aleutian Islands passes near the New Hebrides Islands and through New Zealand. Cape Prince of Wales, the most westerly point of the mainland, is nearly as far west as the Samoan Islands.

Topography. The main mass of Alaska is nearly rectangular, carved out from the continent by Mackenzie Bay on the north and the Gulf of Alaska on the south. An extension to the southeast is furnished by a panhandle—usually called Southeastern Alaska—and another to the southwest by the Alaska Peninsula and the Aleutian Islands. The latter, in conjunction with the Commander Islands of Siberia, form a broken barrier between Bering Sea and the Pacific Ocean. East of this, and parallel to it, lies the Kenai Peninsula, bounded by Cook Inlet on the west and Prince William Sound on the east. The Seward Peninsula extends westward from Central Alaska, and with the Chuckchee Peninsula of Siberia, from which it is separated by Bering Strait, only 54 miles wide, divides Bering Sea from the Arctic Ocean. The coast line of the territory is of two distinct types. Northward from the Alaska Peninsula shallow water conditions prevail, the coast line is regular, and the land slopes gently from the shore. Eastward and southward the shores are usually abrupt, deep water is found near the land, and there are many embayments and islands. The largest of these islands is Kodiak, which with adjacent islands forms a southwestern extension of the Kenai Peninsula. Southeastern Alaska embraces a narrow strip of mainland and the Alexander Archipelago, which fringes the coast for some 300 miles. The largest islands are Chichagof, Baranof, Admiralty, Prince of Wales, and Revillagigedo. The many straits, fiords, and canals of this part of the Territory, together with the rugged mountains of the mainland, have made its scenery world-famous.

Alaska is divisible into four geographic provinces, which named from south to north are: the Pacific Mountain system, the Central Plateau region, the Rocky Mountain system, and the Arctic slope region.

I. The Pacific Mountain system is a rugged highland belt 50 to 200 miles wide, skirting the southern shore line. It comprises four distinct ranges—the Coast, the St. Elias, the Aleutian, and the Alaska—and includes several large basins, notably those of the Copper and Susitna rivers. The Coast Range stretches through southeastern Alaska. It is 5000 to 8000 feet in height and 50 to 80 miles in width. From its northern part many glaciers discharge into the sea. The St. Elias Range extends northwestward from Cross Sound, bends westward near the mouth of Copper River, and near the head of Prince William Sound (long. 147°) turns sharply southwestward and merges in the highlands of the Kenai Peninsula. Much of the seaward slope is covered by glacial ice. Near long. 142° the chain is parted by the valley of the Chitina River into divergent ranges. Of these the southern, called the Chugach Mountains (8000–10,000 feet high), continues the main range across the head of Prince William Sound, and the northern, called the Nutzotin Mountains (7000–10,000 feet high), stretches westward and forms a connecting link between the St. Elias and Alaskan ranges. Between these two forks is a group of volcanic peaks called the Wrangell Mountains, of which Mount Sanford (16,200 feet) is the highest. The St. Elias Range varies in width from 50 miles near Cross Sound to nearly 100 miles near Mount St. Elias, and then to less than 20 miles in the Kenai Peninsula. Near Cross Sound some peaks rise abruptly from tidewater to over 15,000 feet. Westward the range increases in height and complexity, culminating in Mount St. Elias (18,024 feet) and Mount Logan (19,540 feet). The former marks the international boundary, the latter lies in Canadian territory. The Aleutian Range forms the backbone of the Alaska Peninsula. It rises directly from the sea near the southwestern extremity of the peninsula and skirts the Pacific shore as far as the entrance to Cook Inlet. At this point a broad lowland intervenes and throws the axis to the west; the range (here sometimes called the Chigmit Mountains) continues northward to about lat. 61°, and there falls off abruptly to a lowland. The range is widest near lat. 58°, northward from which it rapidly narrows. The Alaska Range extends northeastward from the vicinity of Lake Clark and sweeps around the great Susitna and Copper river basins, formerly the watershed between the Pacific drainage on the south and east and the Kuskokwim and Yukon waters on the north and west. It averages 50 to 60 miles in width. Its southern end has been little explored, but probably has no peaks higher than 5000 or 6000 feet. Toward the north the relief increases: Mount Spurr measures 10,500 feet, Mount Russell 11,300 feet, and Mount Dall 9000 feet. Mount McKinley (lat. 62° 30′), according to measurements taken by the U. S. Coast and Geodetic Survey, reaches 20,300 feet, the highest on the continent; and Mount Foraker, 14 miles to the south, 17,000 feet. These two, though visible from Cook Inlet and known to whites for more than 100 years, were not indicated on maps until 1898. Mount McKinley was known to Russians as Bulshaia and to the natives of Cook Inlet as Traleyka. Both names signify 'high' or 'big mountain.' The natives of the interior know it as Denali. In 1895 it was named Mount McKinley by W. A. Dickey, who ascended the Susitna River and said it was at least 20,000 feet high. In 1898 George H. Eldredge and Robert Muldrow, of the United States Geological Survey, determined its position and altitude, which was later revised as above; and the following year Lieut. Joseph S. Herron, U. S. A., named the second high peak Mount Foraker. In

1902 a more extended exploration of the range was made by Alfred H. Brooks and D. L. Reaburn, of the United States Geological Survey, who were the first white men to reach the base of Mount McKinley. A number of attempts to ascend it were made. In 1912 Professor Herschel Parker of Columbia University and Mr. Belmore Browne of New York got within three or four hundred feet of the summit. In 1913 Rev. Hudson Stuck, Archdeacon of the Yukon, with Mr. H. P. Karstens and two others, reached the top. The eastern end of the Alaskan Range is of lesser altitude, Mount Hayes (13,800 feet) and Mount Kimball (9680 feet) being the highest peaks.

2. East and north of the Pacific Mountains is the Central Plateau region, 200 miles wide, corresponding with the Great Basin region of the western United States. Though formerly a plateau, this region has changed in character. The rivers have trenched broad channels through it, giving it the appearance of a rolling upland with summits of uniform level. The plain of these summits is 4000 feet at the international boundary and falls off gradually to 1000 feet near Bering Sea.

3. The Rocky Mountain system of North America continues northwestward nearly to the Arctic Ocean, then turns almost at right angles, crosses the international boundary in about lat. 68°, and stretches across northern Alaska, finally dying out before it reaches the Arctic Ocean. It enters Alaska as a mountainous belt over 100 miles wide, consisting of several more or less distinct ranges separated by broad, low gaps and containing peaks 7000 to 8000 feet high. The western extension, known as the Endicott Mountains, is little known, but appears to comprise two or more ranges 4000 to 6000 feet in height.

4. The Arctic Slope region begins as a slightly elevated plateau, dissected and more or less rolling, which slopes to the north from the foothills of the Rocky Mountains. This plateau terminates abruptly in a scarp, from which a featureless coastal plain, of varying width, stretches to the Arctic Ocean.

About one-fifth of the drainage of Alaska is toward the Pacific Ocean, nearly one-half toward Bering Sea, and the rest toward the Arctic Ocean. The Pacific drainage embraces two classes of rivers: first, those which rise among the coastal mountains; and second, those which traverse the mountains on their way to the sea. Of the first the Susitna and Copper, and of the second the Alsek, Taku, and Stikine are the most prominent examples. The Yukon (fifth in size of North American rivers) is the master stream, and its basin practically comprises the Central Plateau province. With its longest tributary (the Yukon is formed by the union of the Pelly and Lewes) it is about 2400 miles in length, and its discharge at low water is about 500,000 cubic feet per second. Other chief tributaries of the Yukon are the White, the Porcupine, the Tanana, and the Koyukuk. The headwaters of the Lewes are but 25 miles from the coast at Lynn Canal. Two passes, the Chilkoot (3100 feet) and the White (2800 feet), break the Coast Range at the head of Lynn Canal and afford routes into the interior, which were used by thousands of gold-seekers during the Klondike excitement of 1897 and 1898. A railway over the White Pass now connects tidewater with navigable waters on the Lewes River. The Kuskokwim River, second in size to the Yukon, empties into Bering Sea. Its length is about 1200 miles, and it has many unexplored tributaries. The Arctic drainage includes the Selawik, Kobuk, and Noatak rivers, flowing westward into Kotzebue Sound; and the Meade, Chipp, and Colville rivers, flowing northward into the Arctic Ocean.

Climate. The range of climate in Alaska is greater than that from Florida to Maine. Only the northern third of the Territory can be said to have a distinctly arctic climate, while the southern seaboard is made comparatively temperate by the warm waters and winds of the Pacific. The records at Sitka in southeastern Alaska show for August, the hottest month, a range of 35° to 87° F.; and for February, the coldest month, a range of 3° to 54° F. The mean annual temperature is 43° F., about the same as that of Christiania, Norway. At Fort Tongass, the extreme southeastern point of the Territory, the records indicate a mean annual temperature of 48°. In southeastern Alaska frosts occur from October to April. The snowfall is light at sea level, but heavy in the mountains. The moist winds of the Pacific precipitate their waters along the coastal zone in a rainfall varying from about 130 inches at Fort Tongass to 84 inches at Juneau. April and July are the driest months. Between Cross Sound and Cook Inlet the rainfall is about the same, as is also the mean annual temperature. Though few climatic observations have been made in the Copper River basin, it is known to be drier and colder than on the coast. Extreme temperatures of 94° F. in August, and —53° F. in December have been recorded. The snowfall is 2 to 4 feet. Frosts occur throughout the year, but are rare in June, July, and the early part of August. Valdes on Prince William Sound has a summer temperature 5° colder and a winter temperature 10° colder than Sitka, and probably 50 per cent less rainfall, with a snowfall of about 12 feet. Cook Inlet and the adjacent region to the north have bright, clear weather in summer and cold winters. The extremes of temperature at Kenai (east side of Cook inlet) are 82° F. in July and —43° F. in December with a precipitation of about 17 inches. The Alaska Peninsula and Aleutian Island region has a climate similar to that of northern Scotland, with a rainfall varying from 24 to 48 inches and a mean annual temperature of about 40°. The Bering Sea coastal province has a rainfall varying from 33 inches at Bristol Bay to 18 inches at St. Michael. At St. Michael the mean annual temperature is 26°, and frosts occur from September to June. The northern half of Bering Sea is frozen from November until April, but St. Michael harbor is closed from the end of September until the middle of June. At Nome and in the Seward Peninsula June and July are often dry and clear, but the rains usually begin in the middle of August, often accompanied by high winds, and stormy weather prevails until snow comes early in October. The Arctic Coast of Alaska has a precipitation of about 8 inches. The extremes of temperature are —55° F. and 80° F.; the mean is less than 8° F. The Arctic Ocean is usually locked in ice from early in September until July. The climate of the interior is continental in character: semi-arid with great extremes of heat and cold. From Bering Sea inland the humidity gradually decreases, until at the international boundary the annual precipitation is less than 12 inches. Here extremes of temperature of 90° F. in summer and —76°

ALASKA
SCALE OF STATUTE MILES
0 50 100 150 200 250 300
SCALE OF KILOMETERS
0 100 200 300 400 500
Important towns are shown in heavy face type
Railroads shown thus
ARCTIC CIRCLE
ASIA
SIBERIA
GULF OF ANADIR
BERING SEA
BERING STRAIT
ARCTIC
C. Serdze
C. Unikin
East Cape
DIOMEDE IS.
C. Nunarano
Indian Point
Bald Hill
Ingrahan Pt.
Pt. Hope
C. Thompson
C. Lisburne
C. Beaufort
Cowpen Chalmmer
Pt. Lay
Icy Cape
Pt. Barrow
Franklin Pt.
Pearl Bay
C. Call
Noatak
Grand Canyon
Mulgrave Hills
BAIRD MTS
C. Krusenstern
KOTZEBUE SOUND
Kotzebue
Shismaref
Hotham Pk.
Goodhope R.
Selawik L.
Kuwalik
Zane Pass
Prince of Wales
SEWARD PENINSULA
Deering
Candle
Shelton
Davidson
Koyuk
Council
Sinuk
C. Rodney
C. Nome
SLEDGE I.
Safety Bay
Solomon
Bluff
Nulato
Koyukuk
Kokrines
MILITARY
Yukon
Kaltag
Norton Bay
C. Denbigh
Unalakleet
NORTON SOUND
STUART I.
ST. MICHAEL
Pt. Romanof
St. Michael
Mouths of the Yukon River
Dishkakat
Ophir
Innoko
Aquik
Andreafski
Ikogmut
Koserefsky
Iditarod
Otter
SAND IS.
C. Romanzof
HALL I.
ST. MATTHEW I.
Pt. Dall
Hooper Bay
Askinuk
Kuskokwim
Bethel
Tikchik L.
Lake Clark
C. Mohican
C. Vancouver
Hazen B.
Etolin Strait
NELSON I.
NUNIVAK I.
C. Corwin
C. Andenhall
C. Avinof
Kanektok R.
Kuskokwim Bay
Goodnews B.
C. Newenham
C. Peirce
HAGEMEISTER I.
WALRUS IS.
C. Constantine
Togiak L.
Togiak
Aleknagik L.
Dillingham
Nushagak
Nushagak L.
Hiltuna Lake
Kokanak L.
Jakuek
Ugashik
Ugashik Lakes
Kvichak R.
Kvichak L.
Koggiung
SHELIKOF
Ka
ST. PAUL I.
WALRUS I.
OTTER I.
PRIBILOF ISLANDS
ST. GEORGE I.
BERING SEA
BRISTOL BAY
Gold placers.
Gold and silver lode mines and prospects.
Copper mines and prospects.
Tin deposits.
Coal-bearing rocks.
Areas known to contain workable coals.
Anthracite, semianthracite, and semibituminous.
Petroleum seepages.
Port Heiden
SEAL IS.
Port Moller
Chignik
Chignik Lakes
KUDOBIN IS.
SUTWIK I.
TUGIDAK I.
TRINITY IS.
Kanatak
SEMIDI IS.
MITROFANIA I.
CHIRIKOF I.
Sand Point
KODIAK I.
KORONOT I.
BIG KONIUJI I.
LITT. KONIUJI I.
SHUMAGIN IS.
UNIMAK I.
Immanuel St.
C. Lapin
C. Sarichef
AMAK I.
DEER I.
C. Pankof
SANAK IS.
ALEUTIAN ISLANDS
FOX ISLANDS
AKUTAN I.
Dutch Harbor
UNALASKA I.
BOGOSLOF I.
Makushin Mt.
C. Tanak
KAGAMIL I.
CARLISLE I.
UNALASKA I.
HERBERT I.
SAMUKTA I.
Amaknak Pass
Unmak Pass
IS. OF THE FOUR MTS.
PACIFIC
176° A 180° B 176° C 172° D 168° E 164° F 160° G
1 2 3 4 62° 5 6 58° 7 8 54° 9
D 168° E 164° F 160° G Longitude 156° H

152° J 148° K 144° L 140° M 136° N 132° O 128° P 124° Q 120° R
C O C E A N
C. Bathurst
Macfarlane R.
Anderson R.
Warren Pt.
Mackenzie Bay
ELLICE R.
Kendall I.
Sendzi L.
HALKETT I.
MacMILLRAY I.
MACKENZIE MTS.
MacDougall Pass
Ft. Macpherson
Peel R.
Ft. Good Hope
ARCTIC CIRCLE
Porcupine R.
Rat R.
Flats R.
Black R.
Coldfoot
Ft. Hamlin
Circle
Yukon
Dennison
Eagle
Fairbanks
Steel Creek
Chicken
Dawson
Stewart R.
Ethel L.
Macmillan R.
Bonnet Plume Pass
Mayo L.
Janet L.
Ogilvie
Mt. Hayes
Mt. Kimball
Wagner
Mansfield
Delta R.
Selkirk
Pelly R.
Pelly Lakes
Batzulnetas
Mt. Allen
Mt. Sanford 16,208
Mt. Wrangell
Copper Center
Tonsina
Valdez
Ft. Liscum
Nizina
Blackburn
Kluane L.
White River
White Horse
L. Marsh
Talin L.
Carcross
Atlin L.
Ptarmigan Pass
Taya L.
Dease L.
Chilkat Pass
Chilkoot Pass
Skagway
Haines
Dyea
Klukwan
Porcupine
Chilkat R.
Takahin R.
Takahin
Bennett
Atlin
Surprise L.
Kenai
Seward
Nuchek
Bering Glacier
Mt. St. Elias
Malaspina Glacier
Yakutat
Yakutat B.
Kayak I.
C. Suckling
C. Yakataga
C. St. Elias
C. Clear
C. Resurrection
CHISWELL I.
PYE IS.
MIDDLETON I.
C. Fairweather
Harbor Pt.
Cross Sound
Hoonah
Juneau
Douglas
Treadwell
Gastineau Channel
Auke Bay
Taku R.
Snettisham
Sumdum
Wrangell
Petersburg
Sitka
Baranof
Kruzof I.
Salisbury Sd.
C. Edward
C. Ommaney
Chatham Str.
Christian Sd.
Coronation I.
Iphigenia Bay
Ketchikan
Revillagigedo I.
Coppermine R.
DALL I.
Howkan
C. Muzon
Dixon Entrance
C. Knox
Graham I.
QUEEN CHARLOTTE ISLANDS
GULF OF ALASKA
MILITARY CABLE
ALEXANDER ARCHIPELAGO
BRITISH COLUMBIA
CANADA
MACKENZIE MTS.
RANGE
CHUGACH MTS.
WRANGELL MTS.
SKOLAI MTS.
ALASKA RANGE
KENAI MTS.
BERING SEA
ALEUTIAN ISLANDS
NEAR ISLANDS
SEMICHI IS.
AGATTU I.
BULDIR I.
ATKA I.
AMLIA I.
SEGUAM I.
Seguam Pass
PILLAR ROCK
CHUGUL I.
ST. SITKIN I.
SEMISOPOCHNOI I.
TANAGA I.
KANAGA I.
ADAK I.
SITKIN I.
KISKA I.
RAT ISLANDS
RAT I.
AMCHITKA I.
GARELOI I.
ANDREANOF ISLANDS
TAKAWANGHA I.
TAKALAKA I.
TANAGA I.
KAVALGAI I.
ULAK I.
AMATIGNAK I.
PACIFIC OCEAN
174° East from Greenwich
176° 178° 180° Longitude 178° West 176° 174° from Greenwich
1 2 66° 3 4 62° 5 6 58° 7 8 54° 9
2° J from 148° K Greenwich 144° L 140° M 136° N 132°

F. in winter have been recorded. The mean annual temperature at Eagle is about 21° F. Frosts occur throughout the year, but are rare between the middle of June and the middle of July. Snowfall aggregates 2 to 3 feet. The Yukon breaks about the middle of May and closes early in November, but on account of running ice is usually navigable only from June 1 to September 20.

Fauna. Among the large animals of Alaska the most important are bear, moose, caribou, sheep, goats, and deer. Deer are found in abundance in southeastern Alaska and the adjacent islands, but not elsewhere. Goats occur only in the higher ranges of the Pacific seaboard, but the white sheep (bighorn) is found throughout the higher parts of the midland mountain systems and on Kenai Peninsula. At least two varieties of the caribou are met with: the larger, called the woodland caribou, is abundant in the timbered regions of the interior; while the smaller, known as the wild reindeer, or barren ground caribou, meanders in large herds over the timberless northern areas and is also found on the Alaska Peninsula. Moose, though formerly abundant in the timbered valleys, are becoming scarce in some localities visited by white men. Black bear are widely distributed in the coast and inland regions, but are not found in the barren grounds. The true grizzly probably occurs only in the coastal strip of the Panhandle and in the Upper Yukon basin. There are many varieties of brown bear, the largest of which is the so-called Kodiak bear, which is found on the island of the same name. A closely allied variety, the Alaska brown bear, is found on adjacent parts of the mainland. Smaller varieties are found in the barren grounds. The white polar bear is indigenous only in the extreme north, but occasionally one is carried through the straits into Bering Sea. Of the smaller fur-bearing animals there are wolves, wolverines, foxes, beavers, muskrats, otters, mink, weasels, and sable (ermine). Many of the birds of the temperate zone are found in Alaska during the summer months. The ptarmigan occurs throughout the Territory, and the raven and eagle are plentiful in southeastern Alaska. Reptiles and amphibians are scarce, but there is a great variety of insect life, among which the mosquito is most conspicuous throughout the Territory. The marine mammals include whales (several varieties), porpoises, walrus, sea lion, hair and fur seal, and sea otter; but the last-named is nearly extinct. Fish occur in great variety and abundance. The salmon, white fish, and Arctic trout are the most plentiful and widely distributed.

Flora. In the distribution of vegetable life five broad zones can be recognized: (1) the Pacific coastal forests, (2) the southeastern grass lands, (3) the inland woodland, (4) the tundra, or barren grounds, (5) the alpine zone of the high ranges.

The Pacific coastal forests in the southeast include a luxuriant vegetation with much merchantable timber. The soil covering is chiefly moss, but in some flats grass and wild flowers are also found as far to the northwest as Kodiak Island, where the type is more stunted. Hemlock and Sitka spruce are the dominating varieties of trees. Of the deciduous trees, cottonwood, alder, and willow are most abundant. The devil's club, typical of the coastal region, occurs as far west as Cook Inlet, and up the Copper River as far as Wood's Canyon. The lower Copper River valley is without timber except for some groves of cottonwood. Valuable red cedar is found as far north as Sitka, and the more plentiful yellow cedar as far as Yakutat Bay. The tree line stands at about 3000 to 3500 at Dixon Entrance, and decreases to 500 or 1500 feet on Prince William Sound. Timber is used locally for structural purposes and for making boxes for canned salmon and halibut. There are also large reserves of timber which could be utilized for pulp. Southeastern Alaska has been set aside as the Tongass National Forest, and contains valuable timber reserves. The Chugach National Forest includes an area stretching from Controller Bay to Cook Inlet.

The grass lands of the timberless southwest include the Alaska Peninsula, most of Kodiak Island, and the Aleutian Chain, forming the second province. Grass grows abundantly up to an altitude of 1000 to 2000 feet, above which the vegetation merges into the lichen and moss type of the alpine vegetation zone. This province includes some good grazing lands. Those on Kodiak Island have been used for stock for upwards of a century.

The inland woodland type of vegetation is in most places sharply separated from the coastal forests by a high mountain barrier. At Skagway, on Lynn Canal, and at the head of Cook Inlet, however, there is a mingling of the coast and inland species.

Spruce (black and white) predominates in the interior, but poplar, aspen, white birch, and alder are also common. In the lower Tanana valley tamarack has been found. Near the international boundary the timber line is about 3000 feet above the sea, but along the northern tributaries of the Yukon and the rivers flowing into Kotzebue Sound falls to less than 1000 feet. Heavy forest growth is confined to the valley floors, often to a narrow fringe along the water courses. On the Yukon and some of its larger tributaries spruce trees 2 feet or more at the butt are occasionally found, but as a rule the maximum diameter is 16 to 18 inches. The interior forests, if preserved, will amply supply local use for many years, but the arid conditions and the carelessness of both natives and whites have caused much destruction by forest fires. The fourth province, the tundra, embraces the coastal region northward from the Aleutian Islands to Point Barrow and eastward to the international boundary. The surface is covered with moss and herbaceous plants, with a little fine shrubbery, and fringes of stunted willow along the water courses. The only break in this treeless belt is on the north shore of Norton Sound, where some spruce forests occur. The alpine vegetation zone embraces the upper reaches of the high ranges. Its lower part is characterized by stunted shrubbery, grass, and many flowering plants, merging at higher altitudes into moss and, finally, still higher, into lichens. Throughout Alaska the abundance and variety of wild flowers are striking. Many of these are kindred to species common in the United States. Grasses are very abundant in the Cook Inlet, Copper River, and Yukon River regions, and are also found in sheltered parts of the tundra region.

Geology and Mineral Resources. Some gneisses and schists (Archæan?) which occur in the Yukon basin are the oldest rocks of Alaska. The next higher horizon embraces a great com-

plex of altered sediments with many igneous rocks, which are in part Ordovician, Silurian, and Devonian. These form a broad belt stretching between the Yukon and the Tanana, and the same terrain is probably represented in the Seward Peninsula and in the Panhandle. Devonian, Carboniferous, Triassic, Jurassic, and Cretaceous beds have been found widely distributed. The Tertiary is represented by coal-bearing beds which occur in the Pacific, interior, and Arctic provinces. Extensive sheets of recent gravels, sands, and silts mantle much of the Territory. The Coast Range of southeastern Alaska is made up almost entirely of granite and related igneous rocks. Extensive volcanic ejecta occur in the Copper River basin, the Alaska Peninsula, and the Aleutian Islands. There are active volcanoes in all three of these districts. The mountain ranges throughout Alaska are the results of erosion in areas of very recent uplift. During the glacial period the Panhandle, with the exception of some of the higher peaks, was buried in ice, which channeled out the valleys now remaining as fiords. The same ice cap stretched inland over the Coast Range and extended northwestward down the valleys of the tributaries of the Yukon to about lat. 62°. During this period the St. Elias, Alaska, Aleutian, and Endicott mountains were centres of ice accumulation, which did not, however, extend far into the adjacent lowlands. The fast-disappearing remnants of these former ice sheets are the glaciers of the Pacific ranges. During the maximum extension of the ice it covered less than one-fifth of Alaska. The areas now covered by ice and perpetual snow aggregate less than 20,000 square miles. The developed mineral resources include gold (placer and lode), silver, lead, copper, tin, coal, gypsum, marble, and mineral water. Of prospective value are the deposits of zinc, iron, and possibly petroleum and mercury. The highly altered rocks of the Panhandle are the locus of most of the auriferous lode mining and also contain some placer gold, silver, and copper. This belt appears to be continued in the Prince William Sound and Kenai Peninsula region, where it carries gold and copper. The inland placer-bearing districts (including Forty Mile, Fairbanks, etc.) lie in another belt of highly altered rocks, which also appears to crop out in the Seward Peninsula, where rich placers have been found. Copper-bearing rocks occur both on the north and south slopes of the Wrangell Mountains. The coal-bearing rocks of Alaska cover at least 20,000 square miles. Coal has been found in four different horizons: in the Carboniferous and Jurassic near Cape Lisburne, and in the Cretaceous and Tertiary of the Yukon and Pacific coast regions. The last is the most important, and near Controller Bay and in the Matanuska valley has yielded high-grade bituminous and semi-anthracite coals. Lignite coals are very widely distributed. Marble, gypsum, and mineral waters have been found in commercial quantities in the Panhandle, where iron, zinc, and lead deposits are also known to occur. Petroleum seepages occur at several places along the seaboard between Controller Bay and Cook Inlet. Tin (cassiterite) is found near Cape Prince of Wales and on the lower Tanana, and mercury (cinnabar) in the Kuskokwim basin.

Mining. Though the Russians knew that both gold and copper occurred in Alaska, they made no effort to develop it. Their only attempt at mining was to open up a coal deposit on Cook Inlet in 1854. Gold was found at Sitka in 1876, but it was first mined extensively at Juneau, where it was discovered in 1880. Placer gold in the interior was first found on Forty Mile River in 1886, and this was followed by the discovery of the Birch Creek and Rampart districts in 1893. The annual output of gold from the inland region rose slowly, until by 1895 it amounted to $800,000; the mining population was then about 1600 men. Meanwhile the coastal region had made steady progress: by 1888 the Treadwell mine on Douglas Island, near Juneau, had become one of the great gold-producers of the world, while a number of smaller mines in the vicinity were developed. The Apollo mine on Unga Island in southeastern Alaska was opened in 1886, and the Cook Inlet placer fields were discovered in 1894. It was the discovery of the Klondike gold placers (1896), close to the international boundary but on the Canadian side, which first attracted large numbers of prospectors to Alaska; but no important discoveries of mineral wealth were made in Alaskan territory until 1899, when the Nome placers were found. The gold production of that year, about $6,000,000, was nearly double that of 1898. Since 1899 many new gold-bearing areas have been discovered, and marked progress has been made in the placer-mining industry. The Fairbanks district on the Tanana was discovered in 1902, and in 1905 yielded nearly $6,000,000.

In 1906–07 important new discoveries of placer mines were made in this district, and in 1909 new and valuable quartz veins bearing gold were found in the same region. Placer mining continued to furnish by far the larger portion of the gold produced. During these years a remarkable feature of mining in Alaska was the large quantities of gold found in the sands of the beaches of Cook Inlet and other bodies of water. In 1909–10 a discovery of gold in the waters of Otter Creek, the northern tributary of the Haiditarod or Iditarod River resulted in a rush of prospectors to that region, which is in the Innoko valley. The production from this field increased from $825,000 in 1910 to about $3,000,000 in 1912. The gold production of the Territory in recent years has been remarkably constant. In 1910 it was $16,126,749, in 1911 $16,853,256, and in 1912 $17,145,951. Of the production in 1912 $11,990,000 came from the placer mines, but the tendency is for the relative output from the deep mines to increase. The Fairbanks camp leads all other camps in production, but the output from this camp decreased from $6,100,000 in 1910 to $4,100,000 in 1912.

The silver production, chiefly incidental to gold mining, was 515,186 fine ounces in 1912, valued at $316,839, compared with 460,231 ounces in 1911 and 157,850 ounces in 1910.

The mining of copper promises to be one of the leading mineral industries of the Territory. Copper mining began in 1901 at Prince William Sound, and operations were later extended to Prince of Wales Island. Two smelters were erected here, but have not been operated for several years. The output was not large—in 1905, 30,000 tons, valued at $700,000. Prospecting had for many years been carried on in the Copper Mine district, and large bodies of ore had been found. It was not until 1911, however, that copper was actually produced in this region. In 1911 the copper production of the Territory

was 22,314,889 pounds compared with 4,311,026 in 1910. The increase was due to the production from the Bonanza mine in the Copper River district. The output in 1912 was 29,230,491 pounds, valued at $4,823,031.

Placer tin has been mined in the York district of the Seward Peninsula since 1902, and there has been a small amount of lode tin mining in the same district.

The existence of vast fields of coal in Alaska had been known for many years. In 1896 large deposits were found in the valleys of the Matanuska and Bering rivers. The coal in these fields is anthracite and high-grade bituminous, but much is too crushed to yield a high percentage of lump; and its value for steaming is still mooted. The Bering River field covers about 50 sq. miles, or 32,000 acres. It lies approximately 25 miles from the coast of Controller Bay, the nearest tide-water and about 90 miles from Cordova, the nearest good harbor. The Matanuska field is larger, covering about 74 sq. miles, or 47,360 acres. It is north of Prince William Sound and from 150 to 200 miles from Seward or Resurrection Bay. The coal in the other fields of the Territory, so far discovered, is lignite and low-grade bituminous.

The development of the coal fields of Alaska has been retarded by the lack of transportation facilities (see *Transportation*), and by controversies over the proper administration of the coal lands. (See *History*.) In 1911 only one mine, that of the Chignik Coal Mining Company near Chignik Bay, was operated commercially, and the estimated output of the Territory was only 900 tons. In the fiscal year of 1913, 102,169 tons, valued at $492,301, were imported.

Petroleum has been found in the Katalles field east of the Copper River, but the production as yet has been small. An executive order of Nov. 3, 1910, withdrew unlocated oil lands from entry. Gypsum is found in Chicagof Island. Marble of various colors is quarried on Prince of Wales and other islands of southeastern Alaska. Antimony, graphite, bismuth, cinnabar, and talc have been found, but not in sufficient quantities to justify their commercial exploitation.

The total value of all mineral products in 1912 was $22,537,821, as compared with $20,650,000 in 1911.

Some of the defects in the placer-mining laws as applied to Alaska were remedied by the Sixty-second Congress in 1911. The measures passed were designed to mitigate two evils which have hindered the development of placer mining—the unlimited power of attorney, and the association claims. By this enactment no association placer-mining claim in excess of 40 acres may be issued in Alaska. The provision in regard to the power of attorney restricts the number of such powers to two for any one person in any one month.

Fisheries. Fish have always been an important source of food supply for the natives, among whom the salmon, white fish, tomcod, and inconnu fish are most used. The most important of the fisheries are the salmon, cod, halibut, herring, and whale. Whaling, begun about 1840, is the oldest of the fishing industries, but is now on the decline. The catch of the whaling fleet from 1874 to 1900 was valued at about $11,200,000. The first salmon cannery was established on the Alaskan coast in 1878. There are many species of salmon, of which the king (the largest), silver, red, and humpback are the most important. They are very widely distributed, being found along the entire Alaskan coast, but are caught only at the mouths of the streams which they ascend during spawning season. Bristol Bay is the most important salmon-canning centre, but there are several others along the coast southward as far as the boundary.

In 1907 the mild curing of king salmon was begun and proved to be very profitable. The total output of canned salmon in 1912 was the greatest in the history of the industry. There were about 3,900,000 cases of four dozen one-pound cans each, compared with 2,823,817 cases, in 1911. In 1912 there were 87 salmon canneries in operation, compared with 64 in 1911. The total investment in the fisheries of Alaska in 1912 was $37,549,740, about 90 per cent of which was in salmon fishing. In the several branches of fishing, 24,263 persons were employed, an increase of 6,311 over 1911. The finished product in all branches of fishing for 1912 was valued at $18,877,468. For several years the United States Bureau of Fisheries has carried on successful experiments in hatching salmon fry for restocking the streams.

The decline of whale fishing is noted above. In 1907 a plant for extracting oil and making guano from whales was established at Tyrell on Admiralty Island. This was operated successfully for several years. But next to the salmon the most important fisheries are those of halibut, cod, and herring. Cod banks are scattered along the entire coast line as far north as the southern part of Bering Sea. Halibut are very abundant along the Pacific shore. The total production of halibut in 1912 was 17,146,743 pounds. Immense shoals of herring visit the bays and estuaries, and a small but thriving industry has grown up in the conversion of herring into oil and fertilizer. This practice is being attacked.

Agriculture. Alaska has probably 15,000 to 30,000 square miles of arable lands: as much as the agricultural land of Finland, a country which not only supports a population of 2,500,000, but exports butter, cheese, grain, and live stock. Because of the high cost of labor, Alaska can support only small farms, but these can be made to yield an ample return because of the abundant local market. In 1903 the homestead law was extended to Alaska and modified to permit the acquiring of 320 acres for agricultural purposes. There being no public land surveys, each homesteader has to make surveys at his own expense, with the result that but little land has been taken up. Since 1910, much of the more accessible arable land has been covered by sub-divisional surveys. Climate and location make southeastern Alaska the most favorable for agriculture, but the heavy forest growth entails an almost prohibitive cost for clearing the land in anything except small patches. Moreover, much of this region is too rugged for the purpose. At Sitka wheat, barley, rye, oats, and a great variety of vegetables, together with strawberries, gooseberries, raspberries, and currants, have been successfully raised. The growing season is from May to October. In general the same conditions prevail to the westward as far as Cook Inlet, though the climate is somewhat colder. The region adjacent to Cook Inlet and the Susitna valley is the most promising for agriculture. Here the abundance of native grasses is evidence of a soil suitable for hay; wheat, barley, oats.

buckwheat, clover, potatoes, and many vegetables have been successfully matured. The growing season extends only from about the first of June until September, but the long days and almost continuous sunshine mature plants very rapidly. On the Alaska Peninsula and adjacent islands the abundance of good grass will undoubtedly mark this for a stock-raising region. The Copper River district also contains good grass country, and barley, oats, and rye, as well as many vegetables have been matured. In favorable localities in the Yukon valley, vegetables have been extensively raised for local use. Oats, rye, wheat, and barley have been raised at Rampart and Fairbanks. The Tanana valley is the most favorable part of the interior for agriculture. Near Fairbanks are a number of prosperous ranches. Hardy vegetables have been matured in the Koyukuk valley north of the Arctic Circle. Grass grows luxuriantly throughout the Yukon basin. The growing season is confined to two or three months in summer, but this is partly compensated for by the length of the Arctic summer day.

The United States Department of Agriculture has established agricultural experiment stations in Alaska, and the results obtained indicate that certain sections of the Territory have great possibilities for the raising of some varieties of grain, vegetables, and fruit. It has been proved that while at present growing of wheat, except in an experimental way, is hardly feasible, a considerable portion of the Territory is adapted to raising barley and oats. At an agricultural fair held at Fairbanks in May, 1911, a great variety of native farm products were shown. These experiment stations have shown, also, that garden vegetables can be successfully grown in Alaska. In 1911, as the result of the increase in farming, the shipment of potatoes from the States was smaller by 25,149 bushels than in 1910; of hay, by 2155 tons; of beans and peas, by 7322 bushels; and of onions, by 964 bushels. Experiments in the growth of a hybrid strawberry, by crossing several cultivated varieties with the wild strawberry of the Alaska coast, have been successful.

A station for the breeding of sheep and cattle is maintained on Kodiak Island. This has met with signal success, but the grazing grounds where the station is situated were badly damaged by a heavy fall of volcanic ashes in 1912. The luxuriant growth of grasses in the territory surrounding Cook Inlet, and in other regions where the climate is comparatively mild, induces the belief among agricultural experts that stock-raising will become in time a profitable industry. The grazing area of the Territory is of large extent.

In 1910 the farms in the Territory numbered 222, with an area of 42,544 acres, of which 2660 acres were improved. The farm property was valued at $1,468,402. Vegetables were the most important agricultural product, and their value in 1909 was $186,134; the value of hay and forage was $94,993.

Furs. The fur trade first attracted the Russians to Alaska and continued to be the leading industry until the development of the gold mines. The most valuable fur-bearing animal is the sea otter, formerly numerous along the entire Pacific coast, but now found only on some of the Aleutian Islands and threatened with extermination. The killing of the sea otter is now prohibited by law. It is estimated that during the Russian occupation 260,800 sea otter skins were taken, valued at $26,000,000. Since 1867 about 90,000 sea otter skins have been marketed, but the present annual output is probably less than a score. Good skins are worth from $800 to $1200 in the London market. The fur-seal industry, though developed by the Russians, reached its greatest expansion after the transfer of the Territory. It is estimated that from 1745 to 1867, 3,350,000 fur seals were taken. From 1867 to 1902 2,524,082 skins to the value of $35,000,000 were exported. The fur seal, though during part of the year widely distributed in the northern Pacific and Bering Sea, has only one breeding ground in Alaska, on the Pribilof Islands (lat. 57° N., long. 170° W.), where most of the skins have been taken. In 1870 the capture of seals on these islands, except by government permit, was prohibited by law.

Before April 30, 1910, they were leased by the United States government to companies which had the right to take the fur seals found there. On the expiration of these leases, on the date given above, the United States took sole charge of the islands and the fisheries. The seals had been reduced to such a number that their practical extinction would have been a matter of a few years only, if conditions then prevailing had been maintained. This had come about chiefly because of the practice of "pelagic sealing," which is the killing of seals at sea, outside the three-mile limit. The countries whose fishermen were engaged in this were the United States, Great Britain, Russia, and Japan. The American authorities had for years endeavored to prevent this practice, but with little success. In "pelagic sealing" seals of all ages and both sexes are indiscriminately slaughtered, and the breeding of seals is thereby prevented. To bring an end to this economic waste, which meant the ultimate destruction of all the herds, the United States arranged a conference between the nations concerned. This was known as the International Fur Seal Conference, and it was in session in poaching time from May 11 to July 7, 1911.

As a result of their deliberations it was agreed that "pelagic sealing" should be abandoned for 15 years, and that the terms of the agreement should continue in force after that time unless terminated by a written notice given by one or more of the parties to all the others 12 months in advance. As compensation for this concession the United States agreed to share with the other governments in the profits received from the fisheries on the Pribilof Islands. This convention was ratified and went into effect Dec. 15, 1911. In 1912 the United States Congress passed a measure providing for a close season for five years from 1913 in the Pribilof Islands. Natives in the islands are permitted to kill annually a sufficient number of male seals to provide food and clothing. An actual census of the Pribilof herd in 1912 revealed 215,940 seals of all classes. The provisions of this measure, as well as those of the conference, apply also to the sea otter.

An important measure relating to fur-bearing animals and seals was passed by Congress in 1908. This enactment gives to the Secretary of Commerce and Labor, now the Secretary of Commerce, practical supervision over the fur-sealing industry on the Pribilof Islands. The act also provided that no person shall kill any

otter, mink, martin, sable, fur seal, or other fur-bearing animal in Alaska, except under such regulations as are prescribed by the Secretary. Fur-bearing animals enumerated below may be hunted and killed in the Territory, except during the season specified with respect to each of them.

Sea otter. The hunting or killing of sea otter is prohibited until Nov. 1, 1920.

Beaver. The hunting or killing of beaver is prohibited prior to Nov. 1, 1915.

The hunting or killing of land otter, mink, musk rat, martin, fisher, and ermine is prohibited throughout the season from April 1 to July 31.

The hunting or killing of black bear is prohibited throughout the season from April 1 to July 31.

The hunting and killing of fox, wildcat, or lynx is prohibited throughout the season from April 1 to September 30.

Permits or licenses may be issued by the Secretary for the taking of fur-bearing animals for scientific purposes and for shipment to zoölogical parks.

The animals enumerated above are the most important fur-bearing animals of the Territory. Foxes are found in great abundance. The pelt of the silver-gray fox, next to that of the black fox, is the most valuable, being worth from $75 to $100. Fox farms have been successfully established on some small islands on the Pacific coast. These are leased from the government. A successful attempt has been made to introduce domestic reindeer among the natives. The first importation was made from Siberia in 1892, and in 1912 there were 38,476 reindeer in Alaska, of which the natives owned 62.5 per cent. In the latter part of 1911 the first shipment of reindeer meat was shipped from Nome to Seattle. Although the reindeer have not supplanted dogs as draft animals, they will in time become valuable for fur and for food. The total fur shipments from Alaska in 1912 aggregated $794,156.63, as compared with $802,750 in 1911.

Transportation and Communication. Transportation is the vital problem of Alaska. Without it, neither the great mineral resources nor the agricultural possibilities can be developed. On the other hand, the uncertainty which has attended the tying-up of the coal lands (see *History*), even more than financial and engineering difficulties, has discouraged railroad construction. No new lines were built for several years prior to 1913, and, in the face of a tax of $100 per mile, several existing lines were not in operation.

Of the nine lines of railroad in 1913, with a combined mileage of 466 miles, the principal lines were: the Copper River and Northwestern, extending 197 miles from Cordova to Kennicott and a property of the Alaska Syndicate; the White Pass and Yukon, extending in a northerly direction from Skagway 20 miles in American territory and thence 82 miles in Canadian territory to White Horse, along the line of the historic Klondike trail; the Alaska Northern, which extends 71 miles northward from Seward, but which, under the name "Alaska Central," was originally projected into the interior before financial disaster overtook it in 1909; the Seward Peninsula, about 75 miles long, with its terminus at Nome; and the Tanana Valley, which is the only important line in the interior and runs about 50 miles from Fairbanks to Chena, among the principal placer mining camps of the neighborhood. The Copper River and Northwestern and the Alaska Northern alone are standard gauge.

The urgency of further railroad construction in Alaska is recognized by the Federal government. The Civil Government Act of 1912 (see *Government*) authorized the President to appoint a commission, consisting of an army and a navy engineer, a representative of the Geological Survey, and a civil engineer experienced in railroad construction, to study the transportation problem. The Commission's report, transmitted to Congress on Feb. 6, 1913, recommended, as the best of a number of possible routes, the construction of two trunk-lines: (1) from Cordova to Fairbanks, tapping the Yukon and Tanana valleys and also the Bering River coal fields; and (2) from Seward along Cook Inlet to Iditarod, tapping the Kuskokwim valley and also the Matanuska coal fields, in all, about 733 miles at an estimated average cost of $48,000 per mile. The Commission reckoned on the basis both of public and of semi-private construction, but did not commit itself to either.

Early in the first session of the 63d Congress, bills were introduced, based substantially on the Commission's report and providing for the construction of Federal railroads between harbors of the southern coast and the interior valleys. The essential features of the bill passed by the Senate, Jan. 24, 1914, were: (1) the exact routes to be determined at the President's discretion; (2) the scheme to be financed by a bond issue of $40,000,000 at 3 per cent, which should be paid off from part-proceeds of the sale of public lands within the Territory; (3) operation to be directly by the government or on leases not to exceed ten years; (4) facilities to be such as to secure coal for naval purposes. This legislation was urged in the presidential message of Dec. 2, 1913, and the concurrence of the House seemed certain.

The Alaska Road Commission, created in 1905, directs the construction of roads and trails throughout the Territory. In 1913 the total mileage was: Wagon roads, 862 miles; sled roads, 617 miles; trails, 2116 miles. The construction in 1911 of a united trail from Seward on the Pacific slope to Iditarod shortened the winter route to Nome by about 300 miles. In 1913, automobiles were running over a new road between Valdez and Fairbanks, in the interior.

River navigation has been an important factor in the commerce of Alaska. Because of the latitude at which they enter Bering Sea, the Yukon River is useful for two and the Kuskokwim River for three months only, as connecting links with ocean-borne commerce. The entrance of the Yukon is shallow and the channel shifting, and the entrance of the Kuskokwim is tortuous and little known; but once inside, an ordinary river boat can navigate the Yukon to White Horse, in Canada, about 2200 miles, the Tanana, its largest tributary, to Chena, near Fairbanks, and the Kuskokwim to the Forks, about 650 miles from the mouth. With their tributaries, the two systems provide about 5000 miles of navigable water. Despite the short open season, three to three and a half months, and occasional interruption in places by low water, the possibilities of their utilization in the development of their great valleys will suffice for many years. Navigation also exists

on the lower Copper, the Kobuk, and other streams.

The Pacific coast line of Alaska, including the Aleutian Islands, has many excellent harbors. These are open to navigation throughout the year, with the exception of Cook Inlet, which is closed by ice from November until May. The northern half of Bering Sea is closed to navigation from about November to June, but the ice-pack does not come far south of St. Lawrence Island. This part of the coast is almost without harbors. The Arctic Ocean is open only from July to September.

Cables give telegraphic communication with Seattle from certain ports of southeastern Alaska—Cordova, Valdez, and Seward. Telegraphic lines run from Valdez to Fairbanks and down the Yukon to St. Michael, which is connected by wireless station with Nome. These are all military lines. The Navy Department maintains wireless stations at Kodiak and at Unalaska. The War Department has wireless stations at Sitka, Cordova, Fairbanks, Circle, Eagle, Gibbon, and Nulato; and there are private stations at Iditarod and on Bristol Bay. Many of the mining districts are provided with telephone lines.

Commerce. As has been indicated, Alaska's chief industries are mining and fishing, and next to these comes the fur trade, but this is declining, and some districts no longer yield skins enough for local use. Lumbering is only a local industry. There is an abundance of wood suitable for pulp, but no use has been made of it. Although great advances have been made in agriculture, the value of the products is still relatively unimportant.

The volume of commerce is, however, on the increase. The aggregate value of merchandise shipments to and from the Territory in the fiscal year of 1913 was $67,150,519, as against $64,122,506 for 1912. The greatest increase noted in the shipments from Alaska was in salmon, where there was an increase of $2,875,791. The merchandise shipments to Alaska from the United States amounted to $20,179,547 for the fiscal year of 1913, as against $18,809,270 for 1912. Manufactured goods ready for consumption comprised the greater part of these shipments, especial increase being noted in machinery. The chief points to which the products of Alaska are sent are Seattle, Tacoma, and San Francisco. Almost all foreign trade is with Canada, though there is a little with Siberia.

Population. The natives of Alaska belong to four groups: the Esquimaux, the Aleut, the Thlinkit, and the Athabaskan. The Esquimaux inhabit all the northern part of the Territory, including the area tributary to the Arctic Ocean and the eastern shore of Bering Sea. Tribes closely related to Esquimaux are found along the eastern shore of the Alaska Peninsula, Kodiak Island, and as far east as the Copper River delta. They are essentially a docile, industrious people, whose food before the coming of the white man was chiefly fish, walrus, and seal, together with caribou in some districts. They are skilled in carving and are excellent boatmen. The Aleut, closely related to Esquimaux, are found only on the Aleutian Islands and adjacent mainland. They also are excellent boatmen and are renowned as hunters of the sea otter, an animal exceedingly difficult to approach. The Thlinkits and the closely related tribe called Haidas are confined to the Panhandle. At the coming of the Russians they were the most civilized of the native tribes and also the most warlike. They lived in well-built log houses and had an organized tribal system. They are skilled craftsmen and are of far greater intelligence than any of the other aborigines. The Athabaskans (the same stock as the North American Indian) dwell in the interior, reaching the coast only at Cook Inlet. They are a race of hunters, but those dwelling on the larger rivers also use salmon. With the exception of some of the isolated Esquimaux tribes, they are to-day the least civilized of Alaskan natives. Only the coastal natives appear to have any definite tribal organization; the rest are grouped rather by families. Tribal organization has never been recognized by the United States government.

Enforcement of the stringent laws of 1909, prohibiting the sale or furnishing of liquor to natives, has checked demoralization from drunkenness. The introduction of reindeer among the Esquimaux has improved their condition, their income from this source being, in 1911, $42,216.

The improvement in the native schools has had excellent results, especially among the children. The natives of Alaska, generally, are self-reliant, and many of them engage in profitable industries, especially in the commercial fisheries, and to some extent in the mines in the southeastern part of the country. The natives of the Copper River valley and the Aleutian Islands are poorer than those of most other parts of the Territory, but extreme conditions are not prevalent. The greatest menace is infectious diseases, but the work of physicians of the Bureau of Education has greatly improved health conditions.

The total population of the Territory in 1910 was 64,356; in 1900, 63,592, and in 1890 (partly estimated), 32,052; 1920, 54,899. The increase of nearly 100 per cent in the decade 1890–1900 was due to the rush of the gold-hunters. Although a considerable number of those enumerated in 1900 did not remain in the Territory; and although the natives and Chinese decreased by more than 6000, there was, nevertheless, a slight increase in the population in the decade 1900–10.

The Indian population is almost entirely native. It decreased from 29,536 in 1900 to 25,331 in 1910. The native population, which includes Indians, native whites, and natives of other racial elements, decreased from 50,931 in 1900 to 43,921 in 1910. Of the native population in 1910, 60.6 per cent were born in Alaska, 38.1 per cent in the United States proper, and 1.3 per cent in the Philippine Islands and other outlying territory of the United States.

The white population in 1910 was 36,347, and 22,734 of these were either foreign born or native born of foreign parentage. Of the 17,974 foreign-born whites, 15.1 per cent were born in Sweden, 14.4 per cent in Norway, 12.3 per cent in Canada, 8.6 per cent in Germany, 6.4 per cent in Ireland, 5.7 per cent in England, and 37.4 per cent in other countries. There were, in 1910, 2461 foreign-born colored inhabitants, of whom 1057 were born in China, 897 in Japan, 418 in Canada, and 89 in other countries.

In the total population in 1910 there were 45,857 males and 18,499 females. The number of males to 100 females in the white population

in 1910 was 500.1. This high percentage of males is accounted for by the fact that a large proportion of the native white population is composed of male immigrants from other sections of the United States.

The number of inhabitants per square mile in 1910 was 0.1, the same as in 1900. This is equivalent to an average area of 9.2 square miles, or 5888 acres to each inhabitant. The dwellings in Alaska in 1910 numbered 16,612, and the families 17,809.

There were, in 1910, 14 incorporated towns in the Territory, and of these 7 had a population of 1000 or more. Fairbanks, the largest city, had, in 1910, 3541 inhabitants. The other incorporated places with population in 1910 are: Nome, 2600; Cordova, 1152; Juneau, 1644; Ketchikan, 1613; Treadwell, 1222; Douglas, 1722; Skagway, 872; Valdez, 810; Wrangell, 743; Seward (incorporated in 1912), 534; Haines, 445; Petersburg, 585; Chena, 138; Eagle, 178. The town of Iditarod was incorporated in 1911, and Tanana in 1913. As there were no incorporated places in 1900, it is impossible to give an accurate comparison of population for the two census years. Nearly all these towns show an increase, but several show decreases. Among these is Nome. Sitka, not incorporated in 1910, had a population of 539. The figures for population given above include only those for the white population. In many cases there are, in addition, native villages near these towns which equal or exceed them in population. The government maintains garrisons of 200 or 300 men in four forts: William H. Seward, near Skagway; Davis, near Nome; Liscum, near Valdez; and Gibbin, at the junction of the Yukon and Tanana rivers.

Missions. Christianity came to Alaska through the Greek Catholic missionaries in the early days of the Russian occupation. Wherever the Russians established their trading posts the natives became converts to the Greek Catholic faith. Many of the Aleuts and the natives of the Alaska Peninsula, Kodiak Island, and the vicinity of Sitka still belong to this church, which maintains missions at a dozen localities. Soon after the transfer to the United States, missionaries of other sects went to Alaska and established churches and missions. Now nearly every Christian sect is represented at one or more localities. Besides the Greek church, the Roman Catholics, Episcopalians, Presbyterians, and Congregationalists have the most missions. Probably all of the Alaskan natives are adherents of some Christian sect, though those of the more isolated regions may not visit a mission more than once in two years. Churches for whites of various sects have been established in all of the larger settlements, and many of the clergy have done excellent work in the establishment of hospitals.

Education. The people of Alaska have from the beginning of its occupation shown an interest and pride in their public schools. In the incorporated towns these are supported largely by license money collected in these towns. For places not incorporated provision is made by an Act of Congress passed in 1905. One-fourth of the receipts for license taxes from these communities is set aside to be expended by the government for schools for white children, and for children of mixed blood who lead a civilized life. The native schools are in charge of the United States Bureau of Education. Industrial features are included in the curriculum with a view to attracting the attendance of adults.

Schools are maintained in all the incorporated towns in the Territory. In the schools established by the Act of 1905 the attendance averages about 700. In the native schools are about 4000 pupils. In addition to public institutions, educational facilities are furnished by religious denominations, including those of the Presbyterian, Roman Catholic, Moravian, Methodist, Episcopal, Friends, the Swedish Evangelical, and the Greek Orthodox churches.

Because of the small number of children of school age in the Territory the per capita cost of public instruction is relatively high. The total expenditures for places outside incorporated towns was, in 1912, about $50,000.

Government. Prior to Aug. 24, 1912, Alaska was a district, or unorganized Territory, with no local legislative body. All its laws were made by the Congress of the United States, and the administrative and judicial officers were appointed by the President.

The Civil Government Act passed by the Sixty-second Congress, and approved by President Taft on the date noted above, created a legislative assembly with limited powers. The passage of this act marked the close of long-continued agitation both within and without the borders of the Territory for some form of self-government. President Taft, in repeated messages to Congress, urged the necessity for the passage of measures providing for this. His preference was for a commission form of government until the Territory should be fitted for actual self-government, but he was satisfied with the modified powers of government given by the act, and therefore signed it.

The act first creates Alaska into an organized Territory and establishes a capital at Juneau. It then provides for a Legislature to consist of a Senate composed of eight members, two from each of the four districts into which the Territory is divided, and a House of Representatives, consisting of 16 members, four from each of the judicial districts. The term of office for senators is four years and for representatives two years. The Legislature meets every two years, beginning in March, 1913, and the Governor has power to call special sessions for a period not exceeding 15 days.

The powers of the Legislature are limited. It cannot grant private charters or special privileges; it cannot grant divorces; it must not interfere with existing laws relating to the regulation of the liquor traffic or gambling, and it cannot incur any indebtedness except for the actual expenses of the government. It is not permitted to levy taxes in excess of 1 per cent of the assessed valuation of property, and it can pass no laws which are inconsistent with the laws already passed by Congress. The Legislature was permitted to modify the qualifications of electors by extending the franchise to women. This it did in its first session. The Governor has the veto power, which may be passed over by a two-thirds vote of both houses. All laws must be submitted to Congress for approval before they become valid, and all measures passed must be transmitted to the President within 90 days of their passage. The act contains a provision for the Railroad Commission referred to in the paragraph dealing with transportation.

The first election for members of the Legislature was held on Nov. 5, 1912, and the first session convened on March 3, 1913.

The executive officers of the Territory are a governor, appointed by the President, a secretary (ex officio) of the Territory, a secretary to the governor, and a surveyor-general. The Territory forms a customs district with a collector at Juneau, and 10 deputy collectors at as many ports of entry. There are four judicial divisions, with centres at Juneau, Nome, Valdez, and Fairbanks. Other departments of the government, administered from Washington, are the land office, the department of education, the immigration service, the mine inspection service, the forest service, the game service, the bureau of fisheries, and the health office.

Towns with a population of 300 or more are allowed to incorporate and elect governing bodies, but otherwise there is no local government. Under a law passed in 1906 Alaska is represented in Congress by a delegate elected by male residents of a year or more in the Territory. A complete criminal and civil code was first enacted for Alaska in 1899–1900 and has been amended from time to time. The seat of government was located at Sitka until 1906, when it was removed to Juneau. There is no land tax in Alaska, except within incorporated towns. The assessed valuation of property in nine incorporated towns levying taxes, 1912–13, was $6,042,068; the average tax rate was 1.31 per cent.

History. The evidence of old maps shows that something was known of the Alaskan coast as early as 1579, but it was not until 1711 that Popof, a Cossack who visited East Cape (Siberia), brought back definite knowledge of Bering Strait and the continent said by the natives to lie beyond. Vitus Bering, sent out by Peter the Great, sailed through Bering Strait in 1728; and in 1731 Gwosdef, a Cossack, was blown on to the Alaskan coast, on which he was probably the first Russian to land. Another expedition led by Bering sighted the Alaskan coast at Mount St. Elias, July 18, 1741, and landed on Kayak Island. Chirikoff, in command of Bering's second ship, reached the vicinity of Sitka on July 15, but the boats sent to make a landing did not return. Bering, returning along the Aleutian chain, discovered a number of islands and finally was wrecked on Commander Island. The first white settlement was made on Kodiak Island at Three Saints' Bay in 1783. During the succeeding half century the Aleutian Islands were explored and exploited by the Siberian fur-hunters, who reached the Alaska Peninsula about 1761. Within the next century exploration gradually advanced from three directions: the Russians reached it from Siberia through Bering Sea and Bering Strait; the English traders came from the east by way of the Mackenzie valley; and navigators of various nationalities approached it from the south by following the eastern shore of the Pacific. Among the most prominent of these expeditions were the Russian ones led by Synd (1767), Krenitzin (1768), Billings (1785), Kotzebue (1815), Lütke (1826); the Spanish ones led by Bodega y Quadra (1774), Arteaga (1779), Martinez (1788), Malaspina (1791); and one French under command of La Pérouse (1785). But the most important exploration was done by Capt. James Cook, of the English navy, who in 1778 surveyed almost the entire coast line between lat. 58° and 70°. These surveys were extended by various English navigators, notably Vancouver (1793–94), Franklin (1826), Beechey (1826), and the Franklin relief expeditions (1848–53). Meanwhile the English fur traders had approached from the east, and the explorations of Mackenzie (1793), Dease and Simpson (1837), Murray (1847), and Campbell (1848) had added much to the geographic knowledge of the Territory. The Russian fur-trading interests were consolidated in 1788 into a single company, under the management of Alexander Baranof. This so-called Russo-American Company by royal charter obtained a monopoly of the fur trade throughout Alaska and held it until the transfer to the United States. The company gradually extended its field of operations: it founded Kodiak (1792), Sitka (1804), St. Michael (1834), and Nulato (1841); and explored the Lower Kuskokwim, the Yukon as far as the Tanana, and the lower stretches of the Susitna and Copper rivers. In 1865–66 explorations were made by Robert Kennicott, W. H. Dall, and other employees of the Western Union Telegraph Company with the object of connecting Europe with America by telegraph, but the success of the Atlantic cable led to the abandonment of the project. The Russian colonists made no attempt to develop any resources except the furs, and as these generally decreased, the country was considered less valuable. In March, 1867, by treaty negotiated by William H. Seward, Secretary of State, in spite of much opposition, Russian America was ceded to the United States for $7,200,000 in gold.

On Oct. 18, 1867, the Russian flag was lowered from the flagstaff in front of the Governor's residence at Sitka and the United States flag hoisted amidst the booming of cannon. This was the act of formal transfer by which Russian-America became Alaska and a possession of the United States. At a number of points in southeastern Alaska and Kodiak extensive barracks were erected and occupied by United States troops, while an army officer represented the Federal government. But ten years later all troops were withdrawn, and for a number of years the country was governed by a naval officer stationed at Sitka. Then even this control lapsed, and Alaska was left for a time in the anomalous position of being without either military or civil government. A civil government was enacted by statute in 1884, and has continued with some modifications up to the present day. (See *Government.*) The Alaska Commercial Company succeeded to many of the fur-trading interests of the old Russo-American Company, and as late as 1891 maintained almost a monopoly in this field. For many years after its acquisition Alaska was neglected by the Federal government. The Coast Survey took up the systematic mapping of the shore line, but little attempt was made to explore the interior. The Yukon was mapped in 1869 by Capt. R. W. Raymond, U. S. A., who was sent to determine the approximate position of the international boundary and thus settle the conflicting interests of American and British traders; and in 1883 by Lieut. Frederick Schwatka. Schwatka crossed the Chilkoot Pass (called by him Perrier Pass) with a small party and built a raft at the headwaters of the Lewes and continued down the river in this unmanageable craft, running the various rapids, to Fort Selkirk at the junction of the Pelly and Lewes. From this point on he

was traversing a river which had been explored by the Western Union Telegraph agents and was already occupied by the fur-traders. Schwatka continued his trip to Fort Yukon and thence to the sea.

In 1884 Lieut. W. R. Abercrombie, U. S. A., was detailed to make an exploration of the Copper River, but ascended it only a short distance. This work was taken up again in the following year by Lieut. Henry T. Allen, U. S. A., who, with four men, landed at the mouth of the Copper River in March, 1885, and made his way up that stream by boat and sled for about 300 miles; then crossed to the Tanana by way of the Suslota Pass, and, securing another boat from the natives, continued his journey to the mouth of the Tanana. With indefatigable energy Allen then, with one companion, crossed to the Koyukuk from near the mouth of the Melozi River, and explored it almost from the Arctic Circle to its junction with the Yukon. Crossing by portage from the Lower Yukon to Norton Sound, he made his way to St. Michael, whence he returned by steamer to the United States. Lieut. G. M. Stoney, U. S. N., and Lieut. J. C. Cantwell, U. S. Revenue Marine Service, explored the Noatak and the Kobuk. In 1889 J. E. McGrath and J. E. Turner located the international boundary on the Yukon and the Porcupine. The public interest aroused by the discovery of the Klondike (1897) induced Congress to make appropriation for systematic surveys and explorations by the United States Geological Survey. The Susitna, Kuskokwim, White, and Tanana rivers were explored in 1898, and the Chandlar and Koyukuk rivers in 1899. In 1901 a United States Geological Survey party made a trip the entire length of Alaska, from the southernmost limit to Point Barrow; while another explored the headwaters of the Allen and Kobuk rivers and followed the latter to its mouth at Kotzebue Sound. In 1902 the western front of the Aleutian Range was explored. By 1905 over one-fifth of the Territory had been surveyed and less than one-quarter remained unexplored. In the meantime settlements had rapidly increased both in the interior and along the coast. But many of those founded during the gold craze of 1897–98 were short-lived, for at that time the entire placer-mining industry could not support a population of more than a few thousand. Conditions, however, were completely changed by the discovery of the Nome gold fields (see *Mining*), since which time Alaska has been very prosperous.

Boundary Dispute. When the United States acquired Alaska (1867), its eastern boundary had been fixed by the terms of a treaty made between England and Russia in 1825. At the time this treaty was negotiated England made a determined effort to secure a Pacific outlet for her fur trade, which even then had reached the headwaters of westerly flowing rivers. Russia, however, maintained that the coastal strip as far south as lat. 54° 40′ was hers by right of discovery and occupation, and forced England to accede to her demands. Article III of this treaty, delimiting the first section of the boundary, provides that it shall run from the southernmost point of Prince of Wales Island (54° 40′), ascend to the north along Portland Canal to that part of the continent where it strikes the 56th parallel, and thence follow the summit of the mountains parallel to the coast as far as the intersection with the 141st meridian, from which point the 141st meridian shall serve as the line of demarcation between Russian and British possessions. It provided, furthermore, that whenever the summit of the mountains (north of lat. 56°) shall prove to be more than 10 marine leagues from the ocean, the boundary shall consist of a line parallel to the windings of the coast and never exceeding 10 marine leagues therefrom. For upwards of 50 years this delimitation of the boundary appears to have satisfied England and Russia and the United States, for no question was raised regarding it. In 1835 the Hudson's Bay Company attempted to establish itself in what is now southeastern Alaska, but was promptly ejected by the Russian authorities and received no support from England. The conflict between the two rival fur-trading interests was settled by the Hudson's Bay Company leasing a strip of the mainland. That part of the boundary which followed the 141st meridian (north of Mount St. Elias) was absolutely fixed, but to the south the line was less easily defined. As there was no well-defined range of mountains running parallel to the coast, it was generally conceded that the line should lie everywhere 10 marine leagues from tidewater following the sinuosities of the coast, and it was thus indicated on all British and American maps up to about 1885. Meanwhile the discoveries of gold in the inland region made an outlet to the coast all-important to the Canadians. They claimed that the 10 marine leagues should not be measured from the actual shore line, but from a line connecting headland to headland, and even went so far as to state that the boundary should not follow Portland Canal but Clarence Strait. If this claim had been recognized, it would have thrown into Canada the heads of the longer fiords, as well as several of the southern islands (Revillagigedo, Gravina, etc.) of the archipelago. It would have given the Canadians a seaport on Lynn Canal and left the United States with a series of narrow, broken strips of mainland. When this contention was officially put forth in 1888, surveys of the disputed strip of territory were undertaken by mutual agreement. Thus matters went on, until the discovery of the Klondike gold fields (1896) brought the affair to an issue. The people of Alaska were justly indignant that the dispute was not settled. In a number of instances the local officers came to a clash within the disputed territory. On Jan. 24, 1903, a treaty was signed between the United States and Great Britain creating the Alaska Boundary Tribunal, to consist of six impartial jurists, three from each country to settle the dispute. Henry Cabot Lodge, Elihu Root, and George Turner represented the United States, while Richard Everard Alverstone, Lord Chief Justice of England, and Louis Amable Jetté and Allen Bristol Aylesworth, Canadians, represented Great Britain. The tribunal met in London on Sept. 3, 1903, and on October 20 a decision was reached by a majority, the United States representatives and Lord Alverstone voting against the two Canadians, which was an almost complete vindication of the United States contention, though the actual demarcation of the boundary threw about one-third of the disputed area into Canada. By this decision the Canadians were finally shut off from the sea-coast north of 54° 40′. The larger entrance to Portland Canal was given to Canada and the boundary established through Pearse Canal. Surveys to locate these boundaries were

at once begun and continued through the years following.

Coal Land Dispute. The controversy which has marked the attempts to open up the coal deposits of Alaska has been one of the most prominent features of its political history. Suspicion of fraud and monopoly has naturally induced extreme caution; on the other hand, delay in the development of the coal resources has caused equally natural discontent within and without the Territory. The whole question, moreover, has been confused by its intimate connection with a recent and still beclouded partisan controversy.

The situation and extent of the coal deposits of Alaska have been noted in the paragraph on *Geology and Mineral Resources.* The application of as much of the public land laws of 1873 as relate to coal lands was extended to Alaska by act of June 6, 1900. Since these laws, however, contemplated a public survey prior to location, they were not effective in Alaska. This defect was remedied by a supplementary act of April 28, 1904, which permitted individuals to locate claims of 160 acres by permanent monuments, accompanying their applications for entry, to be made within three years, by plats and notes of private surveys. An executive order of Nov. 12, 1906, withdrew all coal lands in Alaska from entry, being modified by a later order so as not to apply to locations made prior to that date.

Under the Act of 1904 and previous to the executive order of 1906, claims were made covering nearly all the deposits of the Bering River field. Since the law permitted claims to be made in person or by power of attorney, agents were active, and most of the claims occurred in groups, which passed commonly under the names of the agents. The "Cunningham group" was the most notable of these, partly because of the value of the deposits it covered, but largely because the claims it comprised progressed farthest toward final patent and brought the coal land dispute to a head. This group was in the Bering River field, and consisted of 33 adjoining claims of approximately 160 acres each, of which one was held directly by the agent, Clarence Cunningham. Preliminary steps were taken in 1903, and the claims were registered in 1904.

In general, the sources of fraud feared in Alaskan coal cases have been: first, "dummy" claimants; second, collusion between bona-fide claimants to operate corporately. Especially keen has been the fear of monopoly by the Alaska Syndicate, otherwise "The Morgan-Guggenheim Syndicate,"—a fear which, whatever its basis in fact, remains one of the controlling factors in the Alaskan situation. The applicants in the Cunningham cases were, in the main, substantial business men of the Northwest, and were hardly suspected of being 'dummies.' The possibility of collusion was the subject of an investigation stretching over seven years. Preliminary inquiries were made in 1905 by a special agent of the Land Office, lapsing until Aug. 7, 1907, when an uncertain report was made upon 25 of the 33 claims. In the meantime, in the spring of 1907, Richard Ballinger, Commissioner of the Land Office from March 5, 1907, to March 5, 1908, ordered Horace T. Jones to conduct a vigorous inquiry. Mr. Jones's final report of November 1 urged further investigation. At the Commissioner's order, Luther R. Glavis, Chief of the Field Division at Portland, took up the inquiry. On Dec. 23, 1907, Mr. Ballinger ordered the claims clear-listed, but, upon protest from Mr. Glavis in the field, this order was revoked in January when the claims were all but patented. On March 6 the affidavit of Clarence Cunningham was secured, to the effect that his clients had nothing to do with the Guggenheim interests. Later evidence showed, however, that on Dec. 7, 1907, the Guggenheim Syndicate had taken up an option on one-half interest in the Cunningham properties. Furthermore, the affidavit, in ridiculing the impracticability of the existing coal land laws, virtually confessed an intention to work the claims together.

The impracticability of working a 160-acre claim independently under the rough-surface conditions of Alaska was the subject of a remedial act of May 28, 1908, which permitted individual claims, thus far located and entered in good faith, to be consolidated. Stringent provisions against monopoly were added. This act complicated the questions of fact in the Cunningham cases by a problem of construction. Mr. Ballinger, then in private life, appears by his own statement to have represented the Cunningham interests and to have sought to induce them to proceed under the Act of 1908. On becoming Secretary of the Interior in March, 1909, it was his announced policy to leave the adjustment of Alaskan coal land questions to the Assistant Secretary. From the fall of 1908 to the summer of 1909 the investigation dragged, pending a field investigation. On April 20 and thereafter Mr. Glavis was pressed from headquarters to prepare for an early hearing of the claims. This, he protested, would be disastrous to the government's case. His estrangement with his department increased. Finally, in July, he appealed to the Forestry Bureau, which was legally concerned, since 21 of the claims were in the Chugach National Forest. The intervention of the Secretary of Agriculture secured a postponement of the hearing till October 15. On September 18 Mr. Glavis, who now openly charged officials of the Interior Department with trying to rush through fraudulent claims, was dismissed. The Chief Forester, Gifford Pinchot, espoused his cause, and after a violently denunciatory letter of Jan. 6, 1911, was removed by the President. A Joint Committee of Congress, desired by Mr. Ballinger, investigated the affair, and on December 5 reported, on an almost strictly party division, sustaining the Secretary. No action was taken, but in March, 1911, Secretary Ballinger resigned. Walter L. Fisher became Secretary, March 13, and one of his first undertakings was a thorough trip of investigation through Alaska in the summer of 1911.

The Cunningham claims were finally entered for cancellation on June 16, 1911. This action seemed to signal a wholesale disallowance of the outstanding claims. In June, 1913, of the 1129 coal land claims in Alaska, 765 had been cancelled, and field examination had been completed on the rest. As yet, only two patents to coal land had been granted.

The opening of the Alaskan coal fields, then, remains a problem, depending for its solution in part on railroad development (see *Transportation*), in part on a modification of the coal land laws. Probably some system of leasehold, which Secretary of the Interior Lane urged most

emphatically in 1913, will mark the policy of the future.

The same popular outcry against monopoly in Alaska, and especially against monopoly by the "Morgan-Guggenheim Syndicate," which marked the coal land controversy, was further provoked by an executive order of Oct. 28, 1910, which withdrew about 12,800 acres along Controller Bay from the Chugach National Forest and opened them to private entry. Controller Bay is about 25 miles from the Bering River coal field and is the nearest harbor. Monopoly of the coal through a control of terminal facilities was feared. Richard S. Ryan, president of the Controller Bay Railroad and Navigation Company, had petitioned for the withdrawal in 1909, and after the order of 1910, made three scrip entries, aggregating 159 acres. Complying with a Senate resolution of April, 1911, President Taft defended his action in a special message of July 26, 1911, stating that Mr. Ryan had no connection with the Guggenheim interests and that, in all events, the reservation of 80 rod strips between claims having a frontage of 160 rods on navigable waters, in compliance with the law of 1898, was ample guarantee against any future monopoly of terminal facilities. In an address before the American Mining Congress on Oct. 27, 1911, after his return from Alaska, Secretary Fisher indorsed the President's view and also depreciated the value of Controller Bay as a harbor.

In August, 1912, James Wickersham, Progressive Republican, was reëlected delegate to Congress by a large plurality. In 1913 Major J. F. A. Strong of Iditarod was appointed Governor.

For an account of the remarkable eruption of the Katmai volcano on June 6, 1912, see VOLCANOES.

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ALASKA SA'BLE. A name sometimes applied to the fur of skunks when dyed and prepared for the market.

ALASKA-YUKON EXPOSITION. See SEATTLE.

ALAS'KITE. An igneous rock that consists essentially of quartz and alkali-feldspar. It represents the extreme in silica content of the commoner types and includes many that hitherto have been described as granite, rhyolite, aplite, and similar acidic rocks. The name has been recently introduced in petrology (first employed by Spurr with reference to certain Alaskan rocks), but has gained quite general acceptance among students of that science. See GRANITE.

ALASSIO, ä-läs'syō. A seaport of Liguria, Italy, on the Gulf of Genoa, 57 miles by rail southwest of the city of Genoa (Map: Italy, C 3). In winter it is frequented by foreigners, particularly by English-speaking people, and in summer the excellent bathing attracts Italians. The natives are mostly fishermen and boatbuilders. Pop., 1901, 5630; 1911, 5558. Consult Scheer's *Alassio und seine Umgebung* (Weisbaden, 1886).

ALAS'TOR (Gk. 'Αλάστωρ). 1. An avenging, haunting spirit. Among the Greeks the name was sometimes applied to Zeus as an avenging deity; also to the Furies. In the Middle Ages it was given to one of Satan's chief ministers, a demon supposed to execute his purposes. 2. A poem by Shelley, published in 1816, entitled in full, *Alastor, or the Spirit of Solitude.*

ALATAU, ä'lä-tou' (Turk. mottled mountain range). A name given to a range of lofty mountains forming the boundary between Turkestan and Mongolia and the northern limit of the great tableland of Central Asia (Map: Asia, G 4). It is made up of three sierra-like subranges, the Dzungarian, the Trans-Ili, and the Kuznets Alatau. These are all grouped around Lake Issik-Kul as a central point. The peaks of the Alatau, which are principally of granitic formation, attain an elevation of over 15,000 feet.

AL'ATER'NUS (Lat.). The old name of a genus which has now been merged with the genus *Rhamnus.* (See BUCKTHORN.) The common European plant which has long been referred to *alaternus* is a large shrub, densely branched, with shining leaves and clusters of small flowers much frequented by bees. The

berries partake of the purgative qualities attributed to *Rhamnus cathartica*.

ALATRI, ä-lä′trē. An episcopal city in South Italy, 9 miles north of Frosinone (Map: Italy, H 6), occupying the site of the ancient Aletrium. Is a summer resort and contains important cloth factories. Ruins in the near-by valley of Cosa exemplify to a marked degree the characteristics of ancient fortifications. There are fine examples of twelfth-century painted wood carving in the church of Santa Maria Maggiore. Pop., 1901, 15,322; 1911, 16,323.

ALATYR, ä′lä-tēr′. The chief town of a district in the government of Simbirsk, Russia, on the Sura, 107 miles northwest of Simbirsk (Map: Russia, G 4). It has two cathedrals, four monasteries, a hospital, schools, etc. Milling, brewing, and brick-making are the principal industries. Pop., 1897, 11,100. It was founded in 1552 by Ivan the Terrible.

ALAUSI, ä′lou-sē′. A town on the Alausí River, in the province of Chimborazo, Ecuador, 75 miles east of Guayaquil (Map: Ecuador, B 4). It is situated 7980 feet above sea level on a fertile plateau of the Andes. Textiles are manufactured. The town is a health resort, as there are hot springs in the neighborhood. Pop., 1910 (est.), 5000.

ALAUX, à′lō′, JEAN, called LE ROMAIN (1786–1864). A French historical painter, born at Bordeaux. He was a pupil of Vincent and Guérin, director of the French Academy at Rome from 1846 to 1853, and in 1851 was elected a member of the Institute. The principal cause of his reputation was the favor shown him by Louis Philippe, who gave him commissions for several hundred pictures in the Museum of Versailles. He restored several rooms in the Palace of Fontainebleau and decorated the cupola of the Palace of the Senate. His cold and academic art is devoid of true pictorial qualities.

ALAVA. See BASQUE PROVINCES.

ALAVA, ä′lä-vä, DON MIGUEL RICARDO DE (1771–1843). A Spanish general. He was born at Vittoria, Spain, and died at Barèges, France. Sprung from a noble family, he entered the navy in early life, but changed later to the land service. His political conscience was as flexible as his political career was checkered. He abandoned Ferdinand VII for the French in 1808; left the French for the English in 1811, and entered once more into the service of Ferdinand, in 1815, as Minister to The Hague. In 1820 he was leader of the Liberals in the Cortes; in 1822 he fought against Ferdinand's guards at Madrid, and the next year he negotiated with the Duc d'Angoulême for the restoration of Ferdinand to his throne. Fearing Ferdinand's vengeance, however, Alava fled the country. From his exile in England he was recalled by Maria Christina, who made him Ambassador, first to London, in 1834, and, in 1835, to Paris. The following year he refused to swear to the constitution of 1812, reëstablished by the insurrection of La Granja, and retired to France.

ALAY, ä-lī′. A Turkish ceremony on the assembling of the forces at the breaking out of a war, the chief feature of which is a public display of the sacred standard of Mohammed, which may be looked upon only by Moslems and touched only by emirs. It is a capital offense for a Christian to look upon the banner.

ALB. See COSTUME, ECCLESIASTICAL.

ALBA, äl′bä (ancient Lat. *Alba Pompeia*, White Pompeia). An episcopal city of the province of Cuneo, North Italy, situated on the right bank of the Tanaro, 31 miles southeast of Turin (Map: Italy, C 3). The vast Gothic cathedral of San Lorenzo dates from 1486, and there are rich collections of ancient manuscripts, coins, vases, and household utensils. The country produces wine, grain, cattle, silk, truffles, and cheese. Pop., 1901, 12,800; 1911, 14,176.

ALBA, äl′bä, DUKE OF. See ALVA.

ALBACETE, äl′bä-thā′tā. A town of Spain, capital of the province of the same name, in Murcia. It is situated at an altitude of more than 3800 feet, 138 miles southeast of Madrid, and on the railway which runs from Madrid to Alicante (Map: Spain, E 3). It stands in a fertile but treeless plain; consists of an upper and a lower town, the latter of which, being modern, is built with some degree of regularity, and contains a number of squares, hospitals, a bull ring, and many good houses. It is a place of considerable trade and is noted in Spain for the manufacture of knives, daggers, and cutlery. There are sulphur mines near by, matches are manufactured, and there is considerable trade in agricultural products. Annual cattle fairs are held here. Pop., 1887, 20,700; 1900, 21,373; 1910, 24,805.

AL'BACORE, or **AL'BICORE** (Portug. and Sp. *albacora*, from Ar. *al*, the + *bakr*, a young camel, a heifer). A tunny, especially the long-finned, or alalonga. See TUNNY.

AL'BA LON'GA. An ancient town of Latium, founded, according to the popular account (Livy, i, 3; Vergil, *Æneid*), by Ascanius, son of Æneas, on a ridge overlooking the Alban Lake (Albanus Lacus). Here lived several generations of kings, and here were born the twins Romulus and Remus, sons of King Numitor's daughter, Rhea Silvia, by the god Mars. Alba Longa was destroyed under Tullus Hostilius, third king of Rome, and never rebuilt, its inhabitants being removed to Rome (Livy, i, 32). The legend, in its general outline, is doubtless based on facts. In 1817 a remarkable prehistoric necropolis was found here, buried under volcanic ashes and containing burial urns in the form of round huts. (See ARCHÆOLOGY.) The site of the town seems to have been near the modern Castel Gandolfo. The Emperor Domitian had a villa there.

ALBAN, ôl′bən, SAINT. According to legend, the first martyr of Britain. He was born at Verulam in the third century, and after having long lived as a heathen, was converted to Christianity, but put to death in 304. His day is June 22. The town of St. Albans, which bears his name, is believed to stand on the site of his birthplace or the scene of his martyrdom. See ST. ALBANS.

ALBAN LAKE. See ALBA LONGA.

ALBA'NI. In ancient times, a people in Asia inhabiting the country between the Caucasus and the Cyrus River, and between Armenia and the Caspian Sea, corresponding with the modern Shirvan and southern Daghestan. The ancient Albanians were described as tall, strong, and of graceful appearance. They were nomads. A Roman army under Pompey first encountered them in 65 B.C. and found a force of 60,000 infantry and 22,000 cavalry opposing it. Pompey secured a nominal submission, but they continued practically independent.

ALBANI, ôl′bä-nī. A rich and celebrated family of Rome, who came originally from Albania in the fifteenth century and settled first

at Urbino. The great influence of the family dates from the accession (1700) of Giovanni Francesco Albani to the papal throne as Clement XI. It has since furnished a succession of cardinals. Cardinal Alessandro Albani (q.v.) made the celebrated art collection of the Villa Albani at Rome.

ALBANI, ALESSANDRO (1692–1779). A nephew of Pope Clement XI, who insisted on his entering the priesthood and to whom Albani's worldly life later gave much trouble. He was created Cardinal by Innocent XIII in 1721. He was born at Urbino and was a brother of Annibale Albani. Under Maria Theresa, he served as Minister at the Papal Court and Crown-Protector of Austria. After his death his collection (at Rome) of statues and other works of art was bought by George III.

ALBANI, EMMA (1852—). The stage name of Marie Louise Cecilia Emma Lajeunesse. A Canadian dramatic soprano. She was born at Chambly, near Montreal, Nov. 1, 1852. She made her first public appearance at Albany, N. Y., when but 12 years old. She studied under Duprez, of Paris, and Lamperti, of Milan, made her début at Messina as Amina in *La Sonnambula* (1870), and has sung in opera in London, Paris, Berlin, St. Petersburg, and many cities of the United States. Among her impersonations are Senta in the *Flying Dutchman*, Elisabeth in *Tannhäuser*, Elsa in *Lohengrin*, Marguerite, Lucia, Mignon, Ophelia, and Isolde. Madame Albani has also sung in oratorio. She married Ernest Gye, the impresario, in 1878. Consult H. S. Edwards, *The Prima Donna* (London, 1888). She published her memoirs under the title *Forty Years of Song* (London, 1911).

ALBANI, FRANCESCO (1578–1660). An Italian painter, one of the principal representatives of the Eclectic school of Bologna (q.v.). He was born at Bologna, where he studied first with Calvaert, a Netherlander, and then in the school of the Carracci (q.v.), chiefly under Agostino. To his earliest period belongs the cycle of frescoes in Palazzo Fava (1598) representing the "Life of Æneas," and the "Life of the Virgin" in the Palazzo dei Conservatori, Rome. About 1600 he removed to Rome and became an assistant to Annibale Carracci, whose influence gradually supplanted that of Agostino in his works. He took a prominent part in the former's frescoes in Palazzo Aldobrandini, Rome, and practically executed those representing the "Life of San Diego" in San Carlo degli Spagni, Rome, now in the museum of Barcelona. His other frescoes include the important ceiling of the Palazzo Torlonia, Rome, decorated with subjects from Ovid, those of the choir chapel of Santa Maria della Pace, Rome. His easel pictures of this period are hard to distinguish from Annibale's. By him are probably the "Ascension of the Virgin" and "John the Baptist," in Dorchester House, London; "Pan Teaching Apollo the Flute" and "Silenus" in the National Gallery, and perhaps the celebrated portrait called "Beatrice Cenci," attributed to Guido. After his return to Bologna in 1616, he married his second wife, Doralice, by whom he had 10 beautiful children, who are said to have served as models for the cupids of his pictures. Wealthy and popular, he led a happy life. His altar-pieces of the period are not important, the best being an "Annunciation" in San Bartolommeo, Bologna; but the smaller religious pictures are better in quality, particularly his "Holy Families" in Dresden, Louvre, etc. Best of all are his mythological subjects, to which he was by temperament adapted. Prominent among these are four circular panels of antique love subjects in Palazzo Borghese, Rome, often repeated in more or less independent versions. Best known of all his paintings are the "Dancing Cupids" in the Dresden Gallery, which also possesses 10 others; "Cupid Disarmed," "The Toilet of Venus," and 13 others are in the Louvre. The Museum of Turin is particularly rich in his mythological subjects. His last years were embittered by his fierce rivalry with his former friend and lifelong competitor, Guido Reni, and by the loss of his fortune through the mismanagement of his brother. At best his paintings are bright and delicate in color and elegant and graceful in form. The landscapes are particularly charming. His work, however, is unequal in quality, that of the last period being generally inferior. Consult the references under CARRACCI.

ALBANI, MATTHIAS. The name of two famous Tyrolese violin makers, father and son. The father was born in 1621 at Bozen. He was a pupil of Stainer. He died in 1673. The son studied with the masters of violin making at Cremona and afterward settled at Rome. The instruments he made between the years 1702 and 1709 are exceedingly valuable and are by some considered equal to those of Amati.

ALBANI, VILLA. The palace of the Albani family at Rome, containing a famous collection of antique works of art.

ALBANIA, ăl-bā′nĭ-ȧ; *Mod. Gk.* ăl′vȧ-nyē′ȧ (Turk. *Arnaut*). An independent principality in the western part of the Balkan Peninsula, extending along the Adriatic from Montenegro to Greece and separated from Servia mainly by the river Drin and Lake Ochrida. In a wider sense the name is applied to the whole region formerly embraced in the Turkish vilayets of Janina, Monastir, Scutari, and a part of Kossovo, but now annexed to Montenegro, Servia, or Greece (Map: Balkan Peninsula, C 4). It takes in ancient Illyria, most of Epirus, and parts of Macedonia, and covers an area estimated at from 12,000 to 22,000 square miles, according as the name is taken in a narrower or broader sense. It borders on Montenegro and the sanjak of Novibazar on the north, Macedonia on the east, Greece on the south, and the Adriatic Sea on the west. The entire country is traversed by numerous high mountain chains, alternating with long and narrow valleys, running from northwest to southeast. The elevated plateaus found among the mountain chains are mostly fruitful and well populated, and some of them inclose lakes. The rivers of Albania, of which the most important are the Boyana, Drin, Devol, and Voyussa, have an exceedingly tortuous course, on account of the mountainous character of the surface. The climate is healthful and moderate and the soil for the most part fertile. Grain and tobacco grow well, and the olive is cultivated extensively and widely exported. There are also shipments of fish and sea salt.

There is no actual coördinated government among the tribes occupying this large area, who are mostly Mohammedans, but all have been, in a loose way, subject to the rule of Turkey till the Balkan War of 1912. It was then the desire of Servia to annex the whole of this

State, or at least to secure the valuable port of Scutari (Albanian: Schodra), but the move in this direction was blocked by the European powers at the instance of Austria.

There is hardly such a thing as education in Albania, although in some parts there are a few schools and at Scutari is a Jesuit college. The sons of some of the leading families are sent abroad for education, and there appears now to be an awakening of the younger element to the importance of acquiring knowledge.

The population of Albania, within the broader limits given above, is probably not far from 2,000,000, of which some 250,000 are Serbs and Bulgars. Albania proper, or the region which is inhabited mainly by Albanians, has a much smaller population (less than 1,000,000). The Albanians, or Arnauts, who call themselves Shkipetars (Skipetars), are the descendants of the ancient Illyrians, and occupy a unique position among the Caucasian races. Only slightly civilized and very warlike, they keep the country in a constant state of turmoil. The differences in religion of the various tribes, their strong feeling of clanship, together with the warlike spirit of the people, afford ample opportunity for civil strife. In their form of government the Albanians still retain some of the patriarchal institutions. The Mohammedan religion is professed by most of them, while the Christians number 190,000, divided almost equally between Roman and Greek Catholics. There are nearly 200,000 Albanians in Greece, found chiefly in Attica, Megaris, and the islands of the Ægean; about 100,000 in southern Italy, and smaller groups in the Slavonic districts of southern Austria-Hungary. The turbulent tribes which inhabited the region in antiquity resisted all attempts at subjugation, and except during the reign of Pyrrhus of Epirus (296–272 B.C.) never acknowledged any supreme authority. In the Middle Ages the inhabitants displayed the same obstinacy in their resistance first to the Greek Empire, then to Serb and Bulgar invaders, and finally to the Turks. Their great leader, George Castriota, or Scanderbeg (1404–68), overwhelmed twenty-three Ottoman armies, some of them commanded by the Sultan in person, and though after the fall of Scutari, in 1478, the nominal authority of the Porte was acknowledged, the country at all times enjoyed a very large measure of freedom. The conversion of the majority to Mohammedanism in the sixteenth and seventeenth centuries at once distinguished them from the neighboring Serbs, Bulgars, and Greeks who remained Christian, and enabled them to play an important rôle in the history of the Ottoman Empire. From 1807 to 1822 Albania was practically independent under the rule of Ali Pasha (q.v.), the Lion of Janina. The feeling of inveterate hostility for the Greeks kept the Albanians from embracing their cause in the war of liberation. The Turkish Revolution of 1908 (see TURKEY) added impetus to the chronic disorders and insurrections which reached their climax in the revolt of the powerful Christian tribe of Malissori in 1911–12. This revolt, together with concurrent outrages in Macedonia, was one of the causes of the Balkan War of 1912–13 (q.v.), the outcome of which was such as to preclude the further exercise of Turkish dominion in that part of Europe. It had been hoped by the Balkan allies—Greece, Servia, Montenegro and Bulgaria—that they might partition Albania among themselves, but the persistent opposition to such a plan on the part of Austria-Hungary and Italy, both of which had important political and economic interests at stake, caused the European Powers to intervene and to erect a portion of Albania into an autonomous principality under their own protection. By a series of arrangements during 1912–13, the territory formerly embraced under the generic name of Albania was distributed as follows: Ipek and Jakova were awarded to Montenegro; Servia secured Prisrend, Dibra, and Monastir; Greece obtained Janina; while to the principality of Albania were guaranteed Scutari, Alessio, Durazzo, Avlona, and Koritza. In the course of the Balkan War two provisional governments were set up in Albania—a republican form at Valona under the presidency of Ismail Kemal Bey, and a monarchical form under Essad Pasha, an experienced soldier, who enlisted the support of the northern tribesmen. In October, 1913, an International Commission of Control, consisting of six members, chosen one each by Austria-Hungary, Italy, Russia, Great Britain, France, and Germany, was established at Valona. The Powers invited Prince William Frederick of Wied to assume the crown of the principality. Consult: H. Callan, "Albania and the Albanians," in *Scottish Geographical Magazine*, vol. xv (Edinburgh, 1899); P. Traeger, "Mittheilungen und Funde aus Albanien," in *Zeitschrift für Ethnologie*, vol. xxxii (Berlin, 1900); Durham, *High Albania* (London, 1909); Grothe, *Durch Albanien und Montenegro* (Munich, 1913).

ALBA'NIAN LAN'GUAGE. The Albanian forms one of the eight chief divisions of the Indo-Germanic languages (q.v.) and is a descendant of the ancient Illyrian, of which only a few words are preserved. On account of the large number of Greek loan-words in its vocabulary, the Albanian was formerly thought to belong to the Hellenic branch of dialects; but it is now known to be quite independent and to form a branch by itself, akin rather to the Slavic family than to the Greek group. Geographically, the language is not confined to Albania alone, but may be traced also in southern Italy and Sicily. Two main dialect-groups of the language may be distinguished. The northern class, called Gegish, is the more primitive, while the southern, or Toskish, is permeated with loan-words. Of all the languages of the Indo-Germanic group, Albanian has been the most changed in vocabulary by borrowed words, although it has preserved in the main its structure. The vocabulary of loan-words is chiefly Latin, augmented by Slavic and Greek accretions, and in Gegish especially, by numerous Turkish words. From the grammatical point of view, its main characteristic is the abundant use of auxiliaries. The verbs have eight conjugations, distinguished by their infinitives. If poor in intellectual terms, it abounds in physical terms. In point of literary culture Albanian is the most backward of all the Indo-Germanic languages, and it can scarcely be said to possess a literature. While it is rich in folk-songs, tales, and proverbs, only within a comparatively short time has any systematic endeavor been made to cultivate the literary potentialities of the people. In the Gegish dialects the alphabet usually employed is the Roman. Consult: G. Meyer, *Kurzgefasste albanesische Grammatik* (Leipzig, 1888); *Etymologisches Wörterbuch der albanesischen Sprache* (Strassburg, 1891); Pedersen, *Albanesische Texte* (Leipzig, 1895); Pek-

mezi, *Grammatik der albanesischen Sprache* (Wien, 1908); Johl, *Studien zur albanesischen Etymologie und Wortbildung* (Wien, 1911); Wiegand, *Albanesische Grammatik im Südgegischen Dialekt* (Leipzig, 1913); Lambertz and Pekmezi, *Lehr und Lesebuch des Albanischen* (Vienna, 1913).

ALBAN (ăl'băn) **MOUN'TAINS.** A group of volcanic mountains in Central Italy, 13 miles southeast of Rome, with several extinct craters, two of which are occupied by sombre Lake Albano and beautiful Lake Nemi (Map: Italy, G 6). The central crater terminates in Punta Faete and in Monte Cavo, 3145 feet above the sea, on which stood the temple of Jupiter Latiaris, where the sacrificial festival of the Feriæ Latinæ was celebrated annually. The scanty ruins of the temple disappeared about 1777, when Cardinal York, the last of the Stuarts, built on the spot a Passionist monastery. From here there is a splendid view of the sea, the Campagna, and the surrounding mountains. The beauty of the scenery and the agreeableness of the climate have made the Alban Mountains a favorite summer resort of the Romans from the most ancient times. Places that are worthy of a visit by the tourist are Frascati (q.v.), Albano, Grotta Ferrata, Marino, Castel Gandolfo (q.v.), and Rocca di Papa. The site of Alba Longa (q.v.), Rome's mother city, was on the east side of Lake Albano.

ALBANO LAZIALE, or **ALBANO,** ăl-bä'nō lät-syä'lā. A town of Italy, about 12 miles southeast of Rome, on the declivity of the lava walls which encompass Lake Albano (Map: Italy, G 6). It is the seat of a bishop and is surrounded by handsome mansions of the wealthier Romans. Pop. (of the commune), 1911, 8826. The town is celebrated for the beauty of its scenery and the purity of its air. It is on the opposite side of the lake from the site of Alba Longa and owed its origin to the villas of ancient Roman magnates, such as Pompey, Domitian, and Clodius, which are replaced in our own times by the villas of the princely families of the Barberini, Altieri, and others. There are a large convent, and a museum of antiquities from Alba Longa. An excellent wine is produced in the environs. Near the town, on the old Appian Way, are found the remains of an amphitheatre and ancient tombs. A notable modern structure is the viaduct passing over the deep valley between Albano and the town of Ariccia. It is 182 feet high, 988 feet long, and was erected by Bertolini during 1846–53. The Alban Lake (Lago di Albano or Lago di Castello), is formed in the basin of an extinct volcano, has a circumference of 6 miles, and a depth of about 560 feet. It abounds in fish and has an elevation of about 960 feet above sea level. Ancient writers say that, while the Romans were at war with the Veientes (398 B.C.), this lake rose to an extraordinary height in the heat of summer. Etruscan diviners declared that the conquest of Veii depended upon letting off the waters of the lake. Stimulated by this, the Romans, under the direction of the Etruscans, opened an emissary or tunnel through the lava wall on the northwest. In the execution of this work they acquired the art of mining, which they now applied to undermine the walls of Veii. The tunnel, which still remains, and still fulfills its ancient office, is more than a mile in length, with a height of 7 feet and a width of 4 feet. It is the only outlet for the waters of the lake. On the eastern bank of the lake rises Monte Albano, or Monte Cavo, the ancient Albanus Mons, about 3100 feet high, which commands an extensive and magnificent view. Upon its summit once stood the magnificent temple of Jupiter Latiaris, which was approached by a paved way, for the ascent of the solemn processions of the Latin confederation (*Feriæ Latinæ*) and for the ovations of Roman generals. The road remains, in great part, perfect to this day. The Albano stone, called peperino, was much used in Roman buildings. It is a kind of volcanic tufa, of an ash-color, and is still quarried extensively at Albano.

ALBANS, ôl'bănz, SAINT. See SAINT ALBANS.

ALBA'NUS LACUS. See ALBA LONGA.

ALBANY, ăl'bă-nĭ. A seaport and municipality of Plantagenet Co., western Australia, on Princess Royal Harbor, an inlet of King George's Sound, 352 miles from Perth by rail (Map: Australia, D 6). The harbor is one of the finest in Australia and is well fortified. Albany is a port of call for all steamers to Australia taking the Cape route. Its equable climate has made it the health resort of the State. The United States has a resident consular agent. Pop., 1911, 3586.

ALBANY. A city and the county-seat of Dougherty Co., Ga., 107 miles south by west of Macon, on the Central of Georgia, the Atlantic Coast Line, the Seaboard Air Line, the Georgia Southwestern and Gulf, the Georgia Northern, and the Albany and Northern railroads, and on the Flint River, at the head of high-water navigation (Map: Georgia, B 4). It is in an agricultural region and controls large commercial interests, particularly in cotton, cottonseed oil, bricks, fertilizers, lumber, melons, pecans, etc. The city has paved streets, an electric car line, is the home of the Georgia Chautauqua and is noted for numerous artesian wells, which are the exclusive source of the water supply. Settled in 1836, Albany was incorporated two years later. The government, under a charter of 1899, is administered by a mayor, elected biennially, and a council, whose consent is required for all appointments of administrative officials made by the mayor. The water works, gas plant, and electric light plant are the property of the municipality. It also has a public library, a Federal building, court-house costing $125,000, a hospital, and a Confederate monument. Pop., 1900, 4606; 1910, 8190; 1913 (est.), 12,000; 1920, 11,555.

ALBANY. A city and the county-seat of Gentry Co., Mo., 50 miles northeast of St. Joseph, on a branch of the Chicago, Burlington, and Quincy Railroad, with motor-bus connection with the St. Louis and Omaha (Map: Missouri, B 1). The city has fine residences, is surrounded by rich farming country, and has some commercial and industrial interests. It is best known, however, as the seat of Palmer College, which was recently removed from Le Grand, Iowa, and replaces the Northwest Missouri College. It also has a Carnegie library. Albany is governed, under a charter of 1897, by a mayor, who is elected for two years, and a city council. The water works and electric light plant are owned and operated by the municipality. Pop., 1890, 1334; 1900, 2025; 1910, 1922.

ALBANY. Capital of New York State, the county-seat of Albany County, and an important railroad and commercial city. It is on the west bank of the Hudson River, nearly 6 miles below the head of navigation, 145 miles north of New

York City, and about 200 miles west of Boston (Map: New York, G 3).

A narrow alluvial plain extends along the river, and from this the ground rises sharply to a sandy plateau about 200 feet above tide level, with valleys separating the four ridges into which the slope is divided. The principal streets are Broadway, North and South Pearl streets, which run parallel to the river, and State Street, which runs westward, ascending the face of the hill at a very steep grade. The most striking feature as well as the most important edifice in Albany is the Capitol, which is built of Maine granite, in the Renaissance style. Since its corner-stone was laid, in 1871, it has cost over $24,000,000. The edifice has been built with the advantage of large ideas and limitless resources, and the disadvantages of a succession of architects with changing views; these circumstances have left their imprint on the structure. But when all has been said in criticism of details, the general plan, and unused possibilities, it must be ranked among the great buildings of the country. Within are rooms for the Assembly, Senate, Court of Appeals, the Governor, and other State officials. Many relics of the Revolution and Civil War are kept in a military museum on the second floor. Facing the Capitol are the State Hall, and the city hall, of reddish granite, with Romanesque doorways and majestic campaniles, while opposite the Capitol, on Washington Avenue, stands the new State Education Building, a notable structure of four stories and basement with imposing marble colonnade, which, besides offices for the Board of Regents and the Department of Education, contains the State Library and the State Museum. The Federal Building, containing the custom house and post-office, is at the foot of State Street, and on the same street, about a block below the Capitol, is the building known as Geological and Agricultural Hall, which formerly housed the State Museum of Natural History, but which since the transfer of that museum to the State Education Building is used exclusively by the State Department of Agriculture. In the residence districts the most important architectural features are the churches, four of which have more than a local interest: the North Dutch Church, St. Peter's Church, "one of the richest specimens of French Gothic in this country," the cathedral of All Saints, and the cathedral of the Immaculate Conception, with lofty double spires and a spacious interior treated with taste and dignity.

Other important buildings are the Union Station, the Hotel Ten Eyck, the Albany Academy, the new High School, the Albany Institute and Historical and Art Society, the Homœopathic Hospital, Harmanus Bleecker Hall, and the State Armory. The third Van Rensselaer manor house, built in 1765, was removed in 1893 to the campus of Williams College at Williamstown, Mass. The old Schuyler mansion, for many years used as an orphan asylum by the Sisters of Charity, was recently purchased by the State and will be used as a museum. Albany is the seat of a State normal college, and contains the law and medical departments of Union University at Schenectady, and also Dudley Observatory, in the southwest corner of the city. Near the latter are the pavilions of the hospital, built in 1899, and of the orphan asylum, built in 1906; and in the same section is the county penitentiary, opened in 1848, which confines annually between 300 and 400 prisoners, the majority sentenced for short terms.

The city has 402 acres devoted to parks, the largest of which, Washington Park, in the western part of the city, contains a lake 1700 feet long, and two fine bronzes: Calverley's statue of "Robert Burns," and Rhind's statue of "Moses at the Rock of Horeb." In the beautiful Rural Cemetery about 4 miles north of the city is the tomb of President Arthur.

Trade and Transportation. Albany is a terminus of the Boston and Albany Railroad, and the division terminus on the main lines of the West Shore, the New York Central and Hudson River and the Delaware and Hudson railroads. It is thus at the intersection of the great thoroughfares of traffic and travel from Boston and New York to the west and the north. It also has direct steamboat communication by day and night lines with New York and Hudson River points, while by the Erie and the Champlain canals it has water routes to the interior of the State and the west and north. It still remains an important centre of passenger travel, but the great bulk of freight movement now passes the city in through shipments. Manufacturing interests in Albany have increased considerably. The most important industries now include iron, wood, and brass manufactures; printing and engraving; shirt, collar, and cuff manufactures; manufactures of clothing, caps, and knit goods; brewing; tobacco and cigar manufactures; and carriage and wagon building.

The city has about 41 miles of street railways, and electric lines connect also with towns some distance away. There are three bridges across the river to Rensselaer, two of which are used by the railroads and foot passengers, and the third is open for foot and wagon traffic. The water supply is furnished in part by a gravity supply, from a lake 5 miles distant; but a large proportion is pumped from the Hudson River, an improved filtration system having been adopted for the latter supply. There are about 100 miles of paved thoroughfares, some of which are laid with asphalt and brick and creosoted wooden blocks, though most of the important streets are paved with granite blocks and many still have cobblestone pavements.

Administration. As provided by legislative enactment for cities of the second class, the government is vested in a mayor, elected biennially; a city council, the president being elected at large and the aldermen by wards; and administrative departments constituted as follows: *Finance*—comptroller, treasurer, and a board of estimate composed of the mayor, comptroller, corporation counsel, president of the common council, city engineer, and treasurer; *Public Works*—commissioner, who appoints superintendents of water works and parks, city engineer; and a board of contract and supply, composed of the mayor, comptroller, commissioner of public works, corporation counsel, and city engineer; *Public Safety*—commissioner, who appoints chiefs of police and fire departments, with their subordinates, and a health officer and district health physicians; *Public Instruction*—three commissioners of education (term, six years), who appoint the superintendent of schools and teachers; *Assessment and Taxation*—four assessors, two elected every two years for a term of four years; *Charities and Correction*—commissioner, who appoints an overseer of the poor

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and assistants; *Judiciary*—one police court justice who holds office six years, and three city court justices; *Law*—corporation counsel, who appoints an assistant and subordinates. Of these officials, the comptroller, treasurer, assessors, and police and city court justices are elected; all others are appointed by the executive. A sealer of weights and measures is also appointed by the mayor, and supervisors are chosen by popular election.

The annual expenditures of the city amount to over $3,000,000, the principal items (for maintenance and operation) being about $187,000 for the police department, $198,000 for the fire department, $411,000 for schools, $400,000 for bureau of water, and $90,000 for street lighting.

Pop., 1870, 69,422; 1880, 90,758; 1890, 94,923; 1900, 94,151; 1910, 100,253, a gain of but 6.5 per cent in the decade 1900–10; 1920, 113,344.

History. Albany claims to be the second oldest permanent settlement within the limits of the 13 colonies, and has great historical significance on account of its strategic importance during the century of conflict between the English and French in America and in the American Revolution. As early as 1524 the French navigator Verrazano sailed up the Hudson River, and about 1540 a French trading post was set up near the present site of Albany. But this proved only temporary, and the continuous history of the place dates from the effective discovery of the region by Henry Hudson in 1609. Hudson's voyage was followed by Dutch traders, who, in 1614, established a trading station on Castle Island under the name of Fort Nassau. Three years later, the trading post was removed to the mainland. The first actual settlers, however, were 18 Walloon families, who were sent out by the Dutch West India Company in 1623. During the same year Fort Orange, or Aurania, was built, near the site of the present Steamboat Square. Three years later an Indian war broke up the settlement for a time, the families being removed to Manhattan and only a small garrison left in charge of the fort. In 1630 Kiliaen Van Rensselaer bought an extensive tract of land surrounding Fort Orange and sent over settlers from Holland, who rented their land from him as their patroon, or lord of the manor. (See PATROON.) The principal settlement of this patroonship or colony of Rensselaerswyck was located in the immediate vicinity of the company's fort and became the nucleus of the present city. The settlement remained a part of the patroon's colony until 1652, when, after much friction between the patroon's agents and the officials of the company, it was, by a high-handed measure of Director-General Stuyvesant, declared to be independent of Rensselaerswyck and annexed to Fort Orange. The settlement was originally known as the *Fuyck*, or hoop-net, from the converging lines of its streets; afterward it was called Beverwyck, and on the transfer of New Netherland to the English, in 1664, the name of the village was changed to Albany, in honor of the Duke of York and Albany, afterward James II. In 1686 Albany received a city charter from Governor Dongan, providing for an elected council and a mayor to be appointed by the Governor. The first Mayor, Peter Schuyler, continued to serve until 1694. The settlement continued to be inhabited mainly by the Dutch, but the increase in the English population is indicated by the erection of an English church in 1714.

As a frontier town open to Indian attacks, Albany was protected not only by the fort, but by a stockade surrounding the compactly built area. During the French and Indian wars the city was the storehouse for munitions of war, the rendezvous for the troops, and a place of safety for refugees and wounded soldiers. In 1754 there was held at Albany the first general Congress (see ALBANY CONVENTION) of all the colonies, at which plans of union were discussed.

Burgoyne's campaign in 1777 was directed against Albany, as the key to the situation in the north; but the battle of Saratoga preserved this strategic point to the patriots. During the next 20 years Albany was at times the headquarters of the State government; in 1797 it was made the permanent capital of the State, and the first State House was built a few years later.

In 1820 Albany had a population of only 12,630; but the Erie Canal opened a new field for commercial activity and brought a rapid development. By 1840 the population was 33,721, or nearly treble that of 20 years before; by 1860 it had reached 62,367, but since then the increase has been at a slower rate. In 1839 there began the "Anti-Rent War" (see ANTI-RENTISM), the result of an attempt by the Van Rensselaer heirs to collect the quit-rents on the old leases made in the pre-Revolutionary days. Albany has been visited by several disastrous fires, those in 1797 and 1848 being the most destructive. On March 29, 1911, fire destroyed the entire State Library of 500,000 volumes, which was located on the third, fourth, and fifth floors of the west side of the State Capitol. The lower part of the city has often been inundated by spring floods in the river. In 1886 the bicentennial of the incorporation of the city was celebrated with elaborate ceremonies; and on Jan. 6, 1897, the centennial of the selection of the city as the State capital was also commemorated. In 1894 the Delavan House, for 50 years the resort of politicians and eminent men, was burned. See A. J. Weise, *The History of the City of Albany* (Albany, 1884); J. Munsell, *The Annals of Albany* (10 vols., Albany, 1850–59), and *Collections on the City of Albany* (4 vols., Albany, 1865–71); G. R. Howell and J. Tenney, *Bi-centennial History of Albany. History of the County of Albany, N. Y., from 1609 to 1886* (bound with *History of the County of Schenectady*, New York, 1886); C. Reynolds, *Albany Chronicles* (Albany, 1906); and a sketch in L. P. Powell's *Historic Towns of the Middle States* (New York, 1899).

ALBANY. A city and the county-seat of Linn Co., Oreg., 80 miles southwest of Portland, on the Southern Pacific, the Oregon Electric, and the Corvallis and Eastern railroads, and on the Willamette River (Map: Oregon, B 3). It is the seat of Albany College (Presbyterian), opened in 1867, and has a Carnegie library, a hospital, an academy, and many churches. The river, crossed here by a fine steel bridge, furnishes good water power. There are chair, sash, and door factories, sawmills, flouring mills, railroad machine shops, a prune-packing establishment, etc. Flour, grain, lumber, fruit, and sandstone are exported. The surrounding country is rich in timber. Albany was settled about 1850 and was incorporated in 1864. Pop., 1900, 3149; 1910, 4275; 1913 (est. including suburbs), 7500.

ALBANY. A river rising in Lake St. Joseph, in the province of Ontario, Canada. It

flows northeast for a distance of about 400 miles, forming part of the boundary between Ontario and the territory of Keewatin. It is navigable as far as Martin's Falls and empties into James Bay at Fort Albany.

ALBANY, or **AL'BAINN.** An ancient name for Scotland, retained in poetical usage down to our own day. Connected with it is the term "Albiones" applied to the inhabitants of the entire British Islands in Festus Avienus's account of the voyage of Hamilcar, the Carthaginian, in the fifth century B.C.; also the term "Albion" (q.v.), which appears as the name of the islands in Aristotle's *Treatise of the World.* It may be that Albion, or Albany, was the original name of Britain among its Celtic population, and that it only became restricted to the provinces of Scotland north of the firths of Clyde and Forth when the Celts had for the most part become confined to the same region. The modern use of the name "Albany" may be said to have taken its rise in an act of a Scottish council, held at Scone, in June, 1398, when the title of Duke of Albany was conferred on the brother of King Robert III, then acting as regent of the kingdom. The title, being forfeited in the grandson of the first holder, was afterward conferred on Alexander, second son of King James II, in the person of whose son, John, it became extinct in 1536. Subsequently it was conferred on Lord Darnley, and after him on a number of princes of the royal family. Prince Charles Stuart assumed the appellation of Count of Albany as an incognito title and gave the title of Duchess of Albany to his legitimated daughter. The title was restored in 1881 and conferred upon Prince Leopold, and after his death upon his son, who later became Duke of Saxe-Coburg.

ALBANY CONVENTION OF 1754. In 1754, when hostilities were about to begin between the French and English in America, the lords of trade recommended that an intercolonial convention be called to "confirm and establish the ancient friendship of the Five Nations" and consider plans for a permanent union among the colonies. On June 19 commissioners from Massachusetts, Connecticut, New Hampshire, Rhode Island, Pennsylvania, Maryland, and New York assembled at Albany, and, after arranging for the participation of the Indians in the war, adopted, with some modifications (July 11), a plan of intercolonial union proposed by Franklin. This plan provided for the appointment by the crown of a president-general, who was to nominate military officers, commission all officers, and have veto power over the acts of the Grand Council; and for a Grand Council, to be made up of representatives chosen by the legislature of each colony every three years, no colony to have more than seven members nor less than two. This council was not to be prorogued, dissolved, or kept in session longer than six weeks against its consent, and, with the approval of the president-general, was to manage Indian affairs, authorize new settlements, nominate all civil officers, impose taxes, enlist and pay troops, and construct forts, all of its acts to be valid unless vetoed by the crown within three years. The plan was everywhere rejected—by the court and the royal governors, because it gave too much power to the colonies; by the colonies, because it gave too much power to the king. It is notable as being the first comprehensive scheme of union formally proposed to the various colonial governments in America. Consult *New York Colonial Documents*, vol. vi, and R. Frothingham, *Rise of the Republic* (Boston, 1872).

ALBANY, DUKE OF. See LEOPOLD, GEORGE DUNCAN ALBERT.

ALBANY, DUKE OF. In Shakespeare's *King Lear* (q.v.), the husband of Lear's daughter Goneril (q.v.).

ALBANY, LOUISA MARIA CAROLINE, also ALOYSIA, COUNTESS OF (1753–1824). She was the daughter of a minor German prince, and the wife of Charles Edward Stuart, the Young Pretender, to whom she was married for reasons of dynastic policy. Her husband, unable to win recognition of his royal title, called himself the Count of Albany, and he and his Countess led an unhappy and childless existence, wandering aimlessly from one Italian city to another. The Count drank heavily. His wife met Alfieri, the tragic poet of Italy. She fled from her husband, sought refuge with her brother-in-law, Cardinal Yorke, and incidentally saw much of Alfieri. On the death of her husband she and the poet lived openly together in Florence, their great love immortalized in literature by his world-famous pen. He died in 1803, and the grief-stricken widow commissioned the great sculptor Canova to carve his tombstone. The Countess, however, found solace in society. She became the friend of Madame de Staël and opened a brilliant salon in Florence, which, except for a brief period when she was forced to Paris by the jealousy of Napoleon, she maintained till her death. Among those who frequently visited her were Byron, Lord John Russell, Lamartine, Chateaubriand, and Cardinal Consalvi. She and Alfieri are buried together in the church of Santa Croce at Florence, between the tombs of Machiavelli and Michelangelo. Consult: Lee, *The Countess of Albany* (London, 1884); Cerro, *Vittorio Alfieri e la contessa d' Albany* (Torino, 1905); Vaughan, *The Last Stuart Queen* (New York, 1911).

ALBANY RE'GENCY, THE. A name popularly given to a group of New York Democrats living at Albany, who, from 1820 to about 1850, controlled the nominating conventions and patronage of their party within the State and by dictating its general policy exerted a powerful influence in national as well as State politics. They derived their power largely from their great personal influence and remarkable political sagacity and were, for the most part, earnest opponents of political corruption, though they uniformly acted upon the principle, first formulated in 1833 by one of their number (Marcy), that "to the victors belong the spoils." Among those who at various times were members of this unofficial body were Martin Van Buren, William L. Marcy, Silas Wright, John A. Dix, Edwin Croswell, Benjamin F. Butler, A. C. Flagg, Dean Richmond, and Samuel A. Talcott, several of whom "graduated" from it into high offices under the national government. The Regency's loss of prestige dated from about 1848, when their opponents adopted methods similar to their own, and the Democratic party in the State split into irreconcilable factions. (See BARNBURNERS.) Consult Alexander, *A Political History of the State of New York* (2 vols., New York, 1906), and Morgan Dix, *Memoirs of John A. Dix* (New York, 1883).

ALBA POMPEI'A. A town of ancient Italy, in Liguria. See ALBA.

AL'BATEG'NIUS. See AL-BATTANI.

AL'BATROSS (corrupted from Portug. *alcatraz*, the pelican, from Ar. *al*, the + *câdous*, bucket, referring to its supposedly water-carrying pouch). A popular name for the large marine birds of the family Diomedeidæ, closely related to the petrels (q.v.). Albatrosses are among the most exclusively pelagic birds known. They occur on nearly all parts of the ocean, except the north Atlantic, and even there, owing to their extraordinary power of flight, they are

BEAK OF AN ALBATROSS

occasionally seen. Like the petrels, albatrosses have the hind toe, or hallux, reduced to a mere claw, or entirely wanting, while the other three toes are fully webbed. The nostrils also open at the ends of nearly cylindrical, horizontal tubes, a character upon which the order Tubinares is based. Albatrosses differ from petrels, however, not only in their great size, but also in having the nostril tubes placed one on each side of the bill, at its base, instead of close together on top. The bill of an albatross is a heavy and powerful structure, four inches long or more, and strongly hooked at the tip. The covering consists of several distinct plates of horn. The plumage of the body is very thick and compact and well adapted to withstand not only water but cold. Experiment has shown that an albatross can withstand a temperature far below freezing for weeks at a time, even when confined, so that active movement is impossible. The tail is comparatively short and more or less rounded, but the wings are exceedingly long and pointed. The great length of wing is largely due to the unusual length of the humerus and the radius and ulna. Owing to this great length of upper arm and forearm, the number of flight-feathers carried on the wing exceeds that of any other known bird, the number of secondaries being about 40. As might be supposed from their size, albatrosses are very voracious. Their food is all gathered from the surface of the sea, as they do not dive. Fishes, pelagic mollusks, and other floating animal matter, including the offal of vessels, compose the food of these birds, and they may be caught from a vessel with hook and line baited with salt pork. Their power of flight is very remarkable, and they occasionally follow vessels for days at a time. Because of this habit, and because they are almost the only visible inhabitants of the wastes of the southern oceans, sailors regard them with superstitious affection, and it is considered a forerunner of most serious misfortune to kill an albatross. This fact has passed into literature in Coleridge's *Rime of the Ancient Mariner*. The best modern description of the bird is in Froude's *Oceana*. Albatrosses seldom visit land, and then only remote antarctic and oceanic islands, to breed. Often no nest is made, but the single egg is dropped on the bare earth. The egg is large and white, and somewhat ellipsoidal in shape.

The number of forms of albatross is still doubtful, but it is probably about 17. Of these all but seven are placed in the genus *Diomedea*. The largest, and perhaps the best known, species is the wandering albatross (*Diomedea exulans*), which is found throughout the southern oceans and occasionally strays to Europe and possibly to Florida. The plumage of the adult is chiefly white, but the larger wing-coverts and part of the back are more or less barred with black. The young are dusky, lighter on the lower parts. This species is about 4 feet in length, and 10 to 14 feet in extent of wings. On the Pacific coast of North America occur four species, of which the short-tailed (*Diomedea albatrus*) and the black-footed (*Diomedea nigripes*) are fairly common. They are rather small for albatrosses, only 3 feet long and about 7 feet across the wings. Another species of about the same size, widely distributed over the Pacific Ocean, is the sooty albatross (*Phœbetria fuliginosa* or *palpebrata*), the only member of its genus. These three species are easily distinguished by their color: The short-tailed albatross is white, with dark wings and tail and flesh-colored feet; the black-footed is dark chocolate-brown, whitening on the head, and the feet are black; while the sooty albatross is uniform sooty-brown, with light-colored feet. The last species also has a wedge-shaped tail and a slender bill. The yellow-nosed albatross (*Diomedea chlororhyncha* or *Thalassogeron chlororhynchus*), so called from the color of the bill, is a well-known southern species. All these small forms are known to sailors as "mollymawks." See Plate of AUKS, ALBATROSSES, ETC.

AL-BATTA'NI, MOHAMMED IBN JABIR IBN SINAN, known as ALBATEGNIUS (so called from Batan in Mesopotamia) (c.850–929). An Arab chief, one of the most famous astronomers and mathematicians of his race. His first astronomical observations were made at Rakka (877–878) and extended over a period of more than 40 years. He also made several important contributions to pure mathematics. He used the sine of an angle in place of the chord of double the angle (an idea that had occurred to Aryabhatta), computed a table of cotangents, and formulated certain propositions in spherical trigonometry. His astronomical works were first made generally known to European scholars through a translation by Plato of Tivoli, under the title *Mahometis Albatenii de Motu* (or *Scientia*) *Stellarum*. This work has been edited in Arabic and Latin by C. A. Nallino (Milan, 1899). Al-Battani corrected numerous errors of Ptolemy, whom, in general, he followed; e.g., he gave the obliquity of the ecliptic as 23° 35′ instead of 23° 51′ 20″. He also gave the length of the tropical year as 365 days, 5 hours, 46 minutes, 24 seconds; too short by 2 minutes, 26 seconds, but an improvement upon that of Hipparchus, who gave 365¼ days − $\frac{1}{100}$ day, which was too short by 4 minutes, 48 seconds.

ALBAUGH, ăl'bô, JOHN W. (1837–1909). An American actor and manager. He was born Sept. 30, 1837, at Baltimore, where he made his first appearance as Brutus in a play called *Brutus, or the Fall of Tarquin* (1855), on a stage managed by Joseph Jefferson. Of his many subsequent impersonations, perhaps the best known was that of Louis XI, at what later became Daly's Theatre, in New York. After 1868 he was manager of theatres in St. Louis, New Orleans, and Albany, and for a number of years

in Washington and Baltimore, where he owned the new Lyceum. He retired from the stage in 1899. Much of his subsequent leisure years was devoted to his noted stock farm near Washington. Consult Clapp and Edgett, *Players of the Present*, Dunlap Society, publishers (New York, 1899).

ALBAY, äl-bī′. A province and a town of Luzon, one of the Philippine Islands. The province takes in the southeast end of the island and contains an area of 997 square miles and a population (1903) of 240,326 (Map: Philippine Islands, H 6). The surface is rugged, bears traces of volcanic origin, and the province has several extinct volcanoes and the active volcano of Mount Mayon, 8504 feet high. It is well watered and has good roads. A considerable part is covered by thick forests, full of good timber and game. The province contributes about one-fourth of the total hemp export of the Philippines. The production of oil from the cocoanut, the manufacture of boats, and the mining of coal are among the other industries. Gold and silver are found in small quantities. The chief city is situated near the eastern coast, on the Bay of Albay. It has a good harbor and is the seat of a considerable trade. Pop., 1903, 14,049.

ALBE′DO (Lat. whiteness). In astronomy, the reflecting power of a planet's surface. The quantity of reflected solar light received by us from any given planet depends, of course, on the character of that planet's surface. If it were like polished silver, for instance, the albedo would be very high; much higher, indeed, than the power actually possessed by the surface of any known planet. Astronomers designate the albedo of any planet by means of a fraction indicating the ratio of light reflected to the total quantity of light received. Thus the moon's average albedo is 0.17, which means that about one-sixth of the light received by the moon from the sun is again reflected. According to Müller, who made extended observations on the light of the planets at Potsdam from 1885 to 1893, the albedo of Mercury is 0.17; of Venus, 0.91; of Mars, 0.27; of Jupiter, 0.74; of Saturn, 0.87; of Uranus, 0.72; and of Neptune, 0.63.

ALBEE, Ernest (1865—). An American scholar and educator, born in Langdon, N. H. He graduated from the University of Vermont in 1887 and after post-graduate courses at Clark and Cornell universities, received the degree of Ph.D. from the latter in 1894. In 1892 he was appointed instructor; in 1902 assistant professor; and in 1907 professor of philosophy in Cornell University. From 1903 to 1908 he was editor of *The Philosophical Review*. He wrote *A History of English Utilitarianism* (1902) and many articles on philosophical subjects.

ALBEMARLE, first Duke of. See Monk or Monck, George.

AL′BEMARLE, The. A Confederate ram, which, after doing great damage to the Federal shipping, was blown up and completely destroyed on the night of Oct. 27, 1864, by W. B. Cushing. See Cushing, W. B.

ALBEMARLE, or **ISABELA, ISLAND.** The largest of the Galapagos Islands (q.v.), lying between lat. 0° 15′ N. and 1° 5′ S., and long. 90° 50′ W. and 91° 45′ W. It is of volcanic origin and irregular in form, its greatest length about 90 miles and its greatest breadth about 50. The surface, which covers an area of 1650 square miles, is elevated, reaching an altitude of 4700 feet. Albemarle Point is the northernmost extremity of the island.

ALBEMARLE SOUND. An inlet in the coast of North Carolina, nearly 60 miles long and 4 to 15 miles wide, separated from the ocean by an island and not appreciably affected by the tides (Map: North Carolina, F 1). It receives the Roanoke, Chowan, Perquimaus, Little, and Pasquotauk rivers, and is connected with Currituck and Croatan sounds, the latter of which flows into Pamlico Sound. It is about 12 miles in length, and its greatest depth is 18 feet. It is so shallow in some places that it is of little value for navigation.

ALBENGA, äl-beŋ′gä. A seaport and episcopal see of Liguria, Italy, 52 miles by rail southwest of Genoa and on the Gulf of Genoa. The sea-coast line has receded, and its harbor has disappeared. This town is the site of the Roman Albingaunum, which was the chief town of the Ingauni. Many ruins are visible in the vicinity, the most important of which are the old town walls and a bridge. The modern town is reputed to be the quaintest on the Riviera and contains a Gothic cathedral, the châteaux of Italian nobles, the chapel of Santa Maria, and an interesting leaning tower. Pop., 1901, 6250; 1911, 6882.

ALBENIZ, äl′bā-nēth′, Isaac (1860–1909). A Spanish pianist and composer. He was born at Camprodon. His musical precocity almost equaled that of Mozart, so that at the age of six he was accepted as a pupil by Marmontel. After two years of study his father took him on concert tours through Europe and America, but soon realized the necessity of further serious study. The boy then took the regular course at the conservatory at Brussels, where he continued the piano under Brassin and studied composition under Dupont and Gevaert. This course he supplemented further by instruction from Jadassohn, Reinecke, and Liszt. As a concert pianist he soon made a great reputation and was appointed court pianist to the King of Spain. He wrote an oratorio *Cristo*, many zarzuelas (q.v.), and the operas *The Magic Opal* (1893), *Enrico Clifford* (1895), *Pepita Jimenez* (1896). The number of his compositions for piano is over 200. In his latest works he shows to a marked degree the influence of Debussy.

ALBER, äl′bĕr, Matthäus (1495–1570). A German theologian, one of the promoters of the Reformation. He was born at Reutlingen, near Stuttgart, was educated at Tübingen, and in 1521 returned to preach in Reutlingen, where he introduced the Reformation. He rejected Latin and used the native tongue in church services, put out the images, and took a wife. He was summoned before the imperial chambers and charged with nearly 70 distinct heresies, to all of which, save that of speaking disrespectfully of the mother of Christ, he confessed guilty. He was tried, but set free without punishment. Alber was a friend and ally of Luther. He has been called, indeed, the "Luther of Swabia," because of the great part he played in that country. Some of his sermons, a catechism, and a work on *Providence* have been published. For his life consult J. Hartmann (Tübingen, 1863).

ALBERDINGK THIJM, äl′bĕr-dĭŋk tīm, Josephus Albertus (1820–89). A Dutch author, born at Amsterdam. In 1876 he was appointed professor of æsthetics in the Art Academy at Amsterdam. From 1852 he edited the *Volksalmanak voor Nederlandsche Katholicken*, and

from 1855 *De Dietsche Warande*, devoted to the art and literature of the Middle Ages. He published newspaper criticisms, *Drie Gedichten* (1844), *De Klok van Delft* (1846), *Palet en Harp* (1849), *Verspreide Verhalen in Proza* (3 vols., 1879–83), and other volumes. His prose fiction is considered his best work. A five-volume edition of his writings was printed in Amsterdam (1909). Consult the biography by Van der Duys (Amsterdam, 1889); also, a biography based on Alberdingk's letters, by his daughter (Amsterdam, 1896).

ALBERIC I, ăl'bĕr-ĭk (died 925). An adventurer, of Lombard extraction, who appeared in Rome in 889. He soon joined his fortunes with those of Berengar (q.v.), became Margrave of Camerino, and later Duke of Spoleto. He married Marozia (q.v.) before 915, and in 916 joined John X in expelling the Saracens, who had terrorized Italy for more than 30 years. For his services he was probably made "Consul of the Romans." Nothing definite is known of his later years; but he is said to have ruled Rome despotically for a time, to have been driven from the city, to have summoned the Hungarians to his aid, and to have been slain by the Romans about 925.

ALBERIC II (?–954). The son of Alberic I and Marozia. In 932 he led the Romans in a successful attempt to achieve their independence of Hugo, King of Italy, and was elected "prince and senator of all the Romans." Until his death, in 954, he ruled the city absolutely, but wisely and moderately. He was succeeded by his son Octavian, who became Pope, as John XII, in 955.

ALBERONI, ăl'bâ-rō'nê, GIULIO, CARDINAL (1664–1752). An Italian prelate, minister of Philip V of Spain. He was the son of a poor vine-dresser and was born at Firenzuola, in Parma. From a chorister in a church at Piacenza, he quickly rose, through his abilities, to the dignity of chaplain and favorite of Count Roncovieri, Bishop of San Donino. After some diplomatic service in Italy and a visit to Paris, he was sent by the Duke of Parma as chargé d'affaires to Madrid, where he speedily gained the favor of Philip V. He brought about the King's marriage to Elizabeth Farnese, overthrew the powerful Countess Orsini, and rapidly became Grandee, Cardinal, and Prime Minister (1717). Into the languid body of moribund Spain he infused new energy, invigorated her government, revived her commerce and her manufactures, reconstructed her army, rebuilt her fleet. But Alberoni was ambitious, and in order to gratify the covetous desires of Elizabeth Farnese, he suddenly invaded Sardinia, in violation of the Peace of Utrecht, cherishing the hope of reëstablishing the monarchy of Charles V and Philip II, and startling Europe by his insolent audacity. The regent of France broke off his alliance with Spain and united himself with England and Austria. Alberoni was not dismayed. Even when the Spanish fleet in the Mediterranean was destroyed by an English one, he contemplated an extensive war by land, in which all the European powers were to have been entangled. He patronized the Pretender, to annoy England, and the French Protestants, to annoy France. He sought to unite Peter the Great and Charles XII with him, to plunge Austria into a war with the Turks, and to stir up an insurrection in Hungary; and, through his influence with one of the parties at the French court, he actually accomplished the arrest of the regent himself (the Duke of Orleans). But so universal became the complaints against Alberoni that Philip lost courage, and made peace, agreeing to the dismissal of the Cardinal. In 1719 Alberoni received a command to quit Madrid within eight days and the kingdom within three weeks. Exposed to the vengeance of every power whose hatred he had drawn upon himself, he knew no land where he could remain. Not even to Rome could he venture, for Clement XI was more bitterly inimical to him than was any secular potentate. He wandered about in disguise and under fictitious names. At length he was imprisoned in the Genoese territory, through the solicitation of the Pope and the Spanish monarch; but he speedily recovered his liberty, and two years after the death of Clement, was reinstated by Innocent XIII in all the rights and dignities of a Cardinal. In 1740 he retired to Piacenza, where he died 12 years after, at the age of 88. He bequeathed his possessions in Lombardy to Philip V, while his cousin and heir, Cesare Alberoni, became possessor of 1,000,000 ducats. Consult: Rousset, *Histoire du Cardinal Alberoni* (The Hague, 1719; Eng. trans., London, 1719); Bourgeois, *La Jeunesse d'Alberoni* (Paris, 1900); and "Cardinal Alberoni: An Italian Precursor of Pacifism," in *American Journal of International Law*, vol. vii (New York, 1913).

ALBERS, ăl'bĕrs, JOHANN FRIEDRICH HERMANN (1805–67). A German physician, professor of pathology at Bonn. He established there an asylum for the treatment of insanity and nervous diseases, and in 1856 he was director of the pharmacological cabinet. His atlas of pathological anatomy (1832–62) and books on various branches of medical science were regarded as standard works and are still useful and interesting.

ALBERT, ăl'bĕrt; *Ger. pron.* ăl'bĕrt. In Goethe's *Sorrows of Werther* (q.v.), the husband of Lotte, with whom Werther is in love. The character is said to have been taken from that of Goethe's friend Kestner.

ALBERT, Ger. **ALBRECHT,** ăl'brĕkt. The name borne by five archdukes of Austria, of whom two (I and V) were also emperors of Germany.—ALBERT I, Archduke of Austria and Emperor of Germany, was the eldest son of Rudolph of Hapsburg and was born c.1250. Rudolph, before his death, endeavored to have Albert appointed as his successor in the Empire; but the Electors, already aware of the tyranny of Albert, refused to comply. After the old King's death Austria and Styria revolted; but Albert, having vigorously crushed the rebellion, turned his attention toward the Empire. The Archbishop of Mainz, an instrument of the Pope, secured the privilege of appointing the imperial candidate and named his cousin, Adolphus of Nassau, in 1292. Albert took the oath of allegiance and quietly awaited developments. In 1298 Adolphus, who had disgusted his subjects, was deposed, and Albert was elected. He was obliged to fight for the new honor and met his rival in a battle near Worms, in which Adolphus was defeated and slain. Albert was crowned at Aix-la-Chapelle in August, 1298; but Pope Boniface VIII denied the right of the princes to elect Albert and refused to recognize him. Albert, however, made an alliance with Philip the Fair of France and, securing the neutrality of Saxony and Brandenburg, invaded the Electorate of Mainz and forced the Archbishop to make an

alliance with him, thus securing a former ally of the Pope. Boniface was alarmed by his success and entered into negotiations with him. As a result, Albert broke his alliance with Philip, recognized the supremacy of the Pope, and promised to defend the rights of the Roman court whenever called upon. Boniface then excommunicated Philip, and offered the throne to Albert in 1303; but Philip soon retaliated by getting the Papacy under the power of the French crown. After this Albert fought unsuccessfully against Holland, Zealand, Friesland, Hungary, and Thuringia. In January, 1308, news arrived of a rebellion among the Swiss in Unterwalden, Schwyz, and Uri, and the Emperor seized this pretext to subjugate the country. An act of injustice, however, occasioned a crime which put an end to his life. His nephew, Duke John, claimed Swabia as his rightful inheritance, but had urged his claims in vain. When Albert was departing for Switzerland, John renewed his demands, but was refused, and so he resolved to be revenged. He conspired against his uncle's life and assassinated him on the road to Rheinfelden, while separated from his followers by the river Reuss. The Emperor expired, May 1, 1308, in the arms of a beggar woman. Albert left six sons and five daughters, the children of his marriage with Elizabeth, daughter of the Count of Tyrol. The story of William Tell is connected with Albert I. See Mücke, *Albrecht I von Habsburg* (Gotha, 1866). ALBERT V (as German king, Albert II) was born in 1397 and inherited the duchy of Austria while still a child. After receiving what was for the times an excellent education, he assumed direct control of the government in 1411. In 1422 he married the daughter of the Emperor Sigismund, and on the death of the latter, in 1437, succeeded, by election, to the crowns of Hungary and Bohemia. In March, 1438, he was elected King of Germany. Wars with the Turks and disorders in Bohemia and Hungary disturbed his short reign. He died Oct. 27, 1439. See Altmann, *Die Wahl Albrecht II zum römischen Könige* (Berlin, 1886).

ALBERT (?–1412). Duke of Mecklenburg and King of Sweden, a son of Duke Albert I of Mecklenburg. Within a year after he was proclaimed King of Sweden (1364) he was compelled to fight against his uncle, Magnus II, whom he defeated and captured at the battle of Enköping. Hakon of Norway, a son of the latter, who had also disputed the right of succession, fled after the battle, but was compelled to sign a treaty of peace in which he renounced all claims to the throne. The victory, however, was bought at the price of great concessions to the Royal Council, and Albert could find no support among the people, who were heavily burdened with taxes. Consequently an attempt to restore his power failed, and Margaret, widow of King Hakon of Norway, was invited to the throne. Albert was defeated and captured at the battle of Falköping (Feb. 24, 1389), and was not liberated until 1395, when he formally resigned all rights to the crown, and retired to Mecklenburg, which, as Duke Albert II, he ruled until his death. See MARGARET (1353–1412).

ALBERT (1490–1568). The last Grand Master of the Teutonic Order and first Duke of Prussia. He was the son of the Margrave Frederic of Ansbach, who wished him to enter the Church. He was educated under the care of Archbishop Hermann, of Cologne, where he became a canon. He did not, however, neglect knightly exercises. He accompanied the Emperor Maximilian I in his expedition against Venice and was present at the siege of Pavia. In 1511, when scarcely 21 years old, he was chosen Grand Master of the Teutonic Order, the knights expecting their feudal allegiance to Poland to be abolished on account of his near relationship to Sigismund, the monarch of that country, while they also hoped for protection against the Poles from his friends in Germany. He was consecrated at Mergentheim with his father's consent. In 1512 he removed to Königsberg, having been acknowledged by Poland likewise; but, refusing to take the oath of allegiance, he was plunged into a war with Sigismund in 1520. The year after, a four years' truce was agreed to at Thorn. Albert next made his appearance at the Imperial Diet at Nuremberg as a German prince of the Empire, to induce the other princes to assist him against the Poles. But Germany could at that time grant no assistance to any one. Disappointed in his hopes, Albert threw himself into the cause of the Reformation, which had rapidly spread into Prussia and broken the last strength of the declining order, whose possessions now appeared a certain prey to Poland. He still hoped to preserve these by acting upon Luther's advice to declare himself secular Duke of Prussia and place his land under the sovereignty of Sigismund. This was done with great pomp at Cracow in April, 1525, the duchy being secured to him and his descendants. During the remainder of his life Albert zealously sought to further the welfare of his duchy. He regulated the administration of all affairs, both secular and ecclesiastical, established the ducal library, founded in 1544 the University of Königsberg, gathered many literary men around him, and caused their works to be printed. In 1527 he married Dorothea, daughter of Frederick, King of Denmark. Albert earnestly desired peace, but found himself entangled in conflicts with the nobles and in theological disputes, which, along with other troubles of a more personal character, saddened the close of his life. Consult Lohmeyer, *Herzog Albrecht von Preussen* (Dantzic, 1890); and for the part played by Albert in the Reformation, Tschakert, *Herzog Albrecht von Preussen* (Halle, 1894).

ALBERT (1559–1621). Archduke of Austria. He was the sixth son of the Emperor Maximilian II. He was brought up at the Spanish court and dedicated himself to the Church. In 1577 he was made Cardinal, in 1584 Archbishop of Toledo, and during the years 1594–96 held the office of Viceroy of Portugal. He was next appointed Stadtholder of the Netherlands. In 1598 he resigned his ecclesiastical offices and left the Church, and married the Infanta Isabella, receiving with her the Netherlands and Franche Comté. Had it been possible to regain by any means Spain's rebellious provinces, Albert's mild character and conciliatory policy might have done so. As it was, he became engaged in constant warfare prosecuted with little success and marked by bitter feeling on both sides. Later in life he became fanatic, priest-ridden, and in a measure incapable of efficient rule. (Consult Dubois, *Histoire d'Albert et d'Isabelle* (Brussels, 1847), and Schmolke, *Albert und Isabella* (Berlin, 1878).)

ALBERT (1490–1545). Archbishop of Magdeburg and Elector of Mainz, generally called Albert of Brandenburg. He was the younger son

of the Elector John Cicero of Brandenburg, and was born in Brandenburg, June 20, 1490. In 1513 he became Archbishop of Magdeburg, and also administrator of the bishopric of Halberstadt, and in the next year Archbishop and Elector of Mainz. He was put in charge of the preaching, within a certain district, of the jubilee indulgence granted by Leo X, on the condition that one-half the proceeds was to be sent to Rome. He appointed the Dominican Tetzel subcommissioner in the work, whose preaching gave occasion to Luther to post up his well-known 95 theses. He was made a Cardinal in 1518. Even in the Archbishop's own diocese the reformer's doctrines found not a few adherents, so that Albert was compelled at the Imperial Diet at Augsburg (1530) to act the part of peacemaker. When he joined the holy alliance against the League of Schmalkalden, Luther made a fierce attack on him in writing. He was the first of all the German princes who received the Jesuits into his dominions. In 1541 he granted religious liberty to his subjects, under the condition that they should pay his debts, amounting to 500,000 florins. He died at Mainz, Sept. 24, 1545. For his life consult J. May (Munich, 1865–75), and Redlich, *Albert und das Neue Stift zu Halle* (Mainz, 1900).

ALBERT, called ACHILLES (1414–86). Elector of Brandenburg, third son of Friedrich I and Elizabeth of Bavaria. He was born at Tangermünde and after the death of his father, in 1440, succeeded to the margraviate of Ansbach, where, together with several other feudal lords, he soon came into conflict with the inhabitants of the cities of South Germany, which were united against him. In 1449 he attacked Nuremberg, but was defeated at Pillenreut and compelled to effect a permanent compromise (1453). By the death of his brother John he succeeded to the margraviate of Bayreuth, and in 1470 his brother Friedrich II transferred to him the margraviate of Brandenburg and the electoral dignity. He was fond of display and amusements and was distinguished by an enlightenment far in advance of his age.

ALBERT, called ALCIBIADES (1522–57). A margrave of Brandenburg, who was born at Ansbach. Although reared in the Protestant faith, his military enthusiasm and love of power induced him to serve in the army of Charles V, and he fought in the campaign against France in 1543. Afterward he conspired against the Emperor with Maurice of Saxony and several other princes, and was personally instrumental in arranging the Treaty of Chambord with Henry II of France (Jan. 15, 1552). In consequence of differences with his confederates, he subsequently again embraced the cause of Charles, who ratified his territorial claims. In an endeavor to carry these into effect, however, Albert was twice defeated (July 9 and Sept. 12, 1553). He was soon afterward outlawed by the Emperor and fled to France (1554). He died in 1557, shortly after his return to Germany.

ALBERT, ål'bâr', ALEXANDRE MARTIN (1815–95). One of the leading members of the provisional government of France after the revolution of February, 1848. Though a poor mechanic, he took great interest in the political questions of his time and participated in the revolutions of 1830 and 1848. While keeping at his trade, he edited a workingman's paper, started in 1840, called *L'Atelier*. He was summoned by Louis Blanc from his shop, where he was making buttons, to the presidency of the committees on the national workshops and national rewards, but presently resigned and entered the Assembly. For his participation in the attempt of May 15, 1848, to overthrow the government, he was condemned to imprisonment for life, but was pardoned in 1859 by Louis Napoleon. During the commune (1871) Albert played a part of some prominence, but from that time to his death he gradually lost both influence and prestige. He was known in French politics as *L'ouvrier Albert*.

ALBERT, ăl'bĕrt, ARISTIDES ELPHONSO PETER (1853—). A pastor of the Methodist Episcopal Church, South, and also a practicing physician and surgeon. His father was a Frenchman, his mother a slave, and he was born in St. Charles parish, Louisiana. Freed by the war, he removed with his mother to New Orleans. He graduated in arts and theology at Straight University, New Orleans, and in medicine at New Orleans University (1892). After holding various appointments in the Methodist Episcopal Church, South, including that of editor-in-chief of the *Southwestern Christian Advocate* (five years) and the presidency of Gilbert College, Baldwin, La. (1896–1900), he became pastor of Wesley Chapel, New Orleans (1900–02). He represented his conference in the Ecumenical Conference in London in 1901.

ALBERT, called THE BOLD (1443–1500). Duke of Saxony, founder of the Albertine line. He was a younger son of the Elector Frederick, called "the Gentle." From 1464 he reigned conjointly with his brother Ernest, who had been invested with the electoral dignity and gradually obtained such valuable accessions of territory in Thuringia and elsewhere that a separation into the Ernestine and Albertine branches became necessary. At the Reichstag held at Freiburg, in 1498, he was appointed "hereditary governor and potentate" of Friesland. A magnificent bronze monument was dedicated to him at Meissen in 1876.

ALBERT, COUNT OF BOLLSTÄDT (c.1193–1280). A German philosopher, usually called Albertus Magnus, and styled *Doctor Universalis*, who was distinguished for the extent of his acquirements and for his efforts to spread knowledge, especially of the works and doctrines of Aristotle. He was born at Lauingen, in Swabia, probably in 1193, but the date is disputed. After studying principally at Padua, he entered the order of the Dominican friars in 1223 and taught at Regensburg, Bologna, Strassburg, Freiburg, Hildesheim, and Cologne, where Thomas Aquinas became his pupil. He afterward repaired to Paris, where he expounded the doctrines of Aristotle. In 1254 he was appointed Provincial for his order in Germany and undertook the reform of the monasteries. Through his interest in their libraries he added to his already great sum of knowledge. He defended the mendicant orders against the attacks of the University of Paris, and, at the same council, discussed the errors of Averroës. In 1259 he was relieved by Pope Alexander IV of the task of Provincial, but only that he might take the bishopric of Ratisbon. But in 1262 he retired to a convent at Cologne to devote himself to literary pursuits. Here he composed a great number of works, especially commentaries on Aristotle. In 1270 he left Cologne to travel through Bavaria and France, preaching a crusade. In 1274 he attended a council at Lyons, and on the way back

defended publicly at Paris some of the works of his favorite pupil, Thomas Aquinas. He died Nov. 25, 1280, leaving his greatest work, the *Summa Theologiæ*, incomplete. The fullest edition of his works was prepared by Jammy (21 vols., Lyons, 1651), but it is uncritical and far from complete. Many of the writings attributed to him seem to be spurious. He was the greatest student of Aristotle which scholasticism had up to his time produced. He held an inclusive theory regarding the dispute of nominalism and realism; that universal ideas are prior to particulars, being original types in the Divine mind; are in things, since they are the common basis of the class of things; and after things, for our minds deduce them from particular things. He recognized the difference between natural and revealed religion and abandoned the idea of deducing special doctrines, like the Trinity, from reason. He held that all things in philosophy are true in theology, but that beyond the knowledge gained from philosophy is a realm where the mind must depend upon revelation. Revelation is above reason, but not contrary to reason. The extensive chemical and mechanical knowledge which Albert possessed, considering the age in which he lived, brought upon him the imputation of sorcery, and in German tradition he has a very ambiguous reputation. It is related, for instance, that in the winter of 1240 he gave a banquet at Cologne to William of Holland, King of the Romans, and that during the entertainment the wintry scene was suddenly transformed into one of summer bloom and beauty. This myth may rest on the fact that Albert had a greenhouse. The scholastics who followed Albert's opinions took the name of Albertists. His best-known works are *Summa Theologiæ* and *Summa de Creaturis*. For his life, consult Sighart (Regensburg, 1857; English translation by Dixon, London, 1876). For his philosophy, consult Erdman, *History of Philosophy*, vol. i (London, 1890).

ALBERT, Count of Geierstein, gī'ĕr-stīn. In Scott's novel, *Anne of Geierstein* (q.v.), the head of the "Secret Tribunal." At various times he appears in monkish disguise; later he slays Charles of Burgundy in battle.

ALBERT, äl'bĕrt; *Ger. pron.* äl'bĕrt, Eduard (1841–1900). An Austrian surgeon. He was born at Senftenberg, in Bohemia, and studied medicine at Vienna. In 1873 he was made professor of surgery at Innsbruck. From 1881 until his death he was clinical professor of surgery at Vienna. His published works include *Beiträge zur Operativen Chirurgie* (1878–80), *Diagnostik der Chirurgischen Krankheiten* (7th ed., 1896), and a text-book of surgery in four volumes, which has passed through several editions. Albert's original researches resulted in valuable contributions to surgical diagnosis, to operative surgery, and to other branches of medical knowledge.

AL'BERT, *Fr. pron.* ål'bâr', Eugen Francis Charles d' (1864—). A pianist and composer; born at Glasgow, April 10, 1864; the son of Charles d'Albert, a French musician and dancing-master, who was his first teacher. He studied in the National Training School, London, under Sir Arthur Sullivan, Prout, and Pauer, and in 1881 gained the Mendelssohn scholarship; under Hans Richter in Vienna and under Liszt in Weimar. In the same year he made his first appearance at a philharmonic concert in Vienna with brilliant success. He was soon made court pianist in Weimar, traveled in Europe, and came to America in 1892–93 and 1904–05. His interpretations of Bach and Beethoven have been generally deemed the most forceful heard in recent years. His mastery of technic, intellectual grasp, force, and fire place him among the most eminent pianists of the world. His compositions include two concertos for piano and orchestra, pianoforte music, a suite, symphony, two quartets for strings, several songs, and the operas *Der Rubin* (1893); *Ghismonda* (1895); *Gernot* (1897); *Die Abreise* (1898); *Kain* (1900); *Der Improvisator* (1900); *Im Tiefland* (1903); *Das Flötensolo* (1906); *Tragaldabas* (1907); *Izeyl* (1909); *Liebesketten* (1913). Of these operas *Im Tiefland* was given at the Metropolitan Opera House in New York (1908). His later compositions show distinct individuality. He has also made excellent transcriptions for piano of some of Bach's organ works. About the year 1907 complaints began to be heard that his technic had deteriorated. In spite of increasing adverse criticism he continued to appear as a performer until 1909. After three years' retirement he reappeared in 1912 on the concert platform, showing that he had fully regained his former faultless technic.

ALBERT, äl'bĕrt; *Ger. pron.* äl'bĕrt, Francis Charles Augustus Emanuel (1819–61). Prince of Saxe-Coburg-Gotha, and the husband of Queen Victoria of Great Britain. He is popularly known as Prince Albert and the Prince Consort. He was born at Rosenau Castle, near Coburg, Aug. 26, 1819, the second son of Ernest, Duke of Saxe-Coburg-Gotha, and his wife Louise, daughter of Augustus, Duke of Saxe-Gotha-Altenburg. In the Prince's sixth year his parents separated, and he never afterward saw his mother, who died in 1831. The Prince and his elder brother, under a private tutor, received a careful education, and after a year of study at Brussels he attended the University of Bonn, where, in addition to the sciences connected with statecraft, he devoted himself with ardor to the study of natural history and chemistry and displayed great taste for the fine arts, especially painting and music. Several compositions of his obtained publicity, and an opera, afterward performed in London, is said to have been composed by him. He was gifted with a handsome figure and obtained expertness in all manly exercises. He married the young Queen of Great Britain on Feb. 10, 1840. On his marriage Prince Albert received the title of Royal Highness, was naturalized as a subject of Great Britain, and obtained the rank of field-marshal, the knighthood of the Order of the Bath, and the command of a regiment of hussars. As the union proved in the highest degree a happy one, the Prince was loaded with honors and distinctions both by the Queen and the nation. The title of Consort of Her Most Gracious Majesty was formally conferred in 1842, and that of Prince Consort, in 1857, made him a prince of the United Kingdom. He was also made a member of the Privy Council, governor and constable of Windsor Castle, colonel of the Grenadier Guards, acting Grand Master of the Order of the Bath, Chancellor of the University of Cambridge, the standard of which he succeeded in raising considerably, and Master of the Trinity House. Notwithstanding his high and favored position as the Queen's trusted counselor, the Prince, with rare prudence and tact, abstained from meddling with State affairs, and thus escaped the jealousy and detraction of parties, gradually attaining, indeed, the widest popularity. When the Whig

ministry in 1840 proposed for him the income of £50,000, as consort of Queen Victoria, the Tories in conjunction with the Radicals, succeeded in limiting the sum to £30,000. This incident, which occurred before the marriage, appears to have been the only instance of any manifestation of party feeling with reference to the Prince. On the other hand, he opened for himself an influential sphere of action, in the encouragement and promotion of science and art, appearing as the patron of many useful associations and public undertakings. The Exhibition of 1851 owed its origin and the greater part of its success to the Prince. An incessant worker in the interests of his adopted country, his toil undermined his constitution, and he succumbed to an attack of typhoid fever, Dec. 14, 1861. His memory is perpetuated under the surname "Albert the Good." The last of his political acts, one of particular interest to the United States, was instrumental in preventing a war which threatened to arise out of the seizure of the Confederate envoys on the English steamer *Trent*. The draft of the ministerial ultimatum submitted to the Queen seemed to the Prince needlessly irritating. Weak then from the beginning of his last illness, he arose at seven the next morning (Dec. 1, 1861), and wrote and presented a memorandum of his objections to the Queen. His suggestions, adopted by Lord Russell, proved acceptable to President Lincoln. Consult: Martin, *Life* (London, 1875–80); Vitzhum, *Reminiscences* (Eng. trans., 1887); Grey, *The Early Years of His Royal Highness the Prince Consort* (New York, 1867); Bräuer, *Prinz Albert von England und Die Deutsche Einheitsfrage* (Leipzig, 1910); *Principal Speeches and Addresses of Prince Albert* (London, 1862); Wintle, *The Story of Albert the Good* (London, 1897); Stockmar, *Denkwürdigkeiten aus den Papieren des Freiherrn Christian Friedrich von Stockmar* (Brunswick, 1872), translated by G. A. M. under the title *Memoirs of Baron Stockmar* (London, 1873), and Jerrold, *The Married Life of Queen Victoria* (New York, 1913).

ALBERT, Frederick Augustus (1828–1902). King of Saxony, 1873–1902. He served in the first Schleswig-Holstein War, and after his father's accession in 1854 presided over the Council of State. In 1866 he commanded the Saxon army, coöperating with Austria against Prussia. On the entrance of Saxony into the North German Confederation, this force became the twelfth corps of the North German army, and with them the Prince won high honors at Gravelotte and Sedan, receiving the Prussian Iron Cross and the command of the newly formed fourth army, at the head of which he entered Paris with the Emperor and the German princess. He succeeded his father on the throne in 1873. He died June 19, 1902, and was succeeded by his brother Georg. Consult Dittrich, *König Albert und Prinz Georg von Sachsen* (Minden, 1896), and Harden, *Monarchs and Men* (New York, 1913).

ALBERT, Frederick Rudolph (1817–95), generally spoken of by English writers as the Archduke Albert. Archduke of Austria, son of Archduke Charles, grandson of Leopold II, and first cousin of the father of the reigning Emperor. He was distinguished in youth as a cavalry commander, doing good service in the battle of Novara in 1849. He was Governor of Hungary, 1851–60; in 1866 he commanded the Austrians in Venetia, and won the victory of Custozza, June 24; but Benedek's defeat at Sadowa, July 3, made his success nugatory. He became field-marshal in 1863 and inspector-general of the Austrian army in 1866. Albert married, May 1, 1844, Archduchess Hildegarde, daughter of Ludwig I of Bavaria. She died April 2, 1864.

ALBERT, Heinrich (1604–51). A celebrated German composer, sometimes erroneously called Alberti, who was instrumental in developing the present form of the German *Lied*. He was born at Lobenstein, Saxony, and in 1622 went to Dresden to study music under his cousin, the Kapellmeister Heinrich Schütz (q.v.). He established himself at Königsberg in 1626, but soon afterward was taken prisoner by the Swedes. After two years of captivity he returned to Königsberg, when he again turned to music. In 1630 he received an appointment as organist at the cathedral, and at the same time began a thorough course in music under Stobäus. In conformity with the wishes of his parents, however, he discontinued his musical studies and entered the University of Leipzig to study law. Albert was not only a fine musician, but a poet of distinction as well, and the verses which he set to music were usually of his own composition. Several of these, however, were written by the poet Simon Dach, an intimate friend of Albert, and one whose influence is still evident in the well-defined poetic rhythm of the song-forms created by the latter. Albert published eight books of arias (1638–50) and the *Kürbishütte* (1645), a collection of chorals, arias, and *Lieder* for one or several voices. Many of his hymn-tunes, such as the well-known *Gott des Himmels und der Erden; Ich bin ja, Herr, in Deiner Macht;* and *Unser Heil is Kommen*, are still extensively used in the Protestant service. A selection of his songs, with the music, has been published in the work entitled *Neudrucke Deutscher Litteraturwerke* (Halle, 1883).

ALBERT, Joseph (1825–86). A German photographer, who was born and died at Munich. He established a photographer's studio at Augsburg in 1850, and removed to Munich in 1858. About 1867 he introduced an improvement of the greatest importance in photo-mechanical printing (*Lichtdruck*). It had been known since about 1854 that a film of gelatin containing potassium-bichromate does not receive greasy inks unless it has been previously subjected to the action of light and damping. This fact had been utilized for printing purposes by coating a metal plate with gelatin containing some bichromate of potash and chloride of mercury, treating with silver oleate, and exposing to the action of light through a negative. On washing and inking with a lithographic roller, the plate could be used for printing. The soft gelatin coating, however, was extremely perishable, and therefore the process was capable of only limited application until Albert introduced his improvement. Albert found that the gelatin could be sufficiently hardened and rendered durable simply by the action of light. In place of the old metallic plates, he therefore substituted transparent plates, the uncoated side of which he exposed to the action of light. In this manner it became possible to obtain more than a thousand "Albertype" copies from one plate, and the process was adopted in general use. See Gelatin Process.

ALBERT I, called The Bear (c.1100–70). Margrave of Brandenburg. He was the son and

successor of Otto the Rich, Count of Ballenstädt, and of Eilika, daughter of Magnus Billung, Duke of Saxony. Having aided the Duke of Saxony, who became the Emperor Lothair, he received from the latter Lusatia, to be held as a fief of the Empire, and later the northern "mark." In the year 1137 Henry, Duke of Saxony, having been put under the imperial ban, the duchy was given to Albert, when he took the title of Duke of Saxony. Henry, however, was victorious in the contest which followed, and Albert was compelled to flee, and retained only the margraviate of northern Saxony. Returning to his own country, he had himself invested with the lands which he had conquered from the Wends, as a hereditary fief of the Empire, and thus became the founder and first margrave of the new State of Brandenburg. Consult Heinemann, *Albrecht der Bär* (Darmstadt, 1864).

ALBERT I (1317–79). Duke of Mecklenburg, founder of the present reigning dynasty. He was a son of Prince Henry II, the Lion, and reigned as prince from 1329 until 1348, when he was appointed Duke by the Emperor Charles IV. Relying upon the cities of his realm, he sought to suppress the frequent feuds of the nobles and to find advantages by active participation in the affairs of the Empire. Upon the extinction of the dynasty of Schwerin, he united the domains of that principality with his own (1358). He was also instrumental in securing the crown of Sweden for his son, afterward known as Albert II. See ALBERT, DUKE OF MECKLENBURG, and KING OF SWEDEN.

ALBERT I (1875—). King of the Belgians. He was born April 8, 1875, the only son of Philip, Count of Flanders, younger brother of Leopold II of Belgium (q.v.). He was carefully educated and in 1900 married Duchess Elizabeth, daughter of Karl Theodor, Duke of Bavaria, and Marie Joseph, daughter of Prince Miguel of Braganza. Before his accession to the throne he bore the title Count of Flanders. His democratic and friendly manner had made him the most popular member of the reigning house. He traveled widely and was a student of politics and economics. In 1898 he visited the United States and made a study of American railroads under the guidance of James J. Hill. Several years later, he made an extended tour of the Belgian Congo and upon his return to Belgium strongly urged upon his uncle the need of railroad development and of reform in the treatment of the natives. When he became King, many improvements in the administration of this colony were carried out. (See BELGIUM and CONGO, BELGIAN.) On the death of Leopold II Albert became King, on Dec. 23, 1909. Three children were born of his marriage—Prince Leopold, heir-apparent, born Nov. 1, 1901; Prince Charles, born Oct. 10, 1903, and Princess Marie-José, born Aug. 4, 1906.

ALBERT II, DUKE OF MECKLENBURG. See ALBERT, KING OF SWEDEN.

ALBERT IV, called THE WISE (1447–1508). Duke of Bavaria, third son of Albert III, surnamed "the Pious." After the death of his father, in 1460, he was placed under the guardianship of his elder brothers, John III and Sigismund, who had conjointly succeeded to the regency; and upon the death of John (1463), he became co-regent with Sigismund. The acquisition of the territories of the house of Bavaria-Landshut greatly increased the extent of his possessions. In consequence of this increase of power, however, he became involved in a feud with several members of the nobility, and his interference in the affairs of Regensburg (Ratisbon) finally aroused the displeasure of the Emperor and he was placed under the ban. His principal achievement was the establishment of the law of succession in the dukedom of Bavaria (July 8, 1506).

ALBERT V (1528–79). Duke of Bavaria, a son of Duke William IV and Maria Jakobäa of Baden. He succeeded to power in 1550 and soon became involved in religious and other disputes, in consequence of which the power of the feudal barons in his dominions was completely broken. He banished the Protestants from his dominions and prohibited the publication of books favorable to them. He greatly encouraged engraving, painting, brass-founding, and the industrial arts, and laid the foundation of a museum of art as well as of a museum of antiquities, a gallery of paintings, and a royal library. Upon his death he left debts to the amount of 2,500,000 florins.

ALBERTA, ăl-bûr'tâ, a province of Canada established on Sept. 1, 1905, with Saskatchewan (q.v.), by the Dominion Parliament. It was formed out of the former district of Alberta, and parts of the former districts of Athabasca, Saskatchewan, and Assiniboia, and its boundaries are described as the line of the 60th degree of north latitude on the north, the 120th meridian west of Greenwich and the main divide of the Rocky Mountains on the west, the 49th parallel on the south, and the 110th meridian west of Greenwich on the east. The area is given officially as 253,540 square miles. Of this 187,500 square miles are rated as good arable land; 35,400 square miles have been homesteaded or given away in special grants to those who agree to settle on the land or perform settlement duties; 20,500 square miles have been granted to railway companies as subsidies for the construction of their lines; and 4120 square miles have been granted to the Hudson's Bay Company. Most of this is classified as agricultural land. Of the total area of the province, about 91,000 square miles have been surveyed. In 1901 the population of the province was 72,841. By 1906 this figure had increased to 185,412, the advance being due to immigration, which has been very rapid. Following is a table showing the arrival of immigrants since 1906:

1906	17,559
1907	31,477
1908	27,651
1909	42,509
1910	44,782
1911	45,957
1912	48,073
Total	258,008

The population figure for the census of 1911 was 374,663. The northern half of the province and the eastern part of the southern half are, generally speaking, level; but the western part below lat. 56° N., and the southwestern, as it nears the foothills of the Rocky Mountains, become broken and hilly. Most of the eastern half and part of the western are prairie land. Central Alberta is well timbered and well watered. The western part of Lake Athabasca is within the limits of the province, and there are numerous smaller lakes. The river systems are of great

ALBERTA

SCALE OF MILES
0 10 20 30 40 50

Railways thus

120° A 119° B 118° C 117° D 116° E 115° F 114° G 113° H 112° J 111° K 110° L 109°

57° 56° 55° 54° 53° 52° 51° 50° 49°

Longitude West from Greenwich

SASKATCHEWAN

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importance in determining the fertility of the soil by the intersecting valleys which they create. The Athabasca and Peace rivers, joined by numerous tributaries, flow northerly and northeasterly respectively into Lake Athabasca, and thence into the Mackenzie River system and the Arctic Ocean; the Saskatchewan, north and south branches, and tributaries traverse the western part of the province and join the system that drains into Hudson Bay; in southern Alberta some of the tributaries of the Missouri River take their rise and thence drain into the Mississippi and the Gulf of Mexico.

The soil of Alberta is exceptionally rich in the great central region, consisting chiefly of from one to three feet of black vegetable mould, with but small mixture of sand and gravel. The eastern part, except in the south, is not so fertile; and in the south the comparative lack of moisture is being supplied by irrigation. This portion, which was formerly given up to ranching, has recently been devoted in many places to mixed farming and promises a considerable increase in that respect. Irrigation works receive government supervision and aid, and have also been undertaken by many farmers on their own lands, and by corporations, including the railway companies. In 1906 one of the latter was engaged in an irrigation scheme which embraced 3,000,000 acres between Bow and Red Deer rivers. The climate of the province is healthful and invigorating, extremes of heat and cold being mitigated by the dryness of the air; but, as the province extends through 11 degrees of latitude, the temperature varies considerably. Calgary, in lat. 51°, has a moderate and changeable climate, with a mean winter temperature of 15.4°; Edmonton, 53½°, enjoys a steadier climate, but the mean winter temperature drops to 10.3°; Fort Chippewyan, 59°, has a severe climate, with mean winter temperature of 7.2°. The average annual temperature at Edmonton is about the same as that of St. Paul, Minn. The Chinook winds that blow from the west across the Rocky Mountains melt the snow, so that in the southern part of the province cattle and horses can live in the open air throughout the winter. The possibilities in cereal crop raising in Alberta were recognized at the beginning of the twentieth century, and during the first decade the cultivation of cereals developed enormously. Wheat, oats, and barley are most successfully cultivated, especially in central Alberta. Wheat often produces 40, barley 60, and oats 70 to 85 bushels per acre, the latter sometimes producing 100 weighed bushels per acre. Following is a statement showing increase in grain production in Alberta for the decade 1901–11:

Grain	1901		1911	
	Acres	Bushels	Acres	Bushels
Spring wheat	42,668	780,613	757,493	15,730,238
Fall wheat	518	14,682	182,671	4,336,749
Barley	10,987	285,381	103,302	3,037,584
Oats	117,224	3,770,701	669,825	27,604,993
Rye	1,018	17,249	2,190	38,722

Root crops are also successful, and in southern Alberta the sugar beet, which is of exceptional quality, promises large additions to this industry. Apples are grown; so is tobacco in certain parts, and among the native small fruits are raspberries, strawberries, gooseberries, cranberries, cherries, and black currants. In the lakes fish are plentiful, and an abundance of small game, such as mallard, teal, wild goose, partridge, and prairie chicken, is found. Twelve government creameries and a large number of others attest the growth of dairying, and the industry is organized with special reference to cold storage and rapid shipment. In 1911 the value of the field crops was $47,675,000, of which amount the fall wheat was valued at $5,993,000; spring wheat, $16,260,000; oats, $15,893,000; and barley, $1,694,000. In 1912 there were 351,500 horses, 1,091,600 cattle, 181,000 sheep, and 175,200 swine.

Manufacturing interests are important and growing rapidly. In 1910 there were 290 manufacturing establishments, an invested capital of $29,518,346, employing 6980 persons, and a product valued at $18,788,826. In 1905 there were 120 establishments, an invested capital of $5,545,821, employing 2045 persons, and a product valued at $5,116,782.

The mineral deposits of Alberta are especially rich. There are large areas underlaid with bituminous coal, semi-bituminous, and lignite, the aggregate coal area being placed at 16,588 square miles. There is an extensive and valuable anthracite deposit in the neighborhood of Banff, on the Canadian Pacific Railway. Gold has been found in the vicinity of Edmonton, and along the banks of the Athabasca, Saskatchewan, Pembina, Macleod, and other rivers. Galena, with a large percentage of silver, has also been found, and natural gas occurs in several places. In 1910 there were mined 878,011 tons of lignite, 1,896,961 tons of bituminous coal, and 261,785 tons of anthracite. In 1912 the lignite output had increased to 964,700 tons; but owing to labor troubles the output of bituminous and anthracite had decreased to 649,745 and 80,119 tons respectively. The total value of the mineral production in 1912 was $12,110,960.

The bank clearings for Edmonton, Calgary, Medicine Hat, and Lethbridge in 1912 amounted to $643,836,229 as compared with $408,811,748 in 1911.

The railway development of the province since 1900 has been remarkable. The main line of the Canadian Pacific was completed to Vancouver in 1885, and in 1905 this was the only railway in the province. At that time it had a mileage of 1060, and the principal branch lines stretched from Calgary to Edmonton and from Calgary to Macleod. In 1912 the province had four lines —the Canadian Pacific, the Canadian Northern, the Grand Trunk, and the Edmonton Duvegan and British Columbia railways, with mileages of 1480, 1912, 638, and 25, respectively, and a grand total of 3055 miles. The cities of the province, with population according to the 1911 census, are: Calgary, 43,704; Edmonton, 24,900; Lethbridge, 8050; Medicine Hat, 5608; Strathcona, 5579; Wetaskewin, 2411. These cities and many towns are growing rapidly. There are still millions of acres of free land. The government forest reserve on the Rocky Mountain slope includes over 18,000 square miles. In 1905 the immigration into Manitoba, Saskatchewan, and Alberta amounted to 146,266, of which the last-named province received about one-third. Of these immigrants 65,359 were British, 43,652 from the United States, and 37,255 from Continental Europe. In the fiscal year ended March 31, 1912, the immigration into Manitoba, Saskatchewan, and Alberta

amounted to 135,592, of which the last-named province received 45,957.

In 1912 the government telephone system had 4000 miles of long distance line, connected with 270 points; 4800 miles of rural line with 5000 subscribers; and a total investment of $3,800,000. Early in the same year, according to the statement of Premier Sifton, the programme of new construction included over 3000 miles of rural lines and over 700 miles addition to existing long distance lines. In 1912 in 82 towns there were 118 newspapers, of which 10 were daily and 99 weekly.

The government of Alberta is organized on the same principle as the other provinces of the Dominion. The capital is Edmonton. The province is represented in the Dominion Senate by four members, a number which may be increased. To the House of Commons it sends seven representatives, but this number will be increased to 12 on the basis of the 1911 census. The legislative power is vested in an assembly of 41 members with the lieutenant-governor, who is aided in the performance of his executive duties by an appointive council. The province derives its revenue from three sources: (1) from a Dominion subsidy, which in 1912 was $1,216,895; (2) from public school lands, which in 1912 amounted to $166,056; and (3) from a tax on corporations, such as insurance, railway, land, loan, and trust companies, banks, etc. From these three sources there is an annual revenue of about $3,000,000. The grants made by the Dominion government towards the provincial treasury are the following: for the support of the government and legislature, $50,000; an allowance of 80 cents per head on an estimated population of 250,000 and up to 800,000, yielding at present $200,000; compensation for the share of the public debt falling on the province, which has no debt of its own, 5 per cent on the sum of $8,107,500 or $405,375; compensation for the retention by the Dominion government of public lands within the province, 1 per cent on an estimated valuation of $37,500,000 until the population shall exceed 400,000, 1½ per cent until a population of 800,000 is reached, 2 per cent when 1,200,000 has been reached, and 3 per cent thereafter; for the construction of the necessary public buildings one-fourth of 1 per cent on the valuation of the public lands is granted for a period of five years. The lands granted to railways within Alberta aggregate 13,120,000 acres, and an equal area, approximately, is distributed in the form of Indian reservations, parks, school lands, and the possessions of the Hudson's Bay Company. In 1912 there were 2029 school districts in the province, about 70,000 pupils, and grants paid amounted to $430,932.72. There is nominal provision for separate public schools for Protestants and Roman Catholics, but in most districts it is not put into effect. The higher educational institutions include the University of Alberta at Edmonton, with the affiliated Alberta College (Methodist) and Robertson College (Presbyterian); the University of Calgary; a provincial normal school; Lutheran College at Camrose; Mount Royal College (Methodist), and Western Canada College (Baptist) at Calgary; and the Presbyterian Ladies' College at Red Deer.

The formal inauguration of provincial government took place at Edmonton on Sept. 1, 1905, in the presence of Earl Grey, the Governor-General of Canada, and Sir Wilfrid Laurier, the Dominion premier. George Hedley Vicars Bulyea was installed as first lieutenant-governor, and Alexander Cameron Rutherford, a leading Liberal politician, was entrusted with the task of organizing the first government of the new province. The first Legislature assembled at Edmonton early in 1906. During its sessions, which lasted until 1910, a number of important measures were passed. A public school system was organized, a judicial system established, government-owned and operated telephones introduced, restrictions imposed on the liquor traffic, and for the protection and compensation of miners and other workmen. Liberal government aid was extended to agriculture and the development of the dairying industry. In July, 1909, the Grand Trunk Pacific Railway connected Edmonton with Winnipeg, and in the same year the government bought the Bell Telephone Company's rights and made public ownership of the telephone system complete. In October Earl Grey laid the cornerstone of the new parliament building at Edmonton. The second Legislature, which assembled in February, 1910, was formally opened by Lieutenant-Governor Bulyea, who in the same year was appointed for a second term. A political crisis, involving the resignation of Premier Rutherford and the accession to his office of Hon. Arthur Lewis Sifton, Chief Justice of the Province, was precipitated by the proposed building of the Alberta and Great Waterways Railway, to connect Edmonton with the vast northern grain-growing fields of the province. The terms of the contract, and certain proceedings which had taken place in pursuance thereof, were criticized as insufficiently protecting the popular rights. Premier Sifton undertook to procure the application of over $7,000,000, which had been deposited in various banks under proceedings growing out of the contract, for purposes of revenue. The promoters of the railway opposed this, and the resulting litigation culminated in an appeal to the Judicial Committee of the Privy Council, which in 1912 had not given a decision. During 1911–13 two proposed changes of public policy commanded wide attention. The government opposed the Canadian Pacific Railway's exemption from taxation. The amount involved was over $60,000,000, but the Judicial Committee of the Privy Council upheld the legality of the exemption. It was also proposed that the province should acquire control of all lands not available for free settlement, and which at present are part of the public domain and vested in the crown. The objects were increased efficiency in developing the provincial resources and the expansion of the provincial revenues. The question was regarded as likely to persist until settled in favor of the Province. The rapid progress of Alberta compelled the enlargement of the Cabinet, so that in 1912 it had increased from four to eight administrative departments. Consult Leo Thwaite, *Alberta: An Account of its Wealth and Progress* (London, 1912).

AL'BERT CHAP'EL. A memorial chapel in Windsor Castle. See WINDSOR CASTLE.

ALBERT ED'WARD. See EDWARD VII.

ALBERT EDWARD NYANZA. See LAKE EDWARD.

ALBERT EMBANK'MENT. The name given to a part of the Thames Embankment (q.v.), London.

ALBERT HALL, THE ROYAL. An amphitheatre in Kensington, London, built in 1867–71

for concerts and other large assemblies. In shape the building is oval, 270 by 240 feet in dimensions; it seats 8000 people. Its style is Italian Renaissance, the material being brick and the chief external ornament a frieze in terra cotta, representing the different races of men. Its organ, which has nearly 9000 pipes, is famous as one of the largest in the world.

ALBERTI, âl-bâr'tê, DOMENICO (c.1707–40). An Italian composer. He was born in Venice and died in Formio. A style of broken chord bass-accompaniment, which he developed, still is called "Alberti" or "Albertinian" bass.

ALBERTI, LEON BATTISTA DEGLI (1404–72). An Italian architect and writer, the leader in the second phase of early Italian Renaissance architecture, and its greatest theorist on the fine arts. He was born in Venice, Feb. 18, 1404, the illegitimate son of Lorenzo degli Alberti, of a noble and powerful Florentine family, at that time in exile. He received the best education which the age could afford, at first in the school of Barsizia at Padua, then at the University of Bologna, from which he was graduated, at the age of 24, with the degree of Doctor of Laws. At 20 he wrote a Latin comedy which deceived the elect, and he thoroughly mastered Greek, besides being proficient in mathematics and the natural sciences. He was, moreover, a poet and a philosopher, and as a musician ranked as one of the first organists of his day. He excelled also in physical and social accomplishments, and, like Leonardo da Vinci, exercised a powerful and fascinating influence upon all contemporaries. In 1428 he returned from exile to Florence, and afterward traveled through France, the Low Countries, and Germany in the following of the Cardinal Albergati. In 1432 he was appointed a papal secretary by Eugenius IV. His architectural training began with the study of antique monuments during his first stay in Rome, 1432–34. Returning with the Pope to Florence, he entered with ardor into the artistic life of the city. Brunelleschi and Donatello (q.v.) were his friends and associates, and it was probably at this time that he discovered the mathematical laws of linear perspective, which were of inestimable value to the painters of his own and the succeeding generation. He took an active part in the literary life of Florence, and figured as a champion of the use of the native tongue instead of Latin. After spending nine years with the papal court in Florence and elsewhere, he returned with it to Rome, where most of the remainder of his life was spent. He was secretary to six popes, and stood in high favor with Eugenius IV, Nicholas V, and especially with the humanist Pius II. His advice in matters of architecture was, no doubt, sought by the supreme pontiffs, and at least under Nicholas V he was in charge of the projects for rebuilding St. Peter's and the Vatican.

Although Alberti's buildings rank among the best of the Renaissance, he was a theorist rather than a practical architect. He furnished only the plans of his buildings, never supervising their construction. His art is the most strictly classical of the Early Renaissance and prepared the way for that of Bramante (q.v.) and the High Renaissance. Its purity is shown in the façade of the church of San Francesco at Rimini, adapted from the arch of Augustus at Rimini. His intended use here of the dome, his barrel vaults at Sant' Andrea in Mantua, show how in construction he also returned to the forms of ancient Roman architecture. He had a number of pupils and associates, who carried out his plans: Matteo dei Pasti, at Rimini; Fancelli, at Mantua; Bertini in the façade of Santa Maria Novella at Florence (where he so successfully copied the mediæval style of incrusted marbles); and Rossellino in the famous Rucellai Palace (1446–51) at Florence, which combined the older rustic with the smooth pilastered style. His book *De Re Ædificatoria* (1485) was the first great printed work on architecture of the Renaissance, and had been preceded by a manual on the five orders, as well as by other manuals on statuary and painting. The best of these is *De Pictura libri iii*, written in Italian, and the most important treatise on painting before Leonardo. It was first published at Basel in 1540, and the best modern edition is that of Janitscheck (1877). Consult his biography by Mancini (Florence, 1882), for detailed and reliable information; also the scholarly treatise of Von Geymüller, in *Die Architectur der Renaissance in Toscana* (Munich, 1888). The latest biography is by Londi (Florence, 1906), and there is an excellent and detailed article by Suida, in Thieme and Becker's *Allgemeines Künstler Lexicon*, vol. i (Leipzig, 1907).

ALBERTINELLI, âl-bâr'tê-nĕl'lê, MARIOTTO (1474–1515). A Florentine painter of the High Renaissance. He was born of an ancient and noble Florentine family and studied with Cosimo Roselli, and, according to Berenson, with Piero di Cosimo. In Roselli's workshop he formed his life-long friendship with Fra Bartolommeo (q.v.). Jovial and worldly, he was the direct opposite of his clerical friend, with whom he established a common studio. When Bartolommeo entered the cloister in 1500, Mariotto worked independently until his friend's return to Florence in 1509, when he joined him in the atelier of the cloister of San Marco. Their joint signature was a cross with two locked rings until their final separation in 1512. According to Vasari, Albertinelli, in despair, became an innkeeper; what really happened was that he inherited his father-in-law's wine shop. A public house bearing his name still exists in Florence. He soon resumed painting and was afterwards active at Santa Maria della Quercia and in Rome, where he fell ill. He died Nov. 5, 1515, soon after his return to Florence. Although his pictures show his intimate relation with Fra Bartolommeo, who was the stronger artist of the two, Albertinelli's best work belongs to the finest produced by the Renaissance. Among their joint productions are an "Annunciation" (1497) in the Volaterra, the "Last Judgment" (1498), a fresco of Santa Mario Novella, now in the Uffizi; and the fine "Madonna in Glory" in the cathedral of Besançon. Of his independent pictures the finest is the "Visitation" (1503) in the Uffizi, a work of great beauty; others are a "Holy Family" in the Pitti Gallery, a smaller "Madonna," a "Trinity" and an "Annunciation" (1510), in the Florence Academy; a small triptych in the Poldo-Pezzoli Museum, Milan; and the painting of a female saint, in the possession of Mrs. Samuel Untermyer, New York. Consult Gruyer, *Fra Bartolommeo della Porta et Mariotto Albertinelli* (Paris, 1886), and the works cited under Fra Bartolommeo (q.v.), which treat also his friend.

ALBERTIS, âl-bâr'tês, LUIGI MARIA D' (1841–1901). An Italian traveler, born at Voltri. He attended the College of Savona and served in the

army of Garibaldi in 1860. From 1871 to 1878 he made a careful exploration and study of the island of New Guinea. The results of this expedition he published in his *Explorazione della Nuova Guinea* (1880; Eng. trans., 1880).

AL'BERTITE. An asphaltic hydrocarbon compound obtained at Hillsborough, Albert Co., New Brunswick, Canada, where it occurred in a fissure vein in rocks of the Upper Devonian age. It is a soft, jet black mineral that has been derived from petroleum by oxidization of the oily contents, and it was at one time highly prized as a gas-enricher. See ASPHALTIC COAL.

ALBERT LAKE. See LAKE ALBERT.

AL'BERT LEA. A city and the county-seat of Freeborn Co., Minn., 100 miles (direct) south of Minneapolis on the Chicago, Milwaukee, and St. Paul, the Minneapolis and St. Louis, the Chicago, Rock Island, and Pacific, the Iowa Central, and the Illinois Central railroads (Map: Minnesota, D 7). Two fine lakes, county fair grounds, well-kept parks and boulevards, and large hotels make Albert Lea a popular summer resort. The city also contains a splendid county court house, an opera house, public baths, etc., and is the seat of the Albert Lea College for women (Presbyterian), opened in 1885, and the Luther Academy. It is the market for the agricultural and dairy products (chiefly butter) of the surrounding region. It has the only creamery owned and operated by the State in the world. It has also gas engine, corset, paper box, mill tool, road grader, and culvert and tank factories, two creameries, a pork-packing house, etc. There are some 50 artesian wells of chalybeate water, which are owned and operated by the city. Pop., 1890, 3305; 1900, 4500; 1910, 6192; 1913 (est.), 11,283.

ALBERT MED'AL. A decoration instituted in England (1866)—in memory of Prince Consort Albert, whose name it bears—to reward heroic acts in saving life at sea. In 1877 it was extended to acts of gallantry in preventing loss of life in perils on land. There are two classes, the first of gold and the second of bronze, with the words "For Gallantry in Saving Life at Sea" or "on Land," as the case may be.

ALBERT MEMORIAL. A monument of Prince Albert, the Consort of Queen Victoria of England, who died in 1861. The monument, by Sir Gilbert Scott, is in the Victorian Gothic style, in an adaptation of Italian Gothic suggestions, with inlays, mosaic, and a frieze of allegorical sculpture, the whole forming a vaulted canopy over the statue of the Prince. It is situated in Kensington Gardens. See LONDON.

ALBERT NYANZA. See LAKE ALBERT.

ALBERT OF AIX, or **AACHEA** (fl. c.1125). A French historian, of whose life very little is known beyond the fact that he was a canon and "custos" at Aix-la-Chapelle. He was the author of a work which included the history of the first crusade and of the Latin Kingdom of Jerusalem to 1121. Formerly this was widely used by all historians of the crusades from William of Tyre (q.v.) down to 1840. Then its value was attacked by H. von Sybel (q.v.), and for about 40 years it was regarded as almost worthless. Now its value is again recognized, and the theory is current that Albert's work is based upon a chronicle written by a follower of Godfrey of Bouillon (q.v.). Along with much fabulous material it contains much that is valuable. There is no good edition; the least unsatisfactory is in the *Recueil des Historiens des croisades: historiens occidentaux.* See Sybel, *Geschichte des ersten Kreuzzuges* (2d ed., Leipzig, 1881); Kugler, *Albert von Aachen* (Stuttgart, 1885); Vercrugsse, *Essai critique sur la chronique d'Albert d'Aix* (Liége, 1889).

ALBERTSON, CHARLES CARROLL (1865—). An American clergyman and writer, born at Plainfield, Ind. Educated at first to be a lawyer, he later turned to the ministry, for which he received his training at the Garrett Biblical Institute of Northwestern University. He filled pastorates at Goshen, Ind. (1888–92); Jamestown, N. Y. (1892–95); Buffalo, N. Y. (1895–99); and Philadelphia (1899–1904). In 1904 he became pastor of the Central Presbyterian Church of Rochester, N. Y., where he remained until called to the pulpit of the Lafayette Avenue Presbyterian Church, Brooklyn, in 1913. The degree of D.D. was conferred upon him by Allegheny College in 1899. Becoming known as a lecturer and as preacher to various colleges, Dr. Albertson was made a member of the American Philosophical Society and of the Victoria Institute of London. Besides editing several religious compilations and contributing articles to periodicals, he published the following: *Safe Counsel and Sweet Comfort* (1891); *The Gospel according to Christ* (1898); *Many Voices* (1904); *Death and Afterwards* (1907); *College Sermons* (1910); *Distinctive Ideas of Jesus* (1911).

ALBER'TUS MAG'NUS. See ALBERT, COUNT OF BOLLSTÄDT.

ALBERTYPE. See PHOTOGRAPHY; ALBERT, JOSEPH.

ALBES'CENCE. This term is applied to the whitening of portions of foliage leaves different from the blanching due to the absence of light (*etiolation*, q.v.) or the absence of green caused by the lack of iron (*chlorosis*, q.v.). The variegated leaves of many greenhouse plants, such as fancy caladiums, silver geraniums, and striped ribbon grass, afford good examples of albescence. Such leaves must be regarded as less efficient foliage organs than those entirely green. In the case of abutilon (q.v.), the whitening is thought to be due to the presence of a virus, at least the albescence may be transmitted through inoculation by grafting, but in other instances the cause of the albescence is unknown.

ALBI, ål'bē, or **ALBY.** The capital of the department of Tarn in France, built on an eminence (570 feet high) overlooking the river Tarn, which is here crossed by a beautiful stone bridge (Map: France, S., G 5). Albi suffered greatly during the religious wars which devastated the land in the time of the Albigenses, who took their name from this town. The chief building is the cathedral of St. Cecilia, built of brick in a unique style and decorated on wall and ceiling with frescoes executed by the first Italian painters of the day. The south portal is a remarkable example of decorated Gothic. It is adorned with an exquisite recumbent statue of the patron saint in marble. The town maintains a library (including many incunabula) and a museum. There are large brickyards at Albi, and it has a considerable trade in grain, wine, fruit, etc., and linen, cotton, wool, and leather manufactures. Pop., 1896, 14,983; 1901, 18,262; 1906, 23,303; 1911, 25,100.

AL'BIA. A city and the county-seat of Monroe Co., Iowa, 68 miles southeast of Des Moines, on the Chicago, Burlington, and Quincy, the Minneapolis and St. Louis, the Wabash, the Southern Iowa Traction Company, and other railroads

(Map: Iowa, E 3). With its excellent transportation facilities, the city controls a large trade in coal, which is extensively mined in the county, and in agricultural products, live stock, and grain. There are also metal works, a telephone factory, and a packing house. Pop., 1890, 2359; 1900, 2889; 1910, 4969; 1913 (est.), 5342.

AL'BIGEN'SES. A name applied to the heretical Cathari in the south of France about the beginning of the thirteenth century. The name arose from the circumstances that the Cathari were especially numerous in the district of Albigeois, about Albi, in Languedoc. It seems to have been first used in 1181. The so-called Albigensian Crusade was undertaken by Pope Innocent III in 1209. The immediate occasion of it was the murder of the papal legate and inquisitor, Peter of Castelnau, who had been commissioned to extirpate heresy in the dominions of Count Raymond VI of Toulouse; but its real purpose was to deprive the Count of his lands, as he had become an object of dislike from his toleration of the heretics. It was in vain that he had submitted to the most humiliating penance and flagellation from the hands of the legate Milo and had solicited papal absolution by great sacrifices. The legates Arnold, Abbot of Citeaux, and Milo, who directed the expedition, took by storm Béziers, the capital of Raymond's nephew, Roger, and massacred 20,000 of the inhabitants, Catholics as well as heretics. Simon de Montfort, who conducted the war under the legates, proceeded in the same relentless way with other places in the territories of Raymond and his allies. Of these, Roger of Béziers died in prison, and Peter I of Aragon fell in battle. A part of the conquered lands were given as a reward to Simon de Montfort, who was killed at the siege of Toulouse, 1218. Counts Raymond VI and VII disputed the possession of their territories with his son. But the papal indulgences drew fresh crusaders from every province of France to continue the war. Raymond VII continued to struggle bravely against the legates and Louis VIII of France, to whom Montfort had ceded his pretensions. After many thousands had perished on both sides, a peace was concluded, in 1229, when Raymond purchased relief from the ban of the Church by immense sums of money, gave up Narbonne and several lordships to Louis IX, and had to make his son-in-law, the brother of Louis, heir to his other possessions. The Albigenses were left without a protector. The heretics were handed over to the proselytizing zeal of the order of Dominicans and the tribunals of the Inquisition, and both used their utmost power to bring the recusant Albigenses to repentance, and also, by inflicting severe punishment on the penitent converts, to inspire dread of incurring the Church's displeasure. From the middle of the thirteenth century the name of the Albigenses gradually disappears. The remnants of them took refuge in the East, some settling in Bosnia. Consult: Schmidt, *Histoire de la secte des Cathares ou Albigeois* (Paris, 1849); Lea, *History of the Inquisition* (New York, 1888); Döllinger, *Beiträge zur Sektengeschichte des Mittelalters* (Munich, 1890); Luchaire, *Innocent III et la croisade des Albigeois* (Paris, 1905). The last is easily the best discussion of the subject, but contains no references to sources.

ALBI'NO (Portug. and Sp., from Lat. *albus*, white). A term first applied by the Portuguese to the white negroes of West Africa; now applied to any individual in whom there is congenital deficiency of pigment in skin, hair, iris, and choroid of the eye. The skin is abnormally pale, the hair is white or pale flaxen, and the iris is pink. An albino is termed *leucoëthiop* by the Latins, *kakerlak* by the Germans, *bedo* in Ceylon, and *dondo* in Africa. The absence of pigment in the iris renders an albino's eyes sensitive, and partially blind in the sunlight. Nystagmus (oscillation of the eyeball), photophobia, and astigmatism are often present. Albinism is found in many races as a rare condition. Cushing found it among the Zuñi. It is sometimes a family trait. It occurs frequently among rabbits, mice, birds, and other lower animals. See also SOMATOLOGY; VITILIGO; MELANISM AND ALBINISM.

AL'BINOVA'NUS, PEDO. A Roman epic writer; a friend and contemporary of Ovid, who addressed to him one of his *Epistolæ ex Ponto*. He is to be identified, perhaps, with the Pedo mentioned by Tacitus as *præfectus equitum* under Germanicus (q.v.) in Germany. In addition to his epic on the exploits of Germanicus in Germany, fragments of which are preserved in the *Suasoriæ* of Seneca, he is said to have written a poem entitled *Theseïs*, an epic on contemporary history, and numerous epigrams; but he was probably not the author of the elegy on the death of Drusus, which has been attributed to him. Albinovanus is quoted by the younger Seneca, who calls him *Fabulator Elegantissimus*, and is mentioned as a wit by Martial and Quintilian. Consult: Wernsdorf, *Poetæ Latini Minores*, vol. iv; Bährens, *Poetæ Latini Minores* vol. i (Leipzig, 1879; 2d ed., by Vollmer, Leipzig, 1910); Haupt, *Opuscula*, vol. i (1875); Haube, *Beitrag zur Kenntnis des Albinovanus Pedo* (1880).

ALBINUS, BERNHARDT SIEGFRIED (1697–1770). A German anatomist, born at Frankfort-on-Oder. He studied medicine under his father, Boerhave, and Rau. In 1718 he became professor of anatomy at the University of Leyden, and, in 1745, professor of medicine. He was known as one of the greatest instructors in anatomy of his day, and his works *De Ossibus Corporis Humani* (1726) and *Historia Musculorum Hominis* (1734) are still of considerable value.

ALBI'NUS, CLODIUS, the popular name for DECIMUS CLODIUS CEIONIUS SEPTIMIUS ALBINUS (?–197 A.D.). A Roman commander. He was a governor of Gaul and Britain at the time of the death of the Emperor Commodus (192), and was made Cæsar by Septimius Severus in 194, as a means of keeping him neutral. After defeating his rivals, however, Severus turned his arms against Albinus, and in a battle near Lugdunum (Lyons) in Gaul (197), Albinus was defeated and killed (Dio Cass. lxx, 4, *Vita Albini*).

AL'BION (Lat. Gk. *Ἀλουίων, Alouïōn*, from Lat. *albus*, white, referring to the chalk cliffs of the southern coast). The most ancient name of the island of Great Britain. See under ALBANY, or ALBAINN.

ALBION. A city in Calhoun Co., Mich., 96 miles west of Detroit, on the Michigan Central, the Lake Shore and Michigan Southern railroads, and an electric line running from Kalamazoo to Detroit, and on the Kalamazoo River (Map: Michigan, E 6). The city owns its water supply, has a city library, two hospitals and park, and is the seat of Albion College, under Methodist

Episcopal control. Its principal manufactures are malleable iron, flour, carriage and automobile seat springs, locks, hinges, screens, and agricultural implements. Albion was first settled in 1830 and is governed under a charter adopted in 1896, revised in 1897 and in 1899, which provides for a mayor, elected annually, and a city council, composed of the mayor, city clerk, and eight aldermen. Pop., 1890, 3763; 1900, 4519; 1910, 5833; 1913 (est.), 7893.

ALBION. A village, the county-seat of Orleans Co., N. Y., 30 miles northwest of Rochester, on the New York Central Railroad, Buffalo, Lockport, and Rochester Railway, and on the Erie Canal (Map: New York, B 4). The Western House of Refuge for Women, the Swan Library, the high school, the court house, Pullman Memorial Church, and Mount Albion Cemetery are prominent features of interest. It has a very large canning factory and manufactures cement building blocks, etc. Much fruit is grown in the surrounding country. There are three large cold-storage plants in the village. Albion is governed, under a revised charter of 1890, by a mayor, elected triennially, and a board of trustees. Pop., 1890, 4586; 1900, 4477; 1910, 5016; 1913 (est.), 5800.

ALBION, New. The name given by Sir Francis Drake to the western coast of North America, which he visited in 1579. It was originally applied to the whole region including the peninsula of Lower California, but was restricted by Humboldt and other geographers to the section actually explored by Drake between San Francisco Bay and the Columbia River. Consult the map in the Hakluyt Society's edition of Fletcher's *World Encompassed by Sir Francis Drake.*

AL'BION AND ALBA'NIUS. An opera or masque by John Dryden, written to celebrate the successes of the Stuarts after the restoration. It was produced, with music by Louis Grabut, in 1685, and first published the same year. It is an allegory, with classical nomenclature. Albion represents Charles II; and Albanius, James, the Duke of York.

ALBION COLLEGE. An American college, situated at Albion, Mich., established as a seminary in 1835 and organized as a college in 1861. In 1912 it had 27 professors and instructors, and 331 students in the college department, 134 in the schools of music and painting, 91 in the business department, and 68 in the preparatory department. The endowment fund is $355,000, the value of buildings and grounds $250,000, and the annual income from $45,000 to $50,000. The library contains 22,100 volumes and 4300 pamphlets. President, Samuel Dickie, LL.D.

ALBION'S ENG'LAND. A long narrative poem on English history, by William Warner (c.1558–1609). It was first published in 1586, in four books on legendary incidents from Noah's time to that of William the Conqueror; but other books were successively added, till there were 16, bringing the story down to the reign of James I. Many of its materials have been used by later poets.

ALBISTAN, äl'bē-stän', or **EL-BOSTAN,** ĕl'-bō-stän' (Turk. the garden). A town in the Turkish vilayet of Aleppo, about 40 miles northnortheast of Marash, on the small river Jihun (Map: Turkey in Asia, G 3). It is situated in a fertile portion of Anatolia and has a considerable trade in grain. In 1277 there was a bloody battle fought here between the inhabitants and invading Mongols. The town was besieged by the Egyptians late in the fourteenth century. Its population is about 6500.

AL'BITE (Lat. *albus,* white). A sodium feldspar or sodium aluminum silicate, usually white in color, that crystallizes in the triclinic system. It is a constituent of many alkaline rocks and is found extensively in the United States. Certain varieties called moonstones, having a blue chatoyant effect, are cut and polished as gems. See Feldspar.

ALBO, äl'bō, Joseph (c.1380–1444). A Jewish preacher and theologian of Spain. He was born probably at Montreal, Aragon, studied under the speculative philosopher Hasdai Crescas, and in 1413–14 seems to have taken part in the extended theological discussion at Tortosa. He is known chiefly for his apologetic entitled *Ikkarim* ('Principles'), which has exerted wide influence. The work was first published in 1485, was translated into German by Schlesinger (1844), and into English in the *Hebrew Review,* vols. i–iii. Albo reduced to three the basic principles of Judaism: the existence of God, revelation, and divine retribution. Consult Back, *Joseph Albo* (1869), and Tänzer, *Die Religionsphilosophie des Joseph Albo* (1896).

ALBOIN, äl'boin (?–c.572 or 573). The founder of the Lombard dominion in Italy. He succeeded his father in 565 A.D. as King of the Lombards, who were at that time settled in Noricum and Pannonia. He first aided Narses against the Ostrogoths and afterward, allying himself with the Avars, attacked the Gepidæ and defeated them in a great battle (566 or 567), slaying their King, Cunimund, with his own hand. On the death of his first wife, Chlotsuinda, he married Rosamund, daughter of Cunimund. He invaded Italy in 568 with his own nation of Lombards, some of the Gepidæ, 20,000 Saxons, and adventurers from other nations; overran Venetia in 568, Liguria in 569, and Etruria in 570, and captured Beneventum in 571. Pavia was conquered in 572, after over three years of siege. During a feast at Verona he made his queen drink out of the skull of her father, which he had converted into a wine-cup. In revenge she incited her paramour, Helmechis, to murder her husband (572 or 573). To escape the fury of the Lombards, Rosamund fled with her associate and the treasure to Longinus, the exarch, at Ravenna. Longinus becoming a suitor for her hand, she administered poison to Helmechis, who, discovering the treachery, caused her to swallow the remainder of the cup, and she died with him. For several centuries the name of Alboin continued to be famous among the German nations, who celebrated his praises in martial songs. See Foulke, *History of the Langobards* (Philadelphia, 1907).

AL'BOLENE. A neutral, bland hydrocarbon oil, of mineral origin, used in medicine to carry remedies intended to be sprayed into the nose and deeper air passages; as a bland dressing for wounds to prevent dressings from adhering to the granulating surface; and sometimes as a mild laxative in place of castor oil or olive oil. See Petroleum.

ALBONI, äl-bō'nē, Marietta (1823–94). An Italian contralto, born at Cesena, in the Romagna, March 10, 1823. A pupil of Madame Bertolotti, and later of Rossini, she made her début at the age of 15 at Bologna as Orsini in *Lucrezia Borgia,* and her success led to an engagement at La Scala, Milan. In 1846–47 she sang in all the principal cities of Europe; in London,

at Covent Garden, in rivalry with Jenny Lind, who was at Her Majesty's Theatre. In 1852 she visited the United States, singing in the chief towns in opera and concert. With the exception of Malibran (q.v.), she was the greatest contralto of the nineteenth century. Her voice, a fine contralto with a compass of two and one-half octaves, ranging as high as mezzo-soprano, possessed at once power, sweetness, fullness, and extraordinary flexibility. In passages requiring elevation and semi-religious calmness she had no peers, owing to the moving quality of her voice. She possessed vivacity, grace, and charm as an actress of the *comédienne* type, but her attempt at a strongly dramatic part, like Norma, turned out a failure. She married Count Pepoli, of the Papal States, but kept her maiden name on the stage, appearing in opera at Munich as late as 1872. Her husband died in 1866, and in 1877 she married M. Zieger, a French officer. She died at Ville d'Avray, near Paris. Consult G. T. Ferris, *Great Singers* (New York, 1893), and A. Pougin, *Marietta Alboni* (Paris, 1912).

AL-BO'RAK. According to the Moslem creed, the animal brought by Gabriel to carry Mohammed to the seventh heaven. It had the face of a man, the body of a horse, the wings of an eagle, and spoke with a human voice.

ALBORNOZ, äl'bôr-nōth', GIL ALVAREZ CARILLO DE (c.1310–67). A warlike Spanish prelate. He was born at Cuenca, studied at Toulouse, and subsequently became almoner to Alfonso XI, King of Castile, who appointed him Archdeacon of Calatrava, and in 1337 he was chosen Archbishop of Toledo. He took part in the wars against the Moors, saved the life of the King in the battle of Tarifa, and was present at the siege of Algeciras, where the King dubbed him knight. After the death of the King he went to Pope Clement VI at Avignon, who made him a Cardinal. Innocent VII also recognized his abilities as an astute diplomat and twice sent him as Cardinal-Legate to Rome, where, by his tact and vigor, he secured, in spite of the intricate complications of affairs, the restoration of the papal authority in the States of the Church (1353–62). Pope Urban V felt that he owed the recovery of his dominions mainly to him, and out of gratitude appointed him legate at Bologna, in 1367. In the same year he died, at Viterbo; but as he had expressed a wish to be buried at Toledo, Henry of Castile removed his body with almost royal honors, and Urban even granted an indulgence to all who had assisted in transferring the body from Viterbo to Toledo. He left a valuable work upon the constitution of the Roman church, printed for the first time at Jesi in 1473 and now very rare. By his will he provided for the foundation of the College of Spain at Bologna.

ALBRECHT, äl'brĕkt. See ALBERT.

ALBRECHTSBERGER, äl'brĕkts-bĕrk'ĕr, JOHANN GEORG (1736–1809). An Austrian musician, one of the most learned contrapuntists of his age. In 1772 he was appointed court organist, and in 1792 kapellmeister of St. Stephen's Cathedral, Vienna. Among his pupils were Beethoven (whose genius he failed to recognize), Hummel, Moscheles, Seyfried, and Weigl. Of his numerous compositions, few ever appeared in print. His most important contributions to music were his theoretical works, the *Gründliche Anweisung zur Komposition* (1818), and *Kurzgefasste Methode, den Generalbass zu erlernen* (1792).

ALBRET, äl'brĕ', JEANNE D' (1528–72). Queen of Navarre, only daughter of Henry II of Navarre, and Margaret, sister of Francis I. Jeanne married Antoine de Bourbon. She was celebrated for her intellectual strength and personal beauty. She embraced Calvinism and, in spite of Spanish menaces and Roman intrigue, kept her possessions. In 1567 she declared the reformed religion established in the kingdom, and in 1569, with her children, Henry, afterward Henry IV of France, and Catherine, she brought a small band of Huguenots to Coligny at La Rochelle, and after the murder of the Prince of Condé she was looked upon as the only support of the Protestants. She wrote prose and verse, and some of her sonnets have been published. Consult *Mémoires et poésies de Jeanne d'Albret* (Paris, 1893) and *Lettres d'Antoine de Bourbon et de Jehanne d'Albret publiées pour la Société de l'histoire de France* (Paris, 1877).

ALBRET, THE LORDSHIP OF, in the Landes, in France. The lords of Albret were prominent in the Hundred Years' War (q.v.), and Charles, Lord of Albret, was commander of the French forces at Agincourt, where he was killed. John of Albret became King of Navarre by his marriage with Catherine de Foix (q.v.). Their son Henry was created Duke of Albret in 1550. His grandson was Henry of Navarre, by whose accession to the French throne the dukedom became united to the crown; but it was granted to the family of La Tour d'Auvergne in 1651.

ALBRIGHT, ôl'brīt, JACOB (1759–1808). The founder of the Evangelical Association (q.v.). He was born near Pottstown, Pa., May 1, 1759, and died at Mühlbach, Pa., May 8, 1808. In 1792 he joined the Methodist church, in 1796 began his very successful career as preacher among the Germans, and in 1807 was elected first bishop of the church which he founded. For his life, consult Yeakel, *Jacob Albright and his Colaborers* (Cleveland, 1883).

ALBRIGHT BRETH'REN. See EVANGELICAL ASSOCIATION.

ALBRIGHT COLLEGE. A coeducational institution, under the control of the United Evangelical Church, at Myerstown, Pa., founded in 1895 and consolidated in 1902 with Central Pennsylvania College. It has a classical course, requiring Greek for the A.B. degree, Latin, scientific and chemical-biological courses. It has also a preparatory school and music and art departments. In 1913 the faculty numbered 17, and the students 222. The school has a library of 8000 volumes, property valued at $140,000, an endowment of $86,000, and an income of $34,000. President, J. F. Dunlap, D.D.

ALBRIZZI, äl-brēt'sē, ISABELLA TEOTOCHI, COUNTESS D' (1763–1836). An Italian author. She was born at Corfu, of Greek parentage. As the wife of the Inquisitor of State, Count Giuseppe Albrizzi, her home in Venice became the rendezvous for many celebrities of the day, such as Alfieri, Foscolo, and Byron. With Cicognara, she was one of the first to call attention to the genius of Canova, to whom she paid a glowing tribute in her celebrated work, *Opere di scultura e di plastica di Ant. Canova descritte da J. A.* (1809); also published under the title *Descrizione delle opere di Canova* (5 vols., 1821–25). Her other writings include *Ritratti* (1807, 1826); 17 essays on distinguished contemporaries, and a life of Vittoria Colonna (1836).

ALBRU'NA. A German seer of the time of the Roman Emperor Augustus. She is men-

tioned by Tacitus (*Germania*, viii), and is supposed to have acquired renown during the campaigns of Drusus and Tiberius. Albruna is the same as the Old Norse *alfruna* and the Anglo-Saxon *helrun* and is the collective term for the wise women of the ancient Germans.

AL'BUCA'SIS. See ABU'L KASIM.

ALBUERA, ål-bwā'rà. A hamlet in the Spanish province of Badajoz, famous for the battle of May 16, 1811, between the combined English, Spanish, and Portuguese forces under General Beresford, and the French under Marshal Soult, who were not so numerous as the allies, but had abundant artillery. The object of the French was to compel the English to raise the siege of Badajoz. The result was that Soult was obliged to retreat to Seville with the loss of 8000 men; the loss of the allied forces was about 7000. In proportion to the numbers engaged, the battle was the most sanguinary in the whole contest. Of 6000 British who charged the French entrenchments, only 1500 remained unwounded.

ALBUFERA, ål'bōō-fā'rà (Ar. *al*, the + *buhaira*, coast-lake). A lake near Valencia, in Spain, about 10 miles in length and 4 miles in breadth. It is separated from the sea by a narrow tongue of land, and a canal connects it with the city of Valencia (Map: Spain, E 3). Its fish and game birds attract sportsmen, and it is said to have been excavated by the Moors. From it Marshal Suchet (q.v.) took the title of duke.

ALBU'GO. See LEUCOMA.

ALBULA, äl'bu-là. A river in the canton of Grison, or Graubünden, Switzerland (Map: Switzerland, D 2). The Albula is the largest tributary of the Hinter Rhine and rises in Albula Pass, flowing through the Albula valley to empty into the Hinter Rhine after a course of 29 miles. Its outlet is 4500 feet lower than its source.

AL'BULÆ A'QUÆ. Sulphur springs near ancient Tibur (see TIVOLI), much used by invalids for bathing and drinking. Three still remain, forming the lakes known as Bagni di Tivoli.

ALBULA PASS. A high, rocky pass in which rises the Albula River, Switzerland (Map: Switzerland, D 2). It is situated 7600 feet above sea level and lies between the peak of Crasta Mora (9600 feet high) and the Pitz Urtsch or Albulahorn (10,700 feet high). Over it runs the road from Tiefenkasten to Ponte, the shortest route into the Engadine. The opening of a railway line through the pass in 1903 established its importance as a route for trade.

AL'BUM (Lat., neut. of *albus*, white). Among the Romans, a wooden tablet whitened with gypsum, on which were written in black letters the *Annales Maximi* of the pontifex (see ANNALS), the *acta* (q.v.) of the magistrates, etc., edicts of the prætor, and public announcements generally. The word was also applied to the contents of such a board, and, since lists of corporations had to be published, album came to denote any such catalogue; e.g., *Album Senatorium*, the official list of the Senate. In the Middle Ages the word was used to denote any list, catalogue, or register, whether of saints, soldiers, or civil functionaries. In the gymnasia and the universities on the Continent, the list of the names of the members is called the album. The name is also applied to the "black board" on which public notifications of lectures, etc., are written up. But its popular signification in modern times is that of a book for containing photographs, or a blank book for a drawing-room table, intended to receive fugitive pieces of verse, or the signatures of distinguished persons, or sometimes merely drawings.

ALBUMAZAR, ål'bōō-mä'zēr (805–885). An Arabian astrologer, born at Balkh, whose true name was ABOU-MASCHAR DJAFAR IBN-MOHAMMED. He believed that the world was created when the seven planets were in conjunction in the first degree of Aries and that it would be destroyed when they are again in conjunction in the last degree of Pisces. He is the author of more than 50 works, several of which have been translated into Latin. Of the latter are: *Flores Astrologici* (1488); *De Magnis Conjunctionibus, Annorum Revolutionibus ac eorum Profectionibus* (1489); *Introductorium in Astronomiam* (1506).

ALBU'MEN (Lat. the white of an egg, from *albus*, white). In plants, a name formerly applied to the nutritive tissue of seeds, now commonly known as "endosperm." See SEED.

ALBUMEN, or **ALBUMIN.** The most important ingredient in the white of egg. It abounds in the blood and more or less in all the serous fluids of the animal body. It also exists in the sap of vegetables and in their seeds and edible parts. Albumen is often used as a mordant, to fasten various colors on cotton. It is prepared industrially in considerable quantities by drying the white of egg without allowing it to coagulate. For this purpose the white of egg is placed in shallow vessels and kept at a temperature of about 50° C. (122° F.) in well-ventilated chambers. Unless coagulation has taken place, the dried albumen remains completely soluble in water. Albumen is used in photographic printing, and its property of coagulating with heat into an insoluble variety renders it useful in clarifying solutions, as in sugar refining. An aqueous solution of albumen shows the characteristic biuret reaction; if, namely, one adds to a solution containing albumen some caustic alkali and then, drop by drop, some dilute copper sulphate solution, the mixture assumes a reddish color, which gradually turns reddish-violet and violet-blue. However, the biuret test alone does not positively prove the presence of albumen, as many other substances, for instance, those containing the groups CH_2NH_2, $CONH_2$, $CSNH_2$, etc., give the same reaction. For this reason it is important to supplement the biuret reaction with one or more other tests: for instance, treatment with concentrated sulphuric acid and a little sugar, which shows a pretty red color if albumen is present. With corrosive sublimate (bichloride of mercury) and other poisonous salts, albumen forms insoluble compounds; it is, therefore, often used in medicine as an antidote. Consult Schryver, *Chemistry of the Albumens* (London, 1906). See ALBUMINURIA.

ALBU'MINOIDS. See PROTEIDS.

AL'BUMINU'RIA (Lat. *albumen* + Gk. *οὖρον, ouron*, Lat. *urina*, urine). Generally, a symptom of disease of the kidneys; notably Bright's disease (nephritis). It consists of the presence of albumen in the urine. Tests for albuminuria: (1) Pour into a small test tube a little fresh urine, then gently add about one-half the same amount of cold nitric acid. The presence of a white ring at the junction of the liquids indicates albumen. (2) Partly fill a test tube with

fresh urine; add a few drops of acetic acid; boil the top of the liquid. Coagulation indicates the presence of albumen. Physiological albuminuria occurs in young adults, after muscular exercise, and also in some people after cold baths and during indigestion. It may not always be present, even in severe Bright's disease, and it is not necessarily an indication of disease. See BRIGHT'S DISEASE.

ALBUÑOL, äl'bōōn-yōl'. A town of Spain, in the province of Granada, 41 miles southeast of Granada, and about 3 miles from the coast of the Mediterranean (Map: Spain, D 4). It is a well-built town, with clean, paved streets. There are lead mines in the surrounding district, which abounds also in vineyards and is very productive of figs and almonds. The making of wine and brandy and the drying of raisins are the chief occupations of the inhabitants of the town itself. Pop., 1900, 9356; 1910, 7749. The port of Albuñol is a small place called Râbita.

ALBUQUERQUE, *Eng. pron.* äl'bū-kûr'kê. The largest city of New Mexico and the county-seat of Bernalillo Co., on the Rio Grande, 60 miles (direct) southwest of Sante Fe, and on the Atchison, Topeka, and Santa Fe, and the Santa Fe and New Mexico Central railroads (Map: New Mexico, C 3). It has an elevation of 5000 feet, and, on account of the climate, which is especially adapted for the treatment of tuberculosis, is an excellent health resort and attracts from 3000 to 4000 persons annually between October and May. It is the seat of the University of New Mexico, organized 1889, a government school for Indians, founded 1881, six large sanitoriums, and eight denominational and mission schools. The lumber interests are very extensive, and there are railroad shops, a large Indian trading company, a woolen mill, a tie-preserving plant, flour mills, foundries, machine shops, cigar factories, mineral water establishments, etc. Other industries of the city are truck farming, fruit growing, and the mining of lead, zinc, gold, and copper. Albuquerque was founded in 1706, was named in honor of Affonso de Albuquerque, then Viceroy of New Mexico, and was a prominent settlement during the Spanish régime. The church of San Felipe de Neri, established in 1658, still stands. Other notable features are the Harvey Indian Museum, said to contain the finest basket and blanket collection in existence: the federal building; and the Isleta Indian Pueblo. The new town really dates from 1880, and was incorporated as a city in 1892. The mayor is elected annually, and the city council is composed of eight members. The gradual enlargement of the Santa Fe railroad shops is responsible for a continual growth. Pop., 1890, 3785; 1900, 6238; 1910, 11,020; 1913 (est.), 18,000; 1920, 15,157.

ALBUQUERQUE, AFFONSO DE, THE GREAT (1453–1515). Viceroy of the Portuguese Indies. He was born at Alhandra, a town near Lisbon, and is known in the national epics as "the Portuguese Mars" and as "the Portuguese Cæsar." Albuquerque spent his youth in attendance at the palace of King Alfonso V. He took part in the expedition against the Turks, which terminated in the victory of the Christians at Otranto in 1481. In 1489 he became Chief Equerry to King John II. He was assigned to duty on the Indian fleet of 1503 and acquitted himself with such discretion that King Emanuel appointed him Viceroy of the Portuguese possessions in the East in 1506. His predecessor, Francisco de Almeida (q.v.), refused to give up his office, however, and sent Albuquerque as a prisoner to Cananore. In October, 1509, he was released and took over the authority of the Viceroy. Albuquerque captured the fortress of Goa, Feb. 16, 1510, but was forced to evacuate it and retire to Panjim, where he awaited reënforcements from Europe, with whose help, on Nov. 26, 1510, he recaptured the city, which has ever since been the chief seat of Portuguese power and commerce in the East. He gradually completed the conquest of Malabar, Ceylon, the Sunda Isles, the peninsula of Malacca, and (in 1515) the island of Ormuz, at the entrance of the Persian Gulf. He made the Portuguese name respected in the East, and many of the princes, especially the kings of Siam and Pegu, sought his alliance and protection. He maintained strict military discipline, was active, humane, respected, feared by his neighbors, and beloved by his subjects. Notwithstanding his valuable services, Albuquerque did not escape the envy of the courtiers and the suspicions of King Emanuel, who appointed Lopez Soarez, a personal enemy of Albuquerque, to supersede him as Viceroy. This ingratitude affected him deeply. Ishmaël, the Shah of Persia, offered his assistance to resist the arbitrary decree of the Portuguese court, but Albuquerque would not violate his allegiance. A few days afterward, commending his son to the King in a short letter, he died at sea near Goa, Dec. 16, 1515. Emanuel honored his memory and raised his son to the highest dignities in the State. This son, whose name, Braz, or Blasius, was altered to Affonso after his father's death, compiled from the official dispatches and private letters of the Viceroy the *Commentarios do Grande Affonso d'Alboquerque* (printed in Lisbon in 1557; reprinted in 1576 and 1774). A translation, edited by W. de G. Birch, published by the Hakluyt Society of London, in four volumes, 1875–84, is the standard authority for this period of Indian history. See also Stephens, *Albuquerque and the Early Portuguese Settlements in India* (London, 1892), id., *Albuquerque* (Oxford, 1905), and Keller, *Colonization* (Boston, 1908).

ALBUR'NUM (Lat. sap-wood, from *albus*, white). An old name for the sap-wood of ordinary trees (Dicotyledons and Conifers). As the tree adds new layers of wood, the ascending sap abandons the deeper-seated layers, which also become modified through age. This leads usually to a sharp contrast in the appearance of the two regions, the outer region traversed by the sap (alburnum) being lighter in color and consisting of thinner-walled cells than does the older heart wood or "duramen." See WOOD.

ALBURQUERQUE, äl'bōō-kĕr'kâ (Sp. from Lat. *albus*, white + *quercus*, oak-tree). A town of Estremadura, Spain, in the province of Badajoz, 24 miles north of Badajoz, and about 10 miles from the Portuguese frontier (Map: Spain, B 3). It was once fortified. There are factories of tanned leather, soap, chocolate, pottery, and oil, and flour mills. The soil produces rye, grapes, and olives, and there are forests of oak and cork trees. Cattle fairs are held here in May and September. Pop., 1900, 6338; 1910, 11,141.

ALBURY, ąl'bĕr-ĭ. A town of New South Wales, on the Murray River, connected with Victoria by two bridges (Map: New South Wales, G 6). The Murray is navigable by steamers to Albury, which is 1800 miles from

the river's mouth and 190 miles by rail from Melbourne, and 386 miles by rail from Sydney. The town is well known for the wines made in the surrounding districts, from which it also derives considerable trade in agricultural and mineral products. Pop., 1911, 6309.

ALCÆ'US (Gk. *Ἀλκαῖος, Alkaios*). One of the first lyric poets of Greece and contemporary with Sappho. He was a native of Mitylene, on the island of Lesbos, and flourished at the end of the seventh and the beginning of the sixth century B.C. Alcæus was of aristocratic birth and became a leader against the tyrants of his native city, Myrsilus and Melanchrus. Banished from home, he traveled, it is said, as far as Thrace and Egypt. While he was absent, a former comrade in arms, Pittacus, was called to the head of the State by the people, whereupon Alcæus took up arms against him as a tyrant; but in attempting to force his way back he was captured by Pittacus, who, however, generously granted him life and freedom; his last years he spent in Mitylene. Alcæus's odes in the Æolic dialect (see ÆOLIANS)—arranged in 10 books by the Alexandrians—contained political songs bearing on the struggles against the tyrants (some of these he wrote while in exile), hymns, and drinking and love songs. Only fragments remain. Alcæus invented the form of stanza which is named after him, the Alcaic; this Horace, the most successful of his imitators, transplanted into the Latin language (see ALCAICS). The fragments were collected in Bergk's *Poetæ Lyrici Græci*, vol. iii, 4th ed., pp. 147ff. (Leipzig, 1882). Consult Smyth, *Greek Melic Poets* (New York, 1900).

ALCA'HEST. See ALCHEMY.

ALCA'ICS. Certain kinds of Greek and Latin Logaœdic verse, named from the poet Alcæus (q.v.), their reputed inventor. In Greek the greater Alcaic consists of a preliminary syllable (*anacrusis*), a trochaic dipody, cyclic dactyl, and trochaic dipody catalectic:

$$\overset{\vee}{\cdot}\,|\,-\smile|-\smile|-\smile\smile|-\smile|-\wedge$$

The lesser Alcaic is composed of two cyclic dactyls and a trochaic dipody acatalectic,

$$-\smile\smile|-\smile\smile|-\smile|-\overline{\smile}$$

The Alcaic stanza consists of two greater Alcaics, a trochaic quarternarius, with anacrusis,

$$\overset{\vee}{\cdot}\,|\,-\smile\;|-\smile|-\smile|-\overline{\smile}$$

and a lesser Alcaic.

In Horace the second foot in the first three verses of the stanza is an irrational spondee (— >), so that the Alcaic stanza in Horace runs as follows (compare, e.g., Odes 3, 3, 1–4):

Ius ⋮ tum et te|nacem | proposi|ti vi|rum
non ⋮ civium | ardor | prava iu | benti | um,
non ⋮ voltus | instan|tis ty | ranni
mente qua|tit soli|da, neque | Auster

ALCAIDE, ăl-kād'; *Sp. pron.* ål-kī'dā (Sp. from Ar. *al*, the + *qāid*, governor), or **ALCAYDE.** A Moorish title, applied by Spanish and Portuguese writers to a military officer having charge of a fortress, prison, or town. It has also been used to designate a jailer. It is to be distinguished from alcalde, which indicates a civil officer.

ALCALA DE GUADAIRA, ăl'kā-lā' dā gwā-dī'rā (Ar. *al*, the + *Kal'at, Kal'ah*, castle + Sp. *de*, of). The ancient Carthaginian Hienippa (place of many springs). A town of Andalusia, Spain, in the province of Seville, 7 miles east of Seville, partly on a hill, and overlooked by the ruins of an ancient Moorish castle, once one of the most important, as its ruins are still among the finest, in Spain (Map: Spain, C 4). The town is beautifully situated, and on account of the salubrity of the climate is much resorted to as a summer residence by the inhabitants of Seville. It is celebrated for producing a fine grade of bread. There are over 200 flour mills and numerous bakeries in the town which supply Seville. Water comes from a hill above Alcala, which is perforated by tunnels, forming underground canals. Some of the tunnels are believed to be Roman works, but most of them are known to have been made by the Moors. Pop., 1900, 8287; 1910, 8940.

ALCALÁ DE HENARES, ä-nä'rĕs. An old town in Spain, in the province of Madrid, situated on the Henares, 22 miles from the city of Madrid (Map: Spain, D 2). It formerly had a university, founded by Cardinal Ximenes in 1510, and once enjoyed a world-wide fame, second to that of Salamanca alone, which at one period it actually surpassed. In 1836 the university, together with its library, was removed to Madrid. In this library was deposited the original of the celebrated polyglot Bible, which was printed in this town, and called the Complutensian, from the ancient name of the place (Complutum). Alcalá de Henares has, besides, a cavalry school, several interesting churches, and a prison for 800 female convicts, the only institution of its kind in Spain. Its industries include a linen thread factory, soap works, weaving mills of various kinds, and a large leather factory. It is the birthplace of Cervantes, of the Emperor Ferdinand I, and of Catharine of Aragon, first wife of Henry VIII of England. Pop., 1900, 12,056; 1910, 11,728. Consult Calleja, "Bosquejo Histórico de los Colegios Seculares de la Universidad de Alcalá de Henares," in vol. cxvi *Revista Contemporanea* (Madrid, 1899), and Quesada, *Alcalá de Henarez* (Buenos Ayres, 1905).

ALCALA LA REAL, lä rā-äl' (Ar. *al*, the + *Kal'at, Kal'ah*, castle, fortress, and Sp. *la*, the + *real*, royal). A city of Andalusia, Spain, in the province of Jaen, 26 miles northwest of Granada (Map: Spain, D 4). It is situated on a conical hill, in a narrow valley, on the north side of the mountains which separate the province of Jaen from that of Granada, at an elevation of over 3000 feet above sea level. It is very picturesque, irregularly built, with steep and narrow streets and bold towers, and it has a hospital, formerly an abbey, a very fine building. The neighborhood produces grain, olives, wine, and fruit of the finest quality, and the inhabitants are mostly engaged in agriculture. Brandies, flour, and soap are manufactured. There are many electrical plants. Pop., 1900, 15,948; 1910, 17,046. The town first appears in history under the name of *Al Kalá de Beū Zaida*, which was the name of its Moorish lord. In 1341 the place was captured by Alfonso XI, who conferred upon it the title of *La Real*.

ALCALDE, ål-käl'dā (Sp., from Ar. *al*, the + *qādī*, judge). The general title of judicial and magisterial office. It is still used in Spain and in countries in America settled by the Spaniards. The mayor of the *pueblo* or town is called the alcalde and is invested with judicial as well as executive powers.

ALCAM'ENES (Gk. *Ἀλκαμένης, Alkamenēs*).

A famous Athenian sculptor, said to have been a pupil of Phidias. His latest work is dated in 403 B.C., but his most famous works seem to have been executed from 440 to 430 B.C. His greatest achievement was the "Aphrodite in the Garden" at Athens, of which the "Venus Genetrix" statues are probably copies. If Pausanias (q.v.) is right (5, 10, 8) in attributing to an Alcamenes the sculptures in the west pediment of the temple of Zeus, at Olympia, and a statue of Hera in a temple on the road to Phaleron which was destroyed by the Persians, we must assume that there was also an older sculptor of the same name. See GREEK ART.

ALCAMO, äl'kä-mō. A city in Sicily, 840 feet above the sea, and 52 miles by rail, plus 5 miles by highway, southwest of Palermo (Map: Italy, G 10). It has an Oriental appearance in spite of the fact that in 1233, after an insurrection, Frederick II substituted Christian for Saracenic population. The campanile of the cathedral contains a "Crucifixion" by Gagini; the church of San Francisco, statues of the Renaissance period; and the church Dei Minori, a "Madonna" by Rozzolone. Above the town to the south towers Mount Bonifato to the height of 2700 feet, from which is a magnificent prospect of the Bay of Castellamare. The country is agriculturally rich. Pop., 1881, 37,697; 1901, 51,798; 1911, 32,211. Consult "Documenti sulle chiese di Alcamo" in *Archivo Storico Siciliano*, vol. xxv (Palermo, 1900).

ALCANDRE, äl'kän'dr'. In Mademoiselle de Scudéry's *Clélie, Histoire Romaine*, a character representing the young Louis XIV.

ALCÁNTARA, äl-kän'tä-rä (Ar. *al*, the + *kantarah*, bridge). Sometimes identified, but erroneously, as the Norba Cæsarea of the Romans. An old fortified Spanish town, built by the Moors in the province of Estremadura (Map: Spain, B 3). It is noted for the bridge, which was built by Trajan early in the second century. This is 616 feet long and 190 feet high, with six arches, and was constructed of stone without cement. In 1809 the English partially destroyed the bridge, and it suffered again in the civil war of 1836. From that time until 1860, when it was repaired, the inhabitants used a ferry. Pop., 1900, 3097; 1910, 3654.

ALCANTARA. A seaport town of Brazil, in the State of Maranhão, 17 miles northwest of Maranhão, commanding the north side of the entrance to the bay of S. Marcos (Map: Brazil, J 4). It was formerly the capital of the province, but the shallowness of the harbor has prevented its trade from increasing. There are two salt-pits not far from the town. Coffee, hides, sugar, and salt are exported. Pop., about 10,000.

ALCÁNTARA. A western suburb of Lisbon, where, in 1580, the invading Duke of Alva won a victory over the Portuguese. It is now a part of the city.

ALCANTARA, DOCTOR OF. An opera by Julius Eichberg (q.v.), first presented in Boston in 1862.

ALCANTARA, ORDER OF. A religious and military order of knighthood, established about 1176 on the model of the Templars. In 1197 Pope Celestine III confirmed the privileges of the order, imposing the oaths of obedience, poverty, chastity, and eternal war against the Moors. The order was at first known as the Knights of St. Julian, but in 1217 Alfonso IX gave them the town of Alcántara, which he had taken from the Moors. They settled in this town and were known as the Order of Alcántara. In time the grand mastership of the Order was united to the Spanish crown by Pope Alexander VI, in 1495, when the former Grand Master was made Archbishop of Toledo and a Cardinal. In 1546 the Knights were allowed to marry, but were obliged to take an oath to defend the Immaculate Conception. For a time in their early history the Knights of Alcántara acknowledged the superiority of the Knights of Calatrava, but later were independent. In 1835 the Order was suppressed and its property confiscated by the State.

ALCARAZ, äl'kä-räth'. A town of La Mancha, Spain, in the province of Albacete, 36 miles west-southwest of Albacete (Map: Spain, D 3). It stands on the slope of an isolated hill, on the left bank of the Guadarmena, a feeder of the Guadalquivir. The town owes its importance to copper, tin, and zinc mines in the vicinity, which give employment to some of its inhabitants. There are factories of tanned leather, and brandies, and woolen and linen mills. The town is in a great cattle-producing district. Pop., 1900, 4503; 1910, 5405.

AL'CATRAZ', or **PEL'ICAN ISL'AND.** An island in the Bay of San Francisco, nearly 4 miles northwest of the city. It is 1650 feet in length, and it rises 130 feet above the level of the bay. The United States government maintains upon it important fortifications, which command the entrance to the Golden Gate. On its most elevated point has been erected the highest lighthouse on the Pacific coast.

ALCAVALA, äl'kä-vä'lä, or **ALCABALA** (Sp. from Ar. *al*, the + *gabālah*, duty, tax). A duty formerly charged in Spain and her colonies on transfers of property, whether public or private. It was probably instituted in 1341 by Alfonso XI, beginning with 5 to 10 per cent, and by the seventeenth century had increased to 14 per cent of the selling price of all commodities, raw or manufactured, charged as often as they were sold or exchanged. This impost was enforced, despite its ill effect on the commerce of the kingdom, down to the invasion of Napoleon, and indeed, in a modified form, has been continued to the present day. Catalonia and Aragon purchased from Philip V exemption from the tax, and, though still burdened heavily, were in a flourishing state in comparison with districts covered by the alcavala.

ALCAZAR, äl-kä'zär; *Sp. pron.* äl-kä'thär (Sp. from Ar. *al*, the + *kasr*, palace, castle). The name given in Spain to the large palaces built by the Moors, especially royal palaces or those of great emirs. They are often even more in the nature of strongholds than the Florentine palaces, being built around one or more large arcaded courts, with towers at the angles, heavy high walls, and a single gateway with inner and outer gates. Several still exist in the large Spanish cities, dating from Moorish times, as at Malaga, Seville, Toledo, and Segovia. The alcazar differs from the real fortress palace or acropolis fort, called "kal'at" (such as the Alhambra), in being within, instead of outside, the city streets. The term would apply, however, to any palace throughout Mohammedan countries. The best-preserved imitation of this type in Christian art is the princely palace at Ravello, near Naples, built under the influence of Mohammedan art.

ALCAZAR, or **KASR-EL-KEBIR.** A town of Morocco, on the Luccos, 23 miles from its

mouth, at El Araish, on the Atlantic, and 58 miles south of Tangiers. The town is the centre of a fruit-growing district, and wine is manufactured. It was built in the twelfth century and is uninviting because of winter floods which make fever prevalent. The chief edifice is an ancient mosque. King Sebastian of Portugal was defeated and killed here in a battle on Aug. 4, 1578. Early in June, 1911, the Spaniards sent a vessel to El Araish and thence dispatched a column to Alcazar, an act which was resented by powers interested in the Moroccan situation, who claimed violation of existing treaties. Spain denied the charge and defended her action in landing troops on the ground that the movement was aimed solely to defend the city against hostile pretenders and to offer protection to Spanish subjects in a danger-infested city. Pop., about 25,000. See MOROCCO, *History*.

ALCAZAR DE SAN JUAN, ål-kä′thär dā sän hwän′. A town of Spain, in the province of Ciudad Real, 92 miles by rail from Madrid (Map: Spain, D 3). It lies in a mountainous region in the vicinity of extensive iron mines and soda and alkali deposits. It has a number of soap, dagger, powder, and saltpetre factories and carries on a large trade in wine. The environs of Alcázar are believed to have been described by Cervantes in *Don Quixote*. This town is one of many which claims the author as a native. Pop., 1900, 11,292; 1910, 13,647.

ALCE′DO (Lat.), **ALCY′ONE,** ăl-sī′ō-nē (Gk. Ἀλκυόνη, *Alkyonē*). The names of genera of kingfishers, in allusion to a classic myth. See ALCYONE and KINGFISHER.

ALCEDO Y HERRERA, ål-thā′dō ē ār-rā′rä, ANTONIO. A Peruvian soldier and historian, whose *Diccionario geográfico-histórico de las Indias Occidentales*, published at Madrid in four volumes (1786–89), supplies much exclusive information concerning the middle period of Spanish-American history. The original work was suppressed by the Spanish government. An English translation by G. A. Thompson (London, 1812–15) contains considerable additions. Alcedo was also the compiler of an important bibliographical work, the *Biblioteca Americana*, the numerous manuscript copies of which are frequently cited by writers on early American bibliography.

ALCESTE, ål-sĕst′. 1. A character in Molière's play entitled *Le Misanthrope* (q.v.). 2. A name used as a pseudonym by a number of modern French writers, among them Amédée Achard, Alfred Assolant, Louis Belmontet, Hippolyte de Castille, and Edouard Laboulaye. 3. A tragic opera by Gluck, first performed with an Italian text, Dec. 16, 1767, at Vienna. Ten years later it was produced in French at Paris. The printed score appeared in 1768 and contains an elaborate preface in which Gluck lays down the principles that guided him in his reform of the opera. See GLUCK; OPERA.

ALCESTER, ôl′stēr, FREDERICK BEAUCHAMP PAGET SEYMOUR, BARON (1821–95). An English admiral. He was born in London, educated at Eton, and entered the navy in 1834. He became a captain in 1854, a rear-admiral in 1870, and an admiral in 1882. In 1880 he was in command of the allied fleet which made a demonstration off the Albanian coast in order to compel the Turks to cede Dulcigno to Montenegro. For this service he was created G. C. B. In the Egyptian War of 1882 he commanded the British fleet at the bombardment of Alexandria. He was raised to the peerage later in the same year.

ALCES′TIS. See ADMETUS.

AL′CHEMIL′LA. See LADY'S MANTLE.

AL′CHEMIST, THE. A noted comedy by Ben Jonson, acted in 1610, printed in 1612. It makes a jest of the then popular belief in the philosopher's stone and the elixir of life; its leading character, Subtle, is a quack who deludes Sir Epicure Mammon and other credulous persons till he is finally exposed.

ALCHEMY (Ar. *al*, the + *kīmīyā*, from late Gk. χημ[ε]ία, *chēm[e]ia*; see below and under CHEMISTRY). A term applied to the chemistry of the Middle Ages, but more commonly to the search after the transmutation of base metals into gold. "Alchemy," Paracelsus defines, "is the science which teaches how to change one kind of metals into another." The origins of alchemy are buried in remote antiquity. It is impossible to tell when man, surrounded as he is in nature by a great variety of substances and materials, first acquired some knowledge of the properties and transformations of some of these materials, or when he began theorizing about the relationships that almost obviously exist between many of them. A body of knowledge, kept jealously secret, was gradually accumulated by the Egyptian priests and is referred to as the Sacred Art of Egypt. The Egyptians possessed considerable practical knowledge of metallurgy, of the arts of glass-making, bleaching, and embalming; and Mary the Jewess, who was said to have been the sister of Moses, was credited by the alchemists with the invention of a form of the water-bath. There are grounds for believing that the very word "chemistry" is derived from *Chēmi*, the most ancient name of Egypt, while the name "Hermetic art," frequently applied to alchemy, is derived from the name of its alleged founder, Hermes Trismegistos, who is believed to have been the Egyptian priest Hermon, of the first century of our era.

The Greek philosophers certainly devoted much speculation to the relationship of the various forms of matter, and the conception that appealed to them most was that of a universe made up of a single primordial matter, of which all substances are but outwardly differing forms. Thales considered water as that primordial substance. Later the idea became current of earth, water, air, and fire, either as distinct elements or as attributes variously associated with a primordial matter, producing the various solids and liquids and rendering these either cold or hot. That the idea of the essential unity of all matter, together with such phenomena as the well-known "transmutation" of ores into metals, should have suggested the transmutation of the commoner metals into gold, is natural; and, as a matter of fact, efforts in this direction began to be made even during the classical period of antiquity. The Arabs, and through them mediæval Europe, inherited both the alluring problem and its underlying conception of the world of matter, and some of the best men of the age devoted themselves to the attack of the transmutation problem with unparalleled perseverance and assiduity. "They are not given to idleness," says Paracelsus, ". . . but diligently follow their labors, sweating whole days and nights by their furnaces."

Practical contact with natural phenomena in the laboratory, and continual failure of the main

search, led to a variety of speculative working-assumptions, and these, often supported by nothing but the fame of their authors, turned into dogmas taught with unhesitating assurance as established truth. The mere desire to discover a substance which would help transform common metals into gold begot a universal belief in the actual existence of such a substance, and the "philosopher's stone," "magisterium," or "great elixir" became as much a reality in the alchemist's world as the actual substances which he was handling. Geber, the famous master of Arabian alchemy, taught that matter was composed of three elements: mercury, sulphur, and arsenic, of which the first two are contained in all metals. He, too, imagined the existence of a further substance; only, Geber's "magisterium" had the power of curing all disease.

Subsequently the properties of the different magisteria were assumed to be possessed by one and the same substance, and the belief spread that the philosopher's stone could transmute all metals into gold, as well as cure all diseases, restore youth, and indefinitely prolong life. At times one or more of these interesting properties were attributed to some actually known substance. Thus, a solution of gold was believed by Geber, Roger Bacon, and many others to be the very elixir of life, and Raymond Lully was inclined to attribute the same power to alcohol. Paracelsus believed in the existence of an "alcahest," a substance possessing, not only the several properties of the philosopher's stone, but also the power of dissolving everything placed in contact with it. According to Paracelsus, whichever of the four kinds—salts, sulphurs, mercuries, or mixts—a given substance may belong to, it also contains the alcahest, or "quintessence."

A pure metal, as we conceive it to-day, contains nothing but itself; it is, as we sometimes say, 100 per cent pure. The alchemist had no such definite conception, and such expressions as "a gold *infinitely* superior to any heretofore seen" are but too frequently met with in alchemical literature. Of course, the adept might expect anything he desired in a substance purified to infinity: many expected to find the *soul* of the substance altogether free from material dross. But the intellectual chaos in which the alchemists were groping in their researches was still further deepened by the obscurity of language employed in the publications of the period. Not only, as Kunckel complained, was the sulphur of one writer not the sulphur of another, but the sages seemed to feel a certain delicacy about uncovering the nakedness of truth to the gaze of the vulgar and quite intentionally obscured the meaning of their utterances. Needless to say, the initiated suffered more than the vulgar from this cabalistic obscuration of style.

Astrological superstition added a further share to the confusion of thought, and the adverse position of the planets was often held responsible for the failure of a "projection." Above all, however, the growth of correct knowledge was impeded by widespread fraud and imposture among the adepts. For while many, especially among the earlier alchemists, were prompted by genuine scientific curiosity and carried on the search of the "stone" in all sincerity, making important inventions and discoveries in course of their search, not a few made use of the Hermetic art for extortionary purposes. A notorious example of the latter class is Giuseppe Balsamo, better known as Count Cagliostro, who, with the aid of his beautiful wife and other confederates, amassed a great fortune by demonstrations of the art of changing common metals into gold and by similar practices. False stories, too, abounded in alchemical literature. Raymond Lully must have been genuinely affected when he observed the "transmutation" of iron into copper on plunging a bar of iron into a solution of copper salt But Helvetius is plainly prevaricating when he describes in minute detail how, in January, 1667, he obtained from the Hermetic artist Elias—a man of middle height, honest, grave countenance, straight black hair, etc.—a small piece of the philosopher's stone, sufficient to change just six drams of lead into gold; how he, Helvetius, and his wife melted that quantity of lead in a crucible and added the stone; whereupon, in a quarter of an hour, he "found that the whole mass of lead had been turned into the finest gold"!

In the light of the recent conception of the atoms of matter as constituted by large numbers of the still smaller atoms of electricity, the ancient belief in the essential unity of all substances cannot be scoffed at. To be sure, our modern treasure of definition and practical analytical method renders alchemical practices in the narrower sense of the term quite absurd and robs of all reason the existence of such an organization as the present-day "Alchemical Society of France." The substances which we class as elements have passed essentially unchanged through a myriad of chemical and physical processes; they are not affected by violently explosive chemical reactions, nor by powerful galvanic currents, nor by the heat of the electric arc or even of the sun. Only radio-activity, a process before which we still remain as passive spectators, unable either to arrest it or bring it about at will, has demonstrated the possibility of transmutation in nature. For the formation of the element helium from the element radium, discovered by Sir William Ramsay, is a genuine and thoroughly established transmutation of one chemical element into another.

Consult: Justus von Liebig, *Familiar Letters on Chemistry*, original in German, exists in translations (London, 1851); F. Hoefer, *Histoire de la chimie* (Paris, 1869); G. F. Rodwell, *The Birth of Chemistry* (London, 1874); Berthelot, *Les origines de l'alchimie* (Paris, 1885); Berthelot et Ruelle, *Collection des anciens alchimistes grecs* (4 vols., Paris, 1887–88); Kopp, *Die Alchemie in älterer und neuerer Zeit* (2 vols., Heidelberg, 1886); Berthelot, *Introduction à l'étude de la chimie des anciens et du moyen âge* (Paris, 1889); Berthelot, *La chimie au moyen âge* (3 vols., Paris, 1893); *The Hermetic and Alchemical Writings of Bombast of Hohenheim* (Paracelsus), trans. by A. E. Waite (2 vols., London, 1894); M. M. Pattison Muir, *The Alchemical Essence and the Chemical Element* (London and New York, 1894); M. M. Pattison Muir, *The Story of Alchemy and the Beginnings of Chemistry* (New York, 1903); Redgrove, *Alchemy, Ancient and Modern* (London, 1911). As an example of twentieth-century alchemical writing, consult F. Jollivet Castelot, *La Science Alchemique* (Paris, 1904).

ALCHYMIST, Der, dĕr äl'kĕ-mĕst. A German opera by Spohr, the text being by Pfeiffer, produced at Cassel, July 28, 1830. It is founded on Washington Irving's tale of *The Alchemist.*

ALCIATI, äl-chä'tē, Andrea (1492–1550).

An Italian jurisconsult of the Renaissance, successively professor of law in the universities of Avignon, Bourges, Bologna, Pavia, and Ferrara. He improved the method of studying Roman law by substituting historical research for the servile forms of the glossarists. He wrote many legal works, including commentaries on the Code of Justinian and the Decretals, a history of Milan, notes on Tacitus and Plautus, and a *Book of Emblems* (1522), or moral sayings, in Latin verse, which has been greatly admired. Consult Ernst von Mueller, *Andreas Alciati* (1907).

ALCIBIADES, ăl'sĭ-bī'ă-dēz. A tragedy in five acts by Thomas Otway, produced in 1675 at Dorset Garden Theatre, London, with Betterton in the title rôle.

ALCIBIADES (Gk. *'Αλκιβιάδης, Alkibiadēs*) (c.450–404 B.C.). An Athenian politician and general. He was the son of Clinias and Dinomache, and belonged to the class of the Eupatridæ. He was born at Athens, lost his father in the battle of Coronea in 446 B.C., and was in consequence educated in the house of Pericles, his uncle. In his youth he gave evidence of his future greatness, excelling both in mental and bodily exercises. His handsome person, his distinguished parentage, and the high position of Pericles procured him a multitude of friends and admirers. Socrates was one of the former and gained considerable influence over him, but was unable to restrain his love of luxury and dissipation, which found ample means of gratification in the wealth that accrued to him by his union with Hipparete, the daughter of Hipponicus. His public displays, especially at the Olympic Games, in 420 B.C., were incredibly expensive. He bore arms for the first time in the expedition against Potidæa (432 B.C.), where he was wounded, and where his life was saved by Socrates, a debt which he liquidated eight years after at the battle of Delium by saving, in his turn, the life of the philosopher; but he seems to have taken no considerable part in political matters till after the death of the demagogue Cleon, when Nicias (q.v.) brought about a treaty of peace for 50 years between the Athenians and the Lacedæmonians, 421 B.C. Alcibiades, jealous of the esteem in which Nicias was held, set himself at the head of the war party and persuaded the Athenians to ally themselves with the people of Argos, Elis, and Mantinea, and did all in his power to stir up afresh their old antipathy to Sparta; the allies, however, were defeated at Mantinea in 418. It was at his suggestion that the Athenians, against the vigorous opposition of Nicias, engaged in the celebrated enterprise against Syracuse (q.v.), to the command of which he was elected, with Nicias and Lamachus. But while preparations were being made, it happened that during one night all the statues of Hermes (q.v.) in Athens were mutilated. The enemies of Alcibiades threw the blame of this mischief upon him, but, fearing that, if tried at once, he would be acquitted through the support of the soldiers, with whom he was very popular, postponed impeachment of him till he had set sail for Sicily. They then stirred up the people against him to such a degree that he was recalled in the autumn of 415 B.C. to stand his trial. See ANDOCIDES.

On his way home, Alcibiades landed at Thurii in Italy, fled from the fleet, and betook himself to Sparta, where, by conforming to the strict manners of the people, he soon became a favorite. He induced the Lacedæmonians to send assistance to the Syracusans, under Gylippus (q.v.), persuaded them to occupy permanently a post at Decelea in Attica, to form an alliance with the King of Persia, and, after the unfortunate issue of the Athenian expedition in Sicily, to support the people of Chios in their endeavors to throw off the yoke of Athens. He went thither himself and raised all Ionia in revolt against Athens. But Agis (q.v.) and the other leading men in Sparta, jealous of the success of Alcibiades, ordered their generals in Asia to have him assassinated. Alcibiades discovered this plot and fled to Tissaphernes (q.v.), a Persian satrap, who had orders to act in concert with the Lacedæmonians. He now resumed his old manners, adopted the luxurious habits of Asia, and made himself indispensable to Tissaphernes. He represented to the latter that it was contrary to the interests of Persia entirely to disable the Athenians. He then sent word to the commanders of the Athenian forces at Samos that he would procure for them the friendship of the satrap if they would control the extravagance of the people and commit the government to an oligarchy. This offer was accepted, and in 411 B.C. Pisander (q.v.) was sent to Athens, where he had the supreme power vested in a council of 400 persons. When it appeared, however, that this council had no intention of recalling Alcibiades, the army at Samos chose him as their commander, desiring him to lead them instantly to Athens and overthrow the tyrants. But Alcibiades did not wish to return to his native country till he had rendered it some service, and he accordingly attacked and defeated the Lacedæmonians by sea and land. Tissaphernes now ordered him to be arrested at Sardis on his return, the satrap not wishing the King to imagine that he had been accessory to his doings. But Alcibiades found means to escape, placed himself again at the head of the army, beat the Lacedæmonians and the Persians at Cyzicus, 410 B.C., took Cyzicus, Chalcedon, and Byzantium, restored to the Athenians the dominion of the sea, and then returned to his country (407 B.C.), to which he had been formally invited. He was received with general enthusiasm, as the Athenians attributed to his banishment all the misfortunes that had befallen them.

The triumph of Alcibiades, however, was not destined to last. He was again sent to Asia with 100 ships; but, not being supplied with money for the soldiers' pay, he was obliged to seek assistance at Caria, where he transferred the command in the meantime to Antiochus, who, being lured into an ambuscade by Lysander (q.v.), lost his life and part of the ships. The enemies of Alcibiades took advantage of this to accuse him and appoint another commander. Alcibiades went into voluntary exile at Pactye in Thrace, one of the strongholds which he had built out of his earlier spoils. But being threatened here with the power of Lacedæmonia, he removed to Bithynia, with the intention of repairing to Artaxerxes, to gain him over to the interests of his country. At the request of the Thirty Tyrants of Athens, and with the concurrence of the Spartans, Pharnabazus, a satrap of Artaxerxes, received orders to put Alcibiades to death. He was living at this time in a castle in Phrygia; Pharnabazus caused it to be set on fire during the night. As his victim was endeavoring to escape from the flames, he was pierced with a volley of arrows. Thus perished Alcibiades (404 B.C.), about the forty-fifth year

of his age. He was singularly endowed by nature, being possessed of the most fascinating eloquence and having in a rare degree the ability to win and to govern men. Yet in all his transactions he allowed himself to be directed by external circumstances, without having any fixed principles of conduct. On the other hand, he possessed that boldness which arises from conscious superiority, and he shrank from no difficulty, because he was never doubtful concerning the means by which an end might be attained. Consult: The *Lives*, by Plutarch and Nepos; Grote, *History of Greece* (New York, 1853–56); Hertzberg, *Alkibiades, der Staatsmann und Feldherr* (Halle, 1853); Houssaye, *Histoire d'Alcibiade* (2 vols., Paris, 1873). The *Life* by Plutarch has been newly translated, with valuable notes, by B. Perrin (New York, 1912).

ALCI'DA: GREENE'S METAMORPHOSES. A pamphlet by Robert Greene, of which the first known edition dates from 1617, though it was licensed in 1588 and probably published soon after. It contains stories illustrating the ills that result from feminine vanities.

ALCID'AMAS (Gk. *'Αλκιδάμας, Alkidamas*). A Greek rhetorician, pupil of Gorgias and the last of the Sophistical school, of the fourth century B.C. He was a native of Elæa, in Aiolis in Asia Minor, but gave instruction in eloquence at Athens. The only complete extant declamations attributed to him are: *'Οδυσσεύς*, in which Odysseus accuses Palamedes of treachery to the Grecian cause during the siege of Troy (compare Vergil, *Æneid*, iii, 81 ff.); and *Περὶ Σοφιστῶν*, concerning the Sophists. The latter oration, which is said to have been directed chiefly against Isocrates, the contemporary of Alcidamas, in support of the teachings of Gorgias, has been published by Blass in his second edition of *Antiphon* (p. 193). The *'Οδυσσεύς*, however, was not written by Alcidamas. Consult Vahlen, *Der Rhetor Alcidamas* (Vienna, 1864), and Blass, *Die Attische Beredsamkeit* (Leipzig, 1892).

ALCI'DES. A patronymic of Hercules, from the name of his grandfather, Alcæus.

AL'CIMUS. A high priest of the Zadokite family, born about 200 B.C., and appointed to his office probably first by Antiochus V, Eupator, and then, after he had been driven away by the Maccabees, by Demetrius Soter (162 B.C.). He was a leader in the Hellenistic party which opposed the Maccabees, and is said on the occasion of the defeat of the latter (April, 160 B.C.) to have torn down the wall of the court of the inner temple at Jerusalem, probably for the purpose of rebuilding it on a more magnificent scale. See the discussions of his career in Wellhausen, *Israelitische und jüdische Geschichte* (4th ed., 1907), and Büchler, *Tobiaden und die Oniaden im II Makkabäerbuche* (Vienna, 1899).

ALCINOUS, ăl-sĭn'ō-ŭs (Gk. *'Αλκίνοος, Alkinoös*). A mythical King of the mythical Phæacians, grandson of Poseidon. His daughter, Nausicaa, rescued the shipwrecked Odysseus, who was entertained and sent home by Alcinoüs and his Queen, Arete. His people were skilled seamen, but luxurious, and his domain Scheria, a Grecian fairyland. Later tradition identified Scheria with the island of Corcyra (Corfu). Consult Homer, *Odyssey*, vi–viii.

AL'CIPHRON (Gk. *'Αλκίφρων, Alkiphrōn*). A Greek rhetorician who flourished probably about the close of the second century A.D. He was the author of 118 letters in three books, which profess to be epistles written by common people—peasants, fishermen, courtesans, and parasites. Various historical personages are named as if living: these all belong to Athens of the fourth century B.C. The scene, too, is always Athens or its neighborhood. The dialect also is Attic, handled in the main with correctness and elegance. Their style is pure and their form excellent; they are valuable as character sketches, which picture clearly Athenian life of the fourth century B.C.; and the letters of the courtesans, being based on the new comedy, especially on lost plays of Menander, assist us to recreate that literature. Edited by Meineke, in *Fragmenta Comicorum Græcorum*, vol. iv (Leipzig, 1853); Wagner (Paris, 1878); and Hercher, in his *Epistolographi Græci* (Paris, 1873). There is an English translation by Beloe (London, 1890).

ALCIPHRON. The hero of Thomas Moore's novel, *The Epicurean*, published in 1827, to which was appended, in 1839, the poem entitled *Alciphron*, in which the author had first taken up the theme.

ALCIPHRON, or **THE MINUTE' PHILOS'OPHER.** A work by Bishop Berkeley, written at his home in Rhode Island, and published in 1732, after his return to England. It is a dialogue, in which Alciphron, a skeptic, is made the chief speaker for the sake of showing the weakness of the infidel's position.

ALCIRA, ăl-thē'rȧ. A town of Spain, in the province of Valencia, 20 miles south by west of Valencia, on an island in the river Jūcar (Map: Spain, E 3). It is surrounded by old walls with strong towers. The principal streets are wide, but the town is ill built. The main buildings are three churches, six monasteries, and a theatre. The surrounding country is fertile, and there are groves of orange and palm trees, but, owing to the rice swamps, there is much malaria. Fruit and rice are the principal articles of trade. The many canals admirably illustrate the system of irrigation introduced by the Moors, and the town was one of their important trade centres. It has two fine bridges, and there is a remarkable stalactitic cavern in the vicinity. Pop., 1900, 19,906; 1910, 22,057. Alcira was known in Roman times as Sætabicula and was the chief seat of the tribe of the Contestani. The district about Alcira is sometimes called the garden of the kingdom of Valencia.

ALCMÆ'ON (Gk. *'Αλκμαίων, Alkmaiōn*). In Greek legend, the son of Amphiaraüs (q.v.) and Eriphyle (q.v.), and brother or father of Amphilochus. He was the leader of the Epigoni (q.v.), who captured Thebes to avenge the death of their fathers in the War of the Seven (see SEVEN AGAINST THEBES). As Eriphyle had betrayed her husband to his death, Amphiaraüs ordered his son to kill her. For this act madness came upon Alcmæon, and he was pursued by the Furies. In his flight he came to Psophis, in Arcadia, whose King, Phegeus, sought to purify him and gave him his daughter Arsinoë. Alcmæon gave her the necklace and the peplus of Harmonia, the bribe by which Eriphyle had been induced to persuade Amphiaraüs to take part in the War of the Seven. Presently the crops failed, and Alcmæon, uncured and driven by the Furies, went to the river-god Acheloüs (q.v.), who also purified him and gave him his daughter, Callirhoë. For her he took his gifts from his former wife under pretense of dedicating them at Delphi, that he might be com-

pletely cured. When his father-in-law heard of this deceit, he sent his sons to exact vengeance; they killed Alcmæon, but Alcmæon's sons by Callirhoë took bloody vengeance at her instigation. There are indications of a cult of Alcmæon at Psophis, where his tomb was shown, and at Thebes. Later stories told of Alcmæon's conquest of Acarnania (q.v.), apparently as a mythical prototype of the Corinthian civilization of that region.

ALCMÆON (Gk. *Ἀλκμαίων, Alkmaiōn*). A Greek physician and naturalist, who lived in the latter half of the sixth century B.C. He was a native of Crotona, in Italy, and is said to have been a pupil of Pythagoras. He made important discoveries in anatomy and was the first to practice dissection. He wrote a book *On Nature*, of which we have fragments.

ALC'MÆON'IDÆ (Gk. *Ἀλκμαιωνίδαι, Alkmaiōnidai*, descendants of Alcmæon). A distinguished family in ancient Athens, whose founder, Alcmæon, according to tradition, came from Pylos, Messenia. One of them was the Archon Megacles, who, about 612 B.C., slew the conspirator Cylon and his followers at the altars where they had fled, in spite of his promise to spare them. For this sacrilege the whole family was banished, about 596 B.C. They maintained a conflict for many years with Pisistratus and his sons, however, and in 510 were finally brought back to Athens by the help of the Spartans, who were led to aid them by the partiality of the Delphic oracle. Clisthenes (q.v.), then the head of the family, was the noted legislator. Even more famous members of it were Pericles and Alcibiades.

ALC'MAN (Gk. *Ἀλκμάν, Alkman*). A poet of the second half of the seventh century B.C., who is considered the founder of Dorian lyric (choral) poetry. He was born at Sardis, the capital of Lydia, in Asia Minor, but was probably of Greek extraction. A doubtful tradition said that he was a slave; in any case, he attained a high position at Sparta, where he made his home, and became teacher of the State choruses. In the Hellenistic period six books of his poems were current, comprising pieces called partheneia, hymns, hyporchemes, pæans, erotica, and hymenaia. (See PÆAN.) He was counted the founder of erotic poetry, and reached great perfection in his partheneia. His dialect was the Dorian, but his verses show many Æolian characteristics. Alcman occupied the first place in the Alexandrian Canon. The bucolic poets regarded him as their predecessor, and we know that he was read with pleasure in the second century A.D., although his dialect was then considered harsh and unmusical. Only fragments of his poetry remain, edited in Bergk's *Poetæ Lyrici Græci*, vol. iii, pp. 14 ff. (4th ed., Leipzig, 1882); a fragment discovered in 1896 is published in *Oxyrhynchus Papyri*, vol. i. No. VIII. See also H. W. Smyth, *Greek Melic Poets* (New York, 1900).

ALCME'NE, ălk-mē'nē (Gk. *Ἀλκμήνη, Alkmēnē*). In Greek mythology, the daughter of Electryon, King of Mycenæ, and wife of Amphitryon (q.v.), mother of Heracles, by Zeus, who came to her in the form of her husband. This story is well told in the *Amphitruo* of Plautus (q.v.). She was the mother of Iphicles by Amphitryon.

AL'CO (native name). A small, long-haired dog of tropical America, known both wild and in a domesticated condition. In the latter state it is gentle and home-keeping; and as its ears are pendulous it is considered by most authorities as a species introduced in the early days of the Spanish conquest and since become partly feral. Consult Gosse, *A Naturalist's Sojourn in Jamaica* (London, 1851).

ALCOBAÇA, ăl'kō-bä'să. A town in the province of Estremadura, Portugal, situated between the Alcoa and Baca rivers, 4 miles east of Vallado, the nearest railway station. On the west Alcobaça is dominated by a range of hills crowned with Moorish ruins. The most notable feature of the town is the Cistercian abbey of Santa Maria, one of the finest and richest monasteries in the world. It contains the tombs of Inez de Castro and of some Portuguese monarchs. The buildings comprise an imposing church, in early Gothic, five cloisters, seven dormitories, a library containing over 25,000 volumes, and a hospedaria. It is supplied with water by a tributary of the Alcoa, which flows through the enormous kitchen. The abbey was built from 1148 to 1222, was sacked by the French in 1810, and was secularized in 1834. The north part of the structure is now used as a barracks for cavalry. Pop., 1900, 1562.

ALCOCK, ôl'kŏk, Sir RUTHERFORD (1809–97). An English diplomatist and author, born in London. He studied medicine and became distinguished as an army surgeon and hospital inspector and afterward as a lecturer on surgery. In 1844 he was sent as British Consul to China, and he served in Amoy, Fuchow, and Shanghai. He won such distinction in these services that, in 1858, he was made Consul-General in Japan. Here great difficulties were experienced: Japan was in a state of feudal anarchy, assassination was rife, Englishmen treacherously assaulted, the British legation itself twice attacked and once burned, yet Alcock stood by his post. Under his influence, Shimonoseki was bombarded in 1864, after which, the Yeddo government refusing to open more ports to trade, an indemnity of $3,000,000 was extorted, part of which was paid by the Mikado's government in 1874. Recalled in 1865 from Japan, he was appointed Minister Plenipotentiary to Peking and served from 1865 to 1871. It was Alcock who first brought Japanese art to the world's notice, in the London World's Exposition (1862). He was, from 1876, for a long time the president of the Royal Geographical Society. His publications include *Life's Problems; The Capital of the Tycoon* (1863), *Art and Industries in Japan* (1878), and many geographical and other articles in periodicals. For further account of his career, consult R. J. Mitchie, *An Englishman in China during the Victorian Era* (Edinburgh, 1900).

ALCOFRIBAS NASIER, ål'kō'frē'bä' nâ'syâ'. The pseudonym, formed anagrammatically from his own name, under which François Rabelais published his *Pantagruel*, etc.

AL'COHOL (Ar. *al*, the + *kohl*, exceedingly fine powder of antimony for painting eyebrows; hence the quintessence of something; finally rectified spirits, alcohol), or **ETH'YL ALCOHOL**, C_2H_5OH, often called spirits of wine. A chemical compound of carbon, hydrogen, and oxygen that has been known and extensively used from the earliest times. It is consumed in very large quantities in the form of intoxicating liquors and is used for various purposes in the arts and manufactures. The alcohol of commerce, in its various forms, is all made by fermentation.

Natural products containing a large amount of starch, such as grain, rice, potatoes, etc., are reduced with water to a paste, and a small quantity of malt is added to produce fermentation, by which the starch is in a short time transformed into dextrin and a kind of sugar called maltose, according to the following chemical equation:

$$\underset{\text{Starch}}{(C_6H_{10}O_5)_3} + H_2O = \underset{\text{Dextrin}}{C_6H_{10}O_5} + \underset{\text{Maltose}}{C_{12}H_{22}O_{11}}$$

Then yeast, which consists of living plant cells, is added to set up a new process of fermentation, by which the maltose is converted into alcohol, according to the following chemical equation:

$$\underset{\text{Maltose}}{C_{12}H_{22}O_{11}} + H_2O = 4\underset{\text{Alcohol}}{C_2H_6O} + 4CO_2$$

The manufacture of alcohol thus involves two distinct processes of fermentation; for neither can alcohol be obtained from maltose by the action of the *diastase* of malt, nor can maltose be obtained from starch by the action of yeast. Small quantities of organic substances are usually produced along with ethyl alcohol during fermentation; one of these is the well-known *fusel oil*, a mixture of alcohols chemically allied to ordinary alcohol and containing mainly amyl alcohols. (See AMYL ALCOHOL.) A small quantity of fusel oil is contained even in the "raw spirit," a strong alcohol obtained by distilling the weak solution obtained through fermentation. To free the raw spirit from fusel oil, which is highly injurious, it is mixed with water, filtered through charcoal, and subjected to a process of fractional distillation, the intermediate fractions, called rectified spirit, being practically free from fusel oil. The presence of the latter in spirituous liquors may be readily detected by adding a few drops of colorless aniline and two or three drops of sulphuric acid, a deep-red coloration being produced in the presence of fusel oil. The flavor of alcoholic beverages is due to the presence of various organic substances often produced by modifying the process of manufacture. Thus both the flavor and color of beer depend largely on the temperature and duration of heating of the malt before using it; the flavor of Scotch whisky is derived mainly from the peat used in drying the malt, etc. The quantity of alcohol contained in various beverages is very different: gin, rum, and the strong liquors contain from 40 to 50 per cent of alcohol; port contains from 15 to 25 per cent; sherry or madeira, from 15 to 20 per cent; champagne and burgundy, from 10 to 13 per cent; hock, from 10 to 12 per cent; claret, from 8 to 12 per cent; cider and strong ale, 5 to 9 per cent; beer or porter, from 2 to 5 per cent; koumyss, from 1 to 3 per cent. The *United States Pharmacopœia* fixes the specific gravity of rectified spirit at 0.820, which corresponds to 91 per cent of absolute alcohol. The amount of alcohol in spirituous liquids is estimated by observing their specific gravity; but as they usually contain other substances besides water, they must be distilled before a determination can be made. Alcohol in its various forms, especially if taken habitually, is highly injurious to health. While it promotes very powerfully the secretion of the gastric juice, it sets up inflammation of the gastric walls and gradually produces chronic dyspepsia. (See ALCOHOL, PHARMACOLOGY, etc.). The effects of chronic alcohol poisoning are described in the article ALCOHOLISM (q.v.).

Alcohol cannot be entirely freed from water by distillation. Anhydrous or absolute alcohol may be prepared by boiling strong commercial alcohol with unslaked lime until a small sample is turned yellow by barium oxide; to remove the last traces of water the alcohol thus obtained may be further treated with anhydrous copper sulphate and finally distilled over a small quantity of metallic calcium. It must, however, be remembered that drying with metallic calcium introduces into the alcohol a small amount of ammonia, derived from the nitrogen usually present in calcium in the form of calcium nitride. The presence of traces of water may be readily detected by the use of dehydrated copper sulphate, which remains white only in perfectly anhydrous alcohol. Absolute alcohol acts as a deadly poison. It is a colorless liquid of specific gravity 0.8062 at 0°; it boils at 78° and solidifies at about 130° below zero C. It is extremely hygroscopic and mixes in all proportions with water, ether, chloroform, carbon disulphide, and many other liquids. It is also an excellent solvent for many substances, such as oils, gums, resins, and a number of inorganic compounds, and is thus largely employed in the preparation of tinctures, varnishes, dyes, perfumes, etc. The presence of alcohol in aqueous solutions is best detected by the so-called iodoform reaction: small quantities of iodine and of caustic potash almost immediately produce in the presence of alcohol a precipitate of iodoform, which may be readily recognized by its odor. In this manner it has been demonstrated that minute quantities of alcohol are present in the soil, in water and in the atmosphere. Small quantities of alcohol have likewise been found in the urine in diabetes. When acted on by an excess of dry chlorine gas, alcohol is transformed into chloral, from which, by the action of alkali, very pure chloroform may be obtained; chloroform may also be prepared from alcohol directly by the action of bleaching powder (chloride of lime). When warmed with concentrated sulphuric acid, alcohol yields ordinary ether. Alcohol is thus extensively employed in the manufacture of chloral, chloroform, and ether.

During the Middle Ages aqueous alcohol was prepared by the distillation of fermented material. Anhydrous alcohol was prepared first by Lowitz in 1796, and its composition was determined first by Saussure in 1808. See FUEL; METHYLATED SPIRIT.

Consult: Stevenson, *A Treatise on Alcohol, with Tables of Specific Gravities* (London, 1888); Maercker, *Handbuch der Spiritusfabrikation* (Berlin, 1889; French trans., 2 vols., Lille, 1889); Roux's series of seven books on the manufacture of alcoholic beverages, published under the general title *La fabrication de l'alcool* (Paris, 1885–92); Brachvogel, *Industrial Alcohol: Its Manufacture and Uses* (New York, 1907); Herrick, *Denatured or Industrial Alcohol* (New York, 1907); Wright, *Handbook on the Distillation of Alcohol from Farm Products* (New York, 1907); and *Brenneri-Lexicon*, edited by Delbrück (Berlin, 1912 ff.).

ALCOHOL, PHARMACOLOGY (PHARMACODYNAMICS), TOXICOLOGY, AND THERAPEUTIC USE. Ethyl, or grain alcohol (C_2H_5OH) is the only one of the lower alcohols found in the tissues and body fluids under normal conditions. Ac-

cording to recent investigations (Schweisheimer) normal human blood contains, especially after digestion, from 0.003 to 0.004 per cent of alcohol.

Alcohol is used, in one form or other, as a beverage, a drug, and as an external application. Its value depends upon three factors, viz., (*a*) its local irritant action, (*b*) its effect on the central nervous system, and (*c*) its use as a food. When alcohol is applied to the skin in concentrations varying from 60 to 90 per cent, it produces a reddening (flushing) of the skin, and a feeling of heat which is due to a dilatation of the blood vessels and consequent increased flow of blood to the part. When the alcohol begins to evaporate, a sensation of cold is experienced. If applied in concentrated form to a mucous membrane or open wound, it produces pain and a whitening of the tissue at the point of application; this on closer examination will be found to be a coagulum of the tissue protein.

The actual value of alcohol as a beverage cannot be discussed apart from its value as a food, although it is usually imbibed solely for its refreshing and stimulating effect. The rôle played by alcohol on the digestive function has been the subject of many discussions. The belief prevails, especially amongst the laity, that taken in small amounts it will create an appetite and stimulate digestion. It has been found, however, that very small amounts of alcohol do not affect, or stimulate only slightly, the digestive power of ferments outside of the body. It has been further noted that alcohol in a dilution of 5 to 10 per cent diminishes the rate of digestion itself. The pancreatic function is affected by even smaller amounts. Alcohol, when placed in the mouth in a sufficiently dilute form, will stimulate the flow of saliva, but this is considered a reflex act. Acting as an irritant directly on the stomach wall, it accelerates the secretion of gastric juice. According to Chittenden and Mendel, this increased secretion of gastric juice will also occur if the alcohol is introduced in the intestine.

The effect of alcohol on the amount of digestion still remains a matter for dispute. Some (Chittenden, Mendel, and Jackson) assert that the retarding effect of alcohol on digestion is compensated by the increased flow of gastric juice. Others (Kretschy and Buchner) argue that protein digestion is distinctly retarded by alcohol or even beer, which contains only a little alcohol. Eichenberg and Wolffhardt think that alcohol or wine stimulates the digestion, and Gluzinsky states that alcohol, when present in the stomach, inhibits digestion, but that after it is resorbed digestion proceeds at a better rate than when no alcohol had been present. Zuntz and Magnus-Levy, conclude that, when beer is taken with the dietary, absorption and utilization of the food by the tissues are not favored. On the other hand, Atwater and Benedict found that alcohol, when given in moderate amounts, appears to increase very slightly the availability of the nutrients in the diet, but more especially the protein. They point out, however, that in view of the fact that there are often marked differences in the availability of the same kind of diet with different persons and with the same persons at different times, this conclusion must be held with a degree of reserve.

At one time it was supposed that alcohol on absorption by the digestive tract was not utilized by the body, but was eliminated by the skin, lungs, and kidneys in an unchanged state. The experiments of Atwater and Benedict showed, however, that 98 per cent of the alcohol ingested was utilized in the human organism when the subjects received 2½ ounces of alcohol per day, or about as much as would be taken in a bottle of claret, 6 ounces of whisky, or 5 ounces of brandy. It was further noted that a pound of alcohol would furnish as much energy as 1.73 pounds of carbohydrates (starches, sugars, etc.), or 0.78 pounds of fats. It can, therefore, be inferred that alcohol, when utilized by the body, must either produce tissue itself or undergo oxidation and spare some tissue which would otherwise be oxidized for heat and energy production. That alcohol does cause fats and carbohydrates to be spared is to-day an established fact, and the evidence thus far gathered, although not conclusive, makes us almost believe that it will spare the main tissue substance, protein, also, although according to Neumann the body must first become accustomed to alcohol before it can spare protein. The sparing power of alcohol explains in part why some users of alcohol become fat, although in the case of beer-drinkers the solid materials may have some nutritive value. In any case, however, alcohol can never substitute as a regular thing for any great part of the nutrients in the dietary.

The continuous temperate use of alcohol produces a certain degree of tolerance—an immunity as it were—in many subjects; others are hypersusceptible and cannot stand it at all. As some seem to tolerate large doses without any untoward effects, it is obvious that tolerance is entirely dependent upon the quality of the cellular make-up of the individual taking alcohol. Alcohol has a direct toxic effect upon the cells it comes in contact with, and local damage is directly relative to the amount of alcohol present.

The absorption of alcohol is most rapid when the digestive tract is comparatively empty. This explains why the ill effects of alcohol are less apparent when food is eaten at the same time or shortly after taking the alcohol; it is a notable fact that some foods by virtue of their nature delay the absorption of alcohol. Alcohol when taken by way of the mouth goes over into the blood, and the largest amount of alcohol is present in the blood of intoxicated persons.

The principal action of alcohol is on the central nervous system, but it also acts on the spinal cord. Binz and his followers believe that it first stimulates and then depresses, while Schmiedeberg and adherents think that alcohol depresses the central nervous system from the outset. In the first, or excitement, stage alcohol influences the heart beat, the blood pressure rises, an ephemeral but deceptive feeling of warmth is experienced, and there seems to be an increased faculty of motion and speech. Whether this first stage is actually due to the stimulating action of the drug is still a matter of dispute. It has been suggested, however, that it is due to some action on the peripheral nerves, or possibly to the utilization of the alcohol as a food by the muscle tissue. Alcohol does not increase the capacity for mental or physical work; its use practically always causes a dulling of judgment. Kraepelin, of Munich,

who probably has done the most work on the psychical effects of alcohol, is of the opinion that the receptive and intellectual powers are weakened by very small quantities of alcohol, while motor function is increased by very small quantities and retarded by large quantities. Typesetters have been found to make fewer errors and do more work when not using it.

In the narcotic stage there is a generally lowered psychic activity, sensation and motion are lessened, the speech is muttering and thick, the senses are blunted, the gait staggering, and finally there is a tendency to sleep. When unconsciousness is established, there is anæsthesia. In the paralytic stage, i.e., beginning of medullary paralysis, the breathing is slow, intermittent, and stertorous, the pupils are dilated, the pulse is hardly perceptible, the reflexes are abolished, and the skin is cold.

While immediate death is rare from acute alcohol poisoning, many fatalities occur as a result of losing consciousness. In such cases vomitus may be sucked into the air tubes (trachea, etc.), or the subject may fall face downward into water or mud and become suffocated. In winter intoxicated persons often freeze to death. The minimum fatal dose of alcohol is not exactly known; some give it as between 60 and 180 grams (about 2–6 ounces by weight). In Maschka's cases a girl of five and a boy of nine died after the forced administration of about 1.6 oz. of absolute alcohol.

The recovery from alcohol poisoning is slow, and coma is replaced by natural sleep. On awakening the symptoms of an acute gastro-intestinal catarrh (since the stomach, etc. are in an irritable condition) and possibly a neuritis are noted. There are present a coated tongue, foul breath, loss of appetite, vomiting—especially when food is taken—and headache.

By long and injudicious use, alcohol affects all tissues with which it comes in contact. It acts as a stimulator of cell growth, often in undesirable places, as in the liver, kidneys, etc.; it is entirely or in part responsible for many human ills as cirrhosis of the liver (hobnail liver, etc.), nephritis (kidney disease), diabetes, gout, hardening of the arteries (arteriosclerosis), gastritis, insanity, etc. Alcoholics are very susceptible to infectious diseases in general, especially pneumonia and tuberculosis.

Alcohol, when habitually used by parents, has undoubtedly untoward effects on the progeny, as is shown by a vast amount of statistical data. Experimentally, Stockard has shown with guinea pigs that alcohol had a distinct effect on the development of the embryo. The statistics gathered in Paris in the service of Bourneville showed that of 3271 children of impaired mental condition 1156 had alcoholic fathers, 100 alcoholic mothers, and 53 had both alcoholic fathers and mothers; in 538 cases no data were obtainable, and in the remainder the parents were temperate.

Even from what has been said against alcohol, it is not altogether sure that its use as a medicine can be dispensed with. In pharmacy and medicine it finds extensive use as a solvent for drugs, and for preparing fluid and solid extracts and tinctures of drug plants, for essential oils, alkaloids, etc. As a remedy it is valuable in shock, collapse, and syncope, in fever, in conjunction with other drugs for snake bite, locally as an antiseptic, anodyne, stimulant, dressing for wounds, for hardening the cuticle when bed sores are threatened, as a cooling lotion, etc. It must not be assumed, however, that alcohol is good in all diseases, for we know to-day that for most epileptics it is decidedly detrimental.

Consult: W. O. Atwater et al., "An Experimental Inquiry Regarding the Nutritive Value of Alcohol," *Memoirs National Academy of Sciences*, viii (1902); (U. S. Senate, 57 Cong., 1 Sess., Doc. 233); J. S. Billings et al., *Physiological Aspects of the Liquor Problem* (Boston and New York, 1903); Cushny's *Pharmacology* (Philadelphia, 1901); Sollman's *Pharmacology* (Philadelphia, 1908); *Journals American Medical Association;* F. Hare, *Alcoholism: Its Clinical Aspect and Treatment* (Philadelphia, 1913); Rosenfeld's *Der Einfluss des Alkohols auf den Organismus* (Wiesbaden, 1901); W. Schweisheimer, "Der Alkoholgehalt des Blutes unter verschiedenen Bedingungen," in *Deut. Arch. Klin. Med.*, cix, Nos. 3–4.

AL'COHOLISM. The term employed to denote the symptoms of disease produced by alcoholic poisoning. In acute alcoholism, which is generally caused by the rapid absorption of a large quantity of alcoholic drinks, the first symptoms are animation of manner, exaltation of spirits, and relaxation of judgment. The emotions are altered and often perverted; muscular movements become irregular or ataxic; the mechanism of speech suffers. The further development of the symptoms presents a variety of effects. In the ordinary course of the action of the drug, dizziness, disturbance of sight and hearing, and other troubles due to disorder of the central nervous system, ensue, leading to heavy sleep or profound coma, from which it is sometimes impossible to rouse the individual, who lies completely paralyzed, breathing stertorously. Sometimes the alcohol affects so strongly the centres of respiration and circulation that death is caused by paralysis of one or other, or both. This condition of coma requires to be carefully distinguished from opium poisoning. In the former, the face is usually flushed and the pupils dilated, while in the latter the face is pale and the pupils contracted. The odor of the breath is no criterion, inasmuch as sympathizing bystanders are apt to administer spirits in every case of depression, often with hurtful effects. Fracture of the skull, delirium of meningitis, and coma after epilepsy or after cerebral hemorrhage are often undiscovered by the inefficient ambulance surgeon, who is led to diagnose a condition from an alcoholic breath. A second class of alcoholics act in an entirely different manner. Instead of sinking into stupor or coma, the individual becomes more and more excited, bursts into wild mirth or passionate anger, struggles violently with those who attempt to soothe him, and may grievously harm himself or others. This is the condition known as alcoholic mania—the physical explanation of many fearful crimes. It is more apt to follow a somewhat protracted debauch. After a longer or shorter period of fierce excitement, it is in most cases succeeded by great depression, and sometimes during this condition there may be sudden death from failure of the respiration or circulation. In some patients, the stage of excitement culminates in a convulsive seizure. The convulsions are repeated at intervals, are very complicated in character, and produce remarkable contortions of the body. These usually

grow less violent and, passing off, end in deep sleep; but here also death may occur from the action of the poison. Such cases of "alcoholic epilepsy" are comparatively rare and occur principally in acute exacerbations of chronic alcoholism. Acute alcoholism is more apt to occur in those who are of unsound mind and weak nervous system, and this applies especially to the two last-described forms of the affection. In the treatment of acute alcoholism it is always wise to wash out the stomach, in case alcohol is present, or to accomplish much the same object by free vomiting and purgation. In the profound coma the administration of stimulants, such as ammonia and strychnine, may be called for, and sometimes artificial respiration may be the only means of saving life. In the maniacal and convulsive forms of the affection, sedatives must be used. After the immediate symptoms have passed away in all forms, the individual must be carefully fed with nutrient enemata, on account of the disturbance of the digestive system, along with remedies which will subdue the digestive irritation and overcome the depression of the nervous system.

Chronic alcoholism is caused by the prolonged use of overdoses of various alcoholic drinks. Changes (see ALCOHOL, PHARMACOLOGY, etc.) are caused in every tissue of the body, but the nervous, respiratory, and circulatory systems are more especially affected, together with the liver and kidneys. There is always more or less catarrh of the digestive organs, shown by dyspepsia, heart-burn, vomiting—especially in the morning—and usually diarrhœa. The liver becomes enlarged from congestion, and may afterward shrink, pressing on the veins and bringing back blood to the heart from the abdominal viscera, leading to congestion of the bowels, hemorrhoids, and hemorrhages. From changes in the organs of circulation there is a tendency to palpitation, fainting, and breathlessness on exertion. These alterations are degenerations of the heart, which may be soft or even fatty; fibrous changes in the walls of the arteries; and dilatation of the capillaries from paralysis of the vaso-motor nerves. This last condition gives the florid complexion and mottled appearance to chronic drinkers. There is, besides, usually some congestion of the kidneys; but it is erroneous to attribute Bright's disease mainly to alcohol. The lungs are subject to chronic congestion and catarrh of the bronchial tubes and lung tissues. The muscular system suffers, the muscles becoming flabby and fatty. There is a great tendency to deposition of fat, and skin diseases are frequently induced by the vaso-motor changes.

Two characteristic results of the action of the drug on the central nervous structures are delirium tremens and alcoholic insanity. (See INSANITY.) In treating chronic alcoholism the great point is to prevent the employment of alcohol in any form and to invigorate the bodily and mental functions. See DELIRIUM.

Social scientists agree that alcoholism presents one of the most serious of modern social problems. The chief sociological effects of alcoholism are connected with increased morbidity and mortality, industrial accidents, pauperism, crime, insanity, and degeneracy in offspring. The statistical treatment of such effects is at present extremely unsatisfactory. The difficulties inherent in the collection and interpretation of such statistics are complicated by the partisanship of opponents or supporters of the traffic in alcoholic liquors.

With respect to mortality, the evidence of life insurance companies is fairly trustworthy. Statistics were published in 1910 giving the experience of the Leipzig Ortskrankenkasse with respect to about 1,125,000 insured in the period 1887–1905. Of these 4847 were classed as "alcoholics," having been treated at some time during the period for delirium, etc. The mortality of the alcoholics was about three times the average for the same age groups. With this may be compared an investigation undertaken by a British actuary, Mr. F. G. P. Neison, in 1850, dealing with the mortality of a group of a little over 6000 heavy drinkers. Placing the general mortality of England and Wales at 100, the mortality of this group was 325.

Such figures do not, of course, show the net death rate due to alcohol, since it is impossible to determine in how large a proportion of the cases alcoholism is a result rather than a cause of a constitutional weakness that would naturally increase mortality. More satisfactory evidence is afforded by the statistics of mortality in the occupations in which the temptation to drink is especially strong, such as brewing, retail dealing in alcoholic beverages, innkeeping. There is no reason for assuming a higher proportion of constitutional defectives in these industries than in the general population. According to the experience of the Gotha Life Insurance Company, the excess of mortality of brewery workers over that of the general population is 62 per cent, tapsters, 55 per cent, innkeepers, 47 per cent.

Since persons known to be heavy drinkers are generally rejected by insurance companies, information relating to mortality among them is meagre. Some life insurance companies distinguish carefully between total abstainers and moderate drinkers. The latter invariably show a heavier death rate than the former. The most striking figures that have been published by any company are those of the United Kingdom Temperance and Provident Institution. The records cover the period 1866–1905 and show that mortality among total abstainers amounts to 71.54 per cent of the calculated probabilities, as compared with 94 per cent for the moderate drinkers.

There are no trustworthy statistics of the total number of deaths in any country due to alcoholism. In 1883 a report was published by the Harveian Society of London, analyzing the data for 10,000 deaths. The reporters came to the conclusion that alcohol had played some part in causation in 14 per cent of the cases. Assuming that the figures, which were for London, would apply to the country as a whole, it was estimated that the mortality from alcohol in England and Wales would amount to nearly 40,000 annually. An American actuary, Mr. E. B. Phelps, working on the basis of the published statistics of the registration area, calculated the alcoholic mortality in the United States at 7.7 per cent of the whole mortality, or practically 66,000.

A considerable body of statistics on the relation between alcoholism and sickness is being collected in European countries which practice invalidity insurance. The available statistics indicate that, measured in number of days ill, the morbidity of those described as alcoholic is about twice that of the general population.

The tuberculosis morbidity rate is especially heavy among workers in the alcoholic trades, being inferior only to the rate among stone cutters, metal polishers, and printers.

The connection between alcoholism and accidents is generally recognized, but trustworthy statistics bearing upon it are rare. In Prussia, 1869–73, of 33,321 fatal accidents, 4.66 per cent were assignable to drunkenness. In Saxony, of 17,939 fatal accidents in the period 1847–76, 6.2 per cent were due to drunkenness. In England, 1877–81, of 87,458 persons fatally injured, 9.2 per cent were either intoxicated or suffering from delirium tremens. These are, of course, minimum figures, as in many cases all evidence as to the state of the person injured is destroyed by the accident.

Indirect evidence of the relation of alcoholism to industrial accident is given by the distribution of accidents through the week. It is a well-known fact that drinking is most common, among industrial laborers, on Saturday evening and Sunday. An investigation of accidents in the building trades showed that of 3972 accidents 19.9 per cent occurred on Monday, while the next highest percentage was 16.5 per cent. Of 25,295 accidents in the Berlin building trades, 1885–98, 18.7 per cent occurred on Monday, the next highest percentage being 16.6. The same fact is brought out by analysis of the accident statistics of other cities.

There is no agreement as to the relative amount of pauperism due to alcoholism. The Committee of Fifty, which made a careful study of the social aspects of the liquor problem in the United States, assigns 33 per cent of pauperism to the personal use of alcohol, 8.7 per cent to its use by others. British estimates place the percentage of pauperism due to alcoholism at from 20 to 50 per cent. German estimates are far lower—10 to 20 per cent. No estimates of the kind have much scientific value. It is impossible to determine in many cases how far alcoholism is a cause of pauperism, how far merely a concurrent effect of an original moral and physical weakness.

The relation between insanity and alcoholism is close, but here again statistics furnish no clue to the determination of cause and effect. In the asylum population of England and Wales, 17,000 out of 116,000 have alcoholic histories. One-third of the lunatics of New York have been alcoholics. Statistics of the insane in Vienna (1895–96) disclose an alcoholic history in the case of 40 per cent. Prussian statistics for 1888 indicate a connection between alcoholism and insanity in 40 per cent of the cases treated in asylums. The records of the Asylum of St. Anne in Paris indicate an alcoholic history for 51 per cent of the men and 22 per cent of the women.

The relation between alcoholism and crime is still closer. The Committee of Fifty scrutinized the records of 13,402 convicts in 17 American prisons and found that 49.95 per cent had alcoholic histories. In an investigation of Sing Sing and Auburn prisons it was found that, of those who had committed crimes against the person, 40.47 per cent were habitual drunkards. In England prisoners convicted of grave homicidal offenses show an alcoholic percentage of 60. An investigation of the records of 32,837 prisoners in the jails and prisons of the German Empire showed alcoholic histories in the case of 46.1 per cent of the murders, 63.2 per cent of the homicides, 74.4 per cent of homicidal assaults, and 62 per cent of milder assaults. An investigation of convicts in Vienna showed that 58.8 per cent were victims of alcoholism; a similar investigation in Paris showed that 68.6 per cent of the prisoners at the St. Pélagie were alcoholic.

There appears to be strong evidence in support of the view that alcoholism is a factor in producing degeneracy in offspring. Direct experiments carried on with dogs and guinea pigs have established beyond question that excessive amounts of alcohol reduce markedly the number of live offspring as well as the viability of those born living. An excessive proportion of the offspring are physically defective. The taint may be conveyed by either parent. The human race, it would appear, is more nearly immunized to alcohol, and the transmission of physical taint through alcoholism is not so certainly established. None the less there is no lack of statistics indicating some relation between alcoholism and congenital defects. Figures for epileptics at the Craig Colony in New York indicate that over 20 per cent of the inmates are the offspring of alcoholic parents. Bourneville found that of 2552 mentally defective children in the institution at Bicêtre, France, 41 per cent had alcoholic parents. Detailed studies of family histories have brought out the fact that congenital defects may be related to alcoholism in grandparents, where the parents themselves were not alcoholic. On this ground many social scientists believe that the figures given above greatly understate the part played by alcoholism in producing such defects.

Bibliography. The Committee of Fifty has made the best study of the subject in its volume on *Economic Aspects of the Liquor Problem* (Boston, 1899). Consult also: "The Relations of the Liquor Traffic to Pauperism, Crime, and Insanity," *Twenty-sixth Annual Report of the Massachusetts Bureau of Labor Statistics* (Boston, 1895); "Economic Aspects of the Liquor Problem," *Twelfth Annual Report of the United States Department of Labor* (Washington, 1898); Hoppe, H., *Die Tatsachen über den Alkohol* (Berlin, 1901); Kelynack, T. N., *The Drink Problem* (New York, 1907); Williams, H. S., *Alcohol* (New York, 1909); Phelps, E. B., *The Mortality of Alcohol* (New York, 1911).

See TEMPERANCE; PAUPERISM; CRIME.

AL'COHOLOM'ETRY (*alcohol* + Gk. *μέτρον, metron, measure*). A name applied to any process of estimating the percentage of absolute alcohol in a sample of spirits. Certain chemical methods have been tried for the purpose, but the one usually employed consists in determining the specific gravity of the spirit. As liquors, however, generally contain other substances besides water, they must be carefully distilled before a determination can be made. Every mixture of alcohol and water has a specific gravity of its own, which depends (1) on the relative composition of the mixture, and (2) on the temperature; once the specific gravities of various mixtures have been determined, the composition of a sample can be ascertained by determining its specific gravity and observing the temperature. The following table shows the specific gravities of mixtures of alcohol and water, containing 5, 10, 15, 20, etc., per cent by weight of alcohol, at the temperatures 0°, 10°, 20° and 30° C.:

Percentage by weight of alcohol.	0°	10°	20°	30°
5	0.99135	0.99113	0.98945	0.98680
10	0.98493	0.98409	0.98195	0.97892
15	0.97995	0.97816	0.97527	0.97142
20	0.97566	0.97263	0.96877	0.96413
25	0.97115	0.96672	0.96185	0.95628
30	0.96540	0.95998	0.05403	0.94751
35	0.95784	0.95174	0.94514	0.93813
40	0.94939	0.94255	0.93511	0.92787
45	0.93977	0.93254	0.92493	0.91710
50	0.92940	0.92182	0.91400	0.90577
55	0.91848	0.91074	0.90275	0.89456
60	0.90742	0.89944	0.89129	0.88304
65	0.89595	0.88790	0.87961	0.87125
70	0.88420	0.87613	0.86781	0.85925
75	0.87245	0.86427	0.85580	0.84719
80	0.86035	0.85215	0.84366	0.83483
85	0.84789	0.83967	0.83115	0.82232
90	0.83482	0.82665	0.81801	0.80918
95	0.82119	0.82291	0.80433	0.79553
100	0.80625	0.79788	0.78945	0.78096

See also article HYDROMETER.

ALCOHOLS. A name applied in organic chemistry to one of the largest and most important classes of carbon compounds. The alcohols possess in common certain chemical properties, though they are otherwise very different from one another. They all contain one or more hydroxyl groups (OH) linked directly to some fatty hydrocarbon group (such as methyl, CH_3, ethyl, C_2H_5, etc.), and are subdivided both with reference to the number of their hydroxyl groups and with reference to the nature of their hydrocarbon groups. When the alcohols are acted on by the chlorides or bromides of phosphorus, chlorine or bromine takes the place of their hydroxyl groups, and as a result, halogen derivatives of the corresponding hydrocarbons are produced. Thus, by the action of phosphorus pentachloride, ethyl alcohol may be transformed into ethyl chloride (mono-chloro-ethane), according to the following chemical equation:

$$C_2H_5OH + PCl_5 = C_2H_5Cl + POCl_3 + HCl$$

Ethyl alcohol — Ethyl chloride

With reference to the number of their hydroxyl groups, the alcohols are divided into *monohydric, di-hydric, tri-hydric,* etc. According to the nature of the radicle to which these groups are attached, alcohols may be *saturated* or *unsaturated, fatty* or *aromatic.* With reference to their chemical constitution and behavior toward oxidizing agents, alcohols are further divided into *primary, secondary,* and *tertiary.* The primary alcohols are characterized by the uni-valent group CH_2OH; the secondary, by the di-valent group CHOH; the tertiary by the tri-valent group COH. The differences in their reactions are described below.

The hydrogen of the hydroxyl group of an alcohol can be replaced by metals or by hydrocarbon radicles or by acid radicles. In the first of these cases a metallic *alcoholate* is obtained; in the second case, an *ether;* in the third case, an *ester.* Thus, by the action of metallic sodium on ordinary (ethyl) alcohol, sodium alcoholate is obtained, according to the following chemical equation:

$$C_2H_5OH + Na = C_2H_5ONa + H$$

Ethyl alcohol — Sodium alcoholate

On the other hand, by dehydrating ethyl alcohol, ordinary ether is obtained, as follows:

$$C_2H_5OH + C_2H_5OH - H_2O = C_2H_5OC_2H_5$$

2 molecules of ethyl alcohol — Ethyl ether

In this transformation (usually effected by the dehydrating action of sulphuric acid), the ethyl group of one molecule of alcohol evidently takes the place of the hydroxyl hydrogen of another molecule. Finally, the action of an organic acid replaces the hydroxyl hydrogen of an alcohol by an acid radicle. For instance:

$$C_2H_5OH + CH_3COOH = C_2H_5O(CH_3CO) + H_2O$$

Ethyl alcohol — Acetic acid — Ethyl acetic *ester*

The chemical transformations characterizing the three sub-classes of the alcohols, viz., the primary, secondary, and tertiary alcohols, are as follows:

1. It was mentioned above that primary alcohols contain the group CH_2OH. When they are oxidized, this group is changed into the group

which is characteristic of the aldehydes—another important class of organic compounds. By further combination with oxygen aldehydes readily yield acids, the group CHO being exchanged into the acid group

.

2. When secondary alcohols are oxidized, their characteristic group CHOH is converted into the group CO, and as a result *ketones* are produced.

3. Tertiary alcohols cannot be transformed by simple oxidation into a compound whose molecule contains the same number of carbon atoms.

The three sub-classes of alcohols can thus be readily distinguished from one another by their behavior toward oxidizing agents.

Primary alcohols may be transformed into corresponding secondary or tertiary alcohols with the aid of sulphuric acid. Thus, by dehydration with sulphuric acid normal propyl alcohol, $C_2H_5CH_2OH$ (primary), is converted into propylene, $CH_3CH:CH_2$; but when this is re-hydrated by dissolving in fuming sulphuric acid and boiling with water, *iso-propyl* alcohol, $(CH_3)_2CHOH$ (secondary), is obtained. In this manner a hydroxyl group can be made to change its position in the molecule by simple laboratory methods.

The di-hydric alcohols, as the name indicates, contain two hydroxyl groups. *Glycols* is the name usually applied by chemists to the di-hydric alcohols. The simplest glycol, derived from methane (CH_4)—the simplest hydrocarbon—should be represented by the formula $CH_2(OH)_2$. But though certain compounds of this glycol have been obtained, the glycol itself could not be prepared in the free state. Experience shows, in general, that the formation of a compound in which two hydroxyl groups might be attached to one carbon atom is almost invariably accompanied by a loss of the elements of water. The imaginary compound $CH_2(OH)_2$ is thus split up, according to the following equation:

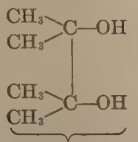
$$CH_2(OH)_2 = CH_2O + H_2O$$

The compound CH_2O (formaldehyde) is therefore obtained in reactions which might be expected to result in the formation of the glycol $CH_2(OH)_2$. The simplest glycol actually pre-

pared is a derivative of ethane (C_2H_6), one hydroxyl group being attached to each of the two carbon atoms of ethane, and its formula therefore being $\begin{matrix}CH_2OH\\|\\CH_2OH\end{matrix}$. This glycol evidently contains two primary alcohol groups (CH_2OH), by the oxidation of one or both of which a series of interesting compounds is obtained, including:

CH_2OH	CHO	CHO	COOH
|	|	|	|
COOH	CHO	COOH	COOH
Glycollic acid	Glyoxal	Glyoxylic acid	Oxalic acid

Glycols containing two tertiary-alcohol groups (COH) are usually called *pinacones*, the simplest pinacone known being represented by the following graphic formula:



Ordinary pinacone

The simplest and best-known tri-hydric alcohol is the well-known glycerin (q.v.). Among other poly-hydric alcohols may be mentioned the hexa-hydric alcohol *mannitol*, which is found in *manna* (q.v.). The poly-hydric alcohols generally possess a sweet taste and are insoluble in ether. A number of them occur ready-formed in nature.

The mono-hydric alcohols are rarely found in nature in the free state; in the form of esters, however, i.e., in combination with acids, they occur largely in the vegetable kingdom. The formation of alcohols from the sugars through fermentation is described elsewhere. (See ALCOHOL and FERMENTATION.) It remains to mention here a few of the general chemical methods by which alcohols are made artificially.

1. Many alcohols are prepared from the corresponding hydrocarbons by substituting halogens for part of their hydrogen, and treating the halogen derivatives thus obtained with dilute aqueous alkalies or with moist silver oxide. The following equations represent examples of the formation of alcohols from halogen-substitution products of hydrocarbons:

CH_3Br	+ KOH	=	CH_3OH	+ KBr
Mono-bromo-methane	Potassium hydroxide		Methyl alcohol	Potassium bromide

C_3H_7I	+ AgOH	=	C_3H_7OH	+ AgI
Mono-iodo-propane	Silver hydroxide		Propyl alcohol	Silver iodide

2. Since aldehydes are produced by the oxidation of primary alcohols, the latter may be obtained, conversely, by reducing aldehydes.

3. Since ketones are produced by the oxidation of secondary alcohols, the latter may, conversely, be prepared from ketones by reduction. Thus, secondary propyl alcohol may be obtained by the action of nascent hydrogen on acetone (dimethyl-ketone).

4. Tertiary alcohols may be prepared from chlorides of acid radicles with the aid of compounds of zinc with hydrocarbon radicles. Thus, tertiary butyl alcohol is obtained according to the following equation:

CH_3COCl	+ $2Zn(CH_3)_2$	+ $2H_2O$	=
Actyl chloride	Zinc-methyl		

$(CH_3)_3COH$	+ CH_3ZnCl	+ $Zn(OH)_2$	+ CH_4
Tertiary butyl alcohol	Zinc-chloro-methyl	Zinc hydroxide	Methane

The aromatic alcohols, i.e., alcohols whose molecules contain a benzene nucleus may be prepared by methods analogous to those just described. Aromatic alcohols must be distinguished from the phenols—a class of hydroxyl derivatives of the aromatic hydrocarbons—which are in many respects quite different from the alcohols. See PHENOLS.

A variety of alcohols may now be best prepared by the Grignard reaction, a general method by which innumerable syntheses have been carried out in recent years. See GRIGNARD REACTION.

ALCOLEA, äl'kō-lā'ä, BRIDGE OF. A bridge across the river Guadalquivir, 8 miles northeast of Cordova, Spain, the scene of a battle Sept. 28, 1868, between the revolutionary troops of Serrano and those of Queen Isabella. The latter were beaten, and the Queen, dethroned, fled to France.

ALCORAN, äl'kō-răn *or* äl'kō-răn'. See KORAN.

ALCORN, äl'kērn, JAMES LUSK (1816–94). An American statesman, born in Golconda, Ill. He was educated at Cumberland College, Ky., and became a lawyer in that State and sat in its Legislature. He went to Mississippi in 1844 and served in the State Legislature from 1846 to 1865, when he was elected United States Senator, but was not then permitted to take his seat. In 1861 he had been a member of the secession convention. He was elected Governor on the Republican ticket in 1869, but resigned two years later to enter the United States Senate, where he continued until 1877. In 1873 he was defeated for Governor on an independent ticket. He was the founder of the levee system of Mississippi, and became president of the Levee Board of the Mississippi-Yazoo Delta. Four years before his death he was a member of the State Constitutional Convention. A Mississippi agricultural and mechanical college for colored students which he was instrumental in establishing was named in his memory. Further proof of his interest in the negro race is found in his *Civil Rights* speech, published by the Government Printing Office in 1874.

ALCOTT, ąl'kŭt, AMOS BRONSON (1799–1888). An American educational reformer, conversationalist, and Transcendental philosopher. He was born at Wolcott, Conn., Nov. 29, 1799, and died in Boston, March 4, 1888. He was the son of a farmer, and his first experience of life was gained as a peddler in the South. In 1828 he became an educational reformer and established in Boston a school in which he attracted much attention by the novelty of his methods. Of this there is an account by Elizabeth Peabody (*A Record of Mr. Alcott's School*, 1834; 3d ed., 1874). His method was largely conversational, and a transcript of his talks appeared in 1836 as *Conversations with Children on the Gospels.* Ways that would now seem more commendable than noteworthy then met with bitter denunciation, so that Alcott abandoned his school, moved to Concord, and

sought to disseminate his views on theology, education, society, civics, and vegetarianism through lectures, winning attention by his originality and sometimes graceful though often rambling speech. In 1842 he visited England and returned with two friends, one of whom bought an estate near Harvard, Mass., where they endeavored to found a community, "Fruitlands," which speedily failed. Alcott then went to Boston and later to Concord, leading the life of a peripatetic philosopher and giving "conversations," which found increasing favor, especially in the West. In later years his manner became more formal and his always nebulous teaching apparently more orthodox. Besides frequent contributions of "Orphic Sayings" to the Transcendental organ, *The Dial*, he published fragments from his voluminous diary, *Tablets* (1868); *Concord Days* (1872); *Table Talk* (1877); *Sonnets and Canzonets* (1877), and also *New Connecticut* (1881), and an *Essay on Ralph Waldo Emerson: His Character and Genius* (1882). For his biography, consult Sanborn and Harris, *Life* (2 vols., Boston, 1893); also Lowell's contemporary criticism, in *A Fable for Critics* (New York, 1848), and "A Study from Two Heads," in the *Poems*.

ALCOTT, Louisa May (1832–88). An American novelist and juvenile writer. She was born at Germantown, Pa., Nov. 29, 1832, and died at Boston, March 6, 1888. She began her active life as a teacher, writing stories of harmless sensation for weekly journals and publishing the insignificant *Flower Fables* (1855). During the Civil War she volunteered as an army nurse and wrote for a newspaper the letters afterward collected as *Hospital Sketches* (1863). She first attracted notice by *Little Women* (1868; second part, 1869), the best and most popular of her writings, in which she drew herself in the character of Jo. Among the more noteworthy of numerous other contributions to the literature of adolescence are: *An Old-Fashioned Girl* (1869), *Little Men* (1871), and *Jo's Boys* (1886). Her novels, *Moods* (1863) and *Work* (1873), attracted little attention. In later years she suffered much from ill-health; but her writing was to the last singularly buoyant and hopeful, full of faith in human nature, democracy, and freedom. She was typical in her social ethics of the literary generation in which her father, Amos Bronson Alcott (q.v.), had been a prominent figure. There is a *Life*, by Cheney (Boston, 1889), which is more frankly written than most biographies, and one by Belle Moses (New York and London, 1909), under the title *Louisa May Alcott, Dreamer and Worker*.

ALCOTT, May (1840–79). An American artist, daughter of Amos Bronson Alcott and wife of Ernest Nieriker. She was born at Concord, Mass., and studied at the Boston School of Design and in Paris. She showed considerable skill in still-life subjects, particularly in flowers and sketches of nature, but attained her greatest success by her oil and water-color copies of the paintings of Turner, which were highly praised by Mr. Ruskin and were given to the pupils of the South Kensington schools, London, to work from. Mrs. Nieriker was the author of *Concord Sketches* (Boston, 1869) and of *Studying Art Abroad* (1879).

AL'COVE. In architecture a recess opening from a larger room or inclosure, usually in order to serve some special function. Among special forms of the alcove may be mentioned the bay-windows of modern houses; the apses (see Apse) of Roman basilicas and Christian churches, and the *triclinia* and *alæ* of the typical ancient Roman house, the former surviving to our time in the dining alcoves of many Syrian houses. In France, at least in Brittany, the bedstead is built into an alcove, and in some French châteaux and palaces the royal bedstead was set in an elaborately decorated alcove hung with tapestries and divided from the main bedchamber by a carved balustrade (Chamber of Henry IV in the Louvre; of Louis XIV at Versailles). Business offices are sometimes arranged with alcoves for special functionaries or clerks, and certain libraries are planned on the alcove system, a part or the whole of one or both sides of a main reading- or book-room being set off into alcoves for special study or for particular classes of books. A similar arrangement is often employed in museums of art or science. See House; Library Buildings.

ALCOY, ål-kō'ē. A town of Spain, in the province of Alicante. It is situated on the river Alcoy, 24 miles north-northwest of the city of Alicante (Map: Spain, E 3), and is one of the most busy and prosperous of Spanish towns. It is picturesquely placed on the slope of the Sierra Mariola, whose streams afford an abundance of water power. The public buildings include a consistory, town hall, poorhouse, and public granary. The city is the great centre of paper manufacture, and the mills are of considerable antiquity. The cigarette paper of Alcoy is especially well known in Spain. Sugar-plums (*peladillas de Alcoy*), woolen cloth, linen and cotton goods, as well as hardware, form other important branches of manufacture. Pop., 1910, 33,896. The prosperity of the place was interrupted for a time in 1873 by an insurrection of the Spanish Internationals, and the district is a centre for frequent communistic agitation.

ALCUDIA, ål-kōō'dhē-å, Manuel de Godoy. See Godoy, Manuel, Duke of Alcudia.

ALCUIN, ăl'kwĭn, or Flaccus Albinus (c.735–804). The most distinguished scholar of the eighth century, the confidant and adviser of Charlemagne. He was born at York, was educated under the care of Archbishop Ecbert, and his relative Ælbert, and succeeded the latter as master of the school of York. Charlemagne became acquainted with him at Parma, as he was returning from Rome, whither he had gone to bring home the *pallium* for a friend. He invited Alcuin to his court and had his assistance in his endeavors to civilize his subjects. As a result of this association, Alcuin became the preceptor of the Emperor, whom he instructed in various subjects, especially rhetoric and dialectics. To render his instruction more available, Charlemagne established at his court a school called Schola Palatina, the superintendence of which, as well as of several monasteries, was committed to Alcuin. In the learned society of the court Alcuin went by the name of Flaccus Albinus. In 790 Alcuin returned to England, but was recalled by Charles in 794, who needed his aid at the Council of Frankfort. He again returned to York, but was forced by political changes to go back to France. He retired to the abbey of St. Martin, in Tours, in 796, and taking as his model the school of York, taught at Tours. While there he wrote frequently to the Emperor. He died May 19, 804.

He left, besides numerous theological writings, a number of works on philosophy, mathematics, rhetoric, and philology, as well as poems and a great number of letters. His letters, of which 311 are extant, while they betray the uncultivated character of the age generally, show Alcuin to have been the most accomplished man of his time. He understood Latin, Greek, and Hebrew. Editions of his works appeared in 1617 (Paris), 1777 (Ratisbon), and in Migne's *Patrologia*. Consult Mullinger, *Schools of Charles the Great* (London, 1877), West, *Alcuin and the Rise of Christian Schools* (New York, 1892), and Gaskoin, *Alcuin* (New York, 1904), and Page, *The Letters of Alcuin* (New York, 1911).

AL'CYONA'RIA (from Gk. ἀλκυόν[ε]ιον, *alkyon*[*e*]*ion*, bastard-sponge). A subclass of the Anthozoa, comprising a group of coral-polyps, characterized by the presence of eight

ALCYONARIA.

tentacles around the mouth and the division of the gastrovascular cavity into eight chambers. Typical forms, like the precious red corals, fall into the subordinate group Alcyonacea; the sea-fans constitute the group Gorgonacea; and the sea-pens the group Pennatulacea. See CORAL.

ALCY'ONE, ăl-sī'ō-nē, or **HALCY'ONE** (Gk. Ἀλκυόνη, Ἁλκυόνη, *Alkyonē*, *Halcyonē*). In later Greek legend, the daughter of Æolus and wife of Cēyx, King of Trachis in Thessaly. According to one story, inconsolable on the death of her husband, she threw herself into the sea, whereupon she and her husband were changed into kingfishers as a reward of their mutual devotion. Alcyone was originally a sea divinity and appears in the legends of Bœotia, Argos, Megara, and elsewhere. The myth has been perpetuated in zoölogy by the name of a genus (Alcyone) of kingfishers; these birds are frequently called halcyons in poetic literature.

ALCYONE (Gk. Ἀλκυόνη, *Alkyonē*). The most brilliant of the "seven stars," or Pleiades. It is a star of the third magnitude and was supposed by Mädler to be the central sun, in reference to which our sun with its planets and all other known systems are moving, perhaps revolving within some almost incomprehensible period of time. It has been shown, however, that any central sun hypothesis is, as yet, far too daring, considering the insufficient state of our knowledge of sidereal systems and their motions. See PLEIADES.

ALDA, FRANCES (1884—). The stage name of a distinguished soprano. Her real name is Davis. She was born in New Zealand of English parents, but educated at Paris, where she was a pupil of Marchesi. She made her début at the Opéra Comique in Paris in 1904. In 1908 she became a member of the Metropolitan Opera House in New York. She won fame not only on the operatic stage, but also on the concert platform. In 1910 she was married to Giulio Gatti-Casazza, the director of the Metropolitan Opera House.

AL'DABEL'LA. 1. In Ariosto's *Orlando Furioso* (q.v.), the wife of Orlando, daughter of Monodantes and sister of Oliviero. In French and Spanish versions of the Orlando legends she appears as Alda and Auda. 2. In Dean Milman's tragedy of *Fazio* (q.v.), a fascinating but wicked woman, of whom Bianca, Fazio's wife, has cause for jealousy, and who is finally condemned to a nunnery.

ALDAN, ål-dän'. An affluent of the Lena, rising in the Siberian territory of Yakutsk, near the mountain ridge of Yablonov, in lat. 56° 31′ N. and long. 123° 51′ E. (Map: Asia, M 3). After flowing in a generally northerly direction for 1320 miles it empties into the Lena, 111 miles below Yakutsk. It is navigable for a distance of over 600 miles and abounds in sturgeon and sterlet.

ALDAN, ål-dän'. A mountain range on the left shore of the river that gives it its name, between 55° and 61° N. lat. (Map: Asia, M 3). It is a branch of the Stanovoi, about 400 miles long. The best-known summit, Kapitan, has an altitude of over 4000 feet.

ALDBOROUGH, ąld'bŭr'ō, *or, colloquially*, ą'bro (AS. *ald*, old). An ancient village in the West Riding of Yorkshire, 16 miles west-northwest of York (Map: England, E 2). It is chiefly remarkable for its ancient ruins, as it was the Isurium of the Romans, and after York (Eboracum) the most considerable Roman camp north of the Humber. Remains of aqueducts, buildings, tessellated pavements, implements, urns, and coins have been found in great number. Pop., 1901, 439; 1911, 422.

ALDEB'ARAN (Ar. *al-dabarán*, the follower, i.e., of the Pleiades). The name of a brilliant red star of the first magnitude, in the constellation Taurus. It is the largest and most brilliant of a cluster of five which the Greeks called the Hyades and is situated a little to the southeast of the Pleiades. From its position in Taurus it is sometimes termed "the bull's eye." Its parallax, as determined by Elkin at New Haven, is 0″.109, corresponding to a distance of 30 light-years.

ALDEGONDE, ål'de-gŏNd', PHILIP VAN MARNIX, SAINT. See MARNIX, PHILIP VAN.

ALDEGREVER, ăl'de-grā'vĕr, HEINRICH (1502–c.1560). A German engraver and painter of the Renaissance, one of the foremost of the "Little Masters." He was born at Paderborn (Westphalia), the son of a burgher, but his real name, Trippenmeker, he discarded in adult life. The character of his art leads to the conclusion that he probably studied at Nuremberg, where he was influenced by the Beham brothers (q.v.) and by Pencz (q.v.), not by Dürer, as is commonly supposed. He settled at and became a burgher of Soest, where he practiced his art. He was most distinguished as a line engraver. His earliest plates, like the "Standard Bearer" (1530), designed more directly under the Nuremberg influence, are the best. Of great merit also are the portrait busts of Luther and Melanchthon after Cranach, and of the Anabap-

tists, John of Leyden and Knipperdollinck, whom he probably drew at the time of their reign at Münster. He also designed suites of biblical subjects and the well-known series of "Wedding Dancers," which are very interesting for the history of costume. His earliest surviving painting is the altar of the Virgin in the Wiesenkirche at Soest, representing the Adoration of the Kings and the Madonna with Saints Anthony and Agatha. Of greater importance are his portraits, such as the "Young Man" (1440) in the Liechtenstein Collection, Vienna, Philip of Waldeck (1435) in the palace of Arolsen, and the "Young Man with the Pink" in the National Gallery, London. He was also active as a glass painter and as a goldsmith. Aldegrever was by far the most important artist of the Renaissance in Westphalia. His painting as well as his engraving is characterized by decisive drawing, by plastic modeling, and a sincere and naïve realism; but the effect, especially in the engravings, is often impaired by awkward and affected movement and by curious drawing of the nude. He is best of all in his engravings of ornament, which were widely imitated as designs in goldsmith work, bronze casting, and majolica. Consult W. B. Scott, *The Little Masters* (London, 1880), and *Die Nurnberger Kleinmeister* (Leipzig, 1911).

AL'DEHYDE, Acetic, CH_3CHO, often called Ordinary Aldehyde, or simply Aldehyde. A colorless liquid having a peculiar pungent and suffocating odor. It is very volatile and inflammable; it boils at 20.8° C., and has at 0° C. a specific gravity 0.801. It occurs in crude alcohol and wood spirit and is readily made from ordinary alcohol by oxidation with chromic acid. Aldehyde combines with ammonia to form a solid crystalline substance called aldehyde-ammonia, and having the formula $CH_3CH(NH_2)OH$; alcohol and acetal, which are generally contained as impurities in crude aldehyde, form no solid compound with ammonia. Therefore, to separate aldehyde from these substances, crystalline aldehyde-ammonia is produced by the direct action of ammonia, washed with ether, and broken up by distillation with dilute sulphuric acid. The aldehyde thus obtained is dehydrated by distillation with dry calcium chloride. Aldehyde is used in the manufacture of certain valuable dyes. If added to an ammoniacal solution of silver nitrate, it produces a precipitate of metallic silver, which may form a mirror if evenly deposited on a glass surface. By the action of reducing agents, aldehyde is converted into alcohol; oxidizing agents readily convert it into acetic acid. If a drop of strong sulphuric acid is added to aldehyde, the latter is transformed into *paraldehyde*, a colorless, transparent liquid having the molecular formula $C_6H_{12}O_3$; it has a strong characteristic odor and a somewhat burning taste; if cooled below 0° C., it solidifies, forming crystals which melt at 10.5° C. Paraldehyde is moderately soluble in water. If taken internally in doses of from one to four cubic centimeters, paraldehyde produces sleep without affecting the heart; it is therefore used as a substitute for chloral, though it has the disagreeable effect of imparting a persistent odor to the breath. Paraldehyde may be readily reconverted into aldehyde by distilling with dilute sulphuric acid. By the action of acids on aldehyde at a low temperature, another compound having the same percentage composition as aldehyde is obtained; this compound is called *metaldehyde;* it is colorless, crystalline, insoluble in water, and is readily converted into aldehyde by heating with dilute acids. Aldehyde was first isolated and studied by Liebig in 1835.

ALDEHYDES (clipped form of *alcohol dehydrogenatum*, alcohol deprived of hydrogen). An important class of organic chemical compounds characterized by the univalent group CHO. The aldehydes are derived from the primary alcohols (see Alcohols) by removing part of the hydrogen of the latter by means of an oxidizing agent. Thus, when ethyl alcohol is oxidized with aqueous chromic acid, ordinary aldehyde is produced according to the following chemical equation:

$$\underset{\text{Ethyl alcohol}}{CH_3CH_2OH} + O = \underset{\text{Aldehyde}}{CH_3CHO} + H_2O$$

Most of the aldehydes are volatile liquid compounds and are readily converted by oxidizing agents into the corresponding organic acids. Thus, benzaldehyde (benzoic aldehyde) is readily oxidized to benzoic acid, according to the following equation:

$$\underset{\text{Benzaldehyde}}{C_6H_5CHO} + O = \underset{\text{Benzoic acid}}{C_6H_5COOH}$$

The aldehydes react with a great variety of substances, and by the use of them chemists have been able to obtain a large number of valuable organic compounds. Among the characteristic reactions of the aldehydes are the following:

1. Being powerful reducing agents, the aldehydes form a mirror of metallic silver when heated in a glass vessel with an ammoniacal solution of silver nitrate to which some caustic soda has been added.

2. By the action of phosphorus pentachloride, the oxygen atom of the aldehyde group (CHO) is replaced by two atoms of chlorine. Thus, by the action of phosphorus pentachloride upon ordinary aldehyde, ethylidene chloride may be obtained according to the following equation:

$$\underset{\text{Aldehyde}}{CH_3CHO} + PCl_5 = \underset{\text{Ethylidene chloride}}{CH_3CHCl_2} + POCl_3$$

3. The aldehydes combine with alcohols to form compounds called *acetals*. Thus, ordinary acetal may be obtained according to the following equation:

$$\underset{\text{Aldehyde}}{CH_3CHO} + \underset{\text{Alcohol}}{2C_2H_5OH} = \underset{\text{Acetal}}{CH_3.CH\begin{matrix}OC_2H_5\\OC_2H_5\end{matrix}} + H_2O$$

4. The presence of an aldehyde in a sample submitted for examination (or the presence of the aldehyde group CHO in a compound) may be demonstrated by adding the substance to a solution of a rosanilin salt that has been bleached by sulphurous acid (SO_2): the appearance of a red coloration indicates the presence of an aldehyde.

5. When treated with nascent hydrogen, the aldehydes are reconverted into the alcohols from which they are derived; while, as stated above, oxidizing agents transform aldehydes into the corresponding acids. The aldehydes may therefore be said to be intermediate between the alcohols and the acids of organic chemistry.

6. Aromatic aldehydes (i.e., derivatives of benzene), when treated with strong alkalies, undergo simultaneous oxidation and reduction, yielding a mixture of the corresponding acid

and alcohol. Thus, by the action of strong potassium hydroxide, benzaldehyde (q.v.) gives a mixture of benzoic acid and benzyl alcohol ($C_6H_5CH_2OH$).

ALDEN, al'den, Bradford R. (1800–70). An American soldier. He was born at Meadville, Pa., and in 1831 graduated at West Point, where he was an instructor from 1833 to 1840. He subsequently served for two years as aid to General Scott, and from 1845 to 1852 was commandant of cadets at West Point. In 1853 he organized and led an expedition against the Rogue River Indians, and in a fierce battle, fought near Jacksonville, Oreg., was so severely wounded that he was soon afterward forced to retire permanently from the army.

ALDEN, Cynthia May (Westover) (1862—). An American journalist and author, born at Afton, Ind., and educated at the University of Colorado and the Denver Business College. For several years she taught music and held positions as soloist in New York City church choirs. Remaining in New York, she was appointed (1887) an inspector of customs, an office which she distinguished by many important seizures of smuggled goods. She acted as secretary to the Commissioner of Street Cleaning for two years, and for a time was employed in the State Museum of Natural History. This position she resigned to enter journalism, as editor of the woman's department, first, of the *New York Recorder*, and afterward of the *New York Tribune*. During her three years with the *Tribune* she planned and founded the International Sunshine Society, of which she became president-general. Although Mrs. Alden accepted a place on the editorial staff of the *Ladies' Home Journal*, she continued to reside in New York. Her published writings include: *Manhattan, Historic: Artistic; Bushy: Child Life in the Far West; Women's Ways of Earning Money* (1904).

ALDEN, Henry Mills (1836–1919). An American editor and author, born at Mount Tabor near (Danby), Vt. He graduated in 1857 at Williams College, where James A. Garfield and Horace E. Scudder were among his fellow-students and in 1860 at the Andover Theological Seminary. Subsequently he was licensed to preach, but was never settled. From 1863 to 1869 he was managing editor of *Harper's Weekly*, and in the latter year became editor of *Harper's Monthly*. In 1863–64 he lectured before the Lowell Institute, Boston, on "The Structure of Paganism." He is known as a classical student of large acquirements, particularly in connection with Greek literature and thought; and his first literary ventures were two articles contributed to the *Atlantic* on the Eleusinian Mysteries. His long editorial service has been unobtrusive but distinctive. His personality has pervaded *Harper's Magazine*, in which he has aimed, among other things, to recognize the novice and to encourage the best type of Americanism. He collaborated with A. H. Guernsey in the preparation of *Harper's Pictorial History of the Great Rebellion* (1862–65); and has published *The Ancient Lay of Sorrow*, a poem (1872), and two profound metaphysical essays, *God in His World* (1890, published anonymously), *A Study of Death* (1895), both extensively read and enthusiastically received by critics, and *Magazine Writing and the New Literature* (1908). With William Dean Howells he has edited numerous collections of stories by American writers.

ALDEN, Mrs. Isabella Macdonald (1841—). An American author, writing under the pseudonym of "Pansy." She was born at Rochester, N. Y. In addition to much fiction for older readers, her works include the *Pansy Books*, a series of about 75 juvenile works, a life of Christ, called *The Prince of Peace* (rev. ed., 1908); a novel, *Unto the End* (1902). Among later books are *Her Own Way* (1912); *A Long Way Home* (1912); *A King's Daughter* (1913). She edited the young folks' journal *Pansy* from 1873 until 1896, and was at various times on the editorial staff of the *Christian Endeavor World* and other religious magazines, Japanese as well as American. Her works have been translated into many foreign languages.

ALDEN, James (1810–77). An American naval officer, born in Portland, Me. He entered the navy as midshipman in 1828, was in the Wilkes exploring expedition to the Antarctic (1838–42), in several naval operations of the Mexican War (1848), and from 1848 to 1860 in the coast survey. In the Civil War he commanded first the steamer *South Carolina* and then the sloop-of-war *Richmond*, being present at the capture of New Orleans and the attack on Port Hudson. He was promoted to be captain in 1863 and commanded the sloop *Brooklyn* in Mobile Bay and at Fort Fisher. He became a commodore in 1866, was placed in command of the Mare Island (Cal.) navy yard in 1868, and in 1869 was appointed Chief of the Bureau of Navigation. He was promoted to the rank of rear admiral in 1871 and took command of the European squadron; he was retired in 1873.

ALDEN, John (1599–1687). One of the Pilgrim Fathers. He was born in England. As a cooper, he was engaged in making repairs on the *Mayflower* at Southampton, and sailed in her, signing the compact. He settled at Duxbury, Mass., and married Priscilla Mullens. Their courtship forms the theme of Longfellow's poem, *The Courtship of Miles Standish*. He was a magistrate for more than 50 years and greatly assisted in the government of the infant colony. He outlived all the other signers of the compact.

ALDEN, Raymond Macdonald (1873—). An American scholar and educator, born in New Hartford, N. Y. After studying at Rollins College, Fla., and at the University of Pennsylvania, from which he graduated in 1894, he took post-graduate courses at his alma mater and at Harvard. In 1894–95 he was instructor in English at Columbian (now George Washington) University; in 1896–97 assistant in English at Harvard; and in 1898–99 senior fellow in English at the University of Pennsylvania. Chosen to fill the assistant professorship of English literature and rhetoric at Leland Stanford, Jr., University (1899), he became associate professor in 1909. In 1911 he accepted the chair of English at the University of Illinois. His writings include: *The Rise of Formal Satire in England* (1899); *The Art of Debate* (1900); *On Seeing an Elizabethan Play* (1903); *Consolation: An Ode* (1903); *Knights of the Silver Shield* (1906); *An Introduction to Poetry* (1909); *A Palace Made by Music* (1910). He also edited several plays of Shakespeare and other Elizabethan dramatists and in 1910 an edition of Thoreau's *Walden*. Alden became known as a contributor of articles to educational journals and short stories to magazines. In 1913 he edited an edition of Shakespeare's *Sonnets* and *A Lover's Complaint*.

ALDEN, Timothy (1823–58). An American inventor of a machine for setting and distributing type. He was born at Barnstable, Mass., and was sixth in descent from John Alden, the *Mayflower* Pilgrim. In early life he was a compositor in his brother's printing office, and while thus engaged is said to have declared: "If I live long enough I will invent a machine to do this tiresome work." After the inventor's death the machine was improved by Henry W. Alden.

ALDEN, William Livingston (1837–1908). An American author. He was born in Williamstown, Mass., and was educated at Lafayette and Jefferson colleges. In 1865 he joined the editorial staff of the *New York Times* and at once attracted attention by his humorous writings. During President Cleveland's first administration (1885–89) he was Consul-General of the United States at Rome, and at the expiration of his term was made Chevalier of the Order of the Crown of Italy by King Humbert. In 1893 he settled in London and became literary correspondent of the *New York Times.* Among his publications are: *Domestic Explosives* (1878); *Shooting Stars* (1879); *Moral Pirates* (1881; new ed., 1908); *Life of Christopher Columbus* (1881); *Cruise of the "Ghost"* (1882; new ed., 1909); *Cruise of the Canoe Club* (1883); *A Lost Soul* (1892); *The Mystery of Elias G. Roebuck* (1896); *His Daughter* (1897); *Dewitt's Dream* (1902); *New Robinson Crusoe* (1903); *Cat's Tales* (1905); *Jimmy Brown Trying to Find Europe* (1905).

ALDER, ąl'dẽr (Lat. *alnus*). A genus of plants of the natural family Betulaceæ. (See Birch.) The genus consists of trees and shrubs, natives of cold and temperate climates; the flowers in terminal, imbricated catkins, which appear before the leaves in some species, though in other species leaves and flowers appear simultaneously. In *Alnus maritima* the flowers appear in the autumn, and the fruits ripen in the following season. The common or black alder (*Alnus glutinosa* or *vulgaris*) is a native of Great Britain, northern Africa, and of the northern parts of Asia, and escaped from cultivation in America. It has roundish, wedge-shaped, obtuse leaves, lobed at the margin and serrated. The bark, except in very young trees, is nearly black. It succeeds best in moist soils and helps to secure swampy river-banks against the effects of floods. It attains a height of 30 to 60 feet. The wood is of an orange-yellow color. It is not very good for fuel, but affords one of the best kinds of charcoal for the manufacture of gunpowder, upon which account it is often grown as coppice-wood. Great numbers of small alder trees are used in Scotland for making staves for herring barrels. The wood is also particularly valuable on account of its property of remaining for a long time under water without decay, and is therefore used for the piles of bridges, for pumps, sluices, pipes, cogs of mill-wheels, and similar purposes. The bark is used for tanning and for dyeing. It produces a yellow or red color, or, with copperas, a black color. The leaves and female catkins are employed in the same way by the tanners and dyers of some countries. The bark is bitter and astringent. The individual tree, viewed by itself, may be regarded as somewhat stiff and formal in appearance, but in groups or clusters it is ornamental. The northern limit of the common alder is the Swedish shore of the Gulf of Bothnia, in the south of Angermannland, where it is called the sea alder, because it is only in the lowest grounds, near the sea, that it occurs. The gray or white alder (*Alnus incana*), a native of many parts of continental Europe, especially of the Alps, and also of North America and of Kamtchatka, but not of Great Britain, differs from the common alder in having acute

ALDER LEAF AND CATKINS.

leaves, downy beneath, and not glutinous. It attains a rather greater height, but in very cold climates and unfavorable situations appears as a shrub. It occurs on the Alps at an elevation above that to which the common alder extends, and becomes abundant also where that species disappears in the northern part of the Scandinavian peninsula. The bark is used in dyeing. *Alnus cordifolia* is a large and handsome tree, with cordate acuminate leaves, a native of the South of Italy, but found to be quite hardy in England. Some of the American species are mere shrubs. The bark of the smooth alder (*Alnus rugosa*), found from south New England to Wisconsin, Kentucky, and Florida, is used in dyeing. The green or mountain alder (*Alnus crispa*) ranges from north New England to the shores of Lake Superior, and northward and southward to North Carolina. *Alnus oregona* is a handsome species of the northern Pacific coast region. In the mountain regions of Alaska and elsewhere alders are the first arborescent growth to succeed conifers swept away by avalanches, etc.

Fossil Forms. Leaves of a plant doubtfully allied to the alder have been described from the Cretaceous rocks of Greenland and North America under the name Alnophyllum, while true alders attained a considerable degree of develop-

ment in Tertiary times throughout the northern parts of Europe, Asia, and Africa.

ALDER FLY. An insect of the family Sialidæ. See CORYDALIS.

ALDERMAN, ąl′dẽr-măn. The designation used in the United States for the representative of the citizens of a district or ward in a city or large town, whose duty it is to attend the local legislature and enact municipal regulations. The title originally derived from the Anglo-Saxon *ealdorman,* compounded of *ealdor,* 'older,' and *man,* and applied to persons of high and hereditary distinction, such as princes, earls, and governors. Whether any definite and invariable functions were connected with the ancient rank of *ealdorman* does not seem to be very clearly ascertained. There were also aldermen of counties, hundreds, cities, boroughs, and castles. At present in England, Wales, and Ireland, aldermen are officers invested with certain powers in the municipal corporations, either as civil magistrates, or as deputies of the chief civil magistrates in cities and towns corporate. The corresponding title in Scotland is bailie. In the majority of American cities aldermen form a legislative body, having limited judicial powers in matters of internal police regulation, etc., though in many cities they hold separate courts and have magisterial powers to a considerable extent. (See sections on *Local Government* in the articles on the important countries and articles on American cities.)

ALDERMAN, EDWIN ANDERSON (1861—). An American educator, born at Wilmington, N. C., and educated at the university of that State. He was professor of English in the North Carolina State Normal College in 1892; professor of pedagogy at his alma mater in 1892–96, and president of that institution in 1896–99. In June, 1904, after four years as president of Tulane University, he became president of the University of Virginia. He also served as district director of the Southern Education Board and as editor-in-chief of *The Library of Southern Literature.* His writings include several biographical and historical works.

ALDERMAN LIZ'ARD. The name, in California, of the obese Chuckwalla (q.v.).

ALDERNEY, ąl′dẽr-nĭ (Fr. *Aurigny,* the *Riduna* of Antoninus). One of the Channel Islands (q.v.), separated from Cape La Hague, France, by a perilous channel, 7 miles wide, called the Race of Alderney. It is 4½ miles long, with an extreme breadth of 1½ miles and an area of 3 square miles (1962 acres) (Map: France, N., D 2). The southeast coast is lofty and bold; it slopes to the northeast and north, forming small bays. It is strongly fortified, and at Braye there is an extensive granite breakwater, built at an enormous expense by the British government in order to form a naval station and harbor of refuge, but the project was a failure. The dangerous Casket rocks, surmounted by three splendid lighthouses, lie 6 miles southwest. St. Anne, in the centre of the island, is the chief town. Alderney is included in the bailiwick and governorship of Guernsey, but has minor legislative and judicial administrations locally elected. Agriculture and grazing are the only industries. The island is known for a distinctive breed of cows. Pop., 1891, 1857; 1901, 2062; 1911, 2561.

ALDERNEY CATTLE. See CATTLE.

ALDERSGATE, ąl′dẽrz-gāt. In the old city wall of London, the gate which stood at the present junction of Aldersgate Street and St. Martin's-le-Grand. It was between Cripplegate and Newgate. It was rebuilt in 1616, with figures of King James I and of the prophets Jeremiah and Samuel.

ALDERSHOT, ąl′dẽr-shŏt (for *Aldersholt; holt,* a wood, Ger. *Holz,* wood). A town in Hampshire, England, 14½ miles east of Basingstoke (Map: England, F 5). Its importance arises from the vicinity of the permanent military camp, established here in 1854–55, which accommodates upward of 20,000 troops. An equestrian statue of the Duke of Wellington stands on an eminence called "Cæsar's Camp," which commands a fine view of the manœuvring ground. Aldershot is a busy junction of the London and Southwestern Railway, with two depots, and has all the elements of a thriving town. Pop., 1891, 25,595; 1901, 30,974; 1911, 35,175.

ALDERSHOT CAMP. A permanent camp of the British army, situated about 35 miles southwest of London, England, and used during the spring and summer for army manœuvres on a larger scale than is possible elsewhere in the kingdom. Up to the Boer War of 1899, the Aldershot garrison consisted of troops available for service with the first army corps. It is also used by volunteers and militia during their annual training and is the headquarters for various military instruction.

ALDGATE, ąld′gāt′. The eastern gate in the old city wall of London, near the present junction of Houndsditch, Aldgate High Street, and the Minories. Its date and the origin of the name have been much disputed. The gate probably dated from the late Saxon or early Norman period, and the name, spelled *Alegate* in a document earlier than 1115, seems to mean the 'gate free to all.'

ALDHELM, ąld′hĕlm (c.640–709). An ecclesiastic, possibly a son of the King of the West Saxons. He was educated at Canterbury, became abbot of Malmesbury about 676, and Bishop of Sherborne in 705, but continued to act as abbot of his monasteries. He was a famous scholar. His works are found in Migne, *Patrologia Latina,* vol. lxxix.

ALDIE, ąl′dĭ. A village of Loudoun Co., Va., about 35 miles west of Washington, D. C. Here, on June 17, 1863, a force of Federal cavalry under Pleasonton defeated a force of Confederate cavalry under Stuart.

ALDIN, CECIL CHARLES WINDSOR (1870—). An English artist and illustrator, born at Slough and educated at Eastbourne College and Solihull Grammar School. He studied anatomy at South Kensington and animal painting under F. W. Calderon. Within three years after his first drawing was published in the *Graphic* (1891) he was commissioned to illustrate Kipling's *Jungle Stories* for the *Pall Mall Budget.* In 1899–1900 he painted a series of sporting prints in vivid colors, known as "The Fallowfield Hunt," which became so popular as to be reproduced by thousands in England and the United States. Aldin made many drawings for the English illustrated weeklies and for important books, becoming one of the best-known men of the day in his profession. He published, in 1913, *Painting Book: The Farm Yard; Jock and Some Others* (with R. Waylett).

ALDINE (ăl′dĭn *or* ąl′dĭn) **EDITIONS.** A name given to the books printed by Aldus Manutius and his family, at Venice (1490–1597),

prized for their scholarly correctness, beautiful typography, and tasteful manufacture, and, subsequently, for their rarity. They include editions of Greek, Latin, and Italian writers, in many cases the earliest printed. The first Aldus was an innovator. He first used italic type (1501) and introduced fine paper or parchment editions (1499). He was an artist in the designing of type, having 9 varieties of Greek and 14 of Roman letters. The establishment remained for more than a century in the family, and produced 908 works, which bear its imprint of an anchor with twisted dolphin, often with the Latin motto, *Sudavit et Alsit.* As the editions gained in reputation, they were often counterfeited by printers in Lyons and Florence. The most precious are those of the first 12 years, especially *The Hours of the Blessed Virgin* (1497) and the *Vergil* (1501). See MANUTIUS.

ALDINI, ål-dē′nē, ANTONIO (1756–1826). An Italian statesman, born in Bologna. He studied law in Rome and became professor of that subject and a practicing barrister there. After the separation of Bologna from the Papal States, he went to Paris and upon his return became president of the Council of Ancients of the Cisalpine Republic. He was dismissed from this position in 1798 because of his opposition to the measures of Napoleon, who, however, in 1801, made him president of the Council of State of the Italian Republic. Of this position he was deprived by Melzi. When the Kingdom of Italy was formed in 1805, Aldini was made a Count, and Secretary of the Interior, in which capacity he drew up the decree dissolving the Papal States. After 1815 he lived in retirement at Milan.

ALDINI, GIOVANNI (1762–1834). A nephew of the famous Galvani and brother of Count Antonio Aldini; a student of natural science. He held the chair of physics at Bologna in 1798, was a founder of the National Institute of Italy, received the British Royal Society's gold medal, and was made Knight of the Iron Crown and Councilor of State at Milan by the Emperor of Austria. He spent much of his fortune in organizing a school of science for workingmen at Bologna. He carried on investigations in applied science and worked out methods of applying galvanism to various useful purposes in medicine and in the industrial arts.

ALDOBRANDINI, äl′dō-brän-dē′nē. A noble family of Florence, raised to the princely dignity by Pope Clement VIII.—SALVESTRO ALDOBRANDINI (1499–1588). A famous teacher of law at Pisa. He led a successful revolt against the Medici in Florence, defended the city against the imperial army of Charles V, and upon its capture was condemned to death, but the intervention of a powerful friend of the Medici caused the change of his sentence to that of banishment in 1530. He went to Rome, Naples, and Bologna, where, in 1538, he became Papal Vice-Legate and Vice-Regent. Realizing the futility of a return to Florence, he went to Ferrara, whence he was called to Rome as fiscal advocate of Pope Paul III.—IPPOLITO ALDOBRANDINI (1536–1605). A son of the preceding. He became Pope, with the title of Clement VIII (q.v.)—PIETRO ALDOBRANDINI (1571–1621). Cardinal; a nephew of Pope Clement VIII. He continued the policy of Clement and zealously promoted the development of the sciences. The great sums of money which he had accumulated he sought to secure by the purchase of Sulmona, Bari, and Bisignano. He became Archbishop of Ravenna under Pope Paul V. When the Roman branch of the family became extinct (1681), a dispute as to inheritance and succession arose between the Borghese and the Pamfili branches, and the princely title, as well as the greater part of the fortune, passed to the Borghese branch.

ALDOBRANDINI MARRIAGE, THE. A famous mural painting, since 1818 in the Vatican Library. It was found in 1606 at Rome and was named after its original modern owner, Cardinal Aldobrandini. It is probably of the time of Augustus. The picture contains 10 figures, arrayed in two groups. In the centre of the bridal chamber sits the bride. On the same couch is the *pronuba,* the bride's attendant (a married woman, a Roman practice); close by is a slave woman ready to assist the bride. In the other group, on the left, in a separate chamber, are three women, preparing a bath; on the right, directly before the bridal couch, is the waiting husband. Three women, finally, are busy with a sacrifice and with the bridal song. The picture illustrates Roman bridal ceremonies and is itself illuminated by such a poem as Catullus, lxi; indeed, it has been thought that the picture was intended to illustrate the marriage there described. Others think it a portrayal of the marriage of Peleus and Thetis, others of that of Paris and Helen, and still others simply an ideal picture. It presents the appearance of a frieze, 8 feet long by 4 feet high.

ALDO MANUZIO, äl′dō mä-nōō′tsē-ō. See MANUTIUS.

ALDRED, äl′drĕd, or **EALDRED** (?–1069), A noted English ecclesiastic. He became Abbot of Tavistock about 1027 and Bishop of Worcester, 1044. He made a pilgrimage to Jerusalem in 1058; was elected Archbishop of York in 1060, and died Sept. 11, 1069. He was very influential under Edward the Confessor, by whom he was employed on embassies. He submitted to and crowned William the Conqueror. He was capable and honest, instituting many reforms, and spending his wealth freely in the service of the Church.

ALDRICH, ąl′drĭch *or* ąl′drĭj, ANNE REEVE (1866–92). An American poet and novelist, whose few works gave promise of a brilliant future. She was born at New York, April 25, 1866, and died there June 22, 1892. Her first work, *The Rose of Flame* (1889), was followed by *The Feet of Love,* a novel, in 1890. *Songs about Life, Love, and Death* appeared posthumously in 1892. The general characteristic of her works is intense, passionate, and erotic.

ALDRICH, CHESTER HARDY (1862—). An American public official, Governor of Nebraska, 1911–13. He was born in Pierpont, Ohio, and graduated from Ohio State University in 1888. Admitted to the bar in 1891, he practiced in David City, Neb., for a number of years. His interest in politics led to his election in 1907 to the State Senate and in 1910 to a successful campaign as Republican candidate for governor. For reëlection in 1912 he was defeated by J. T. Morehead, Democrat. Governor Aldrich took an active part in the attempt to nominate Theodore Roosevelt for the presidency in 1912, and was one of the seven governors who signed a letter urging the latter to become a candidate.

ALDRICH, HENRY (1647–1710). An English theologian, musician, and architect, dean of Christchurch College, Oxford, from 1689. He

wrote a treatise on logic, *Artis Logicæ Compendium* (1691), which, with notes by Dean Mansel, was used as a text-book at Oxford for more than a century. He designed several of the buildings at Oxford, but is best known for his musical attainments. He wrote on the history of music, and composed services, anthems, and catches. His extensive musical library, second only to that of the British Museum, he left to Christ Church.

ALDRICH, JOHN MERTON (1866—). An American entomologist, born in Olmsted Co., Minn., and graduated from the South Dakota Agricultural College in 1888. Post-graduate studies in entomology he took at the University of Minnesota, the Michigan Agricultural College, the University of Kansas, and, previous to receiving a Ph.D. degree in 1906, at Leland Stanford, Jr., University. He was professor of zoölogy at the University of Idaho and entomologist at the experiment station there maintained from 1893 to 1905, when he was tendered the chair of biology. In 1911 he began special studies of the insects of the western salt and alkaline lakes. His published writings include *Catalogue of North American Diptera* and numerous entomological papers. He was made a member of the executive committee of the Entomological Society of America.

ALDRICH, NELSON WILMARTH (1841–1915). An American politician, born at Foster, R. I. In 1875–76 he was a member of the Rhode Island House of Representatives, and in the latter year its Speaker. He was elected to Congress in 1878 and 1880. In 1881 he resigned to take a seat in the Senate, in which he served continuously for 30 years. In his last 10 years in the Senate he held a position of undisputed leadership, chiefly in consequence of his thorough mastery of the details of parliamentary organization and through his skill in effecting combinations of the representatives of various interests. His policies were ultra-conservative, and his voluntary retirement in 1911 was due largely to the impracticability of checking longer the development of progressive tendencies in his party. Aside from his work in perfecting the senatorial methods of transacting legislative business, Aldrich figures in legislative history chiefly in connection with tariff and currency legislation. The Payne-Aldrich Tariff Act of 1909 was largely shaped by Aldrich and forced through Congress under pressure exerted by him. He was largely responsible for the Aldrich-Vreeland Currency Law, enacted in 1908, and as Chairman of the National Monetary Commission, created by the same act, directed a broad investigation of the banking and currency systems of the United States and of foreign countries, with a view to securing information upon which to base a comprehensive scheme for the reform of the American banking system. In 1911 Aldrich made public a tentative scheme, designed to increase the effectiveness of reserves through their control by reserve associations. (See BANK; BANKING.) The Aldrich plan, though approved in its essential features by most monetary specialists, was received with suspicion by the public, which had come to associate the name of Aldrich with the highly protected interests, the "trusts," and Wall Street. Mr. Aldrich's very considerable financial interests, founded originally upon wholesale trade and later extended to manufactures and speculative finance, and his connections with John D. Rockefeller, Jr., his son-in-law, explain sufficiently the popular belief that his legislative services were at the command of the large interests. A just view would appear to be that, both in his defense of high protection and in his currency projects, Mr. Aldrich was actuated by a desire to further the material interests of the country as a whole; but that his interpretation of the interests and needs of the country is of a character that prevailed among practical politicians in the last quarter of the nineteenth century rather than that which is generally acceptable in the first quarter of the twentieth century.

ALDRICH, RICHARD (1863—). An American writer on music. He was born in Providence, R. I. While pursuing the regular academic course at Harvard University, he also took the course in music under Prof. J. K. Paine. From 1885 to 1889 he was the musical and dramatic critic of the *Providence Journal.* He has been the musical critic of the *New York Times* since 1902. He translated Lilli Lehmann's *Meine Gesangskunst* (1902) and wrote *A Guide to Parsifal* (1904) and *A Guide to the Nibelungen Ring* (1906).

ALDRICH, THOMAS BAILEY (1836–1907). An American poet, novelist, traveler, and editor. He was born at Portsmouth, N. H., Nov. 11, 1836. After a boyhood spent in New England and Louisiana, he entered a counting-house in New York in 1854. He was employed as "reader" in a publishing house in 1857, and he served successively on the staffs of the New York *Evening Mirror,* the *Home Journal,* and the *Saturday Press.* In 1866 he removed to Boston, where he was editor of *Every Saturday* until 1874. He then became a regular staff contributor to the *Atlantic Monthly,* and on the retirement of W. D. Howells, in 1881, succeeded to the editorship, which he held until 1890. Afterward he devoted himself to literary work and travel. Aldrich is best known as a poet. He has, not very aptly, been called "the American Herrick," owing to the fact that his verse is graceful, light, and melodious, carefully wrought, restrained, and reminiscent of places that he has visited. His chief publications of verse, besides the collective editions, are: *The Bells* (1855); *The Ballad of Babie Bell* (1856); *Pampinea, and Other Poems* (1861); *Cloth of Gold, and Other Poems* (1874); *Flower and Thorn* (1876); *Friar Jerome's Beautiful Book* (1881); *Mercedes, and Later Lyrics* (1883); *Wyndham Towers* (1889); *Unguarded Gates, and Other Poems* (1895). Like his poetry, Aldrich's prose is delicate and finished in style. His best-known piece of fiction is probably *Marjorie Daw* (1873); and his *Story of a Bad Boy* (1870) is also very popular. Other novels are: *Out of his Head, a Romance* (1862); *Prudence Palfrey* (1874); *The Queen of Sheba* (1877); *The Stillwater Tragedy* (1880); and *Two Bites at a Cherry* (1893), a volume of short stories. His volumes of travel and reminiscence are *From Ponkapog to Pesth* (1883) and *An Old Town by the Sea* (1893). In 1905 he published, in blank verse, a tragedy, *Judith of Bethulia,* which was played by Miss Nance O'Neill. His biography, written by Ferris Greenslet (1908), is a fine appreciation of both Aldrich and his writings.

ALDRICH, WILLIAM SLEEPER (1863—). An American scientist and educator, born in Philadelphia, Pa. He graduated from the United States Naval Academy in 1883 and a year later received the degree of M.E. from the Stevens

Institute of Technology. After several years of teaching in high schools he was successively instructor in drawing (1889–91) and associate in mechanical engineering (1891–92) at Johns Hopkins University; professor of mechanical engineering and director of mechanical arts at West Virginia University (1893–99); and professor and head of the department of electrical engineering at the University of Illinois (1899–1901). For the 10 following years he held the position of director of the Thomas S. Clarkson School of Technology. During the Spanish-American War Aldrich saw service with Admiral Sampson's fleet in Cuban waters. He became a member of numerous scientific societies. His published writings include *Notes on Building Construction and Architecture*, with W. H. Browne, Jr., and *Manual for Electrical Engineering Laboratory*, with same (1900).

ALDRIDGE, ąl'drĭj, Ira Frederick (c.1810–67), "The African Roscius." There are conflicting accounts of his early life. One is that he was a mulatto, born at Bel Air, Md., about 1810, was apprenticed to a German ship carpenter, accompanied Edmund Kean to England as a servant, returned in 1830 or 1831, and appeared on the stage in Baltimore without success; after which he went back to England and gained a high reputation. Another story is that he was the son of a native of Senegal, who was brought here as a slave, became a Christian, and pastor of Greene Street Chapel (African) in New York; that Ira was born in that city in 1807, and was sent to Glasgow University to be educated for the ministry. Preferring the drama, however, he made his début at the Royalty Theatre, London, as Othello, and became remarkably popular. He played also Aaron, in *Titus Andronicus* (1852), and Zanga, Orozembo, Rolla, and other characters for which his color was suited, throughout England. At Belfast he played Othello to the Iago of Edmund Kean, who greatly admired him. In 1852 he appeared in Brussels and thereafter on the Continent took high rank in tragedy. He received crosses and medals from the emperors of Austria and Russia and the King of Prussia and was honored with membership in several of the great academics. He married an Englishwoman.

ALDRINGER, ält'rĭng-ĕr, also Altringer, or Aldringen, Johann, Count (1588–1634). A general in the imperial German army during the Thirty Years' War. He was born at Diedenhofen and studied at the University of Paris. As a reward for his defense of the Elbe Bridge at Dessau, April, 1626, against Mansfield, he was created a Count in 1628. He was in high favor with Wallenstein and after the conclusion of peace with Denmark was appointed major-general. In this capacity he served with distinction under Collalto at the siege of Mantua. On his return to Germany, in 1631, he coöperated with Tilly and, upon the death of that commander (1632), became his successor. As field-marshal, he afterward conducted a successful campaign in Franconia, Bavaria, and Swabia against the Swedes. Eventually influenced by the Court party against Wallenstein, he defended the imperial cause, although he adroitly evaded the order to take Pilsen. After Wallenstein's death, he fought against the Swedes on the Danube, where soon afterward he met his death in the defense of Landshut. Consult Ernst Brohm, *Johann von Aldringen* (1882), Hermann Hallwich, *Johann von Aldringen* (Leipzig, 1885), and J. Krebo, *Zur Beurteilung Holks und Aldringens. Historische Vierteljahrschrift*, vol. iii (Leipzig, 1900).

ALDROVANDI, äl'drō-vän'dē, Ulisse (1522–1605). An Italian naturalist. He was of noble birth. He became, in 1554, a professor of philosophy and logic, and in 1560 lectured on botany in the University of Bologna. He also practiced medicine and succeeded, after violent popular opposition, in establishing an inspectorship of drugs and pharmacies. The Pope confirmed him in the office. Afterward he became professor of natural history, established the Botanical Garden of Bologna in 1567, and was employed for many years in forming a collection of specimens as a basis for an encyclopædic work on animal life. To this end he traveled extensively and enlisted the aid of Gesner and others. In this work, and in the preparation of drawings, he expended the greater part of his fortune. He ceased teaching in 1600 and devoted himself to the publication of his great work, issuing four volumes in Latin on ornithology (1559–1603) and one on mollusks. He bequeathed his collections and manuscripts to the Senate of Bologna; the collections became the nucleus of the great museum of that city, and the manuscripts remained in the university library. Ten other volumes, more or less prepared by him, were rapidly brought out by his colleagues and pupils; but many manuscripts and drawings remain unpublished. He did a great service in stimulating scientific study and collected an enormous number of facts and specimens; but his writings were prolix and not discriminative. Nevertheless, some volumes, as those on birds, rapidly ran through several editions, and the entire series was epitomized by Johnstone. Consult his biography by G. Fantuzzi (Bologna, 1774).

ALDUS, äl'dŭs. See Manutius, Aldus.

ALE. See Beer; Brewing.

ALEANDER, äl'ē-ăn-dĕr, Hieronymus (1480–1542). An Italian humanist and Papal Legate. He was born at Motta, near Treviso, and after a short course in medicine devoted himself to the study of theology and languages. He entered the service of the Bishop of Liége, Eberhard of the Mark, in 1514, and in 1519 he went as Papal Legate to Germany, to combat the Lutheran movement. He inspired the famous edict of Charles V against the reformer (May 26, 1521), a document antedated May 8, 1521, and probably emanating from the pen of Aleander. In 1525 he was captured in the battle of Pavia, but was ransomed from the Spaniards for 500 ducats. As Legate to Germany in 1532, he unsuccessfully endeavored to frustrate the Peace of Nuremberg. In 1536 Pope Paul III appointed him a member of the reform commission under Contarini (q.v.), and two years afterward he was created Cardinal and was again sent to Germany; but his mission proved unproductive of results. His letters and reports are valuable historical documents, and his celebrated writing, *De Concilio Habendo*, is said to have been consulted at the Council of Trent. For his biography down to 1529, consult J. Paquier (Paris, 1900); also in general, Brieger, *Aleander und Luther 1521* (Gotha, 1884); Kelkoff, *Die Depeschen Aleanders vom Reichstag zu Worms* (Halle, 1886).

ALEARDI, ä'lâ-är'dē, Aleardo (1812–78). An Italian patriot and poet, formerly hailed as a rival of Prati. He was born at Verona, studied law at Padua, and was active in the outbreak of

1848. He was sent by the short-lived Venetian Republic to represent its interests at Paris. After the Republic's downfall, his connection with later conspiracies caused his imprisonment at Mantua, 1852, and at Verona and Josefstadt in 1859. Here he remained until liberated by the Peace of Villafranca. He subsequently became professor of æsthetics at Florence, Deputy in the Italian Parliament, and finally Senator. He died at Verona, which has perpetuated his memory by a monument and by a bridge named in his honor. Aleardi's poems will live on account of their artistic finish and their delicate appreciation of nature, but they are marred by a prevailing lack of force and are overburdened with imagery. The best include *Il monte Circello*, *Un' ora della mia giovinezza*, and *I sette soldati*, which was dedicated to Garibaldi, and *Le Città Italiane Marinare e Commerciante*, considered by many his finest poem, and recounting the rise, flourishing, and fall of the maritime and commercial cities of Italy: Venice, Florence, Pisa, and Genoa. An edition of his collected poems appeared at Florence (1862), and a fifth edition with additional material appeared in the same city in August, 1878, shortly after his death. His *Epistolario* was published, with an introduction by G. Trezza, in Verona, 1879. Consult Augusto Bazzoni, *Aleardo Aleardi*, Turin, 1863, for a brief sketch of the man and his work.

ALECSANDRI, ä'lĕk-sän'drĕ, or **ALEXANDRI,** VASILIO, or BASIL (1821–90). A Rumanian patriot and poet. He was born in northern Moldavia, studied at Paris from 1834 to 1839, took part in the revolutionary movement of 1848 in Rumania, and was obliged to seek refuge in Paris. In 1859 and 1860 he was Minister for Foreign Affairs, was elected to the upper chamber in 1879, and in 1885 was appointed Minister at Paris. He was always active in seeking the freedom and unity of Rumania. He collected *Poesii populare ale Românilor* (1853), and wrote *Les doines* (1853) and *Doine si lacrimioare* (1863), two volumes of verse, and the dramas *Despot Voda* ('Prince Despot,' 1880); *Fîntîna Blandusiei* (1884), and *Ovidiu* ('Ovid,' 1885). His *Opere* appeared in seven volumes in 1873–76.

ALEC'TO (Gk. Ἀληκτώ, *Alēktō*, from ἀ, *a*, priv. + λήγειν, *lēgein*, to stop, to cease, The Tireless). The name of one of the three Eumenides (q.v.).

ALEC'TROMAN'CY. See SUPERSTITION.

ALEDO, ä-lē'dō. A city and the county-seat of Mercer Co., Ill., 35 miles southwest of Rock Island, on the Rock Island Southern and the Chicago, Burlington, and Quincy railroads (Map: Illinois, B 2). It contains the William and Vashti College, owned and operated by the county, Drury Academy, and a State agricultural experiment station. The city is in a rich farming region and manufactures brick and tile. Pop., 1890, 1601; 1900, 2081; 1910, 2051; 1913 (est.), 2650.

ALEE'. See HELM.

ALEGRIA, ä-lā'grē-ä. A town on the west coast of Cebú, Philippines, on the strait of Tanon, 55 miles southwest of the town of Cebú. Pop., 1903, 9579.

ALEMAN, ä'lā-män', MATEO (1547–1615?). A famous Spanish novelist, born at Seville in September, 1547. Little is known of his life except that he took his bachelor's degree at Seville in 1565, was appointed to the royal treasury in 1571 or 1572—a position which he resigned after 20 years, as poor as when he assumed it—and emigrated to America in 1608 and probably died in Mexico (where he seems to have been established as a printer by 1609) some time after 1615. His writings include a poetical biography of St. Anthony of Padua (1604) and an *Ortografía castellana* (Mexico, 1609). In 1613 he published the *Sucesos de D. Frai Garcia Gera, arzobispo de Mejico*, and the *Oracion funebre* for the said archbishop. His great work, however, is *Guzman de Alfarache* (1599, second part probably in 1604), a novel with a rogue for the hero, which revives the picaresque tradition of Mendoza's *Lazarillo de Tormes*. *Guzman* at once became exceedingly popular, and within six years had run through 26 editions, aggregating upward of 50,000 copies, besides being translated into French and Italian. In 1623 James Mabbe published the first English version, of which Ben Jonson wrote: "This Spanish Proteus, though writ but in one tongue, was formed with the world's wit." Both in the delineation of manners and in the purity of style, *Guzman* ranks next to *Lazarillo*, which is recognized as the enduring type of the comic prose epic. While lacking the originality, conciseness, and caustic humor of the unknown author of *Lazarillo*, Aleman shows keen powers of observation and a wide knowledge of human nature; and in *Guzman* he has given the world a most diverting study of blackguardism, his hero showing all the resources of a consummate rascal in the various characters of stable boy, beggar, thief, coxcomb, mercenary, valet, and merchant. The book, however, is marred by the moral reflections of the author, which obtrude themselves with somewhat wearisome persistence. The most available editions of *Guzman* are: Aribau's in the *Biblioteca de autores espanoles*, vol. iii (Madrid, 1846); Cejador's in the *Biblioteca Renacimients* (Madrid, 1913). For a critically annotated edition of the *Sucesos*, see A. H. Bushee, "Les Sucesos de Mateo Alemán" (*Revue Hispanique*, xxv, New York, 1911); *Bibliotheca Romanica*, vols. 183–187; *Biblioteca Espanola;* Mateo Aleman, *Guzman de Alfarache*, Primera Parte (Strassburg). Consult: Chandler, *Romances of roguery* (New York, 1899); De Haan, *The Novela Picaresca* (Baltimore, 1900); *Discursos leidos ante la Real Academia Espanola por los excmos senores D. Francisco Rodriguez Marin y D. Marcelino Menendez y Pelayo, en la recepcion publica del primero* (Sevilla, 1907; the first of these discourses is devoted to Aleman).

AL'EMAN'NI, more correctly spelled ALAMANNI. The name of a military confederacy of several German tribes which began to appear on the lower and the middle Main about the beginning of the third century. Caracalla fought with them first on the Main in 211 A.D., but without conquering them; Alexander Severus (q.v.), after his war in the East, marched against them, but was slain by his soldiers in a mutiny. Maximinus (q.v.), successor of Severus, finally drove them beyond the Rhine. After his death they again invaded Gaul, and even threatened Italy, but were defeated by Postumus who pursued them into Germany and fortified the boundary of the Roman territory called the Agri Decumates. The mounds near Pförung, on the Danube, the rampart extending through the principality of Hohenlohe to Jaxthausen, and the ditch with palisades on the north side of the Main, are remains of these

fortifications. The Alemanni, however, did not desist from their incursions, although repeatedly driven back. After 282, being pressed upon from the northeast by the Burgundians, they made permanent settlements within the Roman boundary from Mainz to Lake Constance. Constantius twice defeated them as they were raiding Gaul. Julian, too, came (357) to the relief of Gaul, which had been again suffering from the incursions of the Alemanni, and soon compelled eight chiefs to sue for peace. Their united force, in their principal battle with Julian, amounted to 35,000 men. After the fifth century the confederated nation is spoken of as Alemanni and Suavi or Suevi. During the fourth century they had crossed the Rhine, and extended as far west as the Vosges and south to the Helvetian Alps. At length Clovis broke their power in 496 and made them subject to the Frankish dominion. The southern part of their territory was formed into a duchy, called Alemannia (q.v.). The name of Swabia was later applied to the part of the duchy lying east of the Rhine. From the Alemanni the French have given the name of Allemands and Allemagne to Germans and Germany in general, though the inhabitants of the north of Switzerland, with those of Alsace and part of Swabia, are the proper descendants of the Alemanni. See ALMAIN. Consult *The Cambridge Mediæval History*, vol. i (New York, 1911).

AL'EMAN'NIA, or **AL'AMAN'NIA**. The country of the Alemanni (q.v.). The region included part of the later Switzerland and Tyrol. In the tenth and eleventh centuries Alemannia, or Swabia (q.v.), was one of the four great duchies of the German kingdom.

ALEMBERT, ȧ'läN'bâr', JEAN LE ROND D'. See D'ALEMBERT.

ALEM'BIC (formed by the Arabs from their article *al* and Gk. *ἄμβιξ*, *ambix*, a goblet). A form of still introduced by the alchemists, who

ALEMBIC.

used it in manipulative chemistry for distillation and sublimation.

ALEMTEJO, ä'lĕN-tā'zhụ (literally, in Portuguese, 'beyond the Tagus'). A province in the south of Portugal, bounded by the province of Beira on the north, Spain on the east, Algarve on the south, Estremadura and the Atlantic Ocean on the west (Map: Portugal, B 3). Area, 9431 square miles. Alemtejo, although the largest, is the most sparsely populated province of Portugal. The eastern and southern parts are covered with low, detached mountains, rising to nearly 2000 feet on the southern frontier. These are generally well wooded, oaks and chestnuts predominating. The chief rivers are the Guadiana, Tagus, and Sado. The climate is hot, and swamps, especially those along the coast, render it unhealthy. Fertile plains are found in the northeast, where wheat, barley, corn, rice, and fruit are grown in considerable quantities. The rearing of domestic animals, horses especially, is an important occupation. Manufacturing industries and commerce have been neglected, but some fine olive oil is produced. There are iron mines and quarries, but the mineral wealth of the province has been little developed. Administratively, Alemtejo is divided into the three districts of Portalegre, Evora, and Beja. Pop., 1890, 388,813; 1900, 416,105; 1910, 478,584.

ALENCAR, ä'lân-kär', JOSÉ MARTINIANO D' (1829–77). A Brazilian jurist and novelist, born at Fortabza. He studied law at São Paulo and became a brilliant advocate. In 1868 he was elected deputy for Ceará as a Conservative and in 1868–69 was Minister of Justice. His works, chiefly fiction, most of the material for which is drawn from Indian legend, include *O Guarany*, *Iracema*, *O Gaucho*, and *Urabijara*.

ALENÇON, *Fr. pron.* ȧ'läN'sôN'; *Eng. pron.* ȧ-lĕn'sŏn. The capital of the department of Orne, in Normandy, France, situated on the Sarthe (Map: France, N., F 4). The surrounding region is fertile, and the town is one of the brightest and freshest looking in France. It is the seat of a bishop, and the cathedral is its principal building. Three battlemented towers, the only portion of the old castle which remains, are used as the Hôtel de Ville. The town church —a structure of the sixteenth century, containing the remains of the tombs of the Alençon family, few members of which survived the Revolution—is built in the Gothic style. The inhabitants produce excellent woolen and linen stuffs, embroidered fabrics, and straw hats, and manufacture leather and vehicles. The manufacture of point d'Alençon lace and of Alençon diamonds is no longer important. Pop., 1901, 17,270; 1906, 17,843; 1911, 17,378. Consult Odolant-Desnas, *Mémoires historiques sur la ville d'Alençon* (Alençon, 1787).

ALENÇON, FERDINAND PHILIPPE MARIE, DUC D' (1844–1910). A French nobleman, born at Neuilly, the second son of Louis, Duc de Nemours, and the grandson of Louis Philippe, King of France. He was fourth in order of succession to the French throne, being second cousin to the Duc d'Orléans, the French Pretender. In 1868 he married Sophie, Herzogin zu Bagern, who died in 1897, leaving him two daughters and a son. The greater portion of his later years was spent at his villa at Wimbledon, England.

ALEP'PO (Ar. *Haleb*). One of the most important cities of Syria, and capital of the Turkish vilayet of Aleppo (33,436 square miles; pop., 995,800) (Map: Turkey in Asia, G 4). It is about 80 miles east of the Mediterranean Sea, on both banks of the Kuwek, in about 36° 12' N. lat., and 37° 12' E. long. It is surrounded by hills and has regular and clean streets. In the northwestern part stands the citadel, situated on a hill and surrounded by a deep moat. The town was formerly surrounded by a strong wall, of which only a small portion is left, the remainder, together with many of the public buildings, having been destroyed by the earthquake of 1822. The bazaar is extensive and well built. The European colony of Aleppo is considerable, and there are several European

schools and Christian churches. Among the mosques the most noteworthy is the Great Mosque, or *Jami Sakarya*, containing the alleged remains of Zacharias, the father of John the Baptist. Before the earthquake of 1822, and repeated visitations of the plague and cholera, Aleppo was a great commercial centre in spite of its inland position. It supplied a large part of the Orient with various fabrics of wool, cotton, silk, and silver and gold ware. The trade is still considerable, and its chief exports are wool, cotton, grain, gums, saffron, sesame, and hides. Some silk embroidery, carpets, and leather goods are manufactured. The chief port of Aleppo is Alexandretta (q.v.). The importation of European goods by native merchants has increased rapidly. Aleppo is the seat of a United States consul and several European consuls. The population is estimated at about 200,000, of whom probably more than three-fourths are Moslem. Aleppo is believed to be of great antiquity. In ancient times its name was Berœa, given to it by Seleucus Nicator. It was attacked and taken repeatedly by the Saracens and Mongols, and suffered considerably from earthquakes during the twelfth century. In 1516 Aleppo was wrested from the Mamelukes by the Turkish Sultan Selim, and it became the capital of a pashalic. The city is supposed to have contained in those times about 300,000 inhabitants and carried on a large trade by caravans, which subsequently fell off on account of the discovery of the sea route to the East Indies. In 1850 there was an uprising of Christians, suppressed only after considerable bloodshed. Massacres of Christians occurred in 1862. Consult E. Blochet, "L'histoire d'Alep," in the *Revue de l'Orient Latin* (Paris, 1897).

ALEPPO BUTTON. See Boil.

ALER, ä'lēr, Paul (1656–1727). A Jesuit and scholastic, born at St. Veit, Luxemburg. After teaching at Cologne, he became professor of theology at Trèves, and in 1703 regent of the gymnasium of Cologne. In 1713 he became regent of the gymnasia at Aix-la-Chapelle, Münster, Trèves, and Jülich. His best-known work is the *Gradus ad Parnassum* (1702; 8th ed., 1879). He wrote 11 tragedies, some in Latin and some in German, and other works on philosophy, philology, and poetry.

ALES, ä-lēs', or **ALESSE,** Alexander. See Alesius, Alexander.

ALESHKI, à-lyĕsh'kê, formerly Dnieprovsk. The chief town of a district, in the government of Taurida, Russia, on the Dnieper River, 3 miles southeast of Kherson, and 153 miles northwest of Simferopol, the capital of the government (Map: Russia, D 5). There is considerable trade, and the inhabitants are engaged principally in agriculture and fishing. Pop., 1897, 9100. It was founded by the Genoese in the tenth century and called by them Elice.

ALESIA, à-lē'shī-à. A town of Gaul, the capture of which, in 52 B.C., forms one of Cæsar's greatest exploits. The Gauls were making a last effort to shake off the Roman yoke, and Vercingetorix, their bravest leader, after several defeats, had shut himself up with 80,000 men in Alesia, there to await the reënforcements expected from a general insurrection of the Gauls. The town was on a lofty hill and well calculated for defense. Cæsar, with 60,000 men, surrounded the place, with the view of starving it into surrender. He fortified his position by two lines of ramparts of prodigious extent and strength —one toward the town, for defense against the sallies of the besieged, the other toward the plain, against the armies of relief. Before the relieving forces could assemble, 250,000 strong, he was ready for them; and all their assaults, combined with the desperate efforts of the besieged, were of no avail. Alesia was obliged to surrender, and Vercingetorix was made prisoner. See Cæsar, *De Bello Gallico*, vii. Alesia was afterward a place of some note under the Empire, but was destroyed by the Normans in 864. Near the site of Alesia, west of Dijon, stands the modern village of Alise Sainte-Reine, near which, on the summit of Mont-Auxois, Napoleon III erected a colossal statue of Vercingetorix.

ALESIUS, à-lē'shī-ŭs, Alexander (1500–65). A Protestant theologian. His original name was Ales, but he was also called Alesse, ab Ales, and Alane. He was born in Edinburgh, studied at St. Andrews, became a canon of the Collegiate Church, and contended vigorously for scholastic theology. He was appointed (1528) to refute the reformed views of the Scotch protomartyr Patrick Hamilton, but the result was that his own faith in the old church was shaken, though he long kept the fact secret. For a sermon against dissoluteness among the clergy he was put in prison (1531), whence he escaped to the Continent (1532), traveled in Europe, and settled in Wittenberg, where he met Melanchthon. Meantime he was condemned in Scotland (1534), for heresy, without a hearing. After Henry VIII broke with the Church of Rome, Alesius went to England (1535) and was cordially received by the King, Cranmer, and Cromwell, and was appointed lecturer on theology at Cambridge. But he gave offense, and soon went to London and practiced medicine. In 1540 he returned to the Continent and was chosen to a theological chair at Frankfort-on-the-Oder, the first professor who taught the reformed doctrines. In 1543 he quitted Frankfort for Leipzig, where he filled a similar professorship until his death. He visited England in 1549. He died at Leipzig.

ALESSANDRIA, ä'lēs-sän'drê-à. Capital of the Italian province Alessandria (c.1980 square miles; estimated pop., 1911, 850,000), a strong fortress in a marshy region on the Tanaro, 47 miles from Genoa by rail (Map: Italy, C 3). Its chief ecclesiastical buildings are the cathedral, rebuilt in the beginning of the nineteenth century, and the old church of Santa Maria di Castello. There are a royal palace, an old castle, and extensive barracks. Noteworthy is the Academy of Sciences and Arts, founded in 1562. Alessandria has cotton, woolen, and linen mills, hat factories, etc. The city derives considerable commercial importance from its position on the chief railway lines of eastern Italy. Population of commune, 1901, 71,298.

Alessandria was founded in 1168 by the inhabitants of Cremona, Milan, and Placentia, as a bulwark against Frederick Barbarossa, and was named Alessandria in honor of Pope Alexander III. Frederick tried to capture it, but failed. As it was a fortress to guard the passage of the Bormida and Tanaro, and also the central point of communication between Genoa, Milan, and Turin, the town was often a scene of battle. It was taken and plundered in 1522 by Duke Sforza; besieged, but without success, by the French, under the Prince of Conti, in 1657; and taken, in spite of obstinate resistance, by Prince Eugene, in 1707. After the prostration of Austria at the battle of Marengo, in

1800, Bonaparte concluded an armistice at Alessandria, in accordance with which Upper Italy, as far as the Mincio, was ceded to the French, with 12 fortresses. It was the principal stronghold of the Piedmontese during the insurrection of Lombardy and Venetia in 1848–49, when many new fortifications were added; those built by the French during their occupation, 1800–14, had been destroyed by the Austrians in 1815.

ALESSI, ȧ-lĕs′sē, Galeazzo (1512–72). An Italian architect of the late Renaissance, born in Perugia. He was associated with Michelangelo at Rome in 1536, but followed more the manner of Vignola, adopting a formal, classic style. Aside from a few works at Perugia, his masterpieces are at Genoa, whose famous palace architecture he helped develop, especially the Via Nuova (now Garibaldi), with the Cambiaso, Spinola, Serra, and other palaces. He built the Palazzo Marini, now the Municipal Palace of Genoa. Of his Genoese villas, the most beautiful is the Pallavicini; the domical church of the Carignani is his one important ecclesiastical work. His influence was felt throughout Italy, and in France, Portugal, and Flanders.

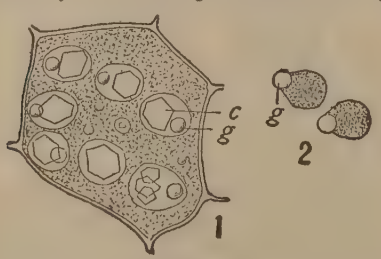
ALESUND, ō′le-sụn *or* ą′le-sụn, or **AALESUND.** A town in the Norwegian province of Romsdal, on two islands of the Skjärgaard Archipelago (Map: Norway, C 5). The harbor is excellent, and the inhabitants of the town carry on a large cod-fishing trade. Houses are almost entirely of stone, the town having been rebuilt largely since 1904, when it was nearly gutted by a disastrous fire. A statue of the Emperor William II commemorates the assistance rendered by the Germans at that time. Pop., 1900, 11,700; 1910, 13,858.

ALETIA. See Cotton Insects.

ALE′TRIUM. A town of ancient Italy, in Latium. See Alatri.

ALEU′ROMAN′CY. See Superstition.

ALEURONE, ȧ-lū′rōn (Gk. ἄλευρον, *aleuron*, wheaten flour). The stored proteid which occurs as minute granules in the food-bearing tissue (*endosperm*) and embryos of many seeds. The granules are much smaller than starch grains, with which they often occur. They are usually rounded in form (though the so-called proteid crystals of some plant tissues are angular), and may be simple or complex in structure. The more complex form of granule consists, in great part, of amorphous proteid substance, in which lie imbedded a large crystalloid and a much smaller globoid. The crystalloid is an angular mass of proteid material, differing from most true crystals by swelling in water; the globoid is a nearly spherical mineral concretion, consisting mainly of a double phosphate of magnesium and calcium. Seeds rich in aleurone are the castor bean (Ricinus), the Brazil nut (Bertholletia), peas, beans, etc. See Proteins.



ALEURONE.

1. A cell from the Castor bean, as seen in water, showing roundish aleurone grains imbedded in the protoplasm. In each, one or more crystals, *c*, and usually a globoid, *g*.
2. Isolated aleurone grains of the same, as seen in olive oil.

ALEUTIAN ISLANDS (ȧ-lū′shan). An archipelago stretching about 800 miles westward from the extremity of the Alaska Peninsula, and forming with the Commander Islands of Siberia a broken barrier between Bering Sea and the Pacific Ocean. There are about 150 different islands, varying in size from rock pinnacles to land masses like Unimak Island, 65 miles long and 25 miles wide, which lies at the eastern end of the chain. The islands lie in a belt 20 to 50 miles wide, between long. 163° 30′ W. and 172° 22′ E., and lat. 51° and 54° 50′ N. They are mountainous, the highest peaks being Mount Shishaldin (8000 feet) on Unimak Island and Mount Makushin (4000 feet) on Unalaska Island, both active volcanoes. There is no timber on the islands, but they support a luxuriant growth of grass and abundant wild flowers. The soil is fertile, and the growing season long enough to mature any vegetables. Cattle have been successfully raised at Dutch Harbor, and the islands undoubtedly have prospective value for grazing purposes. Caribou were formerly found on Unimak Island, but are now extinct; and the rest of the group contains no land animals larger than the fox. The adjacent waters teem with marine organisms, the largest of which are the sea otter (now nearly extinct) and the hair seal. The cod and halibut fisheries are valuable. The precipitation is from 24 to 48 inches, and the mean annual temperature about 40°. The harbors are open throughout the year. The population in 1910 was 1083, of which less than 200 were whites. The largest settlements are Dutch Harbor and Unalaska, both on Unalaska Island. The natives, termed Aleuts by the Russians, are closely related to the Esquimaux. The ravages of the Russian fur-traders from 1754 to 1800 at one time threatened almost to exterminate the native population. The Russians practically enslaved the natives, compelling them to capture sea otters. The Aleuts (see Alaska, *Population*) were long supported by the trade in sea otter skins, but now they make a precarious living by fishing and fox-trapping. There is a small fur trade in the islands, and Dutch Harbor is used as a coaling station by some of the vessels sailing to Nome. They are mostly converts to the Greek church, which maintains missions and schools on Unimak and Attu islands. On Unimak there is also a Methodist mission. There is a lighthouse on the western end of Unimak Island, and the Navy Department is constructing a coaling station on Kiska Island, about midway of the chain. Vitus Bering, a Russian fleet captain, discovered the Aleutian Islands in 1741.

ALE′WIFE (either *aloofe*, the Indian name of the fish, or from its resemblance to a corpulent woman who keeps an alehouse). A small clupeoid fish (*Pomolobus pseudoharengus*), 8 to 10 inches long, closely related to the herring and the shad and resembling the latter in form and color. It is very abundant on the eastern coast of the United States, where it enters Chesapeake Bay and its rivers, the Hudson, and other streams to spawn. Their time of arrival de-

pends upon the temperature, but usually is during the first week of April in the Hudson, somewhat in advance of other fishes. "Their eggs are adhesive, like those of the herring, and stick to the bottom in shoal water, or to anything they may touch, from 60,000 to 100,000 being laid by each female fish at once, almost all of which are devoured by countless enemies before they can hatch." They have also become landlocked in several lakes of western New York. Though inferior to the shad in quality, they are taken in vast quantities (62,000,000 pounds reported in 1896), and are, next to the shad and the salmon, the most important American anadromous food-fish. It is called *gaspereau* by the French-Canadian fishermen, and branch-herring and saw-belly are other local names. In Bermuda the term "alewife" is applied to the round pompano. See Plate of HERRING AND SHAD.

AL'EXAN'DER. The name of eight popes. —ALEXANDER I, Pope about 109–117.—ALEXANDER II (Anselm, Bishop of Lucca), Pope 1061–73. He was one of those raised to the papal see by Hildebrand and showed the latter's zeal in abrogating simony and clerical marriages. He favored William the Conqueror's invasion of England. Through the first part of his reign there was an anti-pope, Honorius II. —ALEXANDER III (Roland of Siena), Pope 1159–81. He had the active opposition of the Emperor Frederick I, who set up three anti-popes in succession. But he finally overcame all his rivals and the Emperor himself. The tragic history of Thomas à Becket comes in his pontificate, and he forced the unwitting cause of the murder, Henry II of England, to do penance for the deed and to restore the church property which he had confiscated. His works are in Migne, *Pat. Lat.*, vol. cc. His *Summa* was separately edited by F. Thaner (Innsbruck, 1874). For his life, consult H. F. Reuter (Leipzig, 1860–64).—ALEXANDER IV (Rinaldo de Conti), Pope 1254–61. He had a controversy with the Emperor Frederick II; and in the last year of his pontificate the Flagellants appeared in Rome.—ALEXANDER V (Pietro Philargi), Pope 1409–10. He was the choice of the Council of Pisa and designed to supersede the two rival claimants to the papal succession. But his rivals would not retire, and he dismissed the council, thus really making more trouble. He conferred upon the mendicant monks the right to hear confession.—ALEXANDER VI (Roderico Lenzuoli Borgia), Pope 1492–1503 (1431–1503). The most celebrated of the eight popes of this name, and the most notorious prince of his age. He was a native of Valencia in Spain. He was handsome and gallant, and his early life was flagrantly dissolute; but he was made a Cardinal at the age of 25 by his uncle, Calixtus III, and on the death of Innocent VIII ascended the papal chair, which he virtually bought. The long absences of the popes from Italy had weakened their authority and curtailed their revenues, and, as a compensation, Alexander endeavored to break up the power of the Italian princes and appropriate their possessions for the benefit of his own children, Giovanni, Duke of Gandia, Cesare, Duke of Valentinois, and Lucrezia, the Duchess of Ferrara, borne him by a mistress with whom he lived publicly even during his occupation of the papal seat. To gain his end he employed the favorite weapons of the princes of the Renaissance, perjury, poison, and the dagger. Modern research discredits the tradition of his death by poison and ascribes it to a fever. The most memorable events of his pontificate were the burning of Savonarola (q.v.), the partition of the New World between Portugal and Spain, and the introduction of the *Index Expurgatorius* of prohibited books. Alexander VI came down to recent times as one of the most nefarious men in history, laden with such vices and crimes as murder, treason, incest, and apostasy. In the nineteenth century, however, serious attempts were made, if not to rehabilitate his character, at least to mitigate the charges brought against him. For the older view in its extremest form, see the *Diarium* of Burchard, master of ceremonies to Alexander VI (Paris, 1883), and Gordon, *Alexander VI and his Son* (London, 1729). For a more charitable estimate, see Roscoe's *Life and Pontificate of Leo X* (London, 1805), and for a well-sustained apology, Leonetti, *Papa Alessandro VI* (Bologna, 1880); Gregorovius, *History of Rome in the Middle Ages*, vols. vi and vii (Eng. trans., London, 1900), while inclining to the generally accepted opinions, deprives Alexander of the qualities of sagacity and fearlessness which no one else denies him, and depicts him as the weak instrument of his ambitious son, Cesare Borgia. Other biographies are by F. Kaiser (Regensburg, 1878) and Clément (Paris, 1882).—ALEXANDER VII (Fabio Chigi), Pope 1655–67. He confirmed the condemnation of Jansenism and had the satisfaction of receiving the Swedish Queen, Christina, the daughter of Gustavus Adolphus, into the Catholic church. Consult his life, by S. Pallavicini (Prato, 1839).—ALEXANDER VIII (Pietro Ottoboni), Pope 1689–91. He published the bull "Inter Multiplices" against Gallicanism.

ALEXANDER I (?–330 B.C.). King of Epirus; son of Neoptolemus and brother of Olympias, the mother of Alexander the Great. He was made King of Epirus by Philip of Macedon, about 342 B.C., and it was at his marriage with Philip's daughter Cleopatra (336 B.C.) that Philip was assassinated. At the request of the Tarentines, Alexander went to Italy (332), to aid them against the Lucanians and the Bruttii, but, after considerable success, was slain by the Lucanians at the battle of Pandosia, in southern Italy.

ALEXANDER I (1857–93). Prince of Bulgaria from 1879 to 1886. He was the second son of Prince Alexander of Hesse by a morganatic marriage with Countess Julia of Hauck. He served in the Russo-Turkish War of 1877–78 on the staff of General Gurko and in the personal suite of the Czar. After the erection of Bulgaria into an autonomous principality, he was elected hereditary prince, April 29, 1879, by the Bulgarian Sobranje, at the instance of Russia, and the choice was confirmed by those powers which had participated in 1878 in the Congress of Berlin. The principality was organized under Russian influence, but at once developed political parties. Alexander began his administration with a Conservative ministry, seeking to maintain a good understanding with Russia and to establish an orderly government. He then tried a Nationalist ministry, but in 1881 dismissed it, convoked the Sobranje, and secured special powers, under which he appointed a Conservative ministry, headed by two Russian generals, Kaulbars and Soboleff. The Conservative party was but a small faction, and Alexander now allied himself with

the Nationalists, who were enabled to assert themselves more and more against the Russian influence. In 1885 eastern Rumelia revolted against its Governor-General, sought aid from Alexander, who assumed the title of Prince of the Two Bulgarias, and accomplished the union in spite of Russian opposition, securing recognition as Governor from the Porte. This brought on a war with Servia, in which Bulgaria triumphed, Prince Alexander conducting his army with courage and skill. In the night of Aug. 20–21, 1886, a conspiracy headed by Zankoff, and inspired by Russian machinations, forced him to sign his abdication, and he was kidnapped and taken into Russian territory. Popular indignation in Bulgaria procured his release, but on September 7 he formally abdicated, fearful of continued opposition from Russia. He had shown a courage, ability, and loyalty to Bulgaria such as had hardly been expected. He died on his estate at Gratz, in Styria. Consult: Soboleff, *Der erste Fürst von Bulgarien* (Leipzig, 1886), trans. from Russian; Draudar, *Prince Alexander of Battenberg* (1884); A. Koch, Alexander's chaplain, *Prinz Alexander v. Battenberg* (Darmstadt, 1887), and Macdonald, *Czar Ferdinand and His People* (New York, 1913).

ALEXANDER I (c.1078–1124). King of Scotland, the fourth son of Malcolm Canmore. He succeeded his brother Edgar in 1107, but he ruled over only the old kingdom of Scotland, north of the Forth and Clyde, Cumbria having been made practically an independent principality by Edgar on his deathbed. Alexander was called "the Fierce," as a result of his campaign against some northern clans who had rebelled because of their aversion to the introduction of English customs. Alexander was naturally inclined to follow English ways, for his mother was Margaret, grandniece of Edward the Confessor, his wife, Sibylla, was a natural daughter of Henry I of England, and he himself had been educated in England. During his reign there was peace between England and Scotland. Yet he worked earnestly for the independence of Scotland, and especially to free the Scottish church from its subjection to either York or Canterbury. He bestowed great gifts on the church and founded several monasteries, including the abbeys of Scone and Inchcolm. He died April 27, 1124, and was succeeded by his brother David.

ALEXANDER I (1876–1903). King of Servia. The son of King Milan and Queen Natalie. On the abdication of Milan, in 1889, he was proclaimed King, under a regency. In 1893 he assumed personal control of affairs, and in 1894 he abolished the Servian Constitution in favor of an earlier and more reactionary one. In July, 1900, he married Madame Draga Mashin, a widow much older than himself. He and his consort were assassinated, June 11, 1903. See SERVIA.

ALEXANDER I, PAVLOVITCH (1777–1825). Emperor of Russia from 1801 to 1825. He was born Dec. 23 (12, Old Style), 1777, at St. Petersburg and was the son of Paul I and Maria Feodorovna (born Dorothea of Württemberg). The violent and arbitrary reign of Alexander's predecessor produced a conspiracy to force his abdication in favor of his son. The Polish prince, Adam Czartoryski, a friend of Alexander, who gives a circumstantial account of the conspiracy, says that Alexander was privy to the plan of forced abdication, but not to the assassination. The news of the accession of Alexander was received, according to the Russian historian Karamsin, as "a message of redemption." Alexander had been educated under the direction of his grandmother, Catharine II, by eminent instructors, chief among whom was the Swiss Colonel LaHarpe, whose ability and liberal views made a strong impression upon the imaginative character of his pupil. His education, however, was still incomplete when broken off by the dismissal of LaHarpe, on account of his sympathy with the French Revolution. Alexander received a military training which was equally incomplete. His defective education, his experiences in the courts of his great but despotic and immoral grandmother and of his half-insane father produced a curious mingling of characteristics and tendencies. Czartoryski speaks of the frank avowal made to him in 1796 by Alexander of his sympathy with republicanism and his belief that hereditary power was unjust and absurd. The tragedy with which his reign began also made its impression.

He began his reign with sweeping reforms. He abolished the barbaric and excessive punishments in use under his predecessors, restrained the brutality of the police, did away with the secret tribunal, pardoned many of his father's victims, and in other ways reformed the laws and procedure. Restrictions upon literature, art, and trade were removed. "I would not place myself above the law, even if I could," Alexander wrote to the Princess Galitzin, "for I do not recognize any legitimate power on earth that does not emanate from the law. . . . The law should be the same for all." He was aided in his work by four intimate friends, young men of liberal views—Count Paul Strogonoff, Prince Victor Kotchubei, Nicholas Novossiltsoff, and Prince Adam Czartoryski. These Alexander called his "committee of public safety." They deliberated the duties and the limitations of the imperial power—a new question in Russia, and not much considered since that time. In 1801 the Senate was made the supreme high court, its ukases to be subject only to the imperial veto. The first move of the Senate in opposition to the Emperor, however, met with a sharp rebuke, and Czartoryski well explains the attitude of Alexander: "The Emperor liked the forms of liberty as we like spectacles. . . . He would have willingly consented that the whole world should be free on condition that the whole world should submit voluntarily to his single will." The Russian Senate, in which the idle nobility were shelved, was not the body with which to experiment in parliamentary government. Alexander and his associates discussed the emanicipation of the serfs; but the time seemed hardly ripe for that measure. An imperial ukase of March 3, 1804, attempted to ameliorate their condition.

The real administrative achievement of Alexander was the creation by the ukase of Sept. 8, 1802, of the ministries, eight in number: Interior and Police, Finance, Justice, Public Instruction, Commerce, Foreign Affairs, Marine, and War. This was a marked step toward an orderly government from the semi-Asiatic methods by which the growing Empire had been managed. Each department was in charge of a minister and an adjunct. Progress was made toward a codification of the laws. The privilege hitherto held by the nobles only, that their

patrimonial estate should not be confiscated as a punishment, was made the common right of all subjects. An imperial bank was instituted, Odessa was made a free port, the laws regarding debt and mortgages were amended, and by the ukase of 1818 peasants were permitted to carry on manufactures. Alexander sent expeditions around the world and made treaties with the United States, Spain, Brazil, and Turkey. Settlements were established on the northwestern coast of America, but the enunciation of the Monroe Doctrine in 1823 checked the Russian advance in the last direction. The new Ministry of Public Instruction meant much for the Empire. There had been but three universities in Russia—Moscow, Vilna, and Dorpat. These were strengthened and three others were founded at St. Petersburg, Kharkov, and Kazan. Literary and scientific bodies were established or encouraged, and the reign became noted for the aid lent to the sciences and arts by the Emperor and the wealthy nobility.

The foreign policy of Alexander was marked, like his internal policy, by plans outrunning performance. He at first stood as an advocate of peace. He endeavored to obtain from Napoleon just compensation for the German States; but, becoming convinced of Napoleon's bad faith, he joined the coalition of 1805. He was the ally of Prussia against Napoleon in the campaign of 1806, carrying on wars at the same time with Persia and Turkey. His forces fought an indecisive battle at Eylau in February, 1807, and were totally defeated at Friedland in the following June. In July, 1807, Alexander signed the Treaty of Tilsit, in which he left Prussia to her fate. Dazzled by the genius of Napoleon and by his scheme for the division of the world into an Eastern and a Western Empire, Alexander joined the Continental System (q.v.), declared war on England (1808), and wrested Finland from Sweden. At Erfurt in the autumn of 1808 the two emperors met with great pomp, but the ill-assorted alliance soon lost force. The pressure of the Continental System on the material resources of Russia, the growth of the Napoleonic despotism, the existence and aggrandizement of the Duchy of Warsaw, were utterly opposed to Alexander's theories and to his sense of sound Russian policy. At length in 1812 a rupture ensued, and Napoleon's Grand Army entered Russia, only to be destroyed in the retreat from Moscow. Alexander threw himself into the struggle of Europe against the French Emperor and raised an army of nearly 900,000 men. He took part personally in the campaigns and was prominent in the negotiations at Vienna.

Here Alexander was at the height of his power. He alone of the allied sovereigns was a liberal, and it was largely owing to his influence that Switzerland received her autonomy and France her *Charta*. The Czar, however, had a weaker side; he was a religious fanatic who prayed with the Quakers on the one hand and joined in religious dances with the Raskolnicks on the other. This mysticism was skilfully played upon by Madame Krüdener, a divorcée, and under her influence Alexander instituted the Holy Alliance (q.v.). This was really a harmless thing, despite the furor which it caused; but not so the personality of the Czar, of whose mental vagaries it was a good expression. By 1820 Alexander had forgotten his liberalism. Kotzebue, his agent, was murdered in Germany, a regiment of the guard refused to parade, and Metternich fanned the flames of suspicion. As a result the ardent young reformer was drawn into a reactionary course. He concurred in the Austrian policy of Metternich, and by repressing insurrection in Europe assisted in crushing the political progress of the nations. The spread of education and liberal ideas, and the disorder of the finances, due to Russia's active part in the Napoleonic wars, aroused popular discontent, which was put down by the censorship and police espionage. Alexander became morbid and embittered, and sought relief alternately in dissipation and in religious mysticism. Personal exposure during the inundation of St. Petersburg in 1824 undermined his health; the death of a favorite daughter and the discovery of a Russo-Polish conspiracy against the House of Romanoff aggravated his illness. With the Empress he sought rest in the Crimea, but was seized by an illness on the journey and died at Taganrog, Dec. 1, 1825.

Bibliography. Schnitzler, *Histoire intime de la Russie sous les empereurs Alexandre I et Nicolas I* (Paris, 1847); Bogdanovitch, *History of the Reign of Alexander I*, in Russian (St. Petersburg, 1869–71), the first four volumes of which are translated into French; Rabbe, *Histoire d'Alexandre I* (Paris, 1826); Schilder, *Emperor Alexander Ist* (St. Petersburg, 1905).

ALEXANDER II (?–c.242 B.C.). King of Epirus, son of Pyrrhus (q.v.) and of Lanassa, daughter of the Sicilian tyrant Agathocles (q.v.). He succeeded his father in 272 B.C. To avenge the death of Pyrrhus, slain while fighting against Antigonus Gonatas (q.v.), he seized Macedonia, the latter's kingdom. Soon afterward, however, he was deprived of both Macedonia and his own dominions by Demetrius, son of Antigonus (so Justinus: others call him brother of Antigonus), but recovered Epirus by the aid of the Acarnanians and Ætolians (Just., xxvi, 3; xxxviii, 1; and Plut., *Pyrrh.*, 9).

ALEXANDER II, Nikolayevitch (1818–81). Emperor of Russia from 1855 to 1881, son of Nicholas I. He was born April 29, 1818, and received a thorough education and military training. He traveled in Germany and in 1841 married Princess Maria of Hesse-Darmstadt. He also journeyed through Russia, Siberia, and the Caucasus and took a creditable part in the campaigns against the Tcherkesses. On succeeding to the throne during the Crimean War (March 2, 1855), he assured the foreign ambassadors that he would adhere to the policy of his uncle (Alexander I) and his father, but his desire was for an honorable peace. In March, 1856, he was compelled to sign the humiliating Treaty of Paris. Alexander had not been in sympathy with the reactionary course of his father. While not a liberal, or an idealist like the first Alexander, he represented the intelligent thought of Russia and believed that a transformation was needed to place it in the first rank among nations. He soon announced his intention to promote reforms, and he was encouraged in this by the shock which the Crimean War had given to the old corrupt officialism of the Empire. Two reform parties arose—one a liberal constitutional party, having its centre at St. Petersburg; the other an old Russian nationalist party, centring at Moscow. They were united only in enmity to the bureaucracy. In response to their wishes and his own convictions, Alexander relaxed the censorship of the press, permitted travel, exercised

a close control over officials, recalled many who had been exiled to Siberia during the previous reign, extended education, and without instituting radical changes in the machinery of the government greatly widened the liberty of his subjects.

His best-known administrative act was the emancipation of the serfs. With this, of necessity, went a reform in the system of land tenure. Nearly all of Russia was held in large estates, worked by serfs who were nominally attached to the land, but were in fact almost as much at the disposal of their masters as if they had been slaves. Nine-tenths of the arable land of Russia was thus held by the imperial family and about 100,000 noble families. Beginning in 1858 by freeing the serfs on the estates of the imperial family, the Czar completed the emancipation by the ukase of March 3, 1861. Serfs who had been domestic servants, not attached to the land, became free without right to property. Those who had been attached to the land were enabled by a State loan, payable 6 per cent annually for 49 years, to purchase the interest of the former landlords in a certain share of the land. The freedmen thus became peasant proprietors, the land being held by the *mirs*, or village communities, which could assign it to the members. Police authority was put in the hands of the communal assemblies, and larger powers of taxation, administration, and police were vested in district and provincial councils. This reform, excellent in theory, increased the burdens of the peasantry. The village community became responsible for a heavy redemption tax from three to six times as high as all possible income that could be derived from the land. It could be paid in one way only—by the labor of those persons in the village community who worked outside as farm hands, factory laborers, etc. The peasant must not leave his commune without a pass; he must return when summoned—for his commune was responsible for this huge additional tax levied to pay interest on loans that went into the pockets of the nobility as ready cash. The peasant became poorer than ever before, and the foundations were thus laid for the agrarian crises of the early twentieth century.

The Emperor also established a regular system of courts. Public schools were founded after the model of western Europe, and scientific schools were erected in addition to those devoted to the regular classical training. The army, which in the Crimean War had so disappointed Nicholas I, was reorganized on the Prussian plan. While Alexander went thus far with the liberals, the Pan-Slavism of the Nationalists found equal sympathy with him. He said to the Polish deputies: "Embrace the union with Russia and abandon all thoughts of independence, now and for evermore impossible. All that my father did was rightly done. My reign shall be a continuation of his." The Polish national movement, culminating in the insurrection of 1863, was severely repressed, and a relentless process of Russification was instituted under Michael Muravieff. Since that time Poland has been under what is practically martial law. After 1863 there was a gradual return to absolutism in Russia, and many of the liberties that had been granted were withdrawn or modified, the Czar falling more under the influence of the conservative Nationalist party, led by Katkoff, the Moscow editor. For a few years the liberals contented themselves with criticism of the conservative position and legal attempts to restore their influence. Then began the revolutionary movement, which finally developed in the hands of a few violent spirits into terrorism after 1875. (See NIHILISM.) The socialism of Marx and Proudhon had by this time been brought in from western Europe.

Between 1868 and 1881 the armies of Alexander were advancing the Russian frontiers in Central Asia. In 1868 Samarkand was occupied; in 1873 the Khan of Khiva was reduced to vassalage; in 1876 Khokand was annexed; and in 1881, just before the assassination of the Emperor, Geok-Tepe, the stronghold of the Teke Turkomans, was taken. The vigorous policy adopted after 1870 brought on a war with Turkey in 1877–78, in which the Russian standards were carried almost to Constantinople. This war appealed to the chivalric spirit of Alexander, who wished to be known as the Liberator Czar, because it was in a sense a crusade in behalf of the oppressed Christian peoples of the Balkans. The hopes of a Russian hegemony in the Balkan Peninsula, entertained by the Pan-Slavists, were overthrown, however, at the Congress of Berlin (q.v.).

The existence of the liberal and reactionary parties side by side in Russia explains some of the inconsistencies in Alexander's character. It is because of these opposing influences, both patriotic, that progressive and oppressive measures were often simultaneously enacted. Personally, Alexander seems to have tended always to the liberal side, although somewhat embittered by the spread of the revolutionary agitation. His life, during the years 1879–81, was never safe from the conspiracies of the extreme revolutionists, who pursued him with a remarkable persistence of hatred. After the terrible explosion of 1880, in the Winter Palace, Alexander gave General Loris-Melikoff, a distinguished officer of liberal tendencies, an extraordinary dictatorial commission for six months, and it is said, that, under Loris-Melikoff's advice, he was considering the question of the promulgation of a constitution by ukase when he was assassinated in St. Petersburg by the explosion of a bomb while driving from the parade to the Winter Palace on Sunday, March 13, 1881. He was succeeded by his son, Alexander III.

Consult: Haumant, in Lavisse et Rambaud, *Histoire générale*, vol. xi (Paris, 1900); Cardonne, *L'empereur Alexandre II* (Paris, 1883); Laferté (pseudonym of the Princess Dolgorouki), *Alexandre II, Détails inédits sur sa vie intime et sa mort* (Basel, 1882); Simkhovitch, *Die Bauernbefreiung in Russland* (Jena, 1908), and Roux, *Alexandre II, Gortchakoff et Napoléon III* (Paris, 1913).

ALEXANDER II (1198–1249). King of Scotland. He succeeded his father, William the Lion, in 1214. He early displayed that wisdom and strength of character by which he won the appellation of "the Peaceful," and in virtue of which he holds so high a place in history among Scottish kings. In 1214 he joined the English barons who had combined to resist the tyranny of King John and secured the Magna Charta. This drew down upon him and his kingdom the papal excommunication; but the ban was removed, and the liberties of the Scottish church were confirmed. On the accession of Henry III to the English throne, Alexander brought the feuds of the two nations to a temporary close

by a treaty of peace (1217), and in 1221 he married Henry's eldest sister, the Princess Joan. The alliance thus established was broken after the death, without issue, of Queen Joan (1238), and the second marriage of Alexander with the daughter of a nobleman of France. In 1244 Henry marched against Scotland to compel Alexander's homage, but peace was concluded without an appeal to arms. While engaged in one of those warlike expeditions which the turbulence of his subjects so frequently rendered necessary, Alexander died of fever at Kerrera, a small island in the Bay of Oban.

ALEXANDER III, Alexandrovitch (1845–94). Emperor of Russia from 1881 to 1894. He was born March 10, 1845, and he succeeded his father, March 13, 1881, but was not crowned until May 27, 1883, after the panic caused by the assassination of Alexander II had somewhat subsided. Alexander at first expressed his intention of following out the constitutional reforms of Loris-Melikoff, but he fell under the influence of the leaders of the old Russian Nationalist party, Katkoff, Pobiedonostseff, and Ignatieff, and restored the autocratic system of Nicholas so far as internal affairs were concerned. He pursued a stern policy of repression with regard to the political agitation which had caused the violent death of his father. The Terrorists were practically suppressed, a rigid censorship was reëstablished, education was restricted, and dissenting religions were persecuted. As a result of the persecution, Jews in great numbers emigrated from the country, chiefly to the United States and South Africa. The policy of the Russification of the non-Russian provinces, begun by Nicholas I and discontinued for a time by Alexander II, was resumed with new vigor. The finances of the Empire were well managed. The revenue was largely increased, and a protective tariff was used as a part of the system to strengthen Russian nationality.

In his foreign policy Alexander did not follow the example of Nicholas. His influence was directed toward the preservation of peace. Russia and France were drawn into closer and closer connection in opposition to the Triple Alliance of Germany, Austria, and Italy. Alexander continued the policy of interference in the affairs of the Balkan States, especially Bulgaria, bitterly resenting that spirit of nationalism which his father had regarded as ingratitude toward Russia. He endeavored, not very successfully, to counteract Austrian influence among the Balkan peoples. In Asia he continued to round out the frontier and strengthen Russia's hold on its provinces.. Several attempts were made to assassinate him, but they lacked the completeness of preparation and the venomous persistence which had pursued his father. Alexander married Dagmar (re-baptized into the Greek church as Maria Feodorovna), daughter of Christian IX of Denmark, Nov. 9, 1863. He died Nov. 1, 1894; and was succeeded by his son, Nicholas II.

Consult: Andrews, *Historical Development of Modern Europe,* vol. ii (New York, 1898); Seignobos, *Political History of Modern Europe* (New York, 1900); Samson-Himmelstierna, *Russland unter Alexander III mit Rückblicken auf die jüngste Vergangenheit* (Leipzig, 1891), translated by Morrison, *Russia under Alexander III and in the Preceding Period* (New York, 1893); Lowe, C., *Alexander III of Russia* (London, 1895). This reign has claimed very little special attention from historians.

ALEXANDER III (1241–85). King of Scotland. He succeeded his father, Alexander II, in 1249, and two years afterward he married the Princess Margaret, eldest daughter of Henry III of England. Alexander's minority enabled Henry to prosecute successfully for some time his schemes for obtaining entire control over the Scottish kingdom; but long before he reached manhood, Alexander displayed so much energy and wisdom as to give assurance that when the administration of affairs should come under his personal direction it would be vain to think of reducing him to submission. Very shortly after he had come of age his energies were summoned to the defense of his kingdom against the formidable invasion of Hakon, King of Norway (1263), who claimed the sovereignty of the Western Isles. In attempting a landing at Largs, on the coast of Ayr, the Norwegian prince was unsuccessful, and, as his fleet had suffered from storms he was obliged to return home. Alexander, as the result of this failure of Hakon, secured the allegiance both of the Hebrides and of the Isle of Man. An alliance was formed between Scotland and Norway, and strengthened in 1281 by the marriage of Alexander's only daughter, Margaret, to Eric, King of Norway. This princess died in 1283, leaving an infant daughter, Margaret, commonly called "the Maid of Norway," whose untimely death, on her way to take possession of her throne, was the occasion of so many calamities to Scotland. During the concluding years of Alexander's reign the kingdom enjoyed a peace and prosperity which it did not taste again for many generations. The justice, liberality, and wisdom of the King endeared his memory to his subjects, while the misfortunes that followed his death heightened the national sense of his loss. His eldest son, Alexander, who had married the daughter of the Count of Flanders, died without issue in 1283. After the death of "the Maid," Alexander contracted a second marriage with Joleta, daughter of the Count of Dreux. He was killed by falling from his horse in 1285.

ALEXANDER, Abraham (1718–86). An American legislator. He was born in North Carolina and in early life was a magistrate of Mecklenburg county, which he represented in the Colonial Legislature until 1775. In this year he served as chairman of the county convention, which, on May 31, passed a series of resolutions, later distorted into the famous "Mecklenburg Declaration of Independence" (q.v.).

ALEXANDER, Archibald (1772–1851). An American Presbyterian clergyman. He was born in Augusta (now Rockbridge) Co., Va. He was self-educated and was led to religious study in the revival of 1789. He was licensed to preach in 1791 and spent several years as an itinerant missionary, and was president of Hampden-Sidney College, 1796–1801. In 1802 he married the daughter of Rev. Dr. Waddell, the blind preacher whose eloquence was eulogized by William Wirt. He was pastor of Pine Street Presbyterian Church, Philadelphia, from 1807 to 1812, and was at the organization of the theological seminary of the Presbyterian church at Princeton, N. J. He was unanimously chosen professor of theology, the position which he maintained with eminent success until his death there, Oct. 22,

1851. His best-known work is *A Brief Outline of the Evidences of the Christian Religion* (Princeton, 1823), which has been translated into many languages and is a text-book in colleges. He wrote also *The Canon of the Old and New Testaments Ascertained* (1826); *The Log College* (1845); and *Moral Science*, which was published after his death (1852). Consult, for his life, J. W. Alexander (New York, 1854).

ALEXANDER, Barton Stone (1819–78). An American soldier, born in Kentucky. He graduated at West Point and entered the engineer corps in 1842. He was engaged in engineering work from 1842 to 1859, superintending the construction of the military asylum at Washington, the marine hospital at Chelsea, Mass., and the Minot Ledge lighthouse, and in 1860 was employed in the construction of defenses around Washington. Subsequently he served with gallantry in the Manassas campaign and in the battle of Bull Run, was Consulting Engineer on the staff of General Sheridan (1864), and in March, 1865, was brevetted Brigadier-General. In 1865–67 he was in charge of public works in Maine. He became senior engineer, with the rank of Lieutenant-Colonel, in 1867, and he was a member of the Pacific board of engineers for fortifications from that time until his death.

ALEXANDER, Boyd (1873–1910). An English naturalist and explorer. Educated at Radley College, he early enlisted in the militia battalion of the Rifle Brigade, and later served with the Gold Coast Constabulary and the regular Rifle Brigade. He led many journeys of exploration and scientific research in various parts of the world, including the Cape Verde islands, the Zambesi River, Fernando Po, and the Niger-to-Nile region. In 1909 he explored several islands in the Gulf of Guinea, and continuing on to the Kamerun country, made a special study of the craters of volcanic mountains. Among other contributions of his to science was the discovery of many new birds, when his party made the first ascent on record of Mount St. Isabel. He received a gold medal from the Royal Geographical Society of Antwerp in 1907, and a year later was made a gold medalist of the Royal Geographical Society of London. In May, 1910, while on a journey of exploration in the French Congo, Alexander was murdered by natives. His writings include the account of his African journeys, *From the Niger to the Nile* (2 vols., 1907); "Birds of Kent" in the *Victorian History of England;* and many papers in geographical journals. In 1912 *Boyd Alexander's Last Journey, with a Memoir by Herbert Alexander*, was published.

ALEXANDER, De Alva Stanwood (1846—). An American public official and historian, born in Richmond, Me., and graduated from Bowdoin College in 1870. From 1862 to 1865 he served as a private in the Union army. Having studied law and been admitted to the bar, he practiced law in Indianapolis until 1881. In that year he was appointed an auditor in the United States Treasury, resuming the practice of law at Buffalo, N. Y., in 1885. From 1889 to 1893 he was United States Attorney for the northern district of New York, and from 1897 continuously to 1912 was a member of Congress. His defeat finally came in a general Republican overthrow in New York. He made an exhaustive study of New York politics, and his *Political History of the State of New York* (3 vols., 1906–09) is considered the final authority on this important subject. He became an overseer of Bowdoin College and received the degree of LL.D. from that institution.

ALEXANDER, Eben (1851–1910). An American diplomat and educator, born in Knoxville, Tenn., and graduated from Yale College in 1873. Almost continuously throughout his life, after this date, he was identified with the University of North Carolina, as professor of ancient languages and later of Greek, and as dean of the faculty. One year (1885) he spent as chairman of the faculty of the University of Tennessee, and four (1893–97) as United States Minister to Greece, Servia, and Rumania. The Tennessee State Teachers' Association made him their president in 1886.

ALEXANDER, Edward Porter (1835–1910). An American soldier and engineer. He was born at Washington, Ga., and graduated at the West Point Military Academy in 1857. After serving as an engineer in the United States army, he joined the Confederacy in 1861, and advanced to the rank of Chief of Ordnance and Chief Signal Officer in the Army of Northern Virginia (1861–62). In February, 1864, he was commissioned Brigadier-General. He was also Chief of Artillery in General Longstreet's corps, and served in that capacity in the battles of the Wilderness and Spottsylvania and at the siege of Petersburg. At the close of the war he was appointed professor of mathematics and engineering at the University of South Carolina, and four years afterward began his career as general manager and president of various Southern railroads. He was a government director of the Union Pacific Railroad from 1885 to 1887, and in 1901, as engineer arbitrator, took charge of the boundary survey between Costa Rica and Nicaragua. He wrote *Railway Practice* (1887), and *Military Memoirs of a Confederate* (1907; new ed., 1913).

ALEXANDER, Francis. An early American portrait painter (1800–81). He was born in Windham Co., Conn., and was practically self-taught in his art. After practicing in Connecticut and at Providence, R. I., he was invited by Gilbert Stuart to settle at Boston, where he enjoyed great vogue as a portrait painter. He studied in Florence and Rome from 1831 to 1833, after which he returned to Boston. His last years were spent at Florence, where he died in 1881. He was of a very enterprising character, and it is related that when Dickens visited America in 1842, he appeared with the pilot who had come to guide the ship into the harbor and induced the novelist to sit to him for a portrait. His best-known portrait is that of Mrs. Fletcher Webster in the Boston Museum of Fine Arts. His art resembles that of the painters of the middle period of American painting, being classic in line and glossy in color. Consult Isham, *History of American Painting* (New York, 1905).

ALEXANDER, Sir George (1858–1918). An English actor and manager, whose full name is George Alexander Gibb Samson. He was born at Reading, June 19, 1858, and was educated at Clifton, Stirling, and Edinburgh. In 1881 he joined Irving's company at the Lyceum, where later he won particular successes as Faust (1886) and Macduff (1888). In the season of 1884–85 he accompanied Mr. Irving to America. Mr. Alexander began management in 1890 at the Avenue Theatre, but took the St. James Theatre

in the next year. He has produced more original plays by English authors than any other manager. Some of his notable productions have been *The Idler* (1891), *Lady Windermere's Fan* (1892), *The Second Mrs. Tanqueray* (1893), *The Prisoner of Zenda* (1896), *In Days of Old* (1899), and Stephen Phillips's *Paolo and Francesca* (1901), besides several successful Shakespearian productions, including *As You Like It* (1896), and *Much Ado About Nothing* (1898). He played in *The Builder of Bridges* before H. M. King Edward, December, 1908, and in *Money* at the Royal Command performance, May, 1911, given on the occasion of the State visit of the German Emperor. He became president of the Royal General Theatrical Fund.

ALEXANDER, Gross (1852–1915). An American clergyman and writer, born in Scottsville, Ky. Graduating from the University of Louisville in 1871, he was from then until 1873 a tutor in that institution. Following two years as professor of Latin and Greek at Warren College, Ky., he entered the Drew Theological Seminary, from which he graduated in 1877. Successively he filled pastorates at Lake Mohonk, N. Y. (1875–76); at New Brighton, Staten Island (1877); and in Kentucky (1877–84). Having occupied during the next 17 years the chair of New Testament Greek and exegesis at Vanderbilt University, he was appointed presiding elder of the Louisville conference (1902). In 1906 he became editor of the *Methodist Review* and book editor of the Methodist Church, South. In addition to many essays and articles on theological subjects, Dr. Alexander's writings include: *History of the Methodist Episcopal Church, South,* in the *American Church History Series* (1894); *The Beginnings of Methodism in the South* (1897); *The Son of Man: Studies in his Life and Teaching* (1899); *Commentary on Colossians and Ephesians* (1909); *New Study of the Resurrection of Jesus* (1913).

ALEXANDER, Hartley Burr (1875—). An American scholar and educator, born in Lincoln, Neb. He graduated from the University of Nebraska in 1897; was a fellow at the University of Pennsylvania (1898–1900); a fellow at Columbia University (1900–01); and from the last-named institution received the Ph.D. degree in 1901. He was an editor and contributor on the staff of the New International Encyclopædia in 1903; for the five succeeding years was a member of the staff of Webster's Dictionary; and in 1908 became professor of philosophy at the University of Nebraska. He was made a member of several learned societies. His published writings include: *The Problem of Metaphysics* (1902); *Poetry and the Individual* (1906); *The Mid-Earth Life* (1907); *Odes on the Generations of Man* (1910); *The Religious Spirit of the American Indian* (1910).

ALEXANDER, James (c.1690–1756). A colonial lawyer. He was born in Scotland, emigrated to New Jersey in 1715, practiced law, and was temporarily disbarred for defending John Peter Zenger (q.v.), when he was accused of sedition in 1733. He held many responsible public offices, including those of Surveyor-General of New York and New Jersey; member of the Legislature and Council of the province of New York; Attorney-General of the province from 1721 to 1723, and later its Secretary. He was one of the founders of the American Philosophical Society. His son was William Alexander (q.v.).

ALEXANDER, Sir James Edward (1803–85). A Scotch officer, traveler, and author. He served in the war against Burma (1825) and in various other campaigns. He traveled in Persia and South America, and in 1836–37 conducted an exploring expedition into Africa. He retired in 1877, and the honorary rank of General was given to him in 1881. His works include: *Travels through Russia and the Crimea* (1830); *Transatlantic Sketches* (1833); *Expedition of Discovery into the Interior of Africa* (1838); *L'Acadie* (1849); *Incidents of the Last Maori War* (1863); *Bushfighting* (1873).

ALEXANDER, James Waddell (1804–59). An American clergyman, a son of Dr. Archibald Alexander. He graduated at Princeton College in 1820 and afterward was a tutor there. He was installed pastor of the Presbyterian church at Charlotte Court House, Va., in 1827, and of the First Church of Trenton, N. J., in 1829. He was professor of Belles Lettres and Latin in Princeton College, 1833–44, pastor of the Duane Street Church, New York, 1844–49, and professor of ecclesiastical history, church government, and sacred rhetoric in Princeton Seminary, 1849–51. When the Duane Street Church in New York was reorganized as the Fifth Avenue Church, he again became its pastor and continued to be until his death. Among his many works are volumes of sermons; *Plain Words to a Young Communicant* (1854), *The American Mechanic and Workingman* (2 vols., 1847), and a biography of his father (1854).

ALEXANDER, John Henry (1812–67). An American scientist, born at Annapolis, Md., and educated at St. John's College there. He was connected with the Maryland geological survey and did much toward opening the coal fields of that State. He published in 1840, a *History of the Metallurgy of Iron.* He was active in establishing a uniform standard of weights and measures throughout the United States and published a *Universal Dictionary of Weights and Measures* (1850). He was professor of physics for two years in St. John's College, Md., and held a similar position at the University of Pennsylvania. In 1857 he was chosen delegate from the United States government to the British commission on decimal coinage. He was recommended as director of the mint, but died before appointment. Consult: Hilgard, *Biographical Memoir of John H. Alexander* (Washington, 1877); National Academy of Sciences, *Biographical Memoirs,* vol. i (Washington, 1866).

ALEXANDER, John White (1856–1915). An American portrait, figure, and decorative painter, a leading figure in contemporary art. He was born in 1856 in Allegheny City, now a part of Pittsburgh, Pa. Orphaned in infancy, he was reared by his grandparents and at the age of 12 became a telegraph boy in Pittsburgh. His talents in drawing attracted the attention of one of his employers, who assisted him to develop them. At 18 he became an apprentice in the art department of *Harper's Weekly,* at the same time that Abbey, Pennell, Pyle, and other celebrated illustrators labored there. After three years' apprenticeship he went to Munich (1877). He studied for a short time at the Royal Academy, but owing to lack of funds he removed to the village of Polling, Bavaria, and worked with Frank Duveneck. He went with Duveneck to Venice, where he profited by the advice of Whistler, and then continued his studies in Florence, Holland, and Paris. In 1881 he returned to New York and speedily achieved great

success in portraiture, numbering among his sitters Oliver Wendell Holmes, John Burroughs, Walt Whitman, whose powerful characteristic portrait is in the Metropolitan Museum of Art, New York City, Henry G. Marquand, R. A. L. Stevenson, and President McCosh of Princeton University. His first exhibition in the Paris Salon of 1893 was a brilliant success and was followed by his immediate election to the Société Nationale des Beaux Arts. For many years he divided his time between Paris and New York, where he later resided. In 1901 he was named Chevalier of the Legion of Honor, and in 1902 member of the National Academy of Design, New York, becoming president in 1909. He was also LL.D. of Princeton and a member of the American Academy of Arts and Letters. Among the gold medals received by him were those of the Paris Exposition (1900) and the World's Fair at St. Louis (1904). He was an honorary member of several European societies, including the Secessionists of Munich and Vienna.

Among his principal paintings are a portrait of Fritz Thaulow (1894), Wilstach collection, Philadelphia; "The Pot of Basil" (1897), Boston Museum; "Pandora" (1898); "In the Café," Philadelphia Academy; "La Femme Rose," Carnegie Institute, Pittsburgh; "The Green Bow," Luxembourg, Paris; "Two Sisters"; the portraits of Rodin (1900), Mrs. Alexander, Worthington Whitredge (Century Club, New York), and Mrs. Wheaton. His portrait of President Loubet hangs in the Elysée Palace, Paris. The Metropolitan Museum possesses his "Study in Black and Green" and "The Engagement Ring" (1912), and the Art School of Yale University his portrait of John F. Weir (1913). His mural paintings include six large canvases representing the "Evolution of the Book" in the Congressional Library, Washington (1896–97); and a splendid series of many panels covering the walls of the three stories of the entrance hall to the Art Museum of the Carnegie Institute, Pittsburgh. The general subject is the "Apotheosis of Pittsburgh," which is represented in the central panel as a mailed knight, saluted by panel after panel of workmen and by the nations of the earth. Alexander's original and highly individual art is based upon a very personal interpretation of humanity. He is especially known as a subtle portrayer of modern woman in her graceful poses and movements, but his strong and characteristic men are no less effective, and he has painted landscapes of great charm and individuality. His very modern technical methods have caused him to be called the most Parisian of American painters. By the use of a very coarse canvas and thin pigments he achieves rapid execution, direct presentation, and great carrying power. His color is fluid and pleasing, with striking light and shade effects. But though always able, his work is not uniformly excellent. Consult *The Studio*, vol. xx (1900); *International Studio*, vols. xxxiv (1908), xlii (1911); Isham, *History of American Painting* (New York, 1905).

ALEXANDER, Joseph Addison (1809–60). Eminent American biblical scholar, born in Philadelphia, a son of Dr. Archibald Alexander. He was a pupil of his father, graduated at Princeton College in 1826, was adjunct professor there of ancient languages and literature from 1830 to 1833, instructor, associate professor, and professor of Oriental and biblical literature in Princeton Seminary from 1833 to 1850; of Church history and government from 1851 to 1860, of New Testament literature and biblical Greek in 1859 and 1860. He wrote commentaries on *The Psalms* (3 vols., 1850); *Isaiah* (2 vols., 1846–47); *Matthew* (1860); *Mark* (1858); *Acts* (1856), all drawn largely from German sources. He also published *Sermons* (2 vols., 1860). Consult his *Life* by H. C. Alexander (2 vols., New York, 1869).

ALEXANDER, Legend of. A famous but largely fictitious account of the adventures of Alexander the Great, which was the basis of many romantic works in the Middle Ages. It originated probably at Alexandria, in Egypt. The historical narrative of Callisthenes (q.v.) having been lost, there appeared about 200 A.D. under his name (sometimes referred to as the pseudo-Callisthenes) a Greek story, which represented Alexander as really the son of Nectanebus, the last King of Egypt, and credited him with a fabulous series of exploits in connection with his actual conquests. This compendium of legendary lore on the Macedonian conqueror was translated into Latin early in the fourth century by Julius Valerius. His version was subsequently abridged, particularly in the account called *Historia de Prœliis*, by Archbishop Leo, about the end of the tenth century. Besides these there were the so-called "Letter of Alexander to Aristotle" on the wonders of India, the "Correspondence" of Alexander and Dindimus, King of the Brahmans, a brief rhythmic abecedary poem on Alexander, and the *Iter ad Paradisum*. About the twelfth century, the period of the *Chansons de geste* of the cycle of Charlemagne, several French poems were built upon the Alexander Legend; one of the earliest was that of Alberic of Besançon, written in ten syllable lines in the Provençal language, of which only the beginning is extant; the best known is the great *Chanson d'Alexandre*, by Lambert li Tors and Alexandre de Bernai. The twelve-syllable lines in which this was written gave its name to the Alexandrine verse. The Alexander of the Middle Ages was essentially a mediæval knight. He became one of the "nine worthies," and one of the four "kings" in the game of cards. More or less original versions of the legend appear in poems of nearly every European country, and even in the Orient, where the story of the pseudo-Callisthenes was rendered into Syrian and Armenian as early as the fifth century. Some of the Slavic forms of the tale go back through Byzantium to this eastern version. Of those in western Europe, most notable after the French poems are perhaps those in German by Lamprecht, who translated that of Alberic, and by Rudolph of Montfort, of the thirteenth century. In Spain the *libro de Alixandre*, one of the oldest monuments of Spanish poetry, has been attributed to Juan Lorenzo Segura de Astorga, but he was probably the copyist only. Though the author reveals his acquaintance with the French poems, his version is original in many ways. Among the numerous English versions of this legend the earliest is probably the *Lyfe of Alisaunder* in verse, composed about 1330. It was published in H. Weber's *Metrical Romances* (vol. i, 1810). Thomas (or Eustache) of Kent's abridged version of Valerius and of the French romances, was originally written in the Anglo-Norman, under the title *Le roman de toute chevalerie*. It was translated into English under the title *King Alisaunder*. Consult: Paul Meyer, *Alexandre le Grand, histoire de la légende*

d'Alexandre dans les pays romains (Paris, 1886); Spiegel, *Die Alexandersage bei den Orientalen* (Leipzig, 1851); Ausfeld, *Der griechische Alexanderroman* (Leipzig, 1907); Pfister, *Kleine Texte zum Alexanderroman* (Heidelberg, 1910); Morel-Fatio, *El Libro de Alixandre* (Dresden, 1906); Rosskopf, *Editio princeps des mittelenglischen Cassamus* (Erlangen, 1911).

ALEXANDER, Mrs. See Hector, Annie.

ALEXANDER, Samuel (1859—). An English philosopher and educator, born at Sydney, N. S. W. He was educated at the University of Melbourne and at Oxford and was Fellow of Lincoln College from 1882 to 1893. In 1893 he was appointed to the chair of philosophy in Owens College (Victoria University). He was president of the Aristotelian Society from 1908 to 1911. In addition to frequent important contributions to the *International Journal of Ethics*, to *Mind*, and other periodicals, he wrote *Moral Order and Progress* (1889); *Locke* (1908).

ALEXANDER, Stephen (1806–83). An American astronomer. He was born at Schenectady, N. Y., and was educated at Union College and Princeton Theological Seminary. He remained at Princeton, becoming adjunct professor of mathematics (1834–45), professor of mathematics (1845–54), and professor of astronomy from 1840 until his retirement in 1878 as professor emeritus. During a part of this time he was professor of natural philosophy. In 1860 he was at the head of the expedition to Labrador to observe the solar eclipse of July 18, and was sent on a similar mission in 1869. He was the author of many scientific papers, chiefly astronomical, such as *Physical Phenomena Attendant upon Solar Eclipses* (1843), *Origin of the Forms and Present Condition of Some of the Clusters of Stars* (1850), and *Harmonies in the Arrangement of the Solar System*. He also wrote on the *Fundamental Principles of Mathematics*. Consult "Memoir of Stephen Alexander" (*National Academy of Sciences, Biographical Memoirs*, 1886, vol. ii).

ALEXANDER the Great (356–323 B.C.). King of Macedonia and conqueror of the eastern world, son of Philip II of Macedon (q.v.) and of Olympias, an Epirot princess. At Alexander's birth his father had already established his position as King of Macedonia, had made great progress in developing his army, and had begun the extension of his kingdom to the eastward, so that he possessed the rich gold mines in Mount Pangæus. The yearly revenue of 1000 talents from these mines made feasible his policy of expansion. Though a thoroughgoing Macedonian, Philip was still possessed of genuine Greek culture; doubtless, while a hostage at Thebes, he had learned much beside military and political wisdom. He chose Aristotle as his son's tutor. How far the teacher influenced the pupil we cannot determine; he undoubtedly gave him a thorough training in rhetoric and literature—he may have inspired that love for the Hellenic past which characterized Alexander later; but it is improbable that Alexander's far-reaching ambition for conquest gained the sympathy of Aristotle. In the summer of 336 B.C. Philip was assassinated; that the murder was instigated by Olympias, whom Philip had put away in favor of the niece of his general Attalus, there is little doubt. Philip had gained a remarkable position for a Greek ruler. He had extended his empire eastward, had made Thrace tributary, and had tried to capture Byzantium. Thessaly was dependent on him; he had gained a place in the Amphictyonic Council; and, by his victory at Chæronea (August, 338), he had made himself the head of all Greece, a position formally recognized by the Congress of States at Corinth in the following year. The greatest legacy, however, which he left his son was the large conception of a Panhellenic empire.

At his accession Alexander found himself surrounded by enemies at home and threatened by dangers abroad. The subject States were planning to revolt, and Greece hated the Macedonian hegemony. But the hands of assassins cleared away his domestic enemies. With the greatest speed he descended to the south; before the summer closed he had reëstablished Macedon's position in Lower Greece and had been elected by the Congress at Corinth to his father's place as General of the Greeks against the Persians (336). The next year he speedily carried out a successful campaign against the defecting Thracians, and penetrated to the Danube. On his return he crushed in a single week the threatening Illyrians and then hurried into Greece, for certain States had been negotiating with Persia. When a report spread that Alexander was dead, the Thebans sought to throw off the Macedonian yoke. Alexander hastened from Illyria to Thebes, defeated the Thebans, and captured the city. In September, in accordance with a vote of the Congress of Corinth, he razed Thebes to the ground, sparing only the house of the poet Pindar. This prompt action ended all positive resistance in Greece and left Alexander free to enter on his eastern campaigns.

At the beginning of 334 he crossed to Asia Minor, where his generals had already gained a foothold. To secure Macedonia and Greece he had been forced to leave behind a considerable portion of his army; only 30,000 foot and 5000 horse, it is said, followed him, yet these were undoubtedly skilled veterans. His ships numbered but 160, which were so inadequate to combat the 400 galleys of the Persians that he soon disbanded them. After visiting the site of ancient Troy and making offerings there, he advanced in early summer to meet a Persian force at the river Granicus. He was victorious and then proceeded to the conquest of Asia Minor. The prompt surrender of Sardis, without resistance, gave him the satrapy of Lydia, and Miletus soon fell. Halicarnassus resisted stubbornly for a time; but finally the defenders withdrew after firing the city. At the close of the summer's campaign Alexander marched into Lycia, which yielded at once, and then advanced through Pamphylia and Pisidia to Celænæ and Gordium, where with a stroke of his sword he loosed the famous knot and entitled himself to become the lord of Asia. See Gordian Knot.

Gordium was the mustering point for the year 333. Alexander led his reassembled army first into Cappadocia, where he received the submission of Paphlagonia, and then advanced to the "Cilician Gates." By a ruse he caused the hostile force here to retire and entered Tarsus unopposed. All Cilicia was soon secured. Thus in less than two summers the greater part of Asia Minor had been won and Alexander had taken the first step in his plan of conquest. The next was to advance by way of Syria to the subjugation of Egypt; this accomplished, Alexander could proceed against Babylon and Susa. But the Great King had assembled a vast

host to check the invader. Battle was joined in the little plain of Issus, where the enormous numbers of the Orientals could not be employed to advantage. The day was decided by Alexander's attack on that part of the line where Darius was in his war-chariot (this scene is portrayed in a famous Mosaic, now in the Museo Nazionale at Naples). The Great King turned and fled, while the Greeks drove all before them. The mother, wife, and children of Darius fell into Alexander's hands, but were treated by him with the respect due royalty. While this victory at Issus opened the way to Syria and Egypt, it was far more valuable to Alexander in the prestige it gave him. Darius himself wrote to Alexander, complaining that Alexander had been an unprovoked aggressor, begging for the return of the royal captives, and proposing to make a treaty of alliance. To Alexander the letter seemed to have, after all, a tone of condescension, and his reply was a stern command to Darius, his defeated foe and subject, to come to him and offer submission.

Alexander was not lured aside to pursue and crush Darius, but moved against Syria, and against the Phœnician towns, especially Tyre and Sidon. Sidon had been reduced by Persia a few years before, so that she welcomed Persia's new foe, who accepted her submission and restored her former territory and rights. The Macedonian army reached Tyre at the end of 333; when this city declined to receive Alexander, it was at once invested. The siege lasted from January to the end of July, 332; again and again the attackers were beaten back, but at last the city fell before a concerted onslaught. Alexander now could advance on Egypt, since Syria was secure. Gaza alone offered stubborn resistance, but succumbed after a siege of some weeks.

About November, 332, Egypt, now wholly cut off from Persia, was reached, and the Persian satrap promptly yielded. At Memphis Alexander was crowned king; he then sailed down the Nile to Canopus and founded a new city bearing his name. (See ALEXANDRIA.) This he intended to become the new capital of Egypt and to supplant Tyre as the emporium of trade. History has shown how wisely the site was chosen and the city planned, but the most significant immediate result was the transfer of commerce from the Phœnicians to the Greeks. Presently Cyrene sent Alexander her submission, so that his influence extended to Carthaginian territory. Early in 331 he visited the shrine of Ammon-Rê in the Libyan desert (see AMMON), where tradition says the god acknowledged him as his son, thereby giving him divine title to succeed the Pharaohs.

The following spring Alexander returned to Tyre, where he was occupied with questions of organization. Then he started for Babylon with 40,000 foot and 7000 horse. Early in August he reached the Euphrates, then advanced across northern Mesopotamia, and marched down the banks of the Tigris. At last he heard that Darius was encamped in a plain near Gaugamela with an enormous host, which tradition reports numbered 1,000,000 infantry and 40,000 horse. October 1, 331, the armies engaged. At certain points the Greeks were hard pressed, but at a critical moment Alexander broke the Persian centre, whereupon Darius fled as he had done at Issus; finally the Macedonians won at every point. Darius was pursued to Arbela (q.v.), where his chariot and weapons were found, but the King escaped on horse to the Median highlands. Babylon opened its gates to the victor, and there the army rested. Susa, with its enormous treasures, soon fell into Alexander's hands.

It was of great importance that Persis and its capital be secured at once, so that although the season was mid-winter Alexander pressed on over the Uxian Pass. He stormed the almost impregnable "Persian Gates" by a surprise march over snow-covered mountains, and soon was at Persepolis and the royal palaces, whose ruins still give some idea of their magnificence. No less than 120,000 talents were found in the treasuries, together with other spoil. At Pasargadæ also much treasure was taken. About four months, apparently from January to April, 330, were spent at the ancient palace of the Achæmenian kings. (See ACHÆMENES.) During this time the district of Caramania yielded. Then Alexander started in pursuit of Darius, who, he had heard, was at Ecbatana with an army; but on reaching the city he found that Darius had fled eastward. Alexander soon pressed on, but after great efforts secured only the dead body of his enemy, who had been treacherously slain by his followers. One of the murderers had fled to Hyrcania on the south shore of the Caspian, and Alexander felt it necessary to secure this district before following the other chief assassin into remoter Bactria. The Persians who had retreated into Hyrcania yielded when Alexander appeared, and left him free to advance into northern Areia, where the Persian satrap promptly surrendered. It is not possible here to give in detail the successive steps of Alexander's new advance; by midsummer, 328, he was master of Drangiana, Seistan, Gedrosia, and Arachosia, satrapies corresponding roughly to modern Afghanistan and Baluchistan; he had annexed Bactria and Sogdiana at the north, and had fixed the limits of his conquests in this direction by founding Alexandria Eschate (Khodjend) near the pass over the Tian-shan Mountains. The following year was spent in putting down uprisings and in firmly establishing his power.

Alexander then turned to the conquest of India; one purpose of this, no doubt, was to secure control of the valuable trade-routes to India. He came back to Afghanistan and at Nicæa (Kabul?) prepared for the new campaign. The advance must have been made by the Khyber Pass. The winter of 327–326 was spent in subduing the hill-men and the inhabitants of the river valleys along the western base of the Himalayas. In the spring he marched to the Hydaspes, receiving the submission of the native princes on the way. At the river he was opposed by King Porus, but by stratagem and skill the Indian monarch was defeated. Alexander gave him back his kingdom much increased, thereby securing a buffer State on his own borders, for apparently he intended the Indus to be the eastern boundary of his Empire. He then continued to the southeast until he reached the river Hyphasis. Here the Macedonians refused to go farther, and unwillingly Alexander was obliged to turn back when, as he thought, he was near the end of the world. He returned to the Hydaspes; then advanced southward, subduing the tribes of the Lower Punjab, and finally reached the Indian Ocean in the early summer of 325. Part of his

ALEXANDER THE GREAT
MARBLE BUST IN THE BERLIN MUSEUM

force had already been dispatched to reduce a revolt in Arachosia. Alexander himself started in early autumn to return to Babylon across the desert of Mekran, while his fleet was to find a seaway between the East and the West. For two months he and his army struggled across the desert, suffering from heat, hunger and thirst. The losses were very great, so that only a portion of those who started reached the capital of Gedrosia. After a rest, Alexander pressed on to Kirman, where he met his Admiral, Nearchus, who in spite of great hardships had made the voyage from India. He was ordered to sail along the Persian Gulf and up the river Pasitigris to Susa, whither Alexander proceeded overland. Upon his arrival his first task was the correction and punishment of misrule on the part of his satraps, many of whom, believing he would never return, had oppressed their provinces and had planned to set up independent kingdoms. When the abuses had been corrected and the guilty punished, Alexander set about the further amalgamation of the Greeks and the Orientals. He had already founded Greek cities wherever he had been; he now encouraged intermarriage and set the example himself by taking to wife Statira, the daughter of Darius. He had already married Roxana (q.v.), a Bactrian princess; he thus followed the polygamous custom of Persia. Many of his officers chose Persian consorts. Furthermore he planned to admit Orientals and Greeks to equality in military service, and established military schools in the various provinces, much against his veterans' wishes.

The greater part of the year 324 was spent in a survey of the Persian Gulf and in general organization at Ecbatana. In the winter Alexander returned to Babylon, where embassies from the remotest west came to seek his friendship. But his mind was now busy with plans for building up a great sea trade with India by way of the Red Sea, the Persian Gulf, and the Indian Ocean. Babylon was to become a great seaport. With these things in view he planned a naval expedition to circumnavigate and conquer Arabia. Before this could start, Alexander fell ill of a fever following a carouse, and in 12 days he lay dead (June, 323).

The rapidity and brilliancy of Alexander's military operations have generally obscured his preëminent qualities as a statesman. He inherited from his father the concept of a great empire, and he had the genius to lay the foundations of a unified realm surpassing the dreams of Philip. Throughout the course of his conquest he organized the rule of his satrapies so that the power was divided and revolt made difficult. Seeing that the ruler of the vast realm which he was conquering should adopt much of the native custom, he assumed not a little Oriental state, which undoubtedly strengthened his position in spite of the disapproval it aroused among his Greek followers; and he took many wise measures to amalgamate the East and the West. His plans for trade development would have had great effect on social and economic conditions if he could have carried them out. The unified Empire which he had created was soon divided among many Macedonian rulers. Yet all the results of his work were not lost. The small Hellenic State had disappeared forever with its narrow exclusiveness, and a more tolerant attitude was maintained by the Greek world after him. The Romans entered into the fruit of his conquests, and the spread of Christianity in the East was made the easier by them.

Consult: Droysen, *Geschichte Alexanders des Grossen* (Gotha, 1898); Grote, *History of Greece* (New York, 1853–56); Holm, *Griechische Geschichte*, vol. iii (Berlin, 1893); B. I. Wheeler's *Life* (New York, 1900); J. P. Mahaffy, *The Story of Alexander's Empire* (1886); *Progress of Hellenism in Alexander's Empire* (1905). See ALEXANDER, LEGEND OF.

ALEXANDER, THE PAPHLAGONIAN. A celebrated impostor of the early part of the second century A.D., of whom Lucian gives a description. He was born at Abonouteichos, in Asia Minor, and after being for some time associated with another charlatan named Coccona, of Byzantium, returned to his native place and established a pretended oracle of Æsculapius, whom he showed in the form of a serpent. Here he gained great reputation, which extended even to Italy. He was especially resorted to during the plague of 166 A.D.

ALEXANDER, Sir WILLIAM, EARL OF STIRLING (c.1567–1640). A Scottish poet and statesman; born probably at Menstrie. He was educated at Glasgow University, traveled on the Continent, was tutor to the young Earl of Argyle, and so found access to the court of James I of England. He wrote sonnets, the *Four Monarchick Tragedies*, *Elegy on the Death of Prince Henry*, *Doomsday*, and many minor poems In 1621 he received the largest gift ever bestowed on a subject, viz., a "gift and grant" of Canada, including Nova Scotia and Newfoundland; a striking expression of royal ignorance of geographical limits in America. Charles I confirmed the grant. Alexander was made Secretary of State for Scotland in 1626, in 1630 was created a peer as Lord Alexander of Tullibody and Viscount Stirling, and was made judge of the Sessions in 1631. The next year he built the Argyle House, still one of the sights of Stirling. In 1633 he was made Earl of Stirling and Viscount of Canada and in 1639 Earl of Dovan. Consult *Poetical Works*, with memoir (Glasgow, 1870–73), and for his biography, Rogers, *Memorials of the Earl of Stirling* (1877).

ALEXANDER, WILLIAM (1726–83). An American soldier, generally called "Lord Stirling." He was born in New York City and was the son of James Alexander (q.v.). He served in the French and Indian War, first as commissary and then as aid-de-camp to General Shirley: but went to England in 1756 to defend Shirley against the charge of neglect of duty (see SHIRLEY, WILLIAM), and to urge his claim before the House of Lords to the earldom of Stirling, through descent from Sir William Alexander, Earl of Stirling (c.1567–1640). This claim was not allowed, and in 1761 he returned to America. He soon became Surveyor-General and a member of the Provincial Council, and in November, 1775, enlisted as Colonel in a New Jersey regiment. In January, 1776, he was promoted to the rank of Brigadier-General, and on August 27 took a conspicuous part in the battle of Long Island (q.v.), where his brigade was almost annihilated and he himself was captured. He was exchanged within a month, became a Major-General in February, 1777, served with great gallantry and efficiency in the battles of Brandywine, Germantown, and Monmouth, and subsequently was in command at

Albany, N. Y., until his death. He was well educated, was an enthusiastic student of mathematics and astronomy, and was one of the founders and first governor of King's College (now Columbia University). He published a pamphlet entitled *The Conduct of Major-General Shirley, Briefly Stated* (1756), and *An Account of the Comet of June and July, 1770.* Consult W. A. Duer, *Life of William Alexander, Earl of Stirling*, in the collection of the New Jersey Historical Society for 1847, and Charles Rogers, *Memorials of the Earl of Stirling and of the House of Alexander*, 2 vols. (Edinburgh, 1877).

ALEXANDER, William (1824–1911). Protestant Archbishop of Armagh and Primate of all Ireland. He was born at Londonderry and was educated at Tunbridge School and at Exeter and Brasenose colleges, Oxford. After entering holy orders he first served a curacy in the north of Ireland, and later became chaplain to the Marquis of Abercorn, Lord Lieutenant of Ireland. He then successively occupied the positions of Dean of Emly (1863) and Bishop of Derry and Raphoe (1867). In 1896 he was enthroned as Archbishop of Armagh. Bishop Alexander, who was select preacher before the universities of Oxford (1870–72 and 1882), Cambridge (1872 and 1892), Dublin (1879), and lecturer at Columbia College (1892), was the author of the following important works: *Witness of the Psalms to Christ* (Bampton Lectures, 3d ed., 1890); *Verbum Crucis* (1892), *Discourses on Epistles of St. John* (1889), *Commentaries on Epistles to Colossians, Thessalonians, Philemon* (Speaker's Commentaries, vols. iv, v); *St. Augustine's Holiday and Other Poems* (1887); *Primary Convictions* (2d ed., 1898); *Leading Ideas of the Gospels* (3d ed., 1898); *The Finding of the Book, and Other Poems* (1900); *Our National Church* (1906).

ALEXANDER, William Lindsay (1808–84). A Scotch divine, born in Edinburgh. He was educated at Edinburgh and St. Andrews, became pastor in Edinburgh, 1835, and professor of theology in the Congregational Theological Hall in that city, 1854. He was a member of the Old Testament Company of the Bible Revision Committee. His publications embrace *The Connection and Harmony of the Old and New Testaments* (London, 1841; 2d ed., 1853); *The Ancient British Church* (1852; ed. by S. G. Green, 1891); *Christ and Christianity* (1854); *Life of Ralph Wardlaw, D.D.* (Edinburgh, 1856); *Labor and Adventure in Northern Europe and Russia* (ed. by J. Paterson, D.D., London, 1858); *A Commentary on Deuteronomy* (1881), and one on *Zechariah* (1885), edited with a life; Charles Ferme's *Analysis on Romans* and A. Melville's *Commentary on Romans*, both translated from Latin (Edinburgh, 1860); and the third edition of Kitto's *Biblical Encyclopædia* (3 vols., 1862–66), translation of Haevernick's *Introduction* (1852), and part of Dorner's *Person of Christ* (1861). For his biography, consult J. Ross (Edinburgh, 1886).

ALEXANDER ÆGUS. See Roxana.

ALEXANDER ÆTO'LUS (Gk. *Ἀλέξανδρος ὁ Αἰτωλός, Alexandros ho Aitōlos*). A Greek poet (c.315–265 B.C.), the one Ætolian poet of whom we have knowledge. Though born in Ætolia (q.v.), he lived mainly at Alexandria, where he was considered one of the seven poets of the Alexandrian tragic pleiad; he was busy there also in the library. (See Alexandrian Age.) He also wrote short epics, elegies, and epigrams, of which fragments have been preserved. These fragments, published in Bergk's *Poetæ Lyrici Græci*, attest the cultivated taste of the writer and prove him one of the immediate predecessors of Callimachus. Consult Couat's *La poésie alexandrine* (1882); Susemihl, *Geschichte der griechischen Litteratur in der Alexandrinerzeit*, vol. i (Leipzig, 1891–92).

ALEXANDER ARCHIPELAGO. A group of over 1100 islands and islets off the west coast of Alaska, U. S., in lat. 54° 40′ to 58° 25′ N. Chichagof, Baranof, Kupreanof, Kuiu, Admiralty, and Prince of Wales are the largest. The town of Sitka is on Baranof Island, the most important of the group.

ALEXANDER BALAS. King of Syria (150–145 B.C.). He was probably born in 173 B.C. Whether he was the second son of Antiochus IV Epiphanes who had escaped when his brother Eupator was murdered, as he himself claimed, and Eumenes and Attalus, of Pergamum, and Ptolemy VII Philometor, of Egypt, maintained, or an impostor possessing a marked resemblance to Eupator, used as a tool by Eumenes, as Diodorus, possibly on the authority of Polybius, the friend of Demetrius, states, cannot be positively decided. In 153 he appeared in Rome with Laodice, the daughter of Antiochus Epiphanes, to plead his cause. Supported by Rome, Pergamum, Cappadocia, and Egypt, he struggled with Demetrius I. In 152 he appointed Jonathan, the Hasmonæan, as high priest, an office which the latter publicly assumed at the Feast of Tabernacles of that year. In 150 B.C. Alexander married Cleopatra, daughter of Ptolemy VII Philometor, and on that occasion conferred on Jonathan the titles of military and civil governor. In 147 B.C. Apollonius, Governor of Cœle-Syria, took up arms for Demetrius II, but was defeated by Jonathan at Ashdod. The Hasmonæans had every reason to be pleased with Alexander. But he was an incapable and corrupt ruler and hated by his soldiers, who deserted him in 145 B.C. He fled to Abbae, in Arabia, and was there assassinated. His official surnames were Theopator Euergetes, but in Syria he was also called Balas, which may represent Baal. See Niese, *Geschichte der griechischen und makädonischen Staaten*, vol. iii (1903); Bevan, *The House of Seleucus II* (1902); Bouché Leclercq, *Histoire des Seleucides* (1913).

ALEXANDER COL'UMN (Russ. *Aleksandrovskaya Kolonna*). A monument to Alexander I of Russia. See Saint Petersburg, *Topography*.

ALEXANDER JANNÆ'US (Lat. form of Heb. *Yannai*, Jonathan) (129–78 B.C.). King and high priest of the Jews from 104 to 78 B.C. He was warlike and energetic and extended the frontiers of his kingdom toward the west and the south. Severely defeated by Ptolemy Lathyrus in Galilee, he formed an alliance with Cleopatra of Egypt and drove the invader from the country. Wars with the Moabites, the Ammonites, and the Arabians engaged his attention till his death. Internally his reign was marked by bitter conflicts between the Sadducees, of which party he was the head, and the Pharisees, who comprised the vast mass of the people. It is estimated that 50,000 people perished in the civil strife. In putting down a revolt at Jerusalem he slaughtered 6000 of the insurgents, and in the year 86, returning triumphantly from exile, where he had been driven by the Pharisees,

he caused 800 rebels to be crucified in his presence and their wives and children to be butchered before their eyes. Consult Josephus, *Antiquities of the Jews*, book xiii, chaps. xii–xv, and *Jewish War*, book i, chap. iv.

ALEXANDER JOHN I (1820–73). Prince of Rumania from 1859 to 1866. He was a Moldavian boyar, by name John Cuza, who, when Moldavia and Wallachia determined to form a Rumanian State, was elected Prince of Rumania under the above title by the Assemblies. He received the recognition of the Sultan in 1861. His reign was arbitrary and unconstitutional and convinced the Rumanians of the impracticability of having as sovereign one of their own number. He followed the example of Napoleon III in his methods, endeavoring to mask arbitrary government under plebiscites and universal suffrage. He became exceedingly unpopular and was forced to abdicate in 1866.

ALEXANDER KARAGEORGEVITCH, kä'rä-gä-ôr'gä-vĭch (1806–85). Prince of Servia, born at Topola. He was for a time an officer in the Russian army and was chosen prince in 1842. Wholly under Austrian influence, he angered the National party by his neutrality during the Crimean War and in 1858 was deposed. He was accused of conspiracy in the murder of the Prince Michael (1868) and was sentenced to an imprisonment of 20 years *in contumaciam*. The few reforms accomplished during his reign are not to be attributed to him.

ALEXANDER LAND. A land area in the Antarctic (lat. 68° 43′ S., long. 70° to 75° W.), discovered by Bellingshausen in 1821.

ALEXANDER NEVSKI, nyĕf'skē (1220–63). A Russian hero and saint. He was born at Vladimir, the son of Prince Yaroslav of Novgorod. In order to defend the country, which was attacked on all sides, but especially by the Mongols, his father left Novgorod, intrusting the government to his sons, Feodor and Alexander. Feodor died soon after. Alexander vigorously resisted the enemy, but Russia was forced to submit to the Mongol dominion in 1240 A.D. Alexander now fought to defend the western frontier against the Danes, the Swedes, and the Teutonic Knights. He received the surname of Nevski from the splendid victory over the Swedes, which he won in 1240 on the Neva, in the region where St. Petersburg now stands. In 1242 on the ice of Lake Peipus he defeated the Livonian Knights of the Sword, who had been instigated by the Pope to attack the Russian heretics. After the death of his father, in 1246, he became Grand Duke of Kiev and Novgorod, and in 1252 through the influence of the Tatars Grand Duke of Vladimir. Pope Innocent IV made a diplomatic attempt in 1251 to reunite the Greek and Roman churches, since his military scheme had failed, and with this end in view sent an embassy to Alexander, which, however, proved ineffectual. To the end of his life Alexander remained a vassal of the Tatars or Mongols. Thrice he had to renew his oath of fealty to the Asiatic barbarians, making in each instance a journey to their camp. He died Nov. 14, 1263, on his return from the last of these journeys. The gratitude of the nation perpetuated his memory in popular songs and even canonized him. Peter the Great honored his memory in 1723 by building a magnificent convent on the spot where he had fought his great battle, and in 1725 founded the knightly order of St. Alexander Nevski.

ALEXANDER OF APH'RODIS'IAS. A Peripatetic philosopher, who was born at Aphrodisias in Caria and lived about 200 A.D. He was the most learned and intelligent Greek commentator on Aristotle (especially on the Metaphysics) and was known as "The Exegetes," or "The Expounder." His works, which formed a rich mine for later interpreters, especially Simplicius (q.v.), were early translated into Latin, and are thus in large part preserved; they are still of good service in the interpretation of Aristotle. He also wrote original treatises, the most important of which are those *On Fate* and *On the Soul*. At the time of the Renaissance a philosophic school which adopted Aristotle's views on immortality was named after him "the Alexandrist" (q.v.).

ALEXANDER OF HALES, hālz (Lat. *Alexander Halensis*) (?–1245). A famous English theologian, known as "the Irrefragable Doctor." He was born in Hales, Gloucestershire, but had attended the schools of Paris, had taken the degree of doctor, and had become a noted professor of philosophy and theology there, when (1222) he suddenly entered the Order of the Franciscans and became a lecturer among them. He resigned in 1238 and died as a simple monk in Paris, 1245. His chief and only authentic work is the *Summa Universæ Theologiæ* (best ed., 4 vols., Venice, 1576), written at the command of Pope Innocent IV, and enjoined by his successor, Alexander IV, to be used by all professors and students of theology in Christendom. Alexander gave the doctrines of the Church a more rigorously syllogistic form than they had previously had and may thus be considered as the author of the scholastic theology. Instead of appealing to tradition and authority, he deduces with great subtlety, from assumed premises, the most startling doctrines of Catholicism, especially in favor of the prerogatives of the papacy. He refuses any toleration to heretics and would have them deprived of all property; he absolves subjects from all obligation to obey a prince who is not obedient to the Church. The spiritual power, which blesses and consecrates kings is, by that very fact, above all temporal powers, to say nothing of the essential dignity of its nature. It has the right to appoint and to judge these powers, while the Pope has no judge but God. In ecclesiastical affairs, also, he maintains the Pope's authority to be full, absolute, and superior to all laws and customs. His work marks the completion of the first great period of scholasticism.

ALEXANDER OF PHERÆ. See PHERÆ.

ALEXANDER OF THE NORTH, THE. Charles XII of Sweden. Sometimes so called from his warlike exploits.

ALEXANDER POL'YHIS'TOR (Gk. Πολυίστωρ, *polyhistōr*, very learned). A famous historian of the first century B.C., who was a native of Cottyacum, in Phrygia, but was educated at Miletus. In Sulla's war against Mithridates he was taken captive and brought to Rome, where Cornelius Lentulus gave him his freedom. Sulla afterward granted him Roman citizenship. Alexander gained the surname Polyhistor because of the great number of his historical works; but he also wrote on geography, grammar, science, rhetoric, and philosophy. All of his books have perished; but they were extensively quoted by Pliny the Elder, Diogenes Laertius, and particularly Clement of Alexandria and Eusebius. These excerpts show him to

have been a rather poor compiler without marked literary ability or historical judgment. But he was evidently a great reader, and he perused Jewish and Samaritan works as well as Greek authors. Thus the world is indebted to Alexander for all extant information concerning such Jewish writers as Philo, the epic poet; Ezekiel, the tragedian; Eupolemus, the historian; Demetrius, the historian; Artapanus, the chronicler; Aristeas, the historian, and such Samaritan writers as Theodotus and Molon. The genuineness of these fragments has been doubted by Rauch and Cruice; but the defense by Müller, Freudenthal, and Schürer is quite convincing. Alexander refers twice to the Bible and gives from Berosus the story of the Deluge and possibly also the legend of the confusion of tongues. The text of the fragments will be found in Eusebius, *Præparatio Evangelica* (London, 1842) and Clement, *Stromata*, i, 21, 130 (Oxford, 1869); Müller, *Fragmenta*, iii, 211 ff., and translated in I. R. Cory's *Ancient Fragments* (London, 1876), J. Freudenthal, *Hellenistische Studien* (Breslau, 1875), Unger, in *Philologus*, 1888, Montzka, in Lehmann's *Beiträge zur alten Geschichte*, ii, pp. 351 ff. (1902), and E. Schürer's *Geschichte des jüdischen Volkes*, iii, 469 ff. (4th ed., 1909), discuss excellently the question of their genuineness.

ALEXANDER SEVE'RUS (c.205–235). Emperor of Rome from 222 to 235 and cousin, adopted son, and successor of Elagabalus. The excellent education which he received from his mother, Julia Mammæa, rendered him one of the best princes in an age when virtue was reckoned more dangerous than vice in a monarch. He sought the society of the learned; Paulus and Ulpian, the jurist (q.v.), were his counselors; Plato and Cicero were, next to Horace and Vergil, his favorite authors. Although a pagan, he reverenced the doctrines of Christianity, and often quoted the saying, "Whatsoever ye would that men should do to you, do ye even so to them." Beloved as he was by the citizens on account of his equity and wisdom, and for the simplicity and purity of his life, he was too weak to maintain discipline in the army, and so soon became an object of hatred to the unruly Prætorian Guards. His first expedition, against Artaxerxes, King of Persia, was happily terminated by a speedy overthrow of the enemy. But during one which he undertook against the Germans on the Rhine, to defend the frontiers of the Empire from their incursions, an insurrection broke out among his troops, headed by Maximinus, in which Alexander was murdered, along with his mother, not far from Mainz. The grateful people, however, enrolled him among the gods. After his death military despotism obtained the ascendency.

ALEXANDER'S FEAST, OR THE POWER OF MUSIC. An ode written by John Dryden for St. Cecilia's Day, 1697. It contains a number of lines now familiar from quotation.

AL'EXAN'DRA, CAROLINE MARIE CHARLOTTE LOUISE JULIE (1844—). Dowager Queen of England, was born at Copenhagen, Dec. 1, 1844, the daughter of Christian IX, King of Denmark. She was married to Albert Edward Prince of Wales, March 10, 1863, and had three sons (two of whom have since died) and three daughters. She visited Russia at the time of the death of Alexander III and also made several visits to Denmark. She took interest in many benevolent enterprises and became an accomplished musician, holding the degree of honorary musical doctor. Upon the accession of Albert Edward to the throne (1901) she became Queen of England, and reigned with him until his death, May 6, 1910. She celebrated in 1913 the fiftieth anniversary of her wedding and of her arrival in England. Consult S. A. Tooley, *Queen Alexandra* (London, 1902). See EDWARD VII.

ALEXANDRA, FEODOROVNA. Empress of Russia. See ALEXANDER III.

ALEXANDRA FALLS. See HAY RIVER.

ALEXANDRE, ä'lăks-än'drâ, RABBI AARON (c.1766–1850). A German chess-player, born at Hohenfeld, Bavaria. He went to Strassburg in 1893, as an instructor in German, and subsequently to Paris and London. He published an *Encyclopédie des échecs* (1837) and a *Collection des plus beaux problèmes d'échecs* (1846), both still valuable.

ALEXANDRE LE GRAND, ä'lĕks'än'dr' le grän'. The name of a tragedy by Racine, produced in 1665. The actress who played Axiane in this piece was the cause of a bitter rivalry between Racine and Molière.

AL'EXANDRET'TA, or **ISKANDERUN,** ĭs-kän'de-roon'. A seaport of Asiatic Turkey, in the vilayet of Adana, on the Gulf of Iskanderun, which forms the extreme northeast nook of the Mediterranean Sea, 70 miles from Aleppo and 45 miles from Antioch by rail (Map: Turkey in Asia, G 4). It is surrounded by hills in a very picturesque locality. The harbor is naturally one of the best on this coast, and the town is important strategically because it commands Beilan Pass, the gateway to northern Syria. It is the port of Aleppo and the seat of an extensive trade in silk goods, wool, hides, leather, licorice, butter, cloth, and some raw products, amounting in 1910 to about $10,000,000 for imports and about $6,500,000 for exports. The population is about 9000. Alexandretta is the seat of a United States vice consul.

ALEXANDRI, ä'lĕks-än'drê. See ALECSANDRI.

AL'EXAN'DRIA (Ar. *Iskanderieh*). A city founded by Alexander the Great, in the winter of 332 B.C., on the site of an Egyptian town, Rhacotis (Map: Africa, G 1). It was situated at the Canopic mouth of the Nile, on the low ridge separating Lake Mareotis from the Mediterranean, and was laid out by the architect Dinocrates (q.v.), of Rhodes, in the form of a parallelogram; two main streets, lined with colonnades and said to have been 200 feet wide, crossed at right angles, though somewhat to the north and east of the centre lines. The other streets were also at right angles with one another, and the arrangement seems to have remained undisturbed for a long period, although the level of the city was raised and new streets laid out above the old ones. The city had a fine double harbor, formed by building a mole (the Heptastadion), 7 furlongs in length, to the island of Pharos, off the northeast end of which was a lighthouse, regarded as one of the wonders of the world. (See PHAROS.) The small harbor, on the west, was open, but the large harbor was entered only by a narrow passage between the Pharos lighthouse and a mole built out from the promontory Lochias on the east of the city. The city grew rapidly and became one of the chief centres of the trade between the east and the west, while the generous policy of the Ptolemies, who made it their capital, attracted a large foreign population. In Roman

days the city was the capital of Egypt. (See EGYPT, near the end of the article.) At Alexandria, under the Romans, there was a very important mint.

Egyptians, Greeks, and Jews were the chief elements, each gathering in a special quarter of the city. On Lochias were the royal palaces, and the neighboring part of the city was filled with magnificent buildings, including the museum and the famous library (see ALEXANDRIAN LIBRARY), the monument of Alexander, the graves of the Ptolemies, the temple of Poseidon, and the Cæsareum—afterward a church, and once marked by the two obelisks known as Cleopatra's Needles, of which one was transported to the Thames Embankment in London in 1878, and the other to Central Park, New York, in 1881. These obelisks were originally erected by Thothmes III and were brought to Alexandria by the Romans. Near the Cæsareum was the great emporium and somewhat to the south lay the Bruchion (Βρύχιον), a residence quarter. The great temple of Serapis lay in the southwest, or Egyptian quarter, where now stands a solitary column, the so-called Pompey's Pillar, a monolith of red granite 73 feet high, erected in 302 A.D. by the Roman eparch, Pompeius, in honor of Diocletian. Earthquakes and floods have changed the surface of the ground, and but few remains are now visible, though excavations conducted for Napoleon III in 1866 by Mahmoud Bey revealed a number of paved streets, and those of 1898–99 by Dr. Noack have thrown much light upon the successive periods of building in the city. The original foundations of the time of Alexander rest on the natural rock and are about 14⅔ feet below the paved streets, which seem to belong to an extensive rebuilding of the city by Antoninus Pius, and are now covered with the earth on which the modern city stands. The policy of Ptolemy Philadelphus and his immediate successors drew not only traders but learned men to the city, and Alexandria became the centre of Greek intellectual life during the third and second centuries B.C. (See ALEXANDRIAN AGE.) The city also developed a very characteristic type of art, which vied with that of Pergamus and seemed to have had great influence on the West. (See ARCHÆOLOGY; ALEXANDRIAN AGE.) Alexandrian influence is marked at Pompeii (q.v.) and in Provence. Consult Mahmoud Bey, *Mémoire sur l'antique Alexandrie* (Copenhagen, 1872); Lombroso, *L'Egitto al Tempo dei Greci e dei Romani* (Rome, 1882, 1886); Aeroutsos Bey, *L'ancienne Alexandrie, étude archéologique et topographique* (Paris, 1888).

In 30 B.C. Egypt passed into the hands of the Romans under Octavius (Augustus), becoming directly subject to the Emperor, and governed by a prefect appointed by him. Under Roman rule Alexandria lost much of its former preeminence as the capital of the Hellenistic world; and though for many centuries it continued to be one of the greatest cities of the Empire, especially as one of the chief sources of the grain-supply of Rome, its decline from the magnificent prosperity it had enjoyed under the Ptolemies was rapid after the first century of the Christian era. The Jewish inhabitants of Alexandria joined in the great national revolt of 116 A.D., and in the desperate struggle which ensued the Jewish population was annihilated, and a large part of the city was destroyed. The excesses of the Alexandrian mob, famous throughout the Empire for its fickleness and its violence, plunged the city into misfortunes twice during the third century. In 215 the seditious conduct of the populace led to a general massacre of the inhabitants at the order of the Emperor Caracalla. Forty-five years later civil war broke out among the different quarters of the city, lasting for 12 years and resulting in the destruction of the Bruchion, the richest district of Alexandria, with its ancient palaces, temples, and public buildings. With the rise of Alexandria as one of the great Christian capitals of the Empire, religious tumult took the place, in large measure, of political dissension, and paganism and Christianity fought out their battle in many bloody riots. The triumph of the new faith was signalized in 389 by the destruction of the Serapion, the last refuge of the pagan belief, but religious peace was by no means secured. (On the destruction of books at this time in the Serapion, see F. J. Teggart, in the *New York Evening Post*, July 7, 1898.) Between 413 and 415 the patriarch Cyril led mobs of monks against the heretics and Jews, and one of these militant bands tore to pieces the beautiful pagan priestess, Hypatia (q.v.). In 616 Alexandria was taken by Chosroes, King of Persia. In December, 641, it fell into the hands of Amru, the Mohammedan conqueror of Egypt, General of the Caliph Omar. The story of the destruction at this time of the famous library at the command of the Caliph Omar is discredited. With the Arabian conquest a period of swift decay set in. The commerce of the city was almost entirely diverted to other cities, the last remnants of its prosperity being destroyed by the discovery of the all-water route to India. Toward the end of the eighteenth century its population was probably less than 7000. On July 2, 1798, Alexandria was taken by the French, who held it until Aug. 31, 1801. In the nineteenth century the city entered upon a new era of prosperity under the wise rule of Mehemet Ali. During the disturbances in connection with the rebellion of Arabi Pasha (q.v.), Alexandria was bombarded by the English fleet under Admiral Seymour, July 11–12, 1882.

Modern Alexandria is divided into two parts. The peninsula between the eastern and western harbors is inhabited chiefly by Mohammedans. It has crooked and narrow streets, a large number of mosques, and, with the exception of the palaces of wealthy Turks, few buildings worthy of notice. The European quarter is situated on the mainland south of the eastern harbor. It is well built and has many of the improvements essential to a modern city. The centre of the European city is the Mehemet Ali Square, containing the statue of Mehemet Ali and surrounded by the official buildings and the finest residences of the Europeans. There are three theatres, a number of churches of different denominations, and the museum of Græco-Roman antiquities. Alexandria has two harbors. The eastern is accessible only for vessels of very light draught and is used mostly by fishing vessels. The western harbor is the chief shipping centre; commercial steamers entered, in 1911, 2014 of 3,443,705 registered tons net. There is, besides, the outer harbor, protected by a mole nearly two miles long. Alexandria is at present one of the chief commercial ports on the Mediterranean and the principal port of Egypt. Its imports and exports in 1911 were valued at £E23,680,344 and £E28,014,926 respectively. The chief arti-

cles of export are grain, cotton, beans, sugar, and rice. With Cairo, Alexandria is connected by rail (since 1855) and by the Mahmudieh Canal. Along the latter are situated the summer residences of the Europeans. It is also connected by cable lines with Malta, Cyprus, Crete, and Port Said. The city obtained a new and adequate water supply in 1906. The population was 332,246 in 1907. It consists chiefly of Mohammedans, with about 50,000 Europeans, mostly Greeks and Italians. Consult Sharpe, *Alexandrian Chronology* (London, 1857), and Kingsley, *Historical Lectures and Essays* (New York, 1889). See EGYPT.

ALEXANDRIA, ă'lĕks-ăn'drê-ȧ. The principal town of the district of the same name in the government of Kherson, Russia, situated at the confluence of the Berezovka and Ingulets rivers, 216 miles from the city of Kherson and about 950 miles from St. Petersburg. The principal occupations of its inhabitants are farming and cattle-raising, and much activity is displayed in its tanning, soap, and candle-making industries. Pop., 1885, 17,400; 1897, 14,000; 1910 (est.), 15,000.

AL'EXAN'DRIA. A villa and country-seat in Peterhof, one of the summer residences of the imperial family of Russia. Planned at the initiative of Alexander I, the noble structure was finished and the grounds laid out only in 1830, during the reign of Nicholas I.

ALEXANDRIA. A city in Madison Co., Ind., 50 miles northeast of Indianapolis, on the Cleveland, Cincinnati, Chicago and St. Louis, and Lake Erie and Western railroads (Map: Indiana, D 2). It has extensive manufactures of glass, paper, mineral wool, and wire fence. Situated in an agricultural region, Alexandria produces much fruit and grain, and many vegetables. The city operates its own water works and has a Carnegie library. Alexandria was first settled in 1834, and is governed under a legislative act of 1905, which provides for a city council of six members and places the mayor's term at four years. The city, once the centre of a natural gas belt, suffered a great loss of population and industrial prosperity with the failure of the gas supply. Pop., 1890, 715; 1900, 7221; 1910, 5096.

ALEXANDRIA. A city and the county-seat of Rapides parish, La., 193 miles northwest of New Orleans, on the Chicago, Rock Island, and Pacific, the Louisiana and Arkansas, the St. Louis, Iron Mountain, and Southern, Morgan's Louisiana and Texas, and the Texas and Pacific railroads; on the line of the Louisiana Railway and Navigation Company; and on the Red River (Map: Louisiana, C 2). It has fine government buildings, a public library, an Elks' Home, a country club, and an opera house. Alexandria is the seat of important commercial and manufacturing interests, principally in cotton, cottonseed oil and cake, sugar, molasses, and lumber. It also produces corn, rice, alfalfa, fruit, and vegetables. The city owns the Artesian water supply, the sewage system, and the electric light and power plant. Pop., 1890, 2861; 1900, 5648; 1910, 11,213; 1913 (est.), 15,000; 1920, 17,510. Alexandria occupies in part the site of an old Indian village. It was once a trading post of the French and Spanish and grew rapidly, being incorporated as a city in 1819. In 1864 the city was almost totally destroyed by fire. Its later development came with the building of the Texas and Pacific Railroad to this point in 1882.

ALEXANDRIA. A city and the county-seat of Douglas Co., Minn., 130 miles northwest of Minneapolis, on the Great Northern and the Minneapolis, St. Paul, and Sault Ste. Marie railroads (Map: Minnesota, C 5). It is admirably situated in a lake region popular as a summer resort and is the centre of a productive wheat-growing and stock-raising district. The manufactures include flour, furniture, wagons, sleighs, boats and launches, stove fixtures, cutlery, and beer, and the city also has a large cold storage plant, and owns the electric light and water works. Pop., 1890, 2118; 1900, 2681; 1910, 3001; 1913 (est.), 3200.

ALEXANDRIA. A city and port of entry in Virginia. It is on the Potomac River, about 6 miles below Washington, and on the Southern, the Pennsylvania, the Atlantic Coast Line, the Baltimore and Ohio, the Seaboard Air Line, and the Chesapeake and Ohio railroads (Map: Virginia, G 3). Alexandria is 100 miles from the mouth of the Potomac, but the stream which forms its harbor is a mile wide and is accessible to large vessels. The city is able, therefore, to control an extensive and increasing trade. It has several glass factories, machine shops, fertilizer factories, a brewery, a pump factory, a silk mill, tread mills, etc. Alexandria owns and operates its gas plant, and has a public library, a hospital, an Episcopalian Theological Seminary, and notably good schools. It was first incorporated in 1749 and is now governed by a charter of 1879, as revised in 1895. The mayor is elected for four years, and the city council is a bicameral body. The people elect all important officers, such as treasurer, auditor, tax collector, etc., the city council electing the others; the mayor has no power of appointment. At Alexandria, originally called Bellehaven, Braddock made his headquarters before marching against the French in 1755, and here, on April 13, the governors of New York, Massachusetts, Pennsylvania, Maryland, and Virginia met to form plans for the expedition. Alexandria lay within the territory ceded by Virginia to the United States in 1789, but was retroceded in 1846 and again became a part of Virginia in 1847. In 1814 the inhabitants, terrified by the approach of a British fleet, secured immunity from attack by paying the equivalent of about $100,000. During the Civil War Alexandria was occupied by Federal troops and was the capital of that part of Virginia which adhered to the Union and recognized Pierrepont as Governor. A Confederate monument, entitled "Appomattox," has been erected in the city, and the Marshall House, where Ellsworth was killed, still stands. Washington was one of the first vestrymen of Old Christ Church here. His pew and also that of General Lee are objects of great interest to visitors. Pop., 1890, 14,339; 1900, 14,528; 1910, 15,329; 1913 (est.), 16,000; 1920, 18,060. Consult *Celebration of the First Centennial of the Municipal Government of Alexandria* (Alexandria, 1880).

ALEXANDRIA BAY. A village in Jefferson Co., N. Y., on the St. Lawrence River, 30 miles north of Watertown, reached by trolley from Redwood, on the Rome, Watertown, and Ogdensburg Railroad. It is the principal resort among the Thousand Islands, which lie opposite and below the village in the St. Lawrence. The entire series of islands forms a grand natural, though, to an extent, also artificially improved, park. The water works are owned by the vil-

lage. Alexandria Bay was settled about 1830 and was incorporated first in 1879. It has a library, founded by Dr. J. G. Holland, and a motor boat factory. Pop., 1890, 1123; 1900, 1511; 1910, 1899; 1913 (est.), 2000.

AL'EXAN'DRIAN AGE. The best literature of ancient Greece, especially poetry, had been fostered by two forces, religion and political freedom. With the loss of political liberty in Greece under Macedonian domination, creative power declined also, and Athens ceased to occupy the preëminent position in literature which she had so long held. During the third century B.C. Alexandria became the centre of science and literature under the direction of the Ptolemies, who used their wealth to attract poets, scholars, and artists to their capital. The religion of Alexandria by this time was not Hellenic, but predominantly Oriental. Ptolemy Soter invited to his court the learned Peripatetic philosopher, Demetrius of Phalerum, under whose advice he laid the foundations of the later collections and libraries. His son, Ptolemy Philadelphus (285–247), however, by his large expenditures became the actual founder of the museum and the libraries; his successor, Ptolemy Euergetes (247–222), fostered especially mathematical and geographical investigations; and the succeeding rulers continued the support of learning in varying degrees. The centre of intellectual life was the library in connection with the museum. This was enriched in every possible way; the total number of books about 250 B.C. is put by Tzetzes (q.v.) at upward of 530,000. The museum had porticoes, lecture halls, and rooms in which scholars lived free of cost; some of the most eminent among these received large annuities from the royal purse. The school thus established resembled in many ways a university. The highest honor attainable was the position of librarian; this was held between 285 and 150 B.C. successively by Zenodotus, Callimachus, Eratosthenes, Apollonius, Aristophanes, and Aristarchus. The chief activity of these grammarians was directed to collecting and preserving what had come down from earlier ages, to establishing standard editions of authors and to the publication of explanatory comments on them. Lists of the best authors (Canons) were also drawn up, as of the five tragedians, the nine lyric poets, and the 10 orators. Intellectual curiosity and the cosmopolitan character of the population led to translation into Greek of works in the Semitic tongues; the so-called Septuagint version of the Old Testament was made under Ptolemy Philadelphus.

Creative poetic impulse was now nearly dead, although bucolic poetry, epigram, and elegy still show originality. Most of the poets, however, were imitators who depended on learning and art and not on genius; they studied closely the works of their predecessors, reproducing more or less closely their form, but for the most part lacking their inspiration. In poetry, then, as in other fields, the Alexandrian Age is marked primarily by reflection, research, and erudition. The most important names are those of Theocritus, Apollonius Rhodius, Callimachus, Aratus, Nicander, Euphorion, and Lycophron. At this time mathematics and astronomy also flourished; the most important names in this field in the pre-Christian period are the names of Euclid, Apollonius, Eratosthenes, Aristarchus, Hipparchus, and Hero, with whom must be reckoned also Archimedes, although his life was spent at Syracuse. Of the later scholars, Ptolemy (Claudius Ptolemæus) (second century A.D.) is famous for his geographical and astronomical works. In the field of pure and applied sciences the Alexandrian Age achieved much. Thus, Aristarchus measured the sun and the moon; Euclid wrote the first systematic treatise on geometry; Archimedes applied mathematics to hydrostatics; Apollonius of Perga wrote the first systematic treatise on conic sections; Eratosthenes worked out a calendar which was the basis of the Julian calendar; Hipparchus determined within six minutes the length of the solar year. Even after the fall of the Ptolemaic dynasty, the museum, libraries, and schools continued to make Alexandria a great intellectual centre for many centuries; the schools of philosophy in particular enjoyed great prosperity, but literary activity had by this time centred in Rome. Under Cæsar a large part of the collection of books was burned; but the loss was repaired in some measure by the removal of the Pergamene library to Alexandria and by acquisitions elsewhere. During the fourth century A.D. the city suffered severely from the struggles between Greeks and Christians, and finally Occidental learning ceased with the conquest by the Arabs in 641. See ALEXANDRIA.

Alexandrian Philosophy. The Alexandrian philosophy is characterized by a blending of the philosophies of the East and of the West, and by a general tendency to eclecticism, as it is called, or an endeavor to patch together, without really reconciling, conflicting systems of speculation, by bringing together what seemed preferable in each. Here belongs the work of Aristobulus (q.v.). The Alexandrian philosophers were, however, not without their sects; the most famous of these were the Neo-Platonists (q.v.). Uniting the religious notions of the East with Greek dialectics, they represent the struggle of ancient civilization with Christianity; and thus their system was not without influence on the form that Christian dogmas took in Egypt. The amalgamation of Eastern with Christian ideas gave rise to the system of the Gnostics (q.v.), which was elaborated chiefly in Alexandria.

On the museum and libraries, see ALEXANDRIAN LIBRARY; MUSEUM; PTOLEMY I; and consult: Ritschl, *Die alexandrinischen Bibliotheken* (Breslau, 1838) and Couat, "Le Musée d'Alexandrie," in *Annales de Bordeaux* (Paris, 1879); also, in general matters, Simon, *Histoire de l'école d'Alexandrie* (2d ed., Paris, 1845); Saint-Hilaire, *De l'école d'Alexandrie* (Paris, 1844–45), and Vacherot, *Histoire critique de l'école d'Alexandrie* (Paris, 1846–51); J. E. Sandys, *A History of Classical Scholarship* (New York, 1906–08); Susemihl, *Geschichte der griechischen Litteratur in der Alexandrinerzeit* (Leipzig, 1891–92); Baumgarten, *Die Hellenistisch-Römische Kultur* (Leipzig, 1893).

Alexandrian Art. The style of art inaugurated in the time of Alexander, centring in the city of Alexandria. It prevailed throughout the Græco-Oriental States up to the time of the Roman conquest, and even then continued to exercise great influence on the formation of Roman art. Its characteristics were: (1) Regularity of plan in laying out cities; (2) love of the colossal, exaggerated, and picturesque in architecture and sculpture; (3) invasion of the element of color and pictorial effect in all arts;

(4) love of the comic and the obscene; (5) rise of portraiture and *genre*. The old Hellenic poise had departed, and the art was one of extremes; it sought its models in every-day life and did not care for types of gods or men. The art of Pompeii shows how this art permeated Roman civilization at the beginning of the Empire. Consult: G. Schreiber, *Die hellenistischen Reliefbilder* (Leipzig, 1894); Collignon, *Histoire de la sculpture grecque* (Paris, 1892–97); Gardner, *Handbook of Greek Sculpture* (London, 1896–97); Mitchell, *A History of Ancient Sculpture* (New York, 1883); Woltmann and Woermann, *Geschichte der Malerei* (Eng. trans., New York, 1880); Mau-Kelsey, *Pompeii: Its Life and Art* (New York, 1902).

ALEXANDRIAN CO'DEX. See BIBLE.

ALEXANDRIAN LI'BRARY. The plan for this, the most famous collection of the ancient world, seems to have been formed by Ptolemy I, Soter (died 283 B.C.), perhaps at the suggestion of an Athenian, Demetrius of Phalerum. The development of this plan and the connection of the library with the museum was the work of Ptolemy II, Philadelphus, about 275 B.C., who collected books on a scale hitherto unknown and placed them at the disposal of the learned men gathered in the museum. (See ALEXANDRIAN AGE.) The management was intrusted to a series of scholars, whose labors led them to a careful study of Greek literary history and the classification of writers, with results of great importance for the transmission of classical texts to our own time. The first librarian was Zenodotus of Ephesus, under whom the poets were arranged. The first catalogue seems to have been the work of Callimachus, and included a classification of the authors, according to their principal themes, as historians, orators, etc. Under each author's name were given a brief biographical sketch, a list of his genuine and spurious works, the opening words of each work, a brief table of contents, and the number of lines occupied in the standard MSS. Variations in names or titles were carefully noted. In the time of Ptolemy Philadelphus, the number of rolls in the main library was 490,000 (often a roll contained more than one work), and in the annex, in the temple of Serapis, the Serapeum (q.v.), 42,800. At the time of Cæsar's visit, in 47 B.C., the number had risen to 700,000, of which a part was consumed in a great fire, which spread from the burning royal fleet, which Cæsar had fired to prevent its falling into the hands of the Egyptians. This loss was in part replaced by the library of Pergamus, which Antony gave to Cleopatra. In Roman times, however, the chief literary centre seems to have been the library in the Serapeum, which was destroyed when the Christians sacked the temple (390 A.D.). The fate of the rest of the library after the loss of its most valuable part is unknown, but it seems likely that much of it had been lost before the surrender of the city to the Arabs, perhaps in the time of Aurelian (272), when the larger part of the district in Alexandria in which the main library was situate was laid waste. The story of the destruction of the books by order of the Caliph Omar is now universally discredited, as resting on very unreliable sources. Consult: Ritschl, "Die Alexandrinischen Bibliotheken," in his *Opuscula Philologica*, vol. i (Leipzig, 1867); Susemihl, *Geschichte der griechischen Litteratur in der Alexandrinerzeit* (Leipzig, 1891–92); and J. E. Sandys, *A History of Classical Scholarship*, vol. i, pp. 107 ff. (New York, 1908). See ALEXANDRIA.

AL'EXAN'DRIANS, EPISTLE TO THE. See APOCRYPHA, *New Testament*.

ALEXANDRIAN SCHOOL. 1. A school of theology founded in Alexandria by Pantænus (180–203), taught by Clement of Alexandria and by Origen, and carried on until the end of the fourth century. It presented Christian truth as modified by philosophic speculation. It was well attended and very influential. Many of the great leaders of orthodoxy came from it, as Athanasius, Cyril, the two Gregories, and Basil. In biblical interpretation it stood for the allegorical method. Consult Kingsley, *Alexandria and her Schools* (London, 1854). 2. The term is also used for the general tendencies in literature, art, and philosophy which arose in Alexandria. This city was the meeting-place of East and West, and its influence was for a tolerant cosmopolitanism.

ALEXANDRINES, ăl'ĕg-zăn'drĭnz. Rhyming verses, consisting each of 12 syllables of six measures. The name is most probably derived from an old French poem on Alexander the Great, belonging to the twelfth or thirteenth century, in which this measure was used; according to others, it was so called from the name of the author of that poem. The Alexandrine became the regular epic, or heroic, verse of the French, among whom each line was divided in the middle into two hemistichs, the cesura, or pause, falling at the end of the sixth syllable. Though Corneille was usually very careful to observe this rule, French poets, from Racine on, have not hesitated to take the greatest liberties with it in order to avoid the monotonous regularity. In Victor Hugo's *La légende des siècles* the cesura may be found in almost any part of the line; and there are verses which have as many as two or three cesuras. Nor in English is this rule always observed, as in the following verse from Spenser:

> That all the woods shall answer, and their echo ring.

The only considerable English poem wholly written in Alexandrines is Drayton's *Polyolbion;* but the Spenserian stanza regularly ends in an Alexandrine, and the measure occurs occasionally in blank verse and in our common heroic verse, as the last verse of a couplet:

> When both are full, they feed our blest abode,
> Like those that watered once the paradise of God. — *Dryden.*

AL'EXAN'DRISTS. Those Renaissance followers of Aristotle who attached themselves with much zeal to the interpretation of Aristotle given by Alexander of Aphrodisias. They stood in bitter rivalry with the Averroists and the Thomists. The dispute concerned itself chiefly with the relation between the individual soul and the universal reason, and with the consequences of this relation for personal immortality. The Thomists, following Thomas Aquinas, held that Aristotle regarded reason as belonging to the individual soul; the Alexandrists maintained that Aristotle considered the individual soul as a merely animal and mortal function, which during the earthly life alone is rationalized by the informing power of universal reason; the Averroists held the intermediate view, viz., that the universal reason works upon the soul and makes it actual intelligence, and then incorporates this actual intelligence with its own eternal nature. Accordingly, the Thom-

ists believed in individual immortality, the Alexandrists in no individual immortality, and the Averroists in the immortality of what has been the individual, but has lost its individuality, to be taken up as a permanent element in the life of God. The leading Averroists were Nicoletto Vernias (died 1499), Alessandro Achillini (died 1518), and Agostino Nifo (1473–1546); the leading Alexandrists were Ermolao Barbaro (1454–93) and Pietro Pomponazzi (1462–1524), the leading Aristotelian of his time; among the Thomists of the Renaissance may be mentioned Francis Suarez (1548–1617). Consult Ueberweg-Heinze, *Grundriss der Geschichte der Philosophie* (Berlin, 1894–98; Eng. trans. by Morris, New York, 1871), and E. Renan, *Averroès et l'Averroïsme* (Paris, 1852).

AL'EXAN'DRITE. See CHRYSOBERYL.

ALEXANDROPOL, ä'lĕks-ăn-drō'pōl (*Alexander* + Gk. *πόλις, polis*, city), formerly GUMRI. A fortified town in Russian Armenia, 85 miles southwest of Tiflis, and 30 miles from Kars on the Arpa-Tschai (Map: Russia, F 6). It is the largest town in the Aras basin, and its importance as a strategic point commanding the entrance to Armenia was recognized by the Russians, who, in 1837, founded it as a stronghold. The fort is 300 feet above the town, which is nearly a mile above sea level, and is large and strong, capable of accommodating 10,000 soldiers. It has been the scene of several encounters between the Russians and the Turks. The chief industry of the town is the manufacture of silk. Pop., 1885, 22,600; 1897, 32,000.

ALEXANDROV, ä'lĕks-ăn'drof. A town in Russia in the government of Vladimir, on an affluent of the Kliasma, a branch of the Volga, 72 miles east of Moscow (Map: Russia, E 3). It was a favorite summer residence of the Czar Ivan the Terrible, who introduced here in the sixteenth century the first printing-press used in Russia. There is here a magnificent imperial stud, established by the Empress Elizabeth in 1761 and completed about 20 years after. The town is noteworthy for its convent, in the burial grounds of which are kept the remains of two sisters of Peter the Great. Steel and cotton manufactures are prominent industries. Pop., 1885, 6700; 1897, 6848.

ALEXANDROVSK, ä'lĕks-ăn'drofsk. A fortified town in the south of Russia, in the government of Ekaterinoslav, on the left bank of the Dnieper, below the cataracts, about 80 miles by rail south of Ekaterinoslav (Map: Russia, E 5). Inland productions are shipped here for the Black Sea, and it is known for its storing facilities, but it has no considerable industries of its own. In the vicinity there are many hillocks, or mounds, which are in all probability the graves of the great chiefs of the ancient Scythians. Opposite the town is the Khortista Island, the chief seat of the famous Zaporogian Cossacks in the seventeenth century. Pop., 1885, 6700; 1897, 16,393.

ALEXANDROVSK-GRUSHEVSKI, grōō-shĕf'skê. A town in the territory of the Don Cossacks, Russia, situated on the river Grushevka, about 20 miles from Novo-Tcherkask. It is well known for the rich coal mines in its vicinity, notably along the banks of the Grushevka. The anthracite coal of these deposits is of remarkable purity, containing as much as 94 per cent of carbon, the highest percentage found anywhere. The discovery of coal in this region dates as far back as the latter part of the eighteenth century, but exploitation of the mines was not commenced until 1839. The yearly output of the mines averages over half a million tons. Pop., 1910, 45,536.

ALEXEI, ä'lĕk-sā', ALEXANDROVITCH (1850–1908). A Russian Grand Duke, fourth son of Alexander II, and uncle of Nicholas II, born Jan. 14, 1850. In 1872 he traveled through the United States. He was Commander-in-Chief of the fleet during the Russo-Japanese War, but the disasters which befell the naval forces of Russia in the course of the war followed by the repeated mutinies of the sailors in the Black Sea and the Baltic revealed the deplorable condition to which mismanagement and corruption had reduced the naval strength of the Empire and led to his resignation in the latter part of 1905.

ALEXEI MIKHAILOVITCH, mê-kī'lô-vĕch (1629–76). Russian Czar, second of the Romanoffs. He succeeded his father, Michael Feodorovitch, in 1645. Owing to his inexperience and youth, the early part of his reign was a stormy one, but in 10 years he had quelled all insurrectionary feeling and was prepared for foreign conquests. In his two campaigns against the Poles (1654–56 and 1660–67), he took Smolensk, overran and devastated almost the whole of Lithuania, and even secured for himself the possession of several provinces. He also gained a part of the Ukraine; and though his war with Sweden (1656–58) was unfortunate, he lost nothing by the following peace. His reign was also marked by great extension of Russian influence eastward, many freebooting raids of the Cossacks over the central Asiatic steppes, and an actual attack on China via the direction of the Amur River. Alexei conferred great benefits on his countrymen by the introduction of various important reforms into the Russian laws; he ordered translations of numerous scientific works, chiefly of a military nature, and even ventured on some ecclesiastical changes. In his private character he was amiable, temperate, and pious. By his second wife, the beautiful Natalia Naryshkin, he was the father of Peter the Great.

ALEXEI PETROVITCH, pĕ-trō'vĕch (1690–1718). The eldest son of Peter the Great of Russia. He was born at Moscow. Because he had shown himself opposed to the reforms and innovations made by the Emperor, Peter threatened to exclude him from the succession to the throne. With this prospect he appeared to be satisfied and declared his intention of spending the remainder of his days in a monastery. But when Peter the Great undertook his second tour in western Europe, Alexei, under the pretense of following the Czar, escaped in 1717 to Vienna and thence went to Naples. He was induced to return to Russia, where, by the ukase of Feb. 14, 1718, he was disinherited, and an investigation was ordered, for the purpose of detecting persons concerned in his flight. A widespread conspiracy to undo all of Peter's reforms was discovered. Eudoxia, the mother of Alexei, Maria Alexeyevna, step-sister of the Czar, and several other personages were made prisoners and either executed or otherwise punished. Alexei was condemned to death, but soon afterward received a pardon. The terror and agitation of the trial, however, and the actual torture to which he was subjected, led to his death in 1718. The Czar, to avoid scandal, ordered the proceedings at the trial to be published. Other

accounts assert that Alexei was beheaded in prison. By his wife, Charlotte Christine Sophie, of Brunswick-Wolfenbüttel, Alexei left a son, who, as Peter II, was elevated to the throne in 1727. Consult Bain, *The First Romanovs* (London, 1905).

ALEX'IANS. See ALEXIUS.

ALEX'IS. In *The Faithful Shepherdess* (q.v.), by John Fletcher, the name of a shepherd. The name is taken from Vergil's second Eclogue.

ALEXIS, or **ALEX'IUS I, COMNE'NUS** (1048–1118) (Gk. Ἀλέξιος Κόμνηνος, *Alexios Komnēnos*). One of the ablest rulers of the Byzantine Empire. He was born at Constantinople, the son of John Comnenus, brother of the Emperor Isaac Comnenus. In his youth Alexis gave brilliant promise of the vigorous military genius which he afterward manifested, and at length, after some anarchic reigns of brief duration, his soldiers succeeded in elevating him to the throne, while the old and feeble Nicephorus Botaniates, his predecessor, was obliged to retire to a monastery (1081). Gibbon graphically summarizes the position and achievements of Alexis in the forty-eighth chapter of his *Decline and Fall of the Roman Empire*. Everywhere he was encompassed with foes. The Scythians and Turks were pouring down from the north and northeast, the fierce Normans, who had violently effected a lodgment in Italy and Sicily, were menacing his western provinces; and, finally, the myriad warriors of the first crusade burst into his Empire on their way to Palestine, and encamped around the gates of his capital. Yet he contrived to avoid all perils and disgraces by the wisdom of his policy, the mingled patience and promptitude of his character, and his discipline in the camp. He reigned for 37 years, and if it had been possible to preserve the Byzantine Empire in its integrity, a ruler like Alexis might have done it.

Undoubtedly the great interest which attaches to Alexis arises from his relations to the crusaders. Historians differ as to the purity and sincerity of his conduct toward them. His daughter Anna (q.v.), who wrote his life, defends his "policy" with filial piety; but it is clear that he entertained a profound dread and suspicion of the half-civilized Franks and, knowing the weakness of his own Empire, was compelled to dissimulate. He promised them help and persuaded them to go off into Asia; but when they did not keep their agreements, he did not fulfill his promises, and simply used them as his instruments to reconquer from the Turks the islands and coasts of Asia Minor. Perhaps, however, little apology is needed for a monarch who "subdued the envy of his equals, restored the laws of public and private order, caused the arts of wealth and science to be cultivated, and transmitted the sceptre to his children of the third and fourth generations." In addition to Gibbon, consult Chalandon, *Essai sur le règne d'Alexis Ier Comnène* (Paris, 1900).

ALEXIS, or ALEXIUS II, COMNENUS (c.1168–83). Emperor of Constantinople. He succeeded his father, Manuel I, about 1180, and was deposed and strangled by his uncle, Andronicus (1183).

ALEXIS III, ANGELUS (?–1210). Brother of Isaac Angelus, Emperor of Constantinople, whose throne he usurped in 1195. In 1203 his capital was besieged and taken by the Venetians and an army of French crusaders, who reinstated Isaac II. On the capture of the city Alexis III fled, and died a few years afterward in exile.

ALEXIS IV, ANGELUS (?–1204). Byzantine Emperor in 1203–04, son of Isaac II (Angelus). After the flight of his uncle, Alexis III, he was associated with his father in the government. After reigning only a few months, however, he was deposed and put to death by Alexis V.

ALEXIS V, surnamed DUKAS MURTZUPHLOS (?–1204). Byzantine Emperor in 1204. After the murder of Alexis IV (1204), he usurped the throne, but at the end of a few weeks was deposed by the crusaders, who had resolved on a partition of the Empire of the East. He fled to the Morea, where he was seized by the Latins, tried for the murder of Alexis IV, and cast from the top of Theodosius's Pillar. Consult Pears, *Fall of Constantinople* (New York, 1886), and Oman, *Byzantine Empire* (New York, 1912).

ALEXIS, or **ALEXIUS, COMNENUS** (c. 1180–1222). A grandson of Andronicus I. When Constantinople was captured by the crusaders in 1204, Alexis, taking advantage of the situation, captured Trebizond and some other cities on the Black Sea. He took the title of Grand Komnenos, and became Governor or Duke of Trebizond. His family reigned there for over two centuries and a half. His grandson assumed the title of Emperor. See Gibbon, *Decline and Fall*, edited by Bury, vol. vi (London, 1898).

ALEX'IS (Gk. Ἄλεξις) OF THURII. A Greek comic poet of the third century B.C. He was born at Thurii, in Magna Græcia, and was, according to Suidas (q.v.), uncle and instructor of Menander. He wrote at Athens, where, according to Plutarch, at the age of 106, he died on the stage while being crowned as victor. Suidas assigns to him 245 comedies, of which we know 130 by name; the extant fragments exhibit elegance and wit. His delineations of the parasite were skillful. He was much admired by the Romans. See the edition by Hirschig (1840) and that of Meineke, in his *Fragmenta Comicorum Graecorum*, vols. i and iii. Consult M. Rösler, *Die Fassungen der Alexius-legende, mit besonderer Berücksichtigung der mittelenglischen versionen* (Vienna and Leipzig, 1905).

ALEXIS, WILLIBALD (1798–1871). The assumed name of Wilhelm Häring, the founder of the German historical novel. Born at Breslau, June 29, 1798, he removed to Berlin, where he began a gymnasium course, but left to take part in the French campaign of 1815, returned to study law and history at the universities of Breslau and Berlin, and then after a few years as a law court official he turned to editorial duties (later on the staff of the *Vossische Zeitung*) and other literary work and to business enterprises. In 1851 he removed to Arnstadt, where after a long illness he died, Dec. 16, 1871. His wife was an Englishwoman.

His works are varied and voluminous: poems, stories, sketches, reviews, editorials, dramas, novels, tales of crime, and translations, among others Walter Scott's "Lady of the Lake," but his fame rests upon his historical novels under the influence of this English author. His first two, *Wallador* (3 vols., 1823–24) and *Schloss Avalon* (3 vols., 1827) passed for a long time as Scott's work. They were translated into English and several other languages. His best novels, based mostly upon the history of Brandenburg and Prussia, are *Cabanis* (6 vols., 1832), *Roland von Berlin* (3 vols., 1840), *Die Hosen des Herrn von Bredow* (5 vols., 1846–48), and *Ruhe ist die erste Bürgerpflicht* (5 vols., 1852). Collected works publ. 1874 in 20 vols.

He was influenced first by Ludwig Tieck and then by Scott. Although occasionally encumbered with too much mere historical detail, his best works are marked by accurate descriptions especially of North German scenery, lifelike pictures of people and times, bright touches of genuine humor, and a strongly patriotic tone. They are now, however, considered too long. His poems and dramas are inferior.

ALEXISBAD, ä-lĕk'sĕs-bät'. A watering place in the duchy of Anhalt, Germany, with an altitude of about 1000 feet. It has two kinds of springs. The Selke spring is used for bathing and contains chloride and sulphate of iron, while the Alexis spring contains carbonic acid and is used for drinking purposes. Alexisbad was established as a watering place by the Duke of Anhalt-Bernburg in 1810.

ALEX'IUS. A Roman saint of the fifth century, patron of the society of Alexians or Cellites. He is said to have been a Roman Senator, but gave up the world for a life of poverty and celibacy. His relics are said to have accomplished marvelous cures. Alexius is honored in the calendars of the Latins, Greeks, Syrians, Maronites, and Armenians. His festival occurs on July 17. He was a favorite subject among the poets of the Middle-High-German period. Consult: Massmann, *Sankt Alexius Leben* (Quedlinburg, 1843); Paris and Pannier, *La vie de Saint Alexis* (1872); Blau, *Zur Alexislegende*, in the *Germania*, vol. xxxiii (1888), and A. Amiaud, *La légende syriaque de Saint Alexis* (1889).

ALEXIUS. The name of several Byzantine kings. See ALEXIS.

ALEY, ā'lĭ, ROBERT JUDSON (1863—). An American scientist and educator, born at Coal City, Ind. He attended Valparaiso College from 1879 to 1882, graduated from Indiana University in 1888, and took post-graduate studies at Leland Stanford, Jr., University and the University of Pennsylvania, receiving the Ph.D. degree from Pennsylvania in 1897. Having had experience in teaching mathematics in normal schools and colleges prior to and during his university studies, he was appointed professor of this subject at Indiana University in 1891. This position he resigned, after 18 years of service, to become State Superintendent of Public Instruction (1909), and this in turn he gave up the next year when chosen president of the University of Maine. For many years he was mathematical editor of the *Inland Educator* and *Educator-Journal* and in 1903 became editor-in-chief of the latter publication. He was made a member of many American and foreign scientific societies. His published writings include *The Geometry of the Triangle* (1897); *Graphs* (1900); *The Essentials of Algebra* (1904) and *Supplementary Problems in Algebra*—both written in collaboration with D. A. Rothrock; *Story of Indiana and its People* (1912).

AL'FA. One of the varieties of esparto (q.v.), a plant which grows in North Africa. Its fibre is valuable for paper-making.

ALFAL'FA (Sp. from Ar. *al-façfaçah*, the best feed), also called LUCERNE. A leguminous plant, widely used, especially in Europe and in parts of North and South America, as a forage and hay crop for stock. The plant (*Medicago sativa*) is a native of the valleys of central western Asia. It has been cultivated in Europe for more than 2000 years, and was introduced into Mexico and South America at the time of the Spanish conquests. In 1854 it was brought from Chile to California, whence it spread rapidly over the semi-arid regions of the Pacific and Rocky Mountain States, where it is now extensively grown. Since then it has become an important crop in the irrigated regions of the West and is also cultivated in that section with only the natural rainfall. In the Eastern and Southern States the acreage in alfalfa has largely increased since 1900. In 1909 Kansas led in acreage and hay production, with 955,470 acres yielding 1,995,571 tons of hay. Nebraska, Colorado, and California ranked next in acreage that year, and Utah stood first in the production of alfalfa seed with 51,812 bushels.

Alfalfa is a long-lived herbaceous forage plant belonging to the clover family. It bears its small kidney-shaped seeds in spirally coiled pods with from two to three turns. The plant has an extensive root system, the taproot often being 15 or more feet long. It is adapted to a wide range of conditions, being grown from sea level to altitudes of over 7500 feet, in dry regions as well as those with copious rainfall, and in tropical climates as well as in sections having severe winters. Hardy strains, however, are required to succeed under climatic extremes.

The plant demands a deep, porous, and fertile soil, well drained, having an adequate lime content and quite free from weeds. It responds readily to soil treatment with barnyard manure, green manure, and commercial fertilizers. As alfalfa, like other leguminous crops, adds nitrogen to the soil through the nodule-forming bacteria of its roots, the commercial fertilizers used need not contain much nitrogen, but they should supply phosphoric acid and potash in liberal quantities. Where liming is required the application is best made the year before the crop is sown, a ton of unslaked lime per acre being usually sufficient. A clean soil is necessary to keep the tender young alfalfa plants from being crowded out by the weeds. The preceding crop should preferably be a fertilized hoed crop such as corn, cotton, potatoes, etc., or a green-manuring crop either turned under or harvested sufficiently early to admit of timely preparing the land for alfalfa. In preparing the seed bed the land should be plowed about 8 inches deep, put into the best of tilth, the upper 2 to 3 inches pulverized finely, and the soil allowed to settle. The plowing is done about six weeks before seeding, and the land is brought into condition by disking and harrowing. The seed is drilled or broadcasted in late summer or in the spring and covered deep enough to insure moisture for germination. From 15 to 30 pounds of seed are usually sown per acre, the quantity being governed by the type of soil and the moisture conditions. Alfalfa is sometimes sown with a nurse crop, but this is not generally recommended. The inoculation of the soil to insure the presence of the nodule-forming bacteria is effected by transferring soil from an alfalfa field producing the nodules abundantly on the roots of the plants or by treating the seed with pure cultures of the particular bacteria. Soil in which sweet clover or bur clover is growing can also be used. Where the culture of the crop is of long standing, the land is usually sufficiently inoculated. For hay alfalfa is cut when the plants are coming into bloom, and again from two to six times, according to the character of

the season. The annual yield of hay varies from three to six or more tons per acre.

Alfalfa is used as a soiling crop, as pasturage, and in the form of silage and hay, and is fed to dairy cows, beef cattle, sheep, hogs, horses, and poultry. It is also an excellent honey crop for bees. The green product has the following percentage composition: water, 71.8; protein, 4.8; ether extract, 1; nitrogen free extract, 12.3; crude fibre, 7.4; and ash, 2.7. When cured as hay, the average percentage composition is: water, 8.4; protein, 14.3; fat, 2.2; nitrogen free extract, 42.7; crude fibre, 25, and ash, 7.4. The different crops and cuttings do not vary greatly in composition. When alfalfa flowers begin to appear, the stalk constitutes about 50 or 60 per cent, and the leaves 40 or 50 per cent of the whole plant. At the usual time of cutting, alfalfa leaves contain one-third more of the total dry matter of the crop. The leaves contain from one-quarter to one-third as much crude fibre as the stalks, and from two to three times as much albuminoids. As shown by experiments with cattle, the following percentage amounts of the ingredients are usually digested: 60.7 per cent of the total organic matter, 72 per cent of the protein, and 69.2 per cent of the nitrogen free extract. Of the crude fibre of alfalfa hay, about 46 per cent is on an average digestible. Chemical analysis and digestion experiments show that alfalfa compares very favorably with red clover, both as green fodder and as hay. When fed as a soiling crop, it should be partially wilted or mixed with hay or straw. In dry regions of the West it is much used for pasturage, especially in the fall, but there is always more or less danger of its causing the cattle to bloat or of the plants being killed by too close pasturage.

Alfalfa Diseases and Enemies. The diseases generally attacking alfalfa affect either the roots or the stems and leaves. Of the root diseases, root-rot (*Ozonium omnivorum*) is most prevalent and destructive, destroying the stand completely as it spreads in almost perfect circles. Land infested with root-rot should be used for other crops than alfalfa for several years in order to get rid of the disease. Of the diseases attacking the leaves and stems the leaf spot (*Pseudopezia mediciaginis*) is the most common. It usually occurs on the leaves of the older plants and may be recognized by the minute brown spots of irregular shape on the green or discolored leaflets. Leaf-rust (*Uromyces trifolii*), powdery mildew (*Erysiphe trifolii*), downy mildew (*Peronospora trifolii*), and another leaf-spot disease (*Macrosporium sarcinæforme*) are also destructive, and the most effective remedy is to mow the crop as soon as these diseases appear to become troublesome. Anthracnose (*Colletotrichum trifolii*) is locally destructive. Alfalfa is also attacked by a parasitic flowering plant known as dodder (q.v.). Animal pests such as gophers, prairie dogs, and mice often cause considerable damage, and in parts of the Western United States an insect known as the alfalfa weevil is very injurious to the crop. In the semi-arid sections grasshoppers often are troublesome.

Bibliography. J. M. Westgate, "Alfalfa," *United States Department of Agriculture, Farmers' Bulletin 339* (Washington, 1908); H. D. Hughes, "Alfalfa Management in Iowa," *Iowa Experiment Station Bulletin 137* (Ames, Iowa, 1913); F. D. Coburn, *The Book of Alfalfa* (New York, 1906); J. E. Wing, *Alfalfa in America* (Chicago, 1910). See also ALKALI SOIL, *Bibliography*.

AL-FARABI. See FARABI.

ALFELD, äl'fĕlt. A town of Prussia, pleasantly situated in a mountainous district at the base of the Sieben Berge, a group of hills, on the Leine, 27 miles south of Hanover. Its industries include the manufacture of paper and farm machinery, and there are iron works. Pop., about 6000.

ALFIERI, ål-fyā'rē, CESARE, MARQUIS DI SOSTEGNO (1796–1869). An Italian diplomat and statesman, a kinsman of Vittorio Alfieri, the poet. He was born at Turin, Aug. 13, 1796, and, having early devoted himself to affairs of State, was successively Secretary of the Sardinian legations at Paris, The Hague, St. Petersburg, Berlin, and Florence. Returning to Turin in 1831, he was associated with Cavour. When the Reform Commission was appointed, Alfieri became its president, and accomplished much for the elevation of universities and for advanced study in general. He was for a very short time in 1848 Prime Minister, then Vice President of the Senate, and, from 1856 to 1860, its President. He died at Florence, April 16, 1869.

ALFIERI, VITTORIO, COUNT (1749–1803). The most important of the Italian dramatic poets, a younger contemporary of Metastasio and Goldoni, a man as unique in his personality as in his writings, and held in honor to-day by his countrymen less for the tragedies which first made him famous than as the reviver of a national spirit in modern Italy. The salient facts of his life are known mainly through his *Autobiography*, a work exceptional in its class for its frank sincerity and keen personal interest. He was born Jan. 17, 1749, at Asti, in Piedmont, which in those days was looked upon by the mass of Italians almost as alien territory. Of the misspent youth which he afterward so keenly regretted, eight years were passed in the Academy of Turin—years of "uneducation," he calls them. Eight years more were equally wasted in roving through France, England, and Holland, and in an idle and dissolute life in Turin. It was not until his twenty-sixth year and his fourth serious infatuation—this time for a certain Marchesa Turinetti di Prie—that he felt himself inspired with lofty aims, and especially with a desire to make a name for himself in the field of dramatic poetry. Under this inspiration he made his first dramatic essay, some scenes of a *Cleopatra*, resumed his serious studies, and removed to Florence in order to perfect himself in the correct Tuscan idiom, for his Italian at this time was scarcely better than his French. In Florence he first met the Countess of Albany, the unhappy wife of Charles Edward Stuart, and formed for her that life-long attachment which he defined as a "degno amore" and which has become historic. After her separation from her husband in 1780, Alfieri joined her for a time in Rome, and after the Pretender's death was seldom separated from her during the remainder of his own life. There is, however, no ground for believing that they were secretly married. For several years they lived in Paris, but narrowly escaped in the Reign of Terror and, being forced to flee, took refuge once more in Florence. Here Alfieri died, Oct. 8, 1803, and here, in the church of Santa Croce, the Countess caused a monument to be erected by Canova to his memory.

Besides his tragedies and autobiography, Alfieri's literary activity produced numerous son-

nets and odes, his *Misogallo*, a fierce denunciation of France, in mingled prose and verse, some unimportant prose writings, and six comedies, four of which, *L'Uno*, *I Pochi*, *I Troppi*, *L'Antidoto*, form a political tetralogy intended to show that the best government is that founded upon the will of the people. The series of tragedies began with *Cleopatra*, first produced at Turin in 1775 and continued until 1789. The most important are *Virginia*, *Agamennone*, *Oreste*, *Timoleone*, *Maria Stuarda*, and *Saul*, which is still regarded as his masterpiece. They are all obviously cast in one and the same mold, and that a narrow one; all classically correct, yet full of dignity and lofty sentiments. The principles which he laid down he rigidly followed. He did not permit himself to imitate or even to read Shakespeare; but adhered to the model of Greek and French tragedy, and followed to a large extent the classic unities. A tragic subject, in his opinion, was one which permitted a powerful excitation of good or evil passions; his own themes were regularly drawn from some stirring event of history or mythology. His highest aim was to unite "artistic truth with moral truth, beauty with morality." He wished the theatre to be "a school in which men might learn to be free, brave, and generous, inspired by true virtue, intolerant of violence, full of love for their country, with a true knowledge of their personal rights, and in all their passions enthusiastic, upright, and magnanimous." It was Matthew Arnold who summed up Alfieri as "a noble-minded, deeply interesting man, but a monotonous poet"; but his poetry was not found monotonous by his own or the following generation. What he did for tragedy was carried on by Monti, by Foscolo, by Pellico, and others. What he did for Italian unity is harder to measure. An entire generation of patriots was inspired by his *Virginia* and *Brutus* and *Timoleone*, and drew freely upon them for passages with which to inflame their hearers. His persistence in regarding himself primarily a native of Italy, and in speaking and writing in classic Tuscan, bore special fruit in his native Piedmont. In the words of his fellow-countryman, Gioberti, "the revival of civil order throughout the peninsula, the creation of a laic Italy, is due to Vittorio Alfieri, who, like a new Dante, was the true secularizer of the spirit of the Italian people and gave to it that strong impulse which still lives and bears fruit."

The complete edition of Alfieri's works is that published at Pisa (1805–15), in 22 volumes. The first edition of the tragedies is that of Siena (1783), containing only 10 tragedies. Good editions of selected tragedies are those edited by G. Falorsi (Florence, Barbera), Pisaneschi (Turin, Paravia), and Trevisan (Verona). For biographical and critical details, consult: *Autobiography*, translated by Lester (New York, 1845); Centofanti, *Tragedie e vita d'Alfieri* (Florence, 1842); Copping, *Alfieri and Goldoni: Their Lives and Adventures* (London, 1857); Howells, *Life of and Essays on Alfieri* (Boston, 1877); Antonini and Cognetti, *Vittorio Alfieri* (Turin, 1898); G. Carducci, *Primi Saggi* (Bologna, 1889); and E. Panzacchi, *Vita italiana nel settecento* (Milan, 1896); Dole, *Teacher of Dante and Other Studies in Italian Literature* (New York, 1908), and Holland, *Builders of Modern Italy* (New York, 1908). Available editions of the important *Vita* alone are those of London, 1807 (2 vols.), and Florence, 1822. See also the edition of the *Vita* annotated by Arturo Linaker, a second edition of which appeared at Florence, 1905.

ALFILARIA, ăl-fĭl'ā-rē'ā. See GERANIUM.

ALFINGER, ăl'fĭng-ĕr, AMBROSIUS (?–1532). A German soldier of fortune, who in 1528 became the agent of the Welser family of Augsburg, to finish for them the conquest of Venezuela; this being the condition under which they held title to the country from Castile. He led out a company of Germans, but his expedition to the neighborhood of Lake Maracaibo and to New Granada was notorious for its cruelties, and he was killed by an Indian.

AL'FIO'NA (Mex. Sp.). The largest of the California surf fishes. See SURF FISH.

ALFONSINE, ALPHONSINE TA'BLES. A revision of the planetary tables of Ptolemy made by the ablest Christian, Jewish, and Moorish astronomers in Spain for Alfonso X (the Learned) of Castile. The many imperfections of the Ptolemaic Tables, due to the erroneous values of the length of the year and of the precession of the equinoxes employed by Ptolemy, had become more and more manifest with the increasing accuracy of astronomical knowledge, and had rendered such a revision necessary. The work was begun in 1248 and was completed at the enormous cost of 400,000 ducats, it is said, in 1252, the year of Alfonso's accession to the throne. The tables were printed for the first time in 1483 in Venice. They were held in only moderate esteem by later astronomers, and Tycho Brahe is said to have deplored the waste of money involved in their compilation.

ALFON'SO I OF CASTILE and VI OF LEON, "the Valiant" (1030–1109). He was the son of Ferdinand the Great, King of Castile and Leon. Leon was given to him by his father; Sancho, the eldest son, received Castile; Garcia, youngest of the three, a part of Galicia and Portugal. Alfonso came to the throne in 1065. War soon broke out between the brothers, and in 1068 Sancho defeated Alfonso in a bloody battle on the Pisuerga. Three years later Alfonso defeated Sancho on the Carrión; but Sancho, reënforced, it is said, by the renowned Cid, Roderigo Diaz de Bivar, nearly annihilated the Leonese army, took Alfonso prisoner, compelled him to abdicate, and shut him up in a monastery. Alfonso escaped and sought shelter with the Moorish King of Toledo. Sancho took possession of Leon and immediately attacked Garcia, defeating and capturing him at Santarem. In 1072 Sancho was assassinated by a Castilian knight, and Alfonso, upon solemnly declaring himself innocent of the murder, was reinstated in his kingdom of Leon, to which was added Castile. His brother Garcia, King of Galicia, was preparing to attack him, but was treacherously invited to his court, made a prisoner, and died in confinement 10 years later. Alfonso now ruled over nearly all of his father's kingdom, and went to the assistance of the Moorish King, who had befriended him and whose kingdom was being invaded by Cordovans. Alfonso's gratitude ended with the death of the old King; he did not scruple to attack his son, and soon captured the city of Toledo, thus adding New Castile to his dominions. Alfonso was monarch of most of Christian Spain, when a powerful Almoravide army from Africa, with the assistance of the King of Seville, inflicted upon him a terrible defeat, in 1086, near Zalaca. He gradually regained strength, but in 1108 the Moors defeated

him and killed his only son. The next year Alfonso died and was succeeded by his daughter, Urraca, who became the wife of Alfonso I of Aragon. His illegitimate daughter, Theresa, married Henry of Burgundy, and gave birth to the first King of Portugal.

ALFONSO I OF NAPLES AND SICILY. See ALFONSO V OF ARAGON.

ALFONSO I (?–1134). King of Navarre and Aragon, who succeeded Pedro I in 1104. His marriage with Urraca, heiress of Alfonso VI, of Leon and Castile, brought that kingdom under his sway. Misunderstandings soon arose with Urraca, and a divorce was granted. Alfonso, however, continued to fight against Castile, thus prolonging the final strife with the Moors. He was called "emperor" and "fighter"; the latter name he won by his victories over the Moors. In 1114 he began the siege of Saragossa, which he captured four years later. In 1120 he slew 20,000 Moors on the field of Daroca. In 1123 he invaded Valencia and two years later he went to the aid of the Christian Moors in Andalusia. In 1130 he crossed the Pyrenees and captured Bordeaux and Bayonne. In 1133 he besieged Fraga on the Cinca. The contest was long and severe, bringing from Africa 10,000 Almoravides. Finally, however, the Christians were defeated. Alfonso died in 1134.

ALFONSO (Port. *Affonso*) **I** (1094–1185). King of Portugal, son of Henry of Burgundy, conqueror and Count of Portugal. His father died when he was about two years old, and the management of affairs fell into the hands of his ambitious and dissolute mother, Theresa of Castile, from whom he was compelled to take it by force on attaining his majority. He was forced into war with Castile, whose supremacy he did not recognize. He then attacked the Moors and won a brilliant victory on the plains of Ourique (1139), where, according to the legend, 200,000 Moors perished. From that day he took the title of king. He was crowned by the Archbishop of Braganza, and the coronation was sanctioned by the Pope in 1169. On Oct. 23, 1147, he took Lisbon, with the aid of some English crusaders under William Longsword, on their way to the Holy Land. The booty was so rich that most of the crusaders returned home. In 1158, after a two months' siege, he became master of Alcazar de Sal. He took by assault the fortress of Santarem from the Saracens, in 1171, and annihilated the garrison; at the same place he defeated the Almohade ruler, Jusef-ben-Jakub, in 1184. He invited to his land the Knights Templars and the Knights of St. John and established the Orders of Avis and of St. Michael. He died at Coimbra, Dec. 6, 1185. He is generally regarded as a saint by the Portuguese.

ALFONSO III, surnamed "the Great" (848–912). King of Leon, Asturias, and Galicia. He succeeded his father, Ordoño I, in 866, but had to maintain his rights by force of arms. From 870 to 901 he was at war with the Moors and gained many victories. In 888 Garcia, the son of Alfonso, raised the standard of revolt. Alfonso collected his forces, conquered his son, and threw him into prison. But Garcia's mother, with the help of several of the grandees, excited a new conspiracy, which resulted in the abdication of the monarch in favor of his imprisoned son, in 910. He died at Zamora in 912. Many fabulous stories are told of him, but little is known which would justify his legendary fame.

ALFONSO V (1385–1458). King of Aragon, Naples, and Sicily. He reigned from 1416 to 1458, receiving the surname "Magnanimous," because on his accession to the throne he destroyed a document containing the names of all the grandees who were hostile to him. He is renowned chiefly for having brought Southern Italy under the dominion of Aragon. In 1420 he attacked Corsica, but speedily hastened to Naples at the request of Queen Joanna II, who in return for his assistance against Louis of Anjou named him as her heir. For some time he enjoyed her highest favor; but in 1423, having thrown into prison her minion, Caracciolo, who was his enemy, the Queen declared for his rival, Louis. At her death, in 1435, Alfonso resolved to claim the kingdom; but René of Anjou, whom Joanna had appointed her successor after the death of Louis, opposed him. Rome and Genoa sided with René. The Genoese fleet inflicted a most serious defeat upon the Aragonese fleet, and Alfonso was captured. He was sent to the Duke of Milan, who set him at liberty and formed an alliance with him. After several battles Alfonso overthrew his adversary and entered Naples in triumph. Having once firmly established his power, he proceeded to suppress the disorders which had sprung up during the reign of Joanna. He died at Naples, June 27, 1458.

ALFONSO V (1432–81). King of Portugal, surnamed "the African," in honor of his victories over the Moors in Algiers. At his father's death, in 1438, there was a fierce struggle for the regency between the Queen Mother and the uncles of the King. Finally the Queen was defeated and his uncle Pedro became regent. In 1448 Alfonso assumed the government; in the following year he declared his uncle a rebel, and defeated him in battle. After a campaign in Africa, Alfonso undertook to seize upon Castile and Leon, but was defeated at Toro. Alfonso endeavored to get assistance from the King of France, but, finding that he was being deceived, he abdicated in favor of his son, Juan, in 1476. He was forced, however, to ascend the throne again. In 1479 he signed the treaty of Alcantara with Castile. In 1481 he died of the plague. He founded the Order of the Tower and Sword under the invocation of San Diego. In his reign the explorations of the Portuguese along the western coast of Africa were pushed beyond the equator.

ALFONSO VI OF LEON. See ALFONSO I OF CASTILE.

ALFONSO VI (1643–83). King of Portugal. Paralyzed at the age of three, and neglected by his mother, the Queen Regent, the Prince developed into a dissolute king. He drove his mother from the court, but was himself the victim of a plot between his wife and his handsome brother Dom Pedro. Alfonso was dethroned and imprisoned (1668), and Dom Pedro took his place as King of Portugal, and, after the death of Alfonso, as husband of his Queen.

ALFONSO X (1221–84). King of Leon and Castile, surnamed "the Astronomer," "the Philosopher," or "the Wise" (*El Sabio*). He succeeded his father, Ferdinand III, in 1252. As early as the storming of Seville, in 1248, he had given indications of his courageous spirit. But instead of wisely confining his efforts to the conquest of the Moors and the repression of the nobility, he lavished the resources of his kingdom in efforts to secure the imperial throne of Germany, to which he was elected in 1257.

Richard of Cornwall was chosen in opposition to him. Neither could succeed in securing recognition, and ultimately the imperial crown was placed upon the head of Rudolph of Hapsburg (1273). While Alfonso was striving for the crown of the Holy Roman Empire, his throne was threatened by the turbulence of the nobility, and at the same time he had to contend with the Moors. The latter, however, he defeated, in 1262, in a bloody battle. In 1270 an insurrection broke out in his dominions, at the head of which was his brother Philip. Later his son Sancho also rebelled and in 1282 deprived him of his throne. He now sought the help of the Moors, but after fruitless efforts to recover his power, he died at Seville, April 4, 1284. He was the most learned prince of his time and has acquired lasting fame through the completion of the code of laws called the *Siete Partidas*, which 200 years later became the law of the land. There are still extant several long poems of his, a work on chemistry, *El libro del tesoro*, translated later by Brunetto Latini (q.v.), and various translations of Arabic works. He labored much to revive knowledge, increasing both the privileges and professorships of the University of Salamanca. He sought to improve the Ptolemaic planetary tables, whose anomalies had struck observers even at that early time. For this purpose, in 1240, he assembled at Toledo upward of 50 of the most celebrated astronomers of that age. His improved tables, still known under the name of the Alfonsine Tables, were completed in 1252. See ALFONSINE TABLES.

ALFONSO XII (1857–85). King of Spain. The son of the deposed Queen Isabella II. He was born at Madrid and was proclaimed King Dec. 30, 1874. On Jan. 23, 1878, he married Princess Maria de las Mercedes (youngest daughter of the Duc de Montpensier), who died soon after. In 1879 he married Archduchess Maria Christina of Austria, by whom he had three children. Returning from an informal visit to Germany, 1883, he was publicly insulted in Paris, and war with France was for a few days thought probable. Alfonso's reign was, on the whole, commendable. His posthumous child, Alfonso XIII, succeeded him.

ALFONSO XIII (1886—). King of Spain. He was born May 17, 1886, the posthumous son of Alfonso XII and of Maria Christina, Archduchess of Austria, who was appointed regent during his minority. The early reign of the young king was marked by mutinies abroad, while at home dissatisfaction found expression in cabinet crises and military insurrections, labor riots, and anarchistic disturbances. The unfortunate war against the United States led to the practical annihilation of Spain's colonial empire. The King assumed personal charge of the government on attaining his sixteenth year (1902). His frank and courageous though somewhat impulsive nature gained him the affection of the nation. On May 31, 1906, he married Princess Ena, daughter of the late Prince Henry Maurice of Battenberg and Princess Beatrice, daughter of Queen Victoria. On their wedding day the royal pair narrowly escaped death in a bomb explosion, the work of anarchists, which killed a score of persons about the King. As a result of this attack several nihilists were brought to trial, among them a prominent educator, Francisco Ferrer. Ferrer was summarily executed, and the King and his government became the subject of much bitter criticism. He has, however, in general, proven himself a liberal monarch, supporting steadily an anti-clerical program, and insisting at times on exercising his royal power of pardon even at the cost of losing his ministry. Several other attempts to assassinate him were made, one on April 13, 1913.

ALFONSO MARIA DI LIGUORI, mȧ-rē'ȧ dȧ lē-gwō'rē. See LIGUORI.

ALFORD, ȧl'fẽrd, HENRY, D.D. (1810–71). An English biblical critic and poet. He was born in London, Oct. 7, 1810, and educated at Trinity College, Cambridge. He became Fellow of Trinity in 1834, Vicar of Wymeswold, a college living, in the diocese of Peterborough, 1835; minister of Quebec Chapel, Marylebone, London, 1853; Dean of Canterbury, 1857. He was very versatile, could play and sing, carve and paint. He wrote poetry and sermons. He was a literary critic and editor. But his reputation rests upon his edition of the Greek New Testament, in which for the first time the treasures of German linguistic and exegetical studies were introduced in comprehensive fashion to those unfamiliar with German. It was begun in 1845, and the fourth and last volume published in 1861. For the day it was a great service. He enabled the mere English reader to reap a great part of his harvest by his *New Testament for English Readers* (4 vols., London, 1868). Other of his writings have had much vogue, especially his poetry, *The School of the Heart, and Other Poems*, etc., which is characterized not so much by depth or originality as by freedom from affectation, obscurity, or bombast. Among his latest writings was *A Plea for the Queen's English* (6th ed., 1880), which excited considerable discussion. He also published several volumes of sermons. He died at Canterbury, Jan. 12, 1871. Consult *The Life of Dean Alford*, by his widow (London, 1873).

AL'FRED. A village in Allegany Co., N. Y., 12 miles southwest of Hornell, on the Erie Railroad (Map: New York, C 3). Alfred was settled in 1807 and was incorporated in 1887; it is known principally as the site of Alfred University (q.v.). The New York State School of Clay Working and Ceramics and a State School of Agriculture are also here. The village has a Carnegie library, a museum, and owns its water works. Pop., 1890, 786; 1900, 786; 1910, 759.

ALFRED, or **ÆLFRED**, THE GREAT (848–900). King of Wessex from 871 to 900. He was born at Wantage, in Berkshire, in 848. His father was Æthelwulf, King of the West Saxons. Alfred, the youngest of five sons, succeeded to the throne in 871, on the death of his brother Æthelred. His reign, which lasted nearly 30 years, is noteworthy, first, because of the wars with the Danish invaders; second, because of the interest which the King took in education. Before discussing his real achievements, however, it may be well to speak briefly of some things erroneously attributed to him. In the popular legends he has been regarded as the author of many reforms and institutions which were in no way due to him. His real and great merits have been overlooked because of the actions incorrectly credited to him. Except for the false statements in many secondary works, it would be unnecessary to say that he did not institute trial by jury and that he was not the founder of the University of Oxford. The picturesque tales of his hiding from the Danes, of

the burned cakes, and of his visit to the Danish camp disguised as a harper, are inventions of a later age.

Alfred became King in the midst of a Danish invasion. After several battles he was able to make peace with the enemy, probably by paying them money. In the following years there was peace, but in 876 the marauding expeditions began again, and by the beginning of 878 the Danes were successful almost everywhere and met with no general resistance. About Easter, 878, Alfred established himself at Athelney and gathered there all the forces that he could. Several weeks afterward he marched to Brixton, gathering troops as he went, and in the battle of Ethandun, probably Edington in Wiltshire, he defeated the Danes and captured their stronghold. The Danish King Guthrum was baptized, and the peace of Wedmore followed. There were some less important engagements in the following years, but on the whole, for the next 14 years Alfred was able to give his time to the internal affairs of his kingdom. In 892 (or 893) the Danes, who had been driven away by Arnulf (q.v.), King of Germany, made a descent upon England. For four years the warfare went on almost continuously, but at last the Danes were driven off—some to Northumbria, some to East Anglia, and others to the Continent. These Danish invasions had an important influence on the history of England. By crushing the individual kingdoms, they worked, unwittingly, for the unity of England. Alfred, by withstanding them successfully, made his kingdom the rallying point for all the Saxons and prepared the way for the eventual supremacy of his descendants.

Alfred was an enthusiastic scholar and a zealous patron of learning. When he came to the throne, as he himself wrote, he found little or no interest in education and few learned men. He invited to his court native and foreign scholars, of whom the best known are Asser and John Scotus Erigena. He labored himself, and encouraged others to labor, for the education of his people. The composition of the Anglo-Saxon *Chronicle* may have been due to his initiative. He himself translated works which he thought would be useful to his people, and instead of merely translating literally, he expanded or omitted portions in order to make the work more serviceable. His principal works were translations of the following: Boëthius, *Consolation of Philosophy;* Orosius, *History of the World;* and Gregory the Great, *Pastoral Care.* Of the last there is an excellent edition in the publications of the Early English Text Society. He is said to have translated, or to have had translated, the *Soliloquies of St. Augustine.* Alfred may have translated Bede's *Ecclesiastical History,* but there is much controversy concerning this, as the translation seems to be made into the Anglian dialect and not the West Saxon. If it was not the work of Alfred, it may have been made under his direction. See Miller, *The Old English Version of Bede's Ecclesiastical History,* Early English Text Society (London, 1890); Schipper, *König Alfreds Uebersetzung von Bedas Kirchengeschichte* (Leipzig, 1897).

His laws show no striking changes from the laws of earlier kings; in fact, he disclaimed originality and spoke of his work as mainly a compilation of existing laws. But they are marked by two characteristics which deserve notice: first, they are intensely religious; second, they make no distinction between English and Welsh, as the earlier laws had done.

Alfred died, Oct. 28, 900. (The date 901 given by the Anglo-Saxon sources seems to be wrong.) But the millenary of King Alfred was celebrated on Sept. 18, 1901, at Winchester, the former capital of the Anglo-Saxon kingdom. The commemorative exercises were participated in by many distinguished men from all English-speaking countries. On September 20, the day of the most important functions, all the delegates joined in a great procession and marched to the site where the colossal statue of Alfred, the work of Thornycroft, was unveiled, and the oration was delivered by Lord Rosebery.

In the United States the Society of American Authors encouraged the celebration of "the one thousandth anniversary of the founder of the Anglo-Saxon race." Exercises were held on October 28 in libraries and schools in various cities. The chief celebration was in New York City, where Alfred Bowker, the Mayor of Winchester, was the guest of honor.

Bibliography. The great contemporary sources of information for Alfred's life are Asser's *Life of Alfred* and the *Anglo-Saxon Chronicle.* Of each of these there are several editions in the original Latin; translations can be found in the Bohn Library; in Stevenson's *Church Historians of England,* and elsewhere. The genuineness of Asser's work has been the subject of much controversy, but most scholars now believe it to be a contemporary work, with some later interpolations.

Of secondary works Pauli's *König Alfred,* edited by Thomas Wright, is still deserving of mention. The constitutional events of the reign are described in Stubbs, *Constitutional History,* vol. i (Oxford, 1891). The millenary celebration caused the production of many books and articles. Of these the following may be mentioned: Plummer, *Life and Times of Alfred the Great* (Clarendon Press, 1902); Earle, *The Alfred Jewel* (Clarendon, 1901); Bowker, *Alfred the Great* (London, 1899), which contains seven special studies by Sir Walter Besant, Sir Frederick Pollock, Frederic Harrison, and others; Conybeare, *Alfred in the Chroniclers* (London, 1900); Draper, *Alfred the Great* (London, 1901); Harrison, *Writings of King Alfred* (New York, 1901); Hughes, *Alfred the Great,* new edition (London, 1901); Jeffery, *A Perfect Prince, The Story of the England of Alfred the Great* (London, 1901); Macfayden, *Alfred the West Saxon* (London, 1901); Wall, *Alfred the Great: His Abbeys of Hyde, Athelney, and Shaftesbury* (London, 1900); Snell, *Age of Alfred* (New York, 1912); Greswell, *Story of the Battle of Edington* (Taunton, England, 1910). Mr. Slade, of the Library of Congress, has prepared a bibliography of Alfred, which aims at completeness; consult also the bibliography in Wülker, *Grundris zur Geschichte der Angelsächsischen Litteratur,* pp. 386–451 (Leipzig, 1885).

ALFRED OF BEV'ERLEY (born c.1100). An old English chronicler, about whom little is known. He describes himself as treasurer and sacristan of the church of Beverley, in Yorkshire, where he wrote in Latin a chronicle history of Britain, from the fabulous period down to 1129, called the *Annales* (in nine books). It is mostly a compilation. An inferior MS. was printed by T. Hearne (1716).

ALFRED U'NIVER'SITY. A non-sectarian American university, at Alfred, N. Y., organized

as a school in 1836 and as a university in 1857. Its total endowment, including equipment, etc., is about $500,000. The library has 25,000 volumes. The campus covers 16 acres, containing 14 university buildings, including a new library building valued at $30,000, the gift of Andrew Carnegie. The university has collegiate, industrial mechanics, fine arts, music, theological and preparatory departments, a State school of clay working and ceramics, and a State school of agriculture. Instructors (1912) 42, students 447. President, Rev. B. C. Davis, Ph.D.

ALFRETON, ăl'fēr-ton. An old market town of Derbyshire, England, about 12 miles by rail north of Derby (Map: England, E 3). Its foundation is ascribed to Alfred the Great. It is a flourishing manufacturing town, and its industries include pottery works, collieries, and iron foundries. Pop., 1891, 15,400; 1901, 17,505; 1911, 19,049.

ALFURESE, ăl'fo͝o-rēz' *or* ăl'fo͝o-rēs', **ALFURU,** ăl-fo͝o'ro͝o, or **ALFORA,** ăl-fō'rȧ (Ar. *al,* the + Portug. *fora,* outside, thus probably meaning 'the outsiders'). In Celebes, the Moluccas, etc., a term applied to the tribes, of the interior especially, who seem to differ from the more or less prevalent Malay type, being perhaps pre-Malay aboriginals. The name can hardly have, however, any strict anthropological connotation. In Celebes the Alfurese are found chiefly in the north, in Gilolo in the central regions, while in Ceram they are the predominant race. The Alfurese of Celebes are probably not so different from the Malayans as has hitherto been believed, being a mixed race. The Alfurese of Gilolo were considered by Wallace the true aborigines of the island; and some of those of Ceram, etc., are of Papuan stock at bottom. There are, evidently, several kinds of Alfurese (the word has somewhat the sense of our "gentile," "pagan"), some Malays doubtless, others pre-Malay, still others of Papuan affinities. See CELEBES; MOLUCCAS.

ALGÆ, ăl'jē (Lat. nom. pl. of *alga,* 'seaweed'). A group of chlorophyll-bearing or colored Thallophytes. The Algæ are contrasted with the Fungi, which latter are devoid of chlorophyll. The presence of chlorophyll enables the Algæ to manufacture their own food; therefore they are independent plants. The Fungi, lacking chlorophyll, are dependent plants, obtaining their food as parasites or saprophytes. The Thallophytes (the lowest great division of the plant kingdom) include many organisms which cannot be referred to either Algæ or Fungi. There is an obvious relationship between the Algæ and the Fungi (q.v.), the latter probably having been derived from the former.

Classification. The Algæ are divided into three great groups, viz., Green Algæ (*Chlorophyceæ*), Brown Algæ (*Phæophyceæ*), and Red Algæ (*Rhodophyceæ*). Under the scientific names there will be found accounts of their general habits and most striking characteristics. From the names of these groups one might imagine that they are distinguished by color marks; but in reality fundamental morphological characters form the basis of the classification. Although it is convenient to think of the Algæ as distinguished by their color, there are many exceptions to the rule, and color should never be regarded as the foundation of the classification.

Chlorophyceæ. The Green Algæ usually contain no pigment in addition to chlorophyll. They include the simplest Algæ and are supposed to represent the group from which the higher plants have been derived. Usually six orders are referred to this group, but some of them are very artificial, and further knowledge will doubtless dispose of them differently. Nevertheless, this grouping is convenient and assists one in keeping the facts in mind. The most primitive order is called Volvocales and is characterized by its motile vegetative cells, which swim freely by means of cilia. So animal-like is their appearance that they are often regarded as animals and referred to the Flagellates (q.v.).

The most primitive of the Volvocales are single, isolated cells; but the higher Volvocales are characterized by colony formation, i.e., the association of cells (individuals) in a colony of definite form and structure. Colony formation reaches its extreme expression in Volvox, a globular colony comprising thousands of cells and visible to the naked eye. The cells of Volvocales under certain conditions produce swimming spores (*zoöspores*), which are really only small vegetative cells. Under other conditions sexual cells (*gametes*) are produced, which are really only very small zoöspores. These gametes pair and fuse, producing a single, thick-walled cell (fertilized egg), which is a protected cell and starts new generations at the beginning of the next growing season. Among the lower Volvocales the gametes are alike, so that there is no visible distinction of sex; but in the higher Volvocales the pairing gametes have become very much unlike in appearance and behavior, one of them being a large and passive cell (*egg*), the other a small and active cell (*sperm*). In this group, therefore, one can see the origin of sex (gametes from zoöspores) and the differentiation of sex (eggs and sperms). Under certain conditions the motile vegetative cells of the Volvocales lose their cilia and pass into a motionless condition. This temporary condition among Volvocales becomes the permanent condition in the second order of Green Algæ, the Protococcales.

The Protococcales also include one-celled forms, *Pleurococcus* (one of the green slimes) being the most common example, but differing from the simple Volvocales in being a motionless cell. It is very common on damp stones, on the north (moister) side of tree trunks, on flower pots in greenhouses, etc. Like the Volvocales, however, the Protococcales also tend to colony formation, the extreme expression of this tendency being *Hydrodictyon* (water-net), a remarkable colony, forming hollow nets sometimes a foot long. The simple *Pleurococcus* forms reproduce only by vegetative multiplication; i.e., the solitary cell divides to form two new cells or individuals. Among the higher Protococcales, however, swimming spores are formed and also gametes, but differentiation of sex is not attained.

The third order, Confervales, was probably derived from the simpler Protococcales and is regarded as the representative order of Green Algæ. It is also thought to be the genetic order, i.e., the order that has given rise to the higher plants. Its features in general are a filamentous body of many cells and an abundant formation of zoöspores. In the lower stretches of the order the body is a simple filament, but later it becomes a profusely branching filament, and in some cases a sheet of cells, as in Ulva, the sea-lettuce. The notable feature of the order, however, is the evolution of its sexual char-

acters. In *Ulothrix* there may be seen every gradation between zoöspores and gametes, so that it is obvious that gametes are simply very small zoöspores. This plant is much used, therefore, to illustrate the origin of sex. In *Œdogonium*, however, the gametes are differentiated into large eggs and small sperms. In both cases the gamete-producing cells are ordinary vegetative cells, which are transformed into sex organs by certain conditions. The most remarkable and suggestive form among the Confervales is *Coleochæte*, whose body is a sheet or mass of cells, and which represents a form from which the liverworts (Bryophytes) might have been derived. Not only does it produce eggs and sperms, but the fertilized egg, instead of producing a new *Coleochæte* plant, forms a small body containing spores (spore-case), and these spores produce the new *Coleochæte* plants. This is a suggestive appearance of the alternation of generations (q.v.) which characterizes the higher groups of plants.

The fourth order, Siphonales, was certainly derived from the Confervales, and is characterized by its cœnocytic body, i.e., a body in which there are no cross-walls, and which is therefore one continuous cavity. The connection with Confervales is indicated by the fact that some Confervales (as *Cladophora*) are incompletely cœnocytic, cross-walls occurring, but the cells containing many nuclei. When completely cœnocytic bodies are attained, they belong to Siphonales. This order is largely marine, and many marine forms display a very highly differentiated body. A very common fresh-water form is *Vaucheria*, and it is interesting in that the gamete-producing cells are differentiated from the vegetative body, so that the oogonium and the antheridium are not transformed vegetative cells.

The Conjugales form a fifth order of Green Algæ, and their relationship to the other orders is very doubtful. *Spirogyra* is the most common representative of the Conjugales, forming green, scummy growth on the stagnant water, and hence often called pond scum. The order is unique among Green Algæ in having no swimming cells, a remarkable fact in connection with an aquatic group. No spores are produced, and the pairing gametes are brought together usually through conjugating tubes. The order is remarkable also for the form of its chloroplasts, which in *Spirogyra* are green, spiral bands, and in *Zygnema* star-shaped bodies. The Desmids are also included among the Conjugales, although they are one-celled forms with a peculiar cell structure. The Diatoms show certain resemblances to the Desmids, but their position is very uncertain.

The Charales are usually included among Green Algæ as a sixth order, but it seems clear that such a grouping is artificial, based on the pigment character of the group and not on its structure. Charales, or "stoneworts," form dense growths on the bottom of ponds, and resemble profusely branching green stems. The stems and branches have definite nodes which produce whorls of branches. The sex organs, borne at the nodes of branches, are remarkably complex, especially the antheridium, which produces thousands of biciliate sperms of high organization. The structure of the working body and of the sex organs suggests a group intermediate between Thallophytes and Bryophytes.

A group of Thallophytes has long been known as the Blue-green Algæ (Cyanophyceæ), which are not at all related to the true Algæ. They are closely related to the Bacteria, and these two groups constitute the group Schizophytes ("fission plants"), very distinct from Algæ and Fungi. The Blue-green Algæ have been confused with the true Algæ simply because they contain a green pigment (possibly chlorophyll), in this case associated with a blue pigment, which together give a bluish-green tint. The structure of the one-celled body, however, is very different from that of the true Algæ. Instead of having such distinct cell organs as the nucleus and chloroplast, the cell structure appears almost homogeneous. The nuclear material is not organized into a definitely bounded nucleus, and the pigment is diffused through the general body rather than restricted to a definite chloroplast. The only method of reproduction is vegetative multiplication, a cell dividing to form two new cells, and the succession of divisions is so rapid that a single cell (individual) may give rise to thousands in a very short time. It is this very rapid succession of divisions that is referred to in the name "fission plants." The cells tend to form colonies, chiefly filamentous in form, common illustrations being *Nostoc* and *Oscillatoria*, the latter form receiving its name from the characteristic oscillating movement of the filaments. The cells are held together in colonies by the production of mucilage by the cell walls, which is so abundant in the case of *Nostoc*, that the plant occurs in nature as jelly-like lumps in which filamentous colonies are imbedded. *Nostoc* also shows a differentiation of the members of the colony, certain cells losing their contents, often enlarging, and serving as anchoring cells. By means of these cells (*heterocysts*) the colony is broken into living fragments, each fragment wriggling loose and developing another colony. This colony multiplication is distinct from cell (individual) multiplication. Blue-green Algæ endure conditions that would destroy other plants. For example, they live in great numbers in the boiling water of hot springs and geysers. This power of endurance is seen also in their near relatives, the Bacteria.

Phæophyceæ. The Brown Algæ constitute a very large and chiefly marine group, with forms ranging from simple filaments to the gigantic kelp or Devil's Apron (q.v.) and highly specialized rock weeds. This class also presents an excellent illustration of the principal stages in the evolution of sex. There are two divisions: one, whose reproductive cells, whether sexual or asexual, are swimming spores, and the other, whose reproductive cells are large eggs fertilized by swimming sperms. The motile reproductive cells of the group, whether sexless spores or gametes (sexual cells), are peculiar in being bean- or kidney-shaped, with the pair of cilia inserted laterally. There are a dozen or more orders in this group, the largest being the Ectocarpales, comprising some of the simplest filamentous forms; the Laminariales or kelps; and the Fucales, which include the rock weeds and *Sargassum*. In vegetative complexity some of the Fucales are probably the most advanced of all the Algæ. For illustration see PHÆOPHYCEÆ.

Rhodophyceæ. The Red Algæ are acknowledged to be the most beautiful of all the marine Algæ, because of the delicacy of their structure and brillancy of color. The vegetative structure is not so highly differentiated as in some of the

Brown Algæ, but the method of sexual reproduction is especially complex. The oogonium has a hair-like process ("trichogyne," q.v.) against which the sperms lodge. The contents of sperm are discharged into the trichogyne and pass into the body of the oogonium. The result is not a fertilized egg, but the oogonium (often fusing with adjacent cells to form a large chamber) buds out numerous branches that produce spores, and this whole spore-bearing structure usually becomes ensheathed by a jacket of cells. This spore-bearing structure, with or without a jacket, is the *cystocarp*, whose spores (*carpospores*) produce the new plants. The Red Algæ also develop asexual spores, which are nonmotile (as are the sperms), and since they are produced in a group of four in each sporangium, they are called *tetraspores*.

The presence of Algæ in reservoirs is often a source of much annoyance, if not a source of disease. Recent experiments have shown the possibility of speedily destroying these objectionable growths by treating the storage basin two or three times during the summer with copper sulphate in such amount as to give an extremely dilute solution. Fully 100 water supply reservoirs have been successfully treated without a single instance of injury being reported. Cress beds have been freed of *Spirogyra* by using 1 part of copper sulphate to 50,000,000 parts of water. For illustrations, see articles CHLOROPHYCEÆ; CYANOPHYCEÆ; PHÆOPHYCEÆ; RHODOPHYCEÆ.

For general description of Algæ, consult: Murray, *Introduction to the Study of Seaweeds* (London, 1895); Farlow, *Marine Algæ of New England* (Salem, 1881); Cooke, *British Fresh-Water Algæ* (London, 1881–83); id., Introduction to *Fresh-Water Algæ* (London, 1902); Wolle, *Fresh-Water Algæ of the United States*.

ALGARDI, ål-gär'dē, ALESSANDRO (1602–54). The most prominent Italian sculptor of the Baroque period after Bernini (q.v.); also an architect. He was born at Bologna, where he first studied painting under Lodovico Carracci, but afterward took up sculpture with Conventui. His early works were ivory carvings and models for small silver and bronze work executed at Mantua under the patronage of Duke Ferdinand, and afterward (from 1625) at Rome. For 15 years he was then principally employed in restoring antique statues. In 1640 he was made head of the Academy of St. Luke, and in the same year he received his first important public commission, the colossal marble group of "St. Philip Neri and the Angel" in Santa Maria in Vallicella (Rome). The following year he carved his well-known "Beheading of St. Paul" for the church of San Paolo, Bologna. Under Pope Innocent X he replaced Bernini as court sculptor. In this capacity he designed the statues and reliefs on the façade of the Villa Doria-Pamfili, in Rome, the stucco ceilings of the interior, and the magnificent garden, with its fountain and casino. In 1645 he designed the colossal bronze statue of Innocent X. Among his other portraits of this Pope is an excellent bust in the Metropolitan Museum of Art, New York. About 1749 he completed the colossal tomb of Pope Leo XI in St. Peter's, and the same year he designed the great fountains of the court of Pope Damasus in the Vatican. Most celebrated of all his works is the marble relief of the "Retreat of Attila from Rome" in St. Peter's (1450), the largest alto-rilievo in the world. Like other Baroque sculptors, Algardi conceived sculpture in the pictorial sense. His style was modeled upon Bernini's, but is more detailed in finish and dryer in textures. He excelled especially in portraiture. Though his works are of high technical ability, their effect is marred by a hollow pathos and exaggerated dramatic action. An architect of note, he designed the Villa Doria-Pamfili and the façade of Saint Ignazio in Rome.

AL'GAROʹBA. See MESQUITE TREE.

ALGAROTTI, ăl'gȧ-rōtʹtē, FRANCESCO, COUNT (1712–64). An Italian philosopher and art critic. He was born in Venice, studied at Rome and Bologna, and when 21 years old published in Paris his *Neutonianismo per le donne* ('The Newtonian Philosophy for Ladies'), a work on optics, on which his reputation was founded. Until 1739 he lived in France and for many years enjoyed the friendship of Voltaire. On his return from a journey to Russia he first met Frederick the Great, who bestowed upon him the title of Count and in 1747 made him Court Chamberlain. He also enjoyed the favor of Augustus III of Poland and lived alternately in Berlin and Dresden until his return to Italy in 1754. He died at Pisa, where Frederick the Great raised a monument to his memory in the Campo Santo. He was a versatile man and a voluminous writer. In his day he was considered a good judge of painting and architecture, and his reputation is confirmed by his *Saggi sopra le belle arti* ('Essays on the Fine Arts') and by the paintings he selected for the Dresden Gallery. His chief defect of style was the strong Gallic flavoring, due to a too faithful study of French literature. English readers are most likely to think of him as Carlyle's "young Venetian gentleman of elegance in dusky skin and very white linen." Algarotti's collected works appeared, with biography by D. Michelessi, Venice, 1791–94.

ALGAROVILLA, ăl'gȧ-rō-vēl'yȧ (Sp. *algarroba*, from Ar. *al-kharrubah*, the carob tree). An astringent product of *Pithecolobium parvifolium*, one of the Leguminosæ growing in tropical America, the pods of which are said to be four times as rich in tannin as the best oak bark. Black ink is made from it, also a yellow dye, and it is useful in medicine.

ALGARVE, ål-gärʹvå. The smallest and most southerly of the provinces of Portugal, situated between Alemtejo and the Atlantic Ocean (Map: Portugal, A 4). Its area is 1873 square miles. The northern part of the province is occupied by the Sierra de Monchique, a range of mountains with an average height of 4000 feet, which are a continuation of the Sierra Morena of Spain and terminate in Cape St. Vincent, the southwest extremity of Europe. The highest ridges are destitute of vegetation, and these mountainous regions are poorly adapted for agricultural purposes. From the main ridge the country slopes southward in jagged terraces and low hills, leaving a level tract of a few miles along the coast. The African heat of the climate is mitigated by the cool sea breeze. The only river of importance is the Guadiana, which is navigable and which separates Algarve from Spain in the east. The soil of the plain is indifferently suited for the production of grain, or even for pasturage; but it produces many kinds of southern fruit, including figs, almonds, olives, and grapes. The mineral wealth is considerable, but its exploita-

tion is insignificant. The principal occupations of the inhabitants are agriculture, cattle-raising, sea-faring, fishing, and the production of sea salt. Pop., 1900, 255,191; 1911, 274,122. The inhabitants have preserved many of the characteristics of the Moors. The chief town is Faro, with a population of about 12,000. In ancient times this province was much more extensive. It received its name from the Arabs, in whose language Algarve signifies 'a land lying to the west.' It belonged to the Moors until 1253, when Alfonso III united it to the crown of Portugal as a separate kingdom.

AL'GAZEL (*Al* is the Ar. article *the*). A gazelle; ordinarily the dorcas. See GAZELLE.

AL'GEBRA. A branch of pure mathematics that materially simplifies the solution of arithmetical problems especially through the use of equations. It also forms the introduction to all of the higher branches of mathematical science, except pure geometry.

The name is derived from the title of the Arabic work by Al-Khuwarizmi (q.v.), *Ilm al-jabr wa'l muqabalah*, meaning 'the science of redintegration and equation'; that is, the science that relates to the reduction of equations to integral form and to the transposition of terms. The title appeared thereafter in various forms, as *ludus algebræ almugrabalœque*, and *algiebar* and *almachabel*, but the abbreviation algebra was finally adopted. The science also went under various other names in the fifteenth and sixteenth centuries, as the *ars magna* (Cardan, 1545), the *arte maggiore*, the *regola de la cosa* (because the unknown quantity was denominated *cosa*, the 'thing'), and hence in early English the *cossike art*, and in German the *Coss*.

The exact limitations of algebra are not generally agreed upon by mathematicians, and hence various definitions have been proposed for the science. It has been proposed to limit it to the theory of equations, as the etymology of the word would suggest; but this has become a separate branch of mathematics. Perhaps the most satisfactory definition, especially as it brings out the distinction between algebra and arithmetic, is that of Comte: "Algebra is the calculus of functions, and arithmetic is the calculus of values." This distinction would include some arithmetic in ordinary school algebra (e.g., the study of surds), and some algebra in common arithmetic (e.g., the formula for square root).

The oldest known manuscript in which algebra is treated is that of Ahmes, the Egyptian scribe, who, about 1700 B.C., copied a treatise dating perhaps from 2500 B.C. In this appears the simple equation in the form, "Hau (literally heap), its seventh, its whole, it makes 19," which, put in modern symbols, means $\frac{x}{7} + x = 19$. In Euclid's *Elements* (about 300 B.C.) a knowledge of certain quadratic equations is shown. It was Diophantus of Alexandria (q.v.), however, who made the first attempt (fourth century A.D.) to work out the science. In the following century Aryabhatta (q.v.) made some contributions to the subject. Little was then done until about 800 A.D., when Al-Khuwarizmi wrote. His efforts were followed by another period of comparative repose, until the Italian algebraists of the sixteenth century undertook the solution of the cubic equation. (See EQUATION.) In this, building upon the efforts of Ferro and Tartaglia, Cardan was successful (1545), although there is reason to believe that the real honor belongs to Tartaglia. Soon after, Ferrari and Bombelli (1579) gave the solution of the biquadratic equation.

The principal improvements in the succeeding century related to symbolism. It took a long time, however, to pass from the radical sign of Chuquet (1484), R^4. 10 through various forms, as $\sqrt{\text{ii}}$ 10, to our common symbol $\sqrt[4]{10}$ and to the more refined $10^{\frac{1}{4}}$. Similarly it was only by slow steps that progress was made from Cardan's cubus p 6 rebus æqualis 20, for $x^3 + 6x = 20$, through Vieta's

$1C - 8Q + 16N$ *æqu.* 40, for $x^3 - 8x^2 + 16x = 40$

and Descartes'

$$x^2 \propto ax - bb, \text{ for } x^2 = ax - b^2,$$

and Hudde's

$$x \overline{\propto} qx. r, \text{ for } x^3 = qx + r$$

to the modern notation. To the Frenchman Vieta, whose first book on algebra, *In Artem Analyticam Isagoge*, appeared in 1591, credit is due for the introduction of the use of letters to represent known as well as unknown quantities.

The next step led to the recognition of the nature of the various number systems of algebra. The meaning of the negative number began to be really appreciated through the application of algebra to geometry by Descartes (1637), and the meaning of the so-called "imaginary," when Wessel (1797) published his memoir on complex numbers, or, more strictly, when Gauss (q.v.) brought the matter to the attention of mathematicians (1832).

The effort to solve the quintic equation, seriously begun in the sixteenth century, had met with failure. It was only after the opening of the nineteenth century that Abel, by the use of the theory of groups discovered by Galois, gave the first satisfactory proof of the fact, anticipated by Gauss and announced by Ruffini, that it is impossible to express the roots of a general equation as algebraic functions of the coefficients when the degree exceeds the fourth.

Among the later additions to the science of algebra may be mentioned the subjects of Determinants (q.v.), Complex Numbers (q.v.), Substitutions and Groups (q.v.), Forms and the modern treatment of Equations (q.v.), and Quaternions (q.v.). Under these heads may be found historical sketches dealing with the recent developments of algebra.

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AL'GEBRA'IC CURVE. See CURVE.

ALGEBRAIC FORMS. See FORMS.

ALGECIRAS, ăl'jê-sī'ras, *Sp. pron.* ăl'hâ-thē'râs (from Ar. *al-jazīrah*, the island, peninsula). A seaport of Spain, in the province of Cadiz, 6 miles west of Gibraltar (Map: Spain,

C 4). Its harbor is good and protected by a fort. It is a well-built city, with fine churches and monasteries. It maintains a brisk and profitable coasting trade, which consists chiefly of exports of leather, charcoal, cork, grain, stone, and spirits. Many of the inhabitants are engaged in fishing. Pop., 1900, 13,131; 1910, 15,818. This was the Pontus Novus of Roman times and later was the first place seized by the Moors from Africa (711). They called it Algeciras, the green island, from the islet at the harbor's mouth, still known as Isla Verde. Alfonso XI besieged it for 20 months and took it after his victory at Rio Salado, 1344. The Moors are said to have used gunpowder for the first time at this siege, at which all Christendom was represented by knights and crusaders. An international conference for the regulation of Moroccan affairs assembled at Algeciras in January, 1906. See MOROCCO.

AL'GER, HORATIO, 2D (1832–99). An American writer of juvenile literature. He was born at Revere, Mass., graduated at Harvard College in 1852, and afterward at the Harvard Divinity School. He became pastor of the Unitarian church at Brewster, Mass., in 1864; but two years later he went to New York, where he labored for the improvement of the condition of street boys. He wrote much for newspapers and periodicals and published about 70 books, of which nearly 800,000 copies have been sold. These writings include the popular Ragged Dick, Tattered Tom, and Luck and Pluck series. In 1879 he published *Grand'ther Baldwin's Thanksgiving, With Other Ballads and Poems.* A new edition of his *Works* was published in 1913.

ALGER, PHILIP ROUNSEVILLE (1859–1912). An American naval officer, born in Boston. He graduated from the United States Naval Academy in 1880 and subsequently served at sea and in the Navy Department at Washington until 1891. He was appointed professor of mathematics (on duty at Washington), and later, with the rank of captain, head of the department of mechanics at Annapolis. At the end of his period of service there, from 1899 to 1907, the department was discontinued. He was made a member of the special Naval Board of Ordnance, and Secretary-Treasurer of the United States Naval Institute. The Institute's *Proceedings* he edited after 1903. Besides articles on ordnance contributed to service journals, his published writings include *Exterior Ballistics* (1904), *Elastic Strength of Guns* (1906), and *War on the Sea* (1908).

ALGER, RUSSELL ALEXANDER (1836–1907). An American soldier and politician, born in Lafayette, Ohio. He studied law at Akron, Ohio, was admitted to the bar in 1859, and began practice at Cleveland. He removed to Michigan in January, 1860, and in September, 1861, enlisted in the Union army as a volunteer, serving successively as captain, major, and lieutenant-colonel, and being brevetted first as brigadier-general and then as major-general "for gallant and meritorious services." He returned to Michigan in 1864, where he amassed a large fortune in the lumber business. He took an active interest in both local and national politics, and was Governor of Michigan from 1885 to 1886. He became Commander-in-Chief of the G. A. R. in 1889, and in 1897 became Secretary of War in President McKinley's cabinet. His administration of the department during the Spanish-American War met with the most vigorous criticism. He was charged with being directly or indirectly responsible for the unsanitary condition of camps, the overcrowding and unfitness of transports, the insufficiency of physicians and medicines, the bad quality of food, and the incompetence of subordinate officers. An investigating committee, appointed by the President, in the main exonerated Alger. He resigned Aug. 1, 1899. In 1902 he was appointed to the United States Senate, and in 1903 was elected to that body. He wrote *The Spanish-American War* (New York, 1901). Consult *Memorial Addresses, 59th Congress* (Washington, 1907).

ALGER, WILLIAM ROUNSEVILLE (1822–1905). An American Unitarian clergyman and ethical writer, born at Freetown, Mass., Dec. 30, 1822. He graduated at the Harvard Divinity School in 1847, held pastorates successively at Roxbury, Boston, New York, Denver, Chicago, and Portland, Me., and afterward lived in Boston. He wrote *Poetry of the Orient* (1856), *History of the Doctrine of a Future Life,* which contains a comprehensive bibliography on the subject by Ezra Abbot (1863), *The Genius of Solitude* (1865), *Life of Edwin Forrest* (2 vols., 1878), *Symbolic History of the Cross* (1881), and *The School of Life* (1881).

ALGE'RIA (Ar. *Al-jazīrah,* the island; Fr. *Algérie*). A French colony in northern Africa, situated between lat. 30° and 37° N. and long. 2° 10′ W. and 8° 50′ E. (Map: Africa, E 1). It is about 550 miles long from east to west and extends inland from 320 to 380 miles. Algeria is divided into Algeria Proper, or the Northern Territories, and the Southern Territories. Their combined area is 222,119 square miles. Its boundaries are formed by the Mediterranean on the north, Morocco on the west, Sahara on the south, and Tunis on the east.

Physiography. The entire northern part is traversed by a section of the Atlas Mountains, which cover the northern part of Africa from the Atlantic to the Gulf of Gabes. The mountain system of Algeria consists of two principal chains, running parallel to each other and connected by small ridges. The northern chain, called Little or Maritime Atlas, runs along the coast, in places very near the sea. Of its several ranges, the Jurjura, to the east of Algiers, rises to a height of about 7500 feet. The Great Atlas is situated south of the Little Atlas, and contains some of the highest peaks of Algeria, as Mount Shelia (about 7600 feet) in the Jebel Aures. These mountains present a steep wall toward the Sahara, but slope more gradually on their northern side, where they are covered with extensive forests. They are furrowed by deep and tortuous defiles. The Algerian Sahara is a rocky plateau, with an average elevation of about 1500 feet. Some geographers distinguish a third chain, the Sahara Border Range, situated between the Great Atlas and the Sahara Desert. The coast of Algeria is much broken, and forms numerous bays, the principal among them being the Bay of Algiers and the gulfs of Bougie and Bona.

The surface of Algeria represents three natural divisions or zones. The first, known as the Tell, is the most northern part of the country extending inland for about 50 miles and taking in the northern slope of the Little Atlas. It is the most productive and best watered part of the country, and contains most of the European settlements. The second, central zone, in-

cludes the elevated steppes south of the Tell and the Great Atlas Mountains. It is interspersed with numerous saline lakes or *shotts*, which generally evaporate during the dry season, leaving a thick stratum of salt on the bottom. In this section there are only a few little streams, which dry up for a part of the year. The third zone is the Algerian Sahara, with an uncertain area estimated at upward of 100,000 square miles. It is subdivided into three parts, called Fiafi, Kifar, and Falat, respectively. The first term is generally applied to the oases of the desert. They are mostly well watered and covered with vegetation and contain numerous thriving villages and settlements. The second refers to those parts of the desert which are covered with grass part of the year. They have no settled population, but are visited by the nomadic tribes on account of the grass. The third part includes the rest of the desert, which is utterly devoid of vegetation and unfit for human habitation. A remarkable feature of the Algerian Sahara is the dried-up river courses. At present, only two such courses are known, called the Wady Igharghar and Wady Miya, respectively. The first begins south of Algerian Sahara near N. lat. 26° and runs due north, terminating at the Shott Melrir. Its length is over 700 miles, and its breadth, even at present, is about 4 miles in some parts. The Wady Miya is a branch of Igharghar, which it joins about 60 miles south of Shott Melrir. There is still some water running beneath its bottom.

Algeria is rich in minerals. Among the metals which are obtained are iron, lead, copper, and quicksilver. Sulphur and petroleum are found, and there are valuable deposits of phosphates. Salt is a most important product. Onyx and beautiful white and red marbles are quarried.

The most important river is the Sheliff, which has in the main a westerly course and empties into the Mediterranean near Mostaganem. Its length is about 400 miles. Among other streams are the Seybouse, which empties into the Gulf of Bona, the Wady el Kebir, which flows past Constantine, and the Tafna in the extreme west. None of these rivers is navigable, but they all contribute considerably to the fertility of the regions through which they flow.

The climate is generally healthful, except in the marshy lowlands. The rainy season on the coast lands lasts from October to March. The summer is hot and rainless, with the noted *sirocco*, or desert hot wind blowing at intervals.

The mountain forests are filled with cedars and different kinds of oak, as well as pines, ashes, junipers, aloes, dwarf palms, and cactuses, but they are rapidly disappearing, giving place to pastures. The flora of the central zone is confined mainly to grasses and some aromatic herbs. Myrtles, olives, pistachias, and dwarf palms are among the characteristic plants of the northern zone. The fauna of Algeria is generally African in its character. Lions were once common, but have now vanished. The smaller carnivorous animals, like jackals and hyenas, are numerous, and antelope, deer, and wild boars are found.

Products. Algeria is chiefly an agricultural country, and its importance is increasing. For 1910 the total agricultural population was returned as 3,738,413, of whom 212,625 were European, mostly French. The soil is generally extremely fertile, and the greater part of the area under cultivation is devoted to grain crops. The area under cultivation in 1910 was 3,512,635 hectares, of which 3,001,066 hectares were under cereals and 152,129 hectares under the vine. The total cereal production was 22,127,835 metric quintals, of which 9,763,372 were wheat, 10,361,277 barley, and 1,672,138 oats. The wine yield was 8,413,654 hectoliters. The cultivation of silk, olives, dates, and other fruits is also important, and is participated in to a considerable extent by Europeans. Potatoes, carrots, onions, and asparagus are the chief vegetables exported. Alfa grass is exported in large quantities to England. The forest area is estimated at about 2,800,000 hectares, of which over 70 per cent belongs to the State. The exploitation of the forests is considerably hindered by their inaccessibility. Much attention is given to mining, which is carried on chiefly by English firms. Among other industries are pottery, leather-dressing, weaving, and the production of esparto goods.

The commerce of Algeria is increasing. Imports, valued at 448,200,000 francs in 1907, amounted to 511,967,000 francs in 1910; while exports advanced from 338,500,000 to 513,267,000. In the latter year the imports from France amounted to 437,896,000 francs, and the exports thereto 410,367,000. After France the countries of greatest trade importance are Great Britain, Morocco, Germany, Belgium, and Spain. Imports consist chiefly of textiles, clothing, furniture, machinery, coffee, tobacco, timber, and coal. The leading exports are wine (207,698 francs in 1911), cereals (80,492,000), live stock (34,193,000), fruits (15,902,000), iron ore (12,000,000), phosphates (10,977,000), tobacco (10,047,000), zinc, cork, vegetables, wool, hides, and alfa. The total length of the railway was 2049 miles at the beginning of 1912. Algeria has, besides, a good system of national roads and about 100 miles of tramway lines. Entered at Algerian ports in 1910, 5003 vessels of 5,691,063 tons; cleared, 5198 of 5,953,639 tons; about half of the shipping is French.

The administration of Algeria is vested in a governor-general, who is assisted by a council. Under the law of Dec. 2, 1902, the governor-generalship of Algeria was divided into two parts, Algeria proper, and the Southern Territories, with separate administrations and budgets but under one governor-general. The Southern Territories were constituted out of portions of Algeria and the Sahara. Algeria proper, or the Northern Territory, comprises 80,208 square miles, with a population (1911 census) of 5,069,522; the Southern Territories aggregate 141,911 square miles, with 494,306 inhabitants; total, area 222,119 square miles; pop., 5,563,828. The population in 1906 was 5,231,850. Est. pop., 1921, 5,365,000. All the laws for Algeria are framed by the French National Assembly. The three departments of Algiers, Oran, and Constantine, into which the Northern Territory is divided, have their own councils, which send delegates to the Superior Council, meeting once a year to discuss the budget. Each department sends one senator and two deputies to the National Assembly. Justice is administered by courts of first instance, of which there are 16, justices of the peace, commercial courts, and a Court of Appeals, situated at Algiers. Criminal justice is organized on the same basis as in France. For the transaction of affairs between the natives

and the Europeans or the government, there are organized so-called *Bureaux Arabes*, which also supervise the religious affairs of the natives. The military forces of Algeria number about 56,000 men, and consist of the Nineteenth Army Corps and the Territorial Army. The financial system of Algeria closely resembles that of France. The revenue is obtained from customs, monopolies, and direct taxes, the latter being the only tax paid by the natives. The budget of Algeria proper for 1912 showed estimated receipts of 145,167,014 francs and estimated expenditures of 145,155,971 francs; that of the Southern Territories 6,523,301 and 6,513,284. The military expenditure is borne by the French budget. By the law promulgated Dec. 19, 1900, Algeria was constituted a legal person, with power to own property, contract loans, grant railway franchises, award public contracts, etc.; and in the following year a decree transferred the customs department from the authorities at Paris to the governor-general. Education and religion are supported by the State. In 1910 there were 116 infant schools (with 24,889 pupils), 1443 primary schools (147,099), and 328 Mussulman primary schools. The Mussulmans have their own schools for secondary education. Lycées are found in the larger cities, and there are nine commercial schools in Algiers, as well as an institution for higher instruction, with several faculties. All religions represented were subsidized until the enactment of the Separation Law in 1905. The native population consists chiefly of Berbers (of whom the Kabyles are a part) and Arabs. The former constitute perhaps 75 per cent of the population and are the original inhabitants of the land. They have a higher standard of morality than the Arabs; they are Mussulmans, but do not practice polygamy. The Arabs are to a considerable extent intermixed with the Berbers. They inhabit chiefly the Tell region and the towns. Part of them are organized in tribes, under chiefs who are not recognized, however, by the French government. They are Mohammedan and practice polygamy. The nomadic part of the Arab population, among whom the tribal system is chiefly developed, hold land in common, each tribe being entitled to a certain territory by virtue of tradition. The non-indigenous population in 1906 numbered 680,263; of these 278,976 were French (exclusive of 170,444 naturalized French), 117,475 Spaniards, 64,645 Jews, 33,153 Italians. These figures do not include certain persons, as the military, counted apart and numbering 73,789. Negroes and Turks are found in only very small numbers. The capital, Algiers, had a population of 172,397 in 1911.

History. In ancient times the Numidians occupied eastern and the Moors (or Mauri) western Algeria. Under the Romans the former possessed the province of Numidia, the latter that of Mauretania Cæsariensis. Like all of northern Africa, these provinces enjoyed a high degree of prosperity and civilization under Roman sway, which was checked by the Vandal conquest about 440 A.D. The settlement of Arabic immigrants in the country after the Mohammedan conquest in the seventh and eighth centuries reared an Oriental civilization in place of that of Rome, and Arab princes ruled the land until the rise of the Almohades (q.v.), who governed until 1269, after which the country was split up into small states. After the expulsion of the Moors from Spain in 1492, they settled in Algeria, and began that career of piracy against the Christian nations which gave the country its evil reputation through many centuries. Hard pressed by Spain, one of the Algerine chiefs, the Emir of Metidja, called in the Turkish corsair Horuk, known as Barbarossa (q.v.), a renegade Greek, who turned against the Emir, and made himself Sultan of Algiers. He was overthrown by the Spaniards and beheaded in 1518; but his brother, Khair-ed-Din, also known to the Christians as Barbarossa, succeeded him, repulsed the Spaniards with the assistance of a Turkish army, and established a military despotism sustained by piracy, which lasted until the French conquest. Khair-ed-Din placed the country under the suzerainty of the Turkish Sultan. The Emperor Charles V, in 1541, led a great expedition against this daring corsair, but met with disaster. In 1600 the soldiery of Algiers obtained from the Turkish Sultan the privilege of setting up an officer, called the Dey, who was to share the authority with the Turkish Pasha. The history of Algiers in the sixteenth and seventeenth centuries is a part of the history of the Barbary pirates and of the fruitless efforts of the Christian powers to suppress them. Spanish, French, English, and Dutch were equally unsuccessful. Early in the eighteenth century the Dey Ali Baba effected the virtual emancipation of the country from the dominion of Constantinople. He banished the Turkish Pasha, who had heretofore represented the Sultan, persuaded the latter to leave the power solely in his hands, and paid no more tribute.

Algeria was now ruled by a military oligarchy, at the head of which stood the Dey, and after him the powerful Turkish militia, recruited from Constantinople and Smyrna. Besides these there was a divan or Council of State, chosen from the 60 principal civil functionaries. The internal history of the country henceforth presents nothing but a bloody series of seraglio revolutions caused by the Janissaries, who permitted few of the deys to die a natural death. Algeria continued to defy the greater Christian powers, and to enforce tribute from the lesser. A final Spanish attack, made on a formidable scale in 1775, was as unfortunate as those that had preceded. During the French Revolution and the time of the Empire, its aggressions were much diminished, in consequence of the presence of powerful fleets in the Mediterranean Sea; but at the close of the Napoleonic wars they were recommenced vigorously. The first substantial rebuke was administered by a small United States squadron, commanded by the younger Decatur, which defeated an Algerine squadron off Cartagena, June 20, 1815, and compelled the Dey to acknowledge the inviolability of the American flag. About the same time Admiral Lord Exmouth, with a strong English and Dutch fleet, bombarded the capital and compelled the Dey to conclude a treaty (1816), by which all Christian slaves were released without ransom, and a promise was given that both piracy and Christian slavery should cease forever. The pledges were not kept. As early as 1817 Algerine pirates ventured as far as the North Sea, and seized all ships in their course not belonging to any of the Powers that sent them tribute, as was done by Sweden, Denmark, Portugal, Naples, Tuscany, and Sar-

dinia. Treaties were of no avail. The Spanish, the Italian, and in particular the German shipping suffered severely. In 1817 the Dey Ali greatly curtailed the power of the Janissaries. His successor, Hussein, by his rash conduct brought on the conflict with France which broke the Moslem power in Algeria and made it a French province. In addition to the standing grievances against Algeria, there was a dispute regarding the payment of a debt incurred by the French government to two Jewish merchants of Algiers at the time of the expedition to Egypt. This matter had long been pending in the French courts, and as the Dey was a creditor of these Jews, he took a personal interest in the matter, and wrote to the King of France, who did not reply. At a reception of the consuls, he taxed the French consul with this, and when the latter replied that "a King of France could not condescend to correspond with a Dey of Algiers," Hussein angrily struck him.

This high crime against the dignity of nations brought the retribution which had not followed years of barbarous piracy. In 1830 the Dey and the Turks were expelled by a French fleet and a strong army under Bourmont, and the French conquest of Algeria began. The excesses of the French soldiers awoke the resentment of the native population, who regarded all restraints as removed when their Turkish masters were driven out. For 17 years the Arabs maintained a vigorous resistance to the French and after them the Kabyles, the native population of the original Berber stock, still continued the struggle in a desultory manner. The drastic measures of the French military government did not tend to pacify the people, whose antagonism was inflamed by race hatred and religious fanaticism. Bourmont was succeeded by Clausel, Berthezène, and the Duke of Rovigo, all of whom failed to master the situation. Abd-el-Kader, a young Arab emir of marked abilities and dauntless spirit, had meanwhile brought together and organized the scattered forces of rebellion and was secretly assisted by the Emperor of Morocco. A treaty was concluded with him during the provisional administration of General Voirol, and an attempt was made to promote the material interests of the country. Toward the end of 1834 there was an effort to organize the administration on a permanent civil basis, and Gen. Drouet d'Erlon was made Governor-General, but a renewed outbreak by Abd-el-Kader led to his recall and that of the military commandment. Clausel, now a Marshal, was sent back to the Regency in 1835, but had to be reënforced by Bugeaud, who made a peace with the Arab chieftain, May 20, 1837, by which Abd-el-Kader recognized the sovereignty of France, but received in return several valuable provinces. In February, 1837, Damrémont succeeded Clausel as Governor-General, and after the former's death, at the storming of Constantine, General Valée was appointed to the difficult post. In October, 1839, Abd-el-Kader violated his last treaty on an insignificant pretext, and a general attack was made upon the French positions. Bugeaud supplanted Valée in 1841, and began an inexorable and unscrupulous campaign against the Arabs with an army augmented to nearly 100,000 men. Abd-el-Kader kept up a determined fight against odds until December, 1847, when he surrendered to General Lamoricière. (See ABD-EL-KADER.) An irregular warfare against French authority was then taken up by the Kabyles, thwarting for many years all attempts to establish civil government.

From 1858 to 1860 the military government of Algeria was superseded by the institution of a special ministerial department for Algeria and the colonies, which was first of all intrusted to Prince Napoleon. In December, 1860, however, a military government was reinstituted, and Marshal Pélissier made Governor-General, with a Vice-Governor under him, a Director-General for civil affairs, and a council of thirty members. In 1863 the Emperor Napoleon announced that he was willing to give the colony a new constitution, with a chamber of representatives for provincial affairs; he also addressed a letter to the Governor-General, in which he explained that Algeria was no colony in the strict sense of the word, but an Arab kingdom, and that the natives had the same right to protection as the colonists. In 1864, however, strife again arose between the colonists and the Arabs; and it was only after several engagements, during the months of April and May, that peace was restored by the submission of the conquered tribes. Pélissier having died in May, 1864, Marshal MacMahon was appointed to succeed him. In the following year the Emperor himself made a journey to Algeria, and on March 5th issued a proclamation, in which, although explaining to the Arabs that the Regency must continue to be united to France, he promised to maintain their nationality and at the same time gave them assurance that they should always remain in undisturbed possession of their territories. Yet these and other measures for conciliating the Arabs were all in vain; for, shortly after the Emperor's return to France, insurrections broke out in the province of Oran and elsewhere. In 1867 and 1868 a severe and general famine checked the military enterprises of the Arabs: and there was peace till 1870, when, owing to the Franco-Prussian War, the Emperor found it necessary to withdraw to Europe the greater part of the forces in Africa. MacMahon's place was then taken by General Durieu, as interim Governor-General, and the natives began to entertain hopes of freeing themselves from the yoke of France. The last serious rebellion was suppressed in 1871. Since then, under the third republic, the industrial and political development of the country has been extremely rapid. A civil government was immediately established, which, changed and modified in 1891 and 1900, provides for the division of the colony into three departments, each sending to the French National Legislature one senator and two deputies. The local administration is conducted by a governor, assisted by a superior council, which is partly elective and partly nominated, and a democratic lower house, wholly elective. Difficult problems of land tenure and education have been manfully faced. The trade of Algeria has doubled; agriculture has been greatly diversified; the appropriation for schools more than quadrupled. Railroads have been built, and Algiers has developed into a beautiful city. The two latest problems which confront the colony both arose in 1912—the one relative to the opening of important coal mines, the other in regard to compulsory military service. Their settlement is still pending.

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ALGERINE WAR, ăl'jê-rēn'. See BARBARY POWERS, WARS WITH THE.

AL GHAZZALI. See GHAZZALI.

ALGHERO, ål-gā'rō, or **ALGHERI,** ål-gā'rê. An episcopal city on the north coast of Sardinia, 21 miles southwest of Sassari (Map: Italy, C 7), founded by Genoese in 1102, and settled by Catalonians in the fourteenth century, who contributed the dialect now spoken by the inhabitants. It is situated on a high, rocky shore, and the harbor is fortified. There are Spanish fortifications and towers in a fine state of preservation and a cathedral dating from 1510. The Casa Albis, where Charles V stayed when he was en route to Africa in 1541, is still pointed out to visitors. Interesting caverns are near the city, the most famous of which is the Grotto of Neptune. The surrounding country produces much fruit, oil, and wine, while coral and shell fish are taken from the sea. Calcium mines have been opened and preserve factories established. Pop., 1911, 11,860.

ALGIERS, ăl-jērz' (Ar. *Al-jazā'ir*, the islands, referring to an island in its bay; Fr. *Alger*, ål'zhā', *formerly* ål'zhâr'). The capital and chief seaport of Algeria, situated on the west shore of the Bay of Algiers, in lat. 36° 47' N., and long. 3° 4' E. (Map: Africa, E 1). It is located on the slope of the Sahel chain, the rich verdure of the mountains giving a beautiful background to the dazzling white of the city, which has the shape of a triangle, while over all towers the Moorish citadel or kasbah, over 400 feet above the sea. Algiers is divided into two parts. The lower part is the modern city, which has been built by the French and which differs in no respect from any well-appointed European city. It has wide and well-shaded streets, spacious squares with statues and parks, and five municipal buildings, mostly located in the Boulevard de la République. The city is lighted by gas, and the water is supplied by four aqueducts, built in the beginning of the seventeenth century. In strong contrast to the European Algiers is the old Moorish city, which rises above the former, and which, in all essentials, continues to be what it was during the reign of the Turkish deys. The streets are narrow and crooked and often impassable for vehicles. The whitewashed stone houses present bare walls to the street, but their interiors bear the marks of splendor and beauty characteristic of Moorish architecture. The roofs are flat, and in the evening become centres of gayety and are even used occasionally for social functions. An additional picturesqueness is given to the Moorish part of the town by the motley crowds in its streets, including the elegantly dressed Frenchman, the splendidly arrayed Moor, as well as the scantily clad native from the interior. The mosques are less numerous than they were before the French occupation, when their number was estimated at about 100. At present there are only four mosques used as regular places of worship, but there are numbers of tombs of saints or "kubas," which are also used occasionally for that purpose. The construction of the citadel or kasbah was begun in 1516; this building, the palace of the deys until the French conquest, was the scene of many attacks. At present it is used as barracks for the French soldiers, and many of its historical features have been entirely obliterated. The modern city has several splendid churches, including the Roman Catholic cathedral of St. Philippe. Of educational institutions the city has schools of law, medicine, science, and letters, several lycées for the natives as well as for Frenchmen, and a number of commercial colleges and higher Mussulman schools. There are also a library and museum, two theatres, and several scientific societies. The harbor is spacious and well fortified. The commerce is very extensive, and its shipping amounts to nearly 7,000,000 tons annually. The commerce is chiefly with France; but there is also considerable export trade with Great Britain and Spain. Algiers is also one of the most important coaling stations on the Mediterranean. Owing to its mild climate and the fertile as well as picturesque country in which it is situated, the city has become a favorite health resort, and its transient population is steadily increasing. It is connected by rail with Oran and Constantine and communicates with France by steamer and cable. Since the French occupation its growth has been quite rapid. In 1838 it had a population of 30,000; 1881, 65,000; 1891, 83,000; 1896, 96,784; 1906, 138,240 (the municipal population was 145,280 and the total population of the commune, including certain persons, as the military, who are counted apart, was 154,049). Europeans numbered 105,908, of whom 50,996 were French, 23,305 naturalized French, and 12,354 Spaniards. The Jews numbered 12,490. The population, according to the 1911 census, was 153,468; municipal population, 162,326; total for the commune, 172,397. The percentage of natives is steadily declining, while the foreign population, especially the French, shows a steady increase. Algiers is the seat of the governor-general and of the superior civil and military officials of Algeria and the department and arrondissement of Algiers. The city is supposed to have been founded A.D. 944, and fell into the hands of the French, July 5, 1830.

ALGOA BAY, ăl-gō'à. A large inlet at the southeastern extremity of Cape Colony (Map: Africa, G 8), into which the Sunday and Baasher rivers flow. Although exposed to south winds, the bay furnishes good anchorage and is of considerable commercial importance. It is known in history as the landing place of the first British immigrants to South Africa. Port Elizabeth

is situated on the west side at the mouth of the Baasher.

ALGOL, ăl'gŏl (Ar. *al-ghūl,* the demon). A remarkable variable star in the constellation Perseus. Its variability was first noticed by Montanari in 1669, though the name of the star indicates that the phenomenon was not unknown to the Arabs. Goodricke discovered its periodicity in 1783 and suggested that it was due to the interposition of a dark satellite. Its period is 2 days, 20 hours, 48 minutes, and 55.4 seconds, and is maintained with great regularity. Ordinarily the star is of the second magnitude; but it suffers periods of diminution, lasting 4½ hours, followed by constant minima of 20 minutes, and a return in 3½ hours to the original brilliancy. At minimum it is of the fourth magnitude and gives only one-sixth as much light as it does in the maximum phase. Algol is the type of a class of variable stars numbering about 30, whose minimum phase is very short. Goodricke's suggestion as to the cause of the variability of Algol was the subject of a searching inquiry by Pickering, who, in 1880, announced that the observed phenomena could be completely accounted for by supposing Algol to be accompanied by a comparatively non-luminous companion-star with a diameter about three-quarters of that of the bright star, the two being engaged in mutual revolution in a period identical with the known period of variability. Pickering's explanation was confirmed in striking manner by Vogel, who found, by his spectroscopic observations in 1889, that the visible star is receding from the earth at the rate of about 26 miles per second before the minima, and approaching us at about the same rate after the minima. His approximate estimate of the dimensions of the system assigns to the distance between Algol and the dark companion a value of 3,230,000 miles and makes the diameters of the two bodies 1,061,000 and 834,300 miles respectively; their respective masses are four-ninths and two-ninths of that of the sun. The orbit is supposed to be seen nearly edgewise from the earth. Chandler's suggestion that there exists still another invisible component rests upon less reliable evidence, derived from a study of the variations in Algol's position on the sky, as observed with meridian instruments by several successive generations of astronomers.

ALGOM'ETER. See PSYCHOLOGICAL APPARATUS.

ALGO'NA. A city and the county-seat of Kossuth Co., Iowa, 105 miles (direct) north by west of Des Moines, on the east fork of the Des Moines River, and on the Minneapolis and St. Louis, the Chicago and Northwestern, and the Chicago, Milwaukee and St. Paul railroads (Map: Iowa, C 1). It is the centre of an agricultural, dairying, and live-stock region, and manufactures creamery supplies, foundry and machine-shop products, planing-mill products, bricks, tile, wagons, etc. The city contains a public library, opera house, and a handsome court house. The electric light and water works are owned by the city. Pop., 1890, 2068; 1900, 2911; 1905, 3047; 1910, 2908; 1913 (est.), 3300.

ALGON'KIAN SYS'TEM. In geology, that system, consisting chiefly of highly metamorphosed clastic rocks, that lies unconformably between the Archæan beneath and the Cambrian above and at the very bottom of the entire series of sedimentary rocks of the earth's crust. The name "Algonkian" was proposed by Walcott in 1889, and has been quite generally accepted by the more progressive American geologists. The rocks of this system consist of crystalline marbles, slates, schists, quartzites, conglomerates, and gneisses, all of which have, through more or less profound regional metamorphism, been derived from original sedimentary rocks, together with contemporaneous igneous intrusives and lava flows. The Algonkian system includes the Huronian and Keweenawan formations of the Lake Superior region, the Grenville series of the Adirondacks and eastern Canada, and the Hastings series of Canada. The known fossils of Algonkian age are very obscure and few in number. Because of the extensive metamorphism suffered by the rocks of both the Archæan and Algonkian systems, rendering, in many regions, their separation under the two divisions almost impossible, it is thought advisable to consider all rocks formed before the Cambrian period under the more comprehensive title PRE-CAMBRIAN FORMATIONS.

ALGON'QUIAN STOCK. The most widely extended and most important Indian linguistic stock of North America, formerly occupying nearly the whole area (with the exception of that occupied by the Iroquoian tribes) stretching from Labrador to the Rocky Mountains in the north, and extending southward to Pamlico Sound on the coast and to the Cumberland River in the interior. It included several hundred tribes and sub-tribes speaking probably 40 distinct languages, besides a large number of dialects. Both linguistic and traditional evidence point to the north Atlantic coast, from the St. John to the Delaware River, as the region from which the various cognate tribes migrated westward and southward. From the fact that the earliest settlements in Canada, New England, New York, New Jersey, and Virginia were all made within the Algonquin area, the history of these tribes is better known, and their languages have been more studied, than those of any others north of Mexico. According to Michelson, these languages fall into four groups, the Blackfoot, Cheyenne, and Arapaho standing apart and distinct from the remaining group. For full two centuries they opposed the advance of the white man step by step, under such leaders as Opechancano, Philip, Pontiac, and Tecumseh, with the final and inevitable result of defeat, suppression, and swift decay. The number of the Algonquian stock (1910) is about 82,000 souls, of whom about 43,000 are in the United States, the remainder being in Canada, with the exception of a few hundred refugees in Mexico.

The principal Algonquian tribes were the Algonquin, Malecite, Miami, Micmac, Naskapi, Cree, Montagnais, Abnaki, Pennacook, Massachuset, Wampanoag, Narraganset, Mohegan, Mahican, Montauk, Lenape or Delaware, Nanticoke, Powhatan, Pamlico, Shawano, Ojibwa, Ottawa, Menominee, Potawatami, Sack, Fox, Kickapoo, Blackfoot, Cheyenne, and Arapaho. (See INDIANS.) Consult Truman Michelson, "Classification of Algonquian Tribes," *Twenty-eighth Annual Report Bureau of American Ethnology.*

ALGON'QUIN, frequently spelled ALGONKIN. An Indian tribe formerly centring about Nipissing Lake and the middle Ottawa River, Ontario. The name (more properly Algomekin) signifies people 'on the other side' of the river. French missionaries began work among the Algonquins early in the seventeenth century and soon dis-

covered their language to be the key to all the numerous dialects now included by philologists under the Algonquian stock. In consequence of destructive wars waged against them by the Iroquois, the tribe rapidly declined, some fleeing to the Upper Lakes, where, with other refugees, they became known later as Ottawas (q.v.); while others, retaining the old name, were gathered into mission villages under French protection. In 1900 there were about 960 Algonquins settled in several villages in Quebec and Ontario, exclusive of those confederated with Iroquois at the Lake of Two Mountains, in Quebec and at Gibson, Ontario, to the number of perhaps 150 more.

AL'GORISM. A word variously used in arithmetic. Primarily it referred to the system of Hindu numerals, concerning which European scholars received much of their early information through the work of Al-Khuwarizmi (q.v.), or Algoritmi, as the name appeared in the mediæval Latin. Those scholars who adopted the Hindu numerals were called, from his name, Algorists, as distinct from the Abacists, who used the abacus in their computations. The word appears in various forms, as algorithmus, algrim, augrim (Chaucer). At present the word is generally used to designate any particular arrangement of numerical work, as the algorism for square root or the algorism for division. See ARITHMETIC.

ALGUAZIL, ăl'gwȧ-thēl', or **ALGUACIL** (Sp. *alguacil*, for Ar. *al-wazīr*, the vizier). The general name in Spain of the officers intrusted with the execution of justice. There are *alguaciles mayores*, who either inherit the office of executing justice in a town as a hereditary right belonging to their families, or are chosen to the office by the municipality; formerly the name was given also to the officers that executed the sentences or orders of tribunals, such as the tribunal of the Inquisition and of the various orders of knights. But usually, under the name of Alguazil, is understood the *alguaciles menores*, or 'ordinarios,' that is to say, the attendants or officers of the courts of justice, gens-d'armes, bailiffs—in short, all the inferior officers of justice and police who are appointed to their office by the judges, *alguaciles mayores*, or town council.

ALHAGI, ăl-hā'ĭ. See MANNA.

ALHAMA, ȧl-ä'mȧ (Ar., the bath; the Roman Astigia Juliensis). A town of Andalusia, Spain, in the province of Granada, 25 miles southwest of Granada (Map: Spain, C 4). Its situation is wild and romantic, for it is built, terrace above terrace, upon a hill on either side of which rise naked limestone crags, while the Sierra Alhama towers to the height of 8000 feet in the background. Alhama is noted for its baths, which are much frequented in the spring and fall. They are situated in the valley of the Marchan, are of a sulphurous character, and reach a temperature of from 107° to 113° F. The Baña de la Reina is a Roman building of great antiquity; the Baño Fuerte is a Moorish structure. An earthquake in 1884 wrought much havoc, and, in consequence, the town has been largely rebuilt, modern structures replacing Moorish edifices. The principal manufactures are flour, spirits, soap, and gypsum, while the important products are grain, wine, oil, almonds, and esparto. Alhama was a watering place and fortress in the time of the Romans, and the Moors valued highly its medicinal springs. It was, however, chiefly as a fortress and outpost to Granada that it was important to them, and when it was captured by the Christians, Feb. 28, 1492, it caused the widespread mourning expressed in the famous ballad, *Ay de mi Alhama*, well known in the English translation. Pop., 1900, 7683; 1910, 7812.

ALHAMA. A town of Murcia, Spain, situated at the foot of the Sierra de España, on the southern slope, 13 miles southwest of Murcia (Map: Spain, E 4). It is celebrated for its sulphur springs and warm mineral waters, 102° to 108° F., and is a favorite resort of invalids and holiday-seekers in spring and early summer. Fruit, especially fine grapes, is grown, and fabrics, alcohol, and saltpetre are manufactured. Copper and iron are found in the neighborhood. Alhama was known in the Roman era and figured in the Moorish wars. Pop., 1900, 8410; 1910, 9184.

ALHAM'BRA (Ar. *al*, the + *hamrā*, red). The fortified palace-citadel of the Moorish kings of Granada. As early as the ninth century a citadel was located here with the name al-Hamra, which was rebuilt when Granada became the capital of what was left of the Moorish dominions in Spain, by King Mohammed Ibn-el-Ahmar and his successors (1248, 1279, 1306, 1354). The citadel stands on a hill north of Granada, on a terrace about 2500 by 675 feet, and is surrounded by a wall with 13 square towers, over a mile in circuit, built of the red brick which gave it the name of *Kal'at el-Hamrâ*, 'The Red Castle.' Inside the citadel were beautiful gardens, a donjon citadel, a gate of justice, a watch tower, and, finally, the palace itself, as sombre and plain on the outside as it was smiling and decorative within. Charles V destroyed a large part of it (especially the Winter Palace) to make room for a tasteless Renaissance building (which, however, was never completed); and Philip V still further mutilated it. Mutilated as it is, it remains the best exemplar of Moorish art in Spain, even though in details the work may not be so exquisite as earlier work in Egypt and the East. What remains is grouped around two principal oblong courts, the Alberca Court, or Court of the Blessing (140 × 74 feet), and the Court of the Lions (116 × 66 feet); and several smaller courts, among them that of the Mosque. There are porticoes, pillared halls, small gardens, baths, and a mosque. The Court of the Lions is surrounded by arcades supported by 124 white marble columns, while similar arcades frame the ends of the other court. The main reception-hall, called the Hall of the Ambassadors, is a square (37 feet), surmounted by a beautiful dome 75 feet high, with stalactite pendentives. Connected with the Court of the Lions are two smaller but equally exquisite halls, the Hall of the Abencerrages, with a dome and exquisite columns, used as a banquet-hall, and the Hall of the Two Sisters, a pleasure-room communicating with the baths. There is a network of smaller apartments. All the surfaces are decorated with a bewildering mass of color and design in tiles, stucco, and painting. The ornamentation comprises intricate geometrical patterns, floral designs and arabesques, and a profusion of Cufic mottoes and of heraldic devices, all stamped or cast in stucco and richly painted in red, blue, black and gold, or executed in a mosaic of small enameled tiles. The most characteristic parts were reproduced in the Alhambra Court of the Crystal Palace, at Syden-

ham, London, and the palace has served as a model for innumerable modern imitations of Moorish art. The Alhambra was partly restored by Queen Isabella II, but was damaged by fire in 1890. Consult: Washington Irving, *The Alhambra* (New York, 1832); Goury and Jones, *Plans, Elevations, Sections and Details of The Alhambra* (London, 1842); M. Junghändel, *Die Baukunst Spaniens* (Dresden, 1889); Girault de Prangey, *Monuments arabes et moresques d'Espagne* (Paris, 1839); Bisson, *Choix d'ornements moresques de l'Alhambra* (Paris, 1855); Contreras, *La Alhambra, el Alcázar y la gran mezquita* (Madrid, 1885); Borrmann, *Die Alhambra* (Berlin, 1900); Calvert, *The Alhambra* (New York, 1907); id., *Granada and the Alhambra* (New York, 1907). See MOHAMMEDAN ART.

ALHAMBRA. A city in Los Angeles Co., Cal., 8 miles east of Los Angeles, on the Southern Pacific and Santa Fe and the Pacific Electric Interurban railroads (Map: California, G 8). It is the seat of the Agnes Hill-Runkle School of Music and the San Gabriel Mission Church (Catholic), founded in 1771 by Franciscan Fathers. There is also a parochial school in connection with the mission. A Mission play similar to the Passion Play at Oberammergau is produced there. The city is primarily residential, but there are some factories. Pop., 1900, 808; 1910, 5021; 1913 (est.), 8000.

ALHAMBRA, THE. A famous collection of tales and legends of the Alhambra, or palace of the ancient Moorish kingdom, at Granada, by Washington Irving (1812).

ALHAZEN, ål-hä'zen, EL-HASAN IBN EL-HASAN IBN EL-HAITAM, ABU 'ALI (c.965–c.1039). An Arabian mathematician and physicist. From his native city, Basra, he went to Egypt and died in Cairo. A man of remarkable intelligence and productiveness, he wrote commentaries on Aristotle, Galen, Ptolemy, Euclid, and Archimedes, and also made numerous original contributions to science. His *Optics*, the most important Arabic work on the subject, was translated into Latin, probably by Gerard of Cremona, and not by Vitellius, who wrote an original work on optics, and was published at Basel in 1572 under the title, *Opticæ Thesaurus Alhazeni Arabis Libri Septem, nunc primum editi, eiusdem Liber de Crepusculis et Nubium Ascensionibus, etc., a Fed. Risnero.* Various other of his works have been translated in whole or in part by Woepcke, Sédillot, Suter, and Baarmann. He is now known chiefly from the problem bearing his name: From two given points within a circle to draw to a point on the circumference two lines which shall make equal angles with the tangent at that point. For bibliography of this problem, consult the *American Journal of Mathematics*, vol. iv, p. 327.

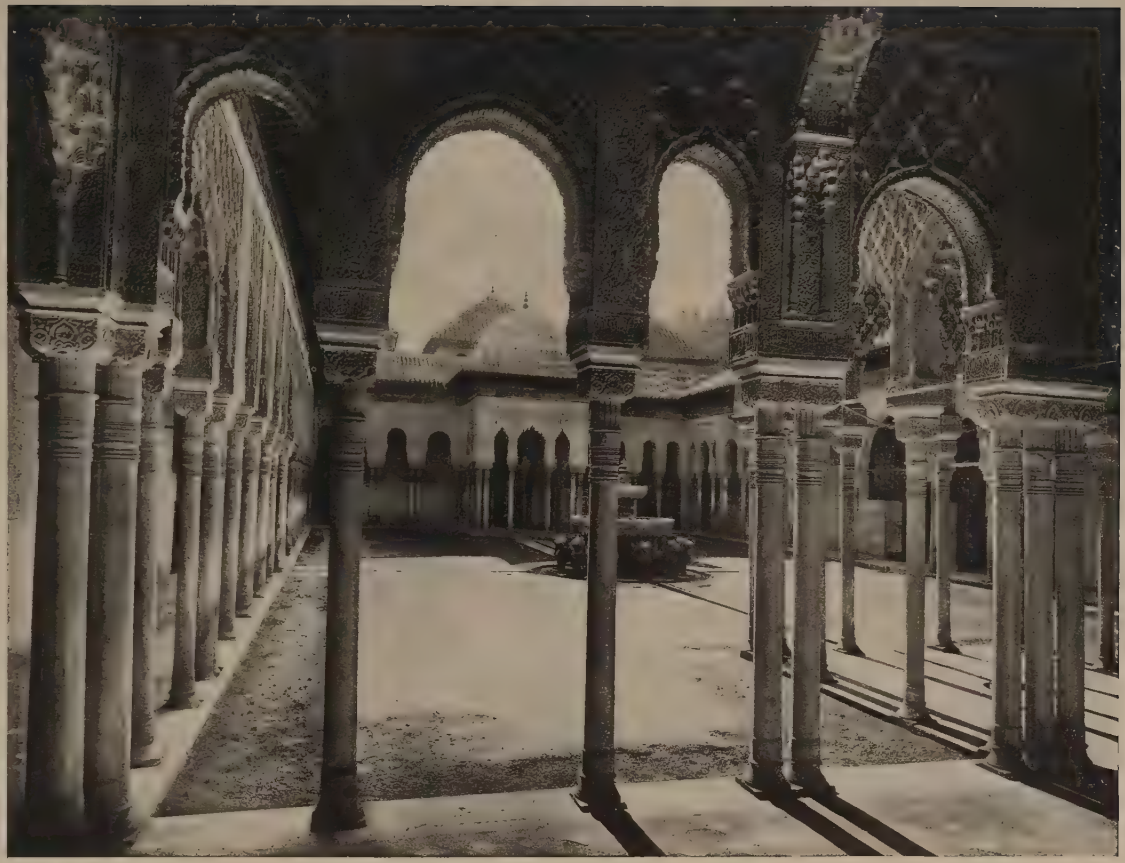
AL-HEN'NA. See HENNA.

ALHONDIGA DE GRANADITAS, ål-ōn'dē-gȧ dȧ grä'nȧ-dē'tȧs. A fortified public storehouse near Guanajuato, Mexico, where, in 1810, in the beginning of the revolution against Spain, the local government officials took refuge and defended themselves vigorously, being captured only after severe fighting by the insurgents under Hidalgo. Local tradition of the fight declares that when the Spaniards in the granary had exhausted their stock of cannon balls, they used bags of silver coins, fresh from the mint, and also quicksilver flasks, which were stored there for use in connection with the great silver mines of the place. Hidalgo was subsequently defeated and executed at Chihuahua, and his head was suspended from a spike on the wall of the Alhondiga, now the local prison.

ALI, IBN ABU TALIB, ä'lê ib-nä'bōō tȧ'lēb (c. 600–661). Fourth Caliph, cousin of Mohammed, and one of his first converts. Ali became a staunch adherent of Mohammed, and fought bravely and vigorously for him. On the death of Mohammed it was expected that Ali, who had married Fatima, the daughter of the Prophet, would succeed him as leader, but he only reached the caliphate on the murder of Uthman, the third Caliph, in 656. His caliphate was very stormy and full of wars, due to the opposition of Ayeshah, the young widow of Mohammed, and her party, chief among whom stood Muawiya, the Governor of Syria. In the "Battle of the Camel," fought at Basra in 656, Ayeshah was captured, and later Muawiya was met at the battle at Siffin. On the 22d of January, 661, Ali was attacked by three members of the Kharijite sect and murdered at Kufa. Near this city he was buried, and when later a monument was raised to his memory, so many pilgrims came that it became the centre of a city, Masjid Ali. After his death his followers formed themselves into a sect called the Shiite, which numbers about 15,000,000, scattered in Irak, Syria, Afghanistan, India, and in the neighborhood of Medina. Persia is a decidedly Shiite country, while Turkey is Sunnite. The Fatimides, who reigned in Egypt, were believed to be the descendants of Ali and Fatima. Ali was noted for his great knowledge and wisdom. Fleischer published Ali's *Hundert Sprüche* ('Hundred Maxims') in the Arabic and Persian texts, with a translation (Leipzig, 1837). The *Diwan* was published by Kuypers (Leyden, 1745), and later at Bulak in 1840. Some of the maxims and poems attributed to Ali, of course, may be genuine, but the majority of them bear traces of later composition. Consult Brockelmann, *Geschichte der arabischen Litteratur*, vol. i, pp. 43–44 (Weimar, 1898).

A'LIAS. A name other than his true and proper name by which a person passes or is known. The phrase (Lat. *alias dictus*, otherwise called) from which the term is derived was formerly employed in indictments and pleadings to render absolutely certain the description of the individual intended by adding his fictitious or assumed name. In order to constitute an alias, the name so described need not be assumed for purposes of deception or from any improper motive. Stage names, pseudonyms, and even nicknames, are properly comprehended under the term. But a name which has, by legal process, been assumed in lieu of one's original name is not an alias. See NAME.

ALI BABA, ä'lê bä'bȧ. The hero of the story of "Ali Baba and the Forty Thieves," in the *Arabian Nights' Entertainments*. He is a poor forester, who accidentally learns the magic formula which opens the door to a robbers' cave. In their absence he repeats the "open sesame" (which has thus become proverbial), enters the cavern, and loads his ass with their treasures. His brother, Kasim, tries to imitate his success in carrying off their wealth, but after entering the cave, forgets the word "sesame," and so is entrapped and slain by the robbers. These then come to Ali Baba's house concealed in oil jars. They are discovered, however, by the ingenious slave girl, Morgiana, who kills them with boiling oil.



ALHAMBRA

THE COURT OF LIONS

ALIBERT, ä'lē'bâr', JEAN LOUIS (1766–1837). Physician to Louis XVIII, of France. As chief physician of the hospital of St. Louis he devoted himself especially to the study of diseases of the skin. His chief work was *Traité complet des maladies de la peau* (1833), but his *Physiologie des passions; ou nouvelle doctrine des sentimens moraux* was given a second edition in Brussels (1825).

ALI-BEY, ä'lē-bā' (1728–73). Mameluke ruler of Egypt. He was born in Abkhasia in the Caucasus, and when a boy was sold as a slave into Egypt. He gained the favor of his master, and rose to be one of the Mameluke beys. In 1766 he seized the government, freed himself from the power of the Sultan; coined money, and assumed the rank of Sultan of Egypt. Soon afterward he captured and plundered Mecca and undertook to conquer all Syria, in alliance with Daher, Pasha of Acre. At Damascus, June 6, 1771, he routed the Turks with great slaughter and took possession of the city through his general, Mohammed; but the latter turned against him and, proceeding to Egypt, put an end to Ali-Bey's power at Cairo. Returning with an army from Syria, Ali-Bey was defeated at the battle of Salahieh and perished a few days later.

AL'IBI (Lat. elsewhere). A defense resorted to in criminal prosecutions, when the party accused, in order to prove that he could not have committed the crime with which he is charged, tenders evidence to the effect that he was in a different place at the time the offense was committed. When true, there can be no better proof of innocence; but, as offering the readiest and most obvious opportunity for false evidence, it is always regarded with suspicion. Consult Wharton, *Criminal Law* (Philadelphia, 1896).

ALICANTE, ä'lē-kän'tā. The chief town of a province of the same name in Spain (Map: Spain, E 3). It is picturesquely situated on a steep hill, at the bottom of which it extends along a level strip of land. This latter portion of the city is comparatively modern, well built, and convenient, with fine squares and promenades. The upper city is a jumble of narrow crowded streets. It possesses several fine churches, two nunneries, a library, a bishop's palace, and a picture gallery, and is overlooked by the castle of Santa Barbara from an eminence 850 feet above the sea. The town, which is, with the exception of Cadiz and Barcelona, the most important seaport of Spain, is strongly fortified, and its harbor is naturally protected. Alicante derives considerable revenue as a seaside resort; but its main source of wealth is the export trade, for much of the oil, wine, silk, fruit, saffron, raisins, liquorice, esparto, and grain of the fertile province of Valencia pass through this port. There is a very large tobacco factory. Alicante is the seat of a United States consulate. This town is the Roman Lucentium, and in ancient times was of considerable importance. It was captured by the Moors in 713 and recaptured by Ferdinand III. Pop., 1910, 51,665.

ALICATA, ä'lē-kä'tä. See LICATA.

AL'ICE. 1. In Shakespeare's *Henry V*, one of the Princess Katherine's ladies in waiting. 2. The heroine of an Elizabethan tragedy, *Arden of Feversham* (q.v.). 3. In Meyerbeer's opera *Robert le Diable*, the foster sister of Robert, who saves his soul from ruin.

ALICE MAUD MA'RY, PRINCESS, GRAND DUCHESS OF HESSE-DARMSTADT (1843–78). The second daughter of Queen Victoria, born April 25, 1843. She was much beloved by the English people for her amiability, gracious disposition, and domestic virtues. On July 1, 1862, she married Prince Frederic William Louis of Hesse-Darmstadt. She died at Darmstadt, Dec. 14, 1878, of diphtheria, a few days after the death of her youngest daughter from the same disease. Consult Sell, *Letters with Memoirs of Alice, Grand Duchess of Hesse* (London, 1884), and Helena (Princess Christian), *Letters with Memoirs of Alice, Grand Duchess of Hesse* (London, 1897).

ALICE, OR THE MYS'TERIES. A novel by Bulwer, published in 1838.

ALICE'S ADVEN'TURES IN WON'DERLAND. A story for children, by Lewis Carroll (C. L. Dodgson), published in 1869. It is the narrative of a little girl's dream. A sequel to it is *Through the Looking-Glass* (1871).

ALICIA, ä-lish'i-ä. 1. In Rowe's tragedy *Jane Shore* (q.v.), a mischief-making lady who ruins the heroine, through jealousy, and goes mad herself. 2. In Lillo's *Arden of Feversham*, the same character as Alice Arden, in the original Elizabethan tragedy of the same name.

AL'IDADE (Ar. *al-'idādah*, the revolving arm). A radius bearing a vernier (q.v.), which travels around a graduated circumference. When an angle is to be measured, the alidade takes first the position of one arm of the angle and then of the other, and the arcs are "read" by the vernier; the difference of the two readings is the measure of the angle. See COMPASS.

ALIEN, āl'yen (Lat. *alienus*, strange, foreign). One recognized by the state in which he sojourns as owing primary allegiance to a foreign sovereign. It is used ordinarily in contradistinction to citizen (q.v.). An alien may become a citizen by *naturalization* (q.v.). Alien friend and alien enemy denote, respectively, an alien whose country is at peace, or is at war, with the country where he is sojourning. In Great Britain the status of aliens is regulated by the Naturalization Act of 1870 (33 and 34 Vict. c. 14). In this country their status is determined generally by State laws, although these are subject to some modification by treaties between the Federal government and that of a foreign country. An alien does not possess political rights, nor is he subject to the political duties of a citizen, and yet he may be required to serve in the militia or police of the country where he is residing and to contribute to the support of such establishments. At common law an alien could not become an owner of real property, although a distinction was made between a case of title by *purchase* (q.v.) and by *descent* (q.v.). If an alien acquired title by purchase, as by a grant (q.v.), or devise (q.v.), he was allowed to hold it until office found (q.v.), that is, until his alienage was duly established, upon inquiry instituted by the proper official, while apparent title by descent was absolutely invalid. This common law disability has been removed in England, as well as in many of our States; and aliens may now acquire, convey, and transmit title to real and personal property in the same manner as citizens. An alien friend may contract, sue, and be sued as though he were a citizen while he is allowed to remain in the country; but he may be expelled or deported at any time, subject to treaty stipulations; his immigration may be prevented, or may be per-

mitted, subject to imposed conditions. An alien enemy is not allowed to maintain an action in the courts of this country, unless he can show some special authority or license therefor; but he may be sued here. Nor can he enter into valid contracts with citizens which are inconsistent with a state of war. The tendency of modern law is to accord to alien enemies, who are permitted to remain in a country, all the rights and privileges of alien friends.

The status of aliens in the United States is involved in some ambiguity owing to the diversity and occasional conflict of State and Federal laws with respect to them. Thus a State may violate or may tolerate the violation by its citizens of rights conferred on aliens within its boundaries by treaties made by the Federal government with the foreign government to which such aliens owe allegiance and to which they look for protection. By the Constitution all treaties with foreign powers are a part of the supreme law of the land. In theory, therefore, the treaty rights of aliens are safeguarded by the Federal authority. As a matter of fact, however, the Federal government exercises no effective authority in such cases, and some eminent lawyers deny that it has, under the Constitution, any such authority. The better opinion, however, is that the government has all requisite power to enforce its treaty obligations, and that all that is necessary is for Congress by suitable legislation to put this power into effective judicial form. Consult *Ann. Report, Am. Institute of Criminal Law and Criminology* (September, 1913); C. H. Burr, *The Treaty-Making Power of the United States* (Philadelphia, 1912). Consult Nelson, *Select Cases, Statutes, and Orders Illustrative of the Principles of Private International Law* (London, 1889), and Cockburn, *Nationality* (London, 1869).

ALIEN AND SEDI'TION ACTS. A series of statutes enacted during the administration of John Adams (q.v.), occasioned largely by the desire of the party in power to stifle the more virulent forms of political opposition then prevalent and to check the activities of those who sympathized with France. There were four statutes passed in execution of the policy of the Federalists (q.v.), of which two became especially notorious. The Alien Act, passed June 25, 1798, to remain in force two years, gave the President power to order the removal from the country of aliens judged to be dangerous, and provided that if those so notified did not leave the country or secure from the President a license to remain, they would be subject to imprisonment for not over three years, and be disqualified from ever becoming citizens of the United States. The President also might order the removal from the country of any alien thus imprisoned, and if such alien should thereafter be found in the country he might be imprisoned for as long a period as the President should deem the public safety required. The Sedition Act, passed July 14, 1798, to be in force until March 3, 1801, imposed penalties not exceeding a fine of $5000 and five years' imprisonment for conspiring against the government and its measures and for interfering with the operations of the government. It imposed a penalty of imprisonment for not over two years and a fine of not over $2000 for printing scandalous material concerning the Federal government, the President or Congress. There were also passed the Alien Enemies Act, July 6, 1798, providing for the treatment of aliens with whose government the United States might be at war, and the Naturalization Act, June 18, 1798, fixing 14 years' residence as a qualification for the acquisition by foreigners of citizenship. The extreme character of these statutes and the partisan spirit which produced them caused an immediate and violent reaction, which was expressed in such forms as in the Virginia and Kentucky Resolutions (q.v.) and which hastened the overthrow of the Federalist party. See historical section under UNITED STATES. For the method and consequences of the enforcement of the above acts, consult Wharton, *State Trials of the United States during the Administrations of Washington and Adams* (Philadelphia, 1849).

ALIENATION, ā'lyen-ā'shŭn (Lat. *alienatio*, the transferring of the possession of a thing to another, from *alienus*, another's, foreign). A legal term to describe the transfer of title to land, or of any interest therein. The modes in which alienation is effected are numerous, ranging in our legal system from the feoffment (q.v.), or livery of seisin (q.v.), of old English law, to the modern transfer by deed (q.v.) or will (q.v.). (See CONVEYANCE.) The right of alienation is one of the two great incidents of the ownership of property, as now understood (the other being the right of inheritance); but this is a distinctly modern notion, and ownership may well exist, and has often existed, without the right to alienate the property owned. In English law the right of a freehold tenant to alienate his lands was long restricted by rules derived from the feudal system. Most of these restrictions were swept away by the third statute of Westminster (18 Edw. I, 1290), known as the Statute Quia Emptores (q.v.), which declared that from thenceforth "it should be lawful to every freeman to sell at his own pleasure his lands and tenements, or part of them," and the few that remained, by the statute of Military Tenures, passed in 1660 (12 Car. II, c. 24), which deprived the crown of the right to exact of its tenants *in capite* the obnoxious fines on alienation. But it was not until the thirty-second year of Henry VIII (1527), that the right to alienate lands by will was finally conceded by Parliament. Now, however, the principle of the alienability of real property has become so firmly established that we cannot conceive of absolute ownership without that quality, and it has long been a rule of our law that a condition attached to the grant of a fee, forbidding or restraining its alienation, is void, as being repugnant to the estate granted. It should be said, however, that such conditions annexed to life estates and leaseholds are perfectly good and of frequent occurrence.

Alienation may be either voluntary or involuntary. The former comprehends the usual modes of conveyance, including transfers by will. The latter refers to the acquisition of title by judgment, execution, bankruptcy, and the other modes in which creditors have at different times and in different jurisdictions been permitted to satisfy their claims by legal process out of the real property of the debtor. See the authorities referred to under the title REAL PROPERTY.

ALIENATION OF AFFECTION. See HUSBAND AND WIFE.

ALIENIST, ā'lyen-ĭst. See PSYCHIATRY.

ALI FERROUGH BEY, ä'lē fĕr'rō bā (1865—). A Turkish statesman who was born

at Constantinople, and became successively secretary of the embassies at Paris, London, and Bucharest; councilor of the embassy at St. Petersburg and Minister Plenipotentiary and Envoy Extraordinary of Turkey to the United States. He published *Public and Private International Law*, and histories of Arabia and Turkey. He was recalled from his post at Washington in 1901.

ALIGARH, ä'lē-gär'. The capital of the district of the same name (area, 1958 square miles), in the Northwest Provinces of India, the native name of which, Koil, has been replaced by that of the adjoining fort, famous for its commanding situation and historic associations. The fort, at an altitude of 740 feet, stands in lat. 27° 56′ N., long. 78° 8′ E., 47 miles north of Agra and 74 miles south of Delhi (Map: India, C 3). Its capture from the Mahrattas in 1803 by General Lake assured British supremacy in the Upper Doab, and it was the scene of exciting incidents during the mutiny of 1857. Cotton and grain are the principal products of the district, and the only important industries are the manufacture of flour and cotton pressing. The town on the railway route from Calcutta to Peshawar is a thriving municipality. It is the seat of the Mohammedan Anglo-Oriental College, which is connected with the University of Allahabad. Pop. of town, 1891, 61,485; 1901, 70,434; 1911, 64,825.

ALIGN'MENT. A term used in surveying, drawing, and military tactics, equivalent to "in line." Thus, the alignment of a battalion is effected when the men are drawn up in line; the alignment of a camp is a rectilinear arrangement of the tents, according to some prearranged plan.

ALIKHANOFF, ä'lĭ-kä'nôf, General (Ali Khan Avarski) (1846–1907). A Russian soldier. He was born at Baku, of Lesghian parentage, and was educated at Webb's School at Tiflis. In 1862 he entered the Russian army as cornet and saw service in the Caucasus. His efficiency soon won for him promotion to the rank of major, and the position of aid-de-camp to the Grand Duke Michael, then Viceroy of the Caucasus. In 1877, as the result of a quarrel with a superior officer, he was reduced to the ranks: as a private soldier taking part in the disastrous campaign against the Turcomans in 1879, and serving also under Skoboleff. He attracted attention by writing for the *Moscow Gazette* a series of brilliant articles describing the Russian advance on India. Of such value did his services become that he was made lieutenant in 1882. Soon afterward, when he had been secretly to Merv, and had negotiated successfully with the Turcoman chiefs to secure their submission, he was made lieutenant-colonel and first Governor of the territory thus gained. He took a conspicuous part in the "Penj-deh affair" of March 30, 1885, when the Russian troops, under General Komaroff, attacked and defeated the Afghan forces while the Russian and British governments were negotiating the boundary of Afghanistan. In 1901 he was promoted to be major-general. The severity with which he treated the Armenians and Georgians over whom he was placed gained for him the bitter hatred of these peoples. He was sent to investigate the Tatar-Armenian outbreak of 1905, but his sympathy with the Mussulman was so obvious that he was soon recalled. In the same and following years he suppressed with great severity the disturbances in Georgia. He was killed by the explosion of a bomb at Alexandropol, in the Caucasus, on July 16, 1907. The assassination was attributed to an Armenian effort for revenge.

ALIKULUF, ä'lē-kōō-lōōf'. A tribe occupying the central and western region of the archipelago of Tierra del Fuego, South America, and representing a distinct linguistic stock, the Alikulufan. Although they go almost naked in the coldest weather, and huddle in shelters hardly deserving the name, they show great skill in the making of weapons, fishing utensils, and canoes, while the women weave water-tight baskets of reeds. They have also trained a native dog to hunting. They now number but a few hundred at most. Consult Chamberlain in *American Anthropologist*, N. S., vol. xiii, pp. 89–92 (1911).

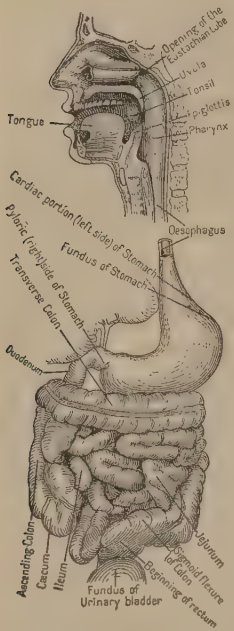
ALIMA, ä-lē'mä. A tributary of the Lower Congo, rising in French Congo, and after a short course westward emptying at Ibaka (Map: Congo Free State, C 3). In its lower course it is navigable for light vessels. It was discovered by De Brazza in 1878 and thoroughly explored by Balley in 1883.

AL'IMEN'TARY CANAL (from Lat. *alimentum*, food). In mammalia, that portion of the digestive apparatus through which the food passes from the time of its entrance until its exit from the body. It is lined by a mucous membrane, which extends from the lips to the anus, being modified in each region. (See Mucous Membrane.) The alimentary canal begins at the mouth and is continued into the space called the pharynx, which also communicates with the nostrils above, and the gullet or œsophagus below. The pharynx is surrounded by three muscles, the constrictors, which grasp the food and force it into the next portion of the alimentary canal, the œsophagus. This is a tube composed of an outer layer of longitudinal muscular fibres, and an inner of circular, which extend down to and spread out upon the stomach. These fibres, by a series of peristaltic contractions, carry the morsel of food along into the stomach. In vomiting, there is a reversal of these actions, which ruminating animals can accomplish at will. The œsophagus passes through an opening in the diaphragm and joins the stomach, which is a pouch curved with the concavity upward, expanded into a *cul de sac* on the left side (the cardiac extremity), and gradually narrowed to the right or pyloric end. It consists of muscular fibres continuous with those of the œsophagus, which become thicker toward the pylorus. Its external surfaces are covered by peritoneum, and its thick, soft mucous lining, when the stomach is empty, lies in folds. Between the muscular and mucous layers is a fibrous layer, in which the blood vessels lie before they pass into the mucous layer. (See Stomach.) At its pyloric or right extremity the stomach communicates with the small intestine, which is about 22 feet in length and is arranged in convolutions, which occupy the middle portion of the abdominal cavity, being kept in position by the mesentery, which attaches them to the posterior wall of the abdomen.

The small intestine is subdivided into three parts. The first 10 inches from the stomach constitute the *duodenum*. Into it open the duct of the pancreas and the common bile duct. Of the remaining portion, the *jejunum* includes about two-fifths and *ileum* three-fifths. The tube con-

sists of three layers, and the whole is surrounded by peritoneum. See INTESTINE.

The ileum ends, in the right iliac region, in the large intestine, which is from 5 to 6 feet in length. It begins at the pouch called the *cæcum* (q.v.), from which springs the *appendix vermiformis;* a double valve guards the opening of the small into the large intestine. The colon passes upward on the right side nearly to the liver (ascending colon), crosses the left hypochondrium (transverse colon), descends to the left iliac fossa (descending colon), where it bends like an S (sigmoid flexure) and joins the rectum at the left margin of the true pelvis. The colon is distinguished by its pouched or sacculated appearance and the presence of three flat bands of longitudinal muscular fibres on its exterior wall. The peritoneum covers it only in parts. (See COLON.) The rectum is not sacculated, but its muscular coat becomes much thicker; at its lower end the longitudinal muscular fibres stop, but the circular fibres become greatly increased, forming the internal sphincter muscle. See ANUS.



ALIMENTARY TRACT IN MAN.

The alimentary canal thus consists of a continuous passage lined by mucous membrane, which rests on a fibrous and muscular layer. Its length is generally about five or six times the length of the body, or 30 feet. It begins below the base of the skull, passes through the thorax, abdomen, and pelvis, and consists, in brief, of the mouth, pharynx, œsophagus, stomach, small and large intestine. The above description refers to the alimentary canal in human anatomy; its parts are variously modified in different animals, as will be found in the articles on its several subdivisions. The process of carrying the digested food to the tissues of the body is discussed under CIRCULATION.

ALIMENTARY SYSTEM, EVOLUTION OF THE. An alimentary system as defined above is almost wanting among plants, which, practically without exception, use only fluid or gaseous food, or else render solid substances fluid before ingestion. This difference between animals and plants is one of the best distinguishing characters.

Types of Alimentary Tracts. The simplest may be designated the temporary type—that exhibited by Amœba. This jelly-like, amorphous organism, when it comes upon a solid particle in the water, simply engulfs it at any point by flowing around it. The engulfed particle is surrounded by a sphere of water. From the plasma of the Amœba an acid is secreted into the sphere of water, and this dilute acid gradually dissolves the solid particle; the solution is then absorbed by the protoplasm. In the case of the Amœba there is no definite, permanent alimentary tract. The same is true of all the rhizopodous Protozoa and of the parasitic ones which do not feed on solids. Many of the ciliate and flagellate Infusoria, on the other hand, ingest solid particles through a permanent mouth and gullet into the general protoplasmic spaces. The surface around the mouth opening may be provided with cilia to carry food into the mouth.

The second type of alimentary tract is permanent but diffuse. This is the type exhibited by sponges. There is not one digestive region, but hundreds of them, as many, indeed, as there are pores and canals passing through the body wall. The solid food passes into these canals; the canals are lined by curiously modified "collared" cells. These pick up the particles and engulf them, as a flagellate infusorian does. The whole sponge, indeed, behaves like a colony of Protozoa, specialized in different directions in different regions of the sponge body.

The third type of alimentary tract is permanent, and concentrated in one cavity, and that cavity is a sac, having only one external opening. This type is characteristic of all the Cnidaria, and is found in certain flatworms. It is typically illustrated by Hydra. Hydra consists of a body wall surrounding a central cavity that has one opening at the upper pole, surrounded by a circlet of tentacles. The opening serves both as mouth and anus. The body wall is two-layered; the outer layer is the sensory one; the inner layer is digestive. The origin of this type is uncertain; it seems quite likely that it has not developed from the sponge type, but that it represents an altogether new line of evolution, in which the body is not to be considered as a colony of infusoria-like cells, but as a greatly enlarged protozoan, with many nuclei and hence with many cells. On this last hypothesis the digestion cavity of Hydra would be homologous with that of an infusorian. In the sea anemones the digestive sac is more complicated than in Hydrozoa, in that it is divided into a number of alcoves opening into one central chamber. The alcoves arise in consequence of a series of radial partitions (called mesenteries) arranged in a plan of four and its multiples or six and its multiples, that pass from the outer body wall toward the centre. In the sea anemones the entrance to the digestive sac is an elongated slit that serves both as mouth and anus. According to one theory, the separate mouth and anus of higher forms arise from opposite extremities of this slit, while in the middle part of the slit the lips are fused together. In the lower flatworms, the planarians and trematodes, the body is elongated, and the digestive sac is elongated likewise; but it is still a sac with a single opening. The cestodes, being abject parasites living in the digestive juices of the host, need no digestive tract and have none. In the higher flatworms, nemathelminths, Nemertinea, Bryozoa, and Brachiopoda, as well as in mollusks, mouth and anus have become distinct, and the digestive sac has become a digestive tube or canal, as in higher groups. With the formation of a digestive tube three portions may be distinguished; viz., fore gut, mid gut, and hind gut. The first and last

are usually of ectodermnal origin. The mid gut is usually lined by entoderm. These three parts of the alimentary tract undergo special modifications. The beginning of the fore gut, or mouth, becomes fitted with grasping and sensory organs; and lower down in the œsophagus there is frequently found a crushing organ, the gizzard. The mid gut is very glandular. In many species the glands have enlarged to perform their work better, and appear as appendages of the mid gut; e.g., the pancreas or hepatopancreas. The hind gut is the rectum. These conditions are shown in their simplest form in the annelids. The sandworm of the sea coast has great jaws in the œsophagus, which is protrusible. Behind, a pair of digestive glands open into the food canal. In the earthworm the œsophagus leads into a crop, and this in turn into a muscular gizzard. In the intestine two dorsal grooves add to the glandular surface. Passing to arthropods, we find the mid gut occasionally coiled, and frequently bearing digestive glands, that gain a great size in the Decapoda. A gastric mill is present in the Malacostraca. In both annelids and arthropods the mouth is on the same side of the body as the great nerve cord, and the anus is placed in the last metamere of the body.

In the Chordata the alimentary tract has very different relations from those found in the Annelida and Arthropoda. In the latter groups the alimentary tract lies dorsal to the main nerve and ventral to the heart; in the chordates the tract is dorsal to the heart and ventral to the spinal cord. The question how the vertebrate condition is derived from the invertebrate condition is a difficult one to answer. It has even led some to deny that vertebrates are related to Annelida or Arthropoda, as it is impossible to think of an animal adapted to traveling on one surface turning over and traveling on its back and transmitting this tendency to its descendants. It is more likely that the intermediate form was one that, like many of the lowest Chordata—the tunicates—was sessile in a ventral position at some time of life and consequently had neither dorsal nor ventral surface.

Embryological History. The history of the alimentary tract in vertebrates is as follows: Part of the outer layer of the germ becomes infolded as a pocket to form the lining of the archenteron or primitive gut. (See EMBRYOLOGY.) By the continued growth of the mesoderm and body cavity the archenteron comes to lie as a canal, closed at the anterior end and communicating posteriorly through the "neurenteric canal" with the neural tube. Later, an infolding of ectoderm occurs on the ventral surface of the embryo to form the proctodeum and anus. The neurenteric canal closes and the post-anal gut degenerates. Finally the ectoderm is inpocketed at the anterior end of the archenteron, forming the stomodeum, and the two cavities become confluent by the breaking away of the opposed walls. Thus, the completed alimentary tract is composed of an ectodermal anterior and posterior end and of an entodermal middle portion. It is enveloped by a mesodermal layer.

Phylogenetically, two quite distinct parts in the alimentary tract of vertebrates can be distinguished, and these do not coincide with the embryological divisions. In Amphioxus more than the first half of the length of the alimentary tract is devoted to the purpose of respiration, since its walls are provided with gill slits. This may be called the respiratory part of the alimentary tract in contradistinction to the remaining hinder portion—the digestive part. The first is also known as the prosenteron. The hinder part is often divided into two—its entodermal part (mesenteron) and its proctodeal portion (metenteron). It will be convenient to treat of the alimentary tract under the three heads of prosenteron, mesenteron, and metenteron. Before going on to this analytical treatment of the tract and its appendages, a few words may be said concerning the general histology of the entire tract. As already stated, two germ-layers are involved: entoderm (or ectoderm) and mesoderm, and to these must be added mesenchyme. The entoderm is always a single layer and forms the so-called *mucosa;* it gives rise to the digestive and glandular epithelium. Next outside lies the mesenchymatous mass, with its blood vessels and nerves—the *sub-mucosa.* Outside of this is the muscular layer derived from mesoderm and containing within circular muscle fibres and without longitudinal ones. Lastly, outside of all and continuous with the lining of the body cavity in all its parts, is the layer of flat epithelial cells, constituting part of the peritoneal membrane.

The Prosenteron.—This region is characterized, in the lower forms, by gills. In Balanoglossus and in Tunicata such a gill-bearing region is well developed, and in the Tunicata becomes extremely complex, in adaptation to their sessile habit, which requires large respiratory surface, since a change of water cannot be got by traveling. In Amphioxus the gill slits are simple but very numerous—100 or more. The variability in number arises from the fact that the slits continue to increase in number as the animal grows older, new ones being formed at the posterior end of the series. Thus the prosenteron grows at the expense of the mesenteron. In embryologic history a single row of 14 slits first arises as ventro-dextral organs; next, a second row of 9 slits is formed at the right of the first, which, as it grows larger, pushes the first row to the left side, where it lies permanently. The cause of the development of the left series on the right side is that the large mouth at first occupies the left side, and its movement ventrally is accompanied by profound changes in the surrounding parts. It has been suggested that the mouth of the ancestors of vertebrates was placed in the mid-dorsal line in front of the notochord; but that, the support of the notochord being needed for the snout in the animal's journeys through the sand, it pushed forward and thrust the mouth to one side. The mouth is dorsal, or, better, *neural,* in young tunicates and in adult annelids; and the embryonic changes in the position of the mouth in Amphioxus apparently recapitulate the phylogenetic changes. The gill slits of the young Amphioxus open from the gut cavity directly to the exterior, but later they open into a common atrium on the ventral side, which functions somewhat as an operculum. The details of the gill system of higher vertebrates will be discussed under RESPIRATORY SYSTEM. It is here merely necessary to say that the number of gill slits becomes much reduced, usually to five or six pairs of slits.

The Mouth.—The beginning of the alimentary tract is enlarged to form an oral or buccal cavity, provided with teeth and glands. The glands are modified skin glands, as would be

expected from their ectodermal origin. The glands develop by a depression of the epidermis and come to lie imbedded deeply in the cutis of mesenchymatous origin. The function of the glands is to keep the mouth moist, consequently they are found only in land vertebrates. The poison glands of serpents are modified oral glands. Salivary glands find their highest development in mammals. They are probably immensely developed skin glands or groups of such. They secrete a thick, glairy fluid, whose chief function is to moisten the food and thus to assist in its mastication and deglutition. On this account these glands are most highly developed in the Herbivora and are absent in Cetacea. Saliva also acts upon starchy food, converting it into sugar.

The tongue is a mass of intertwined muscles, having various functions, as of tasting, grasping, touching, and speaking. In fishes it is little developed, being represented by a thickening of the mucosa covering the ventral part of the hyoid bone. In Amphibia and reptiles it shows a great advance in size and complexity, being capable of extrusion to a great extent (especially in lizards), both through the elongating action of its intrinsic muscles and the forward movement of the base of the hyoid bone.

The thymus gland arises in fishes by the budding off of epithelial masses from the anterior four or five gill pockets; it is thus of multiplex origin. Usually these independently arising masses fuse into a pair of spindle-shaped bodies, but in the Gymnophiona the components persist as distinct bodies. In the land vertebrates, with fewer gill-slits, the points of origin are reduced in number. Into the paired masses connective tissue and blood vessels grow, eventually constituting the greater part of the organs. The function of the thymus is still unknown. It attains its largest size in reptiles and birds. In man it reaches its maximum development in the second year and then gradually degenerates.

The thyroid gland arises directly from the alimentary tract. It has a double origin. First, it arises as an unpaired pocket of the ventral wall of the pharynx behind the last gill-slit: the paired masses are called "accessory thyroid glands." The median part is morphologically the most important. It is the only part found in Amphioxus and Cyclostomi. In these groups it exists as a groove in the ventral wall of the pharynx, called the "hypobranchial groove." A similar groove is found in all tunicates (the "endostyle"), and is glandular in function. In the lower true vertebrates, where the paired components first arise, they remain distinct; in mammals all components fuse.

Œsophagus and Stomach. These parts of the alimentary tract constitute the fore gut in the more restricted sense. They are limited anteriorly by the oral cavity; the limitation is a sharp one, however, only in mammals, which possess a soft palate that curtains off the mouth from the respiratory passage. This soft palate makes its first appearance in the crocodiles, but without the uvula. The posterior limit of the fore gut is not always easy to fix, since not all vertebrates have a specialized stomach with a pyloric valve. The opening of the bile duct may be taken as the lower limit. The post-pharyngeal prosenteron is extremely short in Amphioxus and the lowest vertebrates, and is of relatively slight importance; it gains size and importance as we ascend the vertebrate series. The digestive function is, in the higher groups, transferred to a more anterior region of the enteron, and, coincidently, the entire alimentary tract, which is primitively straight, undergoes a great increase in length and becomes strongly folded. A differentiation of the prosenteron into œsophagus and stomach is first indicated in selachians, and becomes pronounced in Amphibia. The two organs differ not only in their diameter, but also in the character of the mucous membrane, which is smooth and forms a ciliated epithelium on the œsophagus and folded and non-ciliated in the stomach. In birds the œsophagus is specialized, in that it is greatly enlarged at one point, forming the crop. The crop is best developed in granivorous birds; in it grain is acted upon chemically. Certain fish-eating birds have a reservoir (false crop) for excess of food. Insectivorous and frugivorous birds have no sign of a crop. The stomach, likewise, is very complex in birds. There is first a highly glandular, chemically active *proventriculus*, and, below, a mechanically acting muscular stomach or gizzard. In mammals the stomach is the most distended and one of the most functional parts of the alimentary system. An anterior or cardiac portion can be distinguished from a posterior pyloric part. The stomach is larger and more complex in herbivores than in carnivores. In the herbivores the cardiac and pyloric parts are each divided into two parts. The first is a large sac called the pouch, or *rumen*. It communicates broadly with the second chamber, the *reticulum*, so called from its network of folds. Next comes the *psalterium*, whose walls are raised into high, thick-set folds, so that under most circumstances nothing but semi-fluid materials can pass between the folds. The last part is the *abomasum*, with highly vascular and glandular walls. This complex stomach seems to have arisen by natural selection as an adaptation to the peculiar habits possessed by the ruminants. They are all weak, defenseless mammals, and their herbivorous habits require that they shall feed in open fields where the danger of detection by the larger carnivores is very great. The shorter the time they are exposed in the open field the less will be the chance of their destruction. It has therefore been of advantage that they have become able to crop a large amount of grass rapidly without masticating it, the mastication being first done after the ruminant has retired from the field to the secluded forest. The food thus taken into the stomach fills the rumen and reticulum and is mingled with and partly macerated by the saliva. By the action of the abdominal muscles and diaphragm, as in hiccoughing, the food is returned to the mouth and is there masticated. Finally, divided and mixed with saliva, it passes down the œsophagus and is led by means of a special fold directly to the psalterium, through the leaves of which the finely triturated mass can pass. In the fourth part, or abomasum, true gastric digestion now occurs.

Intestinal Region. The mesenteron is, in the higher vertebrates, separated from the prosenteron by a circular fold of the intestinal wall, the pyloric valve. The function of the tract is, on the one hand, to secure fluids that will finish the work of digesting the food which was begun in the stomach, and on the other to absorb the products of digestion. The variations in form of the mesenteron are all to enable it to perform the processes to better advantage. Some of the variations are readily visible to the naked eye,

such as the foldings of the gut or out-pocketings from it; others are microscopic, and due to foldings in the lining of the alimentary tract.

Liver and Pancreas. The largest of these out-pocketings is the *liver*. It is phylogenetically an old organ, as it occurs in all the vertebrates, even in Amphioxus. The form of the liver is always closely adapted to that of the cavity in which it lies. In myxinoids it consists of two lobes, and this is probably the "ground-form" of the organ in all vertebrates. In many cases it is further subdivided into (dog, weasel) six or seven lobes even. The right lobe is the larger, and in it the gall-bladder, when present, lies imbedded. The liver arises as an evagination of the epithelial lining of the ventral wall of the anterior portion of the intestine. In Amphioxus it is located just behind the gill region. The hepatic fundaments are soon transformed into glands made up of branching tubules. The network of tubules early differentiates into excretory and secretory parts. In amphibians and reptiles the tubular nature of the gland is easily recognizable, but in higher vertebrates (birds, mammals, man) the tubular structure is inconspicuous. Simultaneously with the development of the tubules a meshwork of blood vessels appears in the liver. In birds and mammals at the point at which the primary bile ducts open into the duodenum a small evagination is formed. This evagination elongates to form the bile duct. The gall-bladder is a reservoir for storing the gall. It develops as an evagination of the bile duct or from the hepatic ducts. The liver serves as a storehouse in which the sugar not needed by the system for immediate consumption is stored up in the form of glycogen; it destroys the old red blood corpuscles and oxidizes nitrogenous materials into urea. Its function in digestion is less clearly understood. Fats, however, more easily pass through a membrane moistened with bile, and a greater proportion of fat passes unabsorbed through the intestine of a dog when the bile duct is stopped; hence bile probably aids in some way in the absorption of fats. The alkalinity of the bile also aids the pancreatic juice in overcoming the acidity of the gastric juice. Bile also aids in stimulating the action of the muscles of the intestine. Its absence leads to biliousness and even jaundice, and finally the bile acts as a preservative when deficient putrefaction of the contents of the alimentary canal results. The pancreas also arises as an evagination of the alimentary tract, but from the dorsal side of the duodenum, and usually opposite the origin of the liver. Except in cyclostomes and some teleosts, the pancreas is always present in vertebrates. Its size and form varies, and it is not infrequently lobate. In structure it is a racemose gland. Its secretion is either poured directly into the intestine (as in birds, crocodiles, Emydidæ, and some mammals), or, as development proceeds, its outlets move nearer and nearer the bile duct, and finally the secretions of the liver and pancreas are poured into the intestine through a common duct. The pancreatic secretion is alkaline. Its rôle in digestion is very great. Its action on starch is like that of the saliva, only much more energetic. Through the agency of the ferment trypsin it affects proteids, and by another ferment, steapsin, fats are split up into fatty acids and glycerin. The soap and glycerin are both soluble in water and hence are easily absorbed. Much of the fat, however, is emulsified by the albumen; that is to say, it is broken up into fine drops, which are prevented from fusing by the presence of a coating of albumen. The fat in the emulsion is probably capable of absorption as it is.

The Pyloric Tract. The straight tube of Amphioxus is chiefly an absorbing organ, the digestive secretions being poured into the cavity from the liver. In the earth-inhabiting Gymnophiona and Amphisbænæ and the elongated snakes the alimentary tract is little convoluted, since here either the process of absorption is not very rapid, or the area of the mid gut is, even when straight, considerable, relative to the total volume of the body (snakes). The mesenteron is also straight in Petromyzon and some of the sharks which lead an active carnivorous life, but the shortness is fully compensated for by an extensive folding of the inner absorbing surface through the formation of the so-called spiral fold, or spiral valve. The method of origin of the fold is seen in Petromyzon, where it is first represented by a strong, spirally twisted artery lying on the internal wall. This gradually sinks deeper and deeper toward the lumen of the gut, carrying the wall of the gut before it. As a result of this process we find a long, spirally twisted fold projecting far inward from the wall of the gut. The fold itself is richly vascular, from the ramifications of the small blood vessels from the artery. Such a spiral valve is found best developed in Selachians, but it exists also in Ganoids. Teleosts lack such a spiral valve, but the absorbing surface is increased by another means —namely, by out-pocketings, so-called *pyloric appendages*. That these are primarily not glands, but have an absorbing function, is indicated by two facts: (1) They are sometimes found stuffed with food, and (2) their presence seems to be correlated with the absence of the spiral valve and vice versa, even in closely allied species having similar habits; and therefore it is probable that they fulfill the same office in the economy of the organism. Thus, Polypterus possesses a well-developed spiral fold, but only a few pyloric appendages, while Lepidosteus, which is provided with only a slight fold, is superabundantly provided with pyloric appendages. All of this evidence is not quite satisfactory, and it seems probable that in some cases the pyloric appendages are indeed glandular—as, for instance, when several open into the mesenteron by a common duct. Physiological studies are needed to settle this question.

The Mesenteron.—From the Amphibia on, with exceptions, the mesenteron becomes more and more convoluted externally, and at the same time the absorbing surface is increased by folds. Thus, in the frog, the anterior part of the mesenteron is covered by a fine network of folds. Further posteriorly these arrange themselves into structures like the semi-lunar valves of the heart, opening backward. Similar contrivances for increasing the internal absorbing surface are found also in reptiles and birds. In birds and mammals, when the longitudinal folds of the mesenteron are poorly developed, we find finger-like processes—*villi*—produced into the lumen of the gut. Into these folds of the mucous epithelium are continued the connective tissue of the submucosa, together with blood vessels, lymph vessels, and nerves. Food in solution is taken up by the epithelial cells just as an amœba takes it up by throwing out pseudopodia. A large share of the absorptive process is probably to be assigned to the lymph cells, which wander

about in the submucosa and even make their way through the mucosa into the lumen of the gut.

Metenteron.—Like the other parts of the alimentary tract, this becomes differentiated from the common enteron only in the higher vertebrates. In the higher fishes it is indicated by an enlargement of the intestine. This enlargement is directly continuous posteriorly with the cloaca, into which also the urogenital ducts open. In Amphibia and reptiles the ventral wall of the hinder part of the metenteron is enlarged to form a (functional) urinary bladder. In Amniota the metenteron is separated from the mesenteron by an ileo-cæcal valve (q.v.). In nearly all vertebrates the metenteron—in contradistinction to mesenteron—has a straight course; hence it is often called *rectum.* In many mammals, as in man, it is greatly elongated, forming a colon ascendens, transversus, and descendens. A blind pocket or *cæcum* is often formed in connection with the metenteron and is a mere swelling in the wall in reptiles, but attains an enormous development in many birds, in which group it is usually paired. In mammals it is never so long as in birds, but is variable in extent. Thus, in herbivores it may even be as long as the body of the animal possessing it, and in some rodents it contains a spiral valve. In carnivores, on the contrary, it is poorly developed. It would seem to be somewhat compensatory with relation to the rest of the metenteron, for it is much better developed in the horse and allies which have a simple stomach than in the ruminants with a complicated one. Among certain mammals (e.g., man) the distal part of the cæcum is greatly reduced, forming the vermiform process. In man the cæcum is at first of nearly uniform character—the vermiform process arises by a degeneration of its distal end—a process which occurs relatively late. This indicates that in man the cæcum was quite recently of relatively greater importance, and indicates further that man's ancestors were herbivorous—a fact which the presence of the now degenerating third (hindermost) molar likewise confirms.

There are certain other appendages of the metenteron to which we can only refer. Such are the unpaired finger-shaped gland of the dorsal roof of the rectum in sharks, the paired dorsal pockets of Chelonia, and the unpaired bursa Fabricii of birds. The function of the last two organs is doubtful. The bursa Fabricii is a spherical or club-shaped organ lying ventrad to the vertebral columan and dorso-caudad to the rectum, to which it is attached posterio-ventrad to the urogenital opening. It arises as a solid mass, in which secondarily cavities appear, lined by epithelium from the mucosa of the metenteron. They are, therefore, not to be regarded as lymph spaces, nor the organ as a lymph organ. Its development is, therefore, much like that of the thymus gland. The organ degenerates toward the end of the first year, but persists throughout life in some species as an organ covered with a connective tissue coat, and possessing many elongated follicles lined by epithelium within. The function and phylogenetic significance of this organ are both obscure. Possibly it is homologous with the paired pockets of Chelonia; the ontogeny of these latter organs is, however, yet quite unknown.

ALI MIRZA, ä'lē mēr'zȧ, Mohammed (1872—). Shah of Persia, who succeeded his father, Muzaffar-ed-Din, on the death of the latter on Jan. 8, 1907. He was educated in Europe and prior to his succession to the throne was Governor-General of Azerbijan, a position in which heirs to the Persian throne usually receive their preliminary training. His European education, it was thought, had given him pronounced sympathies for western civilization, and hopes were entertained for the prosperity of Persia under his rule. Soon, however, he showed himself arbitrary and untrustworthy, and he became so unpopular that an attempt was made on his life on Feb. 28, 1908. The agitation made by the so-called Nationalist Party for reforms in the government in 1898 (see Persia) resulted in the practical defeat of Mohammed and the establishment of a Russian-English protectorate over Persia. Internal dissension continued in 1909, and on July 13 of that year the Nationalists succeeded in obtaining possession of Teheran, the capital. The Shah took refuge in the Russian legation, finding himself, on the formation of a Nationalist Assembly, deposed, and his son, Ahmed Mirza (q.v.), chosen Shah in his place. Forbidden to remain on Persian soil, Mohammed left for Russia, but at once began intrigues to regain his throne. Having succeeded in 1911 in raising and equipping a body of troops, he arrived in Persia in July of that year. At once the Mejliss, or Assembly, placed on his head a price of 100,000 tomans (about $178,000). His adherents were defeated by the Nationalist forces, and in March, 1912, he was obliged to return to Russia, where he rejoined his family.

AL'IMONY (Lat. *alimonia, alimonium,* nourishment, sustenance, from *alere,* to feed, nourish). In English and American law, the allowance which a married woman is entitled to receive out of her husband's estate by decree or order of the court on judicial separation or divorce *a mensa et thoro.* By Scotch legal writers the term is sometimes used as synonymous with aliment. In the United States jurisdiction with regard to alimony is conferred, in general, by statute on courts of equity. Alimony is of two sorts: *pendente lite* and permanent. The object of the first is to enable a wife to carry on litigation with her husband by securing her support during the pendency of suit. Should she have sufficient means of her own, no allowance will usually be made; the amount is fixed at the discretion of the court and may be changed by the same authority. Permanent alimony is a periodical allowance from a husband decreed to a wife as the result of litigation in her favor. If the result be against her, no allowance is made. The amount varies with the means of the husband and the needs and position of the wife, but is usually from a third to one-half of his income, and is subject to change from time to time, as the court finds circumstances to warrant. The court may enforce its decree by contempt proceedings and the commitment of the defaulting husband to jail, and can prevent a husband from leaving the State if it is made to appear that he means thereby to avoid payment. In some States alimony becomes a lien on the husband's real estate, or the court may compel him to give security for its prompt payment; or, in proper cases, the husband may be restrained by injunction from so disposing of his property as to place it beyond the reach of the court. See Divorce.

ALIN, ä'lĭn, Oscar Josef (1846–1900). A Swedish historian and politician, born at Falun. He became professor of political economy at the

University of Upsala in 1882, and later its rector. Becoming a member of the Riksdag in 1888, he came to have great influence in the councils of the Conservative party. He published many historical works, including *Bidrag till svenska rådets historia under medeltiden* (1872); *Sveriges Historia, 1511–1611* (1878); *Bidrag till svenska statsrickets historia* (1884–87); *Den svensk-norske Unionen* (2 vols., 1889–91); *Fjerde Artiklen af Fredstraktaten i Kiel, 1814* (1899).

ALI PASHA, ä'lē pä-shä' (1741–1822). An Albanian ruler, notorious for cruelty, and known as "the Lion of Janina." He was born at Tepeleni, in the Albanian province of Janina. His father, one of the Albanian beys, died in Ali's boyhood, and the rearing of the child was thus left to his mother, a vindictive and merciless woman, who apparently instilled into him her own spirit. His youth was passed in peril and hardship, seeking to recover the possessions of which the neighboring pashas had robbed his father. Young Ali at last had to betake himself to the mountains and even to pledge his sword to save himself from dying of hunger. At length a change came in his fortunes, and he returned to Tepeleni in triumph. On the very day of his return he murdered his brother and then imprisoned his mother on the charge of poisoning him. He helped the Porte to subdue the Pasha of Scutari and thereby obtained the lands taken from his father and several Greek cities. He also attacked and slew (with the permission of the Sultan) Selim, Pasha of Delvino, and, as a reward, was appointed Lieutenant to the new Pasha of Dervent. He used this office to enrich himself by sharing the profits of brigandage. For this he was deposed, but he bought his way back into favor. For his services in the Turkish military forces in the war of 1787 he was named Pasha of Trikala in Thessaly; at the same time he seized Janina and had himself appointed Pasha of that province. Having thus won a position of power by the most unscrupulous means, he displayed marked administrative ability. He swept his old friends, the robbers, from the mountain roads, incorporated them into military troops, quelled the wretched factions that prevailed, and everywhere introduced order in the place of anarchy by the vigor and vigilance of his administration.

In order to gain a seaport on the Albanian coast Ali formed an alliance with Napoleon. But Napoleon was defeated in Egypt, and Ali, not to be caught on the losing side, changed friends quickly and as an ally of the English soon found himself in full possession of three towns on the Adriatic. He revenged upon the inhabitants of Gardiki an injury done to his mother 40 years before, by the murder of 739 male descendants of the original offenders, who themselves were all dead. But at the same time he maintained order and justice. Security and peace reigned, highroads were constructed, and industry flourished, so that the European travelers, with whom he willingly held intercourse, considered him an active and intelligent governor. From the year 1807, when he once more entered into an alliance with Napoleon, the dependence of Ali on the Porte was merely nominal. Having failed, however, to obtain, through the influence of Napoleon, Parga, on the coast of Albania, and the Ionian Islands, he now entered into an alliance with the English, to whom he made many concessions. In return for these they granted Parga, nominally to the Sultan, but really to Ali. As he now considered his power to be securely established, he caused the commanders of the Greek armatole (or Greek militia), who had hitherto given him assistance, to be privately assassinated one by one, while at the same time he put to death the assassins, to save himself from the suspicion of having been their instigator. The Porte at length determined to put an end to the power of this daring rebel; and in 1820 Sultan Mahmud sentenced him to be deposed. Ali put up a stiff fight, but at last surrendered, on the security of an oath that his life and property would be granted him; the Turks, however, stabbed and then decapitated him. Ali, like many other half-civilized monarchs and chiefs who have lived within the sphere of European influence, was keenly alive to whatever occurred among the powers of Christendom. Though utterly illiterate himself, he had all the foreign journals translated and read to him. He watched every political change, as if conscious that the interests of his little region depended for their future prosperity on the West, and not on the East, and made friendly advances to both the French and English. Consult: Ibrahim Manzour Effendi, *Mémoires sur le Grèce et l'Albanie pendant le gouvernement d'Ali Pacha* (Paris, 1827); Pencker, *Die Sulioten und ihre Kriege mit Ali Pascha von Janina* (Breslau, 1834); Davenport, *The Life of Ali Pasha* (London, 1837).

AL'IQUOT PART (Lat. *aliquot*, some, several). One quantity or number is said to be an aliquot part of another when the quotient of the latter divided by the former is an integer; e.g., 2, 4, 5, 10, 12½, are aliquot parts of 100.

ALISCANS, ä'lē'skäN', **ALESCHANS,** or **LES ALYSCAMPS,** lā zä'lē'skäN' (from Lat. *Elysii Campi*, Elysian Fields). A mediæval cemetery near Arles, in the south of France, supposed to have been consecrated by an apparition of Christ himself. Hence the name of a *chanson de geste*, of the twelfth century, describing two battles fought in this place by William, Count of Orange, against the Saracens. Defeated in the first fight, he raised a new army and renewed the combat with success. The same Christian hero appears in various other *chansons* of the period.

AL'ISMA'CEÆ. A family of monocotyledonous plants, containing about 15 genera and 60 species, widely distributed in fresh-water swamps and streams. Conspicuous representatives of the group are arrow leaf or arrow head (*Sagittaria*), and water plantain (*Alisma*).

AL'ISON. The young wife of John, a rich but miserly old carpenter in Chaucer's *Miller's Tale*. She was "long as a mast and upright as a bolt," more "pleasant to look upon than a flowering pear tree," and her skin "was softer than the wool of a wether." Absolon, a parish clerk, was in love with her, but she herself loved Nicholas, a threadbare scholar lodging in her husband's house.

ALISON, Rev. Archibald (1757–1839). An English philosophical writer. He was born in Edinburgh and studied at the University of Glasgow and afterward at Oxford. He took orders in the Church of England and subsequently held several preferments, among others a prebendal stall in Salisbury, and the perpetual curacy of Kenley, in Shropshire. From 1800 he officiated in a chapel in his native city,

where he remained till his death. Alison is principally known by his *Essays on the Nature and Principles of Taste*, first published at Edinburgh in 1790. The *Essays* advocate what is called the "association" theory of the sublime and beautiful. Two volumes of his sermons, first published at Edinburgh in 1814, were very popular in their day, and reached the sixth edition in 1816. See ÆSTHETICS.

ALISON, Sir ARCHIBALD (1792–1867). A British lawyer, historian, and writer. He was born at Kenley, Shropshire, Dec. 29, 1792. In 1805 he entered Edinburgh University, where he obtained highest honors in Greek and mathematics. He was called to the bar in 1814 and, owing to friendly influence, presently made a handsome income, which enabled him to travel on the Continent, then sought by many young men who desired to visit the scenes of the wars against Napoleon. From 1822 to 1830 he was advocate-deputy, and made his appearance as a writer on law, politics, and literature. In 1835 he settled near Glasgow, as Sheriff of Lanarkshire, an office conferred on him the preceding year, and began systematic and unremitting public and literary work. His *History of Europe*, a popular rather than a profound book (10 vols.), begun in 1829, finished in 1842, achieved a great success. For the sixth edition, published in 1844, the author received 2000 guineas. By 1848, 100,000 copies had been sold in the United States. It was translated into several languages, including French, German, and even Arabic. A continuation of the *History* for the period 1815–1852 (9 vols.) was completed in 1859. His other works, *Life of the Duke of Marlborough* (1845), *The Principles of Population* (1840), etc., though less successful, attracted wide notice. In 1845 he was elected Lord Rector of Marischal College and in 1851 of Glasgow University. He was made D.C.L. of Oxford University, and in 1852 received a baronetcy. In politics he was an arch-Tory. He continued his labors, in health and strength, almost to the day of his death, May 23, 1867. Over 100,000 persons attended his funeral. Consult his *Autobiography*, edited by his daughter-in-law (Edinburgh, 1883).

ALISON, Sir ARCHIBALD, Jr., K.C.B. (1826–1907). A British general. He was born in Edinburgh, the son of the historian, and educated at Edinburgh and Glasgow universities. He entered the army in 1846; served in the Crimean War at the siege of Sebastopol, and in India, where he lost an arm at the relief of Lucknow; and in the Ashanti expedition of 1873–74 he commanded the European brigade. He held an active command in the Egyptian expedition of 1882–83 and was promoted to be lieutenant-general for gallantry. On his return from Egypt he commanded at Aldershot in 1883–89, in 1888 was made an adjutant-general, and in 1889 was chosen military member of the Council of India. Four years later he was retired. He published a valuable treatise on *Army Organization* (1869).

ALISON, WILLIAM PULTENEY, M.D. (1790–1859). A Scotch political economist, physician, and professor of the practice of medicine in the University of Edinburgh from 1822 to 1856. He was an elder brother of the historian and was extremely popular with all classes of the community, because of his efforts to alleviate the sufferings of the poor. A pamphlet published by him in 1840 had the effect of bringing about an improved poor-law for Scotland. He published a work entitled *A Dissertation on the Reclamation of Waste Lands* (1850), recommending the colonization of such lands by paupers and criminals, and several books upon medical subjects, among which may be mentioned his complete treatises on general pathology entitled *Outlines of Physiology* (3d ed., 1831), and *Outlines of Pathology and Practice of Medicine* (1844).

A'LITHE'A. The name of a character in Wycherley's play, *The Country Wife*, and in Garrick's *Country Girl*. She is a self-possessed and witty woman of the world.

ALIZ'ARIN (probably from Ar. *al*, the + *'aṣārah*, juice extracted from a plant), sometimes called madder extract. An exceedingly valuable coloring matter. With the oxides of aluminium, iron, and most other metals, it gives a series of beautifully colored insoluble salts or *lakes*. It was first obtained from madder (the root of *rubia tinctoria*), which has been used for ages in dyeing Turkey-red on cotton. In 1868 Graebe and Liebermann discovered a process by which it could be manufactured from anthracene, thus for the first time artificially producing a natural coloring substance. Their method, since modified with a view to economy, consists in the following operations: (1) *Anthracene*, a hydro-carbon contained in the refuse coal-tar of gas works, is oxidized with potassium bichromate to yield the compound *anthraquinone;* (2) when anthraquinone is heated with fuming sulphuric acid, *anthraquinone-sulphonic acids* are produced; (3) if the sodium salts of these acids are kept for 48 hours, in closed cylinders, with caustic soda and potassium chlorate, at a temperature of 180° C., the sodium salts of *alizarin* and similar compounds, called *purpurins*, are obtained; (4) the sodium salts of alizarin and purpurin are then dissolved in water, and, by addition of hydrochloric acid, alizarin itself and the purpurins are set free and precipitated in crystalline form. The precipitate is collected in filter-presses, thoroughly washed with water, and brought into the market in the form of a rather thin paste usually containing either 10 or 20 per cent of alizarin. Pure alizarin can be readily obtained from this paste by sublimation. Alizarin was first made on an industrial scale by Perkin in 1869.

Alizarin is to some extent soluble in hot water. In the dyeing processes fabrics are first soaked in a solution of the required mordant, and after the latter has been decomposed by steam or with alkali, leaving an insoluble metallic hydroxide in the fibre, alizarin solution is applied to produce the desired "lake."

Chemically, alizarin is a dioxy-anthraquinone, having the structural formula

$$C_6H_4\begin{matrix}CO\\CO\end{matrix}C_6H_2(OH)_2.$$

Nitro-alizarin (commercial *alizarin orange*), which is itself a coloring matter, yields, when heated with glycerin and sulphuric acid, another color, *alizarin blue*, used in calico printing. *Alizarin carmin* is another important alizarin color; it is much used as a substitute for cochineal.

The artificial production of alizarin on a large industrial scale has naturally brought about important changes in the agriculture of

the countries where madder used to be extensively cultivated. Consult: Auerbach, *Das Anthracen und seine Derivate* (2d ed., Brunswick, 1880); Gnehm, *Die Anthracenfarbstoffe* (Brunswick, 1897); Benedikt, *The Chemistry of the Coal-Tar Colors* (trans. by Knecht, 3d ed., London, 1900); Green, *A Systematic Survey of the Organic Coloring Matters* (London, 1904).

AL/KAHEST, or ALCAHEST (a word arbitrarily formed by Paracelsus after Arabic fashion). See ALCHEMY.

ALKAHEST, or THE HOUSE OF CLAES (*The Search for the Absolute*) published in 1834, is one of the most striking novels in Balzac's series *La Comédie Humaine*. Its central character, a Flemish chemist of wealth and position, devotes everything—fortune, name, health, and even sanity—to solve the mystery of matter and finally dies heart-broken and defeated.

AL/KALIES. See ANTIDOTES.

ALKALIES (Fr. *alkali*, ultimately from Ar. *al*, the + *kaly*, ashes of saltwort). A term applied to the compounds of hydrogen and oxygen with the metals lithium, sodium, potassium, rubidium, cæsium, and the radicle ammonium. The alkalies are all soluble in water and have the property of neutralizing acids as well as of turning solutions of red litmus blue. The word "alkal," which is derived from the Arabic, and means *ash*, was originally given to the ashes of sea plants, and was applied first to potash, called the *vegetable alkali*, and then to soda, which was derived from rock salt and called *mineral alkali*. These two became known as the fixed *alkalies*, in distinction from ammonia, which was called the *volatile alkali*. The alkalies are exceedingly caustic and act as powerful corrosive poisons. They show great avidity for acids and combine with them, forming salts, in which the special properties of both acid and alkali are generally destroyed; hence they are said to neutralize one another. (See ACIDS.) The alkalies find extensive use in the arts, as in the manufacture of soap and of baking powders, and in dyeing. The alkaline earths, lime, magnesia, baryta, and strontia, form a group of substances closely allied to the alkalies, but differing from the latter in being less soluble and by the fact that their carbonates are insoluble in water. Consult G. Lunge, *A Theoretical and Practical Treatise on the Manufacture of Sulphuric Acid and Alkali* (London, 1891), and *The Alkali-Maker's Handbook* (London, 1891). See BASE.

AL/KALI FLAT. See PLAYA.

ALKALIMETER. See ACIDIMETRY AND ALKALIMETRY.

AL/KALI SOILS. A term applied to soils occurring in regions of deficient or irregular rainfall, which contain unusually large amounts of soluble salts concentrated in or near the surface. Under certain conditions of moisture these salts appear on the surface of the soil in the form of a crust or powder known as *reh* in India, *sabach* in Egypt, and *alkali* in America. The main constituents of this saline efflorescence are sodium sulphate, sodium carbonate, and sodium chloride, mixed in varying proportions. There are also present salts of calcium and magnesium and smaller amounts of potassium sulphate, sodium phosphate, and sodium nitrate, these salts furnishing the most important elements of plant food. Two main classes of alkali are commonly distinguished: "black" alkali, in which sodium carbonate predominates, and which is on this account highly corrosive and injurious to vegetation; and "white" alkali, the predominant constituent of which is sodium sulphate, and which is much less harmful to plant growth than is the black form. A saline form in which sodium chloride predominates is also frequently met with. Black alkali derives its name from the dark-colored spots which may usually be observed where it abounds, and which owe their color to the organic matter dissolved from the soil by the sodium carbonate.

Practically the same soluble (alkali) salts occur in all soils, but in humid regions the abundant rainfall prevents their accumulation on or near the surface, carrying away in the drainage those salts for which the soil has not a strong absorptive power. In regions of deficient rainfall, on the other hand, the scanty moisture which reaches the soil merely serves to dissolve the salts and carry them down a short distance into the ground, whence they are rapidly drawn up by the capillary rise of the water. The moisture, evaporating at the surface, leaves the salts accumulated there. Such accumulations of alkali are also found in regions which have a rainy and a dry season (as in parts of India), and where the rains occur commonly in sudden and violent downpours, which quickly pass without wetting the soil to any considerable depth.

In irrigated regions alkali frequently appears at the surface of the soil as a result of excessive application of water combined with defective drainage. Irrigation water, carried by canals running through porous, sandy soils, or applied in excessive amounts on the higher lands, seeps through to the lower-lying lands, carrying with it the soluble salts. Conditions are sometimes aggravated by the use of irrigation water rich in soluble salts.

Alkali soils generally occur in circumscribed areas ("spots"), but sometimes as broad stretches of "alkali deserts." Such soils are common in arid regions, i.e., where the average annual rainfall is less than 20 inches (500 millimeters). According to Hilgard, "the arid region, thus defined, includes, in North America, most of the country lying west of the one hundredth meridian, up to the Cascade Mountains, and northward beyond the line of the United States; southward, it reaches far into Mexico, including especially the Mexican plateau. In South America it includes nearly all the Pacific slope (Peru and Chile) south to Araucania; and eastward of the Andes the greater portion of the plains of western Brazil and Argentina. In Europe only a small portion of the Mediterranean border is included; but the entire African coast belt opposite, with the Saharan and Libyan deserts, Egypt, and Arabia are included therein, as well as a considerable portion of South Africa. In Asia, Asia Minor, Syria (with Palestine), Mesopotamia, Persia, and northwestern India up to the Ganges, and northward, the great plains or steppes of central Asia eastward to Mongolia and western China, fall into the same category, as does also a large portion of the Australian continent." There are extensive regions, especially in European Russia, which are not strictly arid according to this definition, but in which alkali soils are of frequent occurrence.

Alkali injures plants by its corrosive action

(in the case of black alkali) on the root crown, and by interference with osmotic action, by which seeds and plants take up the moisture and soil solutions, and thus prevents or seriously retards germination and growth. The latter effect results only when the soluble salts are present in considerable amount; on the other hand, a small amount of alkali appears to have a beneficial effect. Alkali, especially the black variety, also renders soils pasty and difficult to till and drain, and tends to form a tough hardpan impervious to water. Alkali soils are, as a rule, more moist than those free from a localized excess of soluble salts. This is due to the strong absorptive power of the salts for water and their retarding effect on evaporation.

Alkali soils are generally so fertile when freed from excess of noxious salts, and their area is so rapidly increasing under careless methods of irrigation, that the reclamation of alkali lands is a matter of the greatest agricultural importance. Alkali soils may be improved by (1) reducing surface evaporation, which may be effected by maintaining a loose tilth in the surface soil, by mulching, and by the growth of plants which root deeply and shade the soil, or which take up large amounts of soluble salts in their growth; (2) deep and thorough tillage; (3) the use (on black alkali) of chemical correctives, such as gypsum, which converts most of the corrosive carbonate into the comparatively harmless sulphate; and (4) leaching out the excess of salts by irrigation in connection with underdraining. The first two methods of treatment are merely temporary expedients, and are of value only when the amount of alkali is small. The third also affords only temporary relief, and is of value mainly when the amount of alkali is small and of the black variety. It is, however, very effective when employed in connection with the fourth method, for it improves the drainage, and tends to fix in the soil certain of the valuable fertilizing constituents, especially alkaline phosphates and humus, which would otherwise be lost in the subsequent leaching; for it must be borne in mind that, although the leaching process is effective in removing the noxious salts, it is likely to carry away with them a large part of those ingredients upon which the productiveness of the soil depends.

Alkali lands are commonly either entirely devoid of vegetation, or else produce plants of little or no value to man. Plants differ widely as regards tolerance of alkali in the soil, the tolerance depending much upon the kind and proportion of the salts present as well as upon the nature of the plant itself. Hilgard proposes to utilize the natural vegetation as an index of the kind of salts predominating in a soil. Thus, under California conditions, the samphires (*Salicornia subterminalis* and *Allenrolfea occidentalis*), alkali-heath (*Frankenia grandifolia campestris*), and *Cressa cretica truxillensis* are especially indicative of excessive amounts of salts of any kind; tussock grass (*Sporobolus airoides*) and greasewood (*Sarcobatus vermiculatus*) of the presence of large amounts of black alkali; and samphires and saltworts (*Suæda torreyana and Suæda suffrutescens*) of white alkali. The natural vegetation also furnishes, according to Hilgard, a means of determining the reclaimability of alkali soils. Thus, when tussock grass, greasewood, the samphires, saltworts, alkali-heath, and cressa occupy the ground as an abundant and luxuriant growth, such land is considered irreclaimable for ordinary crops unless underdrained for the purpose of washing out surplus salts, as explained above. The more important and valuable of the plants which can withstand large amounts of alkali are the Australian salt-bushes (*Atriplex* spp.), *Modiola decumbens*, tussock grass (*Sporobolus airoides*), wild millet (*Beckmannia crucæformis*), and barnyard grass (*Panicum crus-galli*). Of ordinary farm crops which show a marked tolerance of alkali may be mentioned rice, the millets, beets, English rape, sunflowers, asparagus, celery, spinach, onion, alfalfa, Bokhara clover, and grapes. The Australian salt-bushes, especially *Atriplex semibaccata*, have recently come into considerable prominence as a useful crop for alkali soils. They are highly tolerant of alkali, taking up large amounts of the soluble salts in their growth (nearly 20 per cent of the dry matter of salt-bushes is ash), and they produce a forage of considerable value.

Bibliography. E. W. Hilgard, *Soils* (New York, 1906). C. W. Dorsey, "Reclamation of Alkali Soils," and "Alkali Soils of the United States" (*U. S. Bureau of Soils, Bulletins 34 and 35*, 1906), *U. S. Bureau of Soils, Bulletins 14, 17, 18, 21, 33, 42, 43, 44, 52, Circulars 11* and *12*, and *Reports of Field Operations*, 1899 to date (Washington, 1900—); *U. S. Dept. Agr., Report 71* (Washington, 1902); *Farmers' Bulletin 371; Office of Experiment Stations, Bulletin 217; Reports of Wyoming Experiment Station* (Laramie, 1896–1900); T. H. Kearney, "The Choice of Crops for Alkali Lands," *U. S. Dept. Agr., Farmers' Bulletin 446;* G. P. Merrill, *A Treatise on Rocks, Rock Weathering, and Soils* (New York, 1897).

AL'KALOIDS (literally, resembling alkali). A term applied to all nitrogenous basic compounds found in plants, mostly in the monocotyledon species. They arise in plants, probably, through the decomposition of more complex nitrogenous substances; the decomposition products first found react with other substances present and turn into methyl derivatives, esters, or glucosides; finally, these derivative alkaloids combine with the acids present in the plant to form salts. The alkaloids are, as a rule, the most important medicinal principles of the plants from which they are derived, and in moderate doses constitute therapeutic agents of the highest value. In larger quantities, however, they are extremely poisonous. Most alkaloids are chemically composed of carbon, hydrogen, nitrogen, and oxygen. A very few, including the well-known nicotine of tobacco, and coniine, contain carbon, hydrogen, and nitrogen, but no oxygen. The alkaloids that contain oxygen are non-volatile solids, and can mostly be obtained in the form of colorless crystals. Those that contain no oxygen are volatile liquids. The separation of the two groups of alkaloids can therefore be readily effected by simply subjecting the given mixture to a process of distillation. Like most other substances occurring in plants, the alkaloids are optically active, generally turning the plane of polarized light to the left. See STEREO-CHEMISTRY.

Many alkaloids are chemically related to the organic bases, *pyridine, pyrrolidine, quinoline, iso-quinoline,* and *purine.* Thus, coniine, piperine, and trigonelline are pyridine derivatives; atropine, cocaine, ecgonine, and nicotine are

pyrrolidine derivatives; brucine, cinchonidine, cinchonine, quinine, and strychnine are quinoline derivatives; hydrastine, narceine, narcotine, and papaverine are iso-quinoline derivatives; while caffeine, theobromine, and theophylline are purine derivatives and therefore relatives of uric acid. The parent substances (pyridine, quinoline, etc.) of the alkaloids, appear in the free state when the latter are subjected to such violent reactions as fusion with caustic soda or potash, strong heating with phosphoric acid, distillation with zinc dust, or the like. Most alkaloids contain one or more methoxyl (OCH_3) groups. The presence of these, and the number of them present, may be determined by Zeisel's method, which consists in boiling the given alkaloid with hydro-iodic acid; the result is that the methoxyl groups present are replaced by hydrogen atoms, while as many methyliodide molecules appear as a by-product as there were methoxyl groups in the alkaloid molecule.

In recent years important advances have been made in our knowledge of the constitution of the alkaloids, and many of these substances have been obtained synthetically. Some of the more valuable results of recent study are incorporated in the list given below and in special articles under the names of the more important alkaloids.

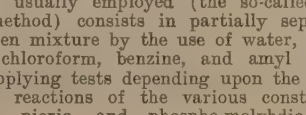
In contradistinction to the true, or *natural alkaloids*, a certain number of substances not found ready-formed in nature, but prepared artificially in the chemical laboratory, have been termed *artificial alkaloids*. Antipyrine, kairine, thalline, and the ordinary acet-anilide, or antifebrine, are examples of artificial alkaloids, which resemble the natural alkaloids in their physiological action.

The separation and detection of the several alkaloids is often a matter of great importance in medico-legal examinations. The analytical method usually employed (the so-called Stas-Otto method) consists in partially separating the given mixture by the use of water, alcohol, ether, chloroform, benzine, and amyl alcohol, then applying tests depending upon the characteristic reactions of the various constituents. Tannic, picric, and phospho-molybdic acids, potassium-mercuric iodide, and a few other reagents form insoluble precipitates with the alkaloids.

The following are the more important natural alkaloids, their characteristic properties, and the sources from which they are obtained.

Aconitine, $C_{34}H_{47}NO_{11}$; melting point, 184° C.; insoluble in water; soluble in alcohol, ether, and chloroform; a violet coloration is produced when its solution in phosphoric acid is cautiously evaporated. It is found in aconite, the tuber of *Aconitum napellus* Linné.

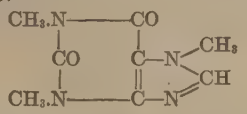
Atropine, or *Daturine*, $C_{17}H_{23}NO_3$; melting point, 115° C.; soluble in alcohol and chloroform; sparingly soluble in hot water and in ether. It does not exist ready-formed in nature, but is produced by the transformation of the alkaloid hyoscyamine. Atropine has been reproduced synthetically. Its constitution is represented by the formula:



Berberine, $C_{20}H_{17}NO_4+4.5H_2O$; melting point, 120° C.; soluble in hot water or alcohol; its aqueous solution is colored red by chlorine. It is found in yellow puccoon, the rhizome and roots of *Hydrastis canadensis* Linné; also, in Canadian moonseed, the rhizome and roots of *Menispermum canadense* Linné, and in other plants.

Brucine, $C_{23}H_{26}N_2O_4+4H_2O$; melting point, 100° C.; soluble in alcohol and in chloroform. It imparts to strong nitric acid a red coloration that gradually changes to yellow; the coloration becomes violet on addition of stannous chloride. It is found along with strychnine, in nux vomica.

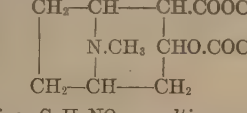
Caffeine or *Theine*, $C_8H_{10}N_4O_2$; melting point, 230.5° C.; soluble in hot water and in chloroform; sparingly soluble in hot alcohol. If its solution in chlorine water is evaporated and ammonia added to the residue, the latter turns purple. It is found in many plants and is contained in considerable quantities in tea and coffee. Caffeine has been reproduced synthetically. Its constitution is represented by the formula:



Cinchonidine, $C_{19}H_{22}N_2O$; melting point, 200.5° C.; soluble in chloroform and in alcohol. It is lævo-rotatory (i.e., its solutions turn the plane of polarized light to the left). It is found along with quinine in cinchona bark. Cinchonidine is probably a stereo-isomer (see STEREOCHEMISTRY) of cinchonine.

Cinchonine, $C_{19}H_{22}N_2O$; melting point about 240° C.; sparingly soluble in chloroform and in hot alcohol. It is dextro-rotatory and is found in cinchona bark. Cinchonine has not yet been synthesized, and its constitution is not quite completely established.

Cocaine, $C_{17}H_{21}NO_4$; melting point, 98° C.; soluble in alcohol and in ether; sparingly soluble in water. It produces local anæsthesia when injected subcutaneously or applied to mucous membranes. It is found in coca, or cuca, the leaves of *Erythroxylon coca* Lamarck. Cocaine has been reproduced synthetically. Its constitution is represented by the formula:

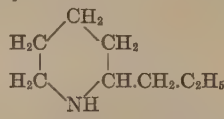


Codeine, $C_{18}H_{21}NO_3$; melting point, 155° C.; soluble in alcohol, chloroform, and ether. With strong sulphuric acid and chloride of iron it gives a blue coloration. It is one of the alkaloids contained in opium.

Colchicine, $C_{22}H_{25}NO_6$; melting point, 145° C.; soluble in water, alcohol, and chloroform. It imparts to strong nitric acid a violet color which gradually turns brown. It is the active principle of colchicum root, the corm of *Colchicum autumnale* Linné.

Coniine, $C_8H_{17}N$; boiling point, 168.5° C.; soluble in alcohol, ether, and chloroform; sparingly soluble in water. Its aqueous solution gives a brown precipitate with a solution of iodine. Coniine has dextro-rotatory power. It

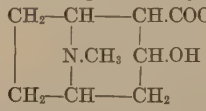
is the active principle of hemlock, the fruit of *Conium maculatum* Linné. Coniine has been reproduced synthetically. Its constitution is represented by the formula:



Curarine. $C_{18}H_{35}N$ (or $C_{16}H_{25}N$?); a yellow powder, soluble in water and in alcohol; turns purple if treated with strong hydrochloric acid. It is the active principle of the South American arrow poison curare, which is made from certain plants, including species of *Strychnos.*

Daturine, see *Atropine,* above.

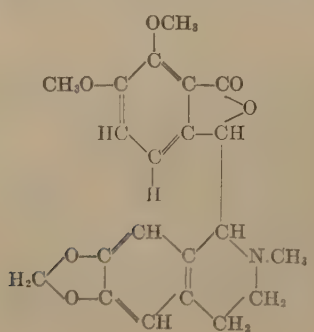
Ecgonine, $C_9H_{15}NO_3$; melting point, 205° C.; soluble in water and in ethyl acetate; sparingly soluble in alcohol and ether; insoluble in acetone, chloroform, toluene, carbon disulphide, and carbon tetrachloride. It occurs together with cocaine in coca, the leaves of *Erythroxylon coca* Lamarck. It has been reproduced synthetically, and its constitution, which is very similar to that of cocaine, is represented by the formula:



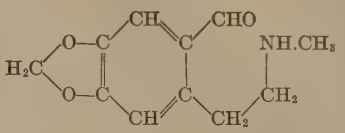
Emetine, $C_{30}H_{40}N_2O_5$ (or $C_{28}H_{40}N_2O_5$?); melting point, 62°–65° C.; soluble in alcohol, ether, and chloroform; gives with a solution of sodium molybdate in strong sulphuric acid a brown coloration which turns blue on addition of hydrochloric acid. It is the active principle of ipecac, the root of *Cephaëlis ipecacuanha.*

Eserine, or *Physostigmine,* $C_{15}H_{21}N_3O_2$; melting point, 40°–45° C.; soluble in alcohol, ether, and chloroform; bleaching powder colors its solution red, but the color disappears again on addition of an excess of bleaching powder. It is the active principle of Calabar bean, the seed of *Physostigma venenosum* Balfour.

Hydrastine, $C_{21}H_{21}NO_6$; melting point, 132° C.; soluble in chloroform and in benzine, sparingly soluble in ether and alcohol, almost insoluble in water. Two drops of dilute potassium permanganate solution, added to a solution of hydrastine sulphate, produce an intense blue fluorescence. Hydrastine occurs, together with berberine (see above) in yellow puccoon, the rhizome and roots of *Hydrastis canadensis* Linné. Its constitution is represented by the formula:



Hydrastinine, $C_{11}H_{13}NO_2$; melting point, 116°–117° C.; extremely soluble in alcohol, ether, and chloroform; sparingly soluble in hot water; in the form of its hydrochloride it is used as a reliable remedy for menorrhagia and metrorrhagia. It does not exist ready-formed in nature, but is produced by oxidizing hydrastine (see above) with nitric acid. Its constitution is represented by the formula:

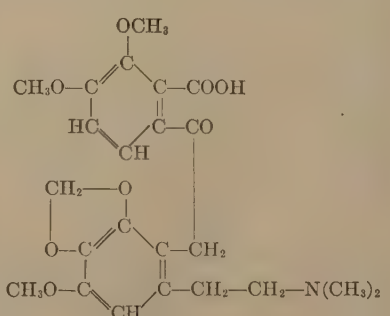


Hyoscyamine, $C_{17}H_{23}NO_3$; melting point, 108.5° C.; soluble in water, alcohol, ether, and chloroform; gives a purple color with strong nitric acid. By the action of caustic alkalies it is readily transformed into the alkaloid atropine (see above). Hyoscyamine is found in many plants of the natural order *Solanaceæ;* e.g., in henbane, the leaves and flowering tops of *Hyoscyamus niger* Linné, and in the leaves of *Atropa belladonna* Linné.

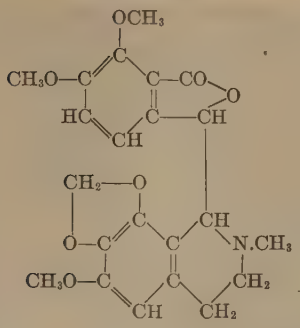
Morphine, $C_{17}H_{19}NO_3$; melting point, 230° C. It may be extracted from alkaline solutions by means of chloroform. With strong nitric acid it gives a blood-red coloration that gradually turns yellow. It is one of the constituents of opium.

Muscarine, $C_5H_{15}NO_3$; a liquid soluble in water and in alcohol; insoluble in ether and chloroform. It is found in the fly fungus, *Amanita muscaria.*

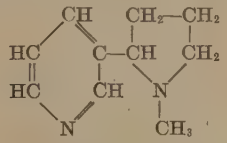
Narceine, $C_{23}H_{29}NO_9$; melting point, 145.2° C.; sparingly soluble in the ordinary solvents. A solution of sodium molybdate in strong sulphuric acid gives a green coloration that turns dark-red. It is one of the constituents of opium and resembles morphine in its physiological action. Its constitution is represented by the formula:



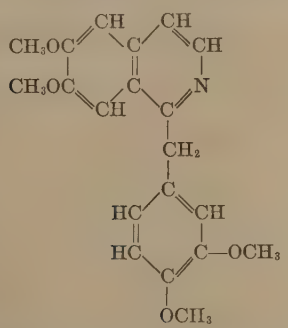
Narcotine, $C_{22}H_{23}NO_7$; melting point, 176°; soluble in chloroform, less soluble in hot alcohol and ether. Its solutions are lævo-rotatory, but when acidified turn the plane of polarized light to the right. It is one of the constituents of opium. Its chemical constitution is represented by the formula:



Nicotine, $C_{10}H_{14}N_2$; boiling point, 241° C.; soluble in water, alcohol, and ether; its smell and taste are like those of tobacco. With hydrochloric acid it gives a violet coloration that turns orange on addition of nitric acid; with iodine solutions it gives a yellow precipitate. It is the active principle of tobacco, the dried leaves of *Nicotiana tabacum;* tobacco smoke, however, contains no nicotine. Nicotine was reproduced synthetically by Pictet in 1903. Its constitution is represented by the formula:



Papaverine, $C_{20}H_{21}NO_4$; melting point, 147° C.; soluble in hot alcohol and in chloroform; gives a violet coloration with strong sulphuric acid. It is found in opium. Its chemical constitution is represented by the formula:

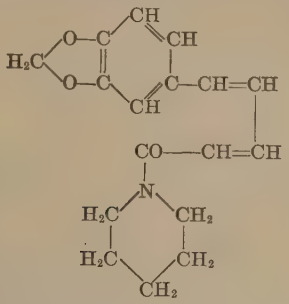


Physostigmine, see *Eserine*, above.

Pilocarpine, $C_{11}H_{16}N_2O_2$; a semi-fluid alkaloid soluble in alcohol, ether, and chloroform; gives a green coloration with strong sulphuric acid and potassium bi-chromate. It is one of the active principles of pilocarpus, or jaborandi, the leaflets of *Pilocarpus selloanus* Engler, or of *Pilocarpus jaborandi* Holmes.

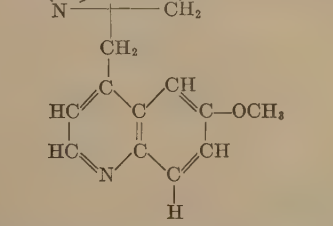
Piperidine, $C_5H_{11}N$; a liquid alkaloid produced by the decomposition of piperine, a substance found in pepper.

Piperine, $C_{17}H_{19}NO_3$; melting point, 128° C.; soluble in hot water and in chloroform; with strong sulphuric acid it gives a yellow color that changes to brown, then to a greenish brown. It is found in plants of the natural order *Piperaceæ*, and is one of the chief constituents of ordinary black pepper. Piperine has been reproduced synthetically. Its chemical constitution is represented by the formula:



Quinidine, $C_{20}H_{24}N_2O_2$; melting point, 168° C.; soluble in chloroform, less so in alcohol and ether; sparingly soluble in water; its solution turns the plane of polarized light to the right. It is found in cinchona bark.

Quinine, $C_{20}H_{24}N_2O_2 + 3H_2O$; melts in its water of crystallization at 57° C., loses its water at 100°, then melts again at 177° C.; soluble in alcohol, ether, and chloroform; sparingly soluble in water; its solutions turn the plane of polarized light to the left. It is found in cinchona bark. Quinine *probably* has the constitution represented by the following formula:



Solanine, $C_{42}H_{73}NO_{15}$; melting point, 235° C.; it may be extracted from its alkaline solutions by means of chloroform; with strong sulphuric acid it gives an orange coloration that turns a brownish red. It is found in bittersweet (woody nightshade), the young branches of *Solanum dulcamara* Linné.

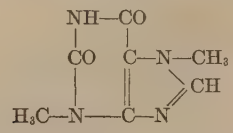
Strychnine, $C_{21}H_{22}N_2O_2$; melting point, about 264° C.; soluble in chloroform and in hot alcohol; sparingly soluble in water and in ether. It gives a pretty display of colors with strong sulphuric acid and a grain of potassium bichromate. It is found in plants of the natural order *Loganiaceæ* and is usually obtained from nux vomica.

Thebaine, or *Paramorphine*, $C_{19}H_{21}NO_3$; melting point, 193° C.; soluble in alcohol and chloroform; gives, with strong sulphuric acid, a dark-red coloration which turns yellow. It is found in opium.

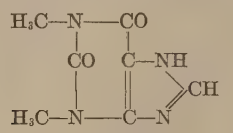
Theine, see *Caffeine*, above.

Theobromine, $C_7H_8N_4O_2$; sublimes without melting at 290° C.; sparingly soluble in the ordinary solvents; may be extracted from an

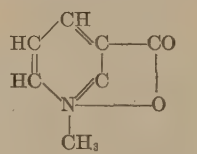
alkaline solution by means of chloroform. On evaporation with chlorine-water a brown residue is obtained that turns purple if a little ammonia is added. It is found in cacao beans. Theobromine has been reproduced synthetically. Its chemical constitution is represented by the formula:



Theophylline, $C_7H_8N_4O_2$; melting point, 264° C.; soluble in warm water, sparingly soluble in cold alcohol. When a chlorinated solution of theophylline is evaporated to dryness, a scarlet residue is obtained, which turns violet on addition of ammonia. Theophylline is found, together with caffeine, in tea. Its chemical constitution is represented by the formula:



Trigonelline, $C_7H_7NO_2$; melting point, 218° C.; extremely soluble in water, less soluble in alcohol; insoluble in ether, chloroform, and benzine; not affected by hot concentrated sulphuric acid. It is found in the seeds of *Trigonella fœnum græcum* and of *Strophantus hispidus* and in the roots of *Strophantus kombé*. It has been reproduced synthetically. Its constitution is represented by the formula:



Veratrine, $C_{32}H_{49}N_9O_9$; a mixture of two isomeric alkaloids; melting point, 155° C.; soluble in alcohol, ether, and chloroform; gives a red coloration if heated with strong sulphuric or with fuming hydrochloric acid. It is found in the seed of *Asagræa officinalis* Lindley.

The extraction of an alkaloid from the plant in which it occurs is often a matter of considerable difficulty. The volatile alkaloids may be obtained by distilling the plant or vegetable product with water and lime (or caustic soda); the liquid distilling over is neutralized with sulphuric acid and evaporated to dryness; the sulphate of the alkaloid may then be dissolved out of the residue by means of a mixture of alcohol and ether. To extract a non-volatile alkaloid, the plant is macerated and treated with a dilute solution of some acid in ordinary alcohol; the solution thus obtained is rendered alkaline by the addition of soda, and the alkaloid set free is either directly obtained in the form of a precipitate, or else may be extracted from the alkaline solution by means of ether, chloroform, or some other solvent that does not mix with water. Such processes, however, usually yield not one single, but mixtures of two or more alkaloids, and those contaminated with large quantities of other organic substances, which often render the isolation of a single alkaloid in the pure state very difficult.

Most alkaloids have a powerful physiological action even if employed in very small quantities. The action of certain alkaloids is, however, at least partly antagonistic to the action of certain others. For this reason one alkaloid may sometimes be employed to relieve the poisonous effect of another alkaloid, though it may itself be a violent poison. The antagonism of morphine and atropine is of considerable value in cases in which a subcutaneous injection of morphine is indicated: the cardiac depression, indigestion, and constipation, usually caused by morphine, may be prevented by injecting simultaneously a trace of atropine.

The alkaloids are sometimes spoken of as vegetable bases, natural organic bases, or vegetable alkaloids. The latter name is applied to them in contradistinction to the animal alkaloids, or *ptomaines*, that are formed during the putrefaction of animal products. Like the vegetable alkaloids, the ptomaines are highly poisonous nitrogenous bases, and they resemble the vegetable alkaloids both in their chemical properties and in their physiological action. See PTOMAINES.

Bibliography. Pictet, *La constitution chimique des alcaloïdes végétaux* (2d ed., Paris, 1897; Eng. trans., New York, 1904); Dupuy, *Alcaloïdes* (Brussels, 1887–89); Brühl, *Die Pflanzenalkaloide* (Brunswick, 1900); Schmidt, *Ueber die Erforschung der Konstitution und die Versuche zur Synthese wichtiger Pflanzenalkaloide* (Stuttgart, 1900); Schmidt, *Die Alkaloidchemie in den Jahren 1900–1904* (Stuttgart, 1904); Schmidt, *Die Alkaloidchemie in den Jahren 1904–1907* (Stuttgart, 1911); Schmidt, *Die Alkaloidchemie in den Jahren 1907–1911* (Stuttgart, 1911); Stewart, *Recent Advances in Organic Chemistry* (London and New York, 1908); Fränkel, *Arzneimittel Synthese*. The most important alkaloids are described in some detail under their special names. See also STOVAINE.

'ALKAMA IBN ABADA AL TAMIMI AL FAHL. A famous Arabian poet, living in the sixth and the beginning of the seventh centuries. He sang in his kasidas the wars between the Lahmids in Hira and the Ghassanids in Bosra, and entered into poetic contests with Amr al Kais. It is said that Jundab, the wife of 'Amr al Kais, in deciding such a contest, gave the victory to 'Alkama, with the consequence that she was divorced and married the latter poet. Through the recital of some of his poems he freed his brother Sha's and some other Tamimites from captivity in 583 A.D. His diwan has been published by Socin, *Die Gedichte des Alkama al Fahl* (Leipzig, 1867), with a German translation, and by Ahlwardt, *The Diwans of the Six Ancient Arabic Poets* (London, 1870), without a translation.

AL'KANET (dim. of Sp. *alcana, alheña*, from Ar. *al*, the + *hinnā*), *Anchusa*. A genus of plants belonging to the family Boraginaceæ and not natives in America. Some of the species are cultivated on account of their hardiness and their blue or purple flowers, which are in coiled clusters suggesting those of the forget-me-not. The common alkanet (*Anchusa officinalis*) grows in dry and sandy places, and by waysides, in the middle and north of Europe. The roots, leaves, and flowers were formerly

used in medicine as an emollient, cooling, and soothing application. The evergreen alkanet (*Anchusa sempervirens*) is also a native of Europe, and a doubtful native of Great Britain, although not uncommon in situations to which it may have escaped from gardens, being often cultivated for the sake of its beautiful blue flowers, which appear early in the season, and for its leaves, which retain a pleasing verdure all winter. It is a plant of humble growth, rising only a few inches above the ground. A number of other species are occasionally seen in our flower borders. *Anchusa tinctoria*, to which the name alkanet or alkanna (Ar. *al-chenneh*) more strictly belongs, is a native of the Levant and of the south of Europe, extending as far north as Hungary. The root is sold under the name of alkanet or alkanna root; it is sometimes cultivated in England; but the greater part is imported from the Levant or the south of France. It appears in commerce in pieces of the thickness of a quill or of the finger, the rind blackish externally, but internally of a beautiful dark-red color, and adhering rather loosely to the whitish heart. It contains chiefly a resinous red coloring matter, to which the name "alkanet" is often applied. See ALKANET, below.

ALKANET. A beautiful red coloring matter obtained from the roots of the alkanet or orchanet herb (*Anchusa tinctoria*, Tausch.) and largely used for imparting a red color to varnishes, cosmetics, etc. It is extracted from the roots by means of benzine, and, on evaporating the latter, is obtained in the form of a thick paste that is insoluble in water, but readily soluble in alcohol, ether, benzine, various oils, and other organic liquids. Alkanet should not be confounded with the red coloring matter contained in the roots of the henna, or alcanna, plant (*Lawsonia inermis* L.). The chemical composition of purified alkanet seems to correspond to the formula $C_{15}H_{14}O_4$.

AL'KEKEN'GI. See PHYSALIS.

AL-KHUWARIZMI, ål-kū'wâ-rīz'mē, ABU 'ABD ALLAH MOHAMMED IBN MUSA, of Khwarezm, a mediæval State included in the present Khanate of Khiva (?–c.831). A Moslem philosopher and celebrated algebraist. He was one of the savants who went to Bagdad in Al-Mamun's reign. He worked in the observatory there, computed a set of astronomical tables, and wrote several works on mathematics. Among these works were treatises on the Hindu arithmetic (trans. Gerard of Cremona, or Adelard of Bath; published by Boncompagni, Rome, 1857), the sundial, the astrolabe (an instrument used to take the altitude of the sun), on chronology, geometry, and algebra. His *Al-jabr wa'l muqabalah*, i.e., the redintegration and the comparison, gave the name to algebra (q.v.). His discussion of the quadratic equation, in which he called to his assistance geometric diagrams, is quite complete. His name appeared in Latin in the form Algoritmi, from which we have our word "algorism" (q.v.). His algebra was translated into Latin by Gerard of Cremona, and into English by F. Rosen (London, 1831). Consult Brockelmann, *Geschichte der arabischen Litteratur* part i, p. 215 (Weimar, 1898).

AL KINDI. See KINDI.

ALKMAAR, älk-mär'. An old town in the province of north Holland, in the Netherlands, situated on the North Holland Canal, 20 miles northwest of Amsterdam (Map: Netherlands, C 2). It is well built, has very clean streets, and is intersected by broad canals. It possesses a town-house, ornamented with curious Gothic carving, with a tower, a museum of antiquities, and a library, and the church of St. Laurence, which dates from the fifteenth century. It is a centre of trade in grain, butter, and cheese. Alkmaar exports great quantities of the last-mentioned commodity, more than one-half the output of the province passing through this town. There are minor maritime industries. It is the birthplace of Henry of Alkmaar. (See ALKMAAR, HEINRICH VON.) Alkmaar, first of all the Netherland cities, successfully resisted the Spanish in 1573, and the anniversary of that siege was commemorated in 1873 by the erection of a statue of Victory, by Stracké. Here, on Oct. 18, 1799, the Duke of York signed a capitulation, by the terms of which the Russo-British army, twice defeated by the French under Brune, left Holland. Pop., 1890, 15,803; 1900, 18,275; 1910, 21,374.

ALKMAAR, HEINRICH VON. A low German translator or adapter of the famous animal epic, *Reynard the Fox* (*Reineke Fuchs*) (q.v.), printed in 1498. Alkmaar is said to have been a tutor of the Duke of Lorraine in the latter part of the fifteenth century. See ANGLO-NORMAN LITERATURE.

AL'KOREM'MI. In William Beckford's romance of *Vathek* (q.v.), the name of Vathek's palace, to which he had added five parts, corresponding to his five senses.

AL'LA, or **EL'LA.** In Chaucer's *Man of Law's Tale*, the name of the king who marries Constance.

ALLA BREVE, äl'lä brā'vā (It. according to the *breve*). In music, a species of common time with a quick movement. In early ecclesiastical music we find no terms indicating the tempo or rate of movement, until, in the fifteenth century, the expressions *augmentation* and *diminution* were introduced to indicate that note values were to be changed by lengthening or shortening. The sign of diminution was a vertical line drawn through the time signature; ∅ for triple and ₵ for duple time. With this diminution, breves (q.v.) were to be taken in the time of semi-breves, thus quickening the movement. At that time the unit of count was a semi-breve. When the breve was "diminished," it meant that one must count "by the breve," hence the name Alla Breve.

In modern music Alla Breve measure (sometimes called Alla Cappella) is marked ∅ or $\frac{2}{2}$ and calls for two counts to the bar, with half notes as the unit. See MENSURABLE MUSIC.

ALLAH. The name of the deity used by Mohammedans. It is generally supposed to be a contraction of *al ilahu*, 'the god,' but may be derived from the Aramaic *alaha*, which has the same meaning. Among the Nabatæan inscriptions from Hejra names like Abd allaha, Abd allahi, Zaid allaha, Saad allahi, Wahab allahi, and Taim allahi are of frequent occurrence (*Corpus Insr-Sem.*, ii, 238, 302, 315, 369, 358, et al.). These are several centuries earlier than Mohammed. In the Safaitic inscriptions the name "Allah" occurs alone. Pre-Islamic poets mention Allah as a great god; and many passages in the Koran show that the Arabs in "the time of ignorance" used the name. Wellhausen supposes that it was employed as an appellative

for the local god of Mecca, Hubal (q.v.). Hubal himself is found among the Aramaic-speaking Arabs of N. W. Arabia and was probably an importation from the North. The conception of Allah in the Koran and in the succeeding Moslem schools of theology has been best described by McDonald. Consult: Wellhausen, *Reste Arabischen Heidentums*, pp. 217 (2d ed., 1907); Nöldeke, 'Arabs' in *Encyclopædia of Religion and Ethics* (1908); McDonald, 'Allah' in *Enzyklopaedie des Islams* (1910).

ALLAHABAD, äl'lä-hä-bäd'. A district and a division of the United Provinces of Agra and Oudh, British India.

ALLAHABAD (Ar. *Allah*, God + Hind. *abad*, city, dwelling). The seat of the government of the United Provinces of Agra and Oudh (formerly the Northwest Provinces), British India (Map: India, D 3). It occupies the fork of the Ganges and Jumna which forms the lowest extremity of the extensive region distinguished as the Doab, or the Country of Two Rivers, lying between those natural boundaries. Its position at the confluence of the holy rivers, which has long made it a centre of superstitious reverence and worship, and a much frequented place of pilgrimage for the purposes of ablution, also rendered it a natural centre of commerce and civilization, an advantage which has been fully appreciated by the British government. It commands the navigation both of the Ganges and of the Jumna. It is on the direct water-route between Calcutta and the Upper Provinces, and is a main station on the Grand Trunk Road and also on the East Indian Railway. Allahabad is 72 miles west of Benares; is distant from Calcutta, by land, 496 miles; by water, 808 miles in the rainy season, 985 miles in the dry season. From Delhi it is distant 386 miles, and from Bombay, by the Jabalpur branch of the East Indian Railway, 840 miles. The cotton, sugar, and indigo produce of the fertile district of Allahabad is brought in large quantities into the city, to be transported thence to Calcutta and elsewhere. Steamers sail to Calcutta and barges to Delhi.

In point of appearance, Allahabad is scarcely worthy of its character and renown. With the exception of a few ancient monuments of costly, elaborate, and tasteful workmanship, the native part of the city consists of mean houses and a network of narrow streets. The most noteworthy buildings are the Jumma Musjid, or the great mosque, and the Sultan Khossor's caravansary—a fine cloistered quadrangle. The fort is of red stone and is approached by a very handsome gate; it contains the palace or residency, and the famous Asoka or Gada Pillar, the club of Bhin Sen, 240 B.C. Below the fort, built over "the undying banyan tree," is the subterranean Chali Satum temple, which is said to communicate with Benares by an underground passage, through which flows a third holy river, the Sereswati, visible only to the eye of faith, the dropping moisture on the rocky walls pointed out as the river scarcely justifying the presumption. Allahabad possesses a hospital, theatres, bazaars, etc., and the Muir Central College (founded 1872), the chief educational institution in the United Provinces. (See INDIA.) As generally in the towns of India, the European quarter is vastly superior. Its nucleus appears to have been the native fort, which on the east and south rises directly from the banks of both rivers, while toward the land its artificial defenses, of great strength in themselves, are not commanded from the neighborhood by any higher ground. This citadel, described by Heber as having been at one time "a very noble castle," has lost much of its romance by having had its lofty towers pruned down to bastions and cavaliers. The Europeans of the garrison occupy well-constructed barracks. Beyond the fort are the cantonments for the native troops. In connection with these are numerous villas and bungalows, few other spots in India boasting such handsome buildings of this kind, which are rendered still more attractive and agreeable by avenues of trees winding between them and connecting them with the fort, the city, and several of the adjacent localities. Two boat bridges cross the Ganges, and the East Indian railway-bridge spans the Jumna at Allahabad. So many poor pilgrims throng the city, especially at the time of the great annual religious fair in January, that instead of Allahabad, the natives call it "Fakirabad," or the city of beggars. The pilgrims assemble to bathe at the confluence of the rivers, and in 1904 it was estimated that 250,000 were present on the great bathing day. Every twelfth year the gathering is much larger; a million people are said to have been present in 1894. From the octroi, professional and carriage taxes, rents and proceeds of the Hindu fair, a considerable municipal revenue accrues, which is expended on police, lighting, street sprinkling, water works, maintenance of parks, medical assistance, and charities. Allahabad was founded by Akbar in 1575, on the site of an ancient fort. From 1765 to 1801 it underwent three changes of rulers, coming in the latter year under British domination. The mutiny of 1857 brought disaster to Allahabad. On the 6th of June of that year, the insurrection, which had begun at Meerut on the 10th of May, extended itself to Allahabad. Though the Europeans held the fort, the mutineers were for some days undisputed masters of all beyond; and between the ravages of the marauders and the fire of the garrison, the city became little better than a heap of blackened ruins. New buildings began to spring up as soon as order had been restored, and most of the city has been rebuilt since that date, with the exception of the few monuments of ancient native architecture described above. Pop. (including cantonments), 1891, 175,246; 1901, 172,032; 1911, 171,697.

ALLAIN-TARGE, ä'lăn' tär'zhä', FRANÇOIS HENRI RENÉ (1832–1902). A French politician, born at Angers. He studied law at Poitiers, was admitted to the bar in 1853, and from 1861 to 1864 was substitute Imperial Procurator at Angers. From 1864 to 1866 he was an editor of the *Courrier du Dimanche*. He joined the staff of the *Avenir National* in 1868, and in the same year founded the *Revue Politique*. Upon the fall of the Empire, he was appointed by the government for national defense Prefect of the department of Maine-et-Loire. He was subsequently an army commissary, and resigned with Gambetta upon the conclusion of peace. He was a municipal Councilor of Paris in 1871 and 1874, Deputy in 1876, 1877, and 1881, and Minister of Finance in Gambetta's cabinet. In 1885–86 he was Minister of the Interior in the cabinet of Brisson.

AL'LAMAN'DA (named after the Swiss scientist Allamand, who died in 1787). A genus of about 12 species belonging to the family Apocynaceæ, and natives of Central and South

America. A number of species are cultivated as greenhouse shrubs, mostly climbers, with whorled leaves and large terminal funnel-shaped flowers. *Allamanda cathartica*, a native of the West Indies, is a climber with whorled or opposite oblong leaves, and golden-yellow flowers, white marked in the throat. It has violently emetic and purgative properties; but in small doses an infusion of the leaves is esteemed a valuable cathartic medicine, especially in the cure of painters' colic.

AL'LAN, David (1744–96). A Scottish genre and portrait painter. He was born at Alloa, studied in Glasgow and afterward at Rome under Gavin Hamilton. During a sojourn of 17 years in Rome he won the gold medal of the Academy of St. Luke and became a member of that body. In 1777 he settled at London as a portrait painter, and in 1780 he removed to Edinburgh, where he became the head of the Trustees' Academy in 1886. He now began to paint scenes from Scottish folk life, becoming a forerunner of Wilkie. Although interesting as illustrations, these paintings are totally deficient in technique. Allan was also an illustrator, his best-known work being illustrations of Allan Ramsay's *Gentle Shepherd* and of the *Poems* of his friend Robert Burns.

ALLAN, Maud (1879—). An American classical dancer. She was born in Toronto, Canada, but when she was four years of age her family removed to San Francisco. She early manifested unusual musical talent, and after pursuing her studies abroad for several years she received from the Berlin Royal High School of Music the highest diploma for piano-playing. Afterward she decided to become a dancer and in 1902 made her first appearance before an invited audience at the Vienna Conservatory of Music. Her success led to public appearances in Brussels, Berlin, Budapest, Hamburg, and Paris. A far greater triumph than these was her appearance at the Palace Theatre in London in 1908 in "The Vision of Salome." In 1910 she appeared in New York.

ALLAN, Sir Hugh (1810–82). A Canadian ship-owner. He went from Scotland to Canada as a clerk in 1826 and in 1835 became a shipbuilder and commission merchant. During the Canadian rebellion of 1837–38, he served in the army as a volunteer and reached the rank of captain. He helped establish (1853), after many disasters, the Allan Line of screw steamships and was one of the projectors of the Canadian Pacific Railway and figured in the scandal connected with that road. Many transportation, manufacturing, and mining companies owed their success largely to his enterprise. He received the honor of knighthood in 1871, for his service to commerce. He was one of the wealthiest men in Canada.

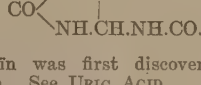
ALLAN, Sir William (1782–1850). A Scotch painter. He was born in Edinburgh and studied art in the Trustees' Academy there and in the schools of the Royal Academy, London. In 1805 he went to St. Petersburg, and spent several years in various parts of Russia and Turkey, where he acquired material for his first successful pictures. Returning to Scotland in 1814, he devoted himself to Scottish historical painting. This part of his work includes "John Knox Admonishing Queen Mary" (1823), and the "Death of the Regent Murray" (1825). In 1834 he returned to his earlier subjects, and his "Polish Exiles on their Way to Siberia" and "The Moorish Love-Letter" won him a seat in the Royal Academy. Later pictures were "A Slave-Market in Constantinople" (1837), "The Battle of Prestonpans" (1842), "Waterloo," from both the French and English sides (1443–44), "Peter the Great teaching Shipbuilding to his Subjects" (ordered by the Czar, 1845). Allan became president of the Royal Scottish Academy in 1838, in 1841 succeeded Wilkie as limner to the Queen in Scotland, and was knighted in 1842. He was the intimate friend of Sir Walter Scott, whom he portrayed in his study (National Portrait Gallery, London). His work, very famous in his own day, is now considered lacking in originality and deficient in color. Consult the *Art Journal* (1849, 1850, 1903).

AL'LANITE. A mineral silicate of the epidote group containing iron, calcium, aluminium, and the rare metals cæsium, neodymium, praseodymium, lanthanium, and yttrium. It occurs in black or dark brown crystals with submetallic or resinous lustre and exhibiting strong pleochroism. It is found as an accessory mineral in many basic crystalline rocks and is frequently associated with masses of magnetic iron ore.

ALLAN'TOÏN (ultimately derived from *allantois*), $C_4H_6N_4O_3$. An organic substance found in the allantoic and amniotic fluids, in fœtal urine, and in the urine of many animals during a short time after birth. It is a crystalline, solid substance, sparingly soluble in cold water, but dissolving readily in hot water or alcohol, and in solutions of alkaline carbonates. It may be obtained from the urine of calves by evaporating and letting stand, at ordinary temperatures, until the substance crystallizes out. Chemically, allantoïn is the di-ureide of glyoxylic acid. It is one of the most important products of the oxidation of uric acid (allantoïn is found in urine after uric acid has been taken internally), and, on the other hand, it may be readily made from urea by prolonged heating with glyoxylic acid. Allantoïn may be best prepared by oxidizing uric acid with peroxide of lead, according the following chemical equation:

$$C_5H_4N_4O_3 + O + H_2O = C_4H_6N_4O_3 + CO_2.$$

The graphic formula of allantoïn is



Allantoïn was first discovered in 1790 by Vauquelin. See Uric Acid.

ALLAN'TOÏS (Gk. ἀλλᾶς, *allas*, a sausage, and *εἶδος*, *eidos*, shape). A delicate membranous bag, which makes its appearance in the eggs of birds during incubation. Its function is chiefly the aëration of the blood of the embryo or chick. It sprouts from the lower part of the intestine of the chick, and rapidly enlarges, so as almost completely to inclose it, lining nearly the whole extent of the membrana putaminis—the double membrane which is immediately within the egg-shell. It is covered with a network of arteries and veins, corresponding to the umbilical artery and vein of mammalia; and the aëration of the blood is accomplished by the air which enters through the pores of the shell; but as the lungs become capable of their function, the circulation in the allantoïs diminishes, and its footstalk contracts and at last divides, leaving only a ligamentous

remnant. The allantois is never developed in the eggs of fishes and amphibians, hence these are called anallantoid vertebrates; while reptiles, birds, and mammalia, in which it is present, are called allantoid. In the mammalia it is superseded at an early period of fœtal life by other contrivances, but continues to exist in the lower animals for receiving the urinary secretion through the urachus, a purpose which it serves in birds and reptiles likewise. In the human species it disappears very early, only a minute vesicle remaining. See EMBRYOLOGY.

ALLARD, ȧ'lär', JEAN FRANÇOIS (1783–1839). Generalissimo of the army of Lahore, and previously Adjutant to Marshal Brune under Napoleon. After the murder of Marshal Brune (q.v.), Allard left France (1815), intending to emigrate to America, but changed his plan, went to Egypt, thence to Persia, to Kabul, and finally to Lahore (1820), where he engaged in the service of Ranjit Singh (q.v.), by whom he was made generalissimo. He married a native of Lahore, and identified himself with the interests of his adopted country, but he could not forget France, and the troops which he commanded were drilled under the French tricolor. The changed political situation after the revolution of 1830 brought him back to Paris (1836), where he was received with distinction and was made French chargé d'affaires in Lahore. He presented to the royal library of Paris a valuable collection of coins and returned to Lahore, leaving his wife and children in Paris. He distinguished himself in the Sikh campaigns against the Afghans and died at Peshawar, Jan. 23, 1839. His remains were, according to his own wish, buried with military honors at Lahore.

AL'LARGAN'DO. A term in music calling for a retardation of the tempo together with an increase in tonal volume. It is usually found in passages leading up to a climax, where the music assumes a character of broadness and majesty. Mere retardation of tempo, which usually goes parallel with decrease of tonal volume, is rallentando or ritardando.

ALLA'TIUS, LEO (1586–1669). A Greek ecclesiastic of the Roman Catholic church. He was born on the island of Chios, removed in 1600 to Rome, and studied at the Greek College there. He was appointed grand-vicar to the Bishop of Anglona, and was sent in 1622 by Gregory XV to bring to Rome the Palatinate, or Heidelberg, library. In 1661 he was appointed by Alexander VII librarian of the Vatican. He tried to reconcile the Western and Eastern churches, writing such treatises as *De Ecclesiæ Occidentalis atque Orientalis Perpetua Consensione* (1648) and *De Utriusque Ecclesiæ in Dogmate de Purgatorio Consensione* (1655). His further works include *De Libris Ecclesiasticis Græcorum* (1645) *and Græciæ Orthodoxæ Scriptores* (1652).

ALLEE VERTE, ȧ'lȧ'vârt' (Fr. green walk). Once a fashionable promenade in Brussels (q.v.), now given over to business interests. It is lined with lime trees, crosses a canal in the city by means of a lofty bridge, and continues as the *Avenue de la Reine* to the church of St. Mary.

ALLEGAN, ăl'ē-gan. A city and the county-seat of Allegan Co., Mich., 33 miles south of Grand Rapids, on the Lake Shore and Michigan Southern, the Pere Marquette, and the Michigan Central railroads, and on the Kalamazoo River (Map: Michigan, D 6). It contains a Carnegie library, a fine court house, a city hall, and a hospital. The city is in a fertile agricultural and fruit-growing region and has valuable natural advantages in good water-power, derived by means of two dams, one in the city and the other on the river, 3 miles above. Power from the latter is transmitted for a considerable distance. The industrial establishments include paper, planing, and flour mills, furniture, casket, mirror, and picture-frame factories, carriage works, and a foundry and machine shop. Allegan was settled in 1835, was first incorporated in 1838, reincorporated in 1858 and again in 1907. The water works are owned and operated by the municipality. The business section of the city was destroyed by fire in 1884. Pop., 1900, 2667; 1910, 3419; 1913 (est.), 3500.

AL'LEGA'NY. A village in Cattaraugus Co., N. Y., 70 miles by rail southeast of Buffalo, on the Erie and the Pennsylvania railroads, and on the Allegheny River (Map: New York, B 6). The village is engaged in the oil industry and has a canning factory, five cheese factories, and saw mills. It is the seat of St. Bonaventure's College and Seminary, a Roman Catholic institution organized in 1859, and St. Elizabeth's Academy for Girls. Allegany was incorporated in 1905. Pop., 1910, 1286; 1913 (est.), 1300.

ALLEGA'TION. In common law pleading the assertion, declaration, or statement of fact made by a party to a suit upon which he relies to sustain his cause of action. As the term is limited to statements of fact, it does not include the declarations of legal right nor the remedy demanded in the pleading. In English ecclesiastical law, the entire plea of a party, comprehending all the statements of fact upon which he relies, is called his allegation. The term is also employed in a special sense in the phrase "allegation of faculties," to denote the statement of the property of the husband in a claim for alimony made by a wife in a suit for divorce in the ecclesiastical court. See PLEADING; DECLARATION; PLEA.

AL'LEGHA'NIES. A mountain range of Pennsylvania, Maryland, West Virginia, Virginia, and North Carolina, lying west of the Blue and Blue Ridge ranges, and having the same direction, northeast to southwest (Map: United States, Eastern Part, K 3). Rich mines of coal and iron have been so highly developed as to make the adjoining regions the greatest in the world in coal mining and in the manufacture of iron and steel products. The term "Alleghanies" is sometimes incorrectly extended to include the whole Appalachian system, of which it is a part. See APPALACHIANS.

AL'LEGHE'NY. An important manufacturing city in Allegheny Co., Pa., on the north banks of the Allegheny and Ohio rivers, now consolidated with the city of Pittsburgh under one municipal government and making up the "North Side" of that city. Connected with the central part of Pittsburgh by eight large bridges, affording ample facilities for communication, even before political consolidation, the two cities have always formed one industrial and social community. Allegheny is the terminus of the Western Pennsylvania, the Pittsburgh and Western, and the Buffalo, Rochester and Pittsburgh railroads; and is on the Pittsburgh, Fort Wayne and Chicago, the Cleveland and Pittsburgh, the Pittsburgh and Erie, and the Pittsburgh and Newcastle railroads, all of which belong to the Western division of the Pennsylvania system. Electric railways connect with

towns in the northern portion of Allegheny County and in Butler and Lawrence counties. It has also a large river traffic. This portion of the city of Pittsburgh covers about 12 square miles, and its topography is decidedly hilly: the hills in the northern part of the city rising to a height of 700 feet above the river or about 1300 feet above sea level. In the central part of the city is a park of over 100 acres, while in the northern part is located Riverview Park of over 150 acres. In the parks the Soldiers', the Washington, the Humboldt, the Anderson, and other monuments are interesting features. The more important benevolent institutions are the Allegheny General, the Presbyterian, and the St. John's hospitals, the colored Orphan Home, the Pittsburgh and Allegheny Orphan Home, the Home of the Friendless, the Gusky Orphanage, the United Presbyterian Children's Home, and the St. Joseph's Orphan Asylum. The Western (State) Penitentiary is also located here. Allegheny is the seat of the Western Theological Seminary of the Presbyterian church, of the Allegheny Seminary of the United Presbyterian church, and of the Reformed Presbyterian Seminary. The Allegheny Observatory (the Astronomical Department of the University of Pittsburgh) is situated on a high hill in the northern part of the city, and in the central part the Carnegie Free Library of over 100,000 volumes occupies a block. The library building is the first erected by Mr. Carnegie on his well-known principles of municipal support.

The most important industrial establishments are the extensive iron and steel rolling mills, and car and locomotive works; there are also large pickling and preserving plants, and many factories of white lead, sanitary plumbing supplies, salt, leather, stoves, and ranges.

Allegheny was laid out in 1788, and the lots were sold in Philadelphia by the State government in order to provide funds to redeem Revolutionary scrip. It was incorporated as a borough in 1828 and in 1840 as a city. On July 4, 1874, occurred a disastrous fire in which 199 buildings were consumed or badly damaged, and three weeks later a flood destroyed much property and caused 124 deaths. The city's growth since 1870 has been remarkable. Pop., 1870, 53,180; 1910, 132,283. The consolidation with the city of Pittsburgh was effected in 1907. Consult: Cushing, *History of Allegheny County* (Chicago, 1889); Lambing and White, *Allegheny County: Its Early History and Subsequent Development* (Pittsburgh, 1888).

ALLEGHENY COLLEGE. A college at Meadville, Pa., founded in 1815 as a Presbyterian institution. The first president, Rev. Timothy Alden, D.D., secured for the college the support of many prominent men, among them John Adams and Thomas Jefferson. The gifts of the libraries of James Winthrop and William Bentley also attracted attention to the institution. In 1833 the college was transferred to the patronage of the Methodist church under an agreement that guaranteed a liberal and non-sectarian management. Courses are offered in the arts and sciences, but the main emphasis has always been put upon non-technical cultural subjects. The buildings and grounds are valued at about $1,250,000. The more important buildings are Bentley Hall, Reis Library (52,000 vols.), Cochran Hall, Ford Chapel, Carnegie Hall of Chemistry and Alden Hall. The endowment is $1,062,000 plus $1,000,000 pledged from the 1921 campaign. In 1921 there were 560 students. President, Fred W. Hixson, LL.D.

ALLEGHENY RIVER. A river of Pennsylvania and New York, rising in Potter Co., Pa., nearly 2000 feet above the sea, and uniting with the Monongahela at Pittsburgh to form the Ohio (Map: Pennsylvania, B 2). Although flowing through a hilly region, it is navigable for small boats for nearly 200 miles above Pittsburgh, whence, via the Ohio and Mississippi, navigation extends to the Gulf of Mexico. It is about 325 miles long and drains an area of 11,000 square miles.

ALLE'GIANCE (Lat. *ad*, to + OF. and Eng. *liege*, but the formation was influenced by Lat. *alligare*, to bind to, and also by *lex*, law). "Allegiance," says Blackstone, "is the tie, or *ligamen*, which binds the subject to the sovereign, in return for that protection which the sovereign affords the subject." Allegiance is the highest legal duty of the subject, and consequently its violation, treason (q.v.), is the highest legal offense. Allegiance is of three kinds: (1) Natural or implied allegiance is that which every native or naturalized citizen owes to the State to which he belongs and whose protection he enjoys. Independently of any express promise, every man, by availing himself of the benefits which an organized political society affords, comes under an implied obligation to defend it, and this equally whether the attack be from without or from within. This conception of allegiance as a political obligation, involved in the notion of citizenship, is comparatively modern, and has gradually supplanted the feudal conception of allegiance as a duty voluntarily assumed as an incident of the feudal tenure of land. (2) Express allegiance is that obligation which arises from an express promise or oath of allegiance. The old English oath of allegiance corresponded in the case of the sovereign, as lord paramount of all the lands in England, to the oath of fealty, which, by the feudal law, all freehold tenants were required to take to their landlords. As administered for upward of 600 years, it contained a promise "to be true and faithful to the king and his heirs, and truth and faith to bear of life and limb and terrene honor, and not to know or hear of any ill or damage intended him, without defending him therefrom."

With the substitution of the political for the feudal motive for allegiance and its consequent general obligation, the importance of the oath of allegiance has greatly diminished. It is commonly exacted of aliens acquiring naturalization, of persons lately in rebellion on resuming the status of citizens, and of public officers of all grades, and members of the bar. The form commonly employed in this country is a simple oath to support the Constitution of the United States and of the State of which the person taking the oath is a citizen. (See OATH.) (3) Local or temporary allegiance is that obedience and temporary aid due from an alien (q.v.) to the State or community in which he resides, by virtue of which he becomes subject to its laws, and liable for duty in the maintenance of social order.

It is but recently that the principal governments of Europe have come to recognize the right of persons voluntarily to change their allegiance as well as their residence, and such recognition is still grudging and imperfect. The United States has always held it to be a natural right, and our legislation so recognizes it. This

difference of view has sometimes brought our government into sharp diplomatic conflict with the States of Europe, especially in the effort to protect from military conscription former subjects of those States who had renounced their allegiance and become naturalized citizens of the United States. These efforts have generally proved successful, but the principle contended for by our government, though accepted (so far, at least, as the naturalization of their subjects in the United States is concerned) by England, France, Germany, and Austria-Hungary, is repudiated by Russia, Turkey, and some other States. This principle is plainly declared in the act of Congress relating to naturalization (q.v.), passed in July, 1868. The preamble states that the right of expatriation is natural and inherent in all people, and indispensable to the enjoyment of the rights to life, liberty, and the pursuit of happiness; that, recognizing this right, our government has received emigrants from all nations and given them citizenship and protection; that it is necessary for the maintenance of public peace that the claim of foreign allegiance as to such adopted citizens should be promptly and finally disavowed; and therefore it was enacted that any declaration, opinion, order, or decision of any officer of this government which denies, impairs, restricts, or questions the right of expatriation, is inconsistent with the fundamental principles of the government; that all naturalized citizens of the United States, while in foreign States, are entitled to, and shall receive from this government, the same protection of person and property that is accorded to native-born citizens in like circumstances. This broad declaration of rights and duties was followed in May, 1870, by the British Parliament in an act revising all British laws on alienage, expatriation, and naturalization—the government for the first time recognizing the right of subjects to renounce allegiance to the crown.

Allegiance of the population of a State or district is often transferred *en masse*, as an incident of territorial conquest or as the result of the cession of territory, as in the successive purchases of Louisiana from France, of Florida and the Philippine Islands from Spain, and of Alaska from Russia, as well as in the enforced cession to the United States of Texas and Porto Rico, and to Germany of Alsace-Lorraine as the result of successful war. The right of a State to claim the allegiance of the inhabitants of territory so acquired is undoubted, and it is only as a humane concession to the sentiment of loyalty of such a population that the right to choose between the old and the new allegiance is sometimes reserved by the treaty of cession. This permission has, in modern times, usually been granted, the inhabitants of the ceded territory being permitted to retain their nationality by withdrawing within a specified period from the ceded district.

In military usage allegiance is the oath demanded of officers and men to the sovereign or president, as supreme commander-in-chief of the army. In the German Empire the troops of Bavaria do not recognize the absolute control of the King of Prussia, except in time of war, when the full oath of allegiance and implicit obedience to the orders of the German Emperor is taken. Consult: Blackstone, *Commentaries on the Laws of England*, book i, chap. x; Pollock and Maitland, *History of English Law* (2d ed., Boston, 1899), vol. i, pp. 296–307, 458–467, vol. ii, pp. 502–511; Salmond, "Citizenship and Allegiance," in *Law Quarterly Review*, vol. xviii, Nos. 67, 69 (London, July, 1901, and January, 1902); Kent, *Commentaries on American Law*, vol. ii, section xxv. See also CITIZEN; SUBJECT.

AL'LEGORY (Gk. ἀλληγορία, *allēgoria*, speaking otherwise, allegory, from ἄλλος, *allos*, other + ἀγορεύειν, *agoreuein*, to speak). The allegory as a literary manner is a narrative in which the incidents and the characters really refer to a complete and logical scheme of underlying thought. To be successful, the narrative must be not only interesting for itself, but also in perfect harmony with the veiled course of abstract reasoning. Such is Bunyan's *Pilgrim's Progress*, where, under the guise of a journey from the City of Destruction to the Celestial City, are portrayed the spiritual conflicts and the ultimate victory of the faithful Christian. Allegory, like other kindred figurative ways of speech, such as metaphor and personification, appears in all literatures. The Eastern people from the earliest times have been fond of it. Witness the beast fables which pass under the name of Pilpay, or Bidpai, where moral observations are enforced by tales about animals; also the comparison of Israel to a vine in the eightieth Psalm. The parables of Christ in the New Testament are essentially allegorical. (See PARABLE.) Though the Greeks had the allegorical habit earlier, the first definite mention of an allegory among them occurs in Plato's *Phædrus*. In this dialogue Socrates remarks on the tendency toward the rationalistic explanation of myths. This and other dialogues of Plato contain very beautiful allegories, among which may be cited the comparison of the soul to a charioteer drawn by two horses, one white and the other black. For Latin literature may be mentioned the story of Cupid and Psyche (which, though Greek in origin, survives only in the *Golden Ass* of Apuleius), Vergil's well-known description of Fame in the fourth book of the *Æneid*, and Ovid's splendid picture of the abode of that goddess in the twelfth book of the *Metamorphoses*. To a later time belongs Boëthius's *De Consolatione Philosophiæ* (sixth century A.D.), which was one of the widest-read books in the Middle Ages. The most flourishing period for the allegory in western Europe was from 1300 to 1600. In the long list of works are Dante's *Divine Comedy*, *The Romance of the Rose*, Langland's *Piers Plowman*, Chaucer's *House of Fame*, the writings of a whole school of Scotch poets, Hawes's *Pastime of Pleasure*, Barclay's *Ship of Fools*, Spenser's *Faerie Queene*, Swift's *Tale of a Tub;* and Addison's *Vision of Mirza*. Obvious allegory has now gone out of fashion, but we have in its place a vaguer symbolism, as in Tennyson's *Idylls of the King*.

The form of allegory thus defined and illustrated is often called moral or spiritual, to distinguish it from the historical allegory; i.e., the representation of historical characters under fictitious names. Thus, Lucifera in the *Faerie Queene* stands not only for pride, but also for Mary, Queen of Scots. The historical allegory became in the seventeenth century a favorite device of romancers, who described contemporary events in the terms of recent history. Of this style, an admirable example is Madame de Lafayette's *Princesse de Clèves*. Moreover, allegory is not confined to literature; it appears equally in painting and sometimes in sculpture.

Allegorical Interpretation. That kind of interpretation whereby the literal meaning of a passage or work is set aside for a more spiritual and profound import. St. Paul allegorizes when he interprets the history of the free-born Isaac and the slave-born Ishmael (Gal. iv. 24). At Alexandria, where met the Greek and the Jew, allegorical interpretation of the Old Testament was practiced as a critical method. Philo Judæus (20 B.C.), for example, applied the principles of Plato's philosophy to Hebrew theology. He was followed by many Christian theologians, the most famous of whom were Clement of Alexandria and Origen. The latter went so far as to say that "the Scriptures are of little use to those who understand them as they are written." As a specimen of his procedure may be taken his interpretation of the Mosaic account of the Garden of Eden. According to him, Paradise symbolized a high primeval spirituality; the Fall consisted in the loss of this state through spiritual and not material temptation; and the expulsion from the Garden lay in the soul's being driven out of its region of original purity. This allegorical method also gained foothold among the critics of Greek literature. Porphyry (died c.305), for example, explained the grotto of the nymphs in Homer's *Odyssey* (book xiii) as an allegory of the world. In a sense, the so-called "metaphysical interpretations" of Christian Science are allegorical. For a succinct account of the progress of allegory with special reference to English literature, consult W. J. Courthope, *A History of English Poetry* (London, 1895).

AL'LEGRET'TO. A musical term denoting a time faster than andante (q.v.) and slower than allegro (q.v.). However, much confusion has resulted from the fact that eminent composers of the last century were not agreed as to the exact character of the tempo. Even Beethoven uses the designation sometimes for fast, sometimes for slow movements. In both the Seventh and Eighth symphonies the allegretto movements are slow, equivalent to andante and andante con moto respectively, whereas in the famous sonata op. 27, No. 2 (Moonlight) the same term is used to denote the scherzo and is equivalent to a fast allegro. Modern composers generally employ the term in its correct signification.

ALLEGRI, ål-lā'grē, ANTONIO. See CORREGGIO.

ALLEGRI, GREGORIO (1584–1652). An Italian composer. He was born in Rome, probably of the Correggio family. He studied under Nanini and was a friend of Palestrina. Appointed to the choir of the Sistine Chapel, Rome, by Urban VIII, he retained the position until his death. He was one of the earliest composers for stringed instruments. His most celebrated work, however, is the *Miserere*, for two choirs (of four and five parts), still annually rendered in the Sistine Chapel on Good Friday. Mozart, at the age of 14, performed the wonderful feat of writing the entire work from memory after having heard it but twice. Allegri is regarded as a link between the Roman and Neapolitan periods of Italian music.

ALLEGRO, ål-lā'grō (It. from Lat. *alacer*, alacritous, lively). One of the five principal tempos (q.v.) in music, implying that the piece is to be performed in a quick or lively style. Allegro, like all the other degrees of movement, is often modified by other terms, such as *allegro non tanto, allegro ma non troppo, allegro moderato, maestoso, giusto, commodo, vivace, assai, di molto, con brio*, etc. As a substantive, allegro is used as the name of a whole piece of music, or a movement, generally the first, of a symphony, sonata, or quartet.

ALLEINE, ăl'ĕn, JOSEPH (1634–68). An English nonconformist divine, author of *An Alarm to the Unconverted.* He was born at Devizes, 86 miles west of London, was educated in Corpus Christi College, Oxford, and became a tutor there (1653). He was offered a political place, which he declined, but gladly took the office of assistant to George Newton, rector of the church of St. Mary Magdalene, Taunton (1654). About this time he married Theodosia, daughter of Richard Alleine. He was not only constant in religious work, but deeply learned in various sciences, and on intimate terms with the patriarchs of the Royal Society. When the persecution of nonconformists came, he and his senior pastor were ejected, and Alleine became an itinerant preacher of the Gospel wherever he could find opportunity. For this he was imprisoned, but released in May, 1664; yet in spite of the Conventicle Act or Five-mile Act, he pursued his work and was again imprisoned. His later years were full of persecution and suffering. No Puritan nonconformist name is more affectionately cherished than his. He died at Taunton, Nov. 17, 1668. For his life, consult Stanford (London, 1861).

AL'LEINE, or **ALLEIN,** RICHARD (1611–81). An English writer and theologian, author of *Vindiciæ Pietatis*, or *A Vindication of Godliness* (London, 1663). He was born at Ditcheat, Somersetshire; educated at Oxford; became assistant in the ministry to his father, Richard Alleine, and was noted for his eloquence. He declared for the Puritans, but continued for 20 years (1641–62) rector of Batcombe in Somerset. On the passage of the Act of Uniformity he went with the ejected, and, after the Five-mile Act, preached where he could find occasion. His *Vindication of Godliness* was refused license, and Roger Norton, the King's printer, caused a large part of the first edition to be seized and sent to the royal kitchen for kindling; but, on reading it, he brought back the sheets and sold the work from his own shop, for which he had to beg pardon on his knees at the council table. Alleine died at Frome Selwood, Dec. 22, 1681.

ALLEMAINE, ăl-mān'. An old name for Germany (cf. Fr. *Allemagne*). See ALEMANNI.

ALLEMANDE, ăl'lê-mând' (Fr. feminine of *allemand*, German). A French dance, said to have been invented in the time of Louis XIV, which again became popular at the Parisian theatres during the reign of Napoleon I. It has the tempo of a slow waltz and consists of three steps (*pas marchés*) made in a sliding manner, backward and forward, but seldom waltzing or turning round. The whole charm of the dance lies in the graceful manner of entwining and detaching the arms in the different steps. In England it was called Almain, and is mentioned in Ben Jonson's play, *The Devil is an Ass*, acted in 1610, which proves it of earlier origin. The name has also reference to a German dance of Swabia, of which Beethoven's 12 *Deutsche Tänze* for orchestra are specimens. The Allemande is also the name of a movement in the *Suite* (q.v.), having no relation to the dance of the same name. It usually consists of a figurative melody which has a simple accompaniment.

AL'LEMAN'NI. See ALEMANNI.

AL'LEN, Alexander Viets Griswold, D.D. (1841–1908). A Protestant Episcopal theologian, born at Otis, Mass. He graduated at Kenyon College in 1862 and at Andover Theological Seminary in 1865. In 1867 he became professor of church history in the Episcopal Theological School at Cambridge, Mass. His publications include *Continuity of Christian Thought* (Boston, 1884; 11th ed., 1895), *Life of Jonathan Edwards* (1889), *Religious Progress* (1894), *Christian Institutions* (New York, 1897), *Life and Letters of Phillips Brooks* (2 vols., 1901). For his life consult C. Slattery (New York, 1911).

ALLEN, Andrew Hussey (1855—). An American archivist and author, born in New York City. He graduated from Harvard in 1878, studied law, and was admitted to the bar, but never engaged in practice. From 1882 to 1885 he was disbursing agent of the court of commissioners of the Alabama claims. While serving in the United States Department of State as Chief of the Bureau of Rolls and Library from 1892 to 1905 he inaugurated (1893) the *Bulletin of Rolls and Library* as a medium for the publication of catalogues, indexes, and important papers of the national archives. This he edited to its conclusion in 1905. His published writings include: *Official Relations of the United States with the Hawaiian Islands from the First Appointment of a Consular Office there by the United States Government* (1893); *Method of Recognition of Foreign Governments and Foreign States by the Government of the United States,* (1897). He edited vols. i–iv of the *Documentary History of the Constitution of the United States* (1894–1905).

ALLEN, Arabella. A character in Dickens's *Pickwick Papers.* She becomes Mrs. Nathaniel Winkle.

ALLEN, Charles, LL.D. (1827–1913). An American jurist, born in Greenfield, Mass. He graduated from Harvard in 1847, studied law, and was admitted to the bar in 1850. For the next 12 years he practiced his profession in his native town. In 1861 he became Reporter of Decisions for the Supreme Judicial Court of Massachusetts, and soon after removed to Boston; from 1867 to 1872 he was Attorney-General of the State; and in 1881 was chairman of the commission to revise the statutes of Massachusetts. During his 16 years of service (1882–98) on the bench of the Supreme Judicial Court of the State, he became known as one of the most eminent jurists of his day. Among his legal writings are *Allen's Massachusetts Reports* (14 vols., 1861–69), and *Telegraph Cases* (1873). He also published *Notes on the Bacon-Shakespeare Question* (1900).

ALLEN, Charles Grant Blairfindie (1848–99). An English author, better known as Grant Allen. He was born in Kingston, Canada, of Irish descent, and was educated at Merton College, Oxford, where he graduated in 1871. He then spent a few years as principal of a colonial college in Jamaica. He is best known by his popular scientific works, his expositions of the theory of evolution being particularly clear and readable. He spent most of his life in London, where he died. Among his scientific books are: *Physiological Æsthetics* (1877), probably his best work; *The Color Sense* (1879); *The Evolutionist at Large* (1881); *Vignettes from Nature* (1881); *Colin Clout's Calendar* (1883); *Flowers and their Pedigrees* (1884); *The Story of the Plants* (1895), and *Evolution of the Idea of God* (1897). He also wrote a life of Charles Darwin (1885) and about 30 novels, among them: *Philistia* (1884); *The Devil's Die* (1888); *A Bride from the Desert* (1896); *The Woman Who Did* (1895), which excited much notice and comment when it appeared because of the author's bold treatment of the sex problem. Historical studies also attracted him, and he published *Anglo-Saxon Britain* (1881) and a series of historical guide books to Paris, Florence, and Belgium.

ALLEN, Charles Herbert (1848—). An American politician and banker. He was born at Lowell, Mass., graduated in 1869 at Amherst College, and for a time was in the lumber industry at Lowell. In 1881–82 he served in the Lower House of the Massachusetts State Legislature and in 1883 in the State Senate. He was subsequently elected to the Forty-ninth and Fiftieth (1885–89) congresses. In 1898 he succeeded Theodore Roosevelt as Assistant Secretary of the Navy, and in 1900–01 was the first civil Governor of Porto Rico. In 1902 he retired from public life and became associated with banking and insurance interests in New York City. He was elected president of the American Sugar Refining Co. in 1913.

ALLEN, David Oliver (1800–63). An American missionary, born at Barre, Mass. He graduated in 1823 at Amherst College, studied at Andover Theological Seminary, and in 1827 went to Bombay as a missionary. He traveled widely in western India, established schools, directed a new translation of the Bible into Mahratta, and in 1853 returned, much broken in health, to America. His *History of India* was published at Boston in 1856.

ALLEN, Ebenezer (1743–1806). An American soldier. He was born in Northampton, Mass., and removed to Vermont in 1771. He became a Lieutenant in a company of Green Mountain Boys, was with Ethan Allen at Ticonderoga and with Colonel Warner in Canada, and during the Revolution served first as Captain in and then as Major of a battalion of New Hampshire rangers. He was conspicuous for gallantry at the battle of Bennington, and in September, 1777, forced the evacuation of Ticonderoga by his capture of Mount Defiance. For the next two years he commanded Fort Vergennes, part of this time serving also on the Board of War, and in 1780 he helped Governor Clinton of New York to intercept Sir John Johnson's raid from Canada. He was prominent in the planning of a new government for Vermont, helping to frame its constitution.

ALLEN, Edward Patrick (1853—). A Roman Catholic bishop of Mobile, Ala., appointed in 1897. He was born at Lowell, Mass., and after completing a theological course at Mount St. Mary's College, Emmitsburg, Md., was ordained a priest in 1881. Afterward he held a professorship at Mount St. Mary's and was its president from 1884 until he was consecrated bishop by Cardinal Gibbons. During his administration he relieved the college of its heavy indebtedness, increased its equipment, and enlarged its faculty.

ALLEN, Elisha Hunt (1804–83). An American diplomat and Hawaiian justice, born at New Salem, Mass. He graduated at Williams College, was called to the Massachusetts bar, and was a member of the State Legislature of Maine from 1836 to 1841 and in 1846. Between these periods he was a member of Congress. In 1849

he was elected to the Massachusetts Legislature and from 1852 to 1856 was United States Consul at Honolulu, Hawaii. In 1857–76 he was Chancellor and Chief Justice of the Hawaiian Islands and after that time was Minister of the Hawaiian Islands to the United States. He was dean of the diplomatic corps in Washington at the time of his death.

ALLEN, Elizabeth Chase Akers (1832–1911). An American author, born at Strong, Me. Her verses, entitled "Rock Me to Sleep, Mother" (1859), became widely known and were frequently set to music. Mrs. Allen began to write under the pen-name Florence Percy. Among her works, which include both prose and poetry, are: *Poems* (1866–69); *Queen Catharine's Rose* (1885); *The Silver Bridge* (1885); *Two Saints* (1888); *The Proud Lady of Stavoren* (1897); *The Ballad of the Bronx* (1901), and *The Sunset Song* (1902). She was married first to Paul Akers (q.v.), the sculptor, who died in 1861, and second to E. M. Allen of New York.

ALLEN, Ethan (1737–89). An American soldier. He was born at Litchfield, Conn., and about 1769 removed to Vermont, settling first at Bennington, where he became conspicuous in the contest between New Hampshire and New York for jurisdiction over the "New Hampshire Grants," now Vermont. He represented his fellow settlers in a suit at Albany in 1771, but, their claims being disregarded, he organized a force of Green Mountain Boys for the eviction of New York settlers. Governor Tryon, of New York, thereupon declared him an outlaw and offered £150 for his arrest. At the outbreak of the Revolution Allen and his associates offered their services to the patriot party and organized an expedition against Ticonderoga (q.v.). On the morning of May 10, 1775, he surprised the garrison and forced its commander to surrender "in the name of the great Jehovah and the Continental Congress." Allen soon afterward joined General Schuyler's army, was employed in secret missions to Canada, and rendered valuable aid in Montgomery's expedition. He was taken prisoner, Sept. 25, 1775, near Montreal, and was sent to England. Some months later he was sent back to this country and was kept as a prisoner in Halifax and New York until May 3, 1778, when he was exchanged. After his release he returned to Vermont, was brevetted Lieutenant-Colonel by the Continental Congress and became Brigadier-General of Vermont militia, though he devoted his attention chiefly to the old territorial dispute, and incidentally carried on a correspondence with Governor Haldimand of Canada, upon which a charge of treason was subsequently based. No satisfactory explanation has ever been given of his conduct, but the charge of treason is at least not fully substantiated. He moved to Burlington in 1787 and died there two years later. Though a blusterer, he was as full of action as he was of talk and had very great ability as a leader both in politics and in war. He wrote a *Narrative of Colonel Ethan Allen's Captivity* (1779), which went into numerous editions; a *Vindication of the Opposition of Vermont to the Government of New York* (1779), and *Reason the Only Oracle of Man, or A Compendious System of Natural Religion* (1784). Consult Henry Hall, *Ethan Allen* (New York, 1892), and Sparks, *Ethan Allen* (Boston, 1834).

ALLEN, Fred Hovey (1845—). An American Congregational clergyman and author. Born at Lyme, N. H., he graduated at the Hartford Theological Seminary, studied at Boston University and the universities of Berlin, Vienna, and Paris, and held pastorates in Boston, Wollaston, Abington, and Rockland. He founded and for some time edited the Lawrence (Mass.) *Eagle*, but is best known as the inventor of the first photogravure plates for art reproduction made in America. His writings include: *Masterpieces of Modern German Art* (1884); *Recent German Art* (1885); *Grand Modern Paintings* (1888).

ALLEN, Frederic de Forest (1844–97). An American classical scholar. He was born at Oberlin, Ohio, and graduated at Oberlin College in 1863. He was at Leipzig in 1868–70, and took his Ph.D. there with his thesis *De Dialecto Locrensium*, which is still an important monograph. Following his foreign study he was professor of foreign languages successively in the University of East Tennessee, the University of Cincinnati, and Yale College; for the last 17 years of his life he held the chair of classical philology at Harvard. In 1881–82 he was president of the American Philological Association, and in 1885–86 director of the American School of Classical Studies at Athens. In addition to numerous articles in classical journals he published an edition of the *Medea of Euripides* (4th ed., 1901); *Remnants of Early Latin* (1880); a revision of Hadley's *Greek Grammar* (2d ed., 1886); *Greek Versification in Inscriptions* (1888); *Æschylus: The Prometheus Bound and the Fragments of the Prometheus Unbound* (1897). His *Posthumous Papers* were published in the *Harvard Studies in Classical Philology*, vol. ix (Boston, 1898). In the same volume will be found a memoir of Mr. Allen, with a list of his books, by James Bradstreet Greenough.

ALLEN, Grant. See Allen, Charles Grant Blairfindie.

ALLEN, Harrison (1841–97). An American physician and anatomist. He was born in Philadelphia and graduated in medicine at the University of Pennsylvania in 1861. In 1862 he became a surgeon in the United States army and served until the conclusion of the Civil War. In 1865 he was made professor of comparative anatomy and medical zoölogy at the University of Pennsylvania and was transferred in 1878 to the chair of physiology, which he occupied until 1895. Dr. Allen was professor of anatomy and surgery at the Philadelphia Dental College and surgeon to the Philadelphia Hospital. He was president of the American Laryngological Society in 1886 and of the American Anatomical Society from 1891 to 1893. In addition to many papers contributed to medical journals, he was the author of *Outlines of Comparative Anatomy and Medical Zoölogy* (1867), *Studies in the Facial Region* (1874), *An Analysis of the Life Form in Art* (1875), and *System of Human Anatomy* (1880).

ALLEN, Henry (1748–84). An American religious enthusiast. He was born at Newport, R. I., but afterward settled in Nova Scotia, where he taught that the souls of all men are emanations from the same Spirit, that they were present with our first parents in Eden, that Adam and Eve in innocency were pure spirits without material bodies, that there will be no resurrection of the body, that men are not bound to obey the ordinances of the Gospel, and that the Scriptures are not to be interpreted literally, but in a spiritual sense. He published a volume of hymns and several treatises and sermons.

Though he made many converts to his religious ideas, the Allenites dwindled after his death.

ALLEN, Henry Watkins (1820–66). An American soldier and politician. He was born in Prince Edward Co., Va.; educated at Marion College, Mo.; taught school and practiced law in Mississippi. In 1842 he raised a company and served in the Texan war against Mexico. He was subsequently a member of the State Legislature of Mississippi and later of Louisiana. After studying law at Harvard and traveling in Europe, he entered the Confederate service in 1861 as Lieutenant-Colonel. He was wounded at Baton Rouge and at Shiloh, became a Brigadier-General in 1864, and in the same year was elected Governor of Louisiana, in which capacity he rendered valuable services to the Confederate government. After the war he removed to the City of Mexico, edited the *Mexican Times*, wrote *Travels of a Sugar Planter*, and assisted in the opening of trade between Texas and Mexico.

ALLEN, Horace Newton (1858—). An American diplomatist and missionary. He was born in Delaware, Ohio, graduated in the Ohio Wesleyan University, studied medicine, and went as medical missionary (Presbyterian) to China. In 1884, at the time of the coup d'état of Kim Ok Kiun, he was at Seoul, Korea, and saved the life of a relative of Queen Ming. He was made court physician, and established a hospital under government control. When the first Korean legation went to Washington in 1888, he acted as interpreter and secretary. Returning to Korea in 1890, he soon became noted for his knowledge of Korean affairs and in 1901 was made United States Minister Plenipotentiary to the Korean Empire. Publications: *Korean Tales* (1889); *A Chronological Index of the Foreign Relations of Korea from the Beginning of the Christian Era to the Twentieth Century* (1900); *Supplement* (1903); *Korea: Fact and Fancy* (Seoul, 1904); *Things Korean* (Seoul, 1908).

ALLEN, Horatio, LL.D. (1802–89). An American civil engineer. He was born at Schenectady, N. Y., graduated in 1823 at Columbia, and in 1826 was appointed resident engineer of the summit level of the Delaware and Hudson Canal, after serving for two years in a similar position on the Chesapeake and Ohio Canal. He was sent to England in 1828 to buy locomotives for the canal company's projected railway, made the acquaintance of George Stephenson, and in 1829, at Honesdale, Pa., the initial point of the railway, operated the "Stourbridge Lion" in the first trip made by a locomotive on this continent. From 1829 to 1834 he was the chief engineer of the South Carolina Railway, at that time the longest railway in the world (about 150 miles), and from 1838 to 1842 was principal assistant engineer of the Croton aqueduct for supplying water to New York City. He was at various times chief engineer and president of the Erie Railway, and consulting engineer for the Panama Railway and the Brooklyn Bridge. In 1842 he became connected with the New York Novelty Works, which furnished engines for nearly all the American and many foreign war vessels and steamships of the time. In 1872 and 1873 he was president of the American Society of Civil Engineers. He was the inventor of the so-called "swiveling truck" for railway cars. *The Railroad Era: First Five Years of its Development* (1884) was written by him. Consult M. N. Forney, *Memoir of Horatio Allen* (reprinted from the *Railroad and Engineering Journal*).

ALLEN, Ira (1751–1814). One of the founders of Vermont. He was born in Cornwall, Conn., and in 1772 removed to Vermont, where he served as a Lieutenant under his brother Ethan, and took an active part in the boundary dispute between New York and New Hampshire. As Lieutenant in Colonel Warner's regiment, and close associate of General Montgomery, he served in the Revolution. He was a member of the Vermont Legislature (1776–77) and of the State Constitutional Convention (1778) and in 1780–81 was a Commissioner to Congress. At various times he was a member of the Vermont Council, secretary and treasurer, and a member of the Board of War during the Revolution. The number of offices which he held finally provoked hostility. In 1789 he presented to the Legislature a memorial for the establishment of the University of Vermont, together with a subscription list of £5643, £4000 of which, plus a fifty-acre site at Burlington, he contributed. He was called the "Metternich of Vermont" and the "Father of the University of Vermont." He went to France in 1795 and bought 20,000 muskets and 24 cannon, intending to sell them to Vermont; but he was captured at sea and taken to England on a charge of furnishing arms to Irish rebels. He was acquitted after a lawsuit that lasted eight years. He published *The Natural and Political History of Vermont* (London, 1798; *Vermont Historical Society Collections*, 1870) and *Statements Appended to the Olive Branch* (1807); "Miscellaneous Remarks on the Proceedings of the State of New York *vs.* the State of Vermont," in *Vermont Historical Society Collections* (Montpelier, 1870).

ALLEN, James Lane (1849—). An American novelist and writer of short stories, born at Lexington, Ky. He was educated privately and at Transylvania University, and subsequently taught for a time in the University of his native State. During early years of bitter poverty he had snatched leisure for some writing, but it was not until 1886 that he found himself sufficiently established as a contributor to magazines to be able to devote himself solely to literary work. He then took up his residence in New York. The background of his fiction is almost always Kentucky—for that State he has done what Thomas Nelson Page has done for Virginia and George W. Cable for Louisiana. Both in rendering incomparably the prodigal beauty of his homeland, and in portraying the vanished or vanishing social types of pioneer or ante-bellum days—Mr. Allen is a rare artist. But he is a psychologist and moralist as well; like Hawthorne, it is the problem of the human soul that most concerns him. His best work is included in the following list: *Flute and Violin* (1891); *The Blue Grass Region, and Other Sketches* (1892); *John Gray: a Novel* (1893); *The Kentucky Cardinal* (1895); *Aftermath* (1896); *A Summer in Arcady* (1896); *The Choir Invisible* (a rewriting of *John Gray*, 1897); *The Reign of Law* (1900); *The Mettle of the Pasture* (1903); *The Bride of the Mistletoe* (1909); *The Doctor's Christmas Eve* (1910); and *The Heroine in Bronze* (1912). Consult for biographical facts *Book News Monthly*, vol. xxiv, p. 753; for a consideration of Mr. Allen as an interpreter of Kentucky life, H. A. Toulmin, in *Social Historians* (Boston, 1911).

ALLEN, Jerome (1830–94). An American educator and author. He was born at Westminster, Vt., and graduated at Amherst College

in 1851. He presided over several educational institutions in the West from 1851 to 1885 and was professor of pedagogy at the University of New York from 1887 to 1893. To his efforts more than to any other agency was due the founding of the New York School of Pedagogy, of which he became dean in 1889. Professor Allen's publications include a *Handbook of Experimental Chemistry* (1876); *Short Studies in English* (1886–87); *Mind Studies for Young Teachers* (7th ed., 1887); and *Temperament in Education* (1890). For many years he edited Barnes's *Educational Monthly* and *School Journal*.

ALLEN, Joel Asaph (1838–1921). An American naturalist. He was born at Springfield, Mass., July 19, 1838. Between 1865 and 1869, and again in 1873, he took part in various scientific expeditions to Brazil and Florida and to the Rocky Mountains, gathering material and contributing studies of it to scientific periodicals, especially the *Proceedings of the Boston Society of Natural History*. In 1870 he became an assistant in the Museum of Comparative Zoölogy at Harvard University and later its curator of birds and mammals. In 1886 he was appointed to a similar office in the American Museum of Natural History in New York. He was one of the founders and early presidents of the American Ornithologists' Union and the editor of its quarterly publication, *The Auk*, from 1884 to 1912. He was one of the early members of the National Academy. Dr. Allen won rank as one of the foremost systemists of American mammals and birds, in which work he made minute subdivisions. He also made fruitful researches into the principles of geographical distribution, and those governing climatic and seasonal variation in color, size, and other details. In addition to a great number of scientific papers, he is author of *Mammals and Winter Birds of Eastern Florida* (1871); *The American Bisons* (1876); *Monographs of North American Rodentia* (with E. Coues, 1877); *History of North American Pinnipedia* (1880); *Mammals of Patagonia* (1905); *The Influence of Physical Conditions in the Genesis of Species* (1905), and *Ontogenetic and Other Variations in Musk-Oxen* (1913).

ALLEN, Joseph Henry (1820–98). A Unitarian scholar. He was born at Northborough, Mass., Aug. 21, 1820; graduated at Harvard College, 1840, and at the Divinity School in 1843. He was pastor at different places; editor of *The Christian Examiner*, 1857–69; lecturer upon ecclesiastical history in Harvard University, 1878–82; joint editor (with J. B. Greenough) of a series of classical text-books; author of *Hebrew Men and Times* [to the Christian era] (Boston, 1861); *Christian History in its Three Great Periods:* (1) Early Christianity, (2) The Middle Age, (3) Modern Phases (3 vols., 1882–83); *Our Liberal Movement in Theology, chiefly as Shown in Recollections of the History of Unitarianism in New England* (1882); *Historical Sketch of the Unitarian Movement since the Reformation* (New York, 1894). His works show independent study and acquaintance with sources, and his denominational histories rest upon personal acquaintance with leaders. He died in Cambridge, Mass., March 29, 1898.

ALLEN, Karl Ferdinand (1811–71). A Danish historian, born at Copenhagen. He studied at the university there, and in 1845 to 1848 made examinations of various European archives. He was appointed an instructor and titular professor at Copenhagen in 1851 and professor of history and northern archæology in 1862. His principal work is his *De Tre Nordiske Rigers Historie, 1497–1536* ('The History of the Three Northern Kingdoms,' 5 vols., 1864–72), one of the most important contributions to the history of northern Europe.

ALLEN, Richard (1760–1831). A colored Methodist preacher. He was born in slavery, but bought his freedom and afterward acquired considerable wealth. He became a local Methodist preacher in 1782 and organized the first church for colored people in the United States, in Philadelphia, in 1793. He was the first colored minister ordained by Bishop Asbury (1799), and was elected a bishop of the African Methodist Episcopal Church on its formation in 1816. He died in Philadelphia.

ALLEN, Robert (1815–86). An American soldier. He was born in Ohio, graduated at West Point in 1836, served with distinction in the second Seminole War and in the Mexican War, and was subsequently Chief Quartermaster of the Pacific Division until 1861, when he became Quartermaster of the Department of Missouri. In this capacity, and afterward (1863–66), as Chief Quartermaster of the Missouri Valley, he rendered valuable services to the Federal armies in the West, and by successive promotions became Brevet Major-General in 1865. After the war he was again Chief Quartermaster of the Pacific Division until retired in 1878.

ALLEN, Thomas (1849—). An American landscape and animal painter. He was born at St. Louis, Mo., studied long at the Düsseldorf Academy and with Ecouen in Paris. After a sojourn of 10 years abroad, he opened a studio in Boston. He became a member of the Society of American Artists (1880) and an associate member of the National Academy of Design (1884) and was one of the international board of judges at the Chicago Exposition in 1893 and president of the International Jury at St. Louis in 1909. In 1910 he became chairman of the Art Commission of the City of Boston. His most successful works are landscape and animal subjects, and include "O'er All the Hilltops is Rest," "Maplehurst at Noon," and "Toilers of the Plain." Although he keeps pace with modern technical achievements, Allen, in his reserved and harmonious art, represents conservative tendencies in American painting.

ALLEN, Viola (1869—). An American actress, born in Alabama, Oct. 27, 1869, daughter of C. Leslie Allen, an actor of great repute. She appeared on the stage when 15 years old, in *Esmeralda*, at the Madison Square Theatre, New York (1882), and later played in the company of John McCullough and with Tommaso Salvini, Lawrence Barrett, Joseph Jefferson, and W. J. Florence. In 1893 she joined the Empire Stock Company and appeared in *The Masqueraders* and *Under the Red Robe*. In 1898 she made a wide reputation in Hall Caine's dramatized novel *The Christian* and subsequently starred in *In the Palace of the King* (1900), by F. Marion Crawford and Lorimer Stoddard, *Twelfth Night*, *A Winter's Tale*, *As You Like It*, *The Lady of Coventry* (1911), etc. Consult L. C. Strang, *Famous Actresses of the Day in America* (Boston, 1899), and J. B. Clapp and E. F. Edgett, *Players of the Present* (New York, 1899).

ALLEN, William (1532–94). An English Cardinal. Born at Rossall, he studied in Oriel College, Oxford, and became principal of St. Mary's Hall in 1556. He opposed the Reformation and after Elizabeth's accession he went to Louvain (1561). He returned to England (1562), but his proselytizing zeal made another flight necessary, and he went to Holland (1565) and never revisited England. He was ordained priest at Mechlin, was more prominent in organizing in the University of Douai (1568), a college for English Roman Catholics, whence he sent Jesuit priests to his native land, the aim of his life being to restore papal supremacy in England. In 1570 he became regius professor of divinity, in 1587 a Cardinal; in 1589 he was offered the archbishopric of Malines, but declined the honor. He died at Rome, Oct. 16, 1594. He made vigorous efforts to check the progress of the Protestant Reformation in England and engaged in polemical writing. Several violent libels of the time are attributed to his pen, but his authorship of these has been disputed. Among the Jesuit priests he sent to England was the celebrated Father Campion, put to death by Elizabeth. He published 10 volumes, among them *Certain Brief Reasons Concerning Catholic Faith* (1564), and aided in revising the English translation of the Bible known as the Douai Bible. Consult his *Letters and Memorials*, with introduction by T. F. Knox (London, 1882).

ALLEN, William (1770–1843). An English philanthropist. He was lecturer on chemistry in Guy's Hospital, fellow of the Royal Society, and one of the founders of the Pharmaceutical Society. Jointly with Samuel Pepys he established the chemical composition of carbonic acid. He belonged to Sir Humphry Davy's circle of friends, and at his request he lectured on physics at the Royal Institution. He was a prominent member of the Society of Friends and bore an active part in the philanthropic movements of his time. Wilberforce and Clarkson were his intimate friends, and he shared in the anti-slavery agitation. He was an active supporter of Lancaster and Bell in their educational movement, championing their side of the controversy in his journal, *The Philanthropist* (1811–17); and he was associated with Robert Owen in his schemes for social improvement. He also founded industrial schools and advocated the abolition of capital punishment. He contributed papers to the *Philosophical Transactions*. Consult *Life of William Allen, with Selections from His Correspondence* (2 vols., Phila., 1847).

ALLEN, William (1784–1868). An American educator and author. He was born at Pittsfield, Mass.; graduated at Harvard in 1802, and after a few years spent in pastoral work became assistant librarian at Harvard. There he prepared his *American Biographical and Historical Dictionary* (1809), the first work of general biography published in the United States. The third edition (1857) has notices of nearly 7000 Americans, while the first has only 700. He contributed to a new edition of Webster's Dictionary 10,000 words not before given. In 1810 he became his father's successor in the pulpit in Pittsfield. In 1817 he was elected president of Dartmouth College, and from 1820 to 1839 (with a short interim) he was president of Bowdoin College. Allen's memoir was published in 1847.

ALLEN, William (1806–79). An American statesman. He was born in North Carolina, but at an early age went to Ohio, where he practiced law. He was elected to Congress in 1832 by the Democrats, but was defeated on a second trial. He was twice elected to the United States Senate and served from 1837 to 1849. In 1848 he was offered the nomination for President, but declined it on the ground that he was pledged to Gen. Lewis Cass. In 1873 he was elected Governor of Ohio. Two years afterward he was a candidate for reëlection, but as he made his canvass on the greenback issue, of which cause he had become the foremost advocate, he was defeated by R. B. Hayes. He is said to be the author of the famous alliterative slogan of the campaign of 1844, "Fifty-four forty, or fight," and while in the Senate, because of speeches he made, was variously known as "Earthquake Allen," "Petticoat Allen," and "The Ohio Gong." Consult Howard Carroll, *Twelve Americans* (1883).

ALLEN, William Francis (1830–89). An American educator and historian, joint editor of Allen and Greenough's series of school books. He was born at Northborough, Mass., and graduated at Harvard in 1851. He studied history and antiquities in Germany and Italy for two years and afterward became professor of Latin and Roman history at the University of Wisconsin, where he held a chair from 1867 until his death. In addition to his text-books, he published many works of standard merit, including *Outline Studies in the History of Ireland* (1887). A memorial volume of his *Essays and Monographs* was published in 1890, containing a sketch of his life.

ALLEN, William Henry (1784–1813). An American naval officer. He was born in Providence, R. I., and entered the navy in 1800. In 1807 he was Third Lieutenant of the *Chesapeake* when she was captured by the *Leopard*, and was a Lieutenant on the frigate *United States* in the action with the *Macedonian*, Oct. 25, 1812, in which the latter was captured. Afterward he commanded the brig *Argus*, cruising off England in 1813. After having captured $2,000,000 worth of property, he encountered the British brig *Pelican*, August 14, and lost his own vessel, dying the next day of wounds received in the fight.

ALLEN, William Henry, LL.D. (1808–82). An American educator. He was born at Manchester, Me., and graduated at Bowdoin College in 1833. He was instructor in Latin and Greek at Cazenovia (N. Y.) Seminary from 1833 to 1836; professor of natural philosophy and chemistry in Dickinson College, 1836–46; of philosophy and English literature there from 1846 to 1849, acting as president for two years; president of Girard College, Philadelphia, 1850–62 and 1867–82. Between his two terms at Girard he served as president of the Pennsylvania State Agricultural College. In 1872 he was chosen president of the American Bible Society. He was the author of a number of interesting pamphlets and reports on educational subjects.

ALLEN, Zachariah (1795–1882). An American scientist and inventor. He was born in Providence, R. I., graduated at Brown University in 1813, studied law in the office of James Burrill, and was admitted to the bar in 1815. Subsequently he became a manufacturer, and in 1825 visited Europe for the study of mechanical methods in England, Holland, and France.

He constructed (1821) the first hot-air furnace for the heating of dwelling houses, was the first to calculate the motive power of Niagara Falls (*Silliman's Journal*, April, 1844), devised the system of mutual insurance of mill property, and framed new laws for regulating the sale of explosive oils. In 1833 he patented his best-known invention, the automatic cut-off valve for steam engines, still in use with improvements. He was from 1822 a member, and from 1880 president, of the Rhode Island Historical Society. His publications include: *The Science of Mechanics* (1829); *Philosophy of the Mechanics of Nature* (1851); *The Rhode Island System of Treatment of the Indians, and of Establishing Civil and Religious Liberty* (1876); address at the bi-centennial anniversary of the burning of Providence; and *Solar Light and Heat, the Source and Supply* (1879). Consult Perry, *Memorial of Zachariah Allen, 1795–1882* (Cambridge, 1883).

ALLENBY, Gen. Sir Ed. See Vol. XXIV.

ALLENDE. A city in Mexico. See San Miguel de Allende.

AL'LENITES. See Allen, Henry.

ALLENSTEIN, äl'lĕn-stīn. A town of East Prussia, capital of the circle of Allenstein, situated about 32 miles from the Russian frontier, on the river Alle (Map: Prussia, J 2). It is a well-built and neat-looking town, with an old castle, a monument to Kaiser Wilhelm I, several churches, a gymnasium, and an agricultural school, a hospital, gas works, and a number of markets. Its industrial establishments include iron foundries, machine shops, and it manufactures barrels, stoves, and matches. Pop., 1900, 24,307; 1905, 27,422; 1910, 33,070.

ALLEN'TIAC. A now extinct South American linguistic stock. At the time of the Spanish conquest the Allentiacs, or Huarpes (Guarpes), inhabited the plains about the great lagunes of Huanacache, in Argentina. They are said to have been a rather savage people and unrelated to the tribes of the Andean valleys. See Chamberlain, in the *American Anthropologist*, vol. xiv, n. s., pp. 499–500 (1912), and Cojazzi, *Gli Indii dell' Arcipelago Fueghino* (Turin, 1911).

ALLENTOWN. A city and the county-seat of Lehigh Co., Pa., 50 miles (direct) northwest of Philadelphia, on the Lehigh River, the Lehigh Canal, and on the Lehigh Valley, the Central of New Jersey, the Perkiomen, and Philadelphia and Reading railroads (Map: Pennsylvania, K 6). The city is one of the largest producers of furniture in the United States, is second in the production of American silks, and has extensive manufactures of iron and steel, cement, shoes, hosiery, underwear, wire, auto fire engines, cigars, thread, etc. The original Portland cement fields are only 10 miles distant. The city is the seat of Muhlenberg College (Lutheran), established 1867, and of the Allentown College for Women, and has an Elks' Home, a library, a hospital, and many churches, in one of which the Liberty Bell was hidden when removed from Philadelphia to prevent its capture by the British. Allentown was laid out about 1752 by William Allen, then Chief Justice of Pennsylvania, and was known by its present name until, in 1811, it became the seat of justice of Lehigh County, and was incorporated as the borough of Northampton. In 1838 its original name was restored, and in 1867 Allentown was incorporated by a special charter. It adopted the commission form of government in 1913. The water works are owned and operated by the municipality. Pop., 1890, 25,228; 1900, 35,416; 1910, 51,913; 1920, 73,502. Consult Matthews and Hungerford, *History of the Counties of Lehigh and Carbon* (Philadelphia, 1884).

ALLEP'PI, ä-lĕp'ē, or **ALLAPPALI,** ä-läp'-ä-lē. A seaport on the west coast of the native State of Travancore, in the southern part of Madras, British India (Map: India, C 7). It has a sheltered roadstead and carries on a considerable export trade in coffee, pepper, and cardamoms. Canals and lagoons along the coast facilitate trade with Cochin on the north and Trivandrum on the south. Pop., 1901, 24,918.

ALLER, äl'ĕr. A river of Germany, rising about 20 miles west of Magdeburg. It flows northwestward, joining the Weser near Verden. Of its course of 155 miles, the greater part across Hanover, the portion which lies below Calle is navigable.

AL'LERTON, Isaac (c.1583–1659). One of the Pilgrim Fathers who came to America in the first voyage of the *Mayflower*. He was one of the energetic and wealthy members of Plymouth Colony and was sent to Europe several times as its agent. A disagreement with the colony in 1631 resulted in his removal to New Amsterdam, where he became a member of the Council in 1643. He spent the latter years of his life in New Haven. His daughter, Mary, was the last survivor of the *Mayflower* company.

ALLESTREE, or **ALLESTRY,** Richard (1619–81). An English divine and educator, born at Uppington in Shropshire. After graduating from Oxford he took arms for the King in 1642. He remained an active Royalist throughout the Commonwealth and at the Restoration became canon of Christ's Church and lecturer at Oxford and, in 1663, the King's chaplain and regius professor of divinity at Oxford. His works include several volumes of sermons.

ALLEVARD-LES-BAINS, äl'l'-vär'lâ-băn'. A town of the department of Isère, France, on the left bank of the Breda, 15 miles southeast of Chambéry. It has iron and steel manufactures and is a popular resort because of valuable medicinal springs and the picturesque scenery of its valley. Pop., 1901, 2546; 1911, 2715.

ALLEYN, äl'ĕn, Edward (1566–1626). An English actor, theatre manager, and the founder of Dulwich College. Born in the parish of St. Botolph, just out of London, he went upon the stage shortly before Shakespeare came from Stratford. Alleyn won rapid success, especially in tragedy, playing among other rôles the Jew in Marlowe's *Jew of Malta*, and also Tamburlaine and Faustus. He owned several playhouses and in 1592 married the step-daughter of Philip Henslowe (q.v.), with whom he was associated in building the Fortune Theatre and in various other enterprises, including the profitable business of bear-baiting. As his wealth increased, he ceased acting and became a manager. His chief claim to remembrance is as the munificent founder of the College of God's Gift, at Dulwich. His motive in this benefaction has been ascribed by tradition to an apparition of the devil, who appeared to him as he was playing that character in a theatre, but his well-known liberality and the fact that he was childless are more to the point. The college was begun in 1613, and in 1619, after some obstruc-

tion on the part of Lord Chancellor Bacon, who wished the King to prefer the foundation of two lectureships at Oxford and Cambridge, it obtained the royal charter. Here for several years Alleyn resided and managed the affairs of the institution. Alleyn was a friend of Shakespeare and Ben Jonson and a patron of Dekker (q.v.) and other writers. He was buried in the chapel of the college he had founded, and among its possessions are his portrait and a collection of his business papers. Consult: J. P. Collier, *Memoirs of Edward Alleyn* (London, 1841); J. P. Collier, *Annals of the Stage* (London, 1819); Warner, *Catalogue of the Manuscripts and Muniments at Dulwich College* (London, 1881); Thomas Fuller, *Worthies of England* (London, 1662).

ALLEYNE, ăl'ĭn, ELLEN. A pseudonym under which Christina G. Rossetti wrote for *The Germ.*

ALL FOR LOVE, OR THE WORLD WELL LOST. One of Dryden's best-known tragedies, produced in 1678. It is unrhymed, and in some respects is an imitation of Shakespeare's *Antony and Cleopatra.*

ALLGAU, ăl'goi. A subdivision of the European Alps (q.v.) in its widest sense, surrounding the basin of the Iller River in southwestern Bavaria. The name is also applied to the Bavarian districts of Sonthofen and Immenstadt.

ALLGEMEINE ZEITUNG, ăl'ge-mī'ne tsī'tung (Ger. 'general newspaper'). The first German newspaper of a high class. It succeeded in 1798 the *Neueste Weltkunde* and was published by Cotta (q.v.), who had sought Schiller as editor. The journal became the organ of statesmen and publicists and has always commanded the services of distinguished literary men as critics and correspondents. First published at Stuttgart, it was successively transferred to Ulm and Augsburg and is now published at Munich.

ALL HAL'LOWS, COLLEGE OF. A college in Dublin, Ireland, for the training of Roman Catholic missionaries. It derives its name from its situation on grounds which once belonged to the monastery of All Hallows, suppressed by Henry VIII. It was founded in 1842 by Father Hand. One year after its foundation the college had 38 students. Over 500 of its graduate priests are to be found in English-speaking countries, and many of these are active among the Irish Catholics in the United States. Among its professors were Dr. Woodlock, Dr. Moriarty, the Rev. Thomas Potter, and Henry Bedford.

AL'LIA. In ancient geography, a small stream which flowed into the Tiber about 11 miles north of Rome. It is celebrated as the scene of the defeat of the Roman army by the Gauls, under Brennus, about 390 B.C. Immediately afterward, Rome was taken, plundered, and burned. It is difficult to identify the Allia with any of the modern streams; but the evidence seems in favor of the Fosso della Bettina.

AL'LIA'CEOUS PLANTS. Plants of the genus *Allium* (q.v.), belonging to the Liliaceæ. The term is generally employed to denote not only the possession of certain botanical characters, but also of a certain smell and taste, well known by the term "alliaceous," of which examples are readily found in the onion, leek, garlic, and other familiar species of *Allium,* much employed for culinary purposes. These plants contain free phosphoric acid and a sulphuretted oil, which is partly dissipated in boiling or roasting. The alliaceous flavor is, however, found also, although in comparatively rare instances, in plants of entirely different botanical affinities.

ALLI'ANCE. A city and the county-seat of Box Butte Co., Neb., 360 miles west by north of Lincoln, on the Chicago, Burlington, and Quincy Railroad (Map: Nebraska, B 1). It has important stock-raising interests and manufactures butter. It has municipal water works and lighting system. Pop., in 1890, 829; in 1900, 2535; 1910, 3105; 1913 (est.), 4000.

ALLIANCE. A city in Stark Co., Ohio, 50 miles (direct) south-southeast of Cleveland, on the Mahoning River, and at the junction of the Cleveland and Pittsburgh, the Pittsburgh, Youngstown, and Ashtabula, the Lake Shore and Michigan Southern, and the Pittsburgh, Fort Wayne, and Chicago railroads (Map: Ohio, H 4). It is a large railroad centre and has interurban lines running in all directions. Mount Union Scio College (Methodist Episcopal) is located here. Alliance has a large steel plant, and among its extensive manufactures are gun carriages, traveling cranes, boilers, drop forgings, account registers, and automobile parts. It has large railroad shops. Alliance was settled in 1838 as Freedom, but in 1854 was incorporated under its present name. The government is administered under the provisions of the Ohio Municipal Code of 1902. The mayor is chosen biennially, and there is a city council of seven members. The water works are owned by the city. Pop., 1900, 8974; 1910, 15,083; 1913 (est.), 18,000; 1920, 21,603.

ALLIANCE ISRAELITE UNIVERSELLE, ăl'yänsʹ ēs'rā'ē'lēt' ụ'nē'vār'sĕl'. An association founded at Paris in 1860 by six Frenchmen (Astruc, Isidore Cohen, Jules Carvalho, Narcisse Leven, Eugene Manuel, and Charles Netter) for the amelioration of the condition of the Jews throughout the world. The original members of the society were Jews, and by far the largest number of its members at present belong to that faith. The organization is unique in that it is a universal educator of Jews and Gentiles alike; hence it has enjoyed at all times the sympathy and coöperation of many prominent Christians. As outlined in its prospectus, the programme of the society included the emancipation of the Jews from oppressive and discriminating laws, political disabilities, and the defense of them in those countries where they were subjected to persecution. For the attainment of this object the founders of the society purposed to carry on a campaign of education through the press and by the publication of works on the history and life of the Jews. In the beginning, however, the course of action adopted by the society for bringing relief to their oppressed brethren in other countries was to secure the intercession of friendly governments in their behalf. Thus, as early as 1867 the governments of France, Italy, Belgium, and Holland made the renewal of existing treaties with Switzerland conditional upon that country's granting full civil and political rights to the Jews. In 1878 representatives of the Alliance laid the condition of the Jews in the Balkan Peninsula before the Congress of Berlin, as a result of which the Treaty of Berlin stipulated that in Rumania, Servia, and Bulgaria no discrimination should be made against any religion in the distribution of civil rights. Of late years the activity of the Alli-

ance has tended to become more educational than political, and the chief problem with which it was occupied at the beginning of the twentieth century was the improvement of the condition of the Jews in the Orient. Schools have been established in Bulgaria, European and Asiatic Turkey, Persia, Tunis, Morocco, and elsewhere. In 1913 the number of such schools was about 150, with a teaching staff of over 700 and an attendance of 45,000. Instruction is carried on in the language of the country or in the dialect employed by the majority of pupils, and instruction, as well as school supplies and lunches, is free to the poorest pupils. In addition to the cultural schools, many manual training workshops have been established for boys and schools of domestic science for girls, the encouragement of handicrafts among the Jews being one of the chief educational aims of the Alliance. Linguistic and vocational training are encouraged in every Alliance school, while the preparation for good citizenship is never neglected. Two farm-schools have been established—one near Jaffa in Palestine, the other at Djedeida, near Tunis; the former of these has supplied the Jewish colonies in Palestine with skilled agriculturists and supervisors. At Paris there is a normal school for the education of teachers who are exclusively drawn from the schools of the Alliance and are sent back after a thorough training to carry on in their turn the work of instruction in their native countries. The central committee of the Alliance, with its seat at Paris, consists of both resident and non-resident members, the latter being scattered all over the world, five of them residing in the United States. The central committee stands in constant communication with the regional and local committees, of which there are a number in the United States, the principal ones being at New York and Philadelphia. The Alliance publishes monthly bulletins and a semi-annual report in French and German, and at intervals issues reports in English, Hebrew, Hungarian, and Judeo-Spanish. In 1910 the Alliance, with the coöperation of the French consular authorities, secured important concessions in Fez. Indeed, in Persia, Morocco, Russia, Turkey, and elsewhere, the good offices of the Alliance, discreetly and persistently rendered, have done much to better the laws under which Jews live. In 1910 the fiftieth anniversary of the Alliance was universally celebrated. Both European and Eastern political history have been influenced by its activities. For a full account of it, consult N. Leven, "L'Alliance Israélite Universelle" in *Cinquante Israélite Universelle*, vol. i (Paris, 1911). Current news of its activities will be found in *Ost und West*, the German organ of the Alliance Israélite Universelle.

ALLIANCE OF THE REFORMED CHURCHES HOLDING THE PRESBYTERIAN SYSTEM. An alliance formed in London in 1875. It holds councils, which have no legislative authority but great moral weight. In them the various Augustinian non-prelatical and Presbyterian or Reformed national and denominational churches find representation. There are over 90 of these churches, with over 5,000,000 members and 25,000,000 adherents, throughout the world. In the intervals between councils the business of the Alliance is conducted by an executive commission. The councils have been held at London, 1875; Edinburgh, 1877; Philadelphia, 1880; Belfast, 1884; London, 1888; Toronto, 1892; Glasgow, 1896; Washington, 1899; Liverpool, 1904.

AL'LIA'RIA. The old name of a genus of plants belonging to the family Cruciferæ, but now included in the genus *Sisymbrium*. It is known by the popular names of sauce-alone and jack-by-the-hedge. The best known species, *Sisymbrium alliaria* (*Alliaria officinalis*), called garlic-mustard, is a native of Great Britain, not unfrequently found on hedge-banks and in waste places in dry, rich soils, and is common in most parts of Europe. It has also become introduced in a number of places in the United States. It is a biennial, with a stem 2 to 3 feet high; large, stalked, heart-shaped leaves, white flowers, and pods much longer than their stalks, which are somewhat spreading. It seems more deserving of cultivation than many other plants which have long received the constant care of the gardener, being wholesome, nutritious, and to most persons pleasant. The powdered seeds were formerly employed as a sternutatory.

AL'LIBONE, SAMUEL AUSTIN (1816–89). An American author. He was born at Philadelphia, and although engaged in commercial pursuits, devoted considerable time to literature. It was therefore as an amateur that he began the literary work to which the best part of his life was devoted. This work, the *Critical Dictionary of English Literature and British and American Authors*, contains notices of 46,599 writers. The first volume appeared in 1854. In 1891 a three-volume supplement to this work, with 37,000 authors' names and 93,000 titles, appeared. Allibone was book editor and corresponding secretary of the American Sunday-school Union from 1867 to 1873 and from 1877 to 1879. In 1879 he was appointed librarian of the Lenox Library in New York and held this position until 1888. He died at Lucerne, Switzerland, Sept. 2, 1889. Besides the *Critical Dictionary*, he compiled the following works: *Poetical Quotations from Chaucer to Tennyson*, containing 13,600 passages, taken from 550 authors (1878; 1901); *Prose Quotations, from Socrates to Macaulay*, with indexes to the 8810 quotations, containing the names of 544 authors and 571 subjects (1876); *Explanatory Questions on the Gospels and the Acts* (1869); *An Alphabetical Index to the New Testament* (1868); *Indexes to Edward Everett's Orations and Speeches* (1850–59); *Great Authors*, an anthology (1885). New editions of his *Poetical Quotations* and *Prose Quotations* were published, respectively, in 1891 and 1893.

AL'LICE, or **AL'LIS** (Fr. *alose*, from Lat. *alausa*). A European shad (*Alosa vulgaris*), about 20 inches long, caught for food when ascending the rivers to spawn. It is the larger, and considered the better of the two species of European shad, of which the other is called the twaite. These are the maifisch of the Rhine valley.

ALLIER, á'lyâ'. A department in central France bordering on the Loire, formed mainly out of the old province of Bourbonnais. There are marble and granite quarries, and coal and iron mines in the mountains in the southeast. There is considerable farm land and many mineral springs, the ones at Vichy being best known. Area, 2850 square miles. Pop., 1901, 422,024; 1906, 417,961; 1911, 406,291. Capital, Moulins.

ALLIER. A tributary of the Loire, which

has its source in the water-shed in the eastern part of Lozère, a department of France (Map: France, K 6). It flows in a northerly direction, through Haute-Loire, Puy-de-Dôme, and Allier, and after a course of more than 250 miles falls into the Loire below the town of Nevers. It is navigable for 140 miles.

AL'LIGA'TION (Lat. *alligare*, to bind to, tie up). A form of proportion of eastern origin, which appears in the early works of Arabian and Hindu writers, notably in the *Lilavati* of Bhaskara Acharya (c.1150). The process was for several centuries confined to problems concerning the combination of metals. Two forms of alligation were recognized, viz., alligation *medial* and alligation *alternate*. Alligation medial teaches the method of finding the price or quality of a mixture of several simple ingredients whose prices or qualities are known; e.g., What is the fineness of gold produced by mixing 6 ounces of gold 22 carats fine with 4 ounces of gold 17 carats fine? Alligation alternate teaches what amount of each of several simple ingredients, whose prices or qualities are known, must be taken to form a mixture of any required price or quality; e.g., How much gold 700 fine and 900 fine must be melted together to produce gold 800 fine? Problems of this kind are indeterminate; that is, they have more than one solution and are best treated by algebraic equations. Alligation in its arithmetic form has practically disappeared from recent text-books and may be regarded as obsolete.

AL'LIGATOR (Sp. *el lagarto*, the lizard, Lat. *lacertus*, lizard). A genus of reptiles of the family Crocodilidæ. True alligators differ from crocodiles in the following respects: The feet are less webbed; the head is shorter and flatter; the long first and fourth teeth of the under jaw fit into pits in the upper jaw, and not into notches between the teeth, and this causes the whole head to be broader and the snout more obtuse than in crocodiles. There are only two species of alligators—the jacare and cayman (q.v.) of Central and South America being classified in a distinct genus. These species are—*Alligator sinensis*, of China, and *Alligator mississippiensis*, of the southern United States. Among the Neocene fossils of the south of England are remains of an alligator, or of a form that approaches very near to it; but this single species comprises all extinct species known, showing that the genus may be of modern origin. Their characteristics are largely those of the other crocodilians (see Crocodile): activity at night, offensive and defensive swinging of the tail, bellowing, egg-laying, etc.; but they are less aquatic than the typical crocodiles and spend much of their time basking in the sun on land. The alligator of the United States originally ranged from North Carolina to the Rio Grande along the coast and up the larger rivers, ascending the Mississippi as far as Jefferson Co., Miss., about lat. 32°; and in favorable places it used to be enormously abundant. It is now rarely seen north of Florida or the coast swamps of Louisiana; and the constant persecution of it for sport, its hide, ivory, or eggs is fast leading toward its extermination. It is estimated by the United States Fish Commission that 3,000,000 alligators were killed in Florida alone between 1880 and 1900. This alligator reaches about 16 feet in length when fully grown, and then is greenish-black above, having lost the yellowish color-bands that belong to its earlier years. It spends most of the day asleep in the sun on a mud bank or log, slipping into the refuge of the water when disturbed. It is timid and quick to retreat, rarely showing any disposition to attack a man, though boats are sometimes followed. When cornered, or caught upon the hook and hauled ashore, or, as is sometimes done, captured and bound with a rope when asleep, the animal proves an ugly customer, rushing with formidable open jaws at its enemies and striking from side to side with its powerful tail. They are strong and active swimmers, and always on the lookout for swimming animals like musk-rats or dogs, and sportsmen have often lost in this manner dogs that have ventured or been sent into the water after game. Alligators lie in wait in shallows, or close to the shore, for such prey also, yet their main fare is fish, salamanders, and the like. Like other crocodilians, it carries its prey to the bottom to be devoured, and then its windpipe and ears are closed against admission of water. The body of the alligator emits a fetid odor, and its flesh, which is white and tender, has a musky taste, yet is eaten by the Indians and some others. During the colder months it burrows into the swamp mud and hibernates, the depth and length of this torpidity being greater, of course, in the more northerly parts of its habitat. Consult Belt, *Naturalist in Nicaragua* (London, 1888).

The breeding of the alligator is thus described by Dr. Hugh M. Smith (*United States Fish Commission, Bulletin XI*, 1891): "The maternal alligator in April or May seeks a sheltered spot on a bank and there builds a small mound. The foundation of the mound is of mud and grass, and on this she lays some eggs. She covers the eggs with another stratum of grass and mud, upon which she deposits some more eggs. Thus she proceeds until she has laid from 100 to 200 eggs. The eggs in the course of time are hatched by the sun, assisted by the heat which the decomposition of the vegetable material generates. As soon as they have 'chipped the shell' the baby alligators are led to the water by the mother, who provides them with food which she disgorges, showing much anxiety for their safety. At this early period of their existence they are exposed to many dangers, being a favorite prey of fishes and turtles." It has been thought that alligators grow very slowly and that about 15 years was necessary for them to reach a length of two feet, while a 12-foot specimen indicated a patriarch of over threescore and ten years. Under extremely adverse conditions of existence, such as cold and lack of sufficient food, the growth may be considerably retarded, but in a favorable environment alligators grow very rapidly. From the time of hatching, an alligator in four years may attain a size large enough to have a commercially valuable hide. The following table showing the *average* increase of growth has been compiled from notes made in the reptile house of the New York Zoölogical Park:

Oct. 1900, hatched	Length 8 inches;	weight 1¾ oz.
Oct. 1901	Length 18 inches;	weight 9¼ oz.
Aug. 1902	Length 23 inches;	weight 3 lbs.
Mar. 1903	Length 45 inches;	weight 14 lbs.
Oct. 1905	Length 64 inches;	weight 50 lbs.
Oct. 1906	Length 72 inches;	weight 72 lbs.

Alligators are extensively utilized. Their hides can be tanned into an excellent leather, which has become expensive. The teeth, obtained by rotting the skulls in the ground, are of fine

ivory, and valued for carving into ornaments. They are worth about $2 a pound (of 50 to 75 teeth). Both flesh and eggs are eaten by some persons, and the eggs are valued because they can be hatched in boxes of warm sand, yielding young alligators to be sold as pets, or killed and made into curious ornaments. Consult Gill, *Smithsonian Miscellaneous Collections*, vol. xlviii (Washington, 1907). See CAYMAN.

ALLIGATOR AP'PLE. See CUSTARD APPLE.

ALLIGATOR FISH. A fish of the family Agonidæ, whose members have an elongated angular body covered with large bony plates that form a coat of mail. The best-known one is *Podothecus acipenserinus*, a species 12 inches long, found on the northern Pacific coast.

ALLIGATOR GAR. The great gar (*Litholepis* or *Lepisosteus tristœchus*) of the rivers of the southern United States, Cuba, Mexico, and Central America, which is greenish in color and sometimes reaches a length of 20 feet. Its flesh is worthless as food, and its scaly armor often turns a spear or even shot. While it is able to breathe air to a certain extent, yet it soon dies in foul water. See GAR.

ALLIGATOR PEAR. See AVOCADO.

ALLIGATOR TER'RAPIN, TORTOISE, or TURTLE. A snapping turtle, especially the long-necked, long-tailed, very large species (*Macrochelys lacertina*) of the southern Mississippi valley, which may weigh over 100 pounds, and have a head measuring 25 inches in circumference. Its flesh is valued as food. The jaws are so powerful that they can cut through a broom handle. The shell is dull yellow in color, matching the coffee-hued waters of its native river. It feeds on fish, which it captures with a sudden dart of the head as it lies hidden on the muddy bottom. See TURTLE.

AL'LINGHAM, WILLIAM (1824-89). An Anglo-Irish poet, born at Ballyshannon, Donegal. He won attention by *Poems* (1850), some of which had previously appeared in English periodicals. In the same year he came to London and was appointed to a subordinate post in the customs. He received a civil pension of £60 in consideration of his services to literature in 1864; married Helen Patterson, a well-known water-color painter, in 1874, and in the same year became editor of *Fraser's Magazine*. He died at Hampstead. His first collection of poems was followed by *Day and Night Songs* (1854), a new edition of which (1855) was illustrated with woodcuts from designs by Arthur Hughes, Rossetti, and Millais. Among subsequent volumes were *Laurence Bloomfield in Ireland*, an ambitious but unsuccessful narrative poem (1864); *In Fairy Land*, illustrated by Richard Doyle (1870); *Songs, Ballads and Stories* (1877); *The Fairies* (1883); *Flower Pieces, and Other Poems*, with designs by Rossetti (1888). *Mary Donnelly* is perhaps the best known of Allingham's many natural and graceful lyrics. His *Diary*, edited by Mrs. Allingham and Radford, is full of fascinating anecdotes of his friends and contemporaries, among whom were Tennyson, Thackeray, and Carlyle. (London, 1907.)

ALLINSON, ANNIE CROSBY (EMERY) (1871—). An American educator and writer, born in Ellsworth, Me. In 1892 she graduated from Bryn Mawr College. She took post-graduate studies at this college and received the degree of Ph.D. in 1896. In 1893 and 1894 she studied at the University of Leipzig. She was appointed Dean of Women and assistant professor of classical philology at the University of Wisconsin in 1897. There she remained until 1900, when she received the appointment of Dean of the Women's College of Brown University. In 1905 she was married to Francis Greenleaf Allinson (q.v.). On her marriage she resigned the position at Brown University. She was joint author with her husband of *Greek Lands and Letters* (1909), and contributed on classical and other subjects to reviews and magazines.

ALLINSON, FRANCIS GREENLEAF (1856—). An American philologist and educator. He was born in Burlington, N. J., and in 1876 graduated from Haverford College. He then spent one year in Harvard University. From 1877 to 1880 he was a fellow of Johns Hopkins University, receiving the degree of Ph.D. in the latter year. From 1880 to 1882 he was an assistant professor of Greek and Latin at Haverford College, and from 1882 to 1891 was head master of classics at the University School in Baltimore. He was appointed assistant professor of Greek and Latin at Williams College in 1892. After serving until 1895 in this chair, he was called to be associate professor of Greek and classical philology at Brown University, and became professor of classical philology in 1898. In 1910 and 1911 he was annual professor at the American School of Classical Studies at Athens. His published writings include *Greek Prose Composition* (1895); *Greek Lands and Letters* (with A. C. E. Allinson, 1909). He edited texts of several Greek authors and was a contributor to *Studies in Honor of Basil L. Gildersleeve* (1892). He contributed also to *The American Journal of Philology and Proceedings of the American Philological Association.*

ALLIOLI, äl'lê-ō'lê, JOSEPH FRANZ (1793–1873). A Roman Catholic biblical scholar. In 1830–36 he issued at Nuremberg, in six volumes, Braun's annotated German translation of the Bible from the Vulgate, but so revised as to be practically a new work. It was the first of its kind to receive papal approbation.

ALLIOT, à'lyō' (JEHAN DANIEL) HECTOR (1862—). A Franco-American archæologist, born at Château des Forestiers, Gironde, France. He graduated from the Lycée Bordeaux in 1879, and later specialized in medicine and chemistry, coming to be known, however, as a writer on art. In 1891 he was associated with Farah Pasha in explorations at Tyre, Asia Minor. As director of the Cliff Dwellers Exploration for the Chicago Exposition in 1893, he made a valuable collection, now the property of the University of Pennsylvania. In 1908 he was appointed professor of art history in the University of Southern California; in 1909 commenced service as curator of the Southwest Museum; and in 1911 occupied the chair of technology in the School of American Archæology. His later archæological work was among the Ute, Hopi, and Pueblo Indians, to whom he devoted over 10 years of research. He became a member of many foreign and American archæological and geographical societies and an officer of the French Academy.

AL'LISON, WILLIAM BOYD (1829–1908). An American legislator. He was born at Perry, Ohio, attended Allegheny and Western Reserve colleges; studied law and practiced in Ohio until 1857, when he removed to Iowa. During the Civil War he was a member of the Governor's staff. Elected as a Republican, he served in the

House of Representatives from 1863 to 1871; was elected to the United States Senate in 1873 and reëlected five times. He was an active member of the Senate, serving on many commissions. From 1881 to 1893, and again two years later, he was chairman of the Committee on Appropriations. The essential feature of the coinage act of 1878, known as the Bland-Allison Act, or more properly the Allison Act, was due to him. He was one of the representatives of the United States at the Brussels Monetary Conference in 1892. Twice he was a prominent candidate in Republican national conventions for the presidential nomination. Both President Garfield and President Harrison offered him the Treasury portfolio.

ALLIT'ERA'TION (Lat. *ad*, to + *littera*, letter). The frequent occurrence of the same or similar letters or sounds. In old German, Anglo-Saxon, and Scandinavian poetry alliteration took the place of rhyme. This kind of verse, in its strict form, required that two stressed syllables in the first hemistich and one in the second hemistich should have the same sound, if consonantal, as in the following Anglo-Saxon line:

*F*lota *s*amig heals *f*ugle gelicost.
(The *b*oat with *b*ow of foam likest a *b*ird.)

Alliterative poems continued to be written in English after it had assumed its modern form. The most remarkable is *Piers Plowman*, a poem of the fourteenth century, of which the following is a specimen:

In a somer *s*eson whan *s*oft was the *s*onne.

Even after the introduction of rhyme, alliteration continued to be largely used as an embellishment of poetry, and is so, though to a less extent, to this day:

*F*ull *f*athom *f*ive thy *f*ather lies.—*Shakespeare.*

The fair *b*reeze *b*lew, the white *f*oam *f*lew,
The *f*urrow *f*ollowed *f*ree. — *Coleridge.*

A *r*ag and a *b*one and a *h*ank of *h*air. — *Kipling.*

Alliteration is not confined to verse; the charm that lies in it exercises great influence on human speech generally, as may be seen in many current phrases and proverbs in all languages: example, "life and limb," "house and home," "wide wears," "tight tears," etc. It often constitutes part of the point and piquancy of witty writing. Among modern writers this use of alliteration is well illustrated by Sydney Smith: for example, when contrasting the conditions of a dignitary of the English church and of a poor curate, he speaks of them as "the right reverend Dives in the palace, and Lazarus-in-orders at the gate, *d*octored by *d*ogs and *c*omforted with *c*rumbs."

In the early part of the seventeenth century the fashion of hunting after alliterations was carried to an extreme; even from the pulpit, the chosen people of God were addressed as "the *c*hickens of the *C*hurch, the *s*parrows of the *s*pirit, and the *s*weet *s*wallows of *s*alvation." *Ane New-Year Gift*, or address, presented to Mary, Queen of Scots, by the poet Alexander Scott, concludes with a stanza running thus:

Fresh, fulgent, flourist, fragrant flower formose,
Lantern to love, of ladies lamp and lot,
Cherry maist chaste, chief carbuncle and chose, etc.

In the following piece of elaborate trifling, given (but without naming the author) in H. Southgate's *Many Thoughts on Many Things*, alliteration is combined with acrosticism:

A n Austrian army, awfully arrayed,
B oldly by battery besieged Belgrade;
C ossack commanders cannonading come,
D ealing destruction's devastating doom;
E very endeavor engineers essay
F or fame, for fortune, forming furious fray,
G aunt gunners grapple, giving gashes good;
H eaves high his head heroic hardihood;
I braham, Islam, Ismael, imps in ill,
J ostle John Jarovlitz, Jem, Joe, Jack, Jill;
K ick kindling Kutusoff, kings' kinsmen kill;
L abor low levels loftiest, longest lines;
M en march'mid moles,'mid mounds,'mid murd'rous mines.
N ow nightfall's near, now needful nature nods,
O pposed, opposing, overcoming odds.
P oor peasants, partly purchased, partly pressed,
Q uite quaking, "Quarter! quarter!" quickly quest.
R eason returns, recalls redundant rage,
S aves sinking soldiers, softens signiors sage.
T ruce, Turkey, truce! truce, treach'rous Tartar train!
U nwise, unjust, unmerciful Ukraine,
V anish, vile vengeance! vanish, victory vain!
W isdom wails war—walls warring words. What were
X erxes, Xantippe, Ximenes, Xavier?
Y et Yassy's youth, ye yield your youthful yest.
Z ealously, zanies, zealously, zeal's zest.

While recent poets, as Tennyson, Swinburne, and Kipling, employ alliteration combined with vowel distribution, for beautiful sound effects, yet prose writers seem to avoid it, or at least to keep it from becoming obvious. Observe from the *Passing of Arthur:* "And on a sudden, lo! the level lake, and the long glories of the winter moon." Tennyson's alliterations are less obvious than Kipling's; whereas Swinburne revels in the recurrence of like sounds and makes this a part of his metrical theory. Consult Guest, *English Rhythms* (London, 1882), and J. Schipper, *Grundriss der Englischen Metrik* (Leipzig, 1895), and for this use of alliteration in Greek and Latin, Plessis, *Métrique Grecque et Latine* (Paris, 1889); Klotz, *Altrömische Metrik* (Berlin, 1890); and Puhlig, *De Alliterationis Vi et Vsu* (Breslau, 1912). See ASSONANCE; ENGLISH LITERATURE; GREEK LITERATURE; LATIN LITERATURE.

AL'LIUM (Lat. garlic). A genus of plants of the family Liliaceæ containing about 300 species. The commonly cultivated species are onion, garlic, leek, chives, and shallot, and these forms represent the habit of the genus, with its alliaceous (q.v.) odor, bulbs, long and narrow leaves, and umbels of small flowers. Eight or nine species are natives of Great Britain, of which the most common is ramsons (*Allium ursinum*), a species with much broader leaves than most of its congeners. It is most frequently found in moist woods and hedge-banks, but occasionally in pastures, in which it proves a troublesome weed, communicating its powerful odor of garlic to the whole dairy produce. Crow garlic, or wild onion (*Allium vineale*), another British species, is sometimes very troublesome in the same way in drier pastures. Both are perennial, and to get rid of them their bulbs must be perseveringly rooted out when the leaves begin to appear in spring. This species has been introduced into the eastern part of the United States, where it is troublesome in lawns, parks, and pastures. A small quantity of carbolic acid injected into the cluster is said to destroy them. Over 60 species are indigenous to the United States, about 50 of them belonging to the Western States. A number of species are grown indoors or as ornamental plants in gardens. Among these *Allium neapolitanum* is one of the best. If grown out-doors, it needs protection in most localities in the United States.

ALLMAN, ăl'măn, GEORGE JAMES (1812–98). A Scotch zoölogist. He was born in Ireland, graduated in 1843 at Trinity College, Dublin, and was in the following year appointed regius professor of botany in Dublin University. In 1855 he was appointed regius professor of natural history in Edinburgh University and, having resigned in 1870, was chosen president of the Linnæan Society in 1874 and president of the British Association in 1879. He received numerous medals from the scientific societies and published *Monograph of the Fresh Water Polyzoa* (1856) and *Monograph of the Gymnoblastic Hydroids* (1871–72).

ALLMERS, ăl'mĕrs, HERMANN LUDWIG (1821–1902). A German poet, born at Rechtenfleth, near Bremen. He studied at Berlin, Munich, and Nuremberg and made his first appearance in literature in his *Marschenbuch* (1858; 4th ed., 1902). This was followed by *Dichtungen* (1860; 4th ed., 1900), and *Römische Schlendertage* (1869; 11th ed., 1904), containing observations on Italian life. His drama, *Elektra* (1872; 2d ed., 1895), with music by A. Dietrichs, was very successful. His further works include *Fromm und Frei* (1891), a volume of verse. His complete works appeared in 1891–95 in six volumes. Consult L. Bräutigam, *Der Marschendichter Hermann Allmers* (Oldenburg, 1891).

ALL'MOUTH. The angler or goosefish. See ANGLER.

ALLOA, ăl'lō-ä. A seaport and the county-town of Clackmannanshire, Scotland, at the mouth of the Forth, and 32 miles by rail from Edinburgh (Map: Scotland, E 3). It is a town of considerable antiquity and is supposed to have been built on the site of the Alauna of Ptolemy. The principal articles manufactured are whisky, ale, cotton, woolen goods, glass, and iron. Considerable coal is obtained from the neighboring collieries, and much of this is exported. Alloa has an excellent harbor, with floating and dry docks. There is regular steamer communication by river with Edinburgh and Stirling. In the neighborhood is Alloa House, supposed to have been built in the thirteenth century, the home of the Earls of Mar and the Erskines, and many Scottish princes. Pop. (police burgh), 1901, 11,555; 1911, 11,893; (parish), 1901, 16,858; 1911, 17,130.

ALLOBROGES (Lat. pl.). A people of Gaul whose territory is now Savoy and Dauphiné. Vienna (the modern Vienne) was their chief town. They were subjected to Rome 121 B.C., by Fabius Maximus, and remained loyal.

AL'LOCU'TION (Lat. *allocutio*, a speaking to, from *ad*, to + *loqui*, to speak). A term applied, in the language of the Vatican, to denote specially the address delivered by the Pope at the College of Cardinals on important ecclesiastical or political circumstances. An allocution presents the papal conclusions on subjects which have usually been discussed by ecclesiastical bodies, and which involve political or religious problems of prime importance to the Church, or to some section of it. Though delivered in secret, it is afterward published and is an important ecclesiastical document.

ALLO'DIUM, or ALLODIAL OWNERSHIP (Med. Lat. probably from OHG. *al*, all + *ōt*, *ōd*, property, estate). The free and absolute right of property in land, properly opposed to feudal tenure (q.v.), or the holding of land in subordination to a superior owner. Blackstone is responsible for the view, which has been generally taken by legal writers of the last century, that a condition of allodial landholding prevailed in England prior to the Norman Conquest, and that this was rapidly superseded by the introduction of the feudal system of land tenure by the Conqueror and his immediate successors, whence Lord Coke's statement that there "is no land in England in the hands of any subject but it is held of some lord by some kind of service." There can be no question as to the universality of feudal tenure, as described by Coke; but it may be doubted whether, in our legal system, the free and unqualified ownership of land—corresponding to the title by which goods and chattels are held—has ever been generally recognized. It is more than probable that from the first the idea of ownership underwent a change when it was transferred from cattle and other personal property to land, and that the owner of land was generally conceived of as having a more or less temporary interest, as holding in subordination to the superior rights of the community, which was somehow regarded as the ultimate and permanent owner. However this may be, we do not find in the books any general recognition of allodial ownership, in the strict sense of the term, anywhere in Europe; and the rapidity with which the feudal system spread over England after the Conquest would seem to indicate that among the Anglo-Saxons such absolute ownership of land was the exception rather than the rule. The terms "alod" and "allodium" do, indeed, occur with some frequency, but usually in a derivative sense, to describe lands which, though held in some form of dependent tenure, are inheritable and thus similar to the modern estate in fee simple. Since the decay of the feudal system in England and its general abolition in the United States, the term "allodial" has come to be applied to the common form of land tenure in subordination to the paramount title of the State, which now commonly prevails, and which, though not entirely free and absolute, has been divested of all the burdensome incidents which were characteristic of feudal tenure. Some of our State constitutions and many of our statutes have expressly declared all tenures to be allodial, in this sense of the term, and in most of the States they are, in the absence of legislation on the subject, deemed to be so. In several of the States, however, tenures partaking more or less of the feudal character still survive. Consult the authorities referred to under REAL PROPERTY.

ALLOG'AMY (Gk. ἄλλος, *allos*, other + γάμος, *gamos*, a wedding) or CROSS-POLLINATION. A transfer of the pollen of one flower to the pistil of another. Allogamy is subdivided into geitonogamy, in which the pollinated flower is on the same plant, and xenogamy, in which it is on a different plant. The opposite of allogamy is autogamy, or self-pollination. See POLLINATION.

ALLON, ăl'on, HENRY, D.D. (1818–92). An English Congregational leader, born at Welton, near Hull. He graduated at Chestnut College, 1843, and was pastor of Union Chapel, Islington, London, from 1844 until his death. He edited the *British Quarterly Review* from 1865 to 1887. He published, besides sermons, the life of Rev. James Sherman (London, 1863), and that of Thomas Binney, prefixed to his edition of Binney's sermons (1875), and *Land and the Puritans* (1882). He compiled *The Congregationalist Psalmist*. Consult his memorial (1892).

ALLONGE, ȧ'lôn'zhȧ', AUGUSTE (1833–98). A French landscape artist. He was born in Paris and studied with Cogniet and Ducornet. He is noted for his charming use of charcoal in landscape work, but his oil paintings, as well, have won approval. His method of using charcoal has almost created a "school" for workers in that material, and his drawings are much sought and highly prized by connoisseurs. His subjects are landscapes of a placid and sylvan kind. Among his works in oil are views on the Somme; among those in charcoal are "Moulin de Givry." He and Camille Bernier were the first to recognize the beauty of Brittany and to find their subjects there. His writings include *Le fusain* (1873) and a later *Grand cours de fusain* (54 plates).

ALLOP'ATHY. See HOMŒOPATHY.

AL'LOPHANE. A fragile hydrated aluminium silicate belonging in the clay group of minerals. It is usually found in amorphous incrustations of a pale sky-blue color, but sometimes of various shades of green, brown, or yellow. Allophane is produced by the alteration of some aluminous silicate, such as one of the feldspars. Acids attack it with the liberation of silica. It occurs in various European localities and at Richmond, Mass., Bristol, Conn., and Morgantown and Friedenville, Pa.

AL'LOPHAN'IC ACID. See UREAS, THE COMPOUND.

ALLORI, ȧl-lō'rē. The name of two Italian painters, of the later Florentine school.—ALESSANDRO (1535–1607) was a pupil of his father's friend, not his uncle, Bronzino, who brought him up. He afterwards adopted a mannered imitation of Michelangelo. He was chiefly employed in the churches of Florence and Tuscany, in the Ducal Villa Poggio a Cajano, and in portraiture. He wrote for artists a treatise on anatomy.—His son and pupil CRISTOFORO (1577–1621) forsook Alessandro's manner for that of Pagani. A more important artist than his father, although his style is mannered, he was influenced by Andrea del Sarto, attaining beauty of color and delicacy of execution. His most celebrated work is "Judith with the Head of Holofernes" in the Pitti Palace, Florence, with replicas in Vienna and the Uffizi. The Pitti collection also has a fine "St. Julian," the Louvre "Isabella of Aragon Pleading with Charles VIII."

ALLOT'ROPY (Eccl. Gk. ἀλλοτροπία, *allotropia*, variety, from ἄλλος, *allos*, other + τρόπος, *tropos*, turn, way, guise), or ALLOTROPISM. A term used in chemistry to denote the existence of an element in several forms differing from each other in their physical properties. By the silent discharge of electricity in an atmosphere containing ordinary oxygen, the latter is transformed into ozone. Ozone can be readily shown to be made up of nothing but the element oxygen; yet oxygen gas and ozone exhibit important differences in their properties; thus ozone (Gk. ὄζων, smelling) has a peculiar and characteristic odor, while oxygen gas is odorless; ozone reacts much more readily with various substances; it has bleaching and disinfectant properties not possessed by oxygen gas, and it is much denser than oxygen. Phosphorus affords another example of allotropism. In ordinary circumstances, and when freshly prepared, phosphorus is a pale yellow solid of the consistence and aspect of wax and to some extent flexible and translucent. It requires to be placed in a vessel with water to keep it from taking fire spontaneously, and it is very poisonous. The same element, when dried and kept for some time at a moderately high temperature, passes, weight for weight—without addition or subtraction of matter—into a substance known to chemists as *amorphous* phosphorus. The color of this new variety is brownish red; and it exists as a powder which has no odor, does not take fire, and is not known to be poisonous at all. Three allotropic modifications of the element carbon are known: diamond, graphite, and amorphous carbon (pure lamp-black). Of nitrogen, only one—the ordinary inert form—was known until 1911, when Strutt discovered an allotropic modification. This new form is produced from ordinary nitrogen by the electric spark. It exhibits a peculiar luminescence for some time after the sparking has been discontinued and is chemically active, readily uniting with phosphorus, iodine, mercury, and other elements.

The different varieties of sulphur, boron, silicon, etc., furnish other examples of allotropism. Though comparatively few elements have been obtained in more than one form, there seems to be no reason why, in general, any other chemical element should be incapable of existing in two or more allotropic modifications. The existence of allotropic varieties brings to the mind the polymorphism of crystalline substances and the isomerism of organic compounds. From the point of view of the atomic theory, the different allotropic modifications of an element are, probably, made up of molecules containing different numbers of atoms, or else of atoms differently combined: thus a molecule of ordinary oxygen contains two oxygen atoms, and its chemical symbol is O_2; a molecule of ozone contains three oxygen atoms, and its chemical symbol is O_3. A similar explanation of the nature of allotropy in solid elements is, however, purely hypothetical; for nothing is known of the ultimate structure of solids. Consult D. Berthelot. *De l'allotropie des corps simples* (Paris, 1894), and Ouvrard, *Etats allotropiques des corps simples* (Paris, 1894).

ALLOUEZ, ȧ'lōō'ȧ', CLAUDE JEAN (1620–89). One of the early French Jesuits who visited the Great Lakes. He founded the Mission of the Holy Ghost on Lake Superior in 1665, explored Green Bay, and established missions among the Illinois Indians, settling at Kaskaskia (q.v.) and continuing there the mission begun by Marquette. He retired in 1679 on the approach of La Salle, an enemy of the Jesuits, and died among the Miamis on St. Joseph's River. Consult an autobiography in *Jesuit Rélations* (Cleveland, Ohio, 1900), and Shea, *Catholic Church in Colonial Days.*

ALLOW'ANCE. In military usage, money allowed in lieu of forage, food, horses, clothing, or quarters, or for any extra work or duties that may have been performed. Such allowance constitutes extra pay. In the United States army "allowance" or "allowances" usually refer to the things gratuitously allowed and not to their money equivalent. For example, fuel, light, heat, quarters, and forage are "allowances"; when the equivalent in money is furnished in lieu thereof, this money is called "commutation." See PAY AND ALLOWANCES, MILITARY.

ALLOWANCE OF QUAR'TERS. See PAY AND ALLOWANCES, MILITARY.

AL'LOWAY KIRK. A ruined church in the parish of Ayr, Scotland, near the mouth of the

Doon, celebrated in Burns's *Tam o' Shanter*. At very short distances from it are the cottage in which the poet was born, the monument erected to his memory in 1823, and the Auld Brig o' Doon, over which Tam o' Shanter made his escape from the witches.

ALLOY' (Fr. *aloi*, from Lat. *alligare*, to bind to, from *ad*, to + *ligare*, to tie). A mixture of two or more metals, usually produced artificially by fusion, although sometimes found native. Alloys are characterized by certain definite properties, which, according to Sir William C. Roberts-Austen, include: liquidation, which is shown by the separation of that constituent which has the lowest melting point when the alloy is heated; density, which seldom corresponds to the mean of those of the constituents of the alloy, being usually either more or less than that shown by the percentage composition; tenacity, which is usually greater than that of the constituents of the alloy, although it is sometimes diminished; hardness, which is almost always increased; extensibility, which is almost always diminished; and fusibility, the melting point being generally lower than the mean of the melting points of the constituent metals.

The great value of metallic alloys in commerce is due to the fact that certain properties which are desirable for practicable purposes may be imparted to many metals by a suitable addition of other metals. For instance, gold and silver are too soft for use as coins when pure, but may be rendered sufficiently hard by the admixture of small proportions of copper. Similarly the hardness of copper is greatly increased by the addition of zinc, yielding brass. In making alloys, the least fusible metal is melted first, after which the others are added. When three metals are used to form the alloy, they are melted in pairs and afterward together. The more important metallic alloys, which are included among the materials of constructive engineering, are the bronzes, the brasses, the coin alloys, and a few alloys of tin, lead, zinc, antimony, and bismuth. The following are the principal alloys, their composition and uses:

Bronze is an alloy of copper and tin. The knowledge of bronze is very old, it being used by the ancients for making coins, weapons, tools, and ornaments. Many of these ancient peoples were very skillful bronze-founders. The principal bronzes are those used in coinage, in ordnance, in statuary, in bells and musical instruments, and in mirrors and the specula of telescopes. *Coin bronze* as made by the Greeks and Romans consisted of from 96 per cent copper and 4 per cent tin to 98 per cent copper and 2 per cent tin. Modern investigations have shown the range of good alloys for this purpose to be quite large, varying from 96 per cent copper and 4 of tin to 80 per cent copper and 14 of tin, the best falling near the middle of this range. *Gun bronze* has different compositions in different countries, but the most common proportion would seem to be 90 per cent copper and 10 of tin, or 89 per cent copper and 11 of tin. When well made, it is solid, yellowish in color, denser than the mean of its constituents, and much harder, stronger, and more fusible than commercial copper: it is somewhat malleable when hot and much less so when cold. *Statuary bronze* is nearly the same composition as gun bronze. It should be rapidly melted, poured at a high temperature, and quickly cooled to get the best results. *Bell metal* is richer in tin than the preceding, and varies in composition somewhat with the size of the bell, the proportion of tin being the larger in the case of small bells. The range of good practice in bell metal is from 18 to 30 per cent tin and from 82 to 70 per cent copper. Chinese gongs are made from 78 to 80 per cent copper and 22 to 20 per cent tin, and are beaten into shape with the hammer, being tempered at intervals during the process. (See ANNEALING.) Bell metal is dense and homogeneous, fine ground, malleable if quickly cooled in the mold, rather more fusible than gun bronze, but otherwise similar, excelling, however, in hardness, elasticity, and sonority. *Speculum metal* contains often as much as 33 per cent tin; it is almost silvery white, extremely hard and brittle, and capable of taking a very perfect polish. Bronze for bearings and other friction surfaces in machinery is made of many proportions, varying from 88 to 96 per cent copper, as more or less hardness is required. *Phosphor bronze* (q.v.) is an alloy of copper, zinc, and tin, which has been given exceptional purity by fluxing with phosphorus. It is very tough and hard, and is used for piston rings and valve covers, pinions, cog wheels, screw propellers, etc. *Tobin bronze* and *Bridgeport bronze* are alloys of copper and zinc in the proportion of about 60 to 62 of copper and 36 to 38 of zinc, with small percentages of tin, iron, and lead. It has great tensile strength, and corrodes with great difficulty. *Aluminum bronze* consists of 90 per cent copper and 10 of aluminum, and is malleable and exceedingly tenacious. It has a golden color and is used in jewelry. When the aluminum exceeds 10 per cent, the alloy becomes brittle, and when 20 per cent is reached, it can be crushed in a mortar. *Manganese bronze* is an alloy consisting of about 88 per cent copper, 1½ of tin, 8.7 of zinc, and smaller percentage of iron, lead, and phosphorus; it is much used for making screw propellers. Both Tobin bronze and manganese bronze are in reality more nearly brasses, since the zinc percentage is greater than the tin percentage.

Brass is an alloy of copper and zinc varying in proportions from 10 parts of copper to 1 of zinc to 1 part of copper to 5 parts of zinc. (See BRASS.) Brass is extensively employed in the arts in the manufacture of scientific apparatus and mathematical instruments, the small parts of machinery, and many sorts of hardware. It can be cast, drawn into wire, rods, or pipe, and rolled into sheets. Brass containing 55 to 60 per cent of copper and 45 to 40 per cent of zinc, when heated, can be extended under hydraulic pressure through dies into various forms for structural purposes; this is known as extruded metal. Brass is harder than copper, very malleable and ductile, and can be "stuck" in dies, formed in molds, or "spun" in lathes into vessels of a wide variety of forms. It is a much poorer conductor of electricity and heat than copper and is more fusible. *Aluminum brass* is made of equal weight of aluminum bronze, copper, and zinc. It has a very high tensile strength and has been used for screw propellers.

Other alloys than bronzes and brasses exist in an immense variety, and have numerous applications in the arts and sciences, although they are much less used than the bronzes and brasses. Only a few of these alloys can be mentioned here. *German silver* (q.v.) is an alloy of

copper, zinc, and nickel in the respective proportions of about 60, 20, and 20 per cent. It is used for table utensils, ornaments, and in the form of sheets, and is one of the most difficult alloys to handle in the foundry and rolling mill. *Pewter* is an alloy of tin and copper often mixed with lead. *Britannia metal* (q.v.) is an alloy of tin, antimony, copper, and brass. It and pewter are much used in making table utensils. *Stereotype metal* is an alloy of 16 per cent antimony, 17 of tin, and 67 of lead. (See PRINTING.) *Babbitt metal* (q.v.) is an alloy of 4 parts copper, 12 parts tin, 8 parts regulus of antimony melted together, and 12 parts tin added after fusion. It is used for lining bearings for journals. *Solders* are alloys used for joining metallic surfaces and parts and have a wide range of composition. The soft solders are made of tin and lead; the hard solders are usually made of brass, and special solders are composed of various alloys of copper, zinc, lead, tin, bismuth, gold, and silver. In making solders, great care has to be taken to secure uniformity of composition. For this reason they are often granulated by pouring from a height into water, or by reducing the cast ingots into powder and then remelting the granulated or powdered material. The soft solders are usually sold in sticks, and silver and gold solder in sheets. Platinum is soldered with gold, and German silver with a solder of equal parts of silver, brass, and zinc. The essentials of a good solder are that it shall have an affinity for the metals to be united, shall melt at a considerably lower temperature, shall be strong, tough, uniform in composition, and not readily oxidized. *Type metal* is an alloy of lead and antimony in the proportions of 4 to 1. It is a hard alloy capable of being cast in molds, and taking form very perfectly. *Gold coin* consists of an alloy of 900 parts gold, 75 parts copper, and 25 parts silver. Iron forms compounds with many elements that are used in metallurgical processes, as ferro-manganese, ferro-titanium, and ferro-tungsten, which will be considered under IRON AND STEEL. Mercury combines with many metals to form amalgams (q.v.). During the years 1875–78 a board for testing iron, steel, and other metals met at the Watertown Arsenal, Mass., and very thoroughly considered the properties of various alloys. Their report, published in 1881, contains much information on the subject, together with a bibliography. Consult: Guettier, *A Practical Guide for the Manufacture of Metallic Alloys*, translated by Fesquet (Philadelphia, 1872); Larkin, *The Brass and Iron Founders' Guide* (Philadelphia, 1878); Graham, *The Brassfounders' Manual* (London, 1879); Brannt, *Metallic Alloys* (London, 1889); Hiorns, *Mixed Metals, or Metallic Alloys* (New York, 1890); Thurston, *A Treatise on Brasses, Bronzes, and Other Alloys, and their Constituent Metals* (New York, 1897); Roberts-Austen, "Reports to the Alloys Research Committee," *Proceedings, Institution of Mechanical Engineers* (London, 1891, 1893, 1895, 1897, 1899, and 1904); and Howe, *Iron, Steel, and Other Alloys* (Boston, 1903); "Aluminum Alloys," *United States Geological Survey* (1911), and *Metal Industry* (1910).

ALLOYS, MAGNETIC, COMPOSED OF NON-MAGNETIC METALS. Hadfield has discovered that the addition of a certain amount of manganese to iron renders the latter perfectly non-magnetic. In 1904 Heusler made the very remarkable discovery that, conversely, certain non-magnetic metals may be rendered magnetic by alloying them with manganese—itself perfectly non-magnetic. Thus, copper, aluminium, and antimony are on the list of distinctly non-magnetic metals. Yet an alloy containing 60 per cent of copper, 14 of aluminium, and 26 of manganese is magnetic. Furthermore, and curiously enough, the magnetic property of the alloy may be readily caused to vary. When freshly prepared, the alloy is but faintly magnetic. If heated to 170° C. (c.340°F.) and then suddenly chilled with water, it loses its magnetic property altogether. But if subsequently kept for some time at the temperature of boiling water, or thereabout, it becomes more permanently, and this time quite strongly, magnetic. Alloys of manganese with antimony, too, are distinctly magnetic. An adequate theoretical interpretation of these facts is, in the present state of science, impossible. The conclusion, however, to which they point is, that magnetizability is rather an acquired and variable than an inherent and constant property of matter, and that its ultimate cause may lie, not deeply within the chemical atoms, but rather in the physical conditions produced, as it were, accidentally in certain molecular complexes. This conclusion suggested to Clemens Winkler a possible analogy in radioactivity, and he raised the question whether radioactivity, too, might not be a more or less accidental physical rather than a deep-seated chemical property of substances, and whether radium itself might not be simply common barium with the property of radioactivity acquired.

ALLPORT, SAMUEL (1816–97). An English petrologist, distinguished by his pioneer work in the field of microscopic petrology. He was librarian of Mason College from 1880 to 1887.

ALL-SAINTS' BAY. A bay in the province of Bahia, Brazil, in 13° S. lat. and 39° W. long. (Map: Brazil, K 6). It forms a superb natural harbor, 37 miles long and 27 miles broad, with an easy entrance. It contains several islands, the largest of which, Itapasica, is 18 miles long and 3 miles broad. The town of Bahia (q.v.) is situated on it.

ALL-SAINTS' DAY. In old English, All-Hallows, All-Hallowmas, or simply Hallowmas, a festival of the ancient Christian Church, introduced because of the impossibility of keeping a separate day for every saint. As early as the fourth century, on the cessation of the persecution of the Christians, the Sunday after Easter was appointed by the Greek church for commemorating the martyrs generally; and in the Church of Rome a similar festival was introduced about 610 A.D., when the old heathen Pantheon (the present Rotunda, or Santa Maria de' Martiri) was consecrated, on March 13, to Mary and all the martyrs. But the real festival of All Saints was first made of obligation by Gregory IV in 835. It was admitted into England about 870 and is now a well-recognized day there and wherever the Church calendar is closely followed. The choice of the day was doubtless determined by the fact that a chapel in St. Peter's Church in honor of all the saints was consecrated by Gregory III, in 731, on November 1, which established the date of the Roman observance. In conformity with this local custom Gregory IV ordered the first of November to be universally observed for the commemoration.

ALL SORTS AND CONDITIONS OF MEN. A story, by Sir Walter Besant, of a wealthy college girl who endeavors to show to the poor of East London a way of escape from the sordid misery of their lives. The People's Palace in East London owes its origin to this novel.

ALL SOULS COL'LEGE. A college of the University of Oxford, founded in 1437–38 by Archbishop Chichele, partly as a chantry where prayers should be made for the souls of all Christians (especially such as fell in the war for the crown of France, of which Chichele had been the adviser), and partly as a society of fellows free from the charge of undergraduate students. The college has been noted for the devotion of its members to history and law, subjects in which the founder was distinguished. In late years the number of fellowships has been increased from 40 to 50, and two Chichele professorships have been instituted—one in international law and diplomacy, and one in modern history. The fellows are selected for their distinction in the study of law and history. Among the ecclesiastics who have been enrolled at All Souls College are Sheldon, Jeremy Taylor, and Reginald Heber; among lawyers and statesmen, Blackstone, Gladstone, Salisbury, and Curzon. The Codrington Library contains over 70,000 volumes and is noted as one of the finest law libraries in England.

ALL-SOULS' DAY. A holy day of the Roman Catholic church, which falls on November 2. The object of it is by prayers and almsgiving to alleviate the sufferings of souls in purgatory. For long no especial day was appointed for the commemoration of all the departed who have not attained perfect life. Among the early Christians the names of the departed were entered on the diptychs, or lists, used at the altar, from which the priest read the names of those for whom he was required to pray that God might give them "a place of refreshment, light, and peace." In the sixth century it was customary in Benedictine monasteries for a commemoration of all the departed brethren to be held at Whitsuntide. In Spain the memorial of All Souls was celebrated in the time of St. Isidore on the octave of Pentecost; this seems a Western echo of the Oriental custom of commemorating All Saints on that day, and All Souls on the Saturday before Whitsunday. St. Odilo of Clugny, in 998, ordered that in all monasteries affiliated to Clugny the commemoration of All Souls should follow on the morrow of the Feast of All Saints. Thence the observance of November 2 as All Souls' day spread throughout the West as a universal custom. The day furnishes a place for the survival, among the European peasantry, of many folk-customs from the pre-Christian times.

ALL'SPICE (*all* + *spice*). A name given to the dry unripe berry of the pimento (*Pimenta officinalis*), a small evergreen tree. The berry is supposed to combine the flavor of several spices, especially cinnamon, nutmeg, and cloves; hence the name. The tree is cultivated in the West Indies, especially in Jamaica, for its aromatic leaves and berries. The berries grow in clusters. They are about the size of peas and are used as a spice for seasoning food. The word "allspice" is also applied to the aromatic bark of various other plants, particularly *Calycanthus floridus* (q.v.). For illustration, see Plate of ABUTILON.

ALL'STON, MARGARET. See BERGENGREN, ANNA (FARQUHAR).

ALLSTON, THEODOSIA BURR. See BURR, THEODOSIA.

ALLSTON, WASHINGTON (1779–1843). A distinguished American painter and author. He was born at Waccamaw, S. C., on his father's plantation, Nov. 5, 1779, but passed his childhood and received his education and early instruction in art at Newport, Boston, and Cambridge. Malbone, the miniature painter, was an early friend and adviser, and the portraits of Pine a valuable influence. After graduating from Harvard in 1800, Allston went to Charleston, S. C., where he began his art career. In 1801 he went with Malbone to London and became a student of the Royal Academy, which was at that time under the presidency of his fellow countryman, Benjamin West. In 1804 he visited Paris in company with the afterward celebrated painter Vanderlyn. Here, before going to Italy, he studied in the Louvre the masterpieces of the various schools and showed a decided preference for the rich, glowing color of the Venetians, an influence which held more or less through life. He passed four years in Rome, the companion of Thorwaldsen, Coleridge, Vanderlyn, and Washington Irving, studying the great masters and acquiring their dignified and lofty style, for which he was peculiarly fitted by temperament. He returned to America in 1809, married a sister of Dr. William Ellery Channing, and went again to London, where he painted and exhibited with marked success for seven years. Failing in health, he came home in 1818, and settled first in Boston, afterward in Cambridge, where he passed the remainder of his life in comparative seclusion on account of enfeebled health. He attracted to himself a refined and cultivated circle of friends and admirers; for Allston was a man of scholarly tastes, a rare talker, and a writer of much charm. His temperament was nervous and high-strung. His cast of mind was eminently artistic, imaginative, and of a noble tenor.

Although Allston was esteemed by contemporaries the greatest artist of his day, modern criticism fails to confirm this verdict. His smaller paintings and portraits often show delicacy of drawing and refinement of color; but his more ambitious efforts prove his inability to realize artistically his mighty conceptions. One of the earliest of his important canvases, "The Dead Man Revived" (1810), was purchased by the Pennsylvania Academy of the Fine Arts. Then followed a number of historical and imaginative works: "St. Peter Liberated by the Angel" and "Uriel in the Sun." In America, after his final return, he painted "The Prophet Jeremiah," now at Yale College, his large unfinished "Belshazzar's Feast," now in the Boston Athenæum, and several smaller works, including "Dante's Beatrice," and "Spalatro's Vision of the Bloody Hand," a powerfully dramatic work. The Metropolitan Museum in New York possesses "The Flood" and "A Spanish Girl." His best-known portraits are those of Benjamin West (Boston Athenæum) and Coleridge (National Portrait Gallery, London). His poem, *The Sylphs of the Season*, was delivered before the Phi Beta Kappa Society at Cambridge and subsequently published in London (1813). He wrote also a novel, *Monaldi* (Boston, 1841). His *Lectures on Art* appeared after his death. He died at Cambridge, July 9, 1843, and his

burial took place by torchlight. For his biography, consult the volume on him in Sweester's *Artist Biographies* (Boston, 1879), and the *Life and Letters* published by his relative, J. B. Flagg (New York, 1892).

ALL'S WELL THAT ENDS WELL. A comedy by Shakespeare, produced in 1601, but probably largely written as early as 1595. It was included in the folio of 1623. The plot is based upon a story in Boccaccio's *Decameron*, which had been already borrowed in Painter's *Palace of Pleasure*. Shakespeare, however, added the comic characters of Lafeu, Parolles, and the clown, though without transforming the pathos of the original tale.

ALL-THE-TAL'ENTS MIN'ISTRY. A complimentary designation bestowed by its friends on the English ministry formed by Lord Grenville in 1806. Used in derision by its opponents, it has passed into history as an ironical appellation.

ALLU'VION (Lat. *alluvio*, a washing upon, from *ad*, to + *luere*, to wash). The legal term for land gained from the sea or other waters, public or private, by the imperceptible relliction of the water boundary or the gradual washing up of silt and earth, the scientific and popular term for which is *alluvium*. Alluvion is an accretion (q.v.) to the upland and becomes part and parcel of the land to which it is annexed and the property of the owner of the latter. When the change effected by the water is sudden, or so rapid as to be perceptible from day to day, as where the line of the seashore is altered by a storm, or a river suddenly changes its course, or where the deposit, however gradual, is the intentional result of artificial causes, it is not an alluvion or accretion, and the title to the land so covered or uncovered is not affected. Thus, if the sea suddenly engulfs a tract of upland, the land continues to be the property of its former owner, even though it remain permanently submerged. The division of alluvion between adjoining riparian proprietors, whose division line, if projected, would cut it, is a matter of some difficulty. Among several rules which have been adopted, the simplest is that which on private streams prolongs the division line at right angles with the middle line or thread of the stream. As such middle line is the boundary between opposite riparian proprietors, an island formed in the stream belongs to the proprietor on whose side of the line it lies. If this line cuts the island, the latter is divided by the line. Consult Angell, *Treatise on the Law of Watercourses* (Boston, 1877), and Gould, *Treatise on the Law of Waters* (Chicago, 1900). See AVULSION; RIPARIAN RIGHTS; SEASHORE; WATER RIGHTS.

ALLU'VIUM (from Lat. *ad*, to + *luere*, to wash). A term applied to the sediment transported by rivers and spread over submerged lowlands during periods of flood. This alluvium sometimes forms "flood plains" bordering rivers, or builds up conical heaps, "alluvial cones," at points where rivers debouch from narrow valleys on to lower areas, or constitutes deltas at river mouths. Alluvial soils are among the most productive known, because of the additional fresh material applied to their surfaces during periods of high water. The flood plains of the Nile, Ganges, and Mississippi are illustrations. See DELTA; FLOOD PLAIN; RIVER; SOIL.

ALLWARD, WALTER SEYMOUR (1875—). A Canadian sculptor. He was born at Toronto and educated in the public schools. In 1889 he was apprenticed to an architect and after five years' study, during which he showed a decided talent for architectural figure-work, began his career as sculptor with the figure of "Peace," surmounting the Northwest Rebellion Monument in Queen's Park, Toronto. He was next commissioned to execute busts of several eminent Canadians for the Art Gallery of the Provincial Museum in that city. Full-length heroic statues of Sir Oliver Mowat, Gen. John Graves Simcoe, J. Sandfield Macdonald, and other prominent Canadians, erected in different cities, attest the popularity and artistic appreciation of his work. His greatest success stands in Queen's Park, Toronto, and is the well-known monument, whose main shaft is 70 feet high, commemorating the Canadian soldiers who fell in the Boer War in South Africa.

ALL'WORTH, LADY. In Massinger's play, *A New Way to Pay Old Debts*, a wealthy widow.

ALLWORTH, TOM. In Massinger's *A New Way to Pay Old Debts*, the stepson of Lady Allworth, and lover of Margaret Overreach.

ALL'WORTHY, THOMAS. The generous squire in Fielding's *Tom Jones;* foster-father of the hero. He is a philanthropic gentleman, an admirable character, understood to be patterned after Fielding's own benefactor and friend, Ralph Allen.

ALMA, äl'mä. A river in the Crimea, rising on the northern woody slope of the Yile, south of the Tchatir-Dagh. It flows at first in a northerly direction, then turns to the west, and empties into a small bay on the Black Sea, 17 miles north of Sebastopol. It is about 46 miles long. The vale of the Alma is renowned for the beauty of its scenery and its many magnificent fruit gardens. On the steep banks of this stream, through the channel of which the British troops waded amidst a shower of bullets, a brilliant victory was won on Sept. 20, 1854, by the armies of Britain, France, and Turkey, under Lord Raglan and Marshal Saint-Arnaud, over the Russian army, commanded by Prince Mentchikoff. After five hours of stubborn fighting the Russians were forced to retreat in disorder upon Sebastopol, 17 per cent of the Russians (numbering 33,000, against 62,000 of the allies) having been killed and wounded. The Turks took no active part in the battle.

AL'MA. A city and county-seat of Wabaunsee Co., Kan., 35 miles west of Topeka, on Mill Creek, and on the Atchison, Topeka and Santa Fé and the Chicago, Rock Island and Pacific railroads (Map: Kansas, F 2). It is the centre of an agricultural and stock-raising district and has good water power and a large flour mill. Pop., 1890, 1125; 1900, 966; 1913 (est.), 1100.

ALMA. A city in Gratiot Co., Mich., 90 miles northeast of Grand Rapids, and 40 miles west of Saginaw, on the Pere Marquette and the Ann Arbor railroads, and on Pine River (Map: Michigan, E 5). It is the seat of Alma College (q.v.), the Michigan Masonic Home, and has an excellent high school. The most important manufactures are auto trucks, hay and paper presses, gas engines, beet sugar, furnaces, cement blocks, flour, asphalt mastic, and lumber products. It is one of the best agricultural territories in the State. Alma was settled in 1853 and was incorporated as a city in 1905. The mayor is elected annually, and the council is composed of eight members. The water works

are the property of the municipality. Pop., 1880, 456; 1890, 1655; 1900, 2047; 1904, 3015; 1910, 2757; 1913 (est.), 3000.

ALMA. A city and county-seat of Buffalo Co., Wis., 52 miles northwest of La Crosse, on the Mississippi River and on the Chicago, Burlington and Quincy Railroad (Map: Wisconsin, B 4). It is in an agricultural region, is connected by steamboat with ports on the river, and has some minor manufactures. Pop., 1890, 1428; 1900, 1201; 1905, 1172; 1913 (est.), 1250.

ALMA. In Spenser's *Faerie Queene*, the personification of the human soul, the queen of "Body Castle."

ALMA. A pseudonym of Charlotte Yonge, the novelist.

ALMACK'S, ąl'măks. A suite of assembly rooms in King Street, London, built in 1765. They took their name from that of their builder, or, rather, that assumed by him. It is said he was originally a poor Scottish Highlander named McCall, and that as a preparatory step to rising into importance in London, he inverted the syllables of his patronymic. The name of Almack's is chiefly associated with the balls which were held there for many years under the management of a committee of ladies of high rank. The glory of Almack's belongs to a period earlier than the middle of the nineteenth century, but the name has become synonymous with aristocratic exclusiveness. The London club now known as Brooks's, formerly Almack's, was established by Almack in Pall Mall some time before 1763. Consult Timbs, *Clubs and Club Life in London* (London, 1873), and Walford, *Greater London* (London, 1883–84).

ALMA COLLEGE. A coeducational institution at Alma, Mich., under control of the Presbyterian church, founded in 1887. In addition to the college department, conferring the degrees of A.B., Ph.B., and B.Sc., it maintains an Academy, Schools of Music and Art, and Extension Courses, with a total attendance in 1913 of 310 and a faculty of 27. It has a campus of 36 acres valued, with the buildings, at $175,000, and an endowment of $400,000. President, Thomas C. Blaisdell, Ph.D.

ALMADA, ąl-mä'dą. A town of Portugal, in the province of Estremadura, on the south bank of the Tagus, opposite Lisbon. It is built at the foot of a height, on the summit of which is the fortress of San Sebastian, is a great wine depot, and has long been celebrated for its fruit. Near it is the gold mine of Adissa. Pop., 1900, 7913.

ALMA DAGH, ąl'mą dăg'. The ancient *Amanus*. A branch of the Taurus mountain range in Asia Minor.

ALMADÉN, or **ALMADÉN DEL AZOGUE,** ąl'mą-dān' dĕl ą-thō'gą (Ar. mine of quicksilver). A town in Spain, 50 miles west-southwest of Ciudad Real, situated between two mountains in the Sierra Morena chain (Map: Spain, C 3). Its ancient name was Sisapon. It is a pretty town, with a ruined Moorish castle and a school of mines. It owes all its importance to famous quicksilver deposits which were known to the Romans and Moors. In the sixteenth century they were leased to the Fuggers of Augsburg. In 1645 they reverted to the crown. During part of the nineteenth century they were worked by the Rothschilds of London. There are five stages or galleries, the lowest being 1150 feet beneath the surface. The mercury is found in many combinations, but about 10,000 tons of ore are annually raised, 10 per cent of which is pure metal. Employment is given to 4000 miners. Sulphur and lead are also found in ths vicinity. Pop., 1900, 7459; 1910, 8398.

ALMAGEST, ăl'mą-jĕst. The greatest work of Claudius Ptolemæus (see PTOLEMY) bore the title *Μεγάλη Σύνταξις, Megalē Syntaxis* ('great system'). The admirers of Ptolemy changed *μεγάλη, megalē*, great, to *μεγίστη, megistē*, greatest, and the Arabian translators added the Arabic article *al*, producing *al-majisti*, whence was derived the common mediæval title "almagest." The work contains Ptolemy's important contributions to trigonometry and mathematical astronomy.

ALMAGRO, ąl-mä'grō. A town of New Castile, Spain, in the province of Ciudad Real, 12 miles east-southeast of Ciudad Real (Map: Spain, D 3). It is situated in a high, arid plain, is well built, and has wide paved streets and a fine square. Brandy, soap, and earthenware are manufactured, and lace-making gives employment to a large number of women in Almagro and the neighboring villages. The surrounding country is celebrated for its beautiful vineyards and olives, and there are many mineral springs. The vine of this region yields the well-known red wine Valdepeñas. Pop., 1900, 8015; 1910, 8310.

ALMAGRO, DIEGO DE (1475–1538). A Spanish adventurer, said to have been a foundling in the Spanish town whose name he bore. He came to America with Pedro Arias de Avilla in 1514 and settled at Darien, whence he removed to Panama in 1519, when that town was founded. In 1524 he formed a partnership with Pizarro for the conquest of a region on the Pacific coast to the south, which was reported to contain gold. The first voyage was a failure. The second voyage, undertaken in 1526, began with a succession of reverses, and Pizarro wished to abandon the enterprise, but Almagro persuaded him to continue, and eventually they were rewarded with the wealth of the Incas' Empire. Pizarro secured to himself and his brothers most of the fruits of victory and deprived Almagro of his fair share of plunder and power. In 1535 Almagro obtained from Charles V the title of Adelantado, or Governor, of "New Toledo," a territory extending 200 leagues along the coast, beginning at the southern limit of Pizarro's grant. A dispute immediately arose as to the boundary between the two grants, Almagro claiming that Cuzco lay within his territory. He returned from an expedition which he had undertaken, without much success, into the snowy plateau region of the southern Andes, to enforce this claim, and entered Cuzco, asserting that he was its legitimate governor. The Marquis Pizzaro at once dispatched Espinosa to effect, if possible, an amicable settlement; but Almagro was elated by his recent successes and refused to entertain any compromises. Further negotiations led to a personal conference between Pizarro and Almagro, Nov. 13, 1537, which ended in an altercation, and the two old friends parted, for the last time, in very angry mood. Pizarro's forces gradually forced Almagro back toward Cuzco, near which place he made a stand. A furious battle was fought, April 26, 1538. Almagro was captured, and garroted in the following July.

Almagro's son, DIEGO (1520–42, called *el Mozo* to distinguish him from his father), whose mother was an Indian girl of Panama, was at

first treated kindly by Pizarro; but he soon came under the influence of some of his father's friends, who had formed a conspiracy to overthrow Pizarro. The marquis was murdered on June 26, 1541; the conspirators proclaimed the lad Almagro, who was about 21 years old, Governor of Peru and then promptly quarreled among themselves. When all but one of the leaders had been murdered or had died from fever and exposure, Almagro took matters into his own hands and ordered the execution of the only remaining man of consequence among them. Meanwhile Vaca de Castro, who had been sent from Spain by the government to end the civil war in Peru, arrived and assumed the government. Almagro refused to submit and was attacked by the royal forces, who defeated him in a desperate battle on Sept. 16, 1542. Almagro fled to Cuzco, but was arrested, immediately condemned to death, and executed in the great square of the city.

AL'MAIN. An old name for Germany, derived from that of the *Alemanni* (q.v.).

ALMALEE, ăl-mä'lê. See ELMALU.

AL'MA MA'TER (Lat. nourishing mother). A name applied to a university or college, and expressing the relation between the institution and the students who have been educated in it. The term is one of affection, and suggests a mutual dependence of university and alumnus one upon the other. The term "matriculation" (q.v.) is derived from the same root and is applied to entrance into a university; it carries the same meaning.

AL-MAMUN, ăl'mä-mo͞on', ABU ABBAS ABDALLAH (783–833). A caliph of the line of the Abbasides (q.v.), distinguished for his intellectual qualities. He was the son of Harun-al-Rashid. When Harun died, his brother Amin succeeded to the caliphate; but his treatment of Al-Mamun led to war, and after five years of fighting Amin was slain and Al-Mamun took his place (813). The early part of his reign was disturbed by revolts and heresies; but when affairs settled down he fostered the cultivation of literature and science throughout his Empire, and Bagdad became the seat of academic instruction and the centre of intelligence. He had books translated from Greek, Pahlavi, and Aramaic, founded astronomical observatories, determined the inclination of the ecliptic, had a degree of the meridian measured on the plain of Shinar, and constructed astronomical tables of remarkable accuracy. He paid more respect to science than to orthodoxy and drew his servants from all countries and all creeds. In 827 he favored the heretical doctrines of the Mutazilites (q.v.), who asserted the free will of man and denied the finality of the Koran. In the latter years of his reign he was involved in war with the Greek Emperor Theophilus, and revolts broke out in various parts of his Empire. In 833, after quelling a disturbance in Egypt, he marched into Cilicia against the Greeks, but died suddenly near Tarsus, leaving the caliphate to his younger brother, who took the name Al Mutasim. Al-Mamun was the author of *Inquiries into the Koran,* a tract on *Signs of Prophecy,* and one on *The Rhetoric of the Priests and Panegyrists of the Caliphs.* Consult Muir, *The Caliphate* (London, 1891). See ARABIA.

AL'MANAC (of disputed origin). A book or table containing a calendar of the civil divisions of the year, the times of the various astronomical phenomena, and other useful or entertaining information. Till a comparatively modern date, this additional matter consisted of astrological predictions and other analogous absurdities; it now embraces, in the best almanacs, a wide variety of useful notes and information, chronological, statistical, political, agricultural, etc.

The history of almanacs, like all early history of astronomy, goes back to very ancient times. The Alexandrian Greeks certainly had almanacs, though the time when they first appeared in Europe is not precisely known. The oldest of the copies (manuscript) existing are of the thirteenth and fourteenth centuries; there are specimens in the libraries of the British Museum and of Corpus Christi College, Cambridge. The earliest-known printed European almanac was compiled by the celebrated astronomer Purbach and appeared between the years 1450 and 1461; but the first almanac of importance was that compiled by his pupil, Regiomontanus, for the 57 years from 1475 to 1531, for which he received a munificent donation from Matthias Corvinus, King of Hungary. Bernardo de Granolachs of Barcelona commenced the publication of an almanac in 1487; the printer Engel of Vienna, in 1491; and Stöffler of Tübingen, in 1524. Copies of these are now very rare. In 1533 Rabelais published at Lyons his almanac for that year and renewed the publication in 1535, 1548, and 1550. The fame and popularity of the astrologer Nostradamus, who prophesied the death of Henry II of France, gave such an impulse to the publication of predictions that in 1579 Henry III of France prohibited the insertion of any political prophecies in almanacs—a prohibition renewed by Louis XIII in 1628. Before this, in the reign of Charles IX, a royal *ordonnance* required every almanac to be stamped with the approval of the diocesan bishop.

Prophetic almanacs have circulated very largely in France in the rural districts and among the uneducated. The most interesting of these is perhaps the old *Almanach Liégeois,* a venerable remnant of superstition. It was first published at Liége—according to the invariable title-page which takes no note of time—in 1636, by one Matthieu Laensbergh, whose existence, however, at any time seems very problematical. The *Almanach Liégeois* is a most convenient one for those who are unable to read, for by certain symbols attached to certain dates the most unlettered persons can follow its instructions; thus, the rude representation of a vial announces the proper phase of the moon under which a draught of medicine should be taken; a pair of scissors points out the proper period for cutting hair, a lancet for letting blood. Of course, among innumerable predictions, some may naturally be expected to come to pass. So in 1774 this almanac predicted that in April of that year a royal favorite would play her last part. Madame du Barry took the prediction to herself, and repeatedly exclaimed: "I wish this villainous month of April were over." In May Louis XV died, and Madame du Barry's last part was really played. The credit of old Matthieu was established more firmly than ever. In 1852, a commission having examined between 7000 and 8000 of the national chapbooks, which included a great number of almanacs, pronounced them so deleterious that it became necessary forcibly to check their circulation. Although still in vogue amongst the ignorant, their popularity is greatly on the wane.

In England, so far was any restraint from being put upon the publication of prophetic almanacs, or "prognostications," as they were usually called, that royal letters patent gave a monopoly of the trade to the two universities and the Stationers' Company, under whose patronage, and with the *imprimatur* of the Archbishop of Canterbury, such productions as *Moore's Almanac* and *Poor Robin's Almanac* flourished vigorously; although "it would be difficult to find, in so small a compass, an equal quantity of ignorance, profligacy, and imposture as was condensed in these publications." The memory of Partridge, long employed as the prophet of the Stationers' Company, is preserved in the lively diatribe of Swift, writing under the name of Bickerstaff. There is a legal decision on record in the year 1775, in favor of a bookseller named Carnan, abolishing the monopoly of the Stationers' Company. In 1779 Lord North brought in a bill renewing their privileges. After a powerful speech against the measure by Erskine, who exposed the pernicious influence of the productions published under the monopoly, it was rejected. The Stationers' Company, however, still maintained their ground by buying up all rival almanacs; and it was not until the publication, in 1828, of the *British Almanac*, by the Society for the Diffusion of Useful Knowledge, that the eyes of the English public became opened to the irrational and deleterious nature of the commodity which their own indifference or folly, as much as the selfishness of their purveyors, had hitherto maintained in existence.

In Scotland the earliest almanacs seem to have been produced about the beginning of the sixteenth century. Shortly after the beginning of the seventeenth century the almanacs, or "prognostications," published at Aberdeen had begun to acquire a great reputation. About the year 1677 they were sold for a *plack* each; and the annual circulation amounted, on an average, to 50,000 copies. In 1683 appeared a rival publication, under the title of *Edinburgh's True Almanack, or a True Prognostication.* For a long time Scottish almanacs continued, like all others of that age, to contain little besides a calendar, with a list of fairs, and—what constituted the great attraction—predictions of the weather. But something more instructive and comprehensive became requisite, and the *Edinburgh Almanac* seems to have been among the first to respond to this requirement of advancing civilization; for, by various additions, such as a list of Scottish members of Parliament, it had, in 1745, been extended from the original 16 pages to 36. In 12 years from that date it had swelled to 72 pages; in 1779 it had reached 252 pages. After 1837 it was published under the title of *Oliver and Boyd's New Edinburgh Almanac*, and extended to above 1000 pages.

Almanacs containing astrological and other predictions are still published in Great Britain; but their influence is extremely limited, even among the most ignorant portion of the community, and their contents are fitted to excite amusement rather than any stronger emotion.

In America the publication of almanacs for popular use is confined very largely to the venders of proprietary or patent nostrums and medicines. These persons distribute the almanacs gratuitously, judging rightly that they constitute a most excellent advertisement of their wares. This is due principally to the fact that people keep their almanacs at hand throughout the year, and thus the advertisements printed in them are ever present to the public eye. Among the almanacs in the United States that are sold for a small price, the most important are probably the *Old Farmers'*, issued in New England, and those coming from several great newspaper offices. It is believed that the first common almanac in North America was for 1687, from Bradford's press in Philadelphia. Franklin's *Poor Richard's Almanac*, begun in 1732, was kept up by him about 25 years, and was widely known both at home and abroad for its wise and witty sayings. *The American Almanac and Repository of Useful Knowledge* was issued in Boston from 1828 to 1861; a continuation, *The National Almanac*, came out for two years only, 1863 and 1864. Nearly every religious denomination has its special annual, either almanac or year-book; and many trades, professions, and enterprises have similar publications.

The *Almanach de Gotha* occupies a place among almanacs peculiarly its own. First published in 1763, it gives genealogical particulars concerning all the sovereign houses of Europe, the mediatized families of Germany, and most of the European princely and ducal houses of non-sovereign rank. It also contains much valuable information regarding the officers of administration and the statistics of the different political divisions of the globe. Until 1871 it appeared in French; since that time it has been published in both French and German.

Astronomical Almanacs. There are also important astronomical almanacs. The *Nautical Almanac*, published in England, was projected by Nevil Maskelyne, Astronomer Royal from 1765 to 1811, who urged its value in connection with the use of lunar distances for the determination of longitude. The first edition of this work was published with the authority of government in 1767. After Dr. Maskelyne's death it gradually lost its character, and in 1830, in consequence of the numerous complaints made against it, the government requested the Astronomical Society to pronounce upon the subject. The suggestions of the society were adopted, and in 1834 the first number of the new series appeared, with such additions and improvements as the advanced state of astronomical science rendered necessary. Still older than this almanac is the French *Connaissance des Temps*, commenced in 1679 by Picard and now published under the authority of the *Bureau des Longitudes.* Its plan is similar to that of the *Nautical Almanac*, but it has contained a larger amount of original memoirs, many of them of great value. Equally celebrated is the Berlin *Astronomisches Jahrbuch*, issued from the Berlin Observatory.

In the United States, Congress in 1849 provided for the publication of such a work, in which "the meridian of the observatory at Washington shall be adopted and used as the American meridian for astronomical purposes, and the meridian of Greenwich shall be adopted for all nautical purposes." Accordingly the *American Ephemeris and Nautical Almanac* was begun in that year by Charles Henry Davis, of the United States navy, and the first volume (for 1855) was published in 1853. The publication is issued from the office of the *Nautical Almanac*, United States Naval Observatory, in Washington, and contains tables of the predicted positions of the sun, moon, and planets, and of all the fixed stars used in navigation. It is pub-

lished three years in advance, for the convenience of navigators bound on long voyages. These astronomical almanacs are also of the greatest importance to astronomers, as they contain collections of numerical data required in the computation of their celestial observations. Their preparation and publication, however, are so costly that they are possible only to the great financial resources of governments, and it is largely for this purpose that governmental astronomical observatories are maintained.

ALMANACH DE GOTHA, ål'mà'na' de gō'tà'. See under ALMANAC.

AL'MANDINE (Fr. *almandine*, from Lat. *alabandina*). The red, transparent, precious variety of garnet, so called from Alabanda, a town in Caria, where it was found. This name is given to a violet-colored variety of Spinel ruby.

ALMANSA, ål-män'så. A town of Murcia, Spain, in the province of Albacete, 43 miles east by south of Albacete, on the Madrid and Alicante Railway (Map: Spain, E 3). It is situated on a fertile plateau. Almansa carries on manufactures of linen, hempen, and cotton fabrics, the materials of which are supplied from the neighborhood; also of brandy, leather, and soap. Many sheep graze on the fine pastures in the vicinity of this town. Pop. of the commune, 1900, 11,117; 1910, 11,887. Near Almansa the French, under the Duke of Berwick, natural son of James II of England, gained a victory on April 25, 1707, over an army of Spanish and English troops commanded by Henry de Ruvigny, Earl of Galway. See SUCCESSION WARS.

AL-MANSUR, ål'mân-sōōr' (Ar. The Victorious), ABU JA'FAR ABDALLAH IBN MOHAMMED (712–775). The second Caliph of the house of the Abbasides (754–775). He regulated the finances and the post in the kingdom and patronized learning. One of his great achievements was to found Bagdad. He died during a pilgrimage to Mecca, at the age of 63. See ABBASIDES.

ALMA-TADEMA, ăl'mà tăd'ê-mà, SIR LAURENCE (1836–1912). A well-known painter, of Dutch origin and Belgian training, who practiced most of his life in London. His real name was Laurens Alma Tadema, but he adopted the more aristocratic form in England. He was born in West Friesland, Jan. 8, 1836, and studied under Wappers and for a longer period under Leys at Antwerp. Pictures of Frankish life occupied him till 1863, after which he took up Ancient Egyptian subjects for two years, finally devoting himself mainly to depicting the life of the Greeks and Romans. Early essays in this style were the "Warrior of Marathon" (1865), "Roman Amateur," and the "Pyrrhic Dance," which he sent over to the Royal Academy in 1869, in which year he went to live in London. His success was recognized by membership in the Academy in 1879 and knighthood in 1899. His house in Grove End Road, furnished in classic style with exquisite taste and containing his valuable collection of antiquities, was a centre of famous artistic gatherings. Among important pictures are "The Roses of Heliogabalus" (1888), "Spring" (1894), "The Conversion of Paula" (1898), and "Thermæ Antoninianæ" (1899). At the World's Fair of St. Louis (1904) he exhibited the "Coliseum," the "Shrine of Venus," and "Caracalla." Later works are the "Finding of Moses" (1905), "A Family Custom" (1909), and the "Voice of Spring" (1910). His work is remarkable for its careful archæological research. He is peculiarly successful in painting marble and bronze. In composition he is scholarly; his drawing is good, his coloring faithful, but he is at times charged, and not without reason, with a lack of sentiment. His pictures indeed have the value of trustworthy records of the past, but they rarely move more than the intellect. His wife and pupil, LAURA T. ALMA-TADEMA (1852–1909), was a genre painter of delicacy and charm, whose art found inspiration in Dutch genre of the seventeenth century. Consult: Zimmern, *L. Alma-Tadema: His Life and Work* (London, 1886); Georg Ebers, *L. Alma-Tadema* (Eng. trans., New York, 1886); Monkhouse, *British Contemporary Artists* (London, 1899); Standing, *Sir Laurence Alma-Tadema* (New York, 1905).

ALMA-TADEMA, Miss LAURENCE. An English author and poet, daughter of Sir Laurence Alma-Tadema. Her published writings include: *Love's Martyr* and *The Wings of Icarus*, novels; *The Crucifix*, tales; *The Fate Spinner*, a novel (1900); *The Herb o' Grace*, essays (1901–02); *Songs of Womanhood* (1903); *Four Plays* (1905); *Tales from My Garden* (1906). In 1907–08 she gave a course of readings in the United States on the *Meaning of Happiness*, etc. She translated several works of foreign writers.

ALMAVIVA, ăl'mâ-vē'vâ, COUNT. A character in Beaumarchais's comedies *Le barbier de Séville*, *Le mariage de Figaro*, and *La mère coupable*, appearing successively as a fascinating young nobleman, a disillusioned husband, and an old gallant.

ALMEH, ăl'mê, or **ALMAI** (Ar. *'ālimah*, learned woman, from *'alama*, to know). A class of singing girls in Egypt. To enter the almeh one must have a good voice, know the rules of verse, and be able to improvise couplets adapted to circumstances. These girls are in demand at all entertainments and festivals, and at funerals as hired mourners. They are distinct from the *ghawāzi*, or dancing girls, who are of a lower order and perform in the streets.

ALMEIDA, ål-mā'ê-dà. Formerly one of the chief strongholds of Portugal, situated on the river Coa, on the Spanish frontier, in the province of Beira (Map: Portugal, B 2). In 1762 it was captured by the Spaniards, who soon afterward surrendered it. In their retreat from Portugal, 1811, the French, under General Brenier, destroyed a great portion of the fortifications of Almeida, which, however, were speedily repaired by the English. It is celebrated also for its sulphur waters. Pop., 1900, 2312.

ALMEIDA. A town situated on the east coast of Brazil, in the State of Espirito Santo, near the mouth of the Reis Magos River, 20 miles north of Victoria. It was founded by Jesuits in 1580. Pop., 1912, 5000.

ALMEIDA, FRANCISCO DE (1450?–1510). A Portuguese warrior and empire builder. For his services against the Moors he was made, in 1505, Viceroy of the Portuguese possessions in the East Indies. At Cannanore, Cochin, and Quilon, and in Ceylon and Sumatra he either built fortresses to protect the Portuguese factories or founded new trading posts. His attempt to establish the supremacy of Portugal in the Indian seas brought him into conflict with the Venetians and the Egyptians. In a great battle fought between Lorenzo de Almeida, son of Francisco, and a combined Venetian and Egyptian fleet, in the harbor of Chaul, in 1507, young Lorenzo fell. To avenge his death, Fran-

LAURENCE ALMA-TADEMA

AT THE SHRINE OF VENUS

cisco sacked the ports of Goa and Dabul, and refusing to acknowledge Albuquerque, who had been sent out to supersede him, destroyed the Egyptian fleet at Diu in 1508. Then he resigned his command and sailed for home, but perished in a skirmish with African savages near the Cape of Good Hope.

ALMEIDA-GARRETT, ål-mā'ē-dà-gär-rĕt' JOÃO BAPTISTA DA SILVA LEITÃO, VISCOUNT OF (1799–1854). A distinguished Portuguese statesman and author, leader of the romantic movement in his country, and its most important poet of the nineteenth century. He was born at Oporto and died at Lisbon. After a boyhood spent in the Azores, under the tutelage of a highly gifted uncle, Bishop of Angra, he attended the University of Coimbra and there imbibed the revolutionary ideas which led him to participate in the revolt of 1820 and three years later resulted in his expatriation. Hitherto his writings, such as the dramas *Merope* and *Catão*, and the didactic poem on painting, *O Retrato de Venus*, reflected the spirit of French classicism and the native "Arcadian" school. In England and France, however, he came under the influence of Scott and the French romanticists, and this influence is reflected in his epic, *Camões* (1825), the burden of which is the poet's longing for his home; and in his equally well-known *Dona Branca* (1826), a long poem, half epic, half lyric, and aimed especially against monastic life. He returned to Portugal in 1826 and suffered a brief imprisonment owing to some political articles. Two years later he was again forced to seek safety in exile; but when, in 1832, Dom Pedro returned from Brazil for the purpose of contesting the throne with his brother, Dom Miguel, Almeida-Garrett joined his forces, and after the victory of 1833 was rewarded with a place in the cabinet as Minister of the Interior. His life henceforth was one of remarkable activity. As a member of the national Cortes, he showed himself an uncompromising supporter of democratic principles and instituted many reforms. He interested himself especially in the founding of a national theatre and a conservatory of dramatic art, and wrote a long series of prose dramas, the central figure in each case being some typical national character, such as *Auto de Gil Vincente* (1838), *De Filippa de Vilhena* (1840), and *Frei Luiz de Sousa* (1844). One of his most important contributions to literature is his *Romanceiro* (1851–53), a collection of 32 early Portuguese ballads and romances, the text of which he freely restored and emended. His last work is a poem, *Folhas cahidas* ('Fallen Leaves') a dramatic record of a love that came in the autumn of life, which for pathos and emotional power is hardly equaled in Portuguese literature. An edition of his collected works appeared after his death (Lisbon, 1854–77). The best biography is that of Gomes de Amorim, *Garrett, Memorias biographicas* (3 vols., Lisbon, 1881–84).

ALMELO, äl'mâ-lō'. A town in the Netherlands, 21 miles by rail northeast of Deventer (Map: Netherlands, E 2). Linen and cotton goods are manufactured. There are many churches, in one of which is the family vault of the Von Rechteren, who were lords of the district previous to the fourteenth century. Their castle is here also. Pop., 1889, 8354; 1900, 10,018.

ALMERIA, äl'mâ-rē'à (Ar. The Conspicuous). The capital of the province of Almeria in Spain, 60 miles southeast of Granada, and the seat of a bishop (Map: Spain, D 4). It stands at the head of the Gulf of Almeria, at the mouth of the river of the same name, and its harbor, which is one of the best in Spain, is well fortified and is 178 acres in extent. Behind it rises a lofty mountain ridge on which is a Moorish fortress. The flat-roofed houses are Oriental in character, and some ruined castles, together with the general appearance of the place, evidence its antiquity. The Gothic cathedral, begun in 1524, is essentially Spanish in its fortress-like outline and battlemented walls. The church of San Pedro occupies the site of a mosque. Other institutions include a normal school and several monasteries. There are manufactures of sugar, white lead, macaroni, etc., but the most important commercial interest in Almeria is its exportation of fruit. It is estimated that 1,000,000 boxes of grapes, each weighing 50 pounds, are shipped from this port annually. Other articles of commerce include oranges, almonds, pomegranates, figs, dates, oil, etc., and iron ore. It is a winter resort for invalids, as its climate rivals that of Nice. Pop., 1910, 45,198. Almeria is one of the most ancient cities of Spain and was founded by the Phœnicians. The Romans called it Unci, and Magnus Portus, the great harbor. It flourished under the Moors, when, as the proverb says, "Granada was no more than its farm." When it passed into Christian hands (1489), its prosperity languished, and only within recent years have railway facilities brought back something of its former activity.

ALMERIA. In Congreve's *Mourning Bride* (q.v.), the heroine, bride of Prince Alphonso, whom she mourns until his unexpected return. Her rôle is famous for the lines, "Music hath charms," etc.

AL'MERI'CIANS. The followers of Amalric of Bène (q.v.).

ALMIQUI, ål-mē'kē (native name). A Cuban insectivore. See SOLENODON; and plate of CAVIES accompanying article CAVY.

ALMISSA, ål-mē'sà. A port of the Austrian crownland of Dalmatia, 14 miles southeast of Spalato, at the mouth of the Cetina. The hills in the neighborhood yield an excellent muscatel wine for which the region has become famous. Almissa was at one time the rendezvous of the pirates who infested the Adriatic. It was formerly tributary to Venice as a part of the small republic of Poglizza. Pop. (commune), 1890, 13,200; 1900, 15,100; 1910, 16,645.

ALMODÓVAR DEL CAMPO, äl'mō-dō'vär dĕl käm'pō. A town of New Castile, Spain, in the province of Ciudad Real, 22 miles southwest of Ciudad Real (Map: Spain, C 3). It stands on the summit of a ridge, near the Vega, a branch of the Guadiana. The streets are tolerably clean but ill paved. There are ruins of a Moorish fortress. The inhabitants are chiefly employed in agriculture, and the only manufactures are domestic. Large flocks of sheep graze on extensive crown lands which are near by, and there are rich seams of coal. Pop., 1900, 11,615; 1910, 13,833.

ALMOHADES, äl'mō-hädz (Ar. *Al-Muwahhidun*, who proclaim the unity of God). The name of a dynasty that ruled in northwestern Africa and Spain during the twelfth and thirteenth centuries. In the reign of Ali b. Yusuf (1107–43), the second Amir al Muslimin of the Almoravides (q.v.), a religious teacher, Mo-

hammed b. Tumart, calling himself Al Mahdi (the guided), founded the sect of the Almohades in Africa. They were opposed to the realistic anthropomorphism of orthodox Islam. Their leader exercised great influence over the Arabs and Berbers throughout northern Africa. Ibn Tumart (q.v.) imposed on his disciples new ceremonies and wrote for their benefit a special treatise entitled *On the Unity of God*. He found a successor in Abd-al-Mumin. Abd-al-Mumin (q.v.) assumed the title of a Caliph or *Amir al Muminin*. Under him the Almohades rose to great power. They extended their conquests into Spain in 1146, subjugating Andalusia, Valencia, and a part of Aragon, and Portugal as far as the Tagus. Under Abu Yakub Yusuf (1163–84) and Yakub-al-Mansur (see ABU YUSUF YAKUB), the dynasty of the Almohades continued to flourish in great splendor. But in 1212 they were completely defeated by Christians in the battle of Navas de Tolosa, the result of which was a rapid collapse of their power in Spain. The power of the Almohades in Spain terminated in 1257 and in Africa in 1269. Consult: Freeman, *History and Conquests of the Saracens* (Oxford, 1856); Coppée, *Conquest of Spain by the Arab-Moors* (Boston, 1881); Dozy, *History of the Almohades* (2d ed., 1881); Fagnan, "Histoire des Almohades," in *La Revue Africaine* (Algiers, 1892); Luciani, *Le livre d'Ibn Tumart* (1903), with Goldziher's Introduction; Goldziher in *Zeitschrift der deutschen Morg. Ges.* xli, 30–140; Codera, *Decadencia y desaparicion de los Almoravides en España* (1899); Bel, *Les Benou Ghanya* (1903).

ALMON, ăl'mon, JOHN (1737–1805). An English journalist and bookseller, born in Liverpool. He attended school for a short time at Warrington, was apprenticed to a printer and bookseller, and in 1759 settled in London as a journeyman printer. He soon took to pamphleteering, became a member of the staff of *The London Gazetteer*, and by a pamphlet entitled *A Review of Mr. Pitt's Administration* won the favor of Burke and others of the opposition party at the time of Pitt's resignation (1761). He then became a publisher and bookseller on his own account and was patronized largely by the members of the opposition. He was a close friend and ardent supporter of John Wilkes (q.v.), and in 1780 was fined for selling a paper containing one of the letters of Junius. In 1784 he became proprietor and editor of the *General Advertiser*, but two years later was driven by a libel suit to relinquish this undertaking. He rendered an important service to students of American history by publishing *The Remembrancer* (1775–83), a monthly collection of contemporary documents bearing on the Revolutionary War, especially of such documents "as serve to display the injustice of the design and the folly of the councils of Great Britain." He also published a valuable *Collection of all the Treaties of Peace, Alliance, and Commerce between Great Britain and Other Powers from 1688 to 1771* (1772); *Biographical, Literary, and Political Anecdotes* (1797); and *Correspondence of John Wilkes, with a Memoir of his Life* (1805). By his contest with the authorities he did much to establish a greater freedom of the press. Consult *Memoirs of John Almon, Bookseller, of Piccadilly* (London, 1790).

ALMONACID DE TOLEDO, ä'mô-nâthēth' dā tōlā'dō. A little town of Spain in the province of Toledo, connected with Toledo by rail. It contains an old Moorish castle and is famous chiefly as the place of a battle between Spanish and French forces on Aug. 11, 1809, in which the latter, numbering about 30,000, were defeated. Pop., 1900, 1574; 1910, 1801.

ALMOND, ä'mŭnd (Lat. *amygdala*, Gk. *ἀμυγδάλη, amygdalē*), *Amygdalus*. A genus of the family Rosaceæ, consisting of trees and shrubs. The almond tree (*Prunus amygdalus* or *Amygdalus communis*) grows from 20 to 30 feet high, closely resembles the peach in general appearance and bloom and furnishes the almond nuts of commerce. It is native to the Mediterranean basin and southwestern Asia and has been in cultivation from remote times. The fruit is a drupe with a thin, hard covering, which splits open when ripe.

Almonds are of two kinds—bitter and sweet. The bitter almond is cultivated to a limited extent in Mediterranean countries, and the nuts are used in the manufacture of flavoring extracts and of prussic acid. The sweet, or edible, almond is grown on a commercial scale in the south of Europe, in California, and in some other countries of similar climate. The nuts contain a large quantity of a bland, fixed oil; they have an agreeable flavor, and are used for desserts, in confectionery, and medicinally in an emulsion which forms a pleasant, cooling, diluent drink. There are three classes of sweet almonds—the hard shell, soft shell, and the paper shell almond. The latter two only are important commercially. Of foreign varieties, the long almond of Malaga, known as the Jordan almond, and the broad almond of Valencia, are most valued in the trade. In California success in almond-growing came only with the improvement of selected seedlings of local origin. Ne Plus Ultra, Nonpareil, IXL, and Languedoc are the best known of these. California produces annually about 6,000,000 pounds of nuts. In addition to the home production, the United States imports, annually, about $3,000,000 worth of nuts. In Syria and northern Africa almonds are grown on dry and stony soils. They are believed to withstand drought better than any other fruit, but are the most susceptible of the deciduous fruits to injury from frost. In California good-paying crops are secured only on fertile, well-drained soils, preferably warm loams; and in the arid regions water for irrigation must be abundant.

The almond is propagated mainly by budding on seedling bitter almond stocks. Trees come into bearing in from two to four years from budding, and reach mature fruitage in from seven to 10 years. On strong land the trees are set at least 24 feet apart each way. The tree is shaped during the first three years' growth, after which little pruning is required. Varieties should be mixed in orchard planting, to insure cross-pollination.

The almond is also widely grown for ornamental purposes in localities where it seldom if ever produces fruit. It is a favorite flowering shrub in England, northern Europe, and parts of the eastern and southern United States. It is one of the earliest fruits to bloom. The peach-like blossoms appear before the leaves.

The flowering almond (*Prunus nana* or *Amygdalus nana*) is a low shrub, seldom more than two or three feet in height. It is common in southern Russia and is frequently planted as an ornament. Another species (*Prunus andersonii*) is found among the hills of southern California,

about the Colorado desert. It is a bushy shrub, and the fruit is a small, velvety drupe, little more than half an inch long. Other species not well known but similar to these are found in the East. Fossil forms of the almond occur in the Miocene Tertiary beds of Oeningen, Germany. See Plate of ACANTHUS.

ALMOND DISEASE. The principal almond disease is that known as leaf-blight. It is caused by the fungus *Cercospora circumcissa*, which attacks the leaves and twigs, and often defoliates the trees by midsummer. Upon the leaves small distinct yellow spots are formed, from which the leaf tissue falls, leaving the leaf appearing as though pierced by numerous shot. The disease may be prevented by spraying the trees before blooming, and about twice after blooming, with the ammoniacal copper carbonate solution. (See FUNGICIDES.) The second spraying should be applied when the trees are in full leaf, and the third two to four weeks later. Almond trees are also subject to crown-gall due to *Bacterium tumefaciens*, and to a common leaf-rust, *Puccinia pruni-spinosæ*. Spraying will control the rust, but there is no known remedy against crown-gall.

ALMONDE, ål-mōn'dâ, PHILIPPUS VAN (1644–1711). A Dutch Vice-Admiral, who served under De Ruyter in the fights of 1676, and after the Admiral's death commanded the Dutch Mediterranean fleet. He was with Tromp in subduing the naval power of Sweden in 1677. He commanded in 1688 the fleet which conducted William III to England, and four years afterward gained fame by his defeat of the French at La Hague. In 1702, with the English Admiral, Sir George Rooke, he commanded the allies which destroyed the Spanish fleet in the Bay of Vigo.

ALMONDS, ä'mŭndz, EXPRESSED OIL OF. A fixed oil expressed from bitter or sweet almonds, and sometimes used in medicine. It has a pale yellow color and a mild, rather agreeable taste. It consists largely of olein.

ALMONDS, VOLATILE OIL OF. See BENZALDEHYDE.

ALMONER, ăl'mŭn-ĕr (OF. *almosne*, alms, from Lat. *eleemosyna*, Gk. *ἐλεημοσύνη, eleēmosynē*, mercy, alms). The name given originally to a member of a religious order who distributed the money and other things set apart for alms, which by canonical law was to amount to at least a tenth of the revenues of the establishment. Afterwards ecclesiastics also received this name who were appointed by princes to the same office in their households. The Grand Almoner of France was one of the principal officers of the court and of the kingdom, usually a cardinal, and, in right of his office, commander of all the orders. Queens, princes, and princesses had also their almoners, and bishops were usually appointed to this office. In England the office of Hereditary Grand Almoner is now a sinecure, his only duty being to distribute the coronation medals among the assembled spectators. The Lord High Almoner, usually a bishop, distributes twice a year the sovereign's bounty, which consists in giving a silver penny each to as many poor persons as the sovereign is years of age.

ALMONTE, ăl'mŏnt. A town in Lanark Co., Ontario, Canada, 35 miles southwest of Ottawa, on the Canadian Pacific Railway (Map: Ontario, G 2). It is a centre for the marketing of agricultural products and manufactures woolen and knit goods and machinery. Almonte was settled in 1830 and was incorporated as a town in 1881. The government is vested in a mayor, elected annually, and a council. Pop., 1901, 3023; 1911, 2452.

ALMONTE, ål-mōn'tâ, DON JUAN NEPOMUCENO (1803–69). A Mexican General and diplomat. He was the reputed son of Morelos (q.v.), the patriot priest. As a mere child he took part in the war of liberation, and in 1815 was sent to the United States to be educated. His diplomatic career began at an early age, and he had filled responsible positions in London and South America before he joined the staff of Santa Anna in 1836, in which year he was made prisoner at San Jacinto. Under Bustamante he was Minister of War, and from 1841 to 1846 was Minister to the United States, retiring when the annexation of Texas had become a certainty. In 1853 he was again Minister to the United States; in 1857 he was Minister to France; he had been twice an unsuccessful candidate for the presidency, and party spirit led him to participate in the French invasion of Mexico and the election of Maximilian. Almonte was proclaimed Dictator of Mexico in 1862, but was distrusted by all parties and was removed the same year. The next year he was President of a junta styled the "Regency of the Mexican Empire." In 1864 Maximilian made him regent of the realm and Grand Marshal, and in 1866 he was sent as Minister to Paris, where he died.

ALMORA, ål-mō'râ. The capital of the Kumaon division, Northwestern Provinces, British India. It is situated on the crest of a mountain ridge, 5337 feet above the sea, and on the head waters of the Kosila, a branch of the Ramgunga, 87 miles north of Bareilly. It gives its name to a district, has a cantonment for two battalions of Ghurkas, and is a health resort for invalids and consumptives. There are several educational institutions, one of which is Ramsay College. The surrounding region produces tea. Pop., 1901, 8596; 1911, 10,560.

ALMORAVIDES, ăl-mō'râ-vĭdz (Ar. al-Murabitun, the hermits). A Moslem dynasty in northwest Africa and Spain. The name is derived from *ribat*, which means 'a fortified place on the frontier' and also 'a hermit's hut.' It was the designation of the place on an island in the Senegal where Abdallah b. Yasin (q.v.) gathered his followers and trained them in religious practices and arms. Hence *al murabitun* came to mean 'the Ribat people,' the followers of Abdallah. As a religious sect the movement started about 1037. During the lifetime of the Mahdi the holy war was conducted by himself and the chiefs of the Sanhaja tribe in southern Morocco, Yahya b. Ibrahim, Yahya b. Umar and Abu Bekr b. Umar. The kingdoms of Sijilmasa (1055) and Aghmat (1056) were conquered. With the aid of Zainab (q.v.) Yusuf ibn Tashfin (q.v.), the nephew of Abu Bekr, became, after the death of the Mahdi (1059), *Amir al Muslimin* and the real founder of the Empire. He built Marrakush (Morocco) and extended his power into Algeria. At the urgent request of the Mohammedan rulers of Andalusia, and especially al Mutamid b. Abbad of Seville, he went across to Spain and defeated the Christians at Zallaka (Sacralias) Oct. 23, 1086. Yusuf b. Tashfin soon made the Moslem princes of Andalusia subject to his authority. He reigned from 1061 to 1107. His son, Ali b. Yusuf, maintained his rule until 1143. In 1147 Morocco fell before

the attack of Abd al Mumin (q.v.), and two years later the power of the Almoravides in Spain ended. Unlike their successors, the Almohades (q.v.), the rulers of this family always recognized the spiritual authority of the Abbaside Caliph in Bagdad. Consult Dozy, *Histoire des Musulmans d'Espagne* (1861); A. Müller, *Islam in Morgen- und Abendland* (1887); Mercier, *Histoire de l'Afrique Septentrionale* (1888); Codera, *Decadencia y desaparicion de los Almoravides en España* (1889); A. Bel, *Les Benou Ghanya* (1903).

ALMQVIST, älm'kvĭst, Karl Jonas Ludwig (1793–1866). A Swedish writer of unusual versatility but very unstable genius. He was born at Stockholm. At 20 he left a good post in the civil service and founded a sort of Brook Farm in the forests of Vermland, where the "come-outers" lived under turf, wore homespun, and ate porridge. The experiment failed, and Almqvist resorted to school-teaching and the composition of text-books, at Stockholm, until the publication of a group of romances under the title, *The Book of the Thorn Rose* (begun in 1832), brought him sudden fame. This work shows great power of language and richness of color; and the dramas which followed, though erratic in plan, are masterly in dialogue and of great tragic force. Almqvist now gave himself wholly to literature and published a great number of books and pamphlets on history, religion, ethics, æsthetics, and pedagogy, as well as lyrics, dramas, and novels, chiefly socialistic in tone and often contradictory in teaching, but marked by a brilliant style. His moral instability apparently led him to crime, for in 1851 he was charged with forgery and murder, and fled from Sweden to America, where he earned a precarious living under an assumed name until 1866, when he returned to Bremen, and lived there under the name of C. Westermann until his death, Sept. 26, 1866. Far too little is known of his American experiences, which must have been highly adventurous. The novels and tales on which his literary fame will rest are of the romantic type. The best of the tales are *The Mill at Skällnora, Araminta May,* and *Grimstahama's Settlement.* Of the novels, *The Palace* is typically romantic in its poetic humor. A later work, *It's All Right,* is in another key, more like the problem novel of our day, and is a grim picture of the evils of conventional marriage, indicating the degeneracy of his misused genius.

ALMS'HOUSE. The place where the publicly supported poor are cared for, sometimes called the poorhouse, the infirmary, etc., and, in England, the workhouse. Wherever indoor relief is provided, the almshouse is the central local institution throughout the United States for the care of the aged and infirm poor, and also for able-bodied poor who are not committed as vagrants to a correctional institution. It is frequently located on a farm, known as the poor-farm, where light work is given the inmates, the results being utilized to contribute toward their support. The latest available figures give for the United States 2476 almshouses, with 81,764 inmates. Consult: A. G. Warner, *American Charities,* chap. vi (Boston, 1894); C. R. Henderson, *Modern Methods of Charity* (New York, 1904); Special Report of the Census Bureau, *Paupers in Almshouses, 1904* (Washington, 1906); A. Johnson, *The Almshouse* (New York, 1911). See Pauperism; Poor Laws.

ALMUCANTAR, ăl'mû-kăn'tĕr (Ar. *al-muḳanṭarāt,* pl. of *al-muḳanṭar,* sun-dial). In astronomy, a small circle of the celestial sphere parallel to the horizon. The word had fallen rather into disuse among astronomers, but has been used of late years as a name for an instrument invented by Chandler. The instrument consists of a telescope supported on a metal float placed in a basin of mercury. This arrangement assures the perfect horizontality of the float, and the telescope can be used to observe heavenly bodies situated at exactly equal altitudes in the celestial hemisphere. Astronomical investigations of considerable importance have been carried out by the use of the almucantar.

AL-MUKANNÁ, ăl'mû-kän'nâ. See Mohammedan Sects.

AL'MY, John Jay (1814–95). An American naval officer. He was born in Rhode Island and entered the navy as a midshipman in 1829. He engaged in the suppression of the African slave trade in 1843–45 and took part in the capture of Vera Cruz and Tuxpan in the Mexican War. He was in the blockade service during the Civil War, and afterward had a varied life on the coast survey as commander of vessels making expeditions to Central and South America and South Africa, and as an officer on ordnance duty in the Brooklyn Navy Yard. He ended his career as commander of the Pacific squadron, becoming a Rear Admiral in 1873. Four years later he was retired.

ALNASCH'AR. In the *Arabian Nights,* the barber's fifth brother, proverbial as a dreamer. Having put his money into a stock of glassware with which to engage in trade, he falls to imagining what he will do with the wealth he is to gain from it and, inadvertently kicking over the basket, smashes all his wares. The name was humorously applied to S. T. Coleridge from his having dreamed the fragment of *Kubla Khan,* which he wrote after waking.

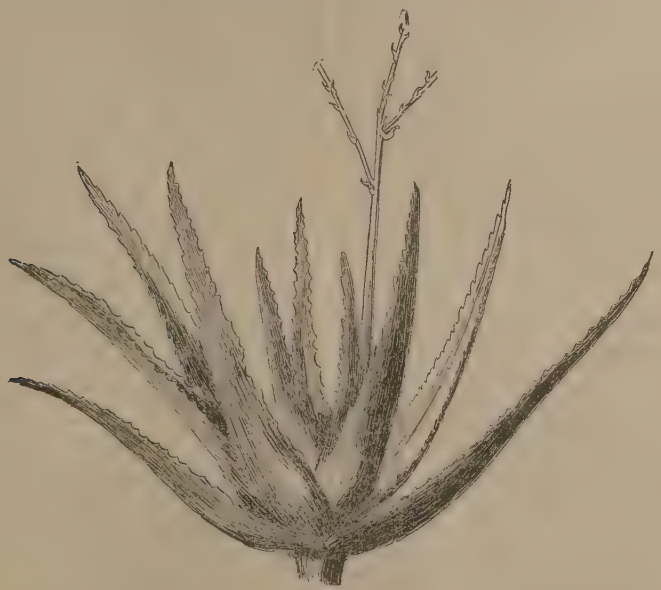
ALNUS, ăl'nŭs. See Alder.

ALNWICK, ăn'ĭk. The capital of the county of Northumberland, England, on the Alne, about 32 miles north of Newcastle (Map: England, E 1). The streets are broad, well paved, and well lighted; the houses modern, built of stone, and in some instances handsome. There are numerous churches and a large park in which are ruins of several abbeys and monuments of historical interest. A large market place occupies the centre of the town. At one time there were many tanning establishments, but milling and brewing are among the industries carried on to-day. Alnwick was at an early period a border stronghold, and some fragments of the ancient walls even yet remain. Alnwick Castle, the residence of the dukes of Northumberland, stands at the north entrance of the town, and is considered one of the most magnificent baronial structures in England. During the Middle Ages it was a bulwark against the invasions of the Scots, who thrice besieged it. Pop., including Canongate, 1901, 6716; 1911, 7041. Consult F. G. Halleck, *Alnwick Castle and Other Poems* (New York, 1836), and C. H. Hartshorne, *Alnwick, etc.* (London, 1860).

ALO'ADÆ, or **ALOI'DÆ** (Gk. *'Αλωάδαι, Alōadai,* or *'Αλωεῖδαι, Alōeidai*), Otus and Ephialtes. The sons of Aloeus, or of Poseidon, and Iphimedea, wife of Aloeus. They were celebrated for their great size and extraordinary strength. Every year they grew an ell in breadth and a fathom in height, and at the end of nine years

were thirty-six feet broad and fifty-four feet high. They are fabled to have chained the god Ares, and to have kept him in a bronze cask for thirteen months. They also threatened the Olympian gods with war, and would have piled Pelion and Ossa on Olympus had they not been destroyed by Apollo before their beards were grown. It is further said that they fell in love, the one with Hera and the other with Artemis; but, when Artemis appeared to them in the form of a hind and ran between them, they shot at the supposed animal and killed each other. They were worshiped as heroes in some places.

AL'OE, *Lat. pron.* ăl'ō-ē; *Engl. pron.* ăl'ō (Gk. *ἀλόη, aloē*). A genus of plants belonging to the family Liliaceæ, including about 100 species which are natives chiefly in the Mediterranean region, Western Asia, and South Africa. About



COMMON ALOES.

50 miles from Cape Town is a mountainous tract completely covered with aloes, and the hills on the west side of Socotra exhibit them in similar profusion. The species vary in height from a few inches to 30 feet. They have permanent succulent leaves. The negroes of the west coast of Africa make cords and nets of the fibres of their leaves, and stockings are woven from the fibres of a species found in Jamaica. Aloes are chiefly valuable for their medicinal properties, which are laxative, drastic, emmenagogue, and vermifuge. The well-known drug called Aloes (q.v.) is the inspissated juice of the leaves of several almost tree-like species, and particularly of *Aloe socotrina*, a native of the island of Socotra; *Aloe purpurascens, Aloe spicata,* and *Aloe arborescens,* which principally yield the Cape aloes; *Aloe arabica, Aloe linguiformis, Aloe mitriformis,* and *Aloe vera;* which last, found in the East and West Indies, in Italy, and in some of the islands of the Mediterranean, is the only species which can be reckoned European, although it also is probably an introduced plant. The extract prepared from its leaves is known as Hepatic aloes, or as Barbadoes aloes. The Socotrine or Zanzibar aloes is the product of *Aloe Perryi.* The bitter principle of aloes has been called aloin. With oxygen aloin forms several compounds that possess acid properties. In the East Indies it is employed as a varnish to prevent the attacks of insects; and has even been applied to the bottoms of ships to protect them from marine worms. A beautiful violet color which does not require a mordant to fix it, is obtained from the leaves of the Socotrine aloe. It also affords a fine transparent color for miniature painting. Mohammedan pilgrims suspend an aloe over their doors on their return from Mecca, to signify that they have performed the pilgrimage. The American aloe is a different plant. Numerous species are used as decorative plants. For this purpose they are grown indoors and set out during summer. They may be propagated by seed, suckers, or cuttings. See AGAVE, and Plate of ACACIA.

ALOES, ăl'ōz. The inspissated juice of the leaves of various species of Aloe (q.v.). A drug of great antiquity, for we find Dioscorides, a writer on materia medica of the first or second century, making mention of aloe as a substance obtained from a plant and possessing cathartic properties. It is obtained from numerous sources, including Bombay, Arabia, Socotra, Madagascar, the Cape of Good Hope, and the West Indies. All these varieties bear large, thick, fleshy leaves, stiff and brittle, pointed, and generally terminating in a strong spine, filled with a mucilaginous pulp, and containing an intensely bitter juice, which yields the medicinal substance of aloe. It is obtained, sometimes in the form of tears, by incision, spontaneous exudation, and inspissation upon the plant; sometimes by spontaneous evaporation of the juice, which exudes by pressure from the

leaves when cut away near the base; sometimes by evaporating the same juice with the aid of heat; and lastly, by evaporating the juice and the decoction of the leaves. The following names are made use of in commerce to denote the various kinds of aloes found in the market: Socotrine, Clear, Cape, East Indian, Barbadoes, and Caballine aloes. The only varieties officially recognized by the Pharmacopœia of the United States are: (1) Socotrine aloes (*Aloe socotrina*), so called from its supposed source, the island of Socotra, near the mouth of the Arabian Gulf. It is a product of *Aloe Perryi*, a plant from the east coast of Africa, the island of Socotra, and Arabia. (2) Barbadoes aloes (*Aloe Barbadensis*) is prepared in the West Indies from *Aloes vera* and other varieties of aloes. Browne's *Natural History of Jamaica* states that the largest and most succulent leaves are placed upright in tubs, that the juice may dribble out. This, evaporated, is sold as Socotrine aloes; but the common aloes is obtained by expressing the juice of the leaves, boiling it with water, evaporating, and pouring it into gourds; whence this kind is often called gourd aloes. Aloes contains an active principle, aloïn, and a resin. When employed in small doses, aloes exerts a tonic, and in larger doses a cathartic action. It acts chiefly upon the large intestine, whose contractions it stimulates. It also causes congestion of the pelvic organs. Upon the bowels its effect is slow, requiring 10 to 12 hours. Aloes is an ingredient of a number of laxative pills mentioned in the United States Pharmacopœia. For illustration see ACACIA.

AL'OES WOOD, also AGILA WOOD, EAGLE WOOD, or AGALLOCHUM. The inner part of the trunk of *Aquilaria ovata* and *Aquilaria agallocha*, trees native of the tropical parts of Eastern Asia and the Malay Archipelago, and supposed to be the *aloes* or *lign aloes* of the Bible. They are large spreading trees, with simple alternate leaves. Aloes wood contains a dark-colored, fragrant, resinous substance, and is much prized in the East as a medicine, and for the pleasant odor which it diffuses in burning. The resinous substance is found only in the inner part of the trunk and branches, the younger wood being white, and almost scentless. The trees abound in the eastern part of Asia, especially in Cochin China, the Moluccas, and neighboring islands. Aloes wood is not only much prized in the East as a perfume, but many medicinal virtues are ascribed to it. The ancients ascribed to it similar virtues, and so valued it for these and its fragrance, that Herodotus says it once sold for more than its weight in gold. It was regarded almost as a universal medicine. Its very fragrance was supposed to have a beneficial influence, and it was therefore worn about the person. As it admits of a high polish and exhibits a beautiful graining, precious gems were set in it; and it was cut into fantastic forms and worn in head-dresses, etc. There seems to be allusion to a similar use of it in Ps. xlv. 8, "All thy garments smell of myrrh and aloes and cassia." Or perhaps this merely refers to its being employed to perfume clothing. It was also, from a very early period, much used to perfume the apartments of the great. The fragrance continues undiminished for years. Lign aloes is a corruption of lignum aloes (aloes wood).

ALO'GIANS, or **AL'OGI** (Med. Lat. *alogiani*, *alogi*, from Gk. ἀ, *a*, priv. + λόγος, *logos*, word, reason). A small and obscure sect of heretics in the second century who opposed the Montanists (q.v.), and rejected John's authorship of the Fourth Gospel, and the Apocalypse, holding that the Gnostic Cerinthus was the author.

ALON'ZO THE BRAVE AND THE FAIR IM'OGENE, A ballad by M. G. Lewis (q.v.), known as "Monk" Lewis.

ALOPECIA, ăl'ō-pē'shĭ-ȧ (Lat. from Gk. ἀλωπηκία, *alopēkia*, fox mange; from Gk. ἀλώπηξ, *alōpēx*, a fox). A disease characterized by loss of hair from any part of the body. See BALDNESS.

ALORA, ȧ'lō-rȧ. A town of Andalusia, Spain, in Málaga province, 18 miles northwest of Málaga. It stands on an elevated site near the right bank of the Guadalhorce, at the foot of the Sierra del Hacho, and in the midst of a fertile country (Map: Spain, C 4). Some of the streets are well built and well paved; some are very steep and irregular. The inhabitants are mostly employed in agriculture, and grain, dates, and fruit are grown. Some spirits and wine are manufactured. The medicinal and mineral springs of Alora are highly valued by citizens of Málaga, who resort in large numbers to this place. Pop., 1900, 10,206; 1910, 10,975.

ALOST, ȧ'lôst (literally, to the east, from Ger. *Ost*, east, it being near the eastern frontier), or **AELST,** älst. A town in Belgium, the old capital of the province of East Flanders, situated on a tributary of the Scheldt, called the Dender, which is here converted into a canal (Map: Belgium, B 4). It is a walled city with five gates, and has the famous church of St. Martin, an unfinished edifice, in late Gothic, one of the grandest in Belgium, and containing a famous painting by Rubens, depicting Christ appointing St. Rochus tutelary saint of the plague-stricken. In the Grand Place is a statue of Thierry Martens, who was born here, and who introduced the art of printing into Belgium in 1475. There is a town hall (about 1200), a college, a hospital, the royal school for sons of military men, an academy of design, etc. Its industries are weaving in silk, wool, and cotton, flax-spinning, lace-making, and it has a thriving trade in hops and grain. Pop., 1900, 30,100; 1905, 32,163; 1911, 34,336.

ALOY'SIA. See LIPPIA.

ALOYSIUS, SAINT. See GONZAGA, HOUSE OF.

ALP, älp; **ALB,** älb (Swabian) (Lat. *alpes*, perhaps of Celtic origin; Gael. *alp*, rock, cliff), also called the Rauhe Alb or Swabian Jura. A chain of mountains in southern Germany, about 70 miles in length, and from 12 to 15 miles in breadth, extending northeast and southwest, and forming, in part, the watershed between the Neckar and the Danube. It lies almost entirely within the kingdom of Württemberg, but crosses Hohenzollern and is situated from 50 to 100 miles east of the Black Forest, but, unlike the latter region, is clothed with forests of hard wood instead of pine. It forms a table-land intersected by a few narrow, deep valleys. The average height of the system is rather more than 2000 feet. On the north it descends to the Neckar in ridges of rocky cliffs and abrupt pointed headlands, but on the south it gradually slopes away to the level of the valley of the Danube. The scenery is often very picturesque, for the sharp, precipitous crags are frequently crowned with the ruins of the strongholds of some of the famous old German families, such as the Hohenzollerns, Hohenstaufens, etc. The

geological formations of the Swabian Alps are limestones of Mesozoic age, which, though regularly stratified, have been folded to a considerable extent. Caverns of a very remarkable character abound. The valleys at the base of the hills are fertile and produce abundance of wine and fruit, but the high table land has an extremely poor and barren soil. The word "Alp" is sometimes applied to the green pasture lands on the slopes of the mountains in Switzerland.

ALPAC'A, or **PA'CO** (Ar. *al,* the + Peruv. *paca*). One of the two domestic races of the Guanaco (*Lama huanacos*), a cameloid mammal of the Andean region. It is smaller than the llama and more nearly resembles the vicuña, although now considered to have been, like the llama, derived from the guanaco. (See LLAMA.) Its form is very sheep-like, except for the long, erectly carried head; and, although some have run wild, it is mainly known in great, semi-domesticated flocks kept by the Peruvian mountain Indians for the sake of the wool. These flocks graze on the pastures of the loftiest valleys, almost at the snow-line, which seem to be the natural home of the animal and where they have formed interesting instincts and habits of vigilance and protection against sudden storms and snowfalls. These flocks are said to be so careful to keep together that it is impossible to separate a full-grown individual, so that none can be truly tamed which is not taken when very young. Once a year the Indians drive their flocks to stone inclosures or huts and shear the wool, after which the flocks are again turned loose. This custom is prehistoric, and Squier says that many of the shearing huts about Lake Titicaca have stood there since long before the Spanish conquest. The alpaca is known from the equator to Tierra del Fuego, but is most common in Peru and Chile; its flesh is well liked as food, and the animal is occasionally used as a beast of burden. The alpaca's coat consists of a thick growth of woolly hair, varying from black to gray or yellowish, and reaching, when unshorn, a length of some two feet. The annually shorn fleece is about eight inches in length. The fibre is small but strong, elastic, very lustrous and silky, and highly valued for weaving warm and fine cloth. The natives of the Andes have made use of it from time immemorial for their ponchos or blankets, remains of which have been found in the oldest graves of the period of the Incas; but it was not until 1836 that the wool began to be exported to Europe and the manufacture of alpaca shawls, cloth, etc., regularly began. This was due to the sagacity and energy of Sir Titus Salt, whose mills at Saltaire, England, are regarded as the foremost in Great Britain. Now the imports of alpaca wool into Europe and America number many millions of pounds annually; but not all of the so-called alpaca cloth is really manufactured from that wool alone, or even in part. See GUANACO; LLAMA; VICUÑA, and Plate of CAMELS AND LLAMAS.

Attempts have been made to introduce the alpaca into Europe, but not with satisfactory results. The considerable flock formerly existing in the Pyrenees seems to have disappeared. Similarly, the costly trial of acclimatizing them in Australia has failed. An attempt was made in 1821 to introduce the alpaca into the United States; a fund was raised, and in 1857 a cargo of them was shipped to Baltimore; but the result showed that they could not be acclimatized.

ALP-ARSLAN, älp'är-slän' (Strong Lion) (c.1028–72). A Seljuk Sultan. He was born in Turkestan about 1028 and succeeded his uncle, Togrul Bey, as ruler of the Seljuk realm of Persia, in 1063. His first act was to unite the whole of his dominions in one kingdom. He embraced Mohammedanism and took the surname of Alp-Arslan ('Strong Lion'), his real name being Muhammad Ghiyath-ud-Dīn abu Khvajah. The Caliph of Bagdad gave him the title of Adhad-ud-Dīn ('Defender of the Faith') and decreed that prayer might be made in his name. He had an excellent vizier, Nizām-ul-Mulk, who was the founder of all the colleges and academies in the kingdom. From 1064 to 1071 Alp-Arslan pursued the course of his conquests and ruled from the Tigris to the Oxus. In 1064 and 1068 he invaded Armenia and Georgia, at that time Christian kingdoms. He next proceeded against the Greeks, who, under their brave Emperor, Romanus IV (Romanus Diogenes), thrice drove the Turks beyond the Euphrates. In August, 1071, a bloody battle was fought near the fortress of Malaskerd, between the towns of Van and Erzerum. Alp-Arslan gained the victory. The Greek Emperor was taken prisoner, and obtained his liberty only by the payment of an enormous ransom. In the following year Alp-Arslan invaded Turkestan, but he perished at Berzem, in Turkestan, by the poniard of Yussuf Kothual, defender of the fortress, whom he had conquered and condemned to death. He was buried at Merv. Consult Bury's ed. of Gibbon's *Decline and Fall of the Roman Empire* (London, 1898).

ALPE'NA. A city and the county-seat of Alpena Co., Mich., 125 miles north of Bay City, on the Detroit and Mackinac Railroad and on Thunder Bay (Map: Michigan, F 3). It is situated in a region containing numerous lakes and is a popular health resort. It has a United States fish hatchery, public library, parks, and municipal electric light and water plants. Large quantities of lumber in various products are exported, and there are fisheries, tanneries, and manufactures of cement, paper, machinery, excelsior, etc. The city has important mineral products, including limestone, clay, and shale. Excellent water power is secured from three dams across the Thunder Bay River, south of the city. Alpena was settled in 1835, incorporated in 1871; its charter, revised in 1897, limits the mayor's term to two years and provides for a city council of 12 members. Pop., 1900, 11,802; 1910, 12,706; 1913 (est.), 15,000; 1920, 11,101.

AL'PENHORN, or **ALP'HORN.** A simple conical, somewhat curved wind-instrument, about 3 feet long, and made of wooden strips. It has a hard-wood cupped mouthpiece and a bell. The notes are the open harmonics of the tube, the quality of tone being modified by the material and by the smallness of the bore in relation to the length of the tube. It is used by the Swiss to convey signals. The melody usually played on this instrument is called the *Ranz des Vaches* (q.v.). The alpenhorn is usually represented in the orchestra by the oboe, English horn, or bassoon. See MUSICAL INSTRUMENTS.

ALPES, BASSES. See BASSES-ALPES.

ALPES MARITIMES, älp mà'rē'tēm'. A department of France (q.v.), in the extreme southeast, on the shores of the Mediterranean and confines of Italy. It is formed mainly of the territory of Nice, ceded by Italy to France in 1860. There are many famous health resorts

in this department, as it is one of the most picturesque and one of the most delightful in the country. The area is 1443 square miles. Capital, Nice. Pop., 1906, 344,007; 1911, 356,338.

AL'PETRA'GIUS. See NUR-ED-DIN EL-BETRUJI.

AL'PHA AND OME'GA (*α*[*ἄλφα*] and *ω* [*ὦ μέγα*, great *o*], the first and last letters of the Greek alphabet). A term employed to convey the idea of completeness. The phrase occurs in the New Testament (Rev. i. 8; xxi. 6; xxi. 13) to denote the immeasurable fullness of God and of Jesus Christ; in Rev. i. 8 it is applied to God; in the other passages, to Christ. The Hebrews similarly employed the phrase Aleph and Tau, the first and the last letter of their alphabet, to denote a thing in its entirety. See, e.g., Jalkut Rubeni xvii. 4, xlviii. 4, cxxviii. 3. A somewhat similar phrase is found in Isa. xliv. 6, "I am the first, and I am the last," which, applied to God, is intended to express both eternity and universal sway.

ALPHABET (late Gk. *ἀλφάβητος*, *alphabētos*, from *ἄλφα*, *alpha* + *βῆτα*, *bēta*, the names of the first two letters of the Greek alphabet; compare the Late Lat. *abecedarium*, the English A B C, and Russ. *azbuka*, from *azu* + *buki*, the names of the first two letters). An alphabet may be defined as a series of characters, usually having a fixed order, employed to represent the single sounds of a language. Strictly speaking, this definition applies only to an alphabet like those of Greece and India in which the vowels as well as the consonants are represented. But the term is also used of the Semitic alphabets that made no attempt to represent vowel sounds. The series of signs for consonantal sounds invented by the Egyptians has also been called an alphabet, though it was never relied upon exclusively, but always more or less supplemented by symbols for words, ideograms, and determinatives. Sometimes the word is likewise employed, loosely and improperly, to designate a system of characters denoting syllables or combinations of elementary sounds. For the various modes employed to represent language, see WRITING; HIEROGLYPHICS; CUNEIFORM INSCRIPTIONS. For the variations in the style of writing at different periods, see PALEOGRAPHY.

The Greeks appear to have been the first to invent an alphabet in which the single sounds of their language, vowels as well as consonants, were expressed by a series of letters. Before the invention of this alphabet Greek colonists on Cyprus had used a syllabary in which the five vowels *a*, *e*, *i*, *o*, and *u* were represented by single letters, but the syllables, beginning with a consonant, were evidently pronounced either with or without the vowel. But the earliest form of the Greek alphabet, without the letters *φ*, *χ*, and *ψ*, meets us on Crete, Melos, and Thera, and it is natural to look in that direction for the origin of this most advanced type of alphabetic writing. There was a connection, however, between this alphabet and the one used by the Semites in Syria, suggesting that it was brought to the Greeks by the Phœnicians. This was the view held by many of the Greeks, as appears from the statements of Herodotus and other ancient writers and from the word *φοινικήια*, *phoinikēïa*, which denotes the letters of the alphabet and occurs in an inscription of Teos in Asia Minor belonging to the first half of the fifth century B.C. It is true that others attributed the invention of the alphabet to such mythical characters as Prometheus, Musæus, Palamedes, and Cadmus, who originally had no connection with Phœnicia, while the addition of certain letters was assigned to Epicharmus and Simonides. Special interest attaches to a statement by Diodorus that "the Cretans have an answer to those who attribute the invention of letters to the Syrians, and who say that the Phœnicians learned them from these and passed them on to the Greeks, this being done through Cadmus and those with him sailing to Europe, so that the Greeks call the letters Phœnician; to this they reply that the Phœnicians were not the original discoverers of letters, but that they simply changed their forms" (v, c. 74). A real tradition probably did not exist anywhere. The foreign names of many of the letters and the similarity in form and order observed by travelers would naturally give rise to the idea of a Phœnician origin. Unfortunately, we do not know whether the 11 or 12 Semitic names were originally used, whether the ending *a* in nine cases is the Aramaic emphatic or a Greek addition, and why the Semitic names of seven or eight other letters were not employed. But, as may be seen from the accompanying table, the forms of the earliest Greek letters bear a close resemblance to those of the North Semitic alphabet. Moreover, the order of the letters in the North Semitic alphabet, as shown by their numerical values and their use in acrostic compositions, is the same as that proved for the Greek by similar evidence and by the so-called *abecedaria*, or alphabets found on early vases. The proximity in both alphabets, of Beth, 'house,' and Daleth, 'door,' Jodh, 'hand,' and Kaph, 'palm of the hand,' Mem, 'water,' and Nun, 'fish,' Resh, 'head,' Peh, 'mouth,' and Shin, 'tooth,' can scarcely be explained except by a common origin. It seems probable, therefore, that the Greek alphabet is an adaptation of a consonantal alphabet invented in Syria. It is possible that more than one type of alphabet appeared in Syria about the same time. Besides the North Semitic alphabet, the South Semitic may also have originated there. This alphabet, in which more than 2000 Minæan, Sabæan, Katabanian, and Hadramautian inscriptions are written, is likely to be as old as the other. There is as yet no consensus of opinion as to the age of the Minæan inscriptions; but Glaser, Winckler, Schmidt, Weber, and Grimme have adduced many reasons for believing that some of them go back to the end of the second millennium B.C. (See MINÆANS.) Attempts have been made, notably by Lidzbarski, to show how the letters could have been derived from the North Semitic, but they have not been convincing. In the present state of our knowledge it is doubtful whether the southern Semites derived their alphabet from their northern kinsmen, as there is much that seems to indicate that both branches are indebted to a common source. Whatever be the relation of the Semitic alphabets to one another, the present evidence points to the conclusion that the consistent employment of a small number of signs to denote, not words nor syllables, but the elementary sounds of a language, originated among the Semites, and that through the trading branch of this family, the Phœnicians, this system of writing was carried to the Greeks and the West. Though the attempts to assign meanings to all the Semitic names of the letters has not proved successful, there can be no doubt

ALPHABETS

HEBREW NAMES	GREEK NAMES	HEBREW	PHŒNICIAN	EARLIEST GREEK	EAST GREEK (MILITAS)	WEST GREEK	LATER GREEK	EARLY LATIN	LATER LATIN
ALEPH	ALPHA	א		A	A A	A	A	A A	A
BETH	PETA	ב		B	B	B	B	[B]	B
GIMEL	GAMMA	ג		Λ Γ	Γ Λ	ᒧ C	Γ	C	C
DALETH	DELTA	ד		Δ	Δ	Δ D	Δ	D	D
HE	EPSILON	ה		E E	E E	E E	E	E	E
WAW	(DIGAMMA)	ו		F F	(F)	[F		[F]	F
ZAYIN	ZETA	ז		I	I	I	Z		(G)
CHETH	ETA	ח		H	H H	H H	H	H	H
TETH	THETA	ט		⊕	⊕ ⊙	⊕ ⊙	Θ		
IOD	IOTA	י		I	I	I	I	I	I
CAPH	KAPPA	כ		K K	K	K	K	K	K
LAMED	LAMBDA	ל		ᒪ	Λ V	Λ L	Λ	L	L
MEM	MU	מ		M M	M	M M	M	M	M
NUN	NU	נ		N	N	N N	N	N	N
SAMECH	(XI)	ס			王		Ξ		
AYIN	OMICRON	ע		O	O	O	O	O	O
PE	PI	פ		ᒥ ᒥ	Γ	ᒥ ᒧ	Π	Γ	P
ZADE		צ		M	(M)				
KOPH	(KOPPA)	ק		Φ	Φ	Φ		Φ	Q
RESH	RHO	ר		P P	P P P	P P	P	P	R
SHIN	SIGMA	ש		ξ	ξ ξ	ξ ξ	Σ	ξ	S
TAU	TAU	ת		T	T	T	T	T	T
	UPSILON			Y V	Y V	Y V	Y	V Y	V
	PHI				Φ Φ	[+ X = ξ]	Φ	+	X
	CHI				X	[Φ Φ = φ]	X		
	PSI				Ψ Ψ	[Ψ Ψ = χ]	Ψ		
	OMEGA				Ω		Ω		

that at least 11 are significant; Aleph means 'ox'; Beth, 'house'; Daleth, 'door'; Jodh or Jadh, 'hand'; Kaph, 'hollow of the hand'; Mem, 'water'; Nun, 'fish'; Ain, 'eye'; Peh, 'mouth'; Resh, or Rosh, 'head'; and Shin, 'tooth.' This leads naturally to the conclusion that the characters were originally representations of these objects, or at least showed some resemblance to them. Inquiry in this direction leads, however, to no satisfactory result as to the origin of the letters, though it may throw light on that part of the Semitic world where the names arose. As the peoples of Syria had intimate connections with Egypt, and as the hieroglyphic and hieratic systems had been in use there for centuries before the earliest known Semitic inscriptions, it was natural to look to the valley of the Nile for the symbols from which the letters had been derived. In a course of lectures given at Paris in 1838, Lenormant attempted to identify the Phœnician letters with Egyptian hieroglyphics; and in 1859 Emmanuel de Rougé read before the Académie des Inscriptions et Belles Lettres a paper in which he sought to prove that the source of the alphabet was to be found in the hieratic characters, as shown in the Papyrus Prisse, an Egyptian document which cannot be later than the eleventh dynasty and may well be much earlier. De Rougé's arguments were first published in detail after his death by his son, in *Mémoire sur l'origine égyptienne de l'alphabet phénicien* (Paris, 1874), in which also a summary of Lenormant's views appeared for the first time in print. De Rougé's opinion was adopted by Canon Isaac Taylor in his book *The Alphabet* (London, 1883), and has been retained in the second edition (1899). Breasted, *History of Egypt*, p. 484 (1905), maintains that with the papyrus the hand that was customarily written upon it also passed into Phœnician before the tenth century. But Ed. Meyer, *Geschichte des Altertums*, i, 1, p. 217 (3d ed., 1910), who thinks that a Phœnician invented the Semitic alphabet c.1000 B.C., deems it historically irrelevant where he obtained his signs and important only that he employed the principle, already discovered thousands of years before in Egypt, of separating the individual sound and using a sign for it. A new turn to the discussion was given by the discovery in 1887 of the Telel-Amarna tablets containing a series of letters written in Syria in the beginning of the fourteenth century B.C., which showed that at that time the cuneiform characters were used by the Phœnicians and other Semites even for correspondence with the Egyptian court and that the Babylonian was evidently the language of international relations. Even before this time Deecke, in *Zeitschrift der deutschen Morgenländischen Gesellschaft*, pp. 103 ff. (1877), and Hommel, *Geschichte Babyloniens und Assyriens*, p. 54 (1885), had attempted to show a connection between the Phœnician alphabet and the cuneiform of Assyria or Babylonia. Delitzsch, *Die Entstehung des ältesten Schriftsystems* (Leipzig, 1897), and Peiser, *Studien zur orientalischen Altertumskunde* (1900), have developed the Babylonian theory, though with differences in detail. This theory, however, labors under one serious difficulty. The early Babylonian characters which are supposed to throw light upon the Phœnician prototypes are probably more than 2000 years older than the earliest Phœnician inscriptions and differ decidedly from the cuneiform characters in use in Syria within 250 or 300 years of the time when the alphabet must have been developed. Peiser has shown that there was a certain principle of arrangement of the Babylonian signs; but Zimmern's attempt to prove a Babylonian influence on the order of the alphabet is not convincing, *Zeitschrift der deutschen morgenländischen Gesellschaft*, p. 670 (1906). It is now known that the Babylonian signs had names (see Viktor Christian, *Die Namen der Assyrisch-Babylonischen Keilschriftzeichen*, 1913), but the names of numerous objects found in both are not arranged in the same order. Similar objections may be brought against De Rougé's derivation from the earlier hieratic. Neither the Egyptian nor the Babylonian origin can, therefore, be regarded as proved.

But Babylon and Egypt were not the only great powers of the early civilization of the East. The Hittites (q.v.) had a hieroglyphic system of their own, which might easily have influenced the Phœnicians, but the alphabet is far more likely to have developed from a linear than from a hieroglyphic system of writing. The Cypriote Greeks down to the fourth century B.C. made use of a syllabic system which in some of its signs shows a resemblance to the Hittite. The value of these signs has been established. In some respects this script furnishes a closer approach to the alphabet than any other that is known to us. Of the greatest importance, however, is the discovery of at least two early systems of writing on the island of Crete. One of these is distinctly pictorial or hieroglyphic, the other (and later) is linear, and contains a number of forms closely analogous to the Phœnician and early Greek characters. Over 2000 inscriptions have been found, most of them in the archive of the palace at Cnosus. (See the account of Ægean Culture under ARCHÆOLOGY.) We know from Egyptian inscriptions that the Philistines took part in the invasion by seafaring Mediterranean peoples of Egypt and Syria, in the reign of Rameses III (c.1200 B.C.), and from the Bible that the Philistines came from Caphtor (Crete) and that Cretans were in the bodyguard of David. It is natural that the discoverer of ancient Crete and its wealth of epigraphic material should have thought of this connection between the island and Syria. Already in 1895 he hinted at a Cretan Philistine influence on the development of the Semitic alphabet (*Cretan Pictographs*, p. 102). In a paper read before the First International Congress for the History of Religion at Paris, in 1900, Schmidt suggested that the North and South Semitic alphabets developed independently in Syria during the twelfth century from a common source, that this source was the script brought over by the Philistines from Crete, and that some of the characters retained their original designations, while others were translated into the language of Canaan. The Cretan origin was also maintained by Fries, *Zeitschrift des deutschen Palästina-Vereins*, pp. 118 ff. (1900), though he looked to the cuneiform system for the names and order of the letters; and by Dyer in lectures delivered in America, 1900–01. Evans has developed his theory most fully in *Scripta Minoa* (1909). The importance of this Ægean element in the discussion cannot be fairly estimated until the Cretan linear and hieroglyphic systems are at least partially understood, for as yet none of the values of the signs is known. It is obvious that mere external likeness is insufficient to prove a common origin;

there must be sufficient resemblance in sound or meaning to account in some degree for the choice of that particular sign by the borrower to serve as a letter in the new alphabet. This is emphasized by Peters, in *Journal of the American Oriental Society*, pp. 177 ff. (1901), who, without committing himself to any theory, characterizes Evans's proposition as "certainly not lacking in plausibility." W. M. Flinders Petrie, in his recent work on the *Formation of the Alphabet* (London, 1912), develops his theory, originally propounded in the eighteenth *Memoir of the Egyptian Exploration Fund*, pp. 31–32 (London, 1900), that the origin of the Græco-Phœnician alphabet is to be sought in ancient signaries or series of signs "that had been gradually brought into use for various purposes." These signs, originally placed on articles of pottery for the purpose of indicating ownership, were given a commercial value and spread by trade from land to land "until the less known and less useful signs were ousted by those in more general acceptance." He asserts that they were already in use in Egypt in prehistoric times. Some two dozen of these signs finally triumphed and became common property to a group of trading communities along the Mediterranean in the form of a kind of short-hand. But Weill, in *Revue Archéologique*, i, 213 ff. (1903), Daressy, in *Annales du Service*, vi, 103, and Eduard Meyer, *Geschichte des Altertums*, i, 2, p. 61 (1909), have urged serious objections against this interpretation of the signs and regard them simply as factory marks without any phonetic value. Such signs of owner or maker meant for recognition, but not as sound-symbols or letters, are used in all ages. Stucken's theory, based on a relation of the alphabet to the signs of the zodiac, assumes a significance of some of the letters and an acquaintance with the zodiac in Syria at the time of their invention that cannot be proved.

The most important inscriptions written in the North Semitic alphabet coming from the earliest period (c.1000–539 B.C.) are the following: (1) on a bronze bowl found at Limassol, Cyprus, in 1877, dedicated by a servant (governor or vassal) of Hiram, King of the Sidonians, to Baal Lebanon, c.970 B.C.; (2) on a number of ostraca found in the palace of Omri and Ahab at Samaria in 1910, dated in the years of a king who is probably Ahab (872–853 B.C.); (3) on a stele found at Diban in 1868, erected by Mesha, King of Moab, after the death of Ahab, c.850 B.C.; (4) on a stele found at Zenjirli in 1902 and published in 1911, erected by Kilamu, King of Ya'udi, c.840 B.C.; (5) on a stele discovered by Pognon in 1903 and published in 1907, erected by Zakir, King of Hamath and La'ash, c.800 B.C.; (6) on a statue to Hadad found at Gerjin in 1890, erected by Panamu, King of Ya'udi, c.780 B.C.; (7) on a stone found at Zenjirli in 1891 inscribed by Bar Rekab, King of Samal, in the time of Tiglath Pileser IV (745–728 B.C.); (8) on a tombstone found at Tachtali Bunar in 1888, dedicated by Bar Rekab, King of Ya'udi, to Panamu, in the time of Tiglath Pileser IV; (9) on weights found by Layard at Nineveh in 1853 from the eighth and seventh centuries B.C.; (10) on a stone found at Gezer in 1908, giving a calendar, probably from the eighth century B.C.; (11) on a rock in the Siloam tunnel discovered in 1880, from the time of Hezekiah (715–686 B.C.); (12) on some seals published by Levy in 1869 and Clermont Ganneau from the eighth and seventh centuries; (13) on a stone found at Hasanbey-li, near Zenjirli, by Luschan in 1895 from the eighth or seventh century B.C.; (14) on a bronze bowl found at Olympia, Greece, from the seventh century B.C.; (15) on a silver bowl found at Wladikaukaz in Caucasus, from the seventh century B.C.; (16) on the colossi at Ipsambul, Nubia, found in 1845, from the time of Psammetichus II (594–588); (17) on a stone found at Nora, Sardinia, probably from the seventh or early part of the sixth century B.C.; (18) on a golden medallion found at Carthage in 1894, probably from the seventh or sixth century; (19) on a stone found at Malta in 1820, probably from the seventh or sixth century B.C.; (20) on a stone from a temple at Taima, northwestern Arabia, found by Huber in 1880, probably from the sixth century B.C.; and (21) on two stones found at Nerab, near Aleppo, from the seventh or sixth century B.C.

All of these exhibit the alphabet in substantially the same form, whether they are written in Phœnician, Aramaic, Moabitish, or Hebrew. The same general type is preserved in all Phœnician and Punic inscriptions, though the hand becomes more and more cursive in the later Carthaginian. It was also used by the Samaritans for the Pentateuch, their Aramaic Targum, and other works, while the Jews adopted, even for the Hebrew Scriptures, the square Aramaic characters. These appeared already in an early form in Egypt, as the Elephantine papyri (q.v.) show, and developed into a great variety of distinct types among the Aramaic-speaking peoples. (See ARAMAIC LANGUAGE AND LITERATURE.) The Aramaic script employed in various parts of the Achæmenian Empire spread beyond the realm of Aramaic speech. It became modified into the Pahlavi (q.v.) of the Arsacid and Sasanian periods, and subsequently into the alphabet in which our manuscripts of the Avesta (q.v.) are written. From the legends on coins it is evident that the Kharosthi alphabet of India, in which some of the Asoka (q.v.) inscriptions are written, goes back to the Aramaic script of the Achæmenian period which may have been introduced in India already by the governors of Darius I (521–485 B.C.). The Brahmi alphabet, in which the majority of the Asoka inscriptions are written, was already at that time used in India. Whether this script was likewise derived from the Aramaic is a moot question. At present, however, there is a strong tendency to regard it as having for its basis the South Semitic. The age of this alphabet and the relations between South Arabia and India render such a derivation possible. Like the Greek alphabet, those of India introduced supplementary signs for the vowels, fewer in the Kharosthi, and more in the Brahmi. The former is read from right to left, the latter from left to right. From the Brahmi the devanagari (q.v.) is a later development. It spread into Thibet and was introduced into China by Kublai Khan (q.v.). The alphabets used in Ceylon, Burma, Siam, and Cambodia, as well as in Korea and Japan before the introduction of the Chinese, came from another branch of the Brahmi. The South Semitic alphabet was introduced also in Abyssinia several centuries before our era (see ETHIOPIC) and is still used in writing the Amharic, the Tigre, and the Tigrina. The script of the Safaitic, Lihyanian, and Thamudene in-

scriptions is generally regarded as an offshoot of the Sabæan, but its age and relation to the South Semitic cannot yet be determined. On the origin of the Arabic script see ARABIC LANGUAGE AND LITERATURE. The Arabian letters, with some modifications, were adopted for later Persian and Turkish.

When the Greeks invented their alphabet is uncertain. It can scarcely have been earlier than 1000 B.C., nor later than the eighth century, as it evidently succeeded the Dorian invasion, but preceded the great colonizing movement, since the colonies regularly use the same alphabet as the mother city. Our earliest extant inscriptions come from the seventh century, and no inscription mentioned by the ancient Greeks was earlier than the middle of the eighth. The most important change they had to make in the alphabet invented in Syria was to introduce signs for the vowels. As such they used Aleph, He, Waw, Yodh, and Ayin. Among the wealth of sibilants offered, Zain was universally appropriated for the double consonant Zeta (probably *dz*); as between Samech, Tzade, and Shin there is great diversity of usage among epigraphists as to the exact course of the development. In the Ionian alphabet, which ultimately came into general use, the place of Samech was filled by Xi (χ), Tzade was dropped, and Shin used for the simple *s* sound. A history of the numerous local variations in the Greek alphabet lies outside the scope of this article. It is enough to mention the chief varieties, which were influential in the development of borrowed alphabets. The primitive alphabet, omitting Xi and ending with Upsilon, is found in early inscriptions of Thera, Melos, and Crete. To this alphabet were added three supplementary signs, and in the method of this change the Greek alphabets after the seventh century fall into two great groups, the Eastern and Western. The former includes Asia Minor, the islands of the Ægean, and some points on the Greek mainland; the latter includes Eubœa, most of the States of Greece proper, Sicily, and Italy. It is to be noted that the lines of demarkation are not those of the dialects nor of the races, though the Eastern group is largely Ionian, and the Western Dorian. Attica occupies a middle position. The Eastern alphabet adopted Ξ = ξ = *x*, and added Φ = ϕ = *ph*, Χ = χ = *ch*, and Ψ = ψ = *ps*. The Western alphabet shows Χ = ξ = *x*, Φ = *ph*, χ = *ch*, Ψ = *ps* was expressed by πσ or ϕσ, or in some cases by a new sign ⋇. As to the origin of these signs, Prætorius, in *Zeitschrift der deutschen morgenländischen Gesellschaft*, p. 676 (1902); p. 715 (1904), suggests that the very similar Safaitic signs became known to some Greeks, in Damascus, c.800 B.C. and adopted by them; while Evans, *Scripta Minoa*, p. 92 (1909), perhaps more plausibly suggests that they were taken directly over from some South Semitic source. Possibly we should then think of the Minæan alphabet, which we know to have existed at the time, and the forms of the letters likely to have been familiar to some extent in the Philistine Negeb and Gaza. The curious diversity in their use still lacks a satisfactory explanation. Among the East Greeks also arose the differentiation of the *e* and *o* sounds; after some variations, the short *e* came to be denoted by E, while for the long *e* was chosen the original aspirate (H); O was appropriated for short *o*, and for long *o* a new symbol (Ω) was invented. Waw or Digamma (*F*) was disused, as the sound had been early lost among the Ionians. In adopting the alphabet, the Greeks seem at first to have adopted also the direction of writing, from right to left, but very early to have become more independent and to have adopted the form where the lines run alternately from right to left and left to right, like the course of the oxen in plowing, whence the name *βουστροφηδόν, boustrophedon*. But the direction was unimportant, and the early inscriptions show many strange variations. It was not until the fifth century that the habit of writing from left to right supplanted the earlier forms.

Through the Greeks the alphabet was brought to Italy, and naturally in the Western form, since the oldest settlement, Cumæ in Campania, was made by colonists from Chalcis and Cumæ in Eubœa. From the Chalcidian alphabet the Etruscan and Latin alphabets were derived. Many other local variations developed; but most of the Italian alphabets preserved throughout their history the original direction of the writing. The Latins, however, probably because of growing intimacy with the Greeks, adopted the later Greek method. Our earliest Latin inscriptions come from the sixth century B.C. The Greek alphabet was not adopted in its entirety. The aspirates (*th, ph, ch*) were not needed, and Z, though perhaps existing in early times, was soon dropped. Its place was later taken by G, a differentiation of C, which seems for a time to have done duty for both the *k* and *g* sounds, as K early fell into disuse, if it did not actually disappear. About the time of Cicero, for the transcription of Greek names, the characters Y (U) and Z were introduced at the end of the alphabet. This Latin alphabet, as spread by the Roman conquests, became the alphabet of most of the modern European languages. The Slavs, however, derived theirs from the Greek of the ninth century A.D. In its early ecclesiastical form it is said to have been the invention of the missionary Cyril, who found it necessary to add 12 signs to express the Slavonic sounds. In Russia it has undergone various modifications, but is still used by Russians, Servians, Bulgarians, and Croatians. Poles and Czechs received the Latin alphabet with the Roman Catholic faith. The number of letters was afterward increased to 48, and in the reign of Peter the Great again reduced so as to form the present Russian alphabet of 35 letters. See RUNES and OGAM for primitive Germanic and Irish writing, and GLAGOLITSA and KIRILLITSA for the Slavic alphabets.

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ALPHABETICAL NOTATION. In music. See MUSICAL NOTATION; NUMERICAL NOTATION; TABLATURE.

ALPHAND, ål'fäN', JEAN CHARLES ADOLPHE (1817–91). A French civil engineer. He was born at Grenoble, studied at the Ecole Polytechnique, and was appointed an engineer at Bordeaux. He was appointed chief engineer of the improvements of Paris in 1854, director of works in 1871, and in 1878 director of water supply and drainage. In 1857 he was chief engineer of roads and bridges, and in the Franco-Prussian War was Colonel of an engineer corps charged with the task of strengthening the fortifications of the capital. He divides with Baron Haussmann the honor of having reconstructed Paris and is to be credited with an important share in the plans for the expositions of 1867, 1878, and 1889. He was the author of a work on the parks, boulevards, and promenades of Paris (1867–73), one describing the trees and flowers of the same city (1874), and of *Art in Gardens* (1886).

ALPHE'US (Gk. Ἀλφειός, *Alpheios*). The chief river of the Peloponnesus (Morea), rising in the southeast of Arcadia and flowing west through Elis and past the famous Olympia into the Ionian Sea. This river is one of the most celebrated in ancient song and is connected with a beautiful and characteristic Greek legend. The upper course of the Alpheus was of a sort likely to affect strongly the imagination of the Greeks. In its passage through Arcadia, a country consisting of cavernous limestone and abounding in shut-in basins and valleys, it twice disappears under ground and rises again. After these feats it was deemed capable of anything—even of flowing under the sea—and the Greek colonists of Sicily thought they recognized it in their new country. Close on the margin of the sea in the island of Ortygia (the site of Syracuse), was the beautiful and copious fountain of Arethusa, and its fresh water was believed to be that of the Alpheus. As evidence it was asserted that, when the river overflowed its banks, the refuse of Olympia polluted the fountain, and that a golden cup, thrown into the Alpheus at Olympia, reappeared in Arethusa. This popular belief was reflected in a favorite story of the later classical times. The river-god Alpheus became enamored of the nymph Arethusa while she was bathing in his stream. To escape him, she prayed to Diana, who changed her into a fountain and opened up an underground passage for her to Ortygia. The river still pursued, and, passing from Greece to Sicily below the sea without mingling his waters with it, united with his love in the fountain.

ALPHONSE, ål'fôNs' (1220–71). Count of Poitiers and Toulouse, son of Louis VIII of France. He took part in the sixth crusade (1248–54), led by his brother, Louis IX (St. Louis), with whom he was taken prisoner at Mansurah. He also accompanied King Louis on the seventh crusade (1270), against Tunis, where he fell fatally ill. His administration of the affairs of his domains was prudent and just and made in general toward increased autonomy and centralization.

ALPHONSINE, ăl-fŏn'sĭn, **TA'BLES.** See ALFONSINE TABLES.

ALPHONSO. See ALFONSO.

ALPHON'SUS MARIA DI LIGUORI. See LIGUORI.

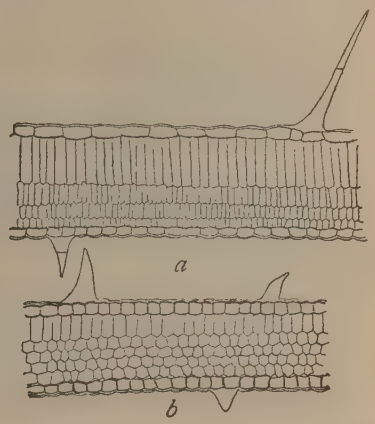
AL'PINE CLUBS. Societies established primarily to promote a spirit of fellowship among lovers of the sport of mountaineering, later fostering mountain exploration and scientific research. The earliest and most noted is the Alpine Club, of England, organized in London in 1857. The Italian and the Swiss Alpine clubs followed in 1863, after which the movement gained rapidly in extent and popularity, until at its jubilee in 1907 the original society could count no less than 166 descendants, representing nearly every civilized country. Some of these national societies are very large, having sections at various centres of population. The German and Austrian society had, in 1912, 403 sections and a total membership of 93,500. Nearly all these clubs are open to women. The original English club being an exception, a woman's society, the Lyceum Club, was organized at London in 1907. In America the first society of the kind—of a purely social nature—was founded in the college coterie at Williamstown, Mass., as early as 1863; the largest is the Appalachian Mountain Club (q.v.), founded in Boston in 1876. On the Pacific coast are the Sierra Club (1892) at San Francisco, the Mazamas (1894) at Portland, and The Mountaineers (1906) at Seattle. The American Alpine Club (1902) is organized more nearly on the lines of the original society and has a limited membership (80 in 1913), but admits women. The Alpine Club of Canada (1906), with headquarters at Banff, devoted chiefly to the study of the Canadian Rocky Mountains, has had a phenomenal growth—over 800 members in 1913.

The more important societies have encouraged geographical exploration in remote mountain ranges—the Himalayas, Tian Shan, Andes, Alps of New Zealand, Alaska, Equatorial Africa, etc.

There now exists a large body of Alpinistic literature, which began in 1859 with the Alpine Club's *Peaks, Passes, and Glaciers*, which was continued in the *Alpine Journal*, 1863. Certain of the continental societies have published extensively. *Appalachia* (12 vols.), *Alpina Americana* (2 nos.), the *Sierra Club Bulletin* (9 vols.), and the *Canadian Alpine Journal* (5 vols.) represent the literary activity of the American societies.

ALPINE PLANT. A plant whose natural habitat is in high altitudes. These plants form one of the three great climatic groups of xerophytes (q.v.) and have in general the ordinary xerophytic structures. Among the leading peculiarities of Alpine vegetation may be noted: 1. The gnarled and twisted aspect of the shrubs and trees; so characteristic is this habit in the mountain pine of Europe that the tree has been called by the Germans *Krummholz*, i.e., 'crooked wood.' 2. The vegetation is notably dwarfed. 3. The plant axes are commonly horizontal rather than vertical, and as a result there are a great number of creeping plants. 4. The "cushion (Ger. *Polster*) habit," so common elsewhere in mosses, is found in many seed plants, which sometimes resemble a brain coral in general effect. 5. The rosette habit is frequent. 6. The flowers and roots of Alpine plants, in striking contrast to the stems and leaves, are not reduced; they may even be increased. This combination makes the roots and flowers appear gigantic, and travelers, as a consequence, are always struck with the relatively large floral development. 7. Alpine leaves show decidedly xerophytic structures, many plants having thick-

Spring beauties (*Claytonia*) from the eastern lowlands (*a*) and Alpine districts of the Rocky Mountains (*b*). Note that the Alpine form shows great stem reduction, moderate leaf reduction, flowers relatively unchanged, and increased root system.



Cross-section of leaf of Germander (*Teucrium*) from the Alpine regions (*a*) and the lowlands (*b*). Note the greatly increased leaf thickness and palisade development in the Alpine leaf. After Bonnier.

skinned, leathery evergreen leaves, as the pines and rhododendrons, while others have hairy leaves, as the edelweiss. Kerner, *Die Abhängigkeit der Pflanzengestalt von Klima und Boden* (1869), and Bonnier, *Cultures expérimentales dans les hautes altitudes* (1888 to date), have carried on some remarkably interesting experiments to determine the influence that Alpine climates exert upon plants. Lowland plants were taken into Alpine regions and were found to assume structural features similar to those usually found in Alpine plants but not usually found under lowland conditions. In particular, subterranean organs were found to increase in size, while aërial stems became reduced and tended toward horizontality. The leaves became smaller and thicker and often more hairy; sometimes the leaves showed more red coloration. The flowers became relatively, and in some cases absolutely, larger and more highly colored, and blossoming often took place earlier than in the lowlands. Structurally the leaves showed a thicker cuticle and increased development of palisade cells. Bonnier found that these plants increased in Alpine characters year by year, and that, when taken again to the lowlands, the Alpine features were not lost for a long time. In general, the structures of Alpine plants are similar to those of Arctic plants, but it has been noticed that the leaves are thinner and show more differentiation, intercellular spaces are fewer, and palisade cells better developed. Hairy plants are perhaps more characteristic of Alpine than of Arctic regions. The Alpine conditions are peculiar and are chiefly due in the last analysis to the rarefied air. The consequent decrease in pressure has probably a direct

effect on vegetation, but experiments have not yet made this clear. In any event, the thin air causes a greatly increased intensity of heat and light by day and a greatly increased radiation of heat by night. Thus great extremes of temperature are the rule. The rarity of the air also prevents great rainfall. These conditions, together with exposure to wind, work in harmony toward the development of a highly xerophytic flora, as has been previously mentioned, and it is easy to see how none but xerophytes can survive in such a location. The differences between Arctic and Alpine conditions may be summed up thus: Arctic light is more constant, but less intense, and this perhaps accounts for the differences in leaf structure and color intensity in Arctic and Alpine regions, as stated above. The changes of temperature are more rapid in Alpine districts. The xerophytic structures of Alpine plants are perhaps due to causes set in operation by thin air, while in Arctic plants the causes may be set in operation rather by the cold or even frozen soil. See also MOUNTAIN PLANT, and the plate showing ALPINE VEGETATION, accompanying this article.

ALPIN'IA. See GALANGALE.

ALPINO, ål-pē'nō, PROSPERO (1553–1617). A Venetian botanist and physician. He anticipated Linnæus in determining the sexual differences of plants, and one of his papers gave Europe the first notice of the coffee shrub. He filled the chair of botany in the University of Padua for many years. His best-known work is *De Plantis Ægyptiis Liber* (Venice, 1592; Padua, 1640). The genus Alpinia is named after him.

ALPS. The word "Alp" is of uncertain origin. By some it is said to be Celtic from *alb*, meaning 'high'; by others to be from Lat. *albus*, 'white'; but by the residents of these mountains, Alp is never used except as meaning the grassy "benches" or plateaus which are to be found abundantly at various high altitudes and which in summer afford pasturage for great numbers of cattle. The "Alps," then, in native phraseology means these plateaus and not the peaks, though in general usage it includes all—peaks, alps, valleys—the range as a whole. The name is applied collectively to a mountain system of southern Europe, which includes most of Switzerland, and extends into France on the west, Austria on the east, Italy on the south, and Germany on the north, and covers altogether an area of some 80,000 to 90,000 square miles (Map: Europe, D 4).

The system rises from the shore of the Mediterranean west of the Gulf of Genoa, and at first trends northward to the west of the plain of Lombardy; then swinging to the east, it stretches with an east and west trend through Switzerland and across the north of Italy into Austria. The total length of the system is upward of 600 miles, and its breadth ranges from about 75 to about 150 miles. It contains hundreds of peaks exceeding 10,000 feet, and its crowning summit, Mont Blanc, has an altitude of 15,781 feet. In the extreme northeast, where the Alpine system reaches the Danube, it is met by a range belonging to the great system of the Carpathian and Sudetic mountains. On the west the Alps are connected with the Jura Mountains. In the south the Apennines form a great continuation, extending through Calabria and into Sicily. The Cévennes in southeastern France constitute in a measure a connecting link with the Pyrenees. The range of mountains known as the Dinaric Alps, on the borders of Dalmatia and Bosnia, are a connecting link between the Alpine system and the Balkan Mountains. The slopes upon the south, to the plains of Lombardy, are much more abrupt than those on the north, to the lower lands of Switzerland and Austria. This broad, complex mountain region is the source of many of the great rivers of Europe. The western slope of that part of the range which trends north from the Mediterranean shore is drained into that sea by the Rhone, while the east slope of this part, together with the southern slope throughout Italy, is drained into the Adriatic mainly by the river Po. The north slope is drained into the North Sea by the Rhine, and into the Black Sea by the Danube, which flows around the eastern end of the mountain system. The head branches of these rivers, aided by the glaciers at their sources, have eroded this mountain mass into a complex of short ranges and ridges, many of which have received distinctive names.

Subdivisions. The Alps are commonly, but quite arbitrarily, divided into three portions. The Western Alps comprise that portion having a north and south trend, and extending northward to the Great St. Bernard Pass; the Central Alps extend thence eastward to the Brenner Pass, while the Eastern Alps include the remainder. In the Western Alps the ranges and ridges are broken and irregular, while in the other parts of the system the secondary ranges trend more commonly parallel to the axis of the system. The system is still further subdivided into groups or ranges separated from one another more or less completely by stream gorges. The following groups are comprised in the Western Alps: The Maritime Alps, near the Mediterranean coast; the Cottian Alps, stretching from Mont Chambeyron, 11,155 feet, to the Col de Fréjus. It contains two peaks exceeding 12,000 feet in height—Monte Viso 12,609 feet, and Viso di Vallante, 12,048 feet. West of it is the small group known as Oisans, or Dauphiné Alps, with Mont Pelvoux, 12,970 feet, and Pointe des Ecrins, 13,462 feet, the highest peak. The Graian Alps are the northernmost group of the Western Alps; here are Grand Paradis, 13,324 feet; Mont Pourri, 12,428 feet; La Grivola, 13,028 feet; the Grands Coulvirs, 12,567 feet; the Grande Sassière, 12,323 feet; and, at the turning point of the range, Mont Blanc, 15,781 feet.

The Central Alps are subdivided into many groups, of which only the principal ones can be mentioned. The Bernese Alps separate the upper valley of the Rhone from the Aar and comprise many well-known peaks, among them the Jungfrau, 13,672 feet; Finsteraarhorn, 14,026 feet; Aletschhorn, 13,720 feet; Mönch, 13,465 feet; Eiger, 13,040 feet; Schreckorn, 13,385 feet, and Wetterhorn, 12,150 feet. This is one of the most rugged groups of the system, containing many peaks exceeding 12,000 feet in height and having many glaciers, one of which, the Aletsch, is the longest in the Alps. On the opposite side of the Rhone valley is another splendid range, the Pennine Alps, in which, grouped about Zermatt, are the Matterhorn or Mont Cervin, 14,780 feet; Weisshorn, 14,803 feet; Grand Combin, 14,164 feet; Lyskamm, 14,889 feet; Mischabel, 14,941 feet; and Monte Rosa, 15,217 feet. The St. Gothard Range stands at the sources of the Reuss, Rhine, and Ticino, separated on all sides by comparatively

SCENE IN THE ROCKY MOUNTAINS OF MONTANA. Alpine lake and meadow in foreground; spruces and firs and perpetual snow in background.

MT. HOOD, OREGON, SHOWING OSCILLATIONS OF THE TIMBER LINE. The trees, mostly mountain pines and hemlocks, advance farther up on the ridges than in the valleys.

low passes. To the south and east of it, and to the northeast of the Pennine Alps, are the Lepontine Alps, through which from northwest to southeast extends the valley of the Ticino. Between the Aar and Reuss are the Emmenthal Alps, separated from the Alps of Uri on the east by the Brünig Pass. The Tödi chain continues the line of Bernese Alps northeastward, with Tödi, 11,887 feet. The Rhætian Alps stand about the headwaters of the Inn River and contain many fine peaks, exceeding 11,000 feet in height, while south of them is the splendid Bernina group, with Mont Bernina, 13,304 feet. Still farther south, on the south flank of the system and east of Lake Como, are the Alps of Bergamo. East of the Rhætian Alps are the Otzthal and Ortler Alps, with peaks rising above 12,000 feet, the Ortlerspitze being 12,800 feet

The Eastern Alps are of less height than the other two groups and are broken into a great number of semi-detached groups and ranges; the North and South Tyrolese, Sarnthal, Dolomite, Venetian, Carnic, and Julian Alps, Hohe Tauern, Niedere Tauern, and the Salzburg, Styrian, and Austrian Limestone Alps. The Eastern Alps culminate in the Gross-Glockner, in the Hohe Tauern, on the borders of Tyrol, Carinthia, and Salzburg, which rises to a height of 12,457 feet, and from which descend glaciers almost rivaling those of the Swiss Alps.

The highest part of the Alpine system, as expressed by the altitude of its summits, is in the western part of the Central Alps, in the Bernese and Pennine groups, and about Mont Blanc. From this region the altitudes diminish eastward and southward. Owing to the broken character of the system, passes are numerous; many of them are comparatively low, and are utilized as routes for roads and railroads. Some of them have been used as routes of travel for many centuries.

Passes and Routes. Owing to the broken nature of the ranges, the passes are frequent and good. A number of them were known to, and used by, the Romans. The chief of these were the Mont Genèvre (6083 feet), from Briançon to Césanne, and the Brenner (4495 feet), Innsbruck to Verona. The passage of the Western Alps is made by five principal roads: 1. The military road, La Corniche, a coast road at the foot of the Alps from Nice to Genoa, parallel to which a railway now runs. 2. The road over the Coldi-Tenda, between Nice and Cuneo, made in 1778; highest point, 6150 feet. A railway tunnels it. 3. The highroad over Mont Genèvre, connecting Provence and Dauphiné with Turin; highest point, 6100 feet. 4. The carriage road made by Napoleon in 1805, over Mont Cenis, connecting Savoy with Piedmont; highest point, 6850 feet. Near this the chain is pierced by the railway tunnel of Mont Cenis. 5. The pass of the Little St. Bernard, connecting Savoy and Piedmont; highest point, 7180 feet. The passage of the Central Alps is made by eight principal roads: 1. That of the Great St. Bernard, connecting the valley of the Rhone with Piedmont; highest point, 8120 feet. It was crossed by Napoleon in 1800. 2. The magnificent road over the Simplon, which mountain is pierced by the Simplon railway tunnel at a level below that of the St. Gothard tunnel, was constructed by Napoleon, 1801–06, and connects Valais with the confines of Piedmont and Lombardy; highest point, 6590 feet. 3. The pass of St. Gothard, connecting Lucerne with Lago Maggiore; highest point, 6936 feet. One of the great Alpine railway tunnels is the St. Gothard. (See St. Gothard.) 4. The San Bernardino Pass; highest point, 6770 feet. 5. The Splügen Pass, connecting the sources of the Rhine with the Adda; highest point, 6945 feet. This pass was the one used by the Romans in their intercourse with the countries bordering on the Danube and the Rhine and also by the German armies on their marches into Italy in the Middle Ages. 6. The Furka Pass, separating the heads of the Rhine and Rhone, and crossed by a wagon road at an altitude of 7992 feet. 7. The Stelvio Pass (Stilfser Joch), on the frontiers of Tyrol and Lombardy, traversed by the most elevated carriage road in Europe; its highest point, 9855 feet. 8. The Brenner Pass on the road from Innsbruck to Trent and Verona; highest point, 4495 feet. It is now crossed by a railway. Besides these great roads, leading south into Italy, there are two which lead north from the valley of the Rhone and cross the Bernese Alps, over the Grimsel Pass, 7103 feet high, and the Gemini Pass, 7640 feet high. Just east of the Gemini is the Lötschen Pass, tunneled by a railway. The roads over the Eastern Alps are much lower and also much more numerous than those in the Middle or Western Alps. The principal are: 1. The road from Venice to Salzburg, crossing the Noric Alps at an elevation of rather more than 5000 feet. 2. The road over the Carnic Alps, which divides into three branches —the first leading to Laibach, the second to the valley of the Isonzo, and the third to the valley of the Tagliamento. 3. The roads from the Danube at Linz to Laibach.

There are four railways crossing the Western and Central Alps: The Mont Cenis, connecting France with Italy; the St. Gothard, connecting Lake Lucerne with Lago Maggiore; the Simplon, from the upper Rhone Valley to Lago Maggiore, and the Brenner, from Munich and Innsbruck to Verona and Venice. The Arlberg railway, which pierces the Alps in the Arlberg tunnel, is the great highway between Switzerland and Austria. Besides these through lines there are many extending into the heart of the mountains. From the upper valley of the Aar many lines extend southward into the Bernese, Urner, and Glarner Alps to Interlaken, Lauterbrunnen, and Grindewald, and to Brienz, Meiringen, Lucerne, and Linthal. A railway passes up the Rhone valley, with a branch to Zermatt, in the Pennine Alps. On the Italian side several railways penetrate the mountains to considerable distances. The Eastern Alps are crossed by several railway lines, which subdivide and join, sending off many branches within the mountain area. Many of the points affording the grandest views in the Alps are now reached by mountain railways; the Gornegrat Railway, the highest railway in Europe, in the vicinity of the Matterhorn, climbing up to an elevation of 9908 feet. The most extensive panorama to be had from any easily accessible point is that obtained from the summit of the Rigi, a peak near Lucerne, less than 6000 feet high. As a pleasure ground for the lovers of grand scenery and adventurous mountain climbers, the Alps are the most attractive region on the earth. It is a truism that the most valuable of Switzerland's assets is the scenery of the Alps. Not that these are the finest mountains on the face of the globe, but there are no others comparable with them which are so accessible, and in which living and

travel are so pleasant and easy. Railways and carriage roads traverse these mountains in all directions. At the best scenic points are excellent hotels, and guides are provided for conducting visitors to all points. Hence every year tens of thousands of travelers visit the Alps from all parts of the civilized world.

Glaciers. As the Alps rise to heights of 12,000 to nearly 16,000 feet above the sea, in a region of ample rainfall, the precipitation on these mountains is great, and gives rise to extensive glaciers, which originate near the summits and descend to different levels, the longest reaching within four or five thousand feet of sea level, and one of them, the Lower Grindelwald, having its termination at an elevation of only 3550 feet. The principal glaciers are found in the Bernese and Pennine Alps and the group about Mont Blanc, although numerous smaller ones exist in many other parts of the system. The total number is estimated at 1200, of which 471 are in Switzerland and 462 in Austria, those in the former country being by far the largest, covering an area of 710 square miles; the total area of snow and ice in the Alps is about 1600 square miles. The area of one glacier in Alaska, the Muir, is 350 square miles, and it has 20 feeders greater than the Mer de Glace; while the largest and longest of the Swiss glaciers, the Aletsch, in the Bernese Alps, has a length of 16 miles (area, 50 square miles), and a breadth of ice of more than a mile. In length the Unteraar is next, with a length of 10.4 miles, followed by the Gorner in the Pennine Alps and the Viesch in the Bernese Alps, each of which is 9.4 miles in length. Other well-known glaciers are the Mer de Glace, above the Valley of Chamonix, Miage Glacier, which has its source on Mont Blanc, the Oberaar and the Unteraar, in the Bernese Alps, and the Rhone Glacier in the same group, near the Furka Pass.

Our present knowledge of glaciers, their origin, structure, flow, advance, recession, and the phenomena of erosion, has been largely derived from a study of these Alpine glaciers. The present glacial system is but the last remnant of a great ice sheet which once covered both flanks of the mountain system, descending to the plains and valleys on either side. As it shrank it left great rivers of ice, which carved mountain gorges and lake basins. (All glaciers of the northern hemisphere are now receding, and probably those of the southern hemisphere also.) The lake scenery of the Alps is unrivaled for beauty, grandeur, and diversity. The largest lakes include Geneva, draining into the river Rhone, Neuchâtel, Bienne, Thun, Brienz, Lucerne, Zug, Zürich, Constance, Como, Lugano, Garda, and Maggiore. In the high mountains are cirques at the heads of all gorges not now occupied by ice, with little lakelets surrounded by frowning semicircular sweeps of cliffs, hanging valleys, and smooth-sided, U-shaped gorges, planed and polished, all bearing mute evidence of their glacial origin. Since the recession of the glaciers, the rivers in their turn have done a vast deal of erosion, but have not yet by any means effaced from the land the handwriting of the ice. The main Alpine region is drained on the north by the upper system of the Rhine, including the Reuss, Aar, and Thur, and by south branches of the Danube, including the Iller, Lech, Isar, Inn, and Enns; on the east by west branches of the middle Danube, including the Drave and Save; on the south by the upper Adriatic coast streams, including the Tagliamento, Piave, Brenta, and Adige, and by the northern branches of the Po, including the Mincio, Oglio, Adda, Ticino, Sesia, and Dora Baltia; and on the west by the eastern tributaries of the lower Rhone, the Durance, Isère, and the upper Rhone itself.

Geology. The Alps are the result of intense folding and faulting of the strata, carried on for a long time, the folds and faults mainly trending northeast and southwest, accompanied and followed by long-continued and intense erosion by ice and water. The net result of the earth movements was greatly to elevate the surface in a broad anticline, composed of many sharp anticlines, synclines, and monoclines. Erosion has planed these off to a comparatively smooth curve, has removed the stratified beds in great part from the higher portions of the system, leaving only fragments of the older beds in limited localities, and has laid bare vast areas of the underlying gneissic rocks. Hence the higher parts of the system are composed almost entirely of gneissic and allied rocks, while upon the flanks are found stratified beds, lying in various positions with regard to the system, here lying up against it, there dipping away from it. The folding and faulting occurred in various geologic epochs, from Paleozoic times down, but was apparently most intense in relatively recent times, in the Mesozoic. They occurred at different times in different parts of the system, and not always or everywhere in the same direction, so that the result, in detail, is exceedingly complicated, and in some places in Switzerland mountain masses of different constitution are suddenly interpolated. These are called Klippen. The principal field of these movements, where the folding and faulting is most complicated and greatest, is north of the higher parts of the range, in other words, on the northern slope; here are found stratified beds succeeding each other in bewildering fashion. The southern or Italian slope is much simpler in structure.

Climate. The Alpine region is at the meeting place of the high middle-latitude marine climate of Western Europe, the continental climate of Central Europe, and the low-latitude marine climate of the Mediterranean regions. While it does not lie directly in the main path of the cyclonic disturbances which sweep across Northern Europe from west to east, yet it does lie within the sphere of influence of these storm centres. Moreover, during the spring, numerous extended cyclones pass over the Alpine region; but they are less frequent in the winter and fall, and are almost totally lacking in the summer. This is the chief reason for the steady cold of the Alpine winter, with but few intensely cold waves, the serenity of its summer climate, and the harshness of its spring weather. The average annual temperature on the northern Alpine boundary at altitudes of 1500 feet is about 48° F., while the seasonal averages range from about 30° F. in winter to 65° F. in summer. In winter temperatures usually descend as low as zero F., and in summer rise as high as 90° F. On the southern Alpine boundary, at altitudes of about 800 feet, the average temperature for the year is about 54° F., the variations ranging from 35° F. in winter to 72° F. in summer; but in winter the temperature usually does not descend below 15° F., and in summer may reach even 95° F. With increase of altitude above these regions there is on the average for the year a decrease in temperature of about 1° F.

ALPINE SCENERY

CHILLON AND THE DENT DU MIDI

for each 330 feet of altitude; but the rate of decrease is much more rapid in summer than in winter. The average daily temperature is remarkably uniform in the Alps; but the temperature changes from day to night are excessive, on account of the intense action of the sun by day and the rapid cooling by radiation by night, as in all elevated regions. The absolute humidity decreases with the altitude, and is greater in summer than in winter. The relative humidity, and, consequently, the degree of cloudiness, are least in winter in the Alps, while in the surrounding region the relative humidity and cloudiness are usually greatest in winter.

On the north side the annual rainfall is from 25 to 40 inches; but this increases irregularly to about 90 inches on the southern side, where the steep slopes deflect upward the moisture-laden warm winds from the Mediterranean Sea. The average annual rainfall for the whole region cannot be far from 60 inches, while that of the surrounding lowlands is less than 35 inches. Where the high mountains have a copious rainfall on the windward side, the valleys on the leeward side experience a deficiency; so that on one side of a mountain range the rainfall may be many times that on the other side. Of the total annual rainfall throughout the Alps about 18 per cent occurs in the spring and about 25 per cent in winter. In summer the proportion decreases from 37 per cent in the northern part to 25 per cent in the south; but in the fall, on the contrary, the proportion increases from 20 per cent in the north to 33 per cent in the south. In the higher Alps much of the precipitation is of course in the form of snow, which is carried down to lower levels by glaciers and is there melted. The snow line in the Alpine mountains undergoes an annual variation, reaching its lowest altitude, about 2000 feet, toward the end of January, and its highest altitude, in the neighborhood of 9500 feet, about the middle of August. The limit differs for the northern and southern exposures, the snow line on the southern slopes lying over 150 feet higher in mid-winter, and about 1300 feet higher in the early fall. At low altitudes of 2000 to 3000 feet, the snowy days much exceed the number of days on which the ground remains snow-covered, but at altitudes of 8000 feet, the first snow commonly remains throughout the season of snow. The lower limit of perpetual snow is at an altitude ranging from 8500 feet to 9500 feet.

The general winds of the Alps follow the cyclonic and anti-cyclonic laws, which give a veering through the south when the cyclones pass to the north, as they usually do, and through the north when the cyclones pass to the south. Local winds are very prevalent; among these the mountain and valley winds, blowing upward from the valleys by day and downward from the mountains by night, are the most characteristic. In the Central and Northern Alps occur these hot, dry winds called the föhn. These are the result of descending air on the leeward side of the mountains after much of the moisture has been condensed by the cold high up on the windward side. These föhn winds, while a source of discomfort to the inhabitants, are welcomed in the spring, for they clear the ground of snow much more rapidly than the sun can accomplish it. Such is the evaporating power of the föhn winds that it may cause two feet of snow to disappear in half a day.

Fauna. The large native animals of the Alps are becoming scarcer and scarcer, by reason of the increasing number of sportsmen and the fact that the exploration habit, which is here practiced by tourists as in no other part of the world, has left scarcely a valley in untrodden seclusion. The wild cat, the brown bear, and the wolf have been driven into the more remote recesses, and are gradually becoming rare. The chamois and the ibex are found among the higher mountains, the haunts of the latter being among the inaccessible rocky solitudes bordering on the snow line. The pursuit of these animals is the most exciting and dangerous of European hunting sports. Foxes, weasels, and Alpine hares are plentiful, while otters and ermines are less numerous. The badger is common in the lower Alps, but the marmot is more distinctively an Alpine habitant, and it seems to maintain its numbers, and flourishes along with some smaller rodents in the higher altitudes even up to the snow line, the Alpine snow mouse having been found up to an altitude of 12,000 feet. The birds of the lower Alps are very numerous, consisting of the adjoining European species, and among the higher mountains are to be found eagles, hawks, and owls, and the smaller birds, choughs, snow finches, and larks. The great lammergeyer, once quite common in the higher Alps, has now become almost extinct. Game birds, such as woodcock, grouse, and partridges, are fairly abundant. Reptiles are not numerous. The lakes of the Alpine region contain a large variety of fishes; trout, salmon, and in some localities species of whitefish being the most important. Insects of all kinds flourish in the Alps. Butterflies and beetles are numerous, and extend up to snow altitudes. With increase of elevation, however, their colors become more and more subdued, and they become more and more deficient in wing power, thus necessitating a closer contact with the ground than prevails in like species below.

Flora. The forms of plant life of the Alps differ with the altitude, ranging from those common in Europe, at lat. 46°, to those typical of the arctic regions. The main subdivision of the Alpine plant growth is therefore into altitudinal zones; with increase of altitude there is a corresponding poleward change in the flora. The Alpine slopes are noted for their verdure up to the limits of vegetation; at low altitudes are the forests and meadows, while above these are the shrub and flower-decked pastures, which are such an important feature both in the landscape and in local life. At the base of the Alps on the south side, the lemon and olive flourish; but on the whole the prosperous growth of the vine may be taken as the most significant indication of plant life. With the grape occur the hardy plants of central Europe, grains, and the principal deciduous trees, oak, beech, ash, sycamore, maple, chestnut, and walnut. These latter are to be found up to an altitude of 4000 or 5000 feet, when they give way to the coniferous trees, which, while plentiful only up to an altitude of 6000 to 7000 feet, are in places found at still greater elevations, where the fir, the larch, and the creeping pine are the chief species seen, together with shrubs of central and northern Europe. The Alpine roses and violets are celebrated for their beauty. The typical Alpine plants, those which grow above the tree line, in some instances up to the region of eternal snow, are characterized by a low, clumpy growth which sends forth at the proper season flower stalks

which bear beautifully colored flowers. The blossoms of many species have peculiar hairy or woolly coatings. Gentians, violets, Alpine bells, edelrue, and the world-famed edelweiss are among the beautiful flowering plants of the region. Shrubs, such as the juniper, dwarf willow, and dwarf rhododendron, also occur in some places in profusion. Above the highest altitude of flowering plants and stunted shrub growth, from 10,000 to 12,000 feet, algæ, mosses, and lichens are the only vegetable life. There is not, however, a uniform flora at the same altitude in all parts of the Alpine region. Some species are indeed common in the appropriate climatic zone throughout the whole region; but, on the other hand, some species are limited to the west Alps, while others are peculiar to the north, south, or east Alps. Some of the arctic plants are so narrowly limited in distribution as to be found only on certain mountain groups.

Bibliography. The list of writings relating to the Alps is a very long one, and embraces important works in all of the principal languages of western Europe, French, German, Italian, and English. In fact, no other single region has been so much written about from a geographical point of view. For a detailed knowledge of the Alps, the publications of the various Alpine Clubs offer the richest sources of information. The chief of these clubs are: The English Alpine Club (organized in 1857), publishes *The Alpine Journal* (London); Deutscher (1869) and österreichischer (1862) Alpen-Verein (fused, 1874), 1800 members, *Zeitschrift des Deutschen und Oesterrcichischen Alpen-Vereins* and *Mittheilungen* (Vienna); Club Alpin Suisse (1863), *Annuaire* and *L'écho des Alpes* (Geneva); Club Alpino Italiano (1863), *Revista mensile* and *Bollettino;* Der österreichische Touristen-Club (1869), *Oesterreicheische Touristen-Zeitung* (Vienna); Le Club Alpin Français (1874), *Bulletin mensuel* and *Annuaire* (Paris); Der Verein der Naturfreunde (1877); Der Oesterreichische Alpen-Club (1878), *Oesterreichische Alpen-Zeitung* (Vienna); Le Club Alpin International à Nice (1879); Der Alpen-Club Salzburg (1880); Sanntbaler Alpen-Club (1880); Der Touristen-Verein Hermagor (1882); La Società degli Alpinisti Triestini (Roveredo). For the best general description, consult: F. Umlauft, *The Alps,* translated by Louisa Brough (London, 1889); T. G. Bonney, *The Alpine Regions of Switzerland and Neighboring Countries* (London, 1868), and *The Building of the Alps* (New York, 1912); J. Tyndall, *The Glaciers of the Alps* (London, 1896); J. Tyndall, *Hours of Exercise in the Alps* (London, 1873); Rambert, *Les Alpes suisses,* 5 vols. (Geneva, 1866–74); Desor, *De l'orographie des Alpes* (Neuchâtel, 1862); C. Lentheric, *L'homme devant les Alpes* (Paris, 1896); E. Suess, *Die Entstehung der Alpen* (Vienna, 1875); Schaubach, *Die deutschen Alpen,* 5 vols. (Jena, 1865–71); Studer, *Ueber Eis und Schnee* (Berne, 1896); Berlepsch, *Die Alpen in Natur- und Lebensbildern* (Jena, 1885); Noë, *Deutsches Alpenbuch,* 6 vols. (Glogau, 1875–88); Schlagintweit, *Untersuchungen über die physikalische Geographie und Geologie der Alpen* (Leipzig, 1850–54); Tschudi, *Das Tierleben der Alpenwelt* (Leipzig, 1892); Grube, *Alpenwanderungen* (Leipzig, 1886); Güssfeldt, *In den Hochalpen* (Berlin, 1892); Conway, *The Alps from End to End* (Philadelphia, 1900; new ed., 1910), and *Alps Described* (New York, 1904); Whymper, *Scrambles among the Alps* (London, 1893; new. ed., 1900); Neumayr, *Erdgeschichte* (Leipzig, 1885–87); Suess, *Das Antlitz der Erde* (Prague, 1883–88), *The Face of the Earth,* English trans. (Oxford, 1909); John Ball, *Hints and Notes for Travelers in the Alps* (1899); W. Brockedon, *Illustrations of the Passes of the Alps* (2 vols., 1828–29); Miss A. B. Edwards, *Untrodden Peaks and Unfrequented Valleys* (1873); Sir Martin Conway and W. A. B. Coolidge, *The Climbers' Guides* (10 vols., 1890–1904), with bibliography; Coolidge, *Alps and Nature in History* (New York, 1908); Swiss Topographical Bureau, *Siegfried Atlas;* Deutscher und O. Alpenverein, *Atlas der Alpenflora* (1897); R. Reinhaul, *Pässe und Strassen in den Schweizer Alpen* (1903); Ratzel, *Die Alpen inmitten der geschichtlichen Bewegungen* (Munchen, 1906); T. G. Bowney, *The Building of the Alps* (London, 1912); R. H. France, *Die Alpen* (Leipzig, 1913).

ALPUJARRAS, ål'pōō-hä'rås (Ar. *al,* the + *basharat,* herbage). A mountainous region in Andalusia, Spain, running parallel to the Sierra Nevada on its south side (Map: Spain, D 4). It is remarkable for its narrow, deep-cut, and romantic valleys, which are the most fertile in Spain. The inhabitants are in part of Moorish descent, large numbers of Moors having taken refuge here after the fall of the kingdom of Granada.

AL RAKIM, ăr'rä-kēm'. A name in the Koran (Sura xviii. 8), connected with the tale of the "Seven Sleepers." It is commonly understood to apply to the dog that guarded the "Sleepers" in their cave. But it has also been variously understood to mean the cave itself, or the valley wherein the cave was situated, or, again, the tablet set up over the entrance of the cave, enumerating the names of the slumbering occupants. See SEVEN SLEEPERS.

AL'REDUS, or **AL'FRED.** See ALFRED OF BEVERLEY.

ALSACE-LORRAINE, ål'zàs'lôr'rān' (Ger. *Elsass-Lothringen; Elsass,* ancient *Alsatia,* from the river *Ill* + Ger. *Sasse,* settler, tenant; *Lothringen,* the realm of Lothaire, grandson of Charlemagne). An imperial territory (*Reichsland*) occupying the southwestern end of the German Empire, and bounded by the Grand Duchy of Luxemburg, the Rhine province of Prussia, and the Rhine Palatinate on the north, Baden on the east, Switzerland on the south, and France on the west. Its area is 5603 square miles. Administratively it is divided into the districts of Upper Alsace, Lower Alsace, and Lorraine, the last being a fragment of the old Lorraine. Alsace is touched by the Rhine on the east and the Vosges Mountains are on the west border. The eastern part is an extensive plain, slightly inclined toward the Rhine, where it occasionally passes into swamps and marshes. The western part is traversed by the Vosges, which attain their greatest elevation in Alsace, the Sulzer Belchen (Ballon de Guebwiller) rising to a height of nearly 4700 feet above the sea. German Lorraine is a plateau region. The offshoots of the Jura where they enter Alsace are about 2500 feet high. Alsace-Lorraine belongs entirely to the basin of the Rhine. The Ill, a tributary of the latter, rises at the south end of Alsace and flows to the north throughout the greater part of its length. In the north, Alsace is watered by the Zorn, Moder, and a few other tributaries of the Rhine; while the western part of Lorraine is crossed by the Moselle.

The lakes are generally small, and furnish water for irrigation and water-power projects. The climate is mild, with a slight difference between the plains and the mountainous regions. The respective average summer temperatures of the two regions are 61° F. and 58°, and those for the winter 39° and 37°. Strassburg has an average yearly temperature of 50°, and Metz about 48.5°. Rainfall is abundant.

Agriculture. The soil of the country is well adapted for agriculture and is in some parts extremely fertile. The mountainous region is devoted almost exclusively to the cultivation of fruit and the vine, which grows as high as 1300 feet above the sea. The southern end of Upper Alsace is considered the most fertile part of the country, in contrast to the northern part of Lorraine, where the stony nature of the ground renders it unfit for agricultural purposes. About 48 per cent of the land is under tillage, over 30 per cent under forests, nearly 13 per cent in meadows, and about 2.3 per cent in vineyards. The land is divided into very small holdings, only about 2 per cent of the total area being in estates of over 50 acres each. Wheat, rye, barley, and oats are the chief grains. Potatoes and sugar beets, as well as hay and hops, are produced in large quantities. The cultivation of tobacco is still very important, although it has been declining of late. The cultivation of the vine is carried on more extensively than in any other section of the German Empire. Alsace produces chiefly white wines, while Lorraine yields exclusively red wines. The value of the output in 1911 was 34,900,000 marks, of which nearly one-half, or nearly one-tenth of the value produced in the Empire, was credited to Lower Alsace. The forests of Alsace-Lorraine consist largely of foliaceous trees, and are owned to a considerable extent by the communities.

Mining. Alsace-Lorraine occupies at present the first rank among the iron-producing countries of the German Empire. The growth of iron mining has been very rapid for the last decade, and, while in 1892 the production of iron ore in Prussia exceeded the output of Alsace-Lorraine by about 500,000 metric tons, in 1911 the latter produced 17,754,571 tons against Prussia's 4,948,711. The centre of iron mining is at the western end of Lorraine, near the frontier of Luxemburg, where the highlands on the left bank of the Moselle contain vast deposits of iron and some phosphate. Coal is mined principally in the Vosges; the output in 1911 was 3,033,436 tons. The output of salt is considerable (60,790 tons in 1911).

Manufactures. Among the manufacturing industries of Alsace-Lorraine the production of textiles occupies the chief place, employing about one-third of the total population engaged in industrial pursuits. Cotton weaving has been carried on extensively in Alsace-Lorraine since the middle of the eighteenth century and is at present considered the most important among the manufacturing industries. The production of textiles is carried on chiefly at Mülhausen, Kolmar, and along the numerous streams, which are utilized largely for industrial purposes. The production of woolens and yarns is very extensively developed in Lower Alsace. Linen and silk weaving establishments are also numerous. The production of textiles is still to some extent a house industry, especially in Lower Alsace. The iron and steel industry is next to the textile in importance. There are extensive foundries, machine shops, tool factories, and numerous other plants for the production of various iron products. The value of the annual output of the mills and foundries is about $40,000,000. Breweries and distilleries are numerous, but supply chiefly local demand.

Transportation and Trade. The transportation facilities of the Reichsland are not behind its industries. There are over 5000 miles of highways, nearly one mile of road to one square mile of territory. Of railway it had in 1912 1305 miles, or nearly 22.3 miles for every 100 square miles of territory, about the same as in the State of Illinois. The canal system of Alsace-Lorraine is one of the best in the Empire, and the government expends large sums on its maintenance and constant extension.

Government. Alsace-Lorraine was established as a part of the German Empire by the law of June 9, 1871; from that year the chief executive head has been the German Emperor, acting through the Statthalter, his appointee, at Strassburg. The constitution of the Empire was extended to the Reichsland Jan. 1, 1874, and on October 29 following a provincial committee (elected indirectly), the *Landesausschuss*, was established. This body was abolished by the constitution of May 31, 1911. Under the constitution the legislative power rests with the Emperor and a diet of two chambers. The First Chamber consists of representatives of the religious bodies, of the four larger cities, of their chambers of commerce, of the agricultural councils, of the trades union, etc., and of members named by the Emperor in number (18 in 1913) not exceeding the rest of the members. All hold office for five years. The Second Chamber consists of 60 deputies elected for five years by general suffrage, direct and secret. The Statthalter is assisted by a ministry. The districts of Upper and Lower Alsace and Lorraine are administered by presidents and councils. The Reichsland sends three members to the Bundesrat and 15 to the Reichstag. The revenue is obtained chiefly from direct and indirect taxes, customs, and state forests. The budget for 1912 balanced at 74,049,304 marks. The public schools are under the supervision of the school board, presided over by the Secretary of State. Since the German occupation the proportion of illiterates has diminished considerably. Education is still controlled to a considerable extent by the Church, over 27 per cent of the teaching staff consisting of clergymen and persons belonging to religious orders. Alsace-Lorraine contains one university, that of Strassburg. The population of Alsace-Lorraine in 1900 was 1,719,470, showing an increase of over 7 per cent since 1890; in 1905 it was 1,814,564, showing an increase of nearly 5.24 per cent since 1900; in 1910, 1,874,014 (Lower Alsace, 700,938; Upper Alsace, 517,865; Lorraine, 655,911). In 1910 Roman Catholics numbered 1,428,343; Protestants, 408,274; other Christians, 3868; Jews, 30,483; others, 3046. Of the total 965,625 were male and 908,389 female. Strassburg, the capital, had 178,891 inhabitants.

History. Originally a part of Roman Gaul and inhabited by Celtic tribes, the region now known as Alsace was overrun by the Germanic nations during the fourth and fifth centuries and was ultimately brought under the dominion of the Franks. The Teutonic invaders supplanted, to a great extent, the old Celtic inhabitants, and by the tenth century the country

had become thoroughly Germanized. After the partition of the Frankish Empire, Alsace was held by the dukes of Swabia and later by the Hapsburgs, under whose rule it enjoyed prosperity. Rich and powerful towns, chief among them Strassburg and Kolmar, sprang up and attained, in the course of time, a very large degree of self-government, entering frequently into treaty relations with other cities of the Empire and partaking fully in the intellectual and spiritual life of the German people. Modern Lorraine, in the meantime, originally the nucleus of the independent nation of Lorraine, had become steadily more and more French. A part of the possessions of the Duke of Burgundy, its autonomous position tended to disappear; until finally Henry II invaded the country, seizing Metz, Verdun, and Loué. Alsace next became the object of French ambition. In the Peace of Westphalia, in 1648, the Hapsburgs (as rulers of Austria) ceded their territories in Alsace to France. Louis XIV subsequently seized the numerous free cities of Alsace. Kolmar was incorporated with France in 1680 and Strassburg in 1681. The Treaty of Ryswick (1697) confirmed France in possession of Alsace.

Systematic attempts to assimilate the inhabitants, who were mainly of Germanic stock, with the French were made by the government, but met with no success until the Revolution, when, in the general overthrow of feudalism, Germans and French were drawn together by the common ideal of democracy. The French spirit penetrated deeply into the upper and middle classes, and even the mass of the population was reconciled to French rule. When war, therefore, between France and Prussia broke out in 1870, those natives of Alsace who did not side zealously with France remained neutral. In Lorraine occurred some of the most decisive battles of the war, Gravelotte and Vionville and the siege of Metz. The surrender of Alsace and a part of Lorraine was made the principal condition of peace by Prince Bismarck, who acted in this as the exponent of a widespread spirit in Germany, which demanded the recovery of the ancient Germanic borderland. Alsace (with the exception of the district of Belfort), and the part of Lorraine where the French language had not supplanted the German, became a part of the newly founded Empire, and were put under the direct control of the Emperor. The attempt to win back the people to German influences was greatly hampered by the vehement opposition of the Gallicized upper classes and the clergy, and the civil administration was brought almost to a standstill for a number of years by the refusal of the men elected to the district and provincial councils to take the oath of loyalty and perform their functions; the representatives to the Reichsrath were, for the most part, French irreconcilables. In 1872 the German government called upon the inhabitants to declare themselves either German citizens or French. More than 150,000 expressed their adherence to France, and of these nearly 50,000 removed across the border. On the part of the German authorities a policy of severity approaching military rule was tried in alternation with one of mildness and concession, and for a long time both proved equally ineffective. The Germanization of the provinces has steadily been aimed at, however, in acts making the study of the German language compulsory in the public schools, and the use of it obligatory in the courts and legislative bodies; in the suppression of French radical newspapers, and in the establishment of higher schools of learning under German control. After 1890 the prospect of an ultimate reconciliation became brighter; a loyalist party appeared which wielded some influence in the elections. The status of Alsace-Lorraine, however, is still far from settled. A great number of the inhabitants yet hope to become reunited to France, while others urge that Alsace-Lorraine should become a republic like Switzerland, with its neutrality recognized by international agreement. In December, 1913, the situation was more critical than ever, owing to the stern suppression of an anti-Prussian demonstration, giving rise to a parliamentary crisis of serious proportions.

Consult: H. Witte, *Zur Geschichte des Deutschthums im Elsass und im Vogesengebiet* (Strassburg, 1897); Gerber, *La condition de L'Alsace-Lorraine dans l'Empire Allemand* (Lille, 1906); H. Derichsweiler, *Geschichte Lothringens* (Wiesbaden, 1901).

ALSA'TIA. The popular name of Whitefriars, London, which served early in the seventeenth century as a refuge for criminals—a reservation which was abolished by Parliament in 1697. See the account in Scott's *Fortunes of Nigel.*

ALSBERG, älz'bĕrg, CARL LUCAS (1877—). An American chemist, born in New York City. His father, Meinhard Alsberg, was one of the founders of the New York Chemical Society, which subsequently grew into the present American Chemical Society. Carl Alsberg graduated from Columbia College in 1896, then studied medicine in Columbia University, receiving the degrees of M.D. and M.A. in 1900. The three following years he spent in Germany, devoting himself to physiology, pharmacology, and chemistry under Hofmeister, Emil Fischer, and others. From 1902 to 1908 he was connected with the Harvard Medical School, acting as head of the department of biochemistry from 1905 to 1908. In the latter year he was appointed chemical biologist in charge of the Poisonous Plant laboratory in the Bureau of Plant Industry at Washington, and in 1912 President Taft chose him to succeeded Harvey W. Wiley (q.v.) as Chief of the Bureau of Chemistry in the United States Department of Agriculture. He has published a number of original studies on the chemistry of the nucleic acids and the proteins, on the value of sea foods, phosphoric acid metabolism, poisonous plants, and enzymes.

ALSEA. A tribe of Indians near the mouth of the Alsea River, Oreg., now reduced to a few individuals. See YAKONAN.

ALSEN, äl'zen (Dan. *Als*). An island in the Baltic belonging to the Prussian province of Schleswig-Holstein and separated from the mainland by the Sound of Alsen, which in some parts is less than 400 yards wide (Map: Prussia, C 1). Its greatest length is nearly 20 miles, its greatest breadth about 12 miles, and its area is 124 square miles. The island is very picturesque in appearance, with a fertile soil. Its lakes have fish, and apples constitute an important article of commerce. The soil is fertile and yields grain. The chief towns are Sonderburg and Nordburg. The former is the capital, has a fine harbor, and is well fortified. Close to the harbor are the ruins of an old and famous castle, in which Christian II of Denmark and Norway was confined from 1532 to 1549. In the

war of 1864 Alsen was taken by the Prussians from the Danes. Pop., 1900, 2500.

AL SIRAT, ăs sē-răt′. The bridge from this world to the Mohammedan paradise, as narrow as a razor's edge, on which the virtuous pass to paradise, while the wicked fall into hell; derived from the Zoroastrian idea of the Chinvat Bridge.

ALSOP, ąl′sŏp, RICHARD (1761–1815). An American author, born in Middletown, Conn. Before he finished his course at Yale College, he went into business. His literary tastes caused him to join the "Hartford Wits," among whom were Theodore Dwight, Benjamin Trumbull, and Lemuel Hopkins, and later he became the principal contributor to the *Echo*, a satirical publication (1791–95; published in a volume, 1807). His works include a *Monody on the Death of Washington*, in heroic verse (1800); *The Enchanted Lake of the Fairy Morgana* (a translation of a portion of *Orlando Innamorato*, 1808); *The Natural and Civil History of Chile* (from the Italian of Molini, 1808); and the *Captivity and Adventures of J. R. Jewett among the Savages of Nootka Sound* (1815). Alsop was an accomplished linguist.

ALSTED, ąl′stĕt, JOHANN HEINRICH (1588–1638). A German Protestant divine and voluminous writer, professor of philosophy and divinity at Herborn and Weissenburg. He was born near Herborn, and died at Weissenburg, Transylvania. Of his compilations may be mentioned his *Cursus Philosophici Encyclopædia*, which includes a treatise on the use and abuse of tobacco, particularly noteworthy from its date; *Thesaurus Chronologiæ;* and *De Mille Annis*. The latter was a prophecy that the millennium would commence in 1694.

AL′STRŒME′RIA, or **ALSTRÖMER′S,** ąl′strē-mĕrz, **LILY** (named after the Swedish botanist, Klas von Alströmer). A genus of South American plants of the family Amaryllidaceæ, which is distinguished by tuberous roots and by often having the outer segments of the perianth different in form from the inner. The leaves are twisted, so that what should be the upper surface becomes the lower. The species number about 60 and are natives of the warmer parts of America. Some are sufficiently hardy to endure the open air in England and as far north as Virginia in the United States and are admired ornaments of flower gardens. Some have climbing or twining stems. Among these is the salsilla (*Alstrœmeria salsilla*), a plant of great beauty, with lanceolate leaves, a native of Peru, cultivated in the West Indies, the tubers of which are eaten like those of the potato. In Great Britain it requires the hothouse. *Alstrœmeria ovata*, also a beautiful plant, with a slender, twining stem and ovate leaves, is cultivated in Chile for its tubers, which are used as food. It has been introduced into Great Britain, but its cultivation has made little progress. The tubers weigh from three to six ounces. A kind of arrowroot is also prepared in Chile from the succulent roots of *Alstrœmeria pallida* and other species. One of the finest species for greenhouse growing is *Alstrœmeria alba*.

ALSTRÖMER, ąl′strē-mĕr, KLAS VON (1736–94). A Swedish naturalist. He had for his master and friend Linnæus, who named in his honor the genus *Alstrœmeria*. He visited Spain and spent 15 months there in the mountains. Unfortunately the journal of his observations was burned. He also wrote a work on the breeding of fine-wooled sheep.

ALTABAN, ąl′tą-băn, or **ALTASAN,** ąl′tą-săn. A division of the Ifugao tribe which formerly inhabited the northwestern part of Nueva Vizcaya province, Luzon, Philippine Islands. They no longer exist as a separate group.

ALTAI (ăl-tī′) **MOUNTAINS** (Tatar, golden mountains, from *altun, altan*, golden; Chin. *keen-shan*, same meaning). A mountain range of Central Asia forming part of the elevated region on the borders of Siberia and the Chinese Empire. The name formerly had a much wider significance, and included the entire line of high lands from the Irtysh River to the Okhotsk Sea, which is composed of several structurally independent units; but it is now limited to the much smaller group lying on the borders of Mongolia, Sungaria, and Siberia, and between about 45° and 54° N. lat. The range has a general trend to the northwest and southeast, nearly at right angles to that of the larger system. The Altai Mountains begin on the southeast with the Ektag range (Greater Altai), in the region of the Gobi Desert, and for some distance they form the boundary between Mongolia and Sungaria. Toward the northwest the range increases in breadth by the converging of outlying mountains, and also in height, but after passing the Siberian frontier it gradually loses its massive character and fades out into the steppes. On the slopes of the Ektag are the sources of the Black Irtysh, Kobdo, and Urungu rivers. North of this range and across the valley of the Bukharma River are several mountainous groups which constitute the Northern Altai. The latter are arranged along an axis parallel to that of the Ektag range, and attain an extreme elevation of over 10,000 feet in Mount Byelukha ('White Mountain'). The Tarbagatai group, farther west, may also be included with the Altai range. This group begins in Sungaria and reaches across the Siberian frontier, where it is continued by the Tschungistan Mountains into the region of the Khirgis steppes. Geologically, the Altai consist of a central core of schists and granite broken through by intrusions of igneous rocks, with Paleozoic strata ranging from the Silurian into Carboniferous on the outer edges. As the mountains were formed by upheaval at an early geological period, they have been subjected to long-continued denudation and erosion. Their crests, of which only the highest rise above the snow line, are generally well rounded, and their slopes are covered with a rich growth of grass or with heavy forests of pine, cedar, and birch. Deer, hares, and wolves abound in the lower, and bears in the higher, portions of the range. The mountains are but thinly populated, except within the limits of the Russian Altai, where there is a well-developed mining industry.

ALTA′IC and **U′RAL ALTA′IC.** Terms used of a family of languages in parts of northern, eastern, and central Europe and the greater part of northern and eastern Asia, besides still other sections. See URAL-ALTAIC and TURANIAN.

ALTAMAHA, ąl′tą-mą-hą′. A river formed by the confluence of the Oconee and Ocmulgee rivers, at the boundary line of Montgomery and Appling counties, Georgia. It flows to the southeast and empties into the sound of the same name, below Darien (Map: Georgia, E 4). It is 155 miles long, drains an area of 14,400 square miles, and is navigable for its entire length for boats drawing five feet of water.

ALTAMIRA, ąl′tą-mē′rą. A famous cavern

in northern Spain noted for its prehistoric paintings. See PALEOLITHIC PERIOD.

ALTAMIRA Y CREVEA, äl'tä-mē'rä ē krā'vā-ä, RAFAEL. Contemporary Spanish critic and historian. Born at Alicante, 1866. After completing his law studies, he went to Madrid, where he collaborated on various political and professional newspapers and magazines and wrote several novels. Later he became professor in the *Institución Libre de Enseñanza* (one of the most influential educational institutions in Spain). For a while he was director of the Republican newspaper *La Justicia* and then was called to a professorship of law at the University of Oviedo. While at Oviedo he became interested in university extension, and it is largely owing to his indefatigable zeal that there is university extension in Spain to-day. Altamira became later Director-General of Primary Education in Spain and a member of the important *Junta para ampliación de studios superiores,* also of the Hispanic Society of America, the Real Academia de Ciencias Morales y Políticas of his own country; and an officer in the Order of the Corona d'Italia.

Altamira has attained prominence as an orator, lecturer, and critic of art and history, and has made lecture tours to South America, the West Indies, and the United States. He is at present a correspondent of the *Revue Historique* at Paris and *The Athenæum* at London.

His published work includes the following important titles: *Historia de la propiedad comunal; De historia y arte; Psicología del pueblo español; Historia del derecho español;* and in French, *L'Enseignement des sciences sociales en Espagne.* The most notable work of Altamira is his *Historia de España, y de la civilización española* (Madrid, 1901–11), four volumes of which have already appeared. A fifth volume, in preparation, will probably complete the work.

AL'TAMONT. 1. A character in Rowe's play, *The Fair Penitent;* the husband of Calista, the heroine, and slayer of Lothario, who has seduced her. 2. In Thackeray's *Pendennis,* a name assumed by the convict Amory on his return; the father of Blanche Amory.

ALTAMONT, FREDERICK. In Scott's novel *The Pirate,* the assumed name of the pirate John Bunce.

ALTAMURA, äl'tä-mōō'rä. An episcopal city in the province of Bari, Italy, 60 miles northwest of Tarentum (Map: Italy, L 7). It is surrounded by walls and is situated at the foot of the Apennines. The magnificent cathedral was consecrated in 1231, under Frederick II, and, after a remodeling early in the fourteenth century, was poorly restored in 1860. The country produces oil, wine, grain, and cattle, and the fairs at Altamura are attended from far and near. Pop., 1881, 20,000; 1901, 22,729; 1911, 25,616.

AL'TAR (Lat. *altare* or *altar,* probably originally a high place, from *altus,* high). The place on which sacrifices were made or offerings laid or libations poured or some other act of worship performed. Altars were in use from the earliest times among all historic peoples. Some of those mentioned in the Old Testament are among the earliest of which descriptions are recorded.

The Ancient East. The oldest altars of the Babylonians which have been excavated are square heaps of sun-dried bricks, and Herodotus relates that their great altars were made of (i.e., incased with) gold. The Assyrians built altars of limestone and alabaster. The British Museum has several highly decorated examples: one triangular, another oblong, with scrolls that call to mind the expression "horns of the altar," which is literally carried out in many Græco-Roman altars with ox-horns or ram-horns at the corners. The Egyptians seem to have used two varieties—a concave conical altar for incense or smaller offerings; and great cubical blocks of stone, decorated with carvings, for larger sacrifices. The Metropolitan Museum, New York, possesses an excellent example of the first variety in the basalt altar of King Chephren and of the second in the great granite altar from the pyramid temple of Amenemhat I. The Hebrews in earliest times erected altars of unhewn stone in places where Yahwe was supposed to have manifested himself. But when worship became centralized at Jerusalem, only two altars were permitted in the temple: 1. The Altar of Burnt Offerings, built of stone and covered with plates of brass, whence it is also called the "Brazen Altar." It was 20 cubits in length and breadth and 10 cubits high and stood in the court to the east of the temple proper. 2. The Altar of Incense, or the Golden Altar, constructed of cedar wood and covered with plates of beaten gold. It stood within the Temple and was only 1 cubit in length and width and 2 high. (See TEMPLE OF JERUSALEM.)

Greek and Roman Altars. The altar was primitively of two classes: Either (1) placed on some height and often nothing but a mound of earth or a heap of stones or of ashes; or else (2) the family altar connected with each dwelling, in front of the entrance. This was smaller, permanent, and more artistic. Then came the altars connected with temples, either in the outer air, in front of the temple steps, or within. The great public altars of Græco-Roman worship in historic times, at which whole hecatombs were sacrificed and great festivals held, developed into immense artistic monuments, as, for example, that of Hiero at Syracuse, that of Hera at Samos, of Apollo at Delphi, and of Zeus at Olympia; the last-named was 125 feet in circumference. The famous altar at Pergamum (see PERGAMUM, GREAT ALTAR OF), with sculptures representing the combat of the gods and the giants, was 40 feet high. Probably such altars and their platforms are derived from the early Pelasgic altars that stood on an immense three-stepped platform and were the one centre of worship, for the Pelasgians had few temples. The Romans also used such colossal and artistic altars, especially to consecrate imperial worship: there was one for Spain and one for Gaul (at Lyons), with an abundance of statuary and decoration, where the Spanish and Gallic councils met annually and proclaimed their political allegiance. The Altar of Peace, with its sculptured friezes, erected in honor of Augustus, at Rome, to celebrate the pacification of the world, was one of the artistic masterpieces of the Augustan reign. (See ARA PACIS.) Of the smaller altars and tables of offerings, hundreds were erected in every city, not only in connection with the temples, but also in shrines and chapels and throughout the streets: they are among the finest pieces of Græco-Roman decoration and are of all shapes—circular, polygonal, square, or oblong. Usually each was consecrated to a single god or hero. Of course, the use to which the altar was put influenced its form, according as

it was for incense or sacred fire, for libations, for fruits, flowers, or the like, or for bloody sacrifices.

Christian Altars. In the Christian Church the altar was quite different in its suggestions. All reminiscence of heathen altars was abhorrent. The marble sarcophagi in which were buried the bodies of martyrs in the catacombs were among the earliest altars, except, indeed, plain wooden tables which developed into marble slabs with one or more legs. For several centuries only a single altar was allowed in each church—none outside—and it was always erected over the relics of a martyr; later, under the monastic régime, when chapels dedicated to saints were added to the church plan, each had its own altar. As early as the fifth century, precious metals came into use for altars. In the Western Church the great variety of shape in pagan times was reduced to one—moderately oblong. The altar was placed in the axis of the church, in front of the chord of the apse, or in the middle of the transept, if there was one. Beneath it was the confession for the relics of the saint, which afterward developed into the crypt. Above it rose a tabernacle, canopy, or ciborium. The structure of the altar itself was rarely ornamented, though in Italy the faces were often inlaid with marbles and mosaics. Nevertheless the altar usually had a number of artistic accessories that must be mentioned to give an idea of its appearance. The *altar-front* or *frontal* was a decoration for the front and sometimes for the other sides of the altar, not merely when the structure was a slab supported on legs, but even when it was solid. It was sometimes in the shape of a rich hanging; sometimes it was a relief of gold, silver gilt, enamel or silver. Famous mediæval altar-fronts are that of the cathedral of Basel, now in Cluny Museum, Paris; the Pala d'oro (q.v.), in St. Mark's, Venice; in Sant' Ambrogio, Milan; in San Giacomo, Pistoia. The *altar-piece* is used as a decoration placed on top of the altar at the back, a custom that did not come into use until the Middle Ages, when the altar was made to face the people and not the apse and when altars against the wall were multiplied. Some altar-pieces, complements to the altar-fronts, were of precious metals, as in St. Mark's, Venice, and San Giacomo, Pistoia, but usually they were devotional pictures, preferably in the form of triptychs, or even groups of sculpture, or a sculptured tabernacle. (See PREDELLA.) The altar-piece was sometimes treated with great splendor of architecture, sculpture, painting, and carving, and made into an imposing architectural composition rising to a considerable height, as (especially) by the Germans and Flemings in the Late Gothic period, and by the Spaniards throughout the entire duration of the Spanish Renaissance. The *altar-screen* is often connected with the confession and its staircase. In early churches it was surmounted by sculpture and hardly distinguishable from an altar-rail.

In the Greek church the altar has retained its primeval simplicity. It is square in form, so that the clergy may pass around in administering the sacrament, and without wealth of decoration which is confined to the iconostasis (q.v.) in front of the altar. Since the Reformation the use of the altar in the Roman Catholic church has remained essentially the same. Although it has been retained by churches of the Anglican and Lutheran communion, its use has been greatly modified and its importance diminished. It has given place to the simple communion table in the Reformed church, and with the non-liturgical Protestant denominations, such as Presbyterians, Congregationalists, Baptists, Methodists, etc., the use of the altar is of course conditioned by the mode of administering Holy Communion. (See COMMUNION IN BOTH KINDS; LORD'S SUPPER.) Consult Schmid, *Der christliche Altar und sein Schmuck* (Regensburg, 1871); Rohault de Fleury, *La Messe* (Paris, 1883); Thier, *Les principaux autels* (Paris, 1888); Lowrie, *Monuments of the Early Church* (New York, 1901); Gilbert Scott, *English Church Architecture* (London, 1881).

ALTAROCHE, ål'tà'rôsh', MARIE MICHEL (1811–84). A French playwright and journalist, born at Issoire. From 1834 to 1848 he was editor-in-chief of *Charivari*, the influence of which was increased by his political satires and his general wit and acumen. He was elected to the Assembly in 1848, but retired the following year and from that time was successively manager of the Odéon, Folies Nouvelles, and other theatrical enterprises. He wrote *Chansons et vers politiques* (1835), *Contes démocratiques* (1837), *Aventures de Victor Augerol* (1838), and the following plays: *Lestocq ou le retour de Sibérie* (1836) and *Le Corrégidor de Pampelune* (1843).

ALTAZ'IMUTH (*alt*itude + *azimuth;* see AZIMUTH). An astronomical instrument, used for determining the position on the sky of stars or other heavenly bodies by measuring their altitude and azimuth (qq.v.). The altazimuth instrument has two brass circles—one with its plane horizontal, the other with its plane vertical—and a telescope is attached to the circles. When this is directed so that a star appears at the intersection of a pair of crossed threads fixed in the field of view, it is possible to read the star's altitude and azimuth from the graduations engraved on the two circles. Being of considerable complexity, the instrument does not give results of a precision quite equal to those obtained with the meridian circle; and for this reason it is employed chiefly in its portable form when observations must be made at temporary observatories, such as eclipse expedition stations. It is in use, however, at Greenwich, for observing the moon on nights when it is not possible to observe that body in the meridian.

ALTDORF, ält'dôrf, or **ALTORF.** The capital of the Swiss canton of Uri, situated in a sheltered spot at the base of the Grunberg, about 2 miles east of the Lake of Lucerne (Map: Switzerland, C 2). It lies 1518 feet above sea level, and is a well-built town, having a church, a nunnery, and a Capuchin monastery, which was built in 1581 and which is the oldest in Switzerland. The town is connected with the Tell legend—for Tell is said to have lived at Bürglen, which is near by—and Tell dramas are played here by the citizens. The spot where his son stood to be shot at is marked by a bronze statue of father and child, by Kissling, erected in 1895. Southeast about 1½ miles is the entrance to the Schächenthal. Pop., 1900, 3147; 1910, 3837.

ALTDORFER, ält'dôr-fĕr, ALBRECHT (?1480–1538). A German painter, architect, and engraver on copper and wood. The exact date and place of his birth are unknown, though the latter was probably near Landshut; but

most of his life was passed at Regensburg, where he filled important civic positions as life member of the outer and later of the inner council, attained wealth, and where he died Feb. 13, 1538. He was influenced to some extent by Dürer, but is of independent importance, being chief master of the so-called "Danube" style and founder of a school. His pictures are marked especially by romantic imagination, his landscapes, which constitute the most important part of his work as a painter, being rather the creation of his own fancy than faithful transcripts of nature. But while his drawing is frequently disappointing, his coloring is rich and strong. One of his best-known works, the "Victory of Alexander at Arbela" (1529), so captivated Napoleon that it was carried off to Paris and only restored in 1815 to the Pinakothek at Munich, where are also his "Susanna's Bath" (1526) and others. Among important examples of his art in the Berlin Museum are "Repose on the Flight to Egypt," "Beggary Sitting on the Train of Pride," and a "Nativity." Others are at Augsburg, Nuremberg, Regensburg, and Vienna. His work on copper, of which over 100 examples remain, entitles him to a place among the "little masters"; and he was also a practicing architect, who held the office of city architect to Regensburg. Consult Friedlander, *Albrecht Altdorfer* (Leipzig, 1891); Voss, *Meister der Graphik*, iii (Leipzig, 1910).

ALTEA, ál-tā'a. A seaport town of Valencia, Spain, in the province of Alicante, 25 miles northeast of Alicante (Map: Spain, E 3). It stands on a rising ground at the head of the bay of Altea, is known for its exports of raisins, and has a lighthouse. Pop., 1900, 6179.

ALTEN, äl'ten. A portion of the province of Finmarken, in northern Norway, surrounding the Altenfjord. It consists of fertile tracts, where, in spite of the high latitude, much grain is grown.

ALTEN, äl'ten, KARL AUGUST, Count of (1764–1840). A celebrated Hanoverian general in the Napoleonic wars. He entered the army in 1781 and gained distinction at Valenciennes and Hondschooten. He was First Lieutenant in 1800, but after the capitulation at Lauenburg went to England, where he was made commander of a battalion in the German Legion (1803). In 1808 he assisted as General of Brigade in covering the retreat of General Moore to Corunna. In 1811 he took part under General Beresford in the siege of Badajoz and the battle of Albuera, and in the following year was promoted by the Duke of Wellington. In almost all the engagements of the Spanish war of liberation—at Salamanca, Vitoria, in the Pyrenees, Nivelle, Nive, Orthez, Toulouse—Alten took a prominent part. At Waterloo he held La Haye-Sainte for hours against the French. He commanded the Hanoverian contingent of the army of occupation in France (1818) and after his return to Hanover was made Minister of War.

ALTENA, äl'tā-nä. A town of Westphalia, Prussia, in the district of Arnsberg, on the Lenne, 40 miles northeast of Cologne (Map: Prussia, B 3). The town possesses a war monument, several churches, and the ancestral castle of the old Counts von der Mark. Its principal manufactures consist of iron, copper, brass, and nickel goods, one of its specialties being metal ecclesiastical vessels. Pop., 1900, 12,800; 1905, 13,594; 1910, 14,579.

ALTENBURG, äl'ten-burk. The capital of the German duchy of Saxe-Altenburg, situated in a fertile country in lat. 50° 59′ N., and long. 12° 25′ E., about 24 miles south of Leipzig, near the river Pleisse (Map: Germany, E 3). It is the home of the Duke of Saxe-Altenburg. Preeminent among the noteworthy buildings is the ducal castle, built upon an almost perpendicular porphyry rock and celebrated as the scene of the abduction, in 1455, of the two Saxon princes, Albert and Ernest. A curious building is the so-called Rothen-Spitzen, composed of two connected towers, containing the State archives. Altenburg possesses several excellent educational institutions, a museum, a picture gallery, and a theatre. The card-game "Skat" originated among the well-to-do peasants of this region. The benevolent institutions include an infirmary and a hospital for poor citizens. Brushes, gloves, hats, playing cards, and cigars are among the chief manufactures, and it has a considerable trade in woolen yarn and produces much grain. Pop., 1890, about 31,000; 1905, 38,818; 1910, 39,977.

ALTENDORF, äl'ten-dôrf. Formerly a commune in Rhenish Prussia; since 1901, a suburban district of Essen, comprising the towns and villages of Kronenberg, Schederhof, Alfredshof, Bochelt, and Vogelheim. At the time of the incorporation it had a population of 63,271. Altendorf is liberally supplied with schools, one of the largest being that of the famous Krupp iron works, which are located here. In addition to the iron industry, Altendorf has extensive coke, brick, and cement works.

ALTENESSEN, äl'ten-ĕs'sen. A city in the Prussian Rhine province, about 2 miles north of Essen, of which it is a suburb. It has important coal mines and machine works. Pop., 1890, about 18,000; 1905, 33,421; 1910, 40,672.

ALTENSTEIN, äl'ten-stīn. A castle in the duchy of Saxe-Meiningen, near the watering place of Liebenstein, and about 13 miles southeast of Eisenach, on the south slope of the Thüringerwald. It is the summer residence of the reigning dukes. There is here a beautiful park containing a limestone cavern 600 feet long in which there is a subterranean lake. St. Boniface, "the apostle of Germany," lived and preached here from 724 to 727; and near by is the place, marked by a monument, where, in 1521, Luther, while returning from Worms, was seized and carried off to the Wartburg.

ALTENSTEIN, KARL, BARON VON STEIN ZUM (1770–1840). A Prussian statesman. He was born at Ansbach and studied at Erlangen and Göttingen. After the Treaty of Tilsit he became the head of the finance department. In 1815 he went to Paris with Wilhelm von Humboldt to claim the restoration of works of art taken from Prussia by the French armies. He was Minister of Public Worship and Education during 1817–38 and did great service for the universities and schools. Under his direction the University of Bonn was founded and a great number of gymnasiums were opened. He drew up the education law of 1819, which is still the basis of public instruction in Germany.

AL'TERA'TION (from Lat. *alter*, other, different). In its most general sense, with reference to a written instrument or a property interest, alteration is such a change as, if effective, would result in substituting a different instrument or interest for the original. An alteration of an easement, as a right of way, consists in changing its course or boundaries.

An alteration of a written instrument consists in making any material change in its language or character, such as erasing, interlining, or adding terms, or removing a seal from a deed. An immaterial change does not come under the description of an alteration. At common law, the alteration of a written instrument avoided it as against a party not assenting thereto. In England it does not matter whether the alteration is made by a party or by a stranger. In this country a distinction is made between the two cases, and alteration by a stranger, or spoliation (q.v.), as well as alteration by a party through pure accident or innocent mistake does not invalidate the instrument, if its original language or tenor remains discoverable. The common-law rule rests upon considerations of public policy, its object being to deter the holder of a written instrument from tampering with it and to force him to carefully guard its integrity. By the Bills of Exchange Act in England and the Negotiable Instruments Law in several of our States, a holder in due course of an altered negotiable instrument may enforce it according to its original tenor. See the authorities referred to under CONTRACT; DEED; NEGOTIABLE INSTRUMENT.

ALTERATION, IN MUSIC. See MENSURABLE MUSIC, *Alteratio.*

AL'TERATIVE (Lat. *alter,* other, another, different). In medicine, a term applied to a remedy that acts slowly and in an unknown way, probably by promoting metabolism and improving the nutrition of the body. Alteratives may act on certain glands, or upon absorption in general; they are given in comparatively small doses, and for a considerable length of time. Mercury and iodine are examples of powerful alteratives, and their most effective action is seen in cases of syphilis.

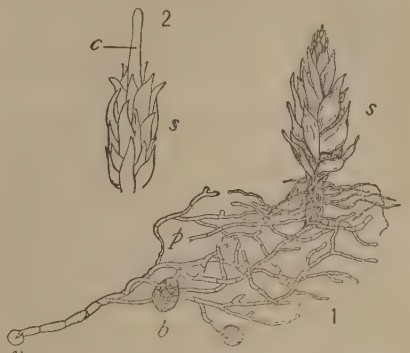
Some preparations of arsenic are powerful alteratives in certain skin diseases. Cod liver oil (q.v.) is an alterative which is used with great benefit in tuberculous conditions, rickets, and other diseases associated with poor nutrition. Preparations of phosphorus have a powerful alterative action. Colchicine (q.v.) is said to act in this way in gout and subacute rheumatism. Sarsaparilla (q.v.) was formerly believed to possess strong alterative qualities, but it has been shown to be practically inert.

ALTER (äl'tĕr) **FRITZ** (Ger. Old Fritz). A popular designation of Frederick the Great.

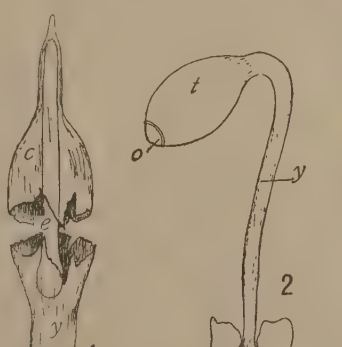
ALTERNATING (äl'tĕr-nā'tĭng) **CURRENTS.** See ELECTRICITY; DYNAMO-ELECTRIC MACHINERY.

AL'TERNA'TION OF GEN'ERA'TIONS (Lat. *alternatio,* an interchange, from *alter,* other, and *generation* from *genus,* birth, descent, offspring). The successive occurrence in one life-cycle of two or more dissimilar forms; the process by which in its life history a plant or animal may pass through alternating phases that do not resemble one another, especially differing in being successively sexual and asexual. This phenomenon is very widespread among organisms, and assumes different characters in different groups of plants or animals.

Among Plants. Alternation of generations is found in all forms of plants excepting the lowest. One may get some conception of alternation of generations in plants by comparing it with the very different alternation of forms which occurs in the life history of a moth or butterfly. In the plant, however, instead of having a series of forms which pass into one another, our plant larva forms an egg which produces the mature form. If in the life history of a butterfly the larva should lay eggs and thus produce the mature forms, we should have something resembling the alternation of generations in plants. One of these generations has sex organs and hence is called the gametophyte; while the other generation has no sex organs and is known as the sporophyte. Both generations produce spores, but in a very different way. By means of its sex organs the gametophyte produces spores in a sexual way, i.e., by the fusion of two sex cells, and such spores are called in general oöspores, or fertilized eggs; while the sporophyte by ordinary cell division produces spores which are called asexual spores, meaning spores which have not been formed by sex organs. In the life history of the plant the fertilized egg of the gametophyte gives rise to the sporophyte, while the asexual spore of the sporophyte gives rise, in turn, to the gametophyte, and so the alternation continues.



Life history of a moss: 1, the gametophyte, with the protonema (*p*) developed from an asexual spore (*y*), and giving rise to buds (*b*) that develop the leafy shoot (*s*); 2, the young sporophyte (*c*) rising above the leafy shoot (*s*).



Sporophyte (sporogonium) of a moss: 1, the young sporophyte (*e*) rupturing the calyptra, carrying up the cap-like upper portion (*c*); 2, a mature sporophyte, showing imbedded foot (*f*), seta (*y*), capsule (*t*), and operculum (*o*).

Alternation of generations is first manifested

among the lowest plants (Thallophytes), but it is not established for all plants until the liverworts and mosses (Bryophytes) are reached. The phenomenon is still more apparent among the ferns and their allies (Pteridophytes); but among the seed plants (Spermatophytes), while evident to the laboratory student, it is well-nigh invisible to the ordinary observer. It is to mosses and ferns, therefore, that one must go for the clearest examples of alternation of generations.

In an ordinary moss the gametophyte consists of the well-known leafy moss plant, which bears sex organs at the tips of its main stem or branches. By means of these sex organs a fertilized egg (oöspore) is formed. When the fertilized egg germinates, it produces the sporophyte, which in this case consists of a more or less elongated stalk (seta) bearing at its summit a capsule or spore case. The leafless sporophyte is anchored in the leafy gametophyte by means of an organ called the foot. This peculiar sporophyte of the moss is commonly spoken of as the fruit, and when it appears upon the leafy plants these are said to be "in fruit." The spores formed in the spore cases are asexual and upon germination produce new leafy plants (gametophytes).

In the case of the ordinary ferns, which belong to the great group Pteridophytes, the same phenomenon may be observed, but with a striking difference. In the mosses the prominent leafy plant is the gametophyte, while in the fern the conspicuous leafy plant is the sporophyte. The gametophyte of the fern is a simple flat body (prothallium) resembling a minute liverwort. Upon this prothallium the sex organs are developed and the fertilized eggs are formed. From these fertilized eggs the comparatively large leafy fern body arises. This leafy body (the sporophyte) produces, usually upon the under side of the leaves, numerous asexual spores, which upon germination give rise again to simple gametophytes.

Among certain club mosses and other Pteridophytes the sporophyte produces two kinds of asexual spores. The most apparent difference between these spores is that of size, and hence they are called "microspores" (small spores) and "megaspores" (large spores). The microspore upon germination produces a male gametophyte, i.e., a gametophyte which bears only male organs. The megaspore upon germination produces a female gametophyte, i.e., a gametophyte which bears only female organs. The differentiation of spores is spoken of as "heterospory," and all the higher plants are heterosporous. With the appearance of heterospory the alternation of generations passes out of the reach of ordinary observation, since the gametophytes are so much reduced as seldom to leave the spores which produce them. In a seed plant, for example, the whole visible body of the tree, shrub, or herb is a sporophyte; the pollen grains are the small asexual spores or microspores, while the so-called embryo sac in the ovule is the large asexual spore or megaspore. The male gametophyte consists of only two or three cells, which form within the pollen grain. The female gametophyte consists of more numerous cells, but they are entirely confined within the megaspore walls and hence never leave the ovule.

Taking the plant kingdom as a whole, it may be said that in the lowest plants only a gametophyte exists. In higher forms a sporophyte begins to appear, at first dependent upon the gametophyte, as in the mosses, but presently attaining independence and prominence, as in the ferns and seed plants. With the independence of the sporophyte, the gametophyte became gradually reduced in size, until in the highest plants it is visible only under the special technique of the laboratory. The significance of alternation of generations in the plant kingdom is by no means clear. One of its results, however, is to multiply the product of a single fertilized egg. If there were no alternation of generations, one fertilized egg would result in a single new plant. By the interposition of a sporophyte bearing numerous spores, each one of which may form a new gametophyte, a single fertilized egg may result in many new plants. Another result has been to assign different kinds of work to different individuals. Conditions that favor the dispersal of aërial spores are not consistent with those that favor fertilization (which results in the fertilized egg), and therefore it is of advantage to have spores and sex organs produced by different individuals. Since this conflict is most obvious in connection with land plants, it is believed that alternation of generations became universal in connection with the land habit.

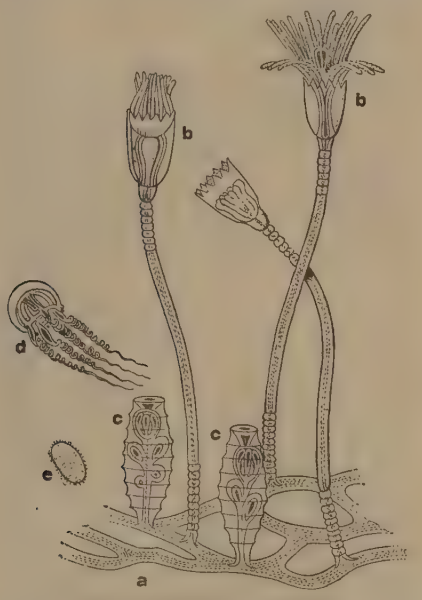
There is a cytological test for alternation that may be mentioned. The nucleus of each kind of plant has a definite number of chromosomes (q.v.). When fertilization occurs, which involves the fusion of two cells, the fertilized egg contains double the number of chromosomes contained by the egg or sperm, usually spoken of as the $2x$, or diploid number. Since the sporophyte arises from the fertilized egg, it is the $2x$, or diploid generation. When the sporophyte produces spores, a reduction in the number of chromosomes occurs, so that each spore contains the x number (haploid). Since the gametophyte is produced by the spore, it is the x or haploid generation. The sporophyte is begun, therefore, by doubling the chromosomes (fertilization), and the gametophyte is begun by reducing the number. It is obvious that a real alternation occurs whenever fertilization occurs. A fertilized egg always contains the $2x$ number, and although in many low plants it does not produce any structure that can be called a sporophyte and does produce directly another gametophyte, still the fertilized egg represents a sporophyte, because it is a $2x$ cell. Consult Coulter, Barnes, and Cowles, *Text-Book of Botany* (New York, 1910). See Apogamy.

Among Animals. In the simplest case of alternation of generations among animals, the successive generations differ only slightly. Thus, in many butterflies having two broods during the year, the spring brood is unlike the fall brood; for example, in our "spring azure" the spring brood is of a violet color, and the fall brood is dark; both are sexual, but the spring and fall forms alternate in the series of generations. This form of alternation of generations is called *seasonal*.

The next example shows a greater difference between alternating generations. In a certain nematode (*Leptodera nigrovenosum*), both males and females are found living in pools of water or in damp earth. These pair, and the fertilized eggs develop into larvæ that enter into the bodies of aquatic animals and develop there as parasites, not as male and female individuals, but as hermaphrodites. These lay self-fertilized eggs,

which develop free as either males or females. Here a diœcious generation (A) alternates with an hermaphroditic generation (B). This kind of alternation of generations is called *heterogony*.

In a third form of alternation of generations eggs are produced, but the fertilization of the egg is omitted from alternate or even several successive generations; these are then followed by diœcious, sexual individuals. To this class belong many cases of parthenogenetically reproducing species; among flat-worms, trematodes; among crustacea, the Cladocera; and among insects, aphids, such as Phylloxera, Chermes, etc. In most of these cases there is a marked difference in form between the individuals of the diœcious and the parthenogenetically reproducing generation. This class of cases is called *heterogenesis*. See HOP-LOUSE.



ALTERNATE GENERATION IN HYDROIDS.

A Campanularian Hydroid: *a*, root-stock (hydrorhiza); *b*, *b*, hydranths; *c*, *c*, gonangia, containing medusa buds; *d*, a free-swimming, gameter-producing medusa; *e*, ciliated larva before settling down.

In the fourth form of alternation the fertilized egg develops into a generation (A) having a characteristic form, and capable of setting free neither eggs nor spermatozoa, but capable of forming buds. These buds develop into a new and different form of individual (generation B), which is diœcious and sets free zygotes, from which generation A is produced. There are numerous examples of this class among animals, e.g., among cœlenterates, the Hydrozoa and some Scyphozoa and Strobila; among flat-worms, certain cestodes (Echinococcus); among annelids, certain Syllidæ and aquatic Oligochæta; among tunicates, the Salpæ and Doliolidæ. This class of alternation of generations has been called *metagenesis*. As an example of it, one of the Hydrozoa may be taken. The free-swimming jellyfishes are diœcious and produce the male and female gametes, which unite in the water. The larvæ which result from the development of the eggs settle down, become attached, and develop into a hydroid, which produces a colony by budding. Certain buds are set free as jellyfishes, and these in turn set free the gametes. Thus the hydroid form (A) and the jelly form (B) alternate with each other.

In certain respects the gamete-producing generation of spermatophytes among plants (see above) resembles the maturation period preceding the formation of gametes in the higher animals; and it has been suggested that even in vertebrates, including man, we have an alternation of generations: (1) the non-sexual generation beginning with fertilization and ending with the primary oöcyte or primary spermatocyte; (2) the sexual generation beginning with the primary germ-cell and ending with the ripe germ-cell (two-cell division).

Bibliography. J. J. S. Steenstrup, *On the Alternation of Generations*, translated by Busk (London, 1845); J. V. Carus, *Zur nähern Kenntniss des Generationswechsels* (Leipzig, 1849); R. Leuckart, *Ueber den Polymorphismus der Individuen, etc.; ein Beitrag zur Lehre vom Generationswechsel* (Giessen, 1851).

AL'TERNA'TOR. See DYNAMO-ELECTRIC MACHINERY.

ALTGELD, ält'gĕld, JOHN PETER (1847–1902). An American politician. He was born in Germany and was brought to the United States when an infant. His parents settled near Mansfield, Ohio. He entered the Union army at the age of 16 and served until the close of the war. He at first taught school, then studied law, and was admitted to the bar in 1869, his election as State Attorney of Andrew County, Mo., following in 1874. He was judge of the superior court of Chicago from 1886 to 1891, and Governor of Illinois from 1893 to 1897, in which capacity his pardon of the anarchists Fielden, Neebe, and Schwab excited wide comment. As a prominent advocate of free silver, he was an active supporter of William J. Bryan during the presidential campaigns of 1896 and 1900. He did much to advance the cause of prison reform and was a vigorous and effective public speaker. In 1890 his writings, *Our Penal Machinery and its Victims* and *Live Questions*, were published together.

ALTHÆ'A (Gk. *ἀλθαία, althaia*, wild or marsh mallow). A genus of plants of the family Malvaceæ, differing from the true mallow (*Malva*) chiefly in its six to nine bractlets (involucel) beneath the flower. The species (about 15), natives of Europe and Asia, and naturalized in North America, are annual and perennial shrubby plants that are much grown for their showy flowers. The more common species are the marsh-mallow (*Althæa officinalis*) and the hollyhock (*Althæa rosea*). The name *Althæa* is applied also by gardeners to the Rose of Sharon (*Hibiscus syriacus*). See HOLLYHOCK; MARSH-MALLOW; HIBISCUS.

ALTHÆA, or **ALTHEA** (Gk. *Ἀλθαία, Althaia*). In Greek story, the mother of Meleager (q.v.). The Fates had told her that her son's life would last as long as a log of wood burning upon the hearth at his birth should be unconsumed. She quenched the fire and long preserved the log, but finally in anger at him set it on fire and so ended his life. She was the daughter of Thestius, wife of Œneus, King of Calydon, and mother also of Tydeus and Deïanira.

ALTHE'A. In Richard Lovelace's *To Althea*

from Prison, and Other Lyrics, a poetical name applied to his love Lucasta, who is understood to have been Lucy Sacheverell.

ALT'HORN. See SAXHORN.

AL'THORP, LORD. See SPENCER, JOHN CHARLES.

ALTHU'SIUS, JOHANNES (1557–1638). Professor of law and ethics at Herborn. He published the first treatise on politics written in Germany. He made the basis of social life an express or implied contract between associated men, thus anticipating Rousseau's famous social contract theory. He defended resistance to usurpation of the rights of the people, from whom all rights proceed. He put combinations of workmen in the category of monopolies to be regulated. His chief works are: *Politica Methodice Digesta* (Herborn, 1603); *Jurisprudentiæ Romanæ Libri* (Herborn, 1588); *Dicæologicæ Libri Tres Totum et Universum Jus, quo Utimur, Methodice Complectantes* (Herborn, 1617). Consult Otto Gierke, *Johannes Althusius* (Breslau, 1880).

ALTIM'ETRY (Lat. *altus*, high + Gk. *μέτρον, metron*, measure). The art of ascertaining altitudes geometrically or measuring vertical angles by means of a quadrant, sextant, or theodolite. When used for this purpose, the instrument is known as an altimeter.

ALTIN, ål-tĭn', ALTYN-NOR (Tatar *altun*, golden + *nor*, lake), or TELETS LAKE. A freshwater lake in the government of Tomsk, Siberia (Map: Asia, H 3). It is in the Altai Mountains, 1600 feet above sea level, is about 75 miles long, has an average breadth of about 20 miles, and is about 184 square miles in area. This lake is remarkable because in winter the northern part is frozen so as to bear sledges, while the southern part has never been known to freeze.

AL'TITUDE (Lat. *altitudo*, height, from *altus*, high, lofty). In astronomy, the elevation of a heavenly body above the horizon. It is measured not as a linear distance, but by the angle which a line drawn from the eye to the heavenly body makes with the horizontal line, or by the arc of a vertical circle intercepted between the body and the horizon. Altitudes are measured by means of a telescope attached to a graduated circle. (See CIRCLE.) The telescope being directed toward the body to be observed, the angle which it makes with the horizon is measured on the graduated circle. The altitude thus observed is the apparent altitude. To obtain the true altitude, corrections for refraction and the dip of the visible horizon below the true horizon must be applied to the apparent altitude. (See HORIZON.) In the case of the sun, moon, planets, a further correction for parallax must be made to obtain the true altitude, which is, in this case, sometimes called the geocentric altitude. The correct determination of altitudes is of vital importance in navigation. The sextant is the only astronomical instrument of precision that can be used without a fixed support on the deck of a rolling ship, and it is essentially an instrument for measuring altitudes. See SEXTANT; ALTAZIMUTH; LATITUDE.

ALTMAN, BENJAMIN (1840–1913). An American merchant, art-collector, and philanthropist, born and educated in New York City. Starting out first in his father's dry-goods store, and later in a small way for himself, he gradually built up a business, one of the most important of its kind in the world. As a philanthropist Mr. Altman did not become widely known, not because he did not give generously and wisely, but because he always gave without ostentation. But as a collector of great art treasures, chosen with the most fastidious taste, he came to have an international reputation, second only to that of J. Pierpont Morgan. This magnificent collection was found, after Mr. Altman's death, to have been willed, for the public benefit, to the Metropolitan Museum of Art (q.v.), the greatest single gift such an institution has ever received. The estimated value, more than $15,000,000, is a mere guess; literally, the collection is priceless.

ALTMÜHL, älť'mül (Ger. old mill). A river of Bavaria which rises at its western border, flows northeast through the Swabian Jura, and empties into the Danube between the towns of Ingolstadt and Ratisbon, and near Kelheim (Map: Bavaria, D 4). It is 100 miles long, and connected with the Regnitz, an affluent of the Main, by the Ludwigs-Kanal, thus establishing communication with the Rhine.

AL'TO. The deepest of the two principal species of voice found in women and boys. Its average range is from *g* to c^3. Originally the *cantus firmus* was given to the tenor (q.v.), against which a higher part, the *discantus*, was set contrapuntally. With the development of harmony a third part, the *contratenor*, was added, which sometimes was above, sometimes below, the tenor. Naturally the extended range demanded by the parts written for contratenor exceeded the natural compass of natural voices, and it was divided into two separate parts, the *contratenor altus* and *contratenor bassus*, whence the abbreviations *alto* and *basso*. In the sixteenth century the contratenor altus was sung by men with falsetto voices, as women were not permitted to sing in the church. In England this was also the general practice in the rendering of glees, and is not quite extinct to-day. Such male altos are called *alti naturali*. In Germany a distinction is made between *alto* and *contralto*, the latter denoting an exceptional range as low as *e* or even *d*. In English the two terms are used interchangeably. But in recent years a well-marked distinction has sprung up, employing the term "alto" for the vocal parts of a composition, whereas the term "contralto" designates the artist. In combination with another word, such as alto-trombone, alto-oboe, etc., it denotes an instrument of such a family with a lower range. For Alto Clef see MUSICAL NOTATION; CLEFS.

ALTON, ăl'ton. A city and railroad centre of Madison Co., Ill. It is picturesquely situated on limestone bluffs, 200 feet above the Mississippi River, which is spanned here by the great bridge of the Chicago, Burlington, and Quincy Railroad, 25 miles above St. Louis (Map: Illinois, B 5). Alton is on the Chicago and Alton, the New York Central, the Chicago, Peoria, and St. Louis, the Chicago, Burlington, and Quincy, the Wabash, the Missouri, Kansas, and Texas, and the Illinois Terminal railroads. Alton has a public library and a park, called Rock Spring Park. It is the seat of the State hospital for the insane, Shurtleff College (Baptist), organized 1827, the Monticello Female Seminary, the Western Military Academy, and the Ursuline Convent and Novitiate. The city is a commercial centre, manufacturing bottles, straw board, corrugated paper, cartridges,

powder, flour, tools, etc. Alton was settled in 1783, incorporated in 1835, and is governed by a charter granted under a general law of 1876. The mayor is elected for two years; the city council is made up of 14 members; and town meetings are held annually. Upper Alton (Pop., 1910, 2918) was annexed in 1911. The mayor appoints the school board and the heads of the police and fire departments, with the approval of the council. On Nov. 7, 1837, occurred here the famous anti-abolitionist riot, in which Elijah P. Lovejoy was killed and his printing office demolished. A monument has been erected to his memory. Other notable features are the Hayner Memorial Library and the city hall, scene of a Lincoln-Douglas debate. Pop., 1890, 10,294; 1900, 14,210; 1910, 17,528; 1920, 24,682.

ALTON (ăl'*ton*) **LOCKE, TAILOR AND POET.** A novel by Charles Kingsley, published 1850.

ALTON, ăl'tŏn, Johann Samuel Eduard d' (1803–54). A German anatomist, son of the anatomist and archæologist Joseph Wilhelm Eduard d'Alton. He studied medicine at Bonn and became professor of anatomy at the Academy of Arts in Berlin in 1827. In 1834 he was made professor of anatomy and physiology at Halle. His writings include *Handbuch der menschlichen Anatomie* (1848–50), *De Monstris Quibus Extremitates Superfluæ Suspensæ Sunt* (1853), and *De Monstrorum Duplicium Origine* (1849).

ALTONA, ăl'tô-nâ. The largest and richest city in the Prussian province of Schleswig-Holstein, situated on the right bank of the Elbe, its eastern boundary adjoining the Hamburg suburb of St. Pauli (Map: Prussia, C 2). From a commercial point of view, Altona forms one city with Hamburg. In 1888 it entered the German Customs Union. On account of its advantageous situation on the Elbe and railway connection with other German cities, its trade is of considerable importance and extends to England, France, the Mediterranean Sea, and the West Indies. There are many important industrial works in Altona; among others, cotton and woolen mills, iron foundries, glass works, breweries and distilleries, and establishments for the manufacture of chocolate, cigars, cotton, soap, leather ware, etc. Local transportation is afforded by numerous street-car lines, which also connect Altona with Hamburg. These are all in the hands of private corporations. The rise of Altona to its present importance has been recent and rapid for a Continental town. In 1880 its population was 91,049; in 1890 the suburbs of Bahrenfeld, Othmarschen, Ottensen, and Övelgönne were incorporated with Altona, and the total population was 143,249; in 1900, 161,507; in 1910, 172,533.

The streets of Altona are broad and for the most part regular, and well lighted by electricity. The city has only about 50 acres laid out in parks. This, however, does not include the suburbs. Among the notable buildings may be mentioned the Rathaus, the palace of justice, the custom house, and the city theatre. Among the objects of greatest interest in the city is the old cemetery of the Portuguese Jews.

The city's affairs are administered by a municipal council composed of 35 members, and an executive board composed of 9 members. (See Prussia, *Government.*) The street-cleaning of Altona is a model of thoroughness.

The city owns its water works, containing a filtering plant by means of which the water of the Elbe is purified for drinking purposes. The plant yields an annual profit of about $90,000. Its system of sewers is practically similar to that of Hamburg. It has not as yet adopted the system of sewage farms, which has proved so successful in some of the German cities. The annual expense of drainage and sewerage is about $12,000.

Altona has an organized fire department, which forms one of the chief items of expense in the city's budget, amounting annually to about $44,000. Altona owns and operates its own gas works at a net profit of about $75,000 annually. Its electric light plant is owned and operated by a private company, which pays the city 10 per cent of its receipts.

Among the charitable and benevolent institutions are a public poorhouse, an infirmary, insane asylum, a house of refuge for boys, one general hospital, two hospitals for children, and a lying-in hospital. Its educational institutions include a gymnasium, three high schools, several technical schools, 27 grammar schools, a school of navigation, and a museum.

Altona was settled in 1536, and rapidly developed into a prosperous commercial town. In 1640 it came under the rule of Denmark. Its trade suffered during the Napoleonic wars, but revived with peace. In 1866 it was annexed to Prussia. Consult Worrl, *Illustrierter durch Hamburg-Altona* (Leipzig, 1902).

ALTO-OBOE. See English Horn.

ALTOONA, ăl-tōō'nâ. A city in Blair Co., Pa., 117 miles east of Pittsburgh, on the Pennsylvania Railroad (Map: Pennsylvania, C 3). It is at the eastern base of the Alleghanies (q.v.), between Alleghany Mountain and Brush Mountain, situated amid picturesque scenery at an elevation of 1180 feet. Altoona is a typical American railroad town, its industries centring principally in the immense shops of the Pennsylvania Railroad, which employ 16,000 operatives and have an extensive production of locomotives, passenger coaches, and freight cars. These are the largest railroad shops in the world. The city has a public library, two hospitals, 52 churches, and Lakemont Park. Of particular interest is the famous Horseshoe Bend on the main line of the Pennsylvania Railroad near the city. There are municipal water works, built in 1860 and acquired by the city in 1872. Altoona spends annually in maintenance and operation about $565,000, the principal items of expense being $280,000 for schools, $35,000 for the fire department, $97,000 for the water works, $50,000 for the police department, and $20,000 for municipal lighting. The city was founded in 1850 by the Pennsylvania Railroad Company, was incorporated as a borough in 1854, and was chartered as a city in 1868. The citizens of Altoona voted to adopt the commission form of government in 1914. The great railroad strike of 1877 caused considerable excitement, and troops were ordered out to protect the company's property. Pop., 1880, 19,710; 1890, 30,337; 1900, 38,973; 1910, 52,127; 1920, 60,331.

ALTOONA, or AL'LATOO'NA, PASS. A pass near Allatoona, Ga., the scene, on Oct. 5, 1864, of one of the most hotly contested of the minor battles of the Civil War. In his operations about Atlanta General Sherman made Allatoona his secondary base, and stored there 1,000,000 rations of bread, which General Hood determined to capture, detailing Gen. S. G.

French for the enterprise. As soon as Sherman was aware of Hood's designs he ordered General Corse (q.v.), stationed at Rome, to move with the utmost speed to the assistance of the small garrison, to hold the place against all odds, until the arrival of reënforcements. Accordingly, with a force of less than 2000, he maintained the defense against some 4000 Confederates from nine in the morning until three in the afternoon, when General French, alarmed by the approach of Federal reënforcements, withdrew. The loss in killed, wounded, and missing was about 700 on each side. An interesting account is given by Ludlow, *The Battle of Allatoona Pass* (Detroit, 1891).

ALTORF, ält'ôrf. See ALTDORF.

ALTO-RILIEVO, äl'tô-rê-lyā'vô. A form of relief sculpture in which the figures project strongly, usually more than one-half their thickness, from the background. See RELIEF SCULPTURE.

ALTÖTTING, ält-ēt'ĭng. A place of pilgrimage not far from the Inn, situated 41 miles southwest of Passau, in one of the most beautiful and fertile plains of Upper Bavaria. Multitudes of Catholics from Germany and Austria visit the ancient chapel containing a black wooden image of the Virgin (the Black Virgin), dating back to the eighth century, and great treasures of jewels, the hearts of Maximilian I and of many princes of the Bavarian family, are said to be interred there. In the Peter and Paul's Chapel lies the body of Count Tilly. Altötting was originally a *villa regia*, where several German emperors held their court. From 1838 to 1873 it was the headquarters of the Redemptorist Fathers, and at present is the site of a Capuchin monastery. Pop., 1910, 5408.

ALTRANSTÄDT, ält'rän-stĕt. A village in Saxony, 15 miles west of Leipzig (Map: Prussia, E 3). It is famous as the place where Augustus II, Elector of Saxony and King of Poland, concluded a treaty with King Charles XII of Sweden in 1706. Pop., 1900, 823.

ALTRI'CES (Lat. nom. pl. of *altrix*, a female nourisher). A term used in ornithology (opposed to *Precoces*) to designate birds whose young are hatched in a helpless condition and require the care of the parent birds. Such birds usually build some sort of nest, where the young remain for some time after hatching. The young are usually naked when hatched. Nearly all land birds (except most game birds), and some water birds, as herons, pelicans, etc., are altricial. See BIRD; NIDIFICATION.

ALTRINCHAM, ąl'trĭng-am. A market town of Cheshire, England, on Bowden Downs, 8 miles by rail southwest of Manchester (Map: England, D 3). It is situated on two railway lines and near the Bridgewater Canal, which has contributed greatly to its prosperity. It is a very neat and clean town, and on account of the salubrity of the air and near-by woods is a favorite residence of many of the merchants of Manchester. It has manufactures of artificial manures, cotton goods, linotype machines, and has an iron foundry; but the chief employment of its inhabitants is the raising of fruit and vegetables for the markets of Manchester. Altrincham was a prosperous town in the time of Edward I, from whom it received many privileges. Pop., 1901, 16,831; 1911, 17,816.

ALTRUISM, ăl'troō-iz'm (It. *altrui*, of, to, or for others, from Lat. *alter*, another). A word first coined in French by Comte (*altruisme*), and introduced by his Positivist followers into English as the antonym of egoism or selfishness. It signifies consideration for others and a due regard for their feelings and interests. Altruism is regarded by Positivists as the crowning virtue, in the exercise of which the perfected individual will find not only his duty but his chief pleasure. The word is now used far beyond the circle of Positivists, sometimes quite loosely in the sense of action resulting in the welfare of others, whatever might be the motive; sometimes more strictly in the sense of conduct motived by the desire for this welfare. It is only in this stricter application that the word has any significance for ethics. One of the most important problems of ethics is that concerning the relations between one's own interests and those of others, in so far as these interests enter as motives into conduct. There are two rival issues to the question. One school maintains that self-sacrifice is the supreme moral principle, the other champions self-assertion. This difference gives occasion to another use of the terms "altruism" and "egoism." The view that altruism is the highest moral motive is itself called altruism, just as the view that acknowledges the primacy of egoism among moral motives is itself called egoism. For the criticism of these two views and for bibliography, see ETHICS; HEDONISM; UTILITARIANISM.

ALTRUISTS, SOCIETY OF. See COMMUNISTIC SOCIETIES.

ALTSCHUL, ält'shōōl, ELIAS (1812–65). An Austrian physician of Jewish extraction. He was born at Prague and studied medicine, graduating at the University of Vienna in 1832. He became professor of medicine at the University of Prague in 1848, and in 1853 founded the first homœopathic magazine in Austria, under the title of *Monatsschrift für Theoretische und Praktische Homöopathie.* He introduced homœopathy at the University. His principal works are: *Dictionnaire de médicine oculaire* (2 vols., 1856); *Lehrbuch der Physiologischen Pharmacodynamik* (1850–52); *Das therapeutische Polaritätsgesetz* (1852).

ALTUS. A city and the county-seat of Jackson Co., Okla., 147 miles southwest of Oklahoma City, on the St. Louis and San Francisco, the Kansas City, Mexico, and Orient, and the Wichita Falls and Northwestern railroads (Map: Oklahoma, B 4). The industries of the city include flour, oil, and alfalfa mills. The county is adapted to truck farming and stock raising. The water works and electric light plant are owned by the municipality. Pop., 1900, 1927; 1910, 4821; 1913 (est.), 5200.

ALTWASSER, ält'väs-er. A town of Silesia, Prussia, 43 miles by rail southwest of Breslau. It has coal-mining industries and manufactures of machinery, porcelain, glass, and mirrors. Pop., 1900, 12,144; 1905, 15,267; 1910, 17,321.

ALT-ZABRZE, ält-zäb'zhe. See ZABRZE.

AL'UM (Lat. *alumen*, of unknown origin). A double salt consisting of a sulphate or selenate of the monovalent element or radicle, and a sulphate or selenate of a sesquioxide, that crystallizes in the isometric system with 24 molecules of water. The principal alums of commerce contain potassium, ammonium, or sodium, and the sesquioxide of aluminum.

Potassium alum is a white, astringent, saline compound, found native as *kalinite*. It is made by calcining carbonaceous shales, the residue

from which is digested with sulphuric acid, yielding aluminum sulphate; to this potassium sulphate is then added, the resulting crystals constituting the alum. Another method consists in dissolving the alumina derived from the minerals cryolite or bauxite in sulphuric acid and treating the solution with potash or ammonia.

Ammonium alum is found native as *tschermigite*, and is artificially made by combining ammonium sulphate with aluminum sulphate as previously described. The low cost of ammonium sulphate, obtained as a by-product in the manufacture of illuminating gas, has led to the substitution of this alum in commerce for potassium alum. The properties of the ammonium and potassium alums are similar, though the ammonium compound is less soluble in water.

Sodium alum is found native as *mendozite* and is made by the combination of sodium sulphate with aluminum sulphate.

Alum is used as mordant in dyeing, to clarify liquors of various kinds and especially water, to precipitate sewage, to harden tallow, fats, and gypsum in the tanning of leather; the ammonium alum is used in the manufacture of baking powders. A potassium chromium sulphate, called *chrome alum*, and an iron aluminum sulphate called *iron alum*, are also used in the arts, especially as a mordant in dyeing and in tanning skins. Consult J. Gardner, *Acetic Acid, Vinegar, Alum, Ammonia, etc.* (Philadelphia, 1885).

ALU'MINA (from *alum*). Aluminum oxide, the most abundant of the earths. It is found native, nearly pure as bauxite and as corundum; with minute quantities of metallic oxides, as ruby, sapphire, Oriental amethyst, Oriental emerald, and Oriental topaz; and with considerable quantities of iron oxide, as emery. It is also found in combination with silica, as in many of the minerals of the feldspar group as well as in certain igneous rocks.

Alumina is known in two forms—a white, soft, pulverulent variety, and a colorless crystalline variety. It may be prepared in a pure state by heating potash alum with a solution of ammonium carbonate; the resulting aluminum hydrate is well washed, dried, and ignited, the residue being pure alumina. A comparatively pure alumina may also be obtained by heating ammonium alum until its volatile constituents are driven off. When alumina is precipitated from a solution containing some coloring matter, such as logwood, it carries down the color with the flocculent precipitate, forming colored insoluble salts called *lakes*. It is this property that has led to its extensive use as a mordant in dyeing. By fusion in the electric arc furnace, the soft, clay-like bauxite is transformed into an exceedingly hard material now much used as an abrasive under the name of *alundum*. Corundum, sapphire, and ruby have been made in Paris from alumina.

ALU'MINITE. A hydrous aluminum sulphate found in compact white masses, in beds of clay.

AL'UMIN'IUM, or ALU'MINUM (from Lat. *alumen*, alum). A metallic element, next to oxygen and silicon the most widely distributed. It is not found native, but in combination, chiefly as an oxide in the mineral corundum (ruby, sapphire, and emery); hydrated oxide in bauxite, hydrargillite and diaspore; hydrated phosphate in wavillite; hydrous sulphate in combination with potash in alunite and in combination with oxygen and metals as aluminates, as in spinel, chrysoberyl, and gahnite. It also occurs as a silicate in various clays. Its chief ore is bauxite of which the United States produced, in 1911, 155,618 tons, valued at $750,649, or $4.82 per ton at the mines. France also produced approximately the same amount. The production from other countries is very small. Two new ores were reported in 1911, which will probably become important factors in the production. Extensive deposits of alunite (hydrous sulphate of alumina and potash) containing 37 per cent Al_2O_3 and 11.4 per cent K_2O are reported to exist in Utah and Colorado, and wavillite (phosphate and hydrate of alumina with water of crystallization), containing 38 per cent Al_2O_3 and 35.2 per cent P_2O_5 has been discovered in Georgia. The elementary nature of aluminium was recognized by Davy and others, but the metal was not isolated until 1828, when Wöhler succeeded in decomposing aluminium chloride by the action of potassium. Deville, in 1854, obtained the metal by electrolysis. Deville's experiments attracted the attention of Napoleon III, under whose patronage a metallurgical plant was established at Javelle, France. Ingots of the metal were exhibited at the World's Fair held in Paris, 1855. In 1886 Hamilton Y. Castner, of New York City, invented an important process for the reduction of aluminium, comprising an improved method of obtaining sodium, by which the price of that reducing agent was lowered from one dollar a pound to one-fourth that amount. He established a plant in Oldbury, England, and began the commercial production of aluminium. Meanwhile, Hall, of Pittsburgh, Pa., and Héroult and Minet abroad, perfected electrolytic methods for the reduction of aluminium. In Hall's process the alumina is held in solution by a molten fluoride bath, which is itself not decomposed by the electric current. The latter is conveyed to the melted solution by means of carbon cylinders placed in the bath for positive electrodes, a carbon-lined pot forming the negative electrode. The oxygen of the alumina goes off at the positive electrode as carbon dioxide, wearing away the carbon at the rate of nearly a pound of carbon to the pound of aluminium produced. The reduced metal settles at the bottom of the pot, which is easily tapped, yielding a metal of 99 per cent purity. The Pittsburgh Reduction Co. erected works for the reduction of aluminium by the Hall process in 1889 near Pittsburgh, and in 1895, taking advantage of the power obtained from the Falls, a large electrolytic plant at Niagara. Extensive litigation between the Electric Smelting and Aluminium Co. (Cowles) and the Pittsburgh Reduction Co. was compromised in 1903. In 1911 the only producer in the United States was the Aluminum Company of America. The Southern Aluminum Company began the erection of a plant in 1912 with a capacity of 5000 tons per year. The production of aluminum in the United States has increased with great rapidity. In 1886, the year of Castner's invention, the production was only 1.5 tons; in 1891, 75 tons; in 1896, 650 tons; in 1901, 3575 tons; in 1906, 7455 tons, and in 1911, 23,062 tons. The price has decreased almost in proportion to the increased production; in 1855 aluminum sold at $90 per pound; in 1870, at $12 per pound; in 1889, at $2 per pound; in 1904, at 33 cents per pound,

and for 1911 the average price was 22 cents. The price during 1910 and 1911 varied from 19 to 24 cents, depending upon the supply and demand. Cheap power is essential to produce aluminum commercially.

Aluminium (sym. Al., at. wt. 27.11) is a white metal with a bluish tinge, is extremely malleable, and has a specific gravity of 2.56, which may be increased to 2.68 by rolling. In its tensile strength it ranks with cast iron, breaking at 15,000 pounds to 20,000 pounds per square inch, but in malleability and ductility it ranks with gold. Like gold and silver, it hardens in working, and rods and wire vary in strength from 26,000 pounds to 62,000 pounds per square inch. The electrical conductivity of aluminium is about 50, with copper at 90, and silver at 100; and its thermal conductivity is 38, with copper at 73.6, and silver at 100. It is also sonorous. Aluminium is a little softer than silver, but its ductility allows it to be drawn, punched, or spun into almost any form. It is practically non-tarnishable, but, strictly speaking, after long exposure to the atmosphere its polish becomes dulled by a very thin film of white oxide. Aluminium is not acted upon by hydrogen disulphide, carbon monoxide, carbon dioxide, or sulphurous acid. It is practically unaffected by common salt, either wet or dry, and hence by sea water. On the other hand, solutions of the caustic alkalies readily attack it, and hydrochloric acid is its natural solvent. Aluminium forms alloys with most of the metals. Those with copper, silver, and tin are much used on account of their color, hardness, and stability, and the ease with which they are worked. (See ALLOYS.) Those with copper are called aluminium bronzes, and those with silver are known as *tiers argent*. The lightness of metallic aluminium, subsequent to the improved processes for its manufacture, suggested its application as a substitute for iron, tin, or copper; but as yet it has failed to supersede any of these metals, on account of its high price and low tensile strength. It is largely used in the form of canteens, cups, and cooking utensils in the United States army; in the textile industry for imparting a brilliancy particularly adapted to ceremonial and theatrical costumes; for paper decorations; and in thin sheets to replace tin foil for wrapping tobacco and candy. For electrical conductors the objection has been its tensile strength, but this has been overcome by placing on the market a conductor composed of seven wires, the centre one of which is of steel with high tensile strength. This wire has been adopted by the Pacific Light and Power Company, and in 1911 a line 275 miles in length was erected from Los Angeles to the power plant; this line is the longest of its size in the world. In the form of alloys it is largely used in the construction of automobiles, balloons, and aëroplanes. In 1911 the British government constructed the framework of its new naval airship of duralium, which contains 91 per cent of aluminum and has a tensile strength of 25½ tons per square inch, about the same as mild steel.

Bibliography. J. W. Richards, *Aluminium: Its History, Occurrence, Properties, Metallurgy, and Applications, including its Alloys* (Baird & Co., Philadelphia, 1896); J. W. Langley and C. M. Hall, "The Properties of Aluminum, with some Information Relating to the Metal," *Transactions of the American Institute of Mining Engineers* (New York, 1890); Minet, *The Production of Aluminum, and Its Industrial Use*. Translated, with additions, by L. Waldo (New York, 1905); "Mineral Resources of the United States for 1911," *United States Geological Survey*, p. 938. See BAUXITE; CRYOLITE.

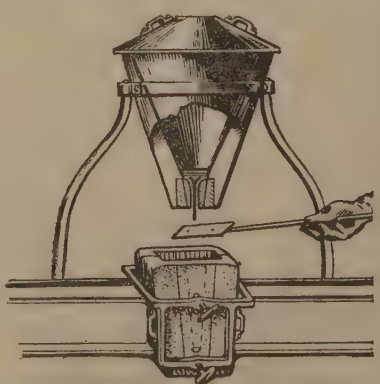
ALUMINO-THERMICS. A term applied to that branch of metallurgy in which the heat, developed by burning metallic aluminum, is utilized (1) to reduce other metals from their oxides, chlorides, or sulphides; (2) to raise the temperature of juxtaposed metals so that welding by pressure may be accomplished; or (3) to obtain molten iron for use in repairing broken iron and steel frames and shafts.

The principle of the reduction of metallic compounds by aluminum has long been known. Friedrich Wöhler, the discoverer of aluminum, tried in 1857 to produce metallic chromium from chromium chloride by means of metallic aluminum, and succeeded in making a chromium-aluminum alloy. The great difficulty in utilizing the reducing power of aluminum for practical purposes has been the fact that the reaction takes place only at very high temperatures and with explosive violence. Dr. Hans Goldschmidt of Essen, Germany, has succeeded in overcoming the practical difficulties and has evolved the "Goldschmidt process," which has found wide practical application in several departments of mechanical engineering.

The chemical reaction involved in this process is strongly exothermic, so that it is only necessary to start it at one point of the mixture, the heat thus liberated being sufficient to raise the adjacent parts to the temperature of reaction, and so on until the entire mixture has been acted upon. In order to start the reaction, a special ignition powder is used. The chemistry of the reaction is very simple and is shown by the following formula:

$$Al + M_2O_3 = M_2 + Al_2O_3,$$

where M represents the metal to be reduced. In practice the metallic oxide, mixed with the proper proportion of powdered aluminum, is



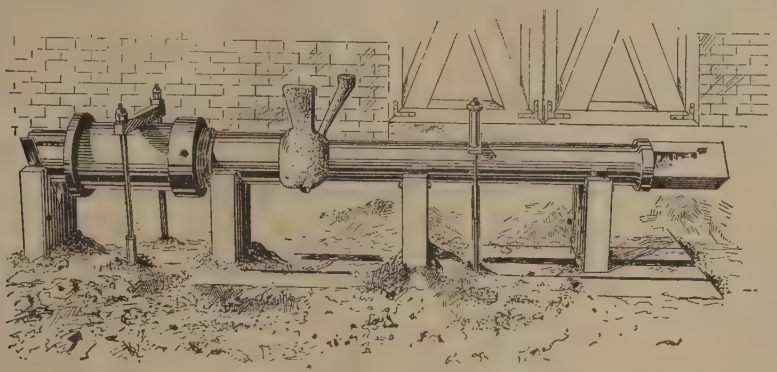
GOLDSCHMIDT PROCESS FOR RAIL-WELDING SHOWING CRUCIBLE AND MOLD.

placed in a base-lined vessel, and a small quantity of barium peroxide and powdered aluminum is laid on the top of the mixture. The reaction is started either by igniting this ignition powder

with a match or by touching a red-hot iron rod to it. In a few seconds the entire mass becomes white-hot and molten; the reduced metal collects at the bottom, and the molten aluminum oxide (artificial corundum) floats on top. The temperature of the molten mass has been estimated to be 3000° C. (over 5400° F.).

The Goldschmidt process is used to manufacture pure metallic chromium *absolutely free from carbon.* Made in the electric furnace or by reduction with carbon, chromium contains impurities and up to 12 per cent of carbon, which renders it useless for the manufacture of chrome steel. Manganese, also produced extremely pure by this process (up to 99 per cent of manganese), is used in the manufacture of special steels containing as much as 12 per cent of manganese, and as these steels are finding increased application the matter is one of some importance. The chief use of this carbon-free metal, however, is in making special brasses, bronzes, and other important alloys.

Probably the widest application of the Goldschmidt process is that of a mixture of iron oxide and aluminum, called "thermit," for repairing iron and steel objects by welding. As applied to welding iron pipes, rods, or similar objects, the ends, clamped against each other, are inclosed in a cast-iron mold. The thermit is then ignited in a flat-bottom crucible and the contents poured into the mold. The slag, going in first, coats the interior of the mold and the outside of the pipes or rods with a protective coating which prevents the steel, flowing in afterward, from melting or sticking to either. The heat of the molten mass rapidly raises the temperature of the iron objects to the welding point, and set-screws force them together to form a butt-weld. As applied to repairing broken castings, the pieces are welded together by white-hot molten iron. The thermit is placed in a special crucible and the molten product poured directly on the iron pieces. The intense heat melts the surfaces of the solid pieces and causes them to become firmly cemented together by the solidifying molten metal. This result, called a fusion weld, is largely used for welding electric-traction girder-rails, where a continuous joint is desired for conductivity in order to diminish resistance. It is also used to repair broken gear-wheels, propeller and crank shafts, steamship stern-posts, connecting rods, locomotive frames, wheels, etc. The enormous advantage in repairing the objects in place is obvious, particularly in the case of steamships, where important repairs can be made without removing the parts. This is strikingly illustrated in repairing the stern-post, propeller blades, shafts, and other parts of a vessel directly accessible when the latter is in dry dock.



REPAIRING A SHAFT BY USE OF THERMIT.

JOINING RAIL ENDS BY THE USE OF "THERMIT."

ALUMINUM BRONZE. See ALLOY, *Bronze.*

AL'UM ROOT. A name given in the United States to two plants, very different from each other, but agreeing in the remarkable astringency of their roots. One of these, *Geranium maculatum* (see GERANIUM), very much resembles some of the species of *Geranium* which are common weeds in Great Britain. The root contains 12.27 per cent tannin, gallic acid, pectin, and red coloring matter. The tincture of the root is of use in sore throat and ulcerations of the mouth and is also administered in various diseases. The property of astringency belongs, in an inferior degree, to some other species of *Geranium* and of the kindred genera *Erodium* and *Pelargonium.* The other American plant to which the name alum root is given is *Heuchèra americana,* of the family Saxifragaceæ (see SAXIFRAGE), an order in which also astringency is a prevalent property. The root of *Heuchera* is a powerful styptic and is used to make a wash for wounds and obstinate ulcers.

ALUM SHALE. A variety of shale or shaly sandstone containing iron pyrites, which on

weathering yields alum. In the process of weathering the pyrite decomposes, and the products of decomposition, reacting on the alumina of the shale, yield limonite and alum. The same process can be hastened by roasting the rock. Alum shales are found in many formations. For commercial purposes the shale is crushed and spread out for exposure to the weather or is roasted; but the industry is rapidly dying out, and is not carried on in the United States. An alum shale from England has the composition: silica, 51.16; iron sulphide, 8.50; iron protoxide, 6.11; alumina, 18.30; lime, 2.15; magnesia, .90; sulphuric acid, 2.5; carbon, 8.29; water, 2.00; total, 99.91.

ALUN'DUM. See ALUMINA.

AL'UNITE. A hydrated aluminum and potassium sulphate that crystallizes in the hexagonal system. In color it is usually white, although gray and reddish varieties are sometimes found. It occurs in seams in trachtic and allied rocks, where it has been formed as the result of the action of sulphurous vapors on the rock. This mineral, which is used as a source of alum, is found at Tolfa and Montioni in Italy, in Hungary, and elsewhere in Europe; also at various localities in the United States, especially in Custer Co., Colo.

ALUNNO, NICCOLÒ. See NICCOLÒ DA FOLIGNO.

AL'URED. See ALFRED OF BEVERLEY.

ALUTA, ŏ'lụ-tŏ, or ALT, or OLT. An affluent of the Danube rising in the Carpathians, in Transylvania. After entering Rumania through the so-called Red Tower Pass of the Transylvanian Alps, it joins the Danube near Nicopolis (Map: Turkey in Europe, E 2). It is about 340 miles long and is unfit for navigation on account of the rapidity of its current.

ALVA. A city and the county-seat of Woods Co., Okla., 150 miles northwest of Oklahoma City, the State capital, situated at the north fork of the Canadian River, on the Atchison, Topeka, and Santa Fe, and the Chicago, Rock Island, and Pacific railroads (Map: Oklahoma, C 2). Alva is in an agricultural region, producing corn, alfalfa, wheat, oats, etc. The leading industries are flour milling, dairying, and the manufacture of brooms. Alva is the seat of the Northwestern State Normal School and has two fine school buildings, a hospital, a library, a city hall, a court house, and an opera house. It owns its water works. Pop., 1890, 1499; 1900, 2800; 1910, 3688.

ALVA, äl'vȧ, or **ALBA,** FERNANDO ALVAREZ DE TOLEDO, DUKE OF (1508–82 or 83). A Spanish general and statesman. His family was one of the most distinguished in Spain. He was trained by his grandfather for war and politics, entered upon a life of brilliant and intense activity, and became Prime Minister, and General of the armies of Spain under Charles V and Philip II. As a young man he fought in the campaigns of Charles V against Francis I, but his military talent was not thought highly of, and this hurt his pride. His appointment to high command was attributed to favor and influence rather than ability. He was in the campaign against the Elector John Frederick of Saxony, over whom he gained a brilliant victory at Mühlberg in 1547, and fought against Henry II of France and in the Italian campaign of 1555 against the combined French and papal forces, when he overran the States of the Church, but was instructed by Philip II, after the abdication of Charles V, to give up his conquests. He acted as proxy for Philip at the French court when the Spanish King espoused Elizabeth, daughter of Henry II of France, after the peace of Cateau-Cambrésis in 1559. Alva is best known for his work in the Netherlands, where he was sent in 1567, with unlimited authority to repress the Dutch revolt against Spanish tyranny and the Inquisition. He promptly established the tribunal which has been known as the "Bloody Council." This body, without legal status or procedure, entered upon a general proscription of the living and the dead and the confiscation of property. Excessive taxation brought commerce almost to a standstill, and more than 120,000 Protestants emigrated. Counts Egmont and Hoorne were executed. Prince Louis of Orange was defeated, and Prince William was driven into Germany, after which Alva made a triumphal entry into Brussels, Dec. 22, 1568. He was especially honored by the Pope, and set up in Antwerp a statue of himself trampling on two figures, representing the nobles and people of the Netherlands. His bloodthirsty tyranny intensified the resistance of the Dutch, and after the destruction of his fleet the King recalled him at his own request (1573). He claimed to have caused the execution of 18,000 men. He was received in Madrid with the highest honors, but for an act of disobedience was banished from the court until called upon to conduct a campaign (1580) against Dom Antonio, of Portugal. The country was conquered and treated with that cruelty and license which always followed Alva's course. Alva was tall, spare, bronzed, with a long beard, a typical Spanish grandee. He was not, however, the bloodthirsty tyrant that Motley describes, and in one instance at least in the execution of Hoorne and Egmont, Alva long delayed action, writing to the King of Spain as he finally signed their death warrant that "it hurt him in his soul." Consult: J. L. Motley, *Rise of the Dutch Republic* (New York, 1836); P. J. Block, *History of the People of the Netherlands* (New York, 1900); Rustant, *Historia de Don Fernando Alvarez de Toledo, duque de Alva* (Madrid, 1751).

ALVARADO, äl'vȧ-rä'dŏ. A seaport in the State of Vera Cruz, Mexico, at the mouth of the Papaloapam River, 40 miles southeast of Vera Cruz (Map: Mexico, L 8). The harbor is well sheltered, but is too shallow for vessels of more than 13 feet draught. Nevertheless the town is a native trading post and a headquarters for steamers engaged in the coasting trade. The climate is very unhealthful because of the surrounding swamps. Its exports are rice and cacao. The inhabitants are engaged in fishing, principally, and the surrounding waters yield turtles, oysters, and crabs. Pop., 1910, 4347.

ALVARADO, ALONZO or ALFONSO DE (?–1554). A Spanish soldier of the sixteenth century. He was born at Burgos, served under Cortes in the conquest of Mexico, and under Pizarro in that of Peru. Sent to Chile in 1537 against the rebel Almagro, he was defeated at the Abancay River by Orgoñez. In 1548, under Gasca, he assisted in suppressing the revolt of Gonzalo Pizarro. He was appointed Captain-General of La Plata and Protosí, but was vanquished by the malcontent Giron in 1554 and died not long after.

ALVARADO, PEDRO DE (c.1486–1541). A Spanish adventurer, a companion of Cortes, and afterward conqueror of Guatemala. He was born

at Badajoz, in Spanish Estremadura. In 1510 he sailed for the New World, passing some time in the islands of Santo Domingo and Cuba. In 1518 he was dispatched from Cuba, by Velasquez, the Governor of that island, to explore, under the command of Grijalva, the shores of the American continent, when for the first time the Spaniards heard of the riches of Montezuma and of his vast empire. In February, 1519, Alvarado sailed with Cortes from Havana for the conquest of Mexico, in which Alvarado played a part second only to Cortes. His blue eyes and blond beard strengthened the impression among the dusky Aztecs that the invaders were "children of the sun," descendants of Quetzlcoatl, who were looked for to resume the dominion of the ancient royal house in Mexico. While he held the city of Mexico, during the absence of his chief, he massacred in the midst of a fête a great number of Aztec nobles. In the night retreat of July 1, 1520, the *noche triste*, Alvarado commanded the rear-guard and saved his life by a famous leap, the "salto de Alvarado," which he accomplished with the aid of his long spear across a wide breach in the causeway along which the retreating Spaniards were being driven. After the conquest of Mexico he was sent, in 1523, to subdue the tribes on the coast of the Pacific in the direction of Guatemala. He was completely successful and returned in 1527 to Spain, where the Emperor Charles V appointed him Governor of Guatemala. Pizarro and Almagro were then prosecuting a brilliant career of conquest in South America. Alvarado did not intend to intrude on their territories, but, as he considered the province of Quito to be without the limits of these, he landed with a force of five hundred soldiers at Bahía de los Caraques, whence he penetrated into the heart of the country, crossing the Andes by a bold and hazardous march. In the plain of Rio Bamba he was met by some of the troops of Pizarro, headed by Almargo, and agreed to retire on receiving an indemnity. Subsequently he received the government of Honduras in addition to Guatemala. He perished in an affray with the Indians near Guadalajara in western Mexico in 1541, crushed under his fallen horse. His greed for wealth led him to commit incredible acts of cruelty, that in the eyes of historians have overshadowed his military valor and talent.

ALVAREZ, ål'vä'râ', Albert Raymond (1861—). A French vocalist. He was born at Bordeaux. He was first in the army as a musical conductor; afterward he studied at the Conservatoire, Paris, and appeared as an operatic tenor. He first sang at the Paris Opéra in 1892 and soon became the leading tenor of the Opéra. In 1893 he appeared in Covent Garden, London. He visited the United States in 1898–99 and 1900. The unanimous approval which he met in Europe was not wholly confirmed in this country. His répertoire includes no less than 45 operas, in 11 of which he created the principal parts.

ALVAREZ, ål-vä'râth, Don José (1768–1827). A Spanish sculptor, known also as Alvarez y Cubero. Born at Priego, he studied at the Academy of San Fernando, Madrid, at Paris, and under Canova at Rome. Refusing to recognize Joseph Bonaparte as King of Spain, he was imprisoned in Castle Sant' Angelo, Rome, but was released and employed by Napoleon in the decoration of the Quirinal Palace. Under Ferdinand VI he returned to Spain, was made sculptor to the King in 1816, and director of the Academy of San Fernando in 1826. He was the chief Spanish representative of the so-called Classicist school of sculpture, the principal masters of which were Thorwaldsen and Canova. His works include statues of members of the royal family of Spain, a number of tombs of Spanish grandees, and several mythological figures and groups. The most celebrated of his works is a group in the Royal Museum of Madrid representing a scene from the siege of Saragossa.

ALVAREZ, Juan (1790–1867). A Mexican general of Indian descent. He was born in Atoyac in the Mexican territory of Guerrero. He joined the revolutionary army in the war for Mexican independence. As a cavalry captain he distinguished himself in the battle of Tres Palos and in an assault on the fort of Acapulco, where he was wounded. He joined Santa Anna in the overthrow of the imperial government of Iturbide. He fought in the Mexican War with the United States in 1847, and he became the first Governor of the new State of Guerrero in 1849. Later he was one of the principal leaders in the successful revolt against the rule of Santa Anna. In September, 1855, he succeeded Carrera as President, but he became disgusted with the petty intrigues of his associates and resigned before the end of the year. Alvarez took up the fight for reform in the Three Years' War against the conservative reaction. He was one of the most determined opponents of Maximilian during the Second Empire in Mexico. Although many times a revolutionist, he had no selfish ambitions. His real interests were indicated by the various literary and scientific societies of which he was a member.

ALVARY, ål-vä'rê, Max (1858–98). The stage name of a famous German dramatic tenor. He was born at Düsseldorf; his father was an eminent landscape painter, Andreas Achenbach. He studied singing with Lamperti and Julius Stockhausen of Frankfort, but owing to his father's opposition to his going on the stage, did not make his début until 1882, at Weimar, in *Stradella*. He came to this country in 1884, and made his first appearance as José in *Carmen* at the Metropolitan Opera House, New York. During his five years' engagement here he developed, partly under Seidl's guidance, into one of the greatest interpreters of Wagnerian rôles. His impersonation of *Siegfried* is still regarded as peerless. Alvary returned to America for the season of 1894–95 and again in 1896. March 21, 1895, at the Metropolitan Opera House, he sang Siegfried for the one hundredth time. In November, 1896, he was afflicted with cancer of the stomach, resulting, it is supposed, from bruises received by a fall through an open trap on the Mannheim stage. He went to his beautiful country-seat, Datenberg, the building of which, and his enforced absence from the stage, had impoverished him. Here he died, Nov. 8, 1898.

ALVENSLEBEN, ål'vĕns-lä'ben, Konstantin von (1809–92). A Prussian General, born in Prussian Saxony. He was trained in the cadet corps, served through the Danish War and the war with Austria, and commanded the third army corps in the Franco-German War. He retired in 1873. A Prussian infantry regiment was named for him, as was also one of the forts at Metz.

AL'VERSTONE, LORD. See Webster, Sir Richard.

ALVINCZY, ŏl′vĭn-tsē, JOSEPH, BARON VON (1735–1810). An Austrian field-marshal. He fought in the Seven Years' War at Torgau and Teplitz, and in 1789 he led the force which unsuccessfully attempted to capture Belgrade by storm. Between 1790 and 1793 he fought bravely in the Netherlands, and in 1796 was placed at the head of the Austrian forces in Italy. Here he was badly defeated by Napoleon, at Arcola and Rivoli. He became field-marshal in 1808.

AL′VIS (All-wise). In Norse mythology, the dwarf, a suitor for the hand of Thor's daughter, who answers Thor's questions in the lay (song) of Alvis.

AL′VORD, BENJAMIN (1813–84). An American soldier and writer. He was born at Rutland, Vt., and graduated at West Point in 1833. After serving in the second Seminole War (1835–37), and as mathematical instructor at West Point, he participated in the war with Mexico, and attained the brevet rank of major. During the march from Vera Cruz to Mexico he was chief of staff to Major Lally's column. He was paymaster of the department of Oregon from 1854 to 1862, and brigadier-general of volunteers from 1862 until his resignation of this grade in 1865. He was then brevetted brigadier-general in the regular army. He was paymaster at New York City till 1867, then in the district of Omaha, Neb., till 1872, and paymaster-general from 1872 until his retirement in 1881. Among his publications are *Tangencies of Circles and of Spheres* (1855) and *The Interpretation of Imaginary Roots in Questions of Maxima and Minima* (1860).

ALVORD, CLARENCE WALWORTH (1868—). An American scholar and educator, born in Greenfield, Mass. He graduated from Williams College in 1891, took post-graduate studies at the universities of Berlin, Chicago, and Illinois, and received the degree of Ph.D. from the last-named in 1908. After 10 years as a teacher in preparatory schools, he became (1901) instructor in history at the University of Illinois, assistant professor (1907), and associate professor (1909). In 1906 he was made special editor for the publications of the Illinois State Historical Society. An officer and member of many State and national historical societies, he contributed numerous articles to periodicals, and edited the *Cahokia Records* (1906); *Invitation sérieuse aux habitants des Illinois* (with Dr. C. E. Carter, 1908); *Governors' Letter Books* (with Dr. E. B. Greene, 1909); *Kaskaskia Records* (1909). In 1912, with Lee Bidgood, he wrote *First Explorations of the Trans-Alleghany Region by the Virginians.*

ALVORD, CORYDON A. (1812–74). An American printer. He was born at Winchester, Conn., and in 1845 removed to New York, where he became widely known as a printer of illustrated books. His establishment on Vandewater Street was one of the largest in the country. It contained fonts of old-style type and of ancient and Oriental letters which enabled him to make remarkable fac-similes of old texts. He was at one time president of the New York Typothetæ. After retiring from business in 1871 he removed to Hartford, where he prepared a history of Hartford and Winchester.

ALVORD, HENRY ELIJAH (1844–1904). An American soldier and authority on dairy matters, widely known as a writer and public speaker, and for many years prominently identified with agricultural education and experimentation. Enlisting in the Union army in 1862, he became a Major three years later. In the regular army he was a cavalry Captain (1866–72) and Chief Engineer on General Sheridan's staff (1868–69). Major Alvord was the first army officer to be detailed to an agricultural college as military instructor. Subsequently he became manager of the Houghton Farm Experiment Station, professor of agriculture in the Massachusetts and New Hampshire colleges, president of the Maryland College, and the first director of the Maryland Experiment Station. In connection with the "School of Farming" of the Chautauqua reading courses, he conducted what was probably the first correspondence course in agriculture in America. He was one of the founders of the Association of American Agricultural Colleges and Experiment Stations, serving as president in 1894–95, and was prominently identified with Federal legislation pertaining to agriculture. He was instrumental in organizing the first creamery east of the Hudson River, as well as many others in Massachusetts, Vermont, and Maine. He organized the Dairy Division of the United States Department of Agriculture in 1895 and remained its chief to his death. The American chapters of *Dairy Farming* (1881), as well as many agricultural monographs, were written by him.

ALWAR, ŭl′wŭr′. A feudatory state of Rajputana, British India (Map: India, C 3). Its area is 3221 square miles. Pop., 1911, 791,688.

ALWAR. Capital of the native Rajputana state of the same name, India, on the Northwestern Railway, 98 miles by rail from Delhi (Map: India, C 3). It is the residence of the Maharaja and of a British political agent. The town, dominated by an imposing fort 1200 feet above it, is picturesquely situated on undulating ground. Its chief building is the royal palace. Other noteworthy features are temples and tombs, and churches of the Roman Catholic and Presbyterian missions. At the time of the Diamond Jubilee of Queen Victoria, and to commemorate the event, there was founded here a school for young noblemen. The town has a fine water supply from the artificial Siliser Lake, 9 miles southwest of the city. Pop., 1901, 56,771; 1911, 41,305.

AL′WATO. See ANDREWS, STEPHEN PEARL.

AL′WOOD, WILLIAM BRADFORD (1859—). An American horticulturist, born in Delta, Ohio. He studied at Ohio State University (1884); Columbian (now George Washington) University (1886–88); the Royal Pomological School in Germany, and the Institut Pasteur in Paris. From 1882 to 1886 he was superintendent of the Ohio Agricultural Experiment Station, and for the two following years served as special agent of the United States Department of Agriculture. Except for the first three of the 16 years (1888–1904), during which he was vice-director of the Virginia Agricultural Experiment Station, he was also professor of horticulture and allied subjects at the Virginia Polytechnic Institute. During this period he carried on important investigations in horticulture and mycology. After being in charge of investigations into the fermentation of fruit products for the Government Bureau of Chemistry from 1900 to 1906, he was given the post of enological chemist. A model farm, on which he gave an example of what country life should be, became Alwood's

chief interest after his retirement from teaching. In 1900 he was vice-president of the International Congress on Agricultural Education, and in 1907 of the International Congress on Viticulture, both held in Paris. Several medals and decorations were conferred upon him by the French government and French agricultural societies. He wrote many pamphlets on horticultural subjects, on the chemical composition of apples and grapes, and on the composition of wines and ciders fermented with pure yeasts. Among the later of these is his *Enological Studies* (1912).

ALYATTES, ăl'ĭ-ăt'tĕz (Gk. 'Αλυάττης). A King of Lydia (c.618–560 B.C.). He took Smyrna, drove the Cimmerians from Asia, and extended the Lydian power to the river Halys. He also attacked Clazomenæ, but was repulsed. A six years' war was waged between him and Cyaxares, King of Media. He was succeeded by his son, Crœsus. His tomb, not far from Lake Gygæa, was one of the wonders of antiquity. Consult A. von Ölfers, *Ueber die lydischen Königsgräber bei Sardes* (1858).

AL'YPIN. A drug used for producing local anæsthesia, as a substitute for cocaine (q.v.). Its chemical makeup is denoted by the name monohydrochloride of benzoyltetramethyldiaminoethylisopropyl alcohol, and the formula $C_{18}H_{28}O_2N_2HCl$. The substance occurs as a white crystalline powder, having a bitter taste, and freely soluble in water and alcohol. Its chief use is as a substitute for cocaine in spinal anæsthesia, being less toxic than the latter.

ALYP'IOS (c.360 A.D.). A Greek writer on music. He was born at Alexandria. His *Introduction to Music* (*εἰσαγωγὴ μουσική*) constitutes our chief source of information regarding the musical system of the ancient Greeks. (See GREEK MUSIC.) He discusses the art under seven headings: 1. Sounds; 2. Intervals; 3. Systems; 4. Modes; 5. Tones; 6. Alterations; 7. Composition, of which, however, only the chapter on Tones has been preserved. Of the other chapters not even fragments have come down to us. The treatise contains the 15 transposition scales in both vocal and instrumental notation in the diatonic, chromatic, and enharmonic systems. The work was first printed by Meursius in 1616. A critical edition was published in 1895 by Karl von Jan in the series *Musici scriptores græci*. A separate appendix, *Melodiarum reliquiæ*, containing all preserved Greek compositions, appeared in 1899.

ALYS'SUM (Gk. *ἄλυσσον, alysson*, a plant used to check hiccough, from *ἀ, a*, priv. + *λύζειν, lyzein*, to hiccough). A genus of low-growing, mostly perennial plants, of the family Cruciferæ. There are many species and cultivated varieties, mostly of European origin. The flowers are small, white or yellow, and borne in racemes. The sweet alyssum (*Lobularia maritima*), grown in low borders, window gardens, baskets, and fenced-in greenhouses, is an annual.

ALZEY, ăl'tsī. An old city in Rhenish Hesse, on the Selz, 18 miles by rail southwest of Mainz (Map: Prussia, C 4). Its industries are weaving and the manufacture of shoes, leather ware, and furniture. Pop., 1890, about 6000; 1900, 6900; 1910, 7500. It was known in the fourth century and was built on the site of the Roman settlement of Altiaia. In 1912 excavation brought to light the remains of a stone fort. Volker the Fiddler, a hero of the *Nibelungenlied*, is supposed to have come from Alzey.

ALZOG, ăl'tsōg, JOHANN BAPTIST (1808–78). A Roman Catholic theologian. He was born at Ohlau, Silesia, June 29, 1808, and was professor of church history in the University of Freiburg from 1853 till his death there, March 1, 1878. He wrote a *Manual of Universal Church History*, which is known in many languages (original, Mainz, 1840; 10th ed. by F. X. Kraus, 1882, 2 vols.; Eng. trans., Cincinnati, Ohio, 1874–76, 3 vols.); also *Grundriss der Patrologie oder der ältern christlichen Litterargeschichte* (Freiburg, 1866; 4th ed., 1888). He was, in 1869, a member of the commission on dogma which prepared the work for the Vatican Council, and was the only member of the commission who opposed the promulgation of the dogma of papal infallibility. He concurred in it, however, after its adoption.

AM'ADAS, or **AM'IDAS,** PHILIP (1550–1618). An English navigator. He was born in Hull, England. Sir Walter Raleigh selected him as captain of one of the two ships sent out in 1584 to find a suitable place on the coast of North America for planting a colony. He and Barlow, captain of the other vessel, coasted northeasterly from the vicinity of Cape Fear and reached Ocracoke Inlet (July 13). They landed on the narrow island separating Pamlico Sound from the Atlantic and afterward visited the Indians on Roanoke Island. They returned to England and gave a glowing account of the country, Barlow writing the report. Several years afterward Amadas conducted an expedition to Newfoundland. Consult Hakluyt, *Principall Voiages*, vol. iii (new ed., London, 1809–12).

AMADEO, ä'mä-dā'ō, GIOVANNI ANTONIO (c.1447–1522). A rarer form of the name, OMODEO, also occurs. The most prominent Lombard sculptor of the Renaissance, also a distinguished architect. He was born in 1447 in Pavia and probably studied with local sculptors. His earliest-known work is the door from the church to the lesser cloister of the Certosa of Pavia and several of the fine figured capitals of both cloisters. To this period also, though somewhat later, belong the doors from the church to the sacristy of the Certosa and the Lavado door. The masterpiece of the period, however, is the celebrated Colleoni Chapel in Bergamo (1470–75), one of the finest productions of decorative art of Italy, containing the tombs of the great condottiere and his daughter Medea, as well as many fine reliefs and sculptural decorations. These early works show great talent in composition and a wealth of fantastic decoration; the figures are well rounded and carefully modeled. But he soon adopted a more naturalistic style, resembling that of the Mantegazza (q.v.) brothers, with heavy broken draperies and flat decorative surfaces. This second manner is seen in the reliefs now incased in the pulpit of the cathedral of Cremona and in the masterpiece of all his works, the façade of the Certosa of Pavia, the gem of Lombard architecture and sculpture. He designed the façade and with the aid of assistants, notably Briosco, executed one-half of its sculptures, the remainder being assigned to the Mantegazza brothers. To him we owe the beautiful bas-relief extending across the lower part of the façade, most of the relief medallions, the window frames and other decorations of the upper façade, as well as the floor of the great cloister. Among several tombs which he designed, the most impres-

sive are two now in the chapel of Palazzo Borromeo in the Isola Bella, Lago Maggiore; the larger of these is one of the most typical, and the richest in decoration of the Lombard Renaissance. Amadeo's last important sculpture was the sarcophagus of St. Lanfrancus in the church of that martyr near Pavia, showing a change from his second manner to a third more correct in form and even more original than his previous work.

Amadeo's activity as an architect was second only to his work as a sculptor. Besides designing the façade of the Certosa, he was also, in conjunction with Dolcebuone, architect of Milan Cathedral. To him we owe the light and graceful Gothic spire which is its crowning feature. Its many sculptures were carved by his pupils after his designs. Somewhat earlier he designed the Renaissance Palazzo Bottigella in Pavia and the arcaded extensions of the cathedral. His last years were embittered by the interference of the engineers of Milan Cathedral with his plans, and he died Aug. 27, 1522. Although he belonged both in sculpture and architecture essentially to the Renaissance, his versatility is attested by his treatment of the Gothic in the spire. Consult the monographs on Amadeo by Frizzoni (Rome, 1873), Majocchi (Paris, 1903), Malaguzzi-Valori (Milan, 1905).

AM'ADE'US. A name borne by several members of the House of Savoy (q.v.), including one King of Spain. See AMADEUS I.

AMADEUS I, FERDINAND MARIA (1845–90). Duke of Aosta and King of Spain. He was the second son of Victor Emmanuel of Italy and was Rear-Admiral in the Italian navy and Lieutenant-General in the army. He married Princess Maria del Pozzo della Cisterna, daughter of the Countess de Merode, May 30, 1867. On Nov. 16, 1870, the Cortes of Spain elected him King, and on December 4 Amadeus accepted the crown, with the sanction of his father and the approval of the Great Powers. He reached Madrid Jan. 2, 1871, four days after the assassination of General Prim. He himself was attacked by assassins in July, 1872. In the same year a Carlist rising took place. On Feb. 11, 1873, he abdicated for himself and his heirs, and returned to Italy, the Spanish Cortes proclaiming the Republic, and making Figueras provisional President. Consult Whitehouse, *The Sacrifice of a Throne* (New York, 1897). See SPAIN.

AMADEUS VIII. See under FELIX.

AM'ADIS OF GAUL. A legendary hero of the most famous of mediæval romances, which even the barber of Don Quixote had not the heart to consign to the flames. It was the centre and parent of a cycle of similar tales of chivalry which have their representatives in every literary language of mediæval Europe and even in Hebrew. In what language it was first written is uncertain. Portugal, Spain, France, and England claimed its nativity, and, with the exception of Portugal, all with some show of justice. It owes its inspiration to the Arthurian cycle, appears to have been developed in northern France, the home of the mediæval epic, to have migrated thence to Provence, and to have been carried by the troubadours, either as a complete story or as a tradition, to Spain, where we find the epic mentioned by poets in the middle of the fourteenth century in a way to indicate that it was already widely popular there, though no contemporaneous trace of it has been found in Italy. (Consult Braunfels, *Kritischer Versuch über den Roman Amadis von Gaula*, Leipzig, 1876.) The earliest surviving Amadis legend is by the Spaniard Garcia Ordoñez de Montalvo and appears to have been finished about 1470. He allowed himself considerable liberties with the tradition, especially toward the close, and his anonymous successors extended the romance to 12 books and more than three times the length he had given it. It was first printed in 1519, and so fully embodies the taste of the generation that had given it birth that it almost immediately became part and parcel of the literary consciousness of Europe, each nation recognizing and reclaiming its share in it, although they claimed no part of the continuation by Montalvo, in which he described, out of his own invention, the deeds of the son of Amadis, Esplandian. Amadis was rendered into Italian in 1546, and into German before the end of the century. It attracted the attention of Francis I during his captivity at Madrid, and at his command was translated by Nicolas de Herberay, who rendered two-thirds of the Spanish epic into polished French, finishing his work in 1548. Ten translations followed this, with supplementary adventures and imitations, till the whole swelled at last to 25 books, detailing the adventures of an entire family. In its simpler form it tells how its hero, Amadis, the illegitimate son of Perion, King of Gaul, and Elisena, a princess of Brittany, was placed by his mother in a river in a box, was rescued at sea by a Scottish knight, and educated at the Scottish court, was enamored of Oriana, daughter of King Lisuarte of England, married her, returned to Gaul, and spent the rest of his life, there and elsewhere, in manifold adventures. Both the French and the Spanish Amadis were criticised in their own day for defective structure, hyperbolic phantasy, immorality, and irreligion. Their popularity lasted until they themselves had raised up worthier imitators of their example. The first of these was d'Urfé's *Astrée*.

An English version of Amadis, much shortened to its advantage, was made by Southey (London, 1803). For the origin of the story consult Grässe, *Litteraturgeschichte* (Dresden, 1844–50); Körting, *Geschichte des französischen Romans im XVII Jahrhundert* (Leipzig, 1885): and for further bibliography, Braga *Grundriss der romanischen Philologie* (Strassburg, 1893), and Menendez y Pelayo, *Origines de la Novela* (Madrid, 1905).

AMADIS OF GREECE. A supplement to *Amadis of Gaul*, a Spanish work by Feliciano da Silva. It is noteworthy as being perhaps the source of Florizel in Shakespeare's *Winter's Tale*, and of the "Masque of Cupid," in Spenser's *Faerie Queene*.

AMADOR, ä'mä-dōr', MANUEL (1833–1909). First president of the Republic of Panama. He was formerly connected with the French diplomatic service in Panama and had some military training. After a short business career in early life, he took up the practice of medicine, becoming distinguished in that profession. In 1903 he took a prominent part in the revolution against Colombia which resulted in Panama's independence. He was elected president of Panama Feb. 17, 1904, and three days afterward was inaugurated to hold office for four years. At the end of that time he declined a renomination. Since his death the main fortification at the Pacific end of the Panama Canal has been named Fort Amador.

AMADOR DE LOS RIOS, ä'mä-dōr' dā lōs rē'ōs, José (1818–78). A Spanish critic and historian, born at Baena. He first became known as editor (with Madrazo) of the collection entitled *Monumentos arquitectónicos de España*. His most noted work is the *Historia crítica de la literatura española* (1861–65), of which he completed but seven volumes. Despite many defects resulting from its scope and complexity, and from the date of its composition, this work must still be consulted for the period of which it treats. His other publications include works on the art monuments of Toledo and Seville, a history of Latin-Byzantine art in Spain, and the exhaustive *Historia social, política y religiosa, de los judíos de España y Portugal* (1875–76).

AMADOU, äm'ä-dōō' (Fr. tinder, from *amadouer*, to bait, allure, coax, alluding to its use as tinder during the Middle Ages). A name given to some fungi of the genus *Polyporus*. They grow upon old trees, especially oak and ash in Great Britain and on the continent of Europe. The fungus appears as a leathery or fleshy mass, sometimes becoming hard, often bracket-shaped or hoof-shaped, and its lower surface is pierced by the innumerable "pores" that give name to the genus. *Polyporus igniarius* is called hard amadou, or touchwood. *Polyporus fomentarius* is called soft amadou, or German tinder. They are used as styptics for stanching slight wounds; and when steel and flint were in general use for striking fire, were much employed as tinder. The soft amadou is used for making small surgical pads, for which its elasticity peculiarly fits it. The remarkably light wood of *Hernandia guianensis*, a shrub of the family Thymelæaceæ, is readily kindled by flint and steel and is used as amadou in Guiana.

AMAGER, ä-mä'gĕr. An island in the district of Copenhagen, Denmark; it is in the Sound, and separated from Zealand by the Kalvebod Strand (Map: Denmark, F 3). Amager has an area of 25 square miles. Christianshavn, at the northern end of the island, forms part of the city of Copenhagen. The chief trade is market gardening for that city. The shipping of the island is of some importance. The inhabitants are chiefly descendants of Dutch emigrants of the sixteenth century, who still preserve their old dress and customs. Pop., 1900, 25,000.

AMAI'MON, or **AMOY'MON** (probably Gk. *ἀ, a* priv. + Heb. *maimin*, believer). A demon named in the theory of the Middle Ages as king of the eastern part of hell. Asmodeus (q.v.), the demon of desire, was his lieutenant. See allusions in Shakespeare's *Merry Wives of Windsor*, ii, 2, and *Henry IV*, first part, ii, 4.

AMAL'ARIC (502–531). The last Visigothic King of Spain (526-531). He married Clotilda, daughter of Clovis, King of the Franks, in 527, and treated her so badly because she would not embrace Arianism that her brother Childebert marched against him and defeated him. According to Gregory of Tours, Amalaric was killed in the battle; according to others, he fled to Barcelona, where he was killed by rebel subjects.

AM'ALASUN'THA (?–535). Queen of the Ostrogoths, daughter of Theodoric the Great. On the death of Theodoric, her son Athalaric succeeded under the regency of Amalasuntha. She was well educated and preferred the Roman civilization. The Goths, who were opposed to this, incited her son to rebellion in 533. Amalasuntha subdued the rebellion, and Athalaric died the following year, at the age of 18. She then associated her cousin Theodahad with her in the kingdom, but did not marry him, as he already had a wife. In 535 Theodahad murdered Amalasuntha, under the pretext that she was planning to betray the Goths to Justinian. Her actions had made it probable that she was thinking of retiring to Constantinople. Belisarius avenged her death by killing Theodahad in 536. Consult Hodgkin, *Italy and her Invaders*, vols. iii and iv (2d ed., Oxford, 1896). See GOTHS.

AMAL'ECITE. See MALECITE.

AM'ALEKITES. An Edomitish tribe in the Negeb (q.v.), south of Judah and north of Kadesh Barnea (q.v.), according to Num. xiii. 29; xiv. 39. Amalek is represented as a son of Eliphaz, the son of Esau by a Horite woman, Timna, his concubine; consequently as a bastard tribe of Edomitish origin (Gen. xxxvi. 12). Their country is first mentioned in Genesis xiv. as the scene of the wars of Chedorlaomer of Elam in the neighborhood of En Mishpath or Kadesh. (See CHEDORLAOMER.) The memory of early struggles between Amalek and the invading tribes has probably been preserved in the accounts of an Amalekite victory at Horma (Num. xiv. 45) and a defeat at Rephidim (Ex. xvii. 8–16). In the days of Saul they were almost annihilated (1 Sam. xv. 2), and later David overcame a band of marauding Amalekites with great slaughter, pursuing them until "there escaped not a man of them save 400 young men who had camels and fled" (1 Sam. xxx. 1–20). In the prophecies of Balaam, which are ascribed by many critics to the age of David, Amalek is described as "the first of nations," but "his end is sure destruction" (Num. xxiv. 20). The inveterate hostility between Amalek and Israel is reflected in so late a production as the Book of Esther, where the designation of Haman, the arch-enemy of the Jews, as "the Agagite" (Esther iii. 1), is introduced in order to emphasize his descent from Agag, the King of Amalek (Num. xxiv. 7). Grimme has suggested that Amalek is a broken plural of Amlak and that it is identical with Meluhha, a country frequently mentioned in Babylonian inscriptions and apparently designating northwestern Arabia, at least, in earlier times. But this identification is very uncertain. Consult: Eduard Meyer, *Die Israeliten und ihre Nachbarstämme*, pp. 345 ff. (1906); Grimme, *Mohammed*, p. 11 (1904); Schmidt, *Messages of the Poets*, pp. 333 ff. (1911).

AMALFI, ä-mäl'fē. A seaport town in Campania, south Italy, situated on the Gulf of Salerno, about 22 miles southeast of Naples. It is built on the slope of a mountain rising from the coast and covered with splendid trees and gardens. The houses tower one above another and are connected by stairways and bridges. The most interesting building of the place is the old cathedral, with its bronze doors cast in Constantinople in the eleventh century, a mosaic façade, and columns from Pæstum. An old Capuchin monastery, dating from the beginning of the thirteenth century, is now used as a hotel. It is finely situated west of Amalfi in the hollow of a rock rising about 230 feet from the sea. The town produces paper, soap, and macaroni, but these industries are declining. Pop., 1901, 7300; 1911, 7472. According to local tradition, Amalfi was founded by Constantine

the Great. From the ninth to the eleventh century it was an independent state and was ruled by doges. Early in the Middle Ages the city had a population of 50,000 and rivaled in importance Genoa and Pisa, with the latter of which Amalfi was continually at variance. One of the oldest maritime codes, the *Tavole Amalfitane*, was compiled in Amalfi, and the town is otherwise famous as being the birthplace of Flavio Gioja and of Masaniello.

AMAL'GAM (Lat. Gk. *μάλαγμα, malagma*, an emollient, plaster, from *μαλακός, malakos*, soft). An alloy of mercury with one or more other metals. An amalgam of silver crystallizing in the isometric system has been found native; a gold amalgam, too, has been reported from several localities, including California. Artificially, amalgams are made (1) by bringing metallic mercury into contact with another metal, as antimony, arsenic, bismuth, etc.; (2) by bringing mercury into contact with a saturated solution of a salt of the other metal, when part of the mercury goes into solution and the remainder combines with the liberated metal, which is the case with calcium, iron, and certain other metals; (3) by placing the metal to be amalgamated in a solution of a salt of mercury, which is the usual method for amalgamating copper and aluminum; finally (4) by placing the metal to be amalgamated in contact with mercury and dilute acids.

Amalgams may be either solid or liquid. Those which are liquid are regarded as solutions in which there is an excess of mercury. The more important amalgams are as follows: *Copper amalgam*, which is made by triturating finely divided metallic copper with mercurous sulphate under hot water. This amalgam has the property of softening when kneaded, and becoming quite hard after standing some hours, which has led to its use for filling teeth. *Gold amalgam* is formed by heating mercury with powdered gold or gold foil. The readiness with which mercury combines with gold has been made the basis of an important process for the extraction of the latter from ores. After the ore containing the free gold is crushed to a fine powder it is washed over copper plates, the surface of which contains a thin film of mercury. The free gold is caught by the mercury, forming an alloy or amalgam which can be scraped from the plate in a plastic condition. The percentage of gold in this amalgam, or its fineness, varies with the size of the gold particles; coarse gold produces high-grade amalgam, whereas fine gold produces low-grade amalgam. The gold is recovered by washing foreign matter from the amalgam in hot water with an excess of mercury, squeezing the excess of mercury from the resultant amalgam through chamois or canvas, and then placing the residue in a retort from which the balance of the mercury is distilled and condensed for further use. Oils or grease coming in contact with the crushed ore will prevent the gold from forming an amalgam with the mercury. *Silver amalgam* is formed by the union of mercury with finely divided silver, and this fact is taken advantage of for the extraction of silver from its ores by a process analogous to that described in connection with gold amalgam. An amalgam consisting of eight parts of mercury to one part of silver is used for silvering metals.

Mercury readily combines with sodium when the two elements are brought in contact with each other, yielding an amalgam which is used for amalgamating copper plates, and in the chemical industry as a reducing agent. *Tin amalgam* is formed when mercury is brought in contact with tin in the proportions of three parts of the former to one part of the latter. This amalgam is the one commonly used for silvering mirrors. *Zinc amalgam* results when zinc filings are mixed with mercury at a heat somewhat below the boiling point of the latter. It is used for coating the rubbers of electric machines. Amalgams of bismuth, cadmium, magnesium, potassium, and other metals are known, but have no important commercial uses. Consult: Dudley, "An Index to the Literature of Amalgams," in *Proceedings of the American Association for the Advancement of Science* (Salem, 1889); Rose, *The Metallurgy of Gold* (London, 1902); Eissler, *The Metallurgy of Gold* (London, 1896).

AMAL'GAMA'TION. See GALVANIC BATTERY.

AMALIA, â-mä'lê-â, ANNA (1739–1807). The wife of Duke Ernst August of Saxe-Weimar-Eisenach. She was born at Wölfenbüttel. On the death of her husband, in 1758, she was appointed Regent for her infant son, Karl August, whom, aided by his tutor, Wieland, she trained in the love of literature and art, also doing much to foster education and material prosperity throughout his domains. Soon after assuming the government, the Duke, with his mother's active coöperation, gathered at Weimar a galaxy of literary talent probably never equaled. Goethe, Herder, and Schiller were its brightest stars, but they shone in goodly company. Weimar continued during and beyond her life what she, more than any other, had made it, the literary centre of Germany. Consult Gerard, *A Grand Duchess, The Life of Anna Amalia, and the Classical Circle of Weimar* (New York, 1902), and see GOETHE.

AMALIE, â-mä'lê-ē, MARIE, or MARIE AMÉLIE (1782–1866). The wife of Louis Philippe, King of the French. She was the daughter of King Ferdinand I (IV) of the Two Sicilies. When she married Louis Philippe (then Duke of Orleans), he was a political exile, without hope of ever rising to the throne of France. Amalie never interfered in politics and, possessing all the domestic virtues, was happy with her husband.

AMALIE, â-mä'lê-*e*, MARIE FRIEDERIKE (1818–75). Queen of Greece, daughter of Grand Duke Augustus of Oldenburg. She married King Otho of Greece, Nov. 22, 1836, shared in her husband's unpopularity, and after his deposition in 1862 accompanied him to Bavaria, residing after his death at Bamberg.

AMALRIC. See AMAURY.

AMAL'RIC OF BENE, bân (d. between 1204–07). Also called AMAURY OF CHARTRES. The founder of a school of Pantheists known by his name. He was born at Bène, near Chartres. He lectured in Paris upon philosophy and theology about 1200. He held that God is all, and that he who believes this can commit no sin. His doctrines were condemned by the university. Pope Innocent III confirmed the condemnation (1204) and ordered Amalric to return to Paris and recant, which he did, and so when he died, which was in the same year, he was buried in the consecrated ground of the monastery of St. Martin des Champs, Paris. But when it was discovered that the sect which he had founded had spread throughout France, a synod was

called in Paris in 1209, his teaching formally condemned, several of his followers burned at the stake as heretics, and his own body was also dug up, burned, and the ashes thrown to the winds. His doctrines were formally condemned by the fourth Lateran Council in 1215. Consult Haureau, *Histoire de Scholastique*, and Hefele, *Conciliensgeschichte*.

AM'ALS, or **AM'ALI.** The royal family of the Ostrogoths, which furnished the sovereigns for about two centuries. The most noted were Theodoric the Great (q.v.), Amalasuntha, and Witigis. The race came to an end in 605, when Germanus Postumus and his daughter were put to death by Phocas. Hodgkin, in *Italy and her Invaders*, vol. iii (Oxford, 1896), gives a genealogical table of the Amals.

AM'ALTHE'A (Gk. *'Αμάλθεια, Amaltheia*). A nymph, the nurse of the infant Zeus. The name was transferred to the goat which, according to the Cretan legend, suckled the god and was rewarded with a place among the stars. This goat was called first merely *Aix*, the Greek word for goat, and was thought of as the property of Themis and the nymph Amalthea. Amalthea was in origin a fructifying earth-goddess, and so was naturally associated with Ge ('Earth') and Themis. The "cornucopia," or horn of plenty, really an attribute of all the deities who were believed to control the fruits of the earth, was said to be the horn of the goat Amalthea, which had been broken upon a tree. See ÆGIS.

AMA'MA, SIXTINUS (1593–1629). A Dutch Orientalist. He was born at Franeker, Friesland, studied Oriental languages at the University there, and subsequently at Exeter College, Oxford. He succeeded Drusius as professor of Hebrew at Franeker. In 1625 he was called to Leyden, but the Estates of Friesland refused to permit him to go. He was among the first to advocate a thorough knowledge of the original languages of the Bible as indispensable to theologians. His works include: *Dissertatio qua Ostenditur Præcipuos Papismi Errores ex Ignorantia Hebraismi Ortum Sumpsisse* (1618), *Censura Vulgatæ Versionis V Librorum Mosis* (1620), and a *Hebreeuwsch Woordenboek* (1628).

AMANA, ăm'ä-nä. A German religious community established at Amana, Iowa, comprising several villages of settlers situated a few miles apart under the government of a president and 13 directors, elected annually by the community. Family life is preserved, but meals are provided for a number of families together. Woolen mills, flour mills, sawmills, dye-shops, and agriculture are the chief industries operated in common for the benefit of all. Life is simple, and all necessaries are furnished freely to members of the community. New members are elected after a probationary period. Daily prayer meetings are held. The sect was founded by Eberhard Gruber in Württemberg, Germany, 1714, and came to America, 1843, settling first in western New York and moving to Amana, 1855–64. The community in 1913 numbered about 1800 persons and owned 26,000 acres of land, their total property being valued at $1,800,000. Consult B. M. Shambaugh, *Amana, the Community of True Inspiration* (1908). See COMMUNISM; COMMUNISTIC SOCIETIES.

AMAN'DA. In Cibber's comedy, *Love's Last Shift*, and Vanbrugh's *The Relapse* (from which Sheridan made *A Trip to Scarborough*), the faithful and charming wife of Loveless, who has basely deserted her, but is finally won back by the sense of her fidelity.

AMANDE DE TERRE, ä'mänd' de târ'. The French name for *Cyperus esculentus*. See CHUFA.

AMAN-JEAN, ä'män'jän', EDMOND (1860—). A French portrait and decorative painter. He was born in Chevry-Cossigny (Seine et Marne) and studied principally with Lehman in the Ecole des Beaux Arts, Paris. His art is correct in design, excels especially in delicate and original color, and altogether renders him a most subtle portraitist of women. His chief works include two scenes from the life of Joan of Arc (1887–88) in the Museum of Orleans; portrait of a young lady (1891) in the Luxembourg Gallery, Paris; three decorative pieces in the Musée des Arts Decoratifs; La Vasque, a decorative panel in the Carnegie Institute, Pittsburgh, and Madame N. (1906) in the Museum of Buenos Aires. He excels especially in pastels, depicting enchanting heads of young women. An exhibition of 10 of his best paintings, along with many others of the advanced French group, was held in Buffalo in 1910, and afterwards in other American cities.

AM'ANI'TA (Gk. nom. pl. *ἀμανῖται, amanitai*, a sort of fungus). A genus of poisonous fungi related to *Agaricus*. *Amanita muscaria*, which is common in woods, especially of fir and beech, in Great Britain, and also in the United States, is one of the most poisonous fungi. It is sometimes called fly agaric, being used in Sweden and other countries to kill flies and bugs, for which purpose it is steeped in milk. The pileus or cap is orange-red, with white warts, the gills white, and the stem bulbous. It grows to a considerable size. Notwithstanding its very poisonous nature, it is used by the natives of Kamtchatka to produce intoxication. *Amanita phalloides*, commonly called death cup, is quite similar to the fly agaric. It is perfectly white, with white spores, and a ring on the stem. For illustration, see FUNGI, POISONOUS.

AMANTS MAGNIFIQUES, ä'mäN' mâ'nyĕ'fĕk' (Fr. magnificent lovers). A prose comedy in five acts by Molière, written by order of Louis XIV in 1670. The two lovers are princely rivals, who give various entertainments and ballets for which the slender plot is made the occasion.

AMAPALA, ä-mä'pä-lä. A free port of Honduras, situated on the north shore of the island of Tigre, in the Gulf of Fonseca, about 950 miles from Panama (Map: Central America, D 4). The harbor is very good, capable of containing vessels of the deepest draught, and the town has a healthful climate. It has secured a good part of the trade of San Salvador and Nicaragua, as it is the only large port of Honduras on the Pacific coast. The chief articles of export are hides and coffee. Gold, silver, and mineral ores were formerly exported in great quantities. The town was founded in 1838, and the opening of the port took place in 1868. Pop., about 3000.

AMARA-KOSA, âm'ä-rä kō'shä. See AMARASINHA.

AM'ARANT. A giant slain by the legendary Guy of Warwick (q.v.) in the Holy Land.

AM'ARANTH (Gk. *ἀμάραντος, amarantos*, from *ἀ, a*, priv. + *μαραίνειν, marainein*, to die away, wither), *Amaranthus*. A genus of plants of the family Amaranthaceæ. This genus contains about 50 species of wide distribution, but chiefly abounding within the tropics. They are herbs or shrubs, with simple leaves, and flowers

in heads or spikes. The genus *Amaranthus* has mostly monœcious flowers. Some of the species are naturally of singular form, and others assume singular but monstrous forms through cultivation. Love-lies-bleeding (*Amaranthus caudatus*), prince's feather (*Amaranthus hypochondriacus*), and other species are common annuals in our flower gardens. The spikes of *Amaranthus caudatus* are sometimes several feet in length. The dry red bracts which surround the flower retain their freshness for a long time after being gathered, for which reason the plant has been employed by poets as an emblem of immortality. The globe amaranth (*Gomphrena globosa*) and the cockscomb, well-known tender annuals, belong to the same family. The globe amaranth is much cultivated in Portugal and other Roman Catholic countries for adorning churches in winter. Its flowers, which are of a shining purple, retain their beauty and freshness for several years. About a dozen species are native and introduced in the United States, where they are mostly coarse annual weeds. *Amaranthus blitum*, *Amaranthus oleraceus* (Chusan han-tsi), and other species are used as pot-herbs. Wholesome mucilaginous qualities are generally found in the leaves throughout the order. The seeds of *Amaranthus frumentaceus* (called kiery) and of *Amaranthus anardana*, or *Amaranthus paniculatus*, are gathered for food in India. Medicinal properties are ascribed to some species of the family, particularly to *Gomphrena officinalis* and *Gomphena macrocephala*, which have a high and probably exaggerated reputation in Brazil as cures for many diseases.

AM'ARANTHA'CEÆ, Amaranth Family (for derivation, see Amaranth). A family of dicotyledonous plants, embracing about 500 species. They are widely distributed, but are most abundant in the tropics. In floral characters they greatly resemble the Chenopodiaceæ, differing in some minor particulars and in habit of growth. The general inflorescence is racemose, the auxiliary cymes going to make up a compound inflorescence. In general habit most of the species are rather coarse weeds, although some are grown as ornamentals, such as cockscomb, prince's feather, love-lies-bleeding, etc. The chief genera are *Amarantus*, *Celosia*, *Gomphrena*, and *Iresine*.

AMARAPURA, ŭm'ă-ră-pōō'rà, or Ummerapoora, City of the gods. The former capital of Burma, situated on the east bank of the Irrawaddy, and on the Rangoon and Mandalay Railway, 9 miles northeast of Ava, in lat. 21° 57′ N., long. 96° 7′ E. It was founded in 1783; in 1810 it was almost totally destroyed by fire; and in 1839 an earthquake laid it in ruins. In 1852–53 it was finally deserted and the capital of the country removed to Mandalay. Nothing remains of the old city save some rows of beautiful trees and interesting ruins of a palace and of several pagodas. A celebrated temple in the suburbs contains a famous colossal bronze image of Gautama (Buddha). The population in 1810 was estimated at 170,000; it has declined to less than 9000.

AM'ARASIN'HA, or AM'ARA-SIṂ'HA. A celebrated Sanskrit lexicographer of antiquity, whose vocabulary, *Amara-kośa*, or Amara's Treasury, formed a storehouse of words in early times and a mine of information for later workers in the field. This glossator is commonly called simply Amara in the native commentaries; but his title *Siṃha* shows that he belonged to the princely class. Little is known of his life, except that he was a Buddhist in religion, and it is assumed that all his writings, except the dictionary, perished through the persecutions which the Buddhists at one time suffered at the hands of the orthodox Brahmans. There is, however, great uncertainty as to the time when Amara lived. His date has been generally put at about 500 A.D., though by some authorities it is given as a century or more earlier. His name is associated with the poet Kalidasa (q.v.) and the others of the "nine gems" at the court of Vikramaditya in an Augustan Age of Sanskrit literature. The sixth century A.D. is the date most commonly assigned for the reign of this monarch; but the Hindus place him some centuries earlier, a view which there is rather a tendency to follow than to reject. (See Kalidasa.) The real title of Amara's Sanskrit vocabulary is not *Amara-kośa*, but *Nāmalingānuśāsana*, 'a book of words and genders.' It is also called *Tri-kāṇḍa* or *Trikāṇḍi*, i.e., tripartite, from its three books of words and homonyms relating to the world and man and miscellaneous matters. The second of these is the longest, and each book is subdivided into chapters, called *vargas*. The whole work comprises about 1500 verses, generally consisting of lines of 16 syllables, and the words, about 10,000 in number, are arranged, not alphabetically, but, in general, as synonyms according to subject and gender. There are numerous editions of the *Amara-kośa*, accompanied also by the old native commentaries. Mention may be made of the edition with introduction, English notes, and index by Colebrooke (Serampore, 1808). This was reprinted in 1829. A French edition, with translation, was published by Loiseleur-Deslongchamps (2 vols., Paris, 1839–45). Valuable are the editions by Chintāmani Sāstrī Thatte, under the superintendence of F. Kielhorn (2d ed., Bombay, 1882), and in the collection of Sanskrit ancient lexicons, or Abhidhānasangraha (Bombay, 1889). Consult Zachariæ, "Die indischen Wörterbücher (Koś'a)," in Bühler's *Grundriss der indo-arischen Philologie und Altertumskunde* (Strassburg, 1897).

AMARI, ä-mä'rē, Michele (1806–89). An Italian historian and Orientalist. He was born at Palermo. At the age of 16 he entered a government office, and soon afterward—his father being condemned to 30 years' imprisonment for a political crime—the duty of supporting his mother and the other members of the family devolved upon him. He succeeded, nevertheless, in acquiring an education, learned French and English, and published a translation of *Marmion* in 1832. In 1837 he removed to Naples. In 1841 appeared his masterpiece, *La Guerra del Vespro Siciliano* ('The War of the Sicilian Vespers'), in which the author overthrows the prevalent notion, established by Villani, of the cause of the famous massacre of 1282. The book was quickly prohibited and, as a consequence, widely read. It was translated into German by Dr. Schröder, of Hildesheim, and into English by Lord Ellesmere. Dreading punishment at Naples, Amari fled to France, where he gave himself up to the study of Arabic and modern Greek, and to the preparation of his *Storia dei Musulmanni di Sicilia* (1854–68). Upon the outbreak of the revolution of 1848, he returned to Italy, and shortly after his arrival was elected vice president of the committee of war in Sicily.

AMARYLLIDACEÆ

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1 LILY OF THE PALACE - HIPPEASTRUM
2 NARCISSUS - NARCISSUS PSEUDO-NARCISSUS
3 FOTHERGILLIA - NERINE CURVIFOLIA
4 ATAMASCO LILY - ZEPHYRANTHES ATAMASCO
5 HYMENOCALLIS - HYMENOCALLIS CRASSIFOLIA
6 STAR GRASS - HYPOXIS
7 COOPERIA - COOPERIA DRUMMONDII

He was next sent on a diplomatic mission by the provisional government to France and England. In 1849 he published at Paris *La Sicile et les Bourbons*, to show up the pretensions of the Neapolitan sovereign. After the Sicilian insurrection had been quelled, Amari took up his residence in Paris, where he devoted himself to literary pursuits till 1859, when he returned to Italy, fighting the following year under Garibaldi. He was made Senator in 1861, and in 1862–64 was Minister of Instruction. He resigned his professorship at Florence in 1878 and removed to Rome, where he continued his historical studies. He died July 16, 1889. Other writings of Amari are upon the language and history of the Arabs, in the *Revue Archéologique*, the *Journal Asiatique*, etc. His letters were published at Turin (1896).

AMARILLO. A city in Potter Co., Texas, 32 miles southwest of Panhandle, on the Fort Worth and Denver City, the Atchison, Topeka, and Santa Fe, the Chicago, Rock Island, and Gulf, the Pecos and Northern Texas, and the Southern Kansas of Texas railroads (Map: Texas, B 2). The city is in a productive agricultural and stock-raising region and has some manufactures. Its growth has been rapid. Pop., 1890, 482; 1900, 1442; 1910, 9957; 1920, 15,494.

AMAR'NA LET'TERS. A collection of more than 300 letters and dispatches, inscribed upon clay tablets, which were found, in the winter of 1887–88, in the village of Tell-Amarna (q.v.) in Middle Egypt. They represent the Asiatic correspondence of the Egyptian court about 1400 B.C., and it is a remarkable fact that they are in the cuneiform character, and, with three exceptions, in the Babylonian language, which would thus appear to have been the medium of diplomatic communication throughout western Asia. One of the letters is in the language of Mitani, in northern Mesopotamia, and two are in that of Arçapi or Arzaya (probably Cyprus). Among the writers are the Egyptian kings Amenophis III (q.v.) and Amenophis IV (q.v.), and the kings of Mitani, of Babylonia, of the Hittites, and of Alashia (Cyprus). It appears from these letters that the Egyptian kings of the eighteenth dynasty intermarried with the royal houses of both Mitani and Babylonia. Amenophis III married a sister of Kadashman-Bel, King of Babylonia, and also a sister of Dushratta, King of Mitani; while Amenophis IV married a niece of his father's Mitanian wife. Frequent reference is made to commercial affairs, implying a considerable intercourse between Egypt and the Asiatic States. By far the greater number of the Amarna letters proceed from Egyptian officials and subject allies in Syria, at that time a dependency of Egypt, and afford a valuable insight into the state of Palestine before the Hebrew invasion. The growing weakness of Egypt and the extension of the Hittite dominion in the north can be clearly seen, and the withdrawal of the Egyptian troops gave opportunity for conflicts between the princes of the small city-states into which the land was broken up. To add to the general confusion, the country was threatened on the east by the Khabiri—marauding nomads from the Arabian Desert, whose sphere of activity extended from southern Palestine as far north as Sidon, Beirut, and Gebal. Some scholars are inclined to identify the Khabiri with the Hebrews, but this theory has not met with general approval. The letters of the Palestinian princes, which are full of mutual recriminations, reveal the fact that there were two chief parties—one loyal to Egypt, the other professing loyalty, but in reality allied with the enemies of Egypt and everywhere successful. Among the most zealous supporters of Egypt was the Prince of Jerusalem, at this time a city of some importance. Two letters are written in a curious dialect which has been taken as the oldest known specimen of Indo-Germanic. Consult: Winkler, in *Schraders Keilinschriftliche Bibliothek* (Berlin, 1896); Eng. trans. by Metcalfe, *The Tell El Amarna Letters* (New York, 1896); Knudtzen, *Die Zwei Arzawa-Briefe* (Leipzig, 1902).

AM'ARYL'LIDÁ'CEÆ (THE AMARYLLIS FAMILY). A family of monocotyledonous plants with about 70 genera and nearly 1000 species. The plants resemble those of the Liliaceæ in many respects, except that they all have inferior ovaries. The species are mostly tropical and subtropical, and are generally found in dry regions. Many are bulbous, leafing and flowering only in the wet season, while others have thick fleshy leaves covered with wax or otherwise protected for their xerophytic habitat. Some of the Amaryllidaceæ are of great economic value (see AGAVE, HEMP, SISAL), while many others are extensively cultivated as ornamentals. See NARCISSUS; AMARYLLIS; BLOOD FLOWER; ALSTRŒMERIA; GALANTHUS; POLIANTHES, ETC.

AM'ARYL'LIS (from the famous nymph *Amaryllis*). A genus of bulbous-rooted plants of the family Amaryllidaceæ. Originally the genus included a large number of species, natives of the warmer regions of the globe, but most of them have been put into other genera, until in some writings only one South African species is left in *Amaryllis*. Many of them have flowers of very great beauty. A species known as *Amaryllis formosissima* was brought to Europe from South America in the end of the seventeenth century and has since been in common cultivation as a garden flower. Its scentless flowers are of a beautiful red color, exhibiting a play of golden gleams in the sunshine. *Amaryllis belladonna*, known also as the belladonna lily, has a scape one to three feet high, bearing an umbel of rose-colored fragrant flowers. *Amaryllis amabilis*, *Amaryllis josephinæ*, and *Amaryllis vittata* are among the most admired bulbous-rooted plants. *Amaryllis sarniensis* is one of the most hardy species, flowering freely in Guernsey, with a little protection during winter, and although commonly called Guernsey lily, it is supposed to be a native of Japan. By artificial pollination, a great number of hybrid forms have been produced.

AMARYLLIS. A shepherdess in the *Idyls* of Theocritus and in Vergil's *Eclogues*. The name is sometimes used as the type of a bucolic sweetheart, as in the pastoral of *The Faithful Shepherdess*, by Fletcher, and Milton's *Lycidas*.

AM'ASA. See JOAB.

AMASIA, â-mä'sê-â (ancient Gk. Ἀμάσεια, *Amaseia*). A town of Asiatic Turkey, the capital of the sanjak of the same name, in the vilayet of Sivas, on the right bank of the Yeshil-Irmak, 200 miles southwest of Trebizond (Map: Turkey in Asia, F 2). It stands in a deep and narrow valley, and the river, flowing through a narrow channel, between precipitous rocky banks, affords fine water power and is used for irrigation purposes. Amasia is the centre of the silk industry in Asia Minor, and

exports silk and grain to Aleppo, Damascus, and even Constantinople. It contains a fine bazaar and a large number of Mohammedan schools for higher education. There are to be found the ruins of an old castle, built on the site of the ancient acropolis, and a number of archaic remains. The population is estimated at 30,000. Amasia was the birthplace of the geographer Strabo, and was once the capital of the kings of Pontus, whose tombs have been discovered near by.

AMA'SIS (Gk. *Ἀμάσις*, Egyptian *'Ah-mose*, probably 'child of the moon'), or AAHMES. The name of two Egyptian kings.—AMASIS I. The first Pharoah of the eighteenth dynasty. He reigned for at least 22 years, from about 1600 B.C., or perhaps a little later. He finished the long war against the Hyksos or Shepherd Kings, rulers of a foreign race, who had subjugated part of Lower Egypt. He captured their stronghold, Avaris, in the Delta, expelled them from Egypt, and began the Egyptian conquests in Asia by making Palestine and Phœnicia tributary.—AMASIS II. The fifth Pharoah of the twenty-sixth dynasty, well known through the anecdotes of Herodotus. Egyptian sources tend to confirm the statements of the Greeks that he was of humble origin and not particularly refined as to habits. He came to the throne through an insurrection of the native troops against King Apries (q.v.), whom he dethroned and slew. The usurper reigned from about 570 to 526 B.C. and was a wise and prudent ruler. He fought against Nebuchadnezzar and later cleverly avoided the conflict with the rising Persian power. (See History of Egypt, under title EGYPT.) The conquest of Cyprus is ascribed to him, though perhaps erroneously. He employed Greek mercenary troops and assigned to the Greeks the city of Naucratis, in the Delta, which soon rose to great commercial importance. Greek writers speak of Amasis in a very kindly spirit and endeavor to prove that he was the friend of various Greek sages and statesmen. (See POLYCRATES.) He is said to have married a Greek woman of Cyrene, but it is quite impossible that she could have been his legitimate wife.

AMATEUR' (Fr. from Lat. *amator*, lover, from *amare*, to love). It would seem at first easy to define the word "amateur" in sports; yet it is a subject that has for half a century taxed the most active and subtle brains of two continents. One would say offhand that the amateur in sport is one who engages in a personal physical contest of pluck, nerve, muscle, and skill for the love of it, as distinguished from the professional, who enters for profit; but that by no means disposes of this intricate subject. There were early found to be men in plenty who entered a particular contest because they loved the sport and who derived no pecuniary interest from that contest, yet whom it was unfair to allow to enter it. As a matter of fact, not long after the renaissance of athletic contests in 1850, it became obvious that the lines would have to be drawn more strictly, or those would have an unfair advantage whose daily occupations gave them a continuous training in the skill needful for perfection. Take, for example, a boat-builder of the old school, one who had been apprenticed to it in his youth and had spent all his early manhood in the handling of boats and oars and in rowing and gradually acquiring the knowledge, power, and endurance of a waterman. To such a man, trained and hardened by years, rowing became a second nature, and his skill in it automatic. It was plainly unfair to allow such a man, however much he rowed for love of the sport and without taking money for his prize, to enter contests where the rest of the participants had acquired their knowledge and skill only for the pleasure of the game and as part of the ordinary routine of school and college or for health and pleasure's sake. So it came to pass that the boat-builder and waterman were early excluded from the amateur ranks. The same principle has been working itself out ever since. Step by step the fences against professionalism have had to be raised, until now the rules bar them out of all contests under the control of the Amateur Rowing Association of England. No person can enter as an amateur "who has rowed or steered in any race for a stake, money, or entrance fee; who has ever knowingly rowed or steered with or against a professional for any prize; who has ever taught, pursued, or assisted in the practice of athletic exercises for any kind of profit; who has ever been employed in or about boats, or in any manual labor for money or wages; who is or has been by trade or employment for wages a mechanic, artisan, laborer, or engaged in any menial duty; or who is disqualified as an amateur in any other branch of sport." The most jealous stickler for the purity of amateur oarsmanship could hardly desire the line to be more firmly or decisively drawn; yet the rules governing amateur athletics in America do go farther, for, *inter alia*, they make a man a professional who engages in an athletic contest where professionals participate, even though no prize is at stake. The following are the rules of the Amateur Athletic Union, which claims jurisdiction over the following games: (1) Basket ball, (2) billiards, (3) boxing, (4) fencing, (5) gymnastics, (6) hand ball, (7) hurdle racing, (8) jumping, (9) lacrosse, (10) pole vaulting, (11) putting the shot and throwing the discus, hammer, and weights, (12) running, (13) swimming, (14) tugs of war, (15) walking, (16) wrestling.

Conditions of Competition.—"1. No person shall be eligible to compete in any athletic meeting, game, or entertainment given or sanctioned by this Union who has (*a*) received or competed for compensation or reward, in any form, for the display, exercise, or example of his skill in or knowledge of any athletic exercise, or for rendering personal service of any kind to any athletic organization, or for becoming or continuing a member of any athletic organization; or (*b*) has entered any competition under a name other than his own, or from a club of which he was not at that time a member in good standing; or (*c*) has knowingly entered any competition open to any professional or professionals, or has knowingly competed with any professional for any prize or token; or (*d*) has issued or allowed to be issued in his behalf any challenge to compete against any professional, or for money, or (*e*) has pawned, bartered, or sold any prize won in athletic competition, or (*f*) is not a registered athlete. Nor shall any person residing within the territory of any active member of this Union be eligible to compete for or to enter any competition as a member of any club in the territory of any other active member of this Union, unless he shall have been elected to membership in such

club prior to April 1, 1891; provided, however, that this restriction as to residence shall not apply to undergraduates connected with any allied college athletic organization.

"2. No one shall be eligible to compete in any athletic meeting, games, or entertainment given or sanctioned by this Union, unless he shall be a duly registered athlete, a member of the organization from which he enters, and shall not have competed from any club in this Union during a period of three months next preceding such entry; nor shall any member of any club in this Union, or any club in any district in this Union, be allowed to compete in case he has within one year competed as a member of any other club then in this Union, except with the consent of such other club, which consent shall be filed with the Registration Committee of his district prior to such competition, unless such other club shall have disbanded or practically ceased to exist; provided, that the requirements of this section shall not apply to any athletic meeting, games, or entertainment, the entries for which are confined to the club or organization giving such meeting or entertainment.

"No athlete who has been released from a club which is a member of this Union, and who competes for another club directly thereafter, shall be allowed to compete again for the club he was released from for one year from the date of his release, except that the club has disbanded or ceased to exist.

"No person shall be eligible to compete for or enter any competition as a member of any club in the territory of any active member of this Union, unless he shall have resided within the territory of said active member at least four months previous to entering for competition; nor shall any person be eligible to enter or compete in any district championship meeting unless he shall have been a *bona fide* resident of such district for at least six months prior to the holding of such championship meeting; and no person shall be eligible to compete in a championship meeting of more than one district in one year. The restrictions contained in this section shall not affect the eligibility of an undergraduate connected with any allied college athletic organization who shall have been elected to membership in any club of this Union prior to Nov. 20, 1899, to represent such club as long as he remains an undergraduate; nor shall these restrictions apply to an undergraduate competing for any college belonging to an allied body.

"3. No prizes shall be given by any individual, club, committee, or association, or competed for or accepted by any athlete, except suitably inscribed wreaths, diplomas, banners, badges, medals, time-pieces and mantel ornaments, or articles of jewelry, silverware, table or toilet service, unless authorized by the Registration Committee."

It will be noticed that this organization does not control golf, in which game amateurs may play in contests against professionals even for a prize; with this limitation, however, that if, in the open contest, an amateur win he must take the prize in plate, and not in money. The golf rules are formulated and enforced by the United States Golf Association.

In cricket there is no bar whatever to playing against or with professionals openly paid for their services or even hired season after season by their clubs; but cricket has been in existence so long, and its ethics are so well understood that no harm results; the professional needs no laws to define his social position or the part he takes in a game which has escaped the eagerness so characteristic of the more modern games. In fact, in nearly every sport there are shades and differences in definition and practice. Notably is this so in bicycling, wherein the classification has been altered several times, and in football, where the rules of college games extend so far as to limit the contestants to those who have been resident pupils for such and such a time and are in such and such an educational grade. Other minute distinctions entitle a man to or debar him from the right to play, and readers desiring to be perfectly sure of their position on any given sport, in any given year, will do well to consult the actual rules in force formulated by the governing body of the sport.

Professionalism sometimes tends to elevate the standard of sports so far as records are concerned, and it is not in itself necessarily bad. But, although some of the truest sportsmen have been professionals, the nature of sport is such that its best uses, recreation and emulation, are in danger of being lost sight of by the professional whose aim is to make money. Baseball in this country has lost none of its popularity through professionalism, its control now being adequate. Bicycle racing, however, has degenerated into a mere gate-money exhibition. In England football is in danger from the same cause, while in America football is played almost exclusively by the colleges, and professionalism is practically unknown. Into some other sports the spirit of professionalism has never entered; notably is this so in lawn tennis, curling, quoits, canoeing, archery, polo, croquet, and its successor roque. These and a few other games have always been played solely by enthusiastic lovers of them. The amateur spirit is essentially a moral quality, and the games will retrograde, or otherwise, just in proportion as the moral code of the contestants is interpreted. Laws are next to useless where men are determined to evade them. Happily, the tendency of the times is distinctly toward a higher plane of interpretation and a stricter separation of the amateur from the professional.

The most conspicuous case in recent years of the enforcement in this country of the standards of amateurism was that of James Thorpe, the remarkable American Indian athlete, who won the all-round championship in the Olympic Games at Stockholm in 1912. Early in the following year it became known that Thorpe, using his own name, had been a salaried member of obscure North Carolina baseball teams in 1909 and 1910. Thorpe (who was a student at the Carlisle Indian School when he was entered in the Olympic Games) admitted the charge, but declared that he did not realize that playing ball for money had made him a professional. The American Olympic Committee and the Amateur Athletic Union promptly disclaimed any previous knowledge or hint of Thorpe's professionalism, apologized to the International Olympic Committee and to the nations concerned for having entered him in the games, and repudiated him as an American contestant. Thorpe returned the trophies he had won at Stockholm and soon after (in 1913) became a member of the New York baseball team in the National League. See OLYMPIC GAMES.

AMATI, ä-mä'tē. A family of celebrated Italian violin makers, who lived in Cremona. Andrea, the eldest, born about 1510, was descended from an ancient family dating back to the eleventh century. The date of his death is also unknown, but it is established that he was still living in April, 1611. He was the founder of the Cremona school of violin makers. His early instruments are so Brescian in character that he is supposed to have been a pupil of Gasparo da Salò. Few of his violins are extant. His model was small, with high back and belly, amber varnish, and clear though weak tone. Nicolo, his younger brother, made basses in preference to violins, and was his inferior. Andrea's sons, Antonio (1555–1638) and Geronimo (1556–1630), worked together much after their father's style. Geronimo also made instruments alone, of larger pattern, and changed the shape of the pointed sound-hole. Geronimo's son, Nicolo (1596–1684), was the most eminent of the family. His model is of extreme elegance. The corners are sharply pointed, the backs and bellies of beautiful grained wood, the sound-holes graceful and bold, the scroll of exquisite cut, and the varnish transparent and of a deep, rich hue. As a rule, he worked after a small pattern, but he produced some large violins, which are now called "grand Amatis" and are highly valued. He also made a number of beautiful tenors and violoncellos. His label reads: *Nicolaus Amati Cremonens. Hieronimi filius Antonii nepos fecit anno 16—.* Antonio Stradivari and Guarneri were his pupils, and the Jacobs of Amsterdam and Grancino of Milan were among his most successful imitators. With Geronimo (1649–1740), his son, the family of Amati ends. He followed their trade, but made indifferent instruments. For a further discussion of the family and their musical inventions, see under VIOLIN.

AMATITLÁN, ä-mä'tē-tlän'. A department, town, and lake of Guatemala, Central America. The town, the capital of the department, situated on the shores of the lake 12 miles southwest of Guatemala City, is also known as St. Juan de Amatitlán. It was founded by Jesuits, who formerly engaged here in extensive sugar-cane cultivation. The gathering of cochineal constitutes the chief industry, and there is trade in salt, raw silk, and fruit. Salt and alum wells and hot springs exist in the neighborhood. The lake has a length of 9 miles and an extreme breadth of 3. The population of the town in 1903 was 12,000; of the department, 35,387. A 1910 estimate returns the same figure for the town and 38,000 for the department.

AMATO, ä-mä'tō, PASQUALE (1878—). A distinguished baritone. He was born at Naples, and his parents expected him to follow the profession of a civil engineer. His remarkable voice showed itself very early, and he was frequently heard at amateur gatherings. Upon the advice of friends he entered the conservatory at Naples and took up singing seriously. After three years he made his début in 1900 at the Bellini Theatre as Germont in Verdi's *Traviata.* His reputation grew rapidly, and within two years he was one of the principal baritones of the Italian Opera at Buenos Aires. There Toscanini was so impressed with the young artist that he recommended him to Gatti-Casazza, who was then the director of La Scala in Milan. An engagement for Milan followed, but after a few appearances Amato suddenly lost his voice. Gradually the voice came back. After some minor engagements at German theatres he returned to Italy, and in 1909 became a member of the Metropolitan Company of New York. Since then he has been heard in all the principal cities of the United States, where he is one of the most highly esteemed artists of the present day.

AM'ATON'GALAND. See TONGALAND.

AM'AURO'SIS (Gk. *ἀμαύρωσις,* a darkening, from *ἀμαυρός, amauros,* hardly seen, dim, obscure). A term applied to absolute blindness, often with no discoverable changes in the eye as, for example, in hysteria. It is also used to include all other cases of total blindness. The word is becoming obsolete. See AMBLYOPIA.

AMAURY, ä'mô'rē', or **AMALRIC.** The name of two kings of Jerusalem. 1. Amaury I was born in 1135 and reigned from 1162 to 1174. He was the brother of Baldwin III. In 1164, 1167, and 1168 he invaded Egypt, but was driven out by Saladin, who carried the war into Amaury's country in 1170. 2. Amaury II, born 1144, was King of Cyprus (1194–1205), and titular King of Jerusalem in 1197, but never made good his claim to the latter kingdom. He died at Acre in 1205. See Stevenson, *Crusaders in the East* (Cambridge, 1907).

AMAURY OF CHARTRES. See AMALRIC OF BÈNE.

AMAXICHI, ä'mäks-ē'kē, or LEVKAS. The capital of the Ionian island of Santa Maura, or Leucadia (Map: Greece, B 3). It is the residence of a Greek metropolitan and is built on the edge of the shallow lagoons which separate the northeast part of the island from the mainland, which narrows down from less than a mile in the north to 3500 feet. It has two harbors. Amaxichi derives its name from Gk. *ἅμαξαι, amaxai,* cars, which the Venetian garrison employed in bringing down oil and wine from the inland districts to the point nearest the fort of Santa Maura, where, subsequently, a settlement was made. Modern buildings are constructed of wood because of the frequency of earthquakes. There are numerous interesting ruins near by on the site of the ancient town of Leucas. Pop., 1896, 5868.

AMAXOSA. See ZULU.

AM'AZI'AH (Heb. whom Yahwe strengthens). Eighth King of Judah. He succeeded Joash (or Jehoash), and his reign may be fixed approximately at 796–777 B.C. Amaziah undertook two wars—against Edom and against Israel, respectively. In the first he is said to have been successful, despite the fact that he had dismissed his mercenaries and thus weakened his army (2 Chron. xxv. 10). The account, however, is not found in the earliest records. Edom was defeated in the Valley of Salt, and Selah, possibly the Petra of later times, was captured (2 Kings xiv. 7). Elated by his success, he challenged Joash, King of Israel, who accepted the challenge only when compelled to. Amaziah was defeated (2 Kings xiv. 12) and taken prisoner to his own capital. Amaziah survived his defeat by 15 years (2 Kings xiv. 7), when he was killed by conspirators at Lachish (2 Kings xiv. 19). The biblical narrator has a word of praise for Amaziah, because in punishing the murderers of his father, Joash, he did not harm the children of the conspirators (2 Kings xiv. 6). See the histories of Israel by Stade, Wellhausen, and Kittel (2d ed., 1909–12).

AM'AZON. A river of South America and

the greatest in the world, called by various names and, finally, by the explorer Orellana, who made the first descent from the Andes to the sea, named Amazon. This was derived from the well-known Amazon legend, which is claimed by some to have had also a native origin among the northern Caribs, but this is doubtful. Orellana found that in certain tribes the warriors were assisted in battle by the women, and undoubtedly from that fact he applied the Old World legend to them and consequently to the river. With the natives each section had its separate name; that is, each band or tribe named its own portion. One of its earliest names by the Spaniards was Marañon, now only applied to a part of its upper course (Map: South America, D 3).

The head waters of the Amazon, the Marañon, and the Ucayali rivers, rise in the central and northern Peruvian Andes, and after a northerly course parallel with these mountains unite in about long. 74° W., and the united waters pursue an almost easterly course between lat. 5° S. and the equator to the Atlantic, which is reached in long. 50° W., where this meridian intersects the equator. The Marañon, which rises in long. 76° 30′ W. and lat. 10° 30′ S., is properly the head stream of the Amazon, as it is farthest west; but the Ucayali is slightly the larger, and has its source farther south in the Andes in long. 72° W. and lat. 16° S. From long. 70° W., where the Amazon leaves Peru, its course is confined to Brazil.

The total length of the Amazon from the head waters of the Ucayali is about 3300 miles. It is between one and two miles wide where it enters Brazil, and gradually increases in breadth, enlarging to a width of 50 miles at its main mouth; and where it enters the sea the distance across it, from headland to headland, is fully 150 miles.

The total area drained by the Amazon is more than 2,500,000 square miles, a territory equal in extent to about 85 per cent of that of the United States (exclusive of Alaska), and embraces most of the South American continent west of long. 50° W. and between lat. 3° N. and lat. 17° S., except a comparatively narrow strip along the Pacific coast and a somewhat broader one on the Atlantic. The latitudinal zone drained by the rivers from the north averages only 6° or 7° in width, while that on the south has a breadth of 13° or 14°.

The chief rivers flowing into the Amazon from the north are the Napo, Putumayo, Yapura, and Rio Negro. These rivers flow in a direction more or less parallel with that of the Amazon, and thus they drain but a narrow longitudinal belt.

The chief affluents from the south (in addition to the Huallaga, an affluent of the Marañon, and the Ucayali) are the Javari, Juruá, Purus, Madeira, Tapajos, and Xingu. The Tocantins River practically belongs to this system of southern branches, being connected with the Amazon by an arm of that river, which cuts off the large island of Marajó.

The basin of the Amazon lies almost wholly within the belt of remarkably uniform equatorial heat, so that there is an uninterrupted plant growth throughout the year. There is a moderately heavy rainfall over the whole of the basin, except in the western part, where, east of the Andes, the rainfall is excessive; and higher up among the Andes, where it is deficient. The very heavy rains in the upper waters of the basin are responsible for the enormous amount of water supplied to the river, which makes it (and its western tributaries) navigable to such a great distance from its mouth. In most sections there is a rainy season from January to May, and a six months' dry season from June to December. In the Upper Amazon valley the rainy season begins in November and continues until July, during which time the prevailing wind is northwest; but in the dry season the wind is chiefly from the southeast. The rainfall amounts to over 100 inches a year in this section.

The alternation of the rainy and dry seasons produces corresponding periods of high and low water in the rivers. Even in the Marañon a rise of 30 feet occurs in the wet season, and throughout the whole length of the Amazon during about half the year its waters are swollen and the adjoining low country inundated. These floods are not by any means of uniform magnitude, and at intervals of every few years abnormally high water occurs. The current of the Amazon averages about 2¼ miles per hour, but its velocity is much increased during the floods.

The drainage basin of the Amazon is remarkably level, and the slope from the outlying bounding highlands is very gradual. The height of land almost to the very sources of the branch rivers does not exceed 1000 feet, and as falls or rapids east of the Andes are almost unknown, these rivers are navigable for the greater part of their lengths. The Amazon and its tributaries form the most remarkable and extensive system of inland water highways in the world. The possibilities of future development in the chain of South American inland navigation are shown by the fact that on the north the Amazon has water communication with the Orinoco through the Rio Negro and the Casiquiare, while on the south the navigable waters of the Tapajos lack little of connecting it with the head waters of a tributary of the Plata River.

Within the basin of the Amazon there occur horizontal layers of argillaceous rocks and sandstone, which vary in height from 100 to 1000 feet. These and other deposits seem to indicate that at one time a local mediterranean sea covered the present Amazonian lowlands, and the Marañon had for its outlet into the western end of this sea a delta, which has gradually moved eastward as the shallow sea became filled up.

Not only the source streams, but nearly all the tributaries of the Amazon, experience a succession of falls where their waters enter upon the floor of the main stream, and some branches have falls higher up. Above these falls, which vary from a succession of rapids to falls of 50 feet or more, navigation is again resumed. On the Lower Amazon these rapids occur at a distance of from only 200 to 300 miles from the main stream; but the distance increases toward the west, so that on the Madeira and Rio Negro rivers the falls are far removed from the mouths, while most of the southern branch rivers west of the Madeira lie almost entirely within the unobstructed low belt.

Where the Amazon enters Brazil its elevation is less than 300 feet above sea level. Even at its low stage its usual depth in its lower course is about 150 feet, and in places it is said to be much deeper still. It has been estimated that

the Amazon discharges between 4,000,000 and 5,000,000 cubic feet of water per second; and with this enormous outflowing water there is carried every 24 hours a quantity of sediment sufficient to form a solid cube measuring 500 feet on each edge. In the flood season it rises in places 30 or 40 feet, and the villages, though built on posts, are frequently in such a state that a canoe can be paddled into the house. The entire country is inundated. The great rise begins in November and is highest in June, in which month there is nothing but water and trees everywhere along its banks and for many miles in each direction. Only the forest shows where the banks ought to be.

The Amazon is navigable by ocean steamers for a distance of 2300 miles, to Iquitos, and for smaller boats 486 miles beyond; but at the entrance to the gorges of the eastern Andes, navigation is practically suspended, on account of the rapids occurring there. Steamboat navigation began in 1853, but it was not until 1867 that the navigation of the river was thrown open to the world. Now lines of steamers ply from the mouth of the Amazon to various points above, Manãos, Remate de Males, Iquitos, etc. Vessels enter the Amazon through the estuary of the Para River, since the main mouth of the Amazon north of Marajo Island is shoal water filled with rocky islands. At the mouth there is a continual battling of the river current, the tides, and the winds. The tidal influence is felt up the river to a distance of about 400 miles. The tidal bore is at times so pronounced as to form successive walls of water 10 to 15 feet in height, which noisily sweep everything before them in their mad rush against the river current. The latter is perceptible at a distance of fully 200 miles seaward from the mouth of the river.

India rubber is the chief export from the Amazon basin, the finest quality coming from the Acre district. The trees from which the rubber is obtained grow wild in the dense forest, and rubber-hunting is a regular occupation. The importance of the Amazon as a highway of foreign commerce will become greater and greater as the economic development of Brazil proceeds, when in exchange for the ever-increasing quantities of tropical products exported, there will be returned the manufactures and products of the temperate zones.

Fauna. The Amazon valley is covered with thick forests of lofty growth, which are thinly inhabited by numerous independent savage tribes, some of whom are little known. They are armed with bows and arrows, with clubs, and with the long blow-gun with which they shoot needle-like arrows, tipped with the deadly Wourahli poison, which almost instantly paralyzes the victim. The animal life is exceedingly rich in numbers, but the flood conditions which so generally compel arboreal habits in unaquatic animals greatly limit at least the species of mammals. The principal animals are the tapir, jaguar, panther, cavy, armadillo, sloth, peccary, ant-eater, and monkey. Birds are exceedingly numerous; many of them are songless, but bedecked with gorgeously colored feathers; such are the humming birds and parrots. Among the snakes, the giant anaconda, or *sucuruju*, is the best known, and of the lizards the iguana attains formidable size. Numerous alligators and turtles, and the great water mammal, the manatee, frequent the river and its branches. Of fishes there is a greater variety than in any other stream, and in fact a large proportion of the present known species are found in the Amazon. Insects exist in the forests in countless numbers. Neither the fauna nor the flora of the Amazon has been more than partly studied, and that mostly by visiting naturalists.

Flora. The flora of the immediate vicinity of the river is that which flourishes in a watery soil and which will survive the long-continued annual inundation which occurs in midsummer. There is no suspension of plant activity; leaves remain green throughout the year, and no month is without its bloom or fruit. Aquatic plants grow in great profusion and attain enormous size, a prominent example being the giant lily, *Victoria regia*. In the undergrowth occur rubias, myrtles, leguminosæ, epiphytic orchids, bromelia, and ferns.

The Amazonian forest presents to the river a wall-like frontage of trees, interwoven with vines and roots clothed and fringed with moss in the most fantastic manner. A continuous mass of verdure overhead has a secondary flora of its own. Some of the trees grow to a height of even 200 feet. The largest unexplored areas of South America are in the Amazon basin, and especially between the Tocantins and the Madeira rivers. The quest for rubber is rapidly revealing the untraversed tracts between the large tributaries. See BRAZIL.

Among the ports on the Amazon (from its mouth upward) are Macapá, Santarem, Obidos, Manãos, Teffe, and Tabatinga. The commercial outlet of the Amazon basin is Pará.

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AMAZONAS, ä'mä-zō'nàs. A northern department of Peru. Area, 13,943 square miles. It is slightly mountainous and has a fertile soil, which produces tobacco and sugar-cane, while some gold is mined. In 1896 the population was estimated to be 70,676, but later figures are smaller because of a steady decrease in the birth rate. Capital, Chachapoyas.

AMAZONAS, or **ALTO AMAZONAS.** The northernmost and largest of the Brazilian states, bounded by British Guiana, Venezuela, and Colombia on the north, State of Pará on the east, Bolivia and the State of Matto Grosso on the south, and Colombia and Peru on the west (Map: Brazil, E 4). Its total area is 732,439 square miles. The surface, with the exception of a few mountain chains on the Venezuelan border, is one alluvial plain, covered with impenetrable forests, and intersected by the Amazon, with its numerous tributaries, including the Rio Negro and Madeira. The climate, although hot, is not unhealthful, and the soil is very fertile.

Industrially, the State is little developed, and its leading articles of trade are food products, principally coffee. With an area three and a half times as large as that of France, an abundance of fertile land, and excellent waterways, Amazonas had (1900) a population of 249,756, or about one inhabitant for three square miles. In 1908 one enumeration gave 280,000. Its capital and chief port is Mañaos. Amazonas originally formed a part of the State of Pará, and was constituted a separate State in 1850. Consult J. Verissimo, *Pará e Amazonas* (Rio de Janeiro, 1899), and C. L. Temple, *The State of Amazonas* (London, 1900).

AM'AZONITE, or AMAZON STONE. See MICROCLINE.

AM'AZONS, AMAZ'ONES (from Gk. *'Αμαζών, Amazōn*). In early Greek legends, a race of warlike women, who either suffered no man to live among them or held men in servitude for the continuance of the race. The earliest accounts place them in Asia Minor, especially on the river Thermodon; later writers put them farther to the north and the west, in Scythia and the Caucasus; and finally we hear of Amazons in Libya, at the south of the known world. Their expeditions, undertaken for war and plunder, led them into Scythia and Syria, but especially to the coast of Asia Minor, where we find them in conflict with Priam, Bellerophon, and other heroes. In this region they were said to have founded many cities, notably Ephesus, where they established the temple of Artemis, which furnished them a refuge when they were defeated by Hercules. They were daughters of Ares and worshiped him and Artemis as their chief gods. They appear chiefly in three stories: (1) the killing by Achilles of their Queen Penthesilea, who led her army to the relief of Troy; (2) the conflict with Hercules, which arose from his endeavor to secure the girdle of their Queen Hippolyta, and led, according to some writers, to their annihilation; (3) the war with Athens, which began with the expedition of Theseus to carry off the Amazon Queen, and ended with their invasion of Attica, their attack on the Acropolis from the Areopagus (q.v.), and their total destruction by Theseus and the Athenians. The origin of these legends is not clear; but if we consider the localities in which the Amazons lived, and remember that in historic times the Greeks found tribes about the Black Sea in which the women held sway and took part in war, while in Caria, Lycia, and Lydia there is much evidence for descent traced through the mother, it seems not improbable that the Amazons embody a reminiscence of the people and the civilization which preceded the Greeks on the east of the Ægean, a civilization in which the women held the important place in state matters and in religion; the Amazons, then, reflect the goddess of this civilization. Representations of the Amazons are very common in all periods of Greek art. At first they appear in the costume of Greek hoplites, but later assume the Scythian garb. They are armed with lance, battle axe, or bow, and usually carry a crescent shield; one breast, the right, is commonly bare. Among the chief ancient representations are the reliefs from Gyölbaschi, in Vienna, which seem to reflect the painting of Micon at Athens; and the friezes from Phigalia and the mausoleum at Halicarnassus, in the British Museum. Of the statues, three types go back to the best period of Greek art; the "Wounded Amazon," in Berlin, probably by Polycleitus; the "Wounded Amazon" of the Capitoline Museum in Rome, and the "Unwounded Amazon" in the Vatican. It was said that, in order to be unimpeded in war, they burned off their right breasts; but no work of art surely shows them thus mutilated, and undoubtedly the story is merely an invention to explain a false etymology, as though the composition of the word "Amazon" were *ἀ*, priv., and *μαζός, mazos*, breast. Miss Bennett, in *American Journal of Archæology* (1912), has suggested that a statue at Princeton represents an Amazon with mutilated breast. Consult Klügmann, *Die Amazonen in der attischen Litteratur und Kunst* (Stuttgart, 1875), and Corey, *De Amazonum Antiquissimis Figuris* (Berlin, 1891). For a very recent discussion of the Amazons and a good bibliography, see Florence M. Bennett, *Religious Cults Associated with the Amazons* (New York, 1912).

AM'BAKIS'TA. A Bantu tribe of Amboia, Portuguese West Africa. They were enterprising traders originally, but were ruined by the Portuguese and dispersed to other regions.

AMBALA, ŭm-bä'lä, or **UMBALLA.** A city in India, capital of the district of Ambala in the Punjab (Map: India, C 2), and an important station on the Sindh, Punjab, and Delhi Railway, 150 miles northwest of Delhi. It is a large, walled town, in a level, well-watered, and cultivated country, and has an extensive trade. It contains a fine Gothic church, a Presbyterian church, dispensary, hospital, and leper asylum. The town was founded in the fourteenth century. Here, at a grand durbar, in 1869, Shere Ali, ameer of Afghanistan, concluded a treaty with Lord Mayo, Governor-General of India. Ambala is an important military station. Pop., 1901, 79,638; 1911, 80,131.

AMBALEMA, ăm'bä-lā'mä. A city in the department of Tolima, Colombia, on the left bank of the Magdalena (Map: Colombia, B 2). The city lies 28 miles above Honda in the midst of an excellent tobacco-growing district and is one of the most modern as well as one of the most thriving towns of Colombia. It is noted for its manufacture of cigars. Pop., 1912, 6285.

AMBARI HEMP, ăm-bä'rē. See HIBISCUS.

AMBARVA'LIA (Lat. *ambi*, round, about, and *arvum*, a field, arable land). Originally a religious procession round the land of the early Roman community, whose purpose was to purge the crops from evil influences. It was held annually, late in May. The main feature of the ceremony was known as the *Suovetaurilia*, because a pig (Lat. *sus*), a sheep (Lat. *ovis*), and a bull (Lat. *taurus*) were led all around the fields, driven by a crowd, whose members were garlanded and carried olive branches, and chanted as they moved. These three animals represented the farmers' most valuable possessions, and they were offered as the crops were ripening and in greatest danger from bad weather and diseases. After the animals had been led three times around the fields, they were sacrificed, and a prayer, which has been preserved in very ancient language, was offered to Mars, conceived of in his original function as a god of vegetation. The view of Mommsen, Hensen, and Jordan that this festival was identical with the Ambarvalia celebrated by the Arval Brothers (q.v.), has been questioned in recent years. Consult Fowler, *Roman Festivals* (London, 1899). See ROMAN FESTIVALS.

AMBARVA'LIS. See ARVAL BROTHERS.

AMBAS'SADOR (Med. Lat. *ambasciator*, agent, from *ambasciare*, to go on a mission, earlier *ambactiare*, from Lat. *ambactus*, vassal; according to Festus, of Celtic origin; compare Welsh *amaeth*, husbandman, and Goth, *andbahts*, servant; Ger. *Amt*, office). The highest rank of public minister accredited to a foreign court. Though used popularly and sometimes by writers on public law in a loose sense as the equivalent of minister (q.v.), the term is strictly appropriately used only of the highest of the four orders of diplomatic agents established by the Congress of Vienna in 1815 and that of Aix-la-Chapelle in 1818. The classification then adopted, which has been generally accepted, is as follows: (1) ambassadors, and legates and nuncios of the Pope; (2) envoys and ministers plenipotentiary; (3) ministers resident, accredited to the sovereign; (4) chargés d'affaires.

The ambassador is supposed to represent directly the head of his state, who signs his credentials, or letters of credence, and the ambassador therefore enjoys of right the privilege of personal communication with the sovereign to whom he is accredited. Ministers and chargés d'affaires do not, in theory, possess this right, though in the case of the minister, at least, the privilege is not usually denied. The chargé d'affaires is, in fact, not accredited to the sovereign, but to the minister of foreign affairs, and is regarded merely as an agent of his government to transact the business intrusted to him. Modern methods of carrying on the diplomatic intercourse of states have greatly diminished the relative importance of ambassadors, as compared with other diplomatic agents, and little remains of their primacy excepting a superior dignity and impressiveness and certain rights of precedence on ceremonial occasions. Prior to 1893 the government of the United States had been represented abroad by no agents of higher rank than ministers resident, who were, in the case of the great Powers, accredited as envoys extraordinary and ministers plenipotentiary. But in that year Congress passed an act authorizing the President to accredit ambassadors to certain European courts. Later the work of ambassador was conferred on the ministers to Mexico, Brazil, and Japan. The countries in which the United States was represented by ambassadors in 1913 were Austria-Hungary, Brazil, France, Germany, Great Britain, Italy, Japan, Mexico, Russia, and Turkey. The privileges and immunities of ambassadors are dealt with under DIPLOMATIC AGENTS. See also ASYLUM, RIGHT OF; EXTERRITORIALITY; LEGATION.

AMBATO, äm-bä'tō, or ASIENTO DE AMBATO, ä-syän'tō dā äm-bä'tō. A town in the province of Leon, Ecuador, on the northeastern slope of Chimborazo, 78 miles south of Quito, and 8859 feet above sea level (Map: Brazil, B 4). It was destroyed in 1698 by an eruption of Cotopaxi, but was rebuilt and flourished rapidly. It manufactures shoes and carries on an active trade in grain, sugar, and cochineal, which are produced in the surrounding region. In 1913 work was begun on the Ambato to Curaray Railway. This opens up a territory in the eastern part of the country which is rich in minerals, timber, and stock raising and agricultural advantages. Pop., about 10,000.

AM'BER (from Ar. *'anbar*, ambergris; called so from its resemblance to ambergris). A fossil resin of vegetable origin. It is usually of a pale-yellow color, sometimes reddish or brownish; it is sometimes transparent, sometimes almost opaque. It occurs in round irregular lumps, grains, or drops; has a perfectly conchoidal fracture, is slightly brittle, emits an agreeable odor when rubbed, melts at 550° F., and burns with a bright flame and pleasant smell. Thales of Miletus was the first to notice that when amber is rubbed it becomes capable of attracting light bodies; this was the first electric phenomenon produced by man. An acid called succinic acid (named from the Lat. *succinum*, amber) is obtained from it by distillation. Amber had formerly a high reputation as a medicine, but the virtues ascribed to it were almost entirely imaginary. It is employed in the arts for the manufacture of many ornamental articles and for the preparation of a kind of varnish. Great quantities are consumed in Mohammedan worship at Mecca, and it is in great demand throughout the East. It was obtained by the ancients from the coasts of the Baltic Sea, where it is still found, especially between Königsberg and Memel, in greater abundance than anywhere else in the world. It is there partly cast up by the sea, partly obtained by means of nets, and partly dug out of a bed of carbonized wood. Limited quantities of it are found in the United States. It sometimes occurs in diluvial deposits, as in the gravel near London; but it is very rare in Great Britain. It is obtained in small quantities from the coasts of Sicily and the Adriatic, and is found in different parts of Europe, in Siberia, Greenland, etc. It sometimes incloses insects of species which no longer exist. Leaves have also been found inclosed in it. Specimens which contain insects or leaves being much valued, artificial substitutes are often manufactured and imposed upon collectors. According to an ancient fable, amber is the tears of the sisters of Phaëthon, who, after his death, were changed into poplars. The ancients set an immense value upon it. Pieces of amber have occasionally been found of twelve or thirteen pounds weight, but such pieces are extremely rare.

AMBER-FISH. Any of several carangoid fishes of the genus *Seriola*, numerous on both coasts of North America, which are of moderate size, graceful form, often brightly colored and excellent to eat. The commonest species of the Atlantic coast is *Seriola lalandi*. On the Pacific coast an allied species (*Seriola dorsalis*), the yellowtail, is highly valued as a food-fish and by anglers. For further discussion and illustration, see HORSE MACKEREL.

AMBERG, äm'bĕrk. The old capital of the Upper Palatinate in Bavaria, 35 miles east of Nuremberg and 32 north of Ratisbon (Map: Bavaria, D 4). It is situated on both sides of the Vils and is well built. The ancient walls are now transformed into shady avenues. Amberg is the seat of the court of appeal for the district, possesses a library of 34,000 volumes, a lyceum, an agricultural and industrial school, a municipal hospital, a house of correction, and numerous churches, among which St. Martin's, with a 300-foot tower, is especially noteworthy. There is located here a royal factory for the manufacture of small arms. The principal products are earthenware, woolen cloths, ironmongery, and beer. Some coal and iron is mined in the vicinity. Near Amberg Archduke Charles defeated the French under Jourdan on Aug. 24, 1796. Pop., 1890, 19,000; in 1900, 22,096; in 1905, 24,303; 1910, 25,222.

AMBERGER, ăm'bĕrk-ēr, CHRISTOPH (c.1500–c.1561?). A German painter of the Renaissance. The date and place of his birth are unknown, but he practiced chiefly at Augsburg, where he was active from c.1530. He developed under the influence of Hans Burgkmair and was affected by Venetian color. His portraits are characterized by a distinguished bearing and by a soft pictorial treatment. The most important are those of the Emperor Charles V (1532) in the Berlin Gallery, a young member of the Fugger family (1541) in private possession at Augsburg, and the geographer Sebastian Münster (1532), also in Berlin. His altarpieces are mannered and show greater Italian influence. By far the best is a triptych in the cathedral at Augsburg, dating from 1554 and representing the "Madonna with Angels Making Music," and wings representing Sts. Ulric and Afra. Consult his biography by Haasler (Königsberg, 1894).

AMBERGRIS, ăm'bĕr-grēs (Fr. *ambre gris,* gray amber; Ar. *'anbar*). Also spelled *ambergrise* and *ambergrease.* A fatty secretion formed in the bowels of some sperm whales (q.v.) and valued as a material for perfume. It is taken from whales directly, but more often is found floating in waters (especially of the tropics) frequented by these cetaceans, or cast upon the beaches in lumps of all sizes up to a mass exceeding 200 pounds in weight. It is lighter than water, gray marbled with blackish in color, opaque and waxy in consistency, softens readily under heat, melting into resinous liquid at 145° F., and develops on exposure to the air a sweet, "earthy" odor in place of its disagreeable smell when first taken from a whale. Chemically, it is soluble in oils, but resists acids; and it dissolves readily in hot alcohol, yielding a substance termed "ambrein." As this is closely related chemically to known biliary secretions, it is further evidence that ambergris is of this nature, perhaps induced by, and partaking of, the squids upon which the sperm whale largely feeds, remains of whose beaks are frequently found mixed with it. Like other bezoars and substances of mysterious origin, ambergris was formerly regarded as an efficacious medicine, but its virtues were imaginary, and it is no longer used in pharmacy, nor as a flavor in cookery, except among a few barbarians of the East. It has a high commercial value, however, as a material for the manufacture of various perfumes, and the price is increasing, owing to the increasing rarity of the sperm whale and a growing demand. Hence it is adulterated and imitated; a test of its genuineness is described as "its solubility in hot alcohol, its fragrant odor, and its uniform fatty consistence on being penetrated by a hot wire."

AM'BER ISLANDS, or ELECTRIDES. In later Greek geography, the islands, famed for their amber, situated in the North Sea, from Denmark to the mouth of the Rhine. Also certain islands at the mouth of the legendary river Eridanus (the Po).

AMBERT, ăN'bâr'. An ancient town in the department of Puy-de-Dome, France, 34 miles southeast of Clermont (Map: Southern France, H 3). It is situated 1730 feet above sea level and is on the Dore River. It contains a church of the fifteenth and sixteenth centuries, and the manufactures include lace, rosaries, paper, and ribbons. There is some trade in cheese. Pop., 1911, 7863.

AMBERT, JOACHIM MARIE JEAN JACQUES (1804–90). A French General and writer. He was born at Chillas, near Cahors (Lot), and was educated at Saint-Cyr. He served in the Spanish and Belgian campaigns, distinguished himself in Algeria, and became Brigadier-General in Europe. He traveled extensively in Europe and America and for some time was a contributor to *L'Abeille,* a French journal published at New Orleans. Among his numerous writings are: *Etudes tactiques* (1865); *Histoire de la guerre de 1870-71* (1873); *Les soldats français* (1878–82); *Gaulois et germains, récits militaires* (1884–86).

AM'BER WITCH, THE. An English opera by W. V. Wallace, the text being by H. F. Chorley, first presented at Her Majesty's Theatre, London, Feb. 28, 1861. Its incidents are based on those of a German story by Meinhold (1843).

AM'BIGU'ITY (Lat. *ambiguus,* going about hither and thither, uncertain, doubtful). In law, the duplicity or uncertainty of meaning of a word, clause, or other part of a written instrument. The rule of evidence forbidding the admission of parol evidence to contradict, vary, or explain a written document is subject to the important exception that parol evidence may be introduced for the purpose of explaining an ambiguity in a written instrument. Lord Bacon's classification of ambiguities as "latent" and "patent" has been generally accepted by the courts, but has little importance. A patent ambiguity is one which appears on the face of an instrument without referring to any intrinsic fact or circumstance. Thus, if a testator after referring in his will to two persons named John, made a bequest to John, the term of the bequest would constitute a patent ambiguity. A latent ambiguity is one which is disclosed only by the proof of extrinsic facts. Thus, if a testator made a bequest to a person, naming or otherwise describing him, and it appeared extrinsically that there were two persons answering the description, the terms of the bequest would constitute a latent ambiguity. It is sometimes said that parol evidence cannot be introduced to explain a patent ambiguity. The statement is much too broad. In any case the underlying facts necessary to put the court in the position of the writer may be proven by extrinsic evidence, whereas direct evidence of intention, as declarations of intention by the writer, will be received, only in that kind of latent ambiguity known as an equivocation, where the name or description employed is equally applicable to two or more persons or things. See the authorities named under the titles CONTRACT, WILL, and EVIDENCE.

AMBI'ORIX. A chief of the Eburones in Belgic Gaul, who fought against Julius Cæsar in 54 B.C. By cunning and strategy he defeated one important Roman garrison under Sabinus and Cotta and massacred every man; but while on the march to another camp, he encountered Cæsar himself, who easily defeated him, though Ambiorix with a few men escaped into the forests.

AMBI'TIOUS STEP'MOTHER, THE. A tragedy by Nicholas Rowe, produced and printed in 1700. The scene is laid in Persepolis.

AM'BLER, JAMES MARKHAM MARSHALL (1848–81). An American surgeon, born in Fauquier Co., Va., and educated at the medical college of the University of Maryland. From 1874 to 1879 he was assistant and past-assistant surgeon, U. S. navy. He volunteered as

surgeon to the *Jeannette* Arctic expedition in 1879 (see De Long, George W.), and was in the first cutter with De Long when the officers and crew left the sinking vessel (June 13, 1881). His body was found March 23, 1882, and buried on Monument Hill, on the Lena Delta, where a pyramidal structure of stone and timber was erected to the memory of the explorers.

AMBLER. A borough in Montgomery Co., Pa., 16 miles northwest of Philadelphia, on the Philadelphia and Reading Railroad (Map: Pennsylvania, L 7). The region is chiefly agricultural, producing wheat, hay, rye, and dairy products. The borough has a Methodist Episcopalian church which is celebrated for its beautiful stained-glass windows. There are many places of historic interest, notably, Fort Washington, General Washington's old camping ground, and the home of Gen. George Meade. At Ambler is located a very large chemical factory, and there is also a large asbestos, shingle, slate, and sheathing company. The town is a popular summer resort for Philadelphians. Pop., 1900, 1884; 1910, 2649; 1913 (est.), 4000.

AM'BLESIDE. A town in the heart of the English lake district, Westmoreland; a favorite resort for tourists on account of its scenery and its nearness to points of historic interest, the homes of Wordsworth, Dr. Arnold, and others. Fragments of Roman buildings have been found in the neighborhood. Stock Gill Force is a waterfall in the hills near the town. Pop., 1901, 2536.

AMBLETEUSE, ăn'blĕ'-tēz'. A seacoast village of France, in the department of Pas-de-Calais, on the English Channel, about 15 miles southwest of Calais and 6 miles north of Boulogne. It is famous as the landing place of James II, after his flight from England in 1689. There is a monument erected by Napoleon to the Grand Army in 1805. Pop., 1901, 685; 1911, 814.

AM'BLYO'PIA (Gk. *ἀμβλυώπια*, dim-sightedness, from *ἀμβλύς, amblys*, blunt, dull + *ὤψ, ōps*, eye). A name given to diminished acuteness of vision not relieved by the use of glasses and in many cases not accompanied by any visible ocular changes. The term is, however, sometimes more loosely used to include other forms of imperfect sight. Congenital amblyopia of one or both eyes is often due to hyperopia, myopia, or astigmatism. These prevent perfect vision, and although the use of proper glasses may eventually cause an improvement in young persons, this is impossible if the lack of proper vision has lasted long. Congenital amblyopia for colors (see Color Blindness) may occur with a contraction of the visual field. Hysterical amblyopia, usually unilateral, may amount to total blindness. There is contraction concentrically of the field of vision for white and colors, and the fields for colors do not maintain the relative sizes which they normally possess. There are generally other hysterical symptoms. Simulated amblyopia is pretended blindness in one or both eyes. Toxic amblyopia is produced at times by large doses of quinine, or excessive and continual use of tobacco, alcohol, particularly wood alcohol, opium, and other drugs. If the drug is entirely given up recovery may occur after a long time. Malarial amblyopia of one or both eyes is usually relieved by quinine. Uræmic amblyopia sometimes appears suddenly in both eyes during an attack of uræmia, without retinal changes, though at times accompanying an albuminuric retinitis. It is generally very transitory. *Amblyopia ex anopsia* is a term applied to partial or complete blindness in an eye from disuse, such as occurs in strabismus or squint. See Sight, Defects of.

AM'BLYOP'SIDÆ (Gk. *ἀμβλύς, amblys*, dull + *ὄψις, opsis*, the look, eyesight). A family of small fishes allied to the cyprinodonts mostly living underground and having their eyes in varying degrees of degeneration. See Cave Animals.

AMBLYP'ODA (Gk. *ἀμβλύς*, blunt + *πούς*, foot). An order of Eocene mammals, including all the short-footed, archaic ungulates. Four families are recognized—the periptychids, pantolambdids, coryphodonts, and uintatheres. The group was of Holarctic origin, and the most general character was the stumpy feet, furnished with five toes, supporting stout, pillar-like limbs. The earliest known forms were of medium size, and partly arboreal; later forms (Coryphodon) equaled small rhinoceroses in size, and were furnished with defensive canine tusks. They were feebly muscled, with short tail, clumsy feet, and of amphibious habits. Finally, the huge uintatheres became the dominant quadrupeds of the Middle Eocene. These great creatures had long narrow skulls with three pairs of horn-cores on the facial portion.

The group seems to have become suddenly extinct in the Upper Eocene. It is astonishing that these exceedingly clumsy and defenseless animals, handicapped by a most diminutive brain, should have survived and steadily increased in size throughout so long a period. We may attribute their extinction to either of two causes —either the low brain power which may have inhibited proper defense and care of the offspring, or the arrested development of the grinding teeth, which are neither larger nor more effective for the comminution of food in the gigantic uintathere than in the much smaller coryphodon. For details, consult Cope, *Vertebrata of the Tertiary Formations of the West* (1884); Osborn, "Evolution of the Amblypoda," *Bull. Amer. Mus. Nat. Hist.* (1898); Matthews, "A Revision of the Puerco Fauna," id. (1897); *Monographs of the United States Geological Survey* (Washington, 1884); Osborn, *The Age of Mammals* (1910).

AMBLYS'TOMA (Gk. *ἀμβλύς, amblys*, blunt, dull + *στόμα, stoma*, mouth). A genus of salamanders ranging over Mexico and the United States. They generally prefer damp climates, for the 15 or more species are grouped in the watered regions on either side of the arid plains. Only one species (*Amblystoma tigrinum*) ranges over all of the United States and into Mexico. The eastern examples transform early and while yet small. The larval or "axolotl" stage of the western forms grows large, transforms late, and may even become sexually mature while still bearing external gills. One Mexican form has never been observed to metamorphose. See Axolotl; Salamander.

AM'BO (Lat. *ambo*, Gk. *ἄμβων*, from *ἀναβαίνειν*, to ascend). The pulpit or reading-desk used in the early Christian churches. There were usually two of them, placed on either side of the raised choir for the lower clergy, which occupied the upper part of the middle nave, below the altar. These ambones were entered from within the choir and stood on its outside edge, toward the aisles, connected with the encircling parapet or screen. They had usually a double staircase on either side and three levels

—the upper for the reading of the Gospels and for preaching, confessions of faith, and important ecclesiastical announcements; the middle one for the reading of the Epistles; the lower for other parts of the Bible. Usually one ambo was devoted to the reading of the Gospels, and near it stood the paschal candlestick, while the second ambo was for the Epistles. The earliest ambones are at Ravenna (cathedral and Sant' Apollinare). Those at Rome are mediæval (San Clemente, San Lorenzo), but are better preserved. They were of marble, merely carved in the earliest examples, inlaid with mosaics in later times. To the form with a single stairway the term "pulpit" is more appropriate. See PULPIT.

AMBOI'NA (Malay *Ambun*), APON, or THAU. The most important of the Moluccas, belonging to the Dutch, and lying southwest of Ceram and northwest of Banda. The island has an area of 264 square miles and is divided by the Bay of Amboina into two unequal peninsulas (Map: East India Islands, G 5)—Hitu the larger, and Leitimor, the smaller. The surface is irregular, highly mountainous, but fertile. There are many small streams which are not navigable. The soil is fertile and produces coffee, pepper, indigo, and rice. But the main product of the island is the clove, which grows there in abundance and constitutes the chief article of commerce. A great part of the island is covered with forests full of valuable woods. The inhabitants number about 39,000. They are physically and linguistically Malayan, although some Papuan admixture from Ceram has occurred. They have also Portuguese blood. Their language contains a considerable Portuguese element, and their religion is Protestantism (introduced by the Dutch), with the addition of rites and ceremonies borrowed from the Portuguese Catholics and inherited from their aboriginal past. The residency of Amboina comprises, besides the Amboina Island, the southern Moluccas, the Banda group, Ceram, Buru, Kei Islands, Aru Islands, and a few other islands, with a total area of 19,871 square miles and a population, 1905, of 299,004, of whom 2232 are Europeans and 1353 Chinese. The capital of the island and of the residency is Amboina. The history of Amboina is similar to that of the Moluccas, except for the massacre of the British settlers by the Dutch in 1623, for which the Dutch government was compelled by Cromwell in 1654 to pay the sum of £300,000, in addition to a small island, as a compensation to the families of the massacred. Consult: *The Barbarous Proceedings against the English at Amboyna* (London, 1651); Beaumont, *Dutch Alliances* (London, 1712); Verbeek, "Over de geologie van Ambon," in vols. vi and vii, *Knoninklijke akademie van wetenschappen* (Amsterdam, 1899).

AMBOINA. The capital of the Dutch residency of that name (q.v.), situated near the middle of the northwest shore of Leitimor, one of the peninsulas of the island of Amboina, in the Moluccas in 3° 41′ S. lat., and 128° E. long. It is well built, has wide streets, and contains a church, several schools, a hospital, and an orphan asylum. The government buildings are situated in Fort Victoria. The roadstead is spacious and affords safe anchorage. Fishing is the occupation of many inhabitants. The town suffered considerably during an earthquake in January, 1898. Pop., 1900, 7978.

AMBOINA WOOD. See KIABOUCCA.

AMBOISE, äN'bwäz'. A town on the left bank of the Loire, in the department of Indre-et-Loire, France. It is 15 miles by rail east of Tours and lies in a region so rich in vineyards that it has been called "the garden of France." The town has considerable steel and woolen manufactures, and trade in leather and cloth. It possesses a castle, in which several of the French kings have resided, and in which Charles VIII was born. The town owes much of its importance to the renown of the great churchmen and statesmen, Cardinal Georges and François Charles d'Amboise. It is memorable as the scene of the commencement of religious wars which devastated the kingdom during the sixteenth century, and where the word "Huguenot" was first applied to the Protestant party. The castle of Amboise was much improved by Louis Philippe, and was the residence of the Arab chief Abd-el-Kader during his captivity in France. Pop., 1901, 4538; 1911, 4660. Consult Chevalier, *Inventaire analytique des archives communales d'Amboise, 1421–1789* (Tours, 1874).

AMBOISE, äm'bwäz, AIMERIC D' (?–1512). A French Admiral. He was Grand Master of the Knights of St. John in Rhodes in 1503, and in 1510 he defeated the Sultan of Egypt in a sea fight.

AMBOISE, GEORGES D' (1460–1510). Cardinal and Prime Minister under Louis XII of France. He was born at Chaumont-sur-Loire. At a very early age he became almoner to Louis XI. It is generally stated that he became Bishop of Montauban at 14; later he was made Archbishop of Narbonne, in 1493 Archbishop of Rouen, and in 1498 Cardinal. Initiated in early years into the intrigues of the court, he soon, by his zealous services, secured the confidence of Louis of Orleans (Louis XII), by whom he was made Premier in 1498. From this time Amboise became the prime mover in all the political affairs of France. By his advice the King undertook the conquest of Milan, which had such great influence on the fortunes of France. After the death of Pope Alexander VI Amboise endeavored to get himself elected as Pope. At first he attempted to terrorize the conclave of cardinals by military force, but he was induced to dismiss his forces and then first Pius III—who occupied the papal chair only 27 days—and later Julius II were elected. Amboise was made Legate of France for life. Cardinal Amboise was a dexterous, experienced, and ambitious statesman. He governed France wisely, introduced reforms in the judicial system, reduced taxation and by his benevolence earned the respect of the whole nation. He died in Lyons, May 25, 1510, but his body was carried to Rouen, where his tomb is one of the striking features in the cathedral. Consult Legendre, *Vie du Cardinal d'Amboise* (Rouen, 1726), and *Lavisse, Histoire de France*, vol. v (Paris, 1903).

AM'BOY CLAYS. A great series of upper Cretaceous clay deposits found extensively developed in northeastern New Jersey, especially in the region around Perth Amboy, whence the name. The beds, which are of non-marine origin, are also known as the Raritan clays, because the Raritan River flows through the area in which they outcrop, and their total thickness, including the interbedded sands, is about 350 feet. A few of the beds contain an abundance of plant remains as well as some of mollusks. The Amboy clays are of great eco-

nomic value, being used in the manufacture of chinaware, firebricks, stoneware, brick, and tile. Large pits have been opened in the deposits at Perth Amboy, South Amboy, Woodbridge, and other points. The clays are used chiefly within the State, but large quantities are also sent to neighboring States. See CRETACEOUS SYSTEM; FIRECLAY; CLAY.

AMBOYNA. See AMBOINA.

AMBRACIA, ăm-brā'shĭ-ȧ (Gk. Ἀμβρακία, *Ambrakia*). A Greek city in the southern part of Thesprotia, in Epirus, on the Arachthus River, about 10 miles from its mouth. It was colonized by the Corinthians, under the leadership of Gorgus, son of Cypselus, in the latter half of the seventh century B.C., and soon rose to a position of great wealth and power. Later, it came under Macedonian control. Pyrrhus of Epirus received it from Cassander as a reward for help against his brother Antipater; he made it his capital and enriched it with many public buildings and works of art. The latter were removed and carried to Rome when the town was taken by the Romans in 189 B.C. After Augustus, in 31 B.C., transferred the inhabitants of Ambracia to the newly founded city of Nicopolis, Ambracia sank into insignificance. The modern town is Arta. See Oberhummer, *Akarnanien, Ambrakia, Amphilochien, Leukas im Altertum* (Munich, 1887); Leake, *Travels in Northern Greece*, vol. i, pp. 205 ff. (London, 1835).

AMBRA'CIAN GULF. See ARTA, GULF OF.

AM'BREE, MARY. The subject of a ballad included in Percy's *Reliques of Ancient English Poetry;* a woman who, to avenge the death of her lover, is said to have disguised herself as a soldier and fought against the Spaniards at the siege of Ghent in 1584. Though unknown in history, she is frequently alluded to by the poets, especially by Ben Jonson, who refers to her in his *Epicœne* (iv, 2), *Tale of a Tub* (i, 2), and *Fortunate Isles;* by Fletcher, in his *Scornful Lady* (Act v); and by others of the period, to whom she became a sort of typical virago.

AMBRIDGE. A borough in Beaver Co., Pa., 16 miles northwest of Pittsburgh, on the Pennsylvania Railroad and the Ohio River (Map: Pennsylvania, A 6). The industries of the borough include bridge building, metal molding, and the manufacture of tubes. The water works are owned by the municipality. Pop., 1910, 5205; 1913 (est.), 8000; 1920, 12,730.

AMBRIZ, ȧm-brēz'. A seaport town, the capital of a district of the same name, in Portuguese Angola, West Africa. It is 70 miles north of Loanda, at the mouth of the Loje River, and has a large export trade in coffee, ivory, and gums. Extensive copper deposits exist in the district. Its occupation dates from 1855. Pop., 2500.

AMBROGIO IL CAMALDOLESE, ȧm-brō'jō ēl kȧ-mäl'dō-lā'zā (properly AMBROGIO TRAVERSARI) (1378–1439). An Italian humanist and Greek scholar, born in the Romagna. He early entered the Convent degli Angeli at Florence, studied the Greek ecclesiastical writers in the original when a knowledge of Greek was rare even among scholars, and in 1431 was appointed Director-General of the Camaldolese Order by Eugenius IV. A member of the circle which Cosimo de' Medici had assembled at Florence for the restoration of the studies of antiquity, he prepared at his request a translation of Diogenes Laërtius. Symonds refers to him as a "little, meagre, lively, and laborious man."

AMBROS, ăm'brōs, AUGUST WILHELM (1816–76). One of the greatest authorities on the history of music. He was born at Mauth, near Prague, and received his education at the gymnasium and University of Prague. In 1840 he entered the office of the Attorney-General, where his exceptional ability was soon recognized, so that in 1850 he was appointed Attorney-General. Decided musical ability manifested itself very early, but his parents obstinately refused to have this talent cultivated. Nevertheless he secretly studied piano and composition with such success that he repeatedly appeared in public as a pianist. His compositions include several overtures, a Stabat Mater, two Masses (in B flat and A minor), a national opera, *Bretislav a Jitka*, and numerous pieces for piano. These are well written, and betray the influence of Schumann. In 1872 he received an appointment at the Ministry of Justice in Vienna and a professorship at the Conservatory. He first attracted attention by his *Grenzen der Poesie und Musik* (1856), a reply to Hanslick's *Vom Musikalisch Schönen*, which had appeared two years previously. In 1860 he published his important *Kulturhistorische Bilder aus dem Musikleben der Gegenwart*. Under the pseudonym "Flamin" he contributed many excellent criticisms to Schumann's *Neue Zeitschrift für Musik*. His great fame, however, rests on his *Geschichte der Musik*, which he began in 1860. It is entirely the result of original researches. In the accomplishment of this difficult task he had the hearty coöperation of the government and the Viennese Akademie, the former granting him extended leaves of absence and the latter substantial funds. In his quest for materials he ransacked the rich libraries of Vienna, Venice, Rome, Bologna, Florence, Naples, and Munich. Unfortunately he died before the completion of the fourth volume, which treats of Palestrina and the beginning of dramatic music. The work was completed by F. W. Langhans (q.v.) under the title *Geschichte der Musik des 17, 18 und 19 Jahrhunderts* (1882–87). The original four volumes have been revised by Sokolowsky, Reimann, and Leichtentritt, who have made use of the most recent investigations up to 1911.

AMBROSE (fl. 1190). A Norman poet and chronicler. He is known through his work called *L'Estoire de la guerre sainte*. This manuscript, discovered by Gaston Paris, describes in verse the adventures of Richard Cœur de Lion as a crusader in the Holy Land in 1190–92. Consult Gaston Paris's edition of the poem in his *Collection des documents inédits sur l'histoire de France* (1897).

AMBROSE. A swindler in Lesage's *Gil Blas*, who, in league with a young man and women, all disguised, entices Gil Blas into a house which the girl says is hers. Here they relieve him of his ring and his money. They then decamp, and he finds out that the house is only a hired lodging.

AM'BROSE, SAINT (c.340–397). One of the most celebrated of the ancient Fathers of the Church and one of the four doctors of the Western church. He was born at Trèves, where his father, as Prefect of Gaul, was wont to reside. According to his earliest biographer, Ambrose received a fortunate omen even in his cradle: a swarm of bees covered the slumbering boy, and the astonished nurse saw that the bees

clustered round his mouth without doing him any harm. His father, perhaps remembering a similar wonder related of Plato, foretold from this a high destiny for Ambrose. He received an excellent education in Rome with his brother Satyrus, who died early, and his sister Marcellina, who became a nun. Ambrose studied law and entered the civil service, and soon distinguished himself so much that he became, about 370, a consular magistrate in Upper Italy, with his court at Milan. In this office his gentleness and wisdom won for him the esteem and love of the people, whose prosperity had been much injured by the troubles caused by Arianism. Accordingly he was unanimously called, by both Arians and Catholics, to be Bishop of Milan in 374. He long refused to accept this dignity and even left the city; yet he soon returned, was baptized, as hitherto he had been only a catechumen, and was consecrated eight days afterward. The anniversary of this event is still celebrated as a *fête* by the Catholic church. As a bishop, Ambrose won universal reverence by his mild and gentle, though, toward wickedness of every kind, severe and unbending character. Thus he defended the churches of Milan against the proposed introduction of Arian worship by the Empress Justina (385–386), and brought to repentance and public penance the Emperor Theodosius himself, who had caused the rebellious Thessalonians to be cruelly massacred by Rufinus (390). He is best remembered, however, not as the faithful bishop and wise counselor, nor as the fluent preacher and learned theologian, but as the sympathizing friend of Monica, the mother of Augustine, when she deplored his rejection of orthodox Christian teaching, and as the one whom Augustine heard with pleasure and who received him into the Church. Ambrose died in Milan, April 4, 397. The Ambrosian ritual has also received his name only because Ambrose had made some changes in it, which are retained at the present day in the Milanese church. A commentary on the Epistles of Paul, which was formerly ascribed to Ambrose, is now frequently ascribed to the Roman deacon Hilarius, and is usually quoted as the "Commentary of the Ambrosiaster." Ambrose is the patron saint of Milan, and the large Ambrosian Library (q.v.) received its name in honor of him. The best edition of his works, in which he followed in many things the Greek theological writers, is that published by the Benedictines (2 vols., Paris, 1686–90), reprinted in Migne, *Patr. Lat.*, xiv–xvii, later edited by Ballerini (6 vols., Milan, 1875–86); by C. Schenkle in *Corpus Scriptorum Ecclesiasticorum Latinorum* (Vienna, 1896 sqq.); English translation of some of his principal works by H. de Romestin (New York, 1896). For his biography, consult Barry (London, 1896). His fifteenth centenary was observed in Milan in 1897. Consult *Il Quindici Centenario della morte di S. Ambrogio* (Milan, 1897).

AM'BROSE'S TAV'ERN. An old tavern in Edinburgh, noted as the scene of the *Noctes Ambrosianæ* (q.v.) by Christopher North (John Wilson). It is no longer standing; its site is occupied by the new register house.

AMBRO'SIA, ăm-brō'zhĭ-ȧ (Gk. *ἀμβροσία*, from *ἄμβροτος*, *ambrotos*, immortal, from *ἀ*, *a*, priv. + *βροτός*, *brotos*, for **μροτός*, **mrotos*, mortal). In the classical mythology, with *nectar* (q.v.), the food and drink of the gods. The word is etymologically identical with the Sanskrit *a-mṛta*, immortal, drink of immortality, and the same root appears in the Latin, *im-mortalis*. Properly, then, *ambrosia* denotes merely immortality, the natural element, the natural sustenance of gods. Naturally, therefore, the gods not only ate ambrosia, but also bathed and anointed themselves with it; and the adjective *ambrosial* may be applied to any of their possessions. Without ambrosia the gods lose their strength; if given to mortals, it confers ageless immortality. It also preserves bodies from decay. The conception of the nature of ambrosia varied, according to its use. As a food, it was like bread; as nectar, like wine. In some of the later writers, nectar becomes the food and ambrosia the drink of the gods. This variation is natural enough, since originally ambrosia and nectar were identical.

AMBRO'SIA BEE'TLES. Beetles of the family Scolytidæ, which differ from the bark-borers by pushing their galleries deeply into timberwood and feeding upon a substance called "ambrosia." They include the genera *Xyleborus*, *Platypus*, *Corthylus*, and their allies, and are common and often injurious throughout North America. All are very small, elongate, compact beetles, of the form shown in the illustrations of their work on the Plate illustrating Army-Worm and Ambrosia Beetles, and their cylindrical galleries rarely exceed a tenth of an inch in diameter. These galleries penetrate the solid wood deeply, ramify widely, are uniform and free from dust, and have many short branches, serving as brood-cells; their walls are stained, and the perforations and stain injure the wood for many uses, although not sufficient to harm the life of the tree perceptibly. The most interesting feature of their history is the care given to their young, and the cultivation of fungi—acts unique among beetles, and comparable to those of the social hymenoptera. Habits and methods vary among the different genera, but in general are as follows: Within their galleries is found a substance, taking various forms, most usually that of a cluster of chains of beads, which has been named "ambrosia," and which is shown by the microscope to be a fungus. This fungus is succulent, and forms the food of the insects and their young, and it is planted and cultivated by these beetles, which regard its safety with the apparently anxious solicitude that bees feel toward their stores of honey food. It is started by the mother insect upon a carefully prepared bed of wood dust, some species devoting special chambers to this purpose, others starting a bed anywhere near the larvæ, using the excrement of the larvæ as an aid to its propagation. Sap must be present, however, in order to secure its growth, and in most species the sap must be in a condition of fermentation. Then the fungus must be eaten as it grows—kept grazed down—or it will ripen, emit spores, and choke up the tunnels. All these difficulties are so well met by these minute gardeners that many generations in succession sometimes inhabit and continue to enlarge their system of galleries. These are sometimes bored in vigorous timber, but more often in weak trees, and dead wood is sometimes occupied, certain species exhibiting a special predilection for the staves of wine casks. A full treatment of this group and their customs and effects has been given by H. G. Hubbard, *United States Department of Agriculture*, new series, *Division of Entomology, Bulletin No. 7* (Washington, 1897).

AMBRO'SIAN CHANT. The choral music

of the early Christian Church, introduced from the Eastern church into the Western by St. Ambrose, Bishop of Milan, in the fourth century. About the real character of this music little is known. It resembled the Gregorian chant, which did not replace it, but was only a general revision of it. It has been stated that St. Ambrose adopted the four authentic modes (see MODES) from the Eastern church. Although it is probable that he did so, the point has not yet been established by positive evidence. That even after the Gregorian revision the Milan liturgy retained some special characteristics, we learn from the statements of some mediæval writers; but what these peculiarities were we do not know. Proof is wanting that the famous "Ambrosian Hymn," *Te Deum laudamus*, was composed by St. Ambrose; it seems probable that this melody was also taken over from the Eastern church. Consult: Camilla Perego, *Regola del canto Ambrosiano* (Milan, 1862); A. W. Ambros, *Geschichte der Musik*, vol. ii (Breslau, 1862–82); G. M. Dreves, *Aurelius Ambrosius, der Vater des Kirchengesanges* (Freiburg, 1893); F. A. Gevaert, *La Mélopée antique dans le chant de l'église latine* (Ghent, 1895); G. Houdard, *La Cantilène Romaine* (Paris, 1905); P. Wagner, *Ursprung und Entwicklung der liturgischen Gesangsformen bis zum Ausgange des Mittelalter* (Leipzig, 1910); E. Garbagnati, *Riviste sul antica salmodia ambrosiana* (Rome, 1912); A. Steier, *Untersuchungen über die Echtheit der Hymnen des Ambrosius* (Leipzig, 1903).

AMBRO'SIAN LI'BRARY. A famous library in Milan, so named in honor of St. Ambrose, the patron saint of the city. It was founded in 1609 by Cardinal Federigo Borromeo, who, in 1609, formally opened it to the public. The library contains upward of 230,000 printed volumes and 8400 manuscripts, some of them of great value. Among the latter the chief treasures are a Greek Pentateuch of the fifth century; several palimpsest texts, including an early Plautus; fragments of Ulfilas's Gothic translation of the Bible; the celebrated Codex Atlanticus, containing original drawings and MSS. by Leonardo da Vinci, and a copy of Vergil with marginal notes by Petrarch. The library possesses a small but excellent collection of paintings, including Raphael's cartoon for the "School of Athens," and the celebrated portrait of Bianca Sforza by Ambruogio da Predis.

AMBRO'SIAS'TER. The name by which the unknown author of the *Commentaria in xiii Epistolas beati Pauli* is known. The use of this name is due to the fact that from the middle of the ninth century to the time of Erasmus this work was generally ascribed to Ambrose of Milan. This authorship Erasmus held to be doubtful—a position which is confirmed not only by the lack of all external evidence in its favor, but by definite internal evidence against it.

Owing to the citation by Augustine of a passage from these Commentaries as by St. Hilary, it has been thought by some critics that they are to be identified with the lost commentary of Hilary of Poitiers on the Epistles. Others in turn have ascribed them to well-nigh every Hilary of antiquity.

In 1899 Dom Morin, in the *Revue d'histoire et de littérature religieuses*, suggested that they were the work of Isaac, a professed convert from Judaism, who was exiled to Spain in 378–380 and is said thereupon to have relapsed to his former faith. This view Morin later withdrew in favor of an authorship by Decimus Hilarianus Hilarius, proconsul of Africa in 377. As between these two views modern scholars are somewhat divided, though they are one in attributing to the author of the Commentaries the pseudo-Augustinian work known as *Quæstiones ex utroque testamento*.

However the authorship of these two works may be decided, it is acknowledged that the Commentaries give perhaps the most sane, lucid, and thoughtful exposition of the Pauline Epistles previous to the Reformation, while the Questions constitute the earliest presentation which we have of biblical difficulties. See Souter, *A Study of Ambrosiaster* (1905); Turner, in *Journal of Theological Studies* (April, 1906).

AMBRO'SIO, or THE MONK. A romance by M. G. Lewis (hence known as "Monk" Lewis), first published in 1795. The hero is a Capuchin abbot of Madrid, who loses his character and is condemned by the Inquisition, but saves himself for a time by a compact with Lucifer.

AM'BROTYPE (Gk. *ἄμβροτος, ambrotos*, immortal + *τύπος, typos*, impression). An early form of positive photograph on glass, similar to the daguerreotype. It consisted of a thin collodion negative backed with a black surface and viewed by reflected light.

AM'BRY, AUMERY, or ALMERY (OF. *almarie*, Fr. *armoire*, from Lat. *armarium*, a closet, chest; for the *b*, see ALHAMBRA). A niche in the wall of a church shut in by a door, or a small cabinet of wood by the altar, holding the vestments and utensils for the mass. In monastic buildings ambries were presses, or even store-rooms or pantries, used for keeping plate, hanging towels, and the like.

AM'BULANCE (Fr. *hôpital ambulant*, walking hospital, from Lat. *ambulare*, to walk). A two- or four-wheeled wagon constructed for conveying sick or wounded persons. Ambulances are constructed to run very easily and are designed to carry one or two tiers of stretchers. Some forms are fitted with water-tank, medicine chest, operating-table, and other conveniences. City hospital ambulances are light, four-wheeled wagons furnished with one or two beds, surgical appliances, and restoratives. Since 1899 electric automobile ambulances have been used by the larger hospitals in the larger cities of the United States. A surgeon rides in the ambulance, and in crowded streets a gong is kept sounding in order that the ambulance may have the road cleared. Ambulances used in the army are large spring wagons provided with all the necessary appliances for the care and transportation of the sick and wounded. In each division of the army these wagons are organized into a corps and placed under the command of an ambulance officer. Railway cars and steamers are also fitted up with conveniences for transporting patients to more remote and permanent hospitals. The system perfected in this country during the Civil War has now been adopted by most of the civilized nations. We find something like an ambulance service, however, introduced into the French army as far back as 1792, by Baron Larrey, whose *Ambulances volantes*, or 'flying field hospitals,' were used to attend the wounded and remove them promptly from the scene of action. Shortly afterward Baron Percy organized a corps of *brancardiers*, soldiers equipped with first-aid appliances and stretchers,

who were trained to collect the injured while fighting was going on and carry them outside the zone of hostilities. The Geneva Convention of 1864 favored the extension of ambulance service in war, and the modern Red Cross service may be said to date from that time. Several of the continental countries keep permanently in reserve railway trains completely equipped for hospital service. In France an ambulance is a portable hospital attached to every division of an army in the field and provided with all the requisites for the medical succor of sick and wounded troops. Such an ambulance is stationed at some spot removed from immediate danger, and soldiers after a battle seek those who have been wounded and convey them to the ambulance. The French also introduced the *cacolets*, which consist of two easy-chairs slung in panniers across the back of a mule, which are available along paths where no wheel-carriage could pass. The cacolets have since been adopted by other armies, as well as improved hand-litters, and wheeled litters or barrows.

AMBULANCE CORPS. See HOSPITAL CORPS.

AM'BULATORY (from Lat. *ambulare*, to walk). In mediæval architecture, any covered walk or passage, such as the arcades of a cloister (see MONASTERY). More specifically, the aisle around the apse at the east end of a church, connecting the north and south aisles of the choir; called also *deambulatory*. The earliest example was probably that of the original place of St. John Lateran at Rome (fourth century). The cathedrals of Paris and Chartres have double ambulatories. See APSE.

AM'BUSCADE' (from Low Lat. *imboscare*, to ambush, from *in*, in + *boscus*, bush, wood). A device of military strategy often employed in ancient and mediæval warfare; now, owing to the changed conditions of fighting, rarely possible. Originally it had special reference to bodies of men "concealed in a wood," as its name implies. The only modern instance of the use of this particular device occurred at the battle of Santiago, during the Spanish-American War of 1898, when effective damage was inflicted on the American attacking forces by Spanish sharpshooters hidden in the dense foliage of the trees. Ambuscade must not be confounded with AMBUSH, which see.

AM'BUSH (for derivation, see AMBUSCADE). A strategical device, enabling one force successfully concealed to surprise, defeat, or capture another. It is probably the one element of strategy that time has never changed; for notwithstanding the transformation that has taken place in the general science of warfare, the ambush with all its variations of form and method still remains. An ambush may be on any scale, from the surprise and capture of a small reconnoitring patrol to the defeat of an army. In the latter case it occasionally is described by a more ambitious title by some European authorities, but such is the exception rather than the rule. Every campaign that history has recorded gives incident after incident of the more or less successful practice of this particular form of strategy; but it has been left to the Anglo-Boer War of 1900–01 for its highest and most successful development. In this campaign the Boers practically owed nearly every success to the use of the ambush in one form or another; a typical example was encountered in General Roberts's campaign. During his march to Bloemfontein a strong detachment of Boer troops, under Gen. Christian De Wet, cleverly concealed themselves among the rocks and kopjes at a place called Sannahspost. A convoy of 128 wagons, carrying valuable supplies and munitions of war, together with their escort, walked unsuspectingly into the trap, and were captured without the firing of a shot or the showing of a single man other than De Wet himself. A body of 200 volunteer horse, sent from the main column to ascertain the whereabouts of the convoy, were similarly captured, and on attempting to escape were practically annihilated by their unseen enemy. Consult Conan Doyle, *The Great Boer War* (London, 1901).

AMEER'. See EMIR.

AM'ELAN'CHIER. A genus of plants of the family Rosaceæ, related to the apple, and distinguished by an ovary having twice as many cavities as styles. It consists of about 25 species of shrubs or trees with simple leaves, abundant racemes of white flowers, and soft, juicy, and agreeable fruit somewhat larger than a pea. About 18 species occur in North America, and they have received such names as Service or Sarvos berry, June berry, shad bush, May cherry, sand cherry, etc. See Plate of SPIRÆA.

AMELIA, ȧ-mā'lē-ȧ (ancient *Ameria*). A city of central Italy, in the province of Perugia, 21 miles southwest of Spoleto. It has been the seat of a bishop since 340 A.D., and has a cathedral. Remains of great polygonal walls show that it was once of some importance, but in the days of Republican Rome it is known chiefly as the birthplace of Sextus Roscius Amerinus, in whose defense Cicero delivered a speech. It claims to be 400 years older than Rome. Pop., 1901, 6246 ;1911, 10,124.

AME'LIA. A novel by Fielding, published by Millar, who is said to have paid £1000 for the copyright, Dec. 19, 1751. Two editions were called for on the day of publication. Much of the story is autobiographical, some of the adventures of the hero, Booth, recalling incidents in the author's earlier life in the country, while the title-character was largely suggested by the personality of Fielding's first wife. The book was a great favorite with Dr. Johnson. Consult Piozzi, *Anecdotes of the Late Samuel Johnson, LL.D.* (London, 1786).

AMELIA ISLAND. A small island off the east coast of Florida, opposite the mouth of St. Mary's River (Map: Florida, G 1). It was settled by General Oglethorpe in 1736, and in 1739 it was the scene of the first bloodshed in the war between Spain and England, a party of Spaniards killing two unarmed Highlanders. After 1808 the island, then a part of Spanish East Florida, was a notorious resort for pirates, smugglers, and slave-traders. In March, 1812, it was captured by rebels against Spain and immediately handed over to the United States; early in 1813 the United States troops stationed here were withdrawn, and in 1817 the island was captured by a filibustering expedition, while later in the year a Mexican force took temporary possession of it in the name of Mexico. The United States again occupied it in 1818 and held it in trust for Spain until she acquired the Floridas by the treaty of 1819. Consult McMaster's *History of the People of the United States*, vol. iv (New York, 1893–1900).

AMELIE-LES-BAINS, ȧ'mȧ'lē'lȧ'bĂN' (Fr. 'watering place of Amelia,' wife of Louis Phi-

lippe), formerly called Arles-les-Bains. A famous watering place and summer resort in France, situated in the department of Pyrénées-Orientales, at the confluence of the Tech and the Mondony, at an altitude of nearly 800 feet above sea level (Map: France, S., G 6). It has 30 copious sulphur springs, with a temperature from 63° to 145° F., the waters of which are used both externally and internally. It contains a very large military hospital and numerous remains of Roman thermæ. Pop., 1901, 1340; 1906, 1328; 1911, 1383.

AMELOT DE LA HOUSSAYE, ăm'lō' de lâ o͞o'sâ', Abraham Nicolas (1634–1706). A French historian, who was made a prisoner in the Bastille by order of Louis XIV. He published a *History of the Government of Venice,* translations of Machiavelli's *Prince,* of Tacitus's *Annals,* and of Sarpi's *History of the Council of Trent,* the notes to the last of which, written by himself, gave great offense to the advocates of the unlimited authority of the Pope. Voltaire speaks of his histories as very good and of his memoirs as very faulty.

AMEN (Heb. 'it is firm,' hence 'surely,' 'verily,' transliterated into Gk. *ἀμήν, amēn,* Lat. *amen* and so in later versions). A word expressive of assent or affirmation. It is sometimes used at the beginning of a sentence referring back to words of a preceding speaker, e.g., 1 Kings, i. 36; Jer. xxviii. 6. The meaning then is let it be so.' This is also the usual rendering of the word in the Greek Old Testament, *γένοιτο, genoito,* 'let it be.' Sometimes it is detached, nothing following, with the same significance, e.g., Deut. xxvii. 15–26; 1 Chron. xv. 36, identical with Ps. cvi. 48, shows its liturgical' use c.200 B.C. In Isa. lxv. 16 we should probably read *omen,* and not *amen;* consequently 'the God of Truth,' as in Isa. xxv. 1. Jesus seems to have used the term adverbially—'verily,' 'of a truth.' It occurs more frequently in the Gospel of Matthew, which stands nearest to the lost Aramaic gospel, than in the other Synoptics. There is no parallel to this usage in Talmudic literature. It may be a manner of using the term peculiar to himself or to the Galileans of his day. The author of the Fourth Gospel observed it and doubled it, probably to give it a mystic significance. In Rev. iii. 14 Jesus is himself called *ὁ ἀμήν, ho amēn,* 'The Amen,' and the name is explained as 'the faithful and true witness,' which shows that words employed in the liturgy were often but vaguely understood, even when the root idea of the word was known. See H. W. Hogg, in *Jewish Quarterly Review,* p. 1 (1896); Dalman, *Die Worte Jesu,* pp. 185 ff. (1898).

AMEN, Harlan Page (1853–1913). An American educator. He was born at Sinking Spring, Ohio, and graduated at Harvard University in 1879. In 1895 he became principal of Phillips Exeter Academy, which under his management continued to hold its place as one of the foremost educational institutions in the United States.

AMENDE HONORABLE, ȧ'mänd' ō'nō'rȧ'bl' (Fr. honorable amends, satisfactory reparation). Formerly an infamous punishment to which criminals were condemned who had offended against public decency or morality. It was first introduced in France in the ninth century and remained in force there until formally abrogated in 1791. It was restored as a punishment for sacrilege in 1826, but disappeared finally in 1830. It consisted of a confession made by a bareheaded and kneeling criminal in open court, conducted thither with a rope around his neck by the common hangman. In popular language, the phrase now denotes a public recantation and reparation to an injured party for improper language or treatment, or is still further extended to mean an apology of any kind, an "honorable compensation" for insult or injury.

AMEND'MENT. A term used with reference both to legislative action and parliamentary and judicial procedure. Amendment in legislation is the alteration of an existing statute by means of a new legislative enactment which may expressly refer to and modify the earlier law, or which by reason of its inconsistency with the earlier law may impliedly modify its scope or meaning. In general there is no limitation upon the power of legislative bodies to amend or repeal existing laws, except the provisions of the constitution to which the legislative body is subject. The British Parliament, being itself the constitution-making body, has unrestricted power to amend and repeal existing laws. In the United States Congress has power to repeal laws of the United States, but it has no power to amend the provisions of the Constitution. The method of amending the Constitution of the United States is provided by Article V of that instrument, but the exercise of this power is limited by the provision "that no State without its consent shall be deprived of its equal suffrage in the Senate." The United States Constitution contains no provision directly limiting the power of the State legislatures to repeal the statute law of the several States; but Article I, Section 10, providing that "No State shall pass any law impairing the obligation of contract," amounts to a restriction on the power of the State Legislature to repeal statutes which are in effect contracts with the citizen of the State. This construction was first established in the celebrated Dartmouth College case (q.v.). The several State constitutions may also, and frequently do, limit the power of the Legislature to amend or repeal existing laws. See Constitutional Law; Abrogation.

Amendment in parliamentary procedure is used in order to vary or to qualify a motion, bill, or resolution before the House. Amendment is usually offered by means of a motion, and when adopted in accordance with the rules of parliamentary procedure becomes a part of the original motion or bill, which may then be voted upon. In the case of bills before legislative bodies amendment is not infrequently a method of changing the entire scope and meaning of a bill or of dismissing it from any further consideration. See Parliamentary Law, and the authorities there referred to.

Amendment in the law of pleading and practice is the correction of an error or defect in a pleading or judicial proceeding in the progress of an action or other proceeding. The amendment may be "as of course," i.e., without application to the counsel or judge, or "on leave," as the statute or rules of pleading and practice may require. Amendment at common law independently of statute might be made to remedy formal defects by leave of the court at any time before the signing of the judgment in the action. Leave to amend was a discretionary matter, and when granted, it might be on such terms as the court should direct, usually on payment of the

costs of the action up to the time of amendment. By modern statutes amendments are sometimes allowed after judgment in furtherance of justice, and they are at any stage of the case before judgment more liberally allowed than formerly, when the defect is one of substance or affects the merits of the case. See PLEADING; PRACTICE; STATUTE OF JEOFAILS, and the authorities there referred to.

A'MENEM'HAT. The name of four Egyptian kings of the twelfth dynasty.—AMENEMHAT I. He reigned for 30 years, beginning about 2130 B.C. How he came to the throne is not known, but on his accession he found Egypt in a state of great disorder. He thoroughly reorganized the government, restored order, and conducted a wise and vigorous administration. He checked the power of the great nobles, and personally superintended a new survey of the whole land. Amenemhat warred in Nubia and on the Asiatic frontier of Egypt, but his chief attention was devoted to internal affairs. He was a great builder, and his monuments are found from Nubia to the Delta. In later times he was esteemed a sage, and, in a work composed apparently under the nineteenth dynasty, he is represented as giving instructions in the art of government, based on his own experience, to his son Usertesen (afterward Usertesen I).—AMENEMHAT II. He reigned for 35 years, beginning about 2066 B.C. During the first two years of his reign he was regent with his father, Usertesen I, and, for three years before his death, his son Usertesen II was associated with him in the government. In the twenty-eighth year of his reign he sent an expedition to Punt on the Somali coast.—AMENEMHAT III. Son of Usertesen III. He reigned for 44 years, from about 1986 B.C. Monuments of this King are found throughout Egypt, but his greatest work was connected with the Fayum (Coptic, *Phiom*, the lake). Amenemhat I (q.v.) had built a dam, reclaiming a considerable extent of land from the highest part of the bed of Lake Mœris. Amenemhat III greatly extended this system of damming. By means of a large embankment, about 20 miles long, he reclaimed some 40 square miles of fertile land and at the same time converted the lake into a gigantic reservoir, whose waters, replenished annually by the inundation of the Nile, were used for irrigating the adjacent country. The lake continued to serve this purpose down to the fifth century B.C. Later it was gradually dried up, and, under the Ptolemaic dynasty, a Macedonian colony was established on a portion of its former bed. The pyramid of Amenemhat III, at Hawara, near Illahun, is built of Nile brick and formerly had a casing of limestone. When entered by Petrie, in 1889, the King's stone sarcophagus was found in the sepulchral chamber, but the mummy had been removed. Adjoining the pyramid are the ruins of the famous labyrinth, formerly a gigantic peristyle temple, covering an area 1000 feet long by 800 feet broad.—AMENEMHAT IV. Son of Amenemhat III, reigned for some nine years, from about 1941 B.C. His reign seems to have been marked by no event of special importance.

A'MEN-HO'TEP. See AMENOPHIS.

AMEN'ITIES OF LIT'ERATURE. A work relating to English literary history, by Isaac Disraeli, completed in 1841.

AM'ENO'PHIS (Egypt. *Amen-hôtep*, Ammon is pleased). The name of four Pharaohs of the eighteenth dynasty.—AMENOPHIS I, the second King of this dynasty, son of Amasis I. He reigned for 10 years, from about 1570 B.C. He carried on some insignificant wars in Nubia, and against the Libyans on the northwest frontier of Egypt. After his early death he was revered as the patron of the Theban necropolis, and, together with his mother, Nofretari, received divine honors. His mummy, found at Dair el-Bahri, is now in the museum of Gizeh.—AMENOPHIS II. He reigned for some 25 years, from about 1450 B.C., waged energetic wars in Syria, and maintained the territory inherited from his father, Thothmes III, in Asia and Ethiopia.—AMENOPHIS III. Son of Thothmes IV. He reigned for 36 years, from about 1410 B.C. In the early part of his reign he seems to have warred in Asia, but later he did little to maintain his Syrian provinces. The Amarna Letters (q.v.) show that in his reign, and in that of his successor, the Egyptian supremacy in Asia was seriously threatened. Amenophis is noted for his activity as a builder. He erected in Thebes a gigantic temple; but of this nothing remains except the two colossi at the entrance, one of which, in classical times, became famous as "the vocal Memnon." The Amarna Letters record the fact that Amenophis married Gilukhepa, sister of King Dushratta of Mitani in northern Mesopotamia. His principal wife (whom he commemorates on his monuments), Teye, was a foreigner. The magnificent tomb of her parents, Thua and Yua, was discovered in 1905 by Mr. Davis.—AMENOPHIS IV. The Napkhururiya (Egyptian Nefer-Khoper-re) of the Amarna Tablets. This monarch is one of the most interesting characters in Egyptian history, because of the great religious reform which he attempted. He endeavored to supersede the old polytheistic religion of Egypt by the exclusive worship of the Sun. But his fanatical efforts in this direction, his persecution of the cult of the Theban god Ammon, and the shifting of his residence to Telel-Amarna led to no permanent results. After his reign of 18 years (beginning about 1375 B.C.) his innovations were abolished, and the old religion was again triumphant. By his wife Nefer-titi he had six daughters.

AMEN'ORRHŒ'A (Gk. *ἀ*, *a*, priv. + *μήν* *mēn*, month + *ῥοία*, *rhoia*, flow, flux). The suspension from any cause other than pregnancy, or the menopause, of the catamenial flow. It is generally an indication of functional disturbance and is to be regarded as a symptom rather than a malady. It is frequently dependent on anæmia, chlorosis, tuberculosis, or obesity, or may be due to defective development of the sexual organs. The treatment adopted should tend to strengthen the general health; the diet should be nourishing and generous, iron and arsenic administered, the bowels carefully regulated, and the patient should take mild exercise in the open air. See EMMENAGOGUE; MENSTRUATION.

A'MENT (Lat. *amentum*, strap or thong), **or CAT'KIN.** A flower cluster in which simple flowers are developed upon an elongated axis and are subtended and more or less concealed by conspicuous bracts. Such clusters are found in the birches, alders, willows, etc., which, in consequence, are often called Amentiferæ. See INFLORESCENCE.

A'MENT, WILLIAM SCOTT (1851–1909). An American missionary in China. He was born at

Owosso, Mich., of Dutch descent, and educated at Oberlin, and at Union (N. Y.) and Andover Theological seminaries. He went to China as a missionary of the American Board and was stationed in Peking, where, in the summer of 1900, he was one of the 800 foreigners and 3000 native Christians who were besieged in the Boxer revolt. When the siege was raised, Dr. Ament, with the missionaries of his station and 500 native Christians, took possession of the deserted premises of a lesser Mongol prince who had become a fugitive. He was a leader in reëstablishing the native Christians, and in making necessary readjustments, but subsequently was severely criticised by many of the American newspapers as morally guilty of looting. This charge was disproved. See his life by H. D. Porter (New York, 1911).

AMENTHES, ȧ-mĕn′thēz. The Greek form of the Egyptian *Amente[t]*, 'the Lower World,' or realm of departed spirits. The word signifies, literally, 'the Western (World),' as the mysterious abode of the dead was supposed to lie beneath the western horizon. The graves of the ancient Egyptians were situated in the desert on the western side of the Nile, and the souls of the dead were believed to pass, with the setting sun, through the gates of Amenthes, where, after many perils, they appeared before Osiris (q.v.) and his 42 assessors to undergo final judgment. The views of the Egyptians in regard to the life of the soul in the nether world were manifold. Plutarch defined Amenthes as meaning 'giving and taking,' and it is sometimes derived from *amen*, 'hidden,' but such etymologies are valueless. See also Anubis; Set; Author.

A′MENTIF′ERÆ. A name of convenience, not of classification; used to include the dicotyledonous plants that bear aments (q.v.) or catkins. The familiar representatives of this assemblage are willows, poplars, walnuts, hickories, birches, alders, beeches, and oaks.

AMERBACH, ä′mĕr-bäg, Johannes, also known as Emmerpach (1444–1513). A German printer, educated in Paris. He established a press at Basel, publishing the works of St. Ambrose and St. Augustine, and began to publish those of St. Jerome, which were finished by his son Boniface. He was one of the first to use Roman instead of Gothic letters.

AMERCE′MENT (Angl. Fr. *amerciment*, from *amercier*, to be at the mercy of). In old English law, a pecuniary penalty imposed for crime or for the violation of the fealty which the freeholder owed his lord. It was imposed as the result of a judicial conviction of the offense charged, but differed from a fine in that it was a commutation of a sentence of forfeiture of goods, while the fine was a commutation of a sentence of imprisonment of the person. The decree of the court was that the offender was at the mercy (*in misericordia, à merci*) of the king, the sheriff, or the lord in whose court the judgment was rendered. The amount of the amercement, originally unlimited, as the term implies, was regulated by a provision of Magna Charta (1215), which decreed that all amercements should be set, or fixed, by good men of the neighborhood, the peers of the offender, and that the amount should vary with the gravity of the offense. Consult Pollock and Maitland, *History of English Law* (2d ed., London and Boston, 1899). See Criminal Law; Fine; Punishment.

AME′RIA. The ancient name of Amelia (q.v.), a city in Italy.

AMER′ICA (named after Amerigo Vespucci, an Italian navigator). America, or the New World, is one of the great land divisions of the earth. It has a meridional extent of about 9000 miles, stretching from 72° N. lat. (Boothia Felix) to 56° S. lat. (Cape Horn), without including the Arctic islands. Its extreme northern part extends far within the Arctic Circle, while on the south it stretches to the border of the Antarctic Ocean. Excluding its islands, it lies between the meridians of 34° and 168° west of Greenwich, and has a maximum breadth of about 3300 miles. The entire area is estimated to be 16,000,000 square miles.

General Features. The New World differs from the Old in size, having about half its area. It differs also greatly in outline, in location on the earth's surface, and in the character of its coasts and its relief. The Old World has, very roughly, a triangular form; while the New World consists of two triangles connected with each other. While both grand divisions lie mainly north of the equator, a greater proportion of the Old World is in the northern hemisphere. The coasts of the Old World, taken as a whole, are much more broken than the American coasts. The principal relief feature of the Old World is a great stretch of elevated land crossing most of Europe and Asia in an east and west direction, while the backbone of America traverses its length in a direction nearly north and south, near its western coast.

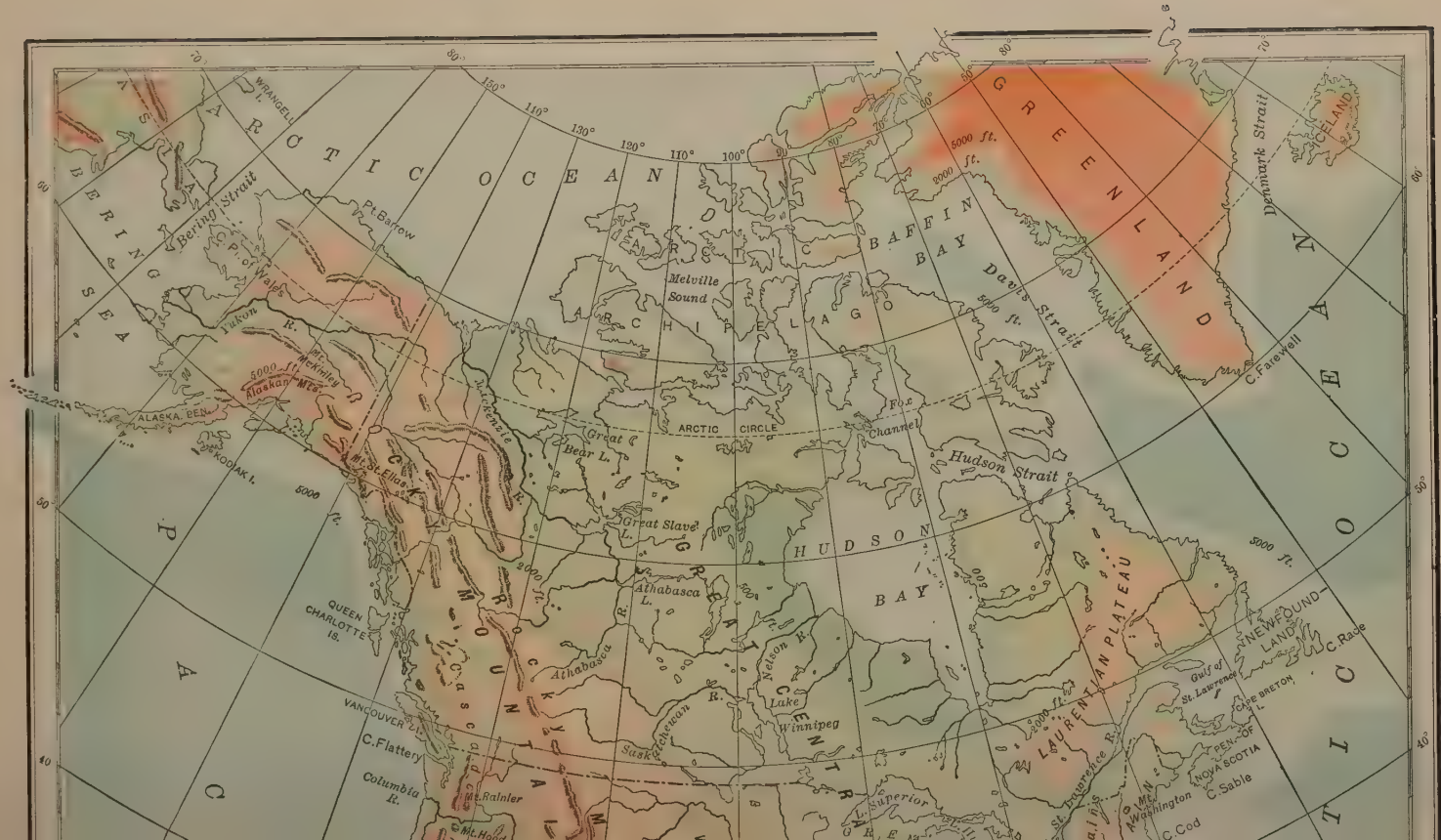
America is bounded on the north by the Arctic Ocean, on the south by the Antarctic, on the east by the Atlantic, and on the west by the Pacific. While stretching from one polar ocean to the other, it separates the Atlantic and Pacific throughout their whole length. In the extreme northwest it almost touches Asia, from which it is separated by Bering Strait. Very narrow passages separate it from the extensive islands that constitute the Arctic Archipelago of the Western Hemisphere.

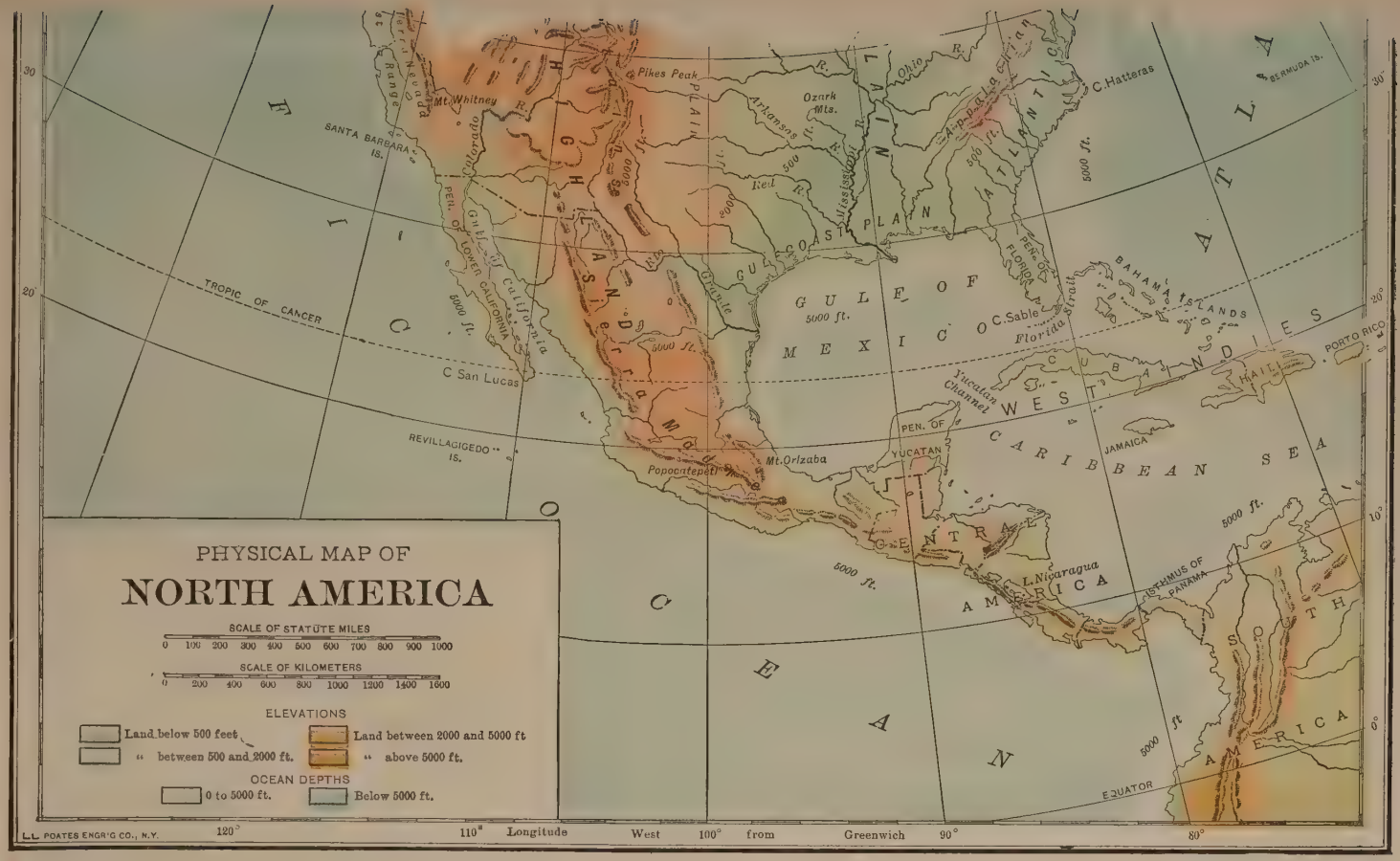
Physical Divisions. America is divided into two continents,—North and South America, separated in part by the Caribbean Sea and the Gulf of Mexico, and connected by the narrow Isthmus of Panama, 40 miles in width.

North America has an area of about 8,300,000 square miles, and South America of 7,700,000. The mean altitude above sea level of both continents is not far from 2000 feet.

These two great continents are much alike in some respects, while differing in others. They are both triangular in shape, with the base of the triangle at the north and the opposite apex at the south. Each has its greatest length along meridians, and greatest breadth along parallels of latitude; each has a great mountain system running the whole length of the western side and parallel to it, and a shorter secondary and more disconnected mountain system in the eastern part, also parallel to the coast, the two mountain systems in each case converging toward the lower apex of the continent. In both cases the eastern ranges are the oldest geologically.

While the two American continents thus present certain similarities of configuration, they are very differently placed on the sphere, and thus their climatic differences are marked, and the conditions dependent on climatic influences likewise differ. The broad part of North


ARCTIC OCEAN
BERING SEA
PACIFIC OCEAN
ATLANTIC OCEAN
GREENLAND
ICELAND
BAFFIN BAY
HUDSON BAY
Bering Strait
Pt. Barrow
Melville Sound
ARCTIC ARCHIPELAGO
Davis Strait
Denmark Strait
C. Farewell
Fox Channel
Hudson Strait
ARCTIC CIRCLE
Great Bear L.
Great Slave L.
Athabasca L.
Athabasca R.
Nelson R.
Lake Winnipeg
Saskatchewan R.
Yukon R.
Mackenzie R.
McKinley Mt.
Alaskan Mts.
ALASKA PEN.
KODIAK I.
Mt. St. Elias
QUEEN CHARLOTTE IS.
VANCOUVER I.
C. Flattery
Columbia R.
Mt. Rainier
Mt. Hood
ROCKY MOUNTAINS
CENTRAL PLATEAU
LAURENTIAN PLATEAU
L. Superior
Gulf of St. Lawrence
NEWFOUNDLAND
C. Race
CAPE BRETON I.
PEN. OF NOVA SCOTIA
C. Sable
C. Cod
Washington
5000 ft.
2000 ft.
500
50°
60°
70°
80°
90°
100°
110°
120°
130°
140°
150°


PHYSICAL MAP OF
NORTH AMERICA
SCALE OF STATUTE MILES
0 100 200 300 400 500 600 700 800 900 1000
SCALE OF KILOMETERS
0 200 400 600 800 1000 1200 1400 1600
ELEVATIONS
Land below 500 feet
Land between 2000 and 5000 ft
" between 500 and 2000 ft.
" above 5000 ft.
OCEAN DEPTHS
0 to 5000 ft.
Below 5000 ft.
L.L. POATES ENGR'G CO., N.Y.
120° 110° Longitude West 100° from Greenwich 90° 80°
30° 20° 10° 0°
PACIFIC OCEAN
ATLANTIC OCEAN
GULF OF MEXICO
CARIBBEAN SEA
EQUATOR
TROPIC OF CANCER
SANTA BARBARA IS.
REVILLAGIGEDO IS.
C San Lucas
PEN. OF LOWER CALIFORNIA
Gulf of California
Colorado R.
Mt. Whitney
Sierra Nevada Mts.
Pikes Peak
GREAT PLAIN
Arkansas R.
Ozark Mts.
Red R.
Mississippi R.
Ohio R.
Appalachian Mts.
C. Hatteras
BERMUDA IS.
5000 ft.
Florida
PEN. OF FLORIDA
Florida Strait
C. Sable
BAHAMA ISLANDS
CUBA
HAITI
PORTO RICO
JAMAICA
Yucatan Channel
PEN. OF YUCATAN
Mt. Orizaba
Popocatepetl
Mexico
Oriente
Sierra Madre
CENTRAL AMERICA
L. Nicaragua
ISTHMUS OF PANAMA
SOUTH AMERICA

America lies mainly within the north temperate zone, and only its apex extends into the tropical zone; thus causing a great portion of the continent to be dominated by comparatively low temperature conditions. In South America, on the contrary, the broad part lies within the tropics, and a comparatively small portion of it extends into the temperate zone.

Coasts. With regard to the nature of their coast-lines, North and South America present an extraordinary contrast. North America, in its extreme irregular coast-line and its great peninsulas, is the counterpart of the Eurasiatic continent in the Old World, while South America, with its almost unbroken coast, is the counterpart of Africa. In North America we have the peninsulas of Alaska, Labrador, Nova Scotia, Florida, Yucatan, and Lower California. South America presents but one great peninsula, that of Patagonia. The Atlantic coast of America is far more irregular and broken than that of the Pacific. On the north of North America, Hudson Bay projects far into the interior of Canada, forming a vast inland sea. Farther south, the Gulf of St. Lawrence and the Bay of Fundy form deep indentations. On the Atlantic coast of the United States are several large bays and harbors, Massachusetts Bay, Long Island Sound, Delaware and Chesapeake bays, and Albemarle and Pamlico sounds being among them. The Gulf of Mexico and the Caribbean Sea have many arms, extending into the land, among them the gulfs of Campeachy, Honduras, and Colon.

The Atlantic coast of South America is simpler, the chief indentations being, on the north the gulfs of Darien and Venezuela, on the northeast the estuary of the Amazon, and on the east the harbors of Bahia and Rio de Janeiro, the estuary of the Rio de la Plata, and the gulfs of Blanca, San Matias, and San Jorge, on the Argentine coast.

The west coasts of both continents are in the main extremely simple. Between lat. 42° S. and 49° N. there are few harbors. In South America, the Gulf of Guayaquil is almost the only indentation of magnitude. South of lat. 42° S., however, the character of the coast changes to a fiord coast, with many deep, narrow passages and hundreds of islands. Where the two continents meet, the bend of the Pacific coast forms the deep bay of Panama. The west coast of North America south of the parallel of 48° N. is broken deeply only by the Gulf of California and San Francisco Bay, but near the northwest corner of the United States a fiord coast commences with Puget Sound and extends thence along British Columbia and Alaska to the Aleutian Islands. The Bering Sea coast of Alaska is low and broken by many indentations, and similar conditions prevail on the Arctic coast.

Topography. The prominent relief feature of both continents consists in a great system of elevation, stretching along or near the western coast, from Cape Horn in South America to the extreme end of the Alaska peninsula in North America. This is known in South America as the Andean Cordillera, and in North America as the Cordillera. It differs greatly in its different parts, in breadth, height, complexity, and character. In North America the Cordillera are succeeded on the east by a broad valley; east of this valley, and separating it from the Atlantic, is the shorter, smaller, and lower Appalachian system. In South America the succession is somewhat similar. East of the Andes is a broad slope or depression, which in Argentina continues to the Atlantic; but in eastern Brazil and the Guianas the continuity of the eastward slope is broken by numerous short and comparatively low ranges, corresponding roughly with the Appalachians of the northern continent.

North America. In North America the Cordillera develops its greatest breadth and complexity in the main body of the United States. Here it includes a broad plateau 1000 miles in width, with an elevation of from 5000 to 10,000 feet, on which stand a succession of mountain ranges trending nearly north and south, the highest of which rise to altitudes of from 14,000 to 15,000 feet. The highest of these ranges are in Colorado and California. In the former State are the Front Range, with Long's Peak, 14,271 feet; Gray's Peak, 14,341 feet; Pike's Peak, 14,108 feet; the Sangre de Cristo Range, with Blanca Peak, 14,390 feet; the Park Range, with Mount Lincoln, 14,297 feet; the Sawatch Range, with the Mountain of the Holy Cross, 14,170 feet; Elbert Peak, 14,421 feet, and Mount Harvard, 14,375 feet; and the San Juan Mountains, with Uncompahgre Peak, 14,289 feet, and Mount Wilson, 14,250 feet.

The principal range of California is the Sierra Nevada, with Mount Corcoran, 14,093 feet; Fisherman Peak, 14,448 feet; Mount Whitney, 14,502 feet; and Mount Shasta, an extinct volcano, 14,380 feet. The Cascade Range of Oregon, Washington, and British Columbia is a continuation of the Sierra Nevada in direction, though not in structure, as it is in the main the product of volcanic action and contains many extinct volcanoes, the highest of these being Mount Rainier, 14,363 feet. Northward in British Columbia the system is not so high nor so broad, but following the coast around through Alaska, it rises in semi-detached groups and ranges, some of which are of great height, culminating in Mount McKinley, north of the head of Cook Inlet, 20,500 feet in height, the highest summit in North America. Another high peak, on the boundary between Alaska and Canada, is Mount St. Elias, 18,024 feet above the sea. This was long supposed to be the highest point in North America.

The area of Mexico, with the exception of the State of Yucatan, lies almost entirely within the Cordilleran mountain system. The plateau extends southward into it from the United States, with an elevation ranging from 4000 to 7000 feet. Upon this undulating table-land, which is known as the plateau of Anahuac, are many mountain ranges and many active or dormant volcanoes, the latter being the highest peaks of the country. Among them are Popocatepetl, 17,520 feet; Orizaba, 18,250 feet; Iztaccihuatl, 16,960 feet; Nevada de Toluca, 14,950 feet; and Malinche, 13,460 feet. In the countries of Central America the Cordillera is represented by detached ranges of hills, with numerous volcanic peaks, some of which are active, others extinct.

The depression lying east of the Cordillera stretches in the north to the Atlantic or to Hudson Bay, and in southern Canada and the United States to the Appalachian or Eastern Mountains, with a breadth of 25° of longitude. Over this great area the surface presents no serious variations of level. The only elevations of importance are the Ozark Hills in Arkansas, south-

ern Missouri, and Oklahoma, with a maximum altitude little over 3000 feet.

The Appalachian Mountains extend from Newfoundland and the Gaspé Peninsula in southeastern Canada, southwestward through the eastern United States to central Alabama and Georgia, in a fairly continuous system. They form a narrow plateau, 100 to 300 miles in width and 1500 to 3000 feet in height, which is bordered on the east by the Blue Ridge and on the west by the Alleghany Mountains. In the northern section the line of elevations includes the Green and White Mountains of Vermont and New Hampshire, which differ more or less in their geological structure from the central and southern portions of the system. The highest summits are Mount Washington in New Hampshire, 6279 feet, and Mount Mitchell in North Carolina, 6711 feet. East of this mountain system the land slopes gently to the Atlantic coast, and is known as the Piedmont Plateau and the Atlantic Plain. See ROCKY MOUNTAINS; APPALACHIANS; ETC.

South America. The Cordillera of the Andes follows the western coast of South America in a continuous mountain system from Cape Horn to the Isthmus of Panama, leaving a narrow strip of lowland between its base and the coast nowhere much more than a hundred miles in breadth. In the south the system is narrow and simple, consisting in great part of a single range, which has no great height. Northward it increases in altitude and becomes more complex, reaching a culminating point in the great peak of Aconcagua, in lat. 32° S., which reaches the height of 23,080 feet, the loftiest summit in South America. Still farther north the peaks are not so high, but the system broadens and becomes more complicated by the appearance of ranges in Argentina, east of the Andes proper. In lat. 18° S. the system curves to the northwest, following the coast; here it has a breadth of fully 300 miles, with two, and, in places, three main ranges, and incloses an elevated plateau, on which is situated Lake Titicaca, 12,645 feet high. Near this lake, in the Cordillera Real, are many high peaks, among them Ancohuma, 21,490 feet; Cacaca, 20,250 feet; and Illimani, 21,192 feet.

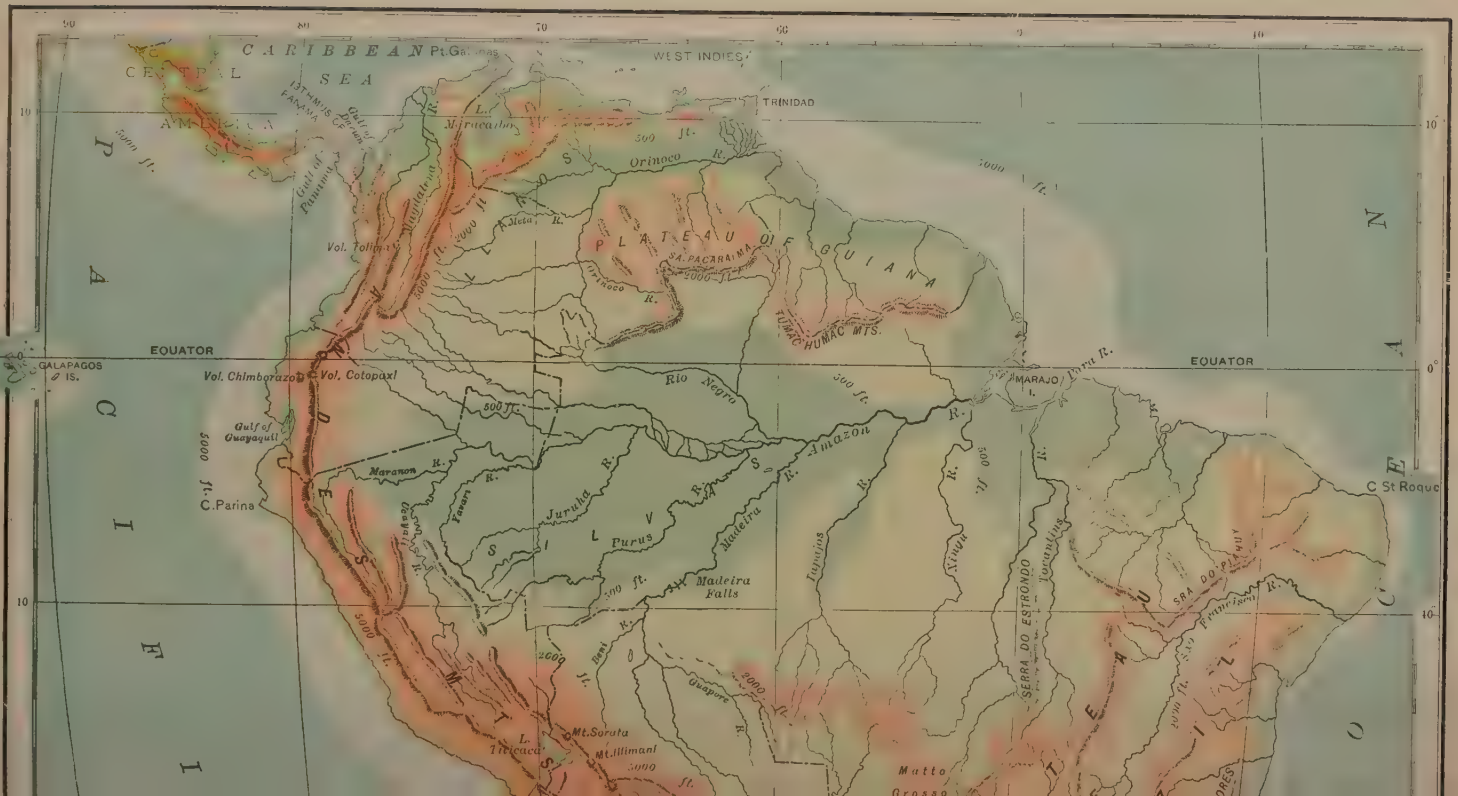
Still following the coast, the system turns north again at the Gulf of Guayaquil, maintaining the form of a broad, elevated plateau, bordered by lofty ranges, with many volcanic peaks. In the neighborhood of the equator, in Ecuador, are many notable peaks, among them Tunguragua, 16,690 feet; Cotopaxi, 19,613 feet; Chimborazo, 20,498 feet; Antisana, 19,335 feet; Cayambe, 19,186 feet; and Pichincha, 15,918 feet. From this knot of lofty volcanoes the system falls off in altitude northward toward the Isthmus of Panama and the shores of the Caribbean Sea, splitting into three ranges, which trend away from one another to the north and northeast.

East of the Andes the level of the land descends rapidly to the llanos of the Orinoco, the valley of the Amazon, and the pampas of Argentina. This great area, comprising by far the greater part of South America, is but slightly diversified by hills, forming mainly an immense plain. In eastern Brazil is a mountain system standing on a broad plateau, and composed of many ranges, trending in general parallel to the coast and having collectively a great breadth. The highest point in this system is Itatiaia, with an altitude of 10,340 feet. A similar but smaller plateau occupies much of the area of the Guianas. See ANDES, etc.

The islands pertaining to this grand division belong mainly to North America. In the Arctic Ocean these land bodies are numerous and large, Greenland, almost continental in area, being the largest of them. West of Greenland, across Smith Sound, is the great extent of Ellsmere Island, with Axel Heiberg, and other islands west of it, and south of this are North Devon and Baffin islands, with many other large islands to the west, including Bathurst, Melville, Prince of Wales, North Somerset, Banks and Victoria islands, the whole forming an extensive archipelago in the Arctic Sea. In Bering Sea, on the northwest of the continent, are several smaller islands, while the chain of the Aleutian Islands, stretching in a great curve, convex southward, from the point of the Alaskan Peninsula, partly separates Bering Sea from the Pacific. On the east side of the continent, the great island of Newfoundland partially closes the mouth of the Gulf of St. Lawrence.

Mainly within the tropics, and lying between the northern coast of South America and the southeast coast of the United States, are the West Indies, with Cuba, Haiti, Jamaica, and Porto Rico, known collectively as the Greater Antilles, and many smaller islands grouped about and stretching away from them. They are the unsubmerged portions of a mountain system. On the north side are the Bahamas, consisting of a large number of small coral islands, and on the southeast, stretching in a broad curve, convex to the east, to the south American coast, are the Lesser Antilles,—all small, and many of them of volcanic origin. The best known among them are Guadeloupe Martinique, and Trinidad. South America ha few islands, the Falkland Isles, east of th Strait of Magellan, being the largest, if v except Tierra del Fuego, at the south end o the continent. Off the west coast, and under the equator, are the Galapagos Islands, once prominent as a source of guano.

Hydrography. *North America.*—While most of North America is drained into the Atlantic, great areas are drained into the Pacific and Arctic oceans. The Rocky Mountains, i.e., the easternmost ranges of the Cordillera, carry the continental divide, and most of the ranges and valleys of this system are drained westward to the Pacific by the Colorado River of the West, through its marvelous canyons to the head of the Gulf of California, by the Sacramento and San Joaquin, to San Francisco Bay, and by the Columbia, the Fraser, Copper, and other rivers. The northern and northeastern slopes of the system, as well as most of Alaska and much of the Yukon province of Canada, are drained by the great river Yukon to Bering Sea. The northern part of the great central depression of the continent sends its waters to the Arctic Ocean by way of the Mackenzie and Coppermine rivers. Farther south the land is drained to Hudson Bay by the Nelson and other rivers, and to the Atlantic directly by the chain of the great lakes, Superior, Michigan, Huron, Erie, and Ontario, and the river St. Lawrence. The waters of the southern part of this depression are collected by one of the greatest rivers of the earth, the Mississippi, with its branches, the Ohio, Missouri, Arkansas and Red rivers, and are carried to the Gulf of Mexico. The coast-land


CARIBBEAN SEA
WEST INDIES
TRINIDAD
Pt. Gallinas
ISTHMUS OF PANAMA
Gulf of Darien
Gulf of Panama
Mts. of Darien
L. Maracaibo
Maracaibo R.
Orinoco R.
Meta R.
Vol. Tolima
Magdalena R.
Andes Mts.
PLATEAU OF GUIANA
SA. PACARAIMA
Parima R.
TUMAC-HUMAC MTS.
EQUATOR
GALAPAGOS Is.
Vol. Chimborazo
Vol. Cotopaxi
Gulf of Guayaquil
Rio Negro
MARAJO I.
Para R.
Maranon R.
Ucayali R.
Amazon R.
C. Parina
Juruhá R.
Purus R.
Madeira R.
Madeira Falls
Tapajos R.
C St Roque
SERRA DO ESTRONDO
Xingu R.
SERRA DO PARIMA
Iça R.
Japura R.
Mt. Sorata
Mt. Illimani
L. Titicaca
Beni R.
Guapore R.
Mato Grosso
PACIFIC OCEAN
ATLANTIC OCEAN
500 ft.
2000 ft.
3000 ft.
5000 ft.

PHYSICAL MAP OF
SOUTH AMERICA
SCALE OF STATUTE MILES
0 100 200 300 400 500 600 700 800 900 1000
SCALE OF KILOMETERS
0 200 400 600 800 1000 1200 1400 1600
ELEVATIONS
Land below 500 feet
Land between 2000 and 5000 ft.
" between 500 and 2000 ft.
" above 5000 ft.
OCEAN DEPTHS
0 to 5000 ft.
Below 5000 ft.
TROPIC OF CAPRICORN
EQUATOR
BOLIVIA
Mt. Itatiaia
SERRA DO MAR
SERRA GERAL
Paraguay R.
Paraná R.
Iguassu Fall
Pirano Fall
Salado R.
Mt. Aconcagua
JUAN FERNANDEZ IS.
Colorado R.
Negro R.
Plata R.
San Matias Gulf
CHILOE I.
Chubut R.
CHONOS ARCH.
St. George Bay
C. Blanco
G. of Penas
WELLINGTON
Strait of Magellan
TIERRA DEL FUEGO
FALKLAND IS.
Cape Horn
PACIFIC OCEAN
ATLANTIC
Longitude West from Greenwich
L.L. POATES ENGR'G CO., N.Y.

of the Gulf of Mexico itself is drained by a number of rivers on either side of the Mississippi. The Atlantic slope of the Appalachian mountain system is drained to the Atlantic by many comparatively small rivers.

Besides the great lakes of the St. Lawrence system, North America contains many large bodies of water. In Canada are Great Bear and Great Slave and Athabasca lakes in the Mackenzie River system; lakes Reindeer, Winnipeg, Manitoba, and Lake of the Woods, which are drained to Hudson Bay, and Lake Nepigon, tributary to the St. Lawrence system. In the northern United States are thousands of small lakes, which, in common with those of Canada, were formed by the Laurentian glacier. In the Cordilleran region are many lakes, some of glacial origin, like Pend Oreille and Flathead, others of volcanic origin, like Yellowstone Lake, while many occupy desert valleys and have no outlet, like Great Salt, Carson, and Walker lakes. See YUKON RIVER; MISSISSIPPI, ETC.

South America.—South America is for the most part drained into the Atlantic Ocean, the Andes forming a great and continuous watershed; and while three great river systems carry most of the waters to the sea, yet a number of secondary but by no means small rivers aid them in this work. In the extreme northwest of South America, the Magdalena drains the region in which the Andes separate into diverging ranges before their subsidence. The area of its basin is not great, but the enormous rainfall sends great volumes of water through this river channel into the Caribbean Sea. The entire length of the Magdalena, independent of its windings, is not over 700 miles. The great valley at the extreme north of South America, lying between the Andes on the west and the plateau of Guiana on the east, is drained by the Orinoco, which, although not more than 1200 or 1400 miles long, not counting the windings, carries an immense volume of water into the Atlantic, because it, too, lies almost wholly within the belt of excessive rains. Between the Orinoco and the Amazon there are a number of short rivers draining the plateau of Guiana, and heading chiefly in the watershed between this section and the valley of the Amazon on the south. Next in order, proceeding southward on the Atlantic coast, is the mighty Amazon itself, whose system drains the great valley included between the plateau of Brazil on the southeast, the plateau of Guiana on the north, the Andes on the west, and the highlands of the Cordillera Geral and Matto Grosso on the south, thus embracing about one-third of South America. The Amazon pours a vastly greater quantity of water into the ocean than any other river on the globe. The plateau of Brazil is drained chiefly by the Tocantins, which flows to the north and empties into the Pará estuary; a number of smaller streams which flow northeast and enter the Atlantic between the mouth of the Pará and Cape St. Roque; the São Francisco, which has a generally northeastern direction, and a few smaller streams which drain the short eastern slopes along the whole extent of coast between the mouth of the São Francisco, lat. 10° S., and the estuary of the Plata, lat. 35° S. The Plata, which receives the waters of the Paraná, Paraguay, and Uruguay, drains the whole of the south central part of South America, from the Amazon watershed in lat. 15° S. to lat. 35° S., and embraced between the coast sierra on the east and the Andes on the west. This great river system has been compared with the Mississippi River system, with which it has certain features in common. South of the Plata are a number of rivers, including the Colorado, Negro, and Chubut. On the Pacific coast the drainage is effected by short, torrential streams scarcely worthy the name of river. See AMAZON; ORINOCO, ETC.

Geology. The geological history of North America, considered in a broad way, is not complex. The oldest part of the continent, the first to be elevated above the sea, is the northwestern section, including the Adirondacks of New York and the Laurentian Highlands of Canada, and a region about the Great Lakes, together with a southward projection just east of the Blue Ridge in the Southern States. This is the Archæan area. From this, as a nucleus, the continent grew westward, as is indicated by the surface formations, which become successively more recent. The eastern portions of the Appalachians are in great part composed of Silurian beds. The plateau forming the western part of the system is Carboniferous, which formation also underlies much of the Mississippi valley. The great plains which form the eastward slope of the Cordilleran plateau are floored, in westward succession, by Triassic, Cretaceous, and Tertiary beds.

The mountains of the Cordilleran system are mainly of recent formation and show strata of all ages, as they have been much disturbed by uplift, and the beds exposed by subsequent erosion. Upon the mountains granitic rocks largely predominate, as the stratified beds which formerly covered them have been eroded away, while in very many cases these stratified beds still remain on the flanks of the ranges, as hogback ridges. The valleys are often partially filled with detritus from the mountains. In this region many great areas have been covered by outflows of lava, some of them in very recent times. The regions bordering the coasts of the Atlantic and the Gulf of Mexico are floored with Cretaceous and Tertiary deposits, indicating their comparatively recent uplift. At present there are no active volcanoes in the United States proper or in Canada. The third greatest volcanic belt in the world is in Alaska, extending from Mount Wrangell for 1600 miles westerly along the Alaska peninsula and the Aleutian chain. Some of the volcanoes of this region are majestic in their proportions, like Iliamna, Redoubt, Shishaldin, and Wrangell, which range in height from 8952 for Shishaldin to 17,500 for Wrangell. Shishaldin is constantly active. There have been numerous violent eruptions in this field, the latest, highly destructive, the eruption of Katmai on June 6, 1912, a peak 7500 feet high, on the peninsula opposite Kodiak Island. Day was made night, and the town of Kodiak, 100 miles distant, was covered with ashes like a deep snow. Bogoslof peak, which rises out of Bering Sea northwest of Unalaska, forms and reforms its surface frequently, aided by the disintegrating action of the sea. In Mexico, Central America, and the West Indies there are many active volcanoes. See *Geology* under UNITED STATES; CANADA, ETC.

South America.—The eastern highlands are of Archæan and Palæozoic formations, with a superimposed layer of sandstone. No subsequent submergence has occurred, and no folding has taken place since Palæozoic times, so that

no recent marine deposits have been made, and the deep valleys are due to erosion rather than to irregular faulting, the rock layers lying horizontally. These eastern highlands are but the remains of a great mountain system which has been worn away to the existing condition in the filling up of the plains below, to which they have contributed their material. The western highlands (see ANDES), while of more recent origin than the eastern, are made up of ranges differing in geologic age. Most of the great peaks of the Andes are of volcanic origin, and many of them are still active, or have been eruptive in recent and historic times. The lowlands east of the Andes are, so far as known, floored with Tertiary deposits, with broad bands of alluvium bordering the larger streams. See *Geology* under BRAZIL; ARGENTINA, ETC.

Glaciation. In recent geologic times nearly all of Canada and much of the United States were covered by a great sheet of ice, the Laurentian glacier. In the United States it covered New England and New York, extended southward to the Ohio River and westward to the Missouri. Throughout this area the surface has been modified by erosion and deposition by ice. Stream courses have been changed, countless lake basins have been formed, and the surface covered with drumlins, kames, and other morainal deposits. In the northern part of the Cordillera evidences of former glaciation are everywhere abundant, and in the higher ranges many glaciers still exist. Indeed, in the mountains on the Alaska coast, where the precipitation is profuse, there are glaciers of great magnitude, many of which reach the sea. The Muir Glacier covers over 350 square miles, and there are others of equal size. In the fiords of Prince William Sound huge glaciers reaching tide water are common. Even these great glaciers, however, are but the much reduced relics of far larger ones, which covered the coast and eroded the fiords intersecting it.

In South America the glacial history, so far as known, is confined to the Andes. Most of the higher peaks, even those under the equator, have glaciers upon their upper slopes, while in the southern portion of the system glaciers are extremely abundant, and the configuration of the land shows that in past time they covered it, lying in every gorge and fiord, which are evidently products of ice erosion.

Climate. Stretching from the south temperate zone through the tropics to the north polar zone, America has many climates, dependent upon latitude, prevailing winds, and the distribution of the relief features. The main body of North America is principally within the region of the anti-trades or prevailing westerlies. These winds give to the western coast of the United States and Canada and to southeastern Alaska an insular climate with great uniformity of temperature and a heavy rainfall. Their influence extends inland but a short distance, owing to the mountain ranges which border this coast, and the rest of the United States and Canada have a continental climate with much greater extremes of temperature; the Cordilleran region, which is dependent upon the Pacific as its source of precipitation, has an arid climate; but in the east, where the Gulf of Mexico and the Atlantic serve as sources of supply, the rainfall is ample.

Central America is within the region of the trade winds and has measurably an insular climate, owing to the narrowness of the land. That portion of South America which lies in the tropics, over which the trade winds blow continuously from the east, has a warm, moist climate and a heavy rainfall. This region is limited on the west by the Andes, over whose wall none of the moisture from the Atlantic can pass. Hence most of the Pacific coast of South America within the tropics is a desert. In Chile and Argentina the conditions prevailing in North America are duplicated. Here in the south temperate zone the prevailing westerly winds bring to the western coast the mild, saturated atmosphere of the Pacific. The temperature is uniform throughout the year and the rainfall heavy; while east of the Andes the westerly winds, deprived of their moisture in crossing the mountains, blow dry over the land, and the semi-desert pampas are the result.

North America.—The mean annual temperature ranges from 80° F. in Central America down to 5° on the Arctic coast, and except on the Pacific coast the temperature decreases quite regularly with the latitude. On the Pacific coast the reduction in temperature with increase in latitude is much less rapid. At San Diego, on the southern boundary of the United States, the mean annual temperature is about 70°, while the Alaska coast, even as far north as Prince William Sound, has a temperature only 30° lower and 20° higher than in the same latitude on the Labrador coast. This measures the effect of the ocean in ameliorating the mean annual temperature.

In midwinter (January) the temperature ranges from 80° in the south to —25° on the Arctic coast. Here again the reduction with increasing latitude is much less on the Pacific coast than in the interior or on the Atlantic coast. The coast of southern Alaska is 30° warmer than that of Labrador in approximately the same latitude. The midsummer (July) temperature is highest on the arid plateau of northern Mexico and in southern Arizona, where it reaches 95°. Thence it diminishes in all directions, sharply to the west as the Pacific coast is neared, and much more gradually northward and eastward. The range of summer temperature between San Diego and the Aleutian Islands is but 20°, from 70° to 50°, while in the eastern part of the continent its range is from 80° to 40°, and in the Cordilleran region from 95° to 40°. In this latter region extreme heat as well as extreme cold is frequently encountered; in southern Arizona temperatures of 120° have been recorded, and 100° as far north as lat. 60°. On the Pacific coast the range of temperature between midsummer and midwinter (July and January) seldom exceeds 20°, while upon the Atlantic coast the corresponding range is nearly twice as great, and in the Cordilleran region it is in many places three times as great.

The distribution of rainfall over North America depends upon the configuration and relief of the land and on the direction of the winds. In the region of the trade winds the rainfall is very heavy, 200 inches at Panama, and diminishing northward. In the region of the anti-trades, the Pacific coast receives nearly all the moisture brought by these winds from the Pacific, and here the amount and distribution of the rainfall are radically affected by the relative temperatures of land and sea. Where and when the land is colder than the sea, moisture is condensed from the air currents and falls in

rain; the rainfall is therefore heavy on the northern part of this coast and light on the southern part, and is heavy in winter and light or entirely absent in summer.

At San Diego the rainfall, even in winter, is very light, while at Puget Sound it has increased to from 75 to 100 inches, and has an average along the Alaska Pacific coast of about 90 inches annually, most of which falls in winter. Air currents from the Pacific, deprived of most of their moisture in passing over the mountain ranges near the Pacific coast, flow over the Cordilleran region during most of the year as dry winds. In the summer, however, they retain a little moisture, which they give up to the high ranges of the interior. Hence this region, which is upon the whole desert, or semi-desert, receives most of its scanty supply of rain, 20 inches or less, in the summer time.

Moving eastward, this general air movement from west to east, which commonly takes the form of great cyclones or anti-cyclones, draws air currents from all directions. These, coming off the Gulf of Mexico, are saturated with moisture and, cooling as they go northward, give rain to the land. Thus the great depression of the continent is watered in the main from the Gulf of Mexico, the rainfall ranging from 60 inches on the coast to 30 inches in the region of the Great Lakes and Hudson Bay. These cyclonic disturbances, as they approach the Atlantic, draw saturated air currents in from that ocean, and from that source of moisture the Atlantic coast is watered, the amount of rainfall ranging from 50 to 40 inches.

South America.—The southern continent has no such range of temperature as North America, since it lies on both sides of the equator. The annual temperature ranges from 80° to 40°, the highest temperature being in the northern part. The midwinter (July) temperature ranges from about 80° in the north to 35° in the south, and the midsummer temperature from 85° to 50°, the highest being in the interior, in northern Argentina. On the southern part of the west coast of South America, where the prevailing winds are from the west, the temperature is moderated by them as on the western coast of North America, making the winter temperature higher and the summer temperature lower. The greatest range between summer and winter is found in northern Argentina, a region corresponding in situation to the Cordilleran region in North America. Here the range between the hottest and coldest months is from 25° to 30°.

The great Amazon basin, lying within the tropics, is abundantly watered by the trade winds which come to it saturated from the Atlantic. The rainfall over this great area is estimated at from 50 to 75 inches and in some parts is 150 to 200 inches. This heavy rainfall extends to the foot of the Andes and even up its abrupt eastern slopes. The air currents, thus deprived of their moisture, descend the western slope as dry winds, and the narrow western base of the range receives little moisture. Farther south in southern Chile and Argentina, the conditions are reversed. The westerly winds bring rain to the narrow strip of land on the west coast, which receives as much as 80 inches in certain localities, and the pampas on the east receive very little, on account of the intercepting mountains.

Flora. *North America.*—The flora of North America is varied, ranging from those plants peculiar to Arctic regions to those of the tropics. In the extreme northern part of Canada and Alaska, where the ground is constantly frozen, thawing only on the surface in the summer and forming the well-known tundra, the prevailing plant life consists of grasses, moss, with a few dwarf Arctic willows. But in the short, hot summers of this region even the tundra is gay with bright-colored blossoms. Near the Arctic Circle forests of spruce, with some birch and alders, appear, at first in scattering clumps, and then more continuously, especially along the river bottoms. Thence southward as far as the North Saskatchewan River, in Canada, the land is forested with coniferous trees, spruce, pine, fir and hemlock. This timbered area extends southward along the Pacific coast nearly to San Francisco Bay. In Washington, Oregon, and California exist probably the heaviest forests in the world, consisting entirely of coniferæ, great firs, sugar pines, redwoods, and the giant sequoia, the largest and the oldest living thing.

Eastern Canada and the United States are forested, the western limit including most of Minnesota, Wisconsin, and Indiana, southern Missouri, the eastern part of Indian Territory, and northeastern Texas. In the central United States the prevalent species change to hard woods, while in the southern States yellow pine becomes the dominant species. West of this forested region in the United States and Canada is the prairie region, once grassed and with groves of timber, now highly cultivated, which passes by insensible degrees into the treeless plains which form the eastern slope of the Cordilleran plateau.

In the Cordilleran region forests are, as a rule, found only on the mountains and consist mainly of coniferæ. The valley vegetation depends upon the degree of aridity; here may be found grass, artemisia, cacti, yucca, and other thorny desert shrubs, which in some localities grow so densely as to form what is called chaparral. Throughout a certain belt from northern Texas across New Mexico, Arizona, southern Colorado, and southern Utah, on mesas and the lower hills and mountains occur the piñon (*pinus edulis*) and the juniper. The northern plateau region of Mexico is without forests, except upon the higher ranges, while the southern and lower part of the country, with Central America, has a tropical profusion of fruit and vegetation. See *Flora*, under ROCKY MOUNTAINS; CANADA; UNITED STATES; MEXICO; NICARAGUA, ETC.

South America.—The flora of South America ranges from that of the tropical to that of the temperate zone and is controlled not only by latitude, but by altitude and rainfall. At the extreme north in Colombia, on the waters of the Magdalena, the hot climate and excessive rainfall produce a luxuriant vegetation which changes from its tropical character only with great change of altitude above the sea, palms, bamboos, and tree ferns forming much of the lower forests, and coniferæ higher on the mountains. To the east of this region are the llanos of the Orinoco, with their tall grasses and isolated trees. To the south of these, east of the Andes, are the great selvas of the Amazon, with their rich forests and mixed flora. Directly south of these occur the great forests of the Matto Grosso, to the east of which lie the Ca-

tinga woodlands and the Brazilian campos, with their thickets interspersed with open glades. To the west of the Matto Grosso lie the low mountains of southwestern Brazil and Bolivia. To the south of the Matto Grosso lies the Gran Chaco, with its wax palms and other rich forest growth. Still farther south begin the plains or pampas of the Plata, which, at first consisting of rich grasses, soon degenerate into the dry plains of southern Argentina, with their stunted and poor plant growth. The flora of the western strip of South America, which includes the Andean regions, is in general tropical or sub-tropical at low levels, and changes in altitudinal zones with increase of height above the sea level, but is much modified by the distribution of rainfall throughout the length of the continent, which permits of an abundant vegetable growth in the northern and southern portions, but greatly limits it in the intervening region of little rainfall. The potato is indigenous to South America. See *Flora* under ANDES; COLOMBIA; ECUADOR; PERU; BOLIVIA; CHILE; AMAZON; BRAZIL; ARGENTINA.

Fauna. In considering this subject, it must be recognized, first, that we here have to deal with two continental faunæ, for the animal life of North America is almost completely different from that of South and Central America. This unlikeness seems related in large degree to history and derivation. The fauna of North America is very similar to that of the northern zones of the Old World, in large part identical with it. Among mammals substantially similar to those of Europe or northern Asia are all the bears, wolves, the lynx, most fur-bearers (*Mustelidæ*), the bison, reindeer, moose ("elk" of Europe), bighorn, white goat, beaver, and the majority of the rodents, and small insectivores, bats, etc., where the differences are rarely more than generic. The peculiar North American mammals of note are the puma, the skunk, the pronghorn, the musk-ox, and certain rodents, as the pouched-rats and sewellel. The absentees are equally interesting. Although they arose in Tertiary North America, no horses, camels, or rhinoceroses are in its recent fauna; nor any true antelopes or swine (except in the extreme southwest); of marsupials a single form, the opossum, is present. The birds present a similar parallelism with northern Europe and Asia, many species, and nearly all the families, being common to both continents. The same is true of reptiles and amphibians, which are marked in North America by the preponderance of certain subordinate forms, such as the rattlesnakes, rather than by anything very different from those of the Old World. Fishes present somewhat greater distinctions, yet the bulk of freshwater fish are similar to, and some are identical with, those of the colder parts of Europe. Insects and fresh-water mollusks seem generally related to those of Europe and Asia; but the United States is richer than any other part of the world in fluviatile mollusks, especially river mussels (*Unionidæ*). On the whole, the Nearctic fauna is closely allied to the Palæarctic, and by some students they are united in a single grand division, termed "Holarctic," or "Triarctic."

South America, considered with reference to its fauna, includes Central America, the lowlands of Mexico, and the West Indies, and forms one of the grand zoögeographical divisions, named "Neotropical" by Sclater. It is characterized by richness and isolation, leading to the belief that its union with North America has been accomplished at a comparatively recent date and that the origin of its animal population is exceedingly remote and was followed by long isolation. It has eight families of mammals absolutely confined to it, including two families of monkeys, markedly different from those of the Old World (but no lemurs), the blood-sucking bats, and the greater part of the order of Edentates, and many peculiar rodents. The continent has no Mustelidæ or Viverridæ; only one kind of bear; almost no insectivora; no horses or related animals, except one species of tapir; no ruminants, except the cameloid llamas (not known elsewhere), and only a few small ungulates of any sort. Birds display still greater isolation and singularity when compared with the avifauna of the Old World or of North America. Wallace gives 23 families and 600 genera as exclusively Neotropical, while that continent or its northerly extensions possess the greater part of many other important families, such as the humming-birds (some 500 species), tanagers, and macaws, to which must be added a long list of peculiar sea-fowl. Among reptiles there are less peculiar forms, the boas and scytales being most conspicuous among snakes; but there are several local families of lizards and many genera, the iguanids being widely developed, while the Varanidæ, Lacertidæ, and Agamidæ, so characteristic of the Old World, are entirely absent from America. The Amphibia present a similar case. Fishes of fresh waters are enormously abundant, and their resemblance, as a whole, is to the African piscifauna, while many are survivors of very ancient types, such as lepidosiren. Similar facts might be adduced to show the regional exclusiveness of the insects and other invertebrates. On the whole, South America is characterized by the possession of a very uniformly distributed fauna, far more local and distinct than that of any other continent, unless it be Australia, probably more than four-fifths of its species being restricted to its zoögeographical boundaries. See DISTRIBUTION OF ANIMALS.

HISTORY

Discovery. Christopher Columbus, in 1492, added a new world to European commerce and civilization; but there can be little doubt that the Western Hemisphere to which Columbus opened the way had previously been visited by voyagers from the older world. There is nothing inherently impossible in the stories that Japanese or Chinese vessels, blown by storms or carried by the Pacific currents, reached the western coast of North America. The most circumstantial of these tales relates that some Chinese Buddhist priests in the fifth century A.D. reached a land of Fu-sang, and successfully returned with the account of their adventures in what some critics have thought was the country now known as Mexico, but which is now generally believed to have been Japan. From Europe the earliest visitors to America came by way of Iceland, and the story of their experiences, though it does not satisfy all the demands of modern historical criticism, may safely be deemed true in its principal details. In 876 Gunnbjörn, a sea rover, while on his way from Norway to the new Norse settlement in Iceland, was blown westward until he sighted an unknown land. A

century later, about 985, a restless young Norwegian named Eric the Red succeeded in verifying the stories which had been handed down from Gunnbjörn's time and in establishing a settlement on the shores of the land to which, with the idea of attracting colonists, he gave the name of Greenland. Two years or so after this, Bjarni Herjulfson, while in command of a ship in which he had set out to visit the Red Eric's settlement, encountered storms that drove him, as he reported, southward until he came in sight of land.

In the year 1000 Leif, Eric's son, started to explore Bjarni's land. He came first to a barren shore backed by ice-covered mountains, a description which suggests Labrador. Sailing south, he met with more pleasant regions, to which he gave the names of Markland and Vinland. Many attempts have been made to identify these localities, and Newfoundland and Nova Scotia perhaps best answer the essential conditions. At Vinland a flourishing settlement was established and maintained for several years, and there Gudrid, the wife of Thorfinn Karlsefni, gave birth, in 1007, to a son, Snorri, from whom the sculptor Thorwaldsen claimed descent. Many localities—Newport and Dighton, on Narragansett Bay; Cambridge and Waltham, on the Charles; Salem, indeed, well-nigh every town situated beside a pleasant river northward from Long Island—have laid claim to this Norse settlement, regarding the actual situation of which, however, nothing certain is known. During the succeeding 500 years many voyagers may have crossed the Atlantic, but none of them left any proof of their work. Madoc, son of Owen Gwynnedd, a Prince of Wales, is said by Humfrey Lloyd, in a book printed in 1559, to have sailed westward and to have established a transatlantic Welsh colony in 1170. The Venetian brothers Zeno, between 1380 and 1390, probably made a voyage from the Shetland Islands to Iceland and Greenland, and in their letters home to their Italian brethren they seem to have given a picturesque account of what they had learned about the country lying still farther to the southwest. French, Breton, and Basque fishing vessels very likely visited the cod banks in the western Atlantic during the fifteenth century; but if they did, they were careful not to let the information of their valuable discovery reach their rivals.

Consecutive discovery and exploration began with the voyage of Christopher Columbus in 1492. (For a full account of his expeditions, see COLUMBUS, CHRISTOPHER.) In 1493 and 1494 Columbus established the main features of the islands in the West Indies. In his third voyage, 1498, he touched at Trinidad and followed the mainland for some distance; and in 1502–04 he coasted from Yucatan to Venezuela. Meanwhile, in 1497, John Cabot sailed from England and reached the neighborhood of the Gulf of St. Lawrence; but many years passed before the identity of the land, which served as headquarters for the hosts of fishing boats frequenting the banks, with that of the New World of the Spaniards was definitely determined. It appears probable that almost simultaneously with Cabot's landing on the American continent Pinzon (accompanied by Vespucius) discovered Central America. A succession of voyages now rapidly extended geographical knowledge of the coast line of the Mexican Gulf and northeastern South America. In 1499 Ojeda and Vespucius coasted the northern shores of the southern continent, naming Venezuela, 'the little Venice,' and uniting this coast with the territory visited by Columbus. Pinzon, early in 1500, reached Brazil, entered the mouth of the Amazon, and crossed the equator, reaching 8° 20′ S. on the Brazil coast. Cabral, in 1500, too, was blown to the same coast while trying to follow the route of Vasco da Gama to the East Indies and thus established the Portuguese claim to a part of America. Vespucius, transferring his services to Portugal, in 1501 followed the coast from Cabral's Land nearly to the mouth of the Plata. These were the official recorded voyages; but the extent and importance of the information secured by the surreptitious voyagers who were striving to gain a part of whatever the new-found lands had to offer is best shown by the fact that though Cuba was not officially circumnavigated until 1508, by Ocampo, nevertheless, it is represented as an island on La Cosa's map of 1500 and on the Cantino Portuguese map of 1502. As soon as it was realized that a vast land mass still barred the way to India and Japan, the problem of foremost importance became that of finding a water route through or around the western continent. The way was found in 1520 by Fernão Magalhães, commonly known as Magellan. Magalhães sailed so directly for the strait which now bears his name that it has been surmised that he already knew of its probable existence from the captains of merchant vessels who had explored the coast to the extreme south in their search for trading chances, and, indeed, it is depicted on a globe made before the voyage of Magalhães. (This globe was made by Johann Schöner, 1515. A copy of it is in the city museum of Frankfort, Germany. Magalhães passed through the strait in Oct.–Nov., 1520.) From the western end of the strait Magalhães laid his course to the East Indies. There, on one of the Philippine Islands, he was killed in April, 1521; but Juan Sebastian del Cano, in command of the *Victoria*, prosecuted the voyage successfully, and reached Seville in September, 1522, by way of the Cape of Good Hope, having circumnavigated the globe for the first time.

The exploration of the interior demanded attention as soon as the main features of the coast had been determined. In 1513 Vasco Nuñez de Balboa ascended one of the peaks in the range which forms the isthmus of Panama, and looked down upon a south sea, to which Magalhães, a few years later, gave the name of Pacific, because of his calm and pleasant passage. Cortes, in 1519, set out from Cuba to investigate the persistent gold rumors from the West, and landed at a port to which he piously gave the name of Vera Cruz. Two years later he had mastered the geography, as well as the people, of central Mexico, and within the ensuing ten years his captains traversed a large part of the Central American region, reaching the Pacific by several routes. In 1527 Cortes built a fleet on the western coast, which he dispatched to the Moluccas under Alvaro de Saavedra, for the purpose of coöperating with an expedition commanded by Sebastian Cabot, who had, however, turned aside from his original purpose of sailing to the East Indies by way of the Strait of Magellan, and was spending three years in ascending nearly to the head waters of the Plata. In 1536 Cortes found Lower California, which

was supposed to be an island. In 1539 Francisco de Ulloa determined it to be a peninsula. This, however, was forgotten, and in 1540 Alarcón proved its continuity with the mainland by his trip up the Colorado River of the West. Similarly, in 1512, Ponce de Leon discovered the "island" of Florida, which Pineda, in 1519, definitely connected with the continent by a voyage along the coast from Florida to Vera Cruz. Ponce de Leon was followed by Narvaez, Cabeza de Vaca (the latter making the first journey of a European across the continent to the west coast of northern Mexico, in 1536), and Fernando de Soto, whose explorations, combined with that of Vasquez Coronado from Mexico to the Kansas-Nebraska prairies, had, by 1545, made known the principal features of central North America south of the Missouri and Ohio rivers.

Francisco Pizarro was the successful discoverer of the truth in the reports of a rich land southward from Panama, of which the settlers had heard from the time of their first visit to the isthmus. Between 1531 and 1534 Pizarro brought the Inca Empire of Peru within the limits of the known world, while his associate, Diego de Almagro, pushed on farther south into the plateau of northern Chile. Gonzalez Pizarro, in 1540–41, crossed the Andes and reached the head waters of the Amazon, which one of his companions, Francisco de Orellana, followed down to its mouth, reaching the sea in August, 1541. The reports of a large river in the northeastern part of the southern continent caused much confusion in the handiwork of European map-makers, and it was a long while before they succeeded in evolving two distinct river systems. It is often quite impossible to determine from the narratives of early explorers in the interior whether they are describing the Orinoco or the Amazon. The latter was known at first by several names, among them Marañon and Orellana; but the name given for the tribe whose female warriors, with their men, fought Orellana and thereby suggested the original Amazon myth of the Old World, eventually became the accepted designation. The other great river system, that of the Plata, was first visited in 1515 by De Solis, whose name clung to it for several years, until after the explorations of Sebastian Cabot and Diego Garcia in 1527–30. The only remaining section of South America, from the Strait of Magellan northward to Chile, which had been explored to 40° south by Valdivia in 1540, is not known to have been visited until the latter part of the century, when Drake and his fellow freebooters undertook to tap the sources of Spanish wealth. Drake started off on a mission of vengeance for the injuries he had brought upon himself in the West Indies in the winter of 1577–78. Sailing through the Strait of Magellan, he followed up the west coast, plundering as he went, until he had filled his vessels with Spanish treasure. Learning that his enemies were watching to attack him when he should return through the strait, Drake decided to seek some other way home to England. He tried first for a northwest passage; but the season was not propitious, and after visiting the California coast and annexing it to the British crown under the name of New Albion, he turned westward and completed the first English circumnavigation in 1580.

John Cabot showed the way to the Newfoundland Banks, and it is probable that English, Breton, and Basque fishermen visited the neighboring coasts regularly from the very beginning of the sixteenth century. They added little, however, to the general geographical knowledge of the country. Gaspar de Cortereal visited the St. Lawrence region or the Labrador coast in 1500–01, and Jean Denys of Honfleur was on the Newfoundland coast in 1506. By chance a record of these voyages has been preserved. Many similar voyages must have been undertaken, but all traces of them are lost. In 1524 Giovanni de Verrazano, sailing with a commission from the French King, followed the North American coast for a long distance, perhaps from Cape Fear as far as Cape Race. He entered the mouth of the river later called the Hudson and is the first European on record to do so. His narrative provides the earliest description of many of the characteristic features of the coast. At one point he saw open water beyond low-lying land, such as the narrow islands which protect the Albemarle and Pamlico sounds, and he guessed that this might be the much-sought Southern Sea. In consequence, many of the maps of the ensuing years represent a vast gulf of the Pacific, entering from the west and occupying the larger part of the northern continent, being separated by a narrow isthmus from the Atlantic. In 1534 and 1535 Jacques Cartier entered the Gulf of St. Lawrence and sailed up the river as far as the present site of Montreal, where he heard of the Great Lakes—another hopeful clue to the longed-for water passage to the east. During the second half of the century, attempts at settlement led to a more careful determination of the details of the north Atlantic coast. St. Augustine was founded in 1565. Raleigh's famous "lost colony" on the Carolina or "Virginia" coast was established in 1587, and the attempts to determine the fate of the settlers led to several voyages during the next two decades, by means of which the coast was more or less carefully examined from New Jersey southward. Farther north, the work of Gosnold in 1602, Pring in 1603, Champlain and Weymouth in 1605, and in 1609 Hudson, who entered the river bearing his name, marked out the courses which were followed year by year by a constantly increasing number of vessels.

Champlain settled Quebec in 1608, and began the systematic exploration of the interior by visiting the lake which preserves his name in 1609. In 1615 he penetrated to Lake Huron. Traders and missionaries year by year pushed their way farther up the river and along the lakes. Père Allouez, in 1665, founded a mission on the southern shores of Lake Superior, and in 1672, accompanied by P. Dablon, he made a tour through Wisconsin and Illinois. A year later Marquette and Joliet reached the Upper Mississippi. In 1679 La Salle began his career by a voyage from Niagara to the southern end of Lake Michigan. Hennepin, one of La Salle's companions, crossed to the Mississippi, which he followed up as far as Minneapolis in 1680. Two years later La Salle made a trip down the Ohio to the Mississippi and on to the Gulf of Mexico, establishing the claim of France to the whole of the interior of the continent.

Henry Hudson, in 1610, entered the bay to which his name has been attached, and there, with several others, he was left in an open boat by his mutinous sailors. Some years earlier, in 1592, Juan de la Fuca, in a Spanish vessel, prob-

ARCTIC OCEAN
PACIFIC OCEAN
ATLANTIC OCEAN
ALASKA
DOMINION
HUDSON BAY
GREENLAND
BAFFIN BAY
DAVIS STRAIT
HUDSON STRAIT
NEWFOUNDLAND
ST. JOHNS
GRAND BANKS
ICELAND
REIKIAVIK
JAN MAYEN I.
SPITZBERGEN
ARCTIC CIRCLE
NORTHEAST FORELAND
KING WILLIAM'S LAND
PRINCE OF WALES I.
VANCOUVER I.
QUEEN CHARLOTTE I.
MELVILLE I.
BANKS LAND
PR. PATR. CH.
PARRY'S
MELVILLE
BATHURST
DEVON
SOMERSET
BYLOT I.
BAFFIN LAND
DISCO I.
GODTHAAB
JULIANEHAAB
FAREWELL
RESOLUTION I.
SOUTHAMPTON I.
MELVILLE PEN.
BOOTHIA
VICTORIA
WALLASTON
ARCTIC CIRCLE
MACKENZIE R.
YUKON R.
KLONDIKE
ENDICOTT RANGE
MT. McKINLEY
ALASKA PEN.
ALEUTIAN I.
MT. FAIRWEATHER
MT. ST. ELIAS
MT. BROWN
MT. HOOKER
PRINCE ALBERT
EDMONTON
CALGARY
WINNIPEG
L. WINNIPEG
L. WINNIPEGOSIS
L. MANITOBA
L. ATHABASCA
GREAT BEAR L.
GREAT SLAVE L.
L. ATHABASCA
L. WINNIPEG
L. MICHIKAMAU
L. HAMILTON
L. MELVILLE
L. HARRY
L. MACDOUGALL
L. BAKER
L. NUELTIN
L. REINDEER
L. DUBAWNANT
L. CHURCHILL
L. KASBIA
L. ST. JOHN
L. MISTASSINI
L. ALBANEL
L. MISTASSINI
L. ABITIBI
L. TEMISCAMING
L. NIPISSING
L. SUPERIOR
L. HURON
L. ERIE
L. ONTARIO
L. MICHIGAN
L. ST. CLAIR
L. CHAMPLAIN
L. MEMPHREMAGOG
L. ST. JOHN
L. TIMISK

NORTH AMERICA
SCALE OF STATUTE MILES
0 200 400 600 800 1000
SCALE OF KILOMETERS
0 200 400 600 800 1000 1200 1400 1600
Important towns are shown in heavy face type
Important Railroads
Canals
ISTHMUS OF PANAMA
SCALE OF MILES
0 5 10 15
SCALE OF KILOMETERS
0 5 10 15 20 25
NOTE
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UNITED STATES
MEXICO
GULF OF MEXICO
CARIBBEAN SEA
GREATER ANTILLES
LESSER ANTILLES
CENTRAL AMERICA
SOUTH AMERICA
ATLANTIC OCEAN
PACIFIC OCEAN
TROPIC OF CANCER
EQUATOR
Washington
New York
Philadelphia
Chicago
San Francisco
Mexico City
Havana
Panama
Isthmus of Panama
Caracas
Bogota
Quito
Amazon R.
Orinoco R.
Rio Negro
Panama Canal
Long. West from Greenwich
100° 90° 80° 70° 60°

ably entered the sound on the western coast which was more carefully explored and named by Captain Vancouver exactly 200 years later, and carried home a report that he had seen a vast stretch of open water extending eastward. The attempts to find a way between these two bays, the search for the Northwest Passage, belongs to the article on Arctic discovery. The discovery of the interior of Canada was largely accomplished by the trappers and agents of the Hudson's Bay Company, which was organized in 1670; but it was not until 1738–1743 that Pierre Gaulthier Varenne de la Verendrye and his sons made known the vast extent of the country lying east of the northern Rocky Mountains. The sons went as far as, probably, the Wind River Mountains, in 1742–43. In 1769–72 the fur-trader Hearne traced the Coppermine River to the sea, and in 1793 Mr. (afterward Sir A.) Mackenzie, while crossing the continent for the first time north of Mexico, from the Atlantic to the Pacific, discovered the course of the river to which his name has been given. In 1776 Escalante and Dominguez, two Spanish priests, traveled north from Santa Fé to Utah Lake, thence south to the upper Virgin River, and east and south to Zuñi and Santa Fé.

The real exploration of what is now the western part of the United States did not begin until after the republic had acquired some of that region. As soon as the Louisiana purchase had been concluded, Jefferson dispatched Lewis and Clark to investigate the course of the Missouri and determine its relation to the Pacific, which they did by descending the Columbia to the sea, their journey occupying the years 1804–06. Pike, meanwhile, was traversing the country between the head waters of the Mississippi and Red rivers, and afterward, 1806, he went to the Rocky Mountains south of the peak which now bears his name, but which he did not climb, examining it from another height. Pike's Peak was named by Long, James Peak, after his botanist, who was the first white man on record to reach its summit. Pike trespassed on Mexican territory and was captured, being later released in Mexico. He did not find the Red River of that region of which he was in search.

Among the other explorers of the United States in the first half of the nineteenth century were Ogden, General Ashley, Jedediah Smith, Joseph Walker, James Bridger, Long, Bonneville, Schoolcraft, Catlin, Nicollet, and Frémont. Among their successors in the second half of the century were Ives, Wheeler, Whitney, Hayden, and Powell. The list of explorers of British America and Alaska in the nineteenth century embraces Sir John Franklin, Back, Richardson, Beechy, Dease, Simpson, and Rae, whose activity lay in the realm of Arctic exploration, and Bell, Selwyn, Dawson, Dall, Muir, Allen, Schwatka, Ogilvie, Russell, and Low. Of the many explorers of South America in modern times mention may be made of Humboldt, Maximilian of Wied, Spix, Martius, Auguste de Sainte-Hilaire, Orbigny, Pöppig, the brothers Schomburgk, Darwin, Avé-Lallemant, Tschudi, Castelnau, Burmeister, Herndon and Gibbon, Chandless, Crevaux, Bates, Karl von den Steinen, and Ehrenreich. Among the explorers of the Andes in recent times have been Reiss, Stübel, Whymper, Fitzgerald, and Conway.

Colonization. Before Columbus left the newly discovered West India Islands in January, 1493, he built a fort on Española, now Haiti. Here some 40 of his sailors remained to form a settlement which should serve as headquarters for the further discoveries that Columbus expected to make as soon as he could return to the new world. These first Spanish colonists were killed by the Indians, but their places were taken by others, numbering between 200 and 300, who accompanied Columbus on his second voyage. During the early months of 1494 the town which they built, named in honor of the Queen, Isabella, rapidly assumed the appearance of a flourishing city. During the next 10 years a constant stream of settlers, many of them accompanied by their families, flowed from Spain into the new city. Many of these remained there to practice the trades necessary to town life, while others took farms near by or went on to assist in building up the newer towns which were being established at every good harbor and in the mining districts. These places became in a surprisingly short time practically self-supporting, and they were soon able to supply men and equipment for further exploration. Cortes drew from Cuba whatever he needed for his enterprise of 1519, a debt which Mexico repaid by furnishing the supplies for the large expedition which Vasquez Coronado led through the present Arizona and New Mexico to the great buffalo plains of the Mississippi valley in 1540–41. Moreover, Almagro and Pizarro drew from Panama the means for their adventurous expeditions into Peru and Ecuador, and these countries furnished the supplies to send Valdivia southward into Chile (1540), and Orellana and Ursua (see AGUIRRE) to explore the trans-Andean regions. By 1550 the Spanish-American settlements were firmly established, with every prospect of developing into powerful and wealthy colonies. Unluckily, the home government in Spain persisted in retaining all the administrative authority in the hands of officials appointed in Europe. As a result, the colonists were subjected to a succession of incompetent, corrupt governors, ignorant of American conditions, and desirous only of securing the greatest annual revenue for themselves and for the royal treasury. Deprived of all the incentives of public service, the Spanish-Americans suffered a steady decline in social and intellectual tone, very similar to that which was so noticeable in the northern English colonies between 1690 and 1750. Missionary zeal supplied almost the only active force for extending the colonial limits. The Jesuits built up a very remarkable domination over the natives along the upper Paraná and Paraguay, and north of Mexico the Franciscans, although driven out of New Mexico by the native "rebellion" of 1680, eventually succeeded in laying the foundations for permanent settlements in that region. During the eighteenth century there was a flourishing provincial life along the upper Rio Grande del Norte, the strength of which may be inferred from the fact that the first printing press west of the Mississippi, in what is now United States territory, was set up about 1737 in the town of San Fernando de Taos, New Mexico, which is still many miles from any railway. The Franciscans, Dominicans, and Jesuits sent their friars into Alta, or Upper California, and the mission buildings whose ruins are now so carefully cherished were begun at San Diego in 1769. Before the end of the century 17, in all, had been established, and by 1820 three more were

added, making a total of 20. Soldiers and ranchers followed the priests, and by 1800 the Spanish settlements were scattered thickly along the Pacific coast as far north as the Bay of San Francisco, and they were numerous in New Mexico in the valley of the Rio Grande.

Portugal began to colonize the eastern coast of South America in 1531, in order to maintain its claim to what is now Brazil against the Spanish, who were locating everywhere else on the new continent. A few settlements along the coast, however, were all that resulted until early in the eighteenth century, when the Portuguese tried to develop the country as a substitute for the East Indian possessions which the English and Dutch had taken from them. There was little European impress upon the country, however, before 1808, when the Portuguese court emigrated to Rio de Janeiro, which became for a while a pseudo-European capital. In 1821 King John VI went back to Portugal, but he left his eldest son, Dom Pedro, as Emperor. Extensive Brazilian estates were granted to his European retainers, and foreign capital began to be introduced. The country was developed for investment rather than colonization. There was no extensive taking up of the land by Europeans until the second half of the nineteenth century, when Italians, Germans, and Poles turned their attention to this region.

The French colonization of North America began with De Monts' settlement on the Bay of Fundy in 1604. The English (see ARGALL) effectually stopped all efforts to extend these settlements along the Maine coast, and so Champlain undertook to open up the interior by way of the St. Lawrence River. Quebec was settled in 1608 and Montreal in 1642; but these towns grew rapidly as trading and shipping places rather than as centres for colonization. A few other towns were started along the lines of communication with the trapping and hunting regions around the great lakes, as headquarters for trade with the Indians. As the competition with England for the possession of the country south of the lakes became keen, military posts, of which Fort Duquesne is the best known, were established on the Ohio and the Mississippi, to emphasize and protect the French claims. Nowhere was there much actual possession of the soil. When, in 1763, England secured the whole of French North America east of the Mississippi, the greatest part of it was open for settlement by her own people.

The English, like the other European nations, began by establishing outposts, first for the fishermen on Newfoundland before 1570, and in 1585 on the Carolina coast for the purpose of extending the search for gold and treasures inland. Religious and political conditions, however, changed the character of the English emigration to America soon after 1600. In 1620 and 1630 the Pilgrims and Puritans established themselves along Massachusetts Bay, with the deliberate purpose of becoming permanent inhabitants of the country. A few years earlier, in 1607, a Church of England colony had been attempted at Sagadahoc, now Popham Beach, on the Maine coast; but it made no permanent impression on New England. The same year a settlement was started at Jamestown, in Virginia, a successor to Raleigh's "lost colony" of 1587; and after many vicissitudes this gradually acquired a permanent character. The English Roman Catholics had held themselves ready to emigrate if necessary throughout the reign of Elizabeth, but it was not until 1634 that they prepared a place for themselves in Lord Baltimore's grant of Maryland. The development of New England, beginning with the "great immigration" of 1630, was very rapid. In 1635 the "Bay Colony" was able to spare a large body of people, who, disagreeing with the majority in some minor matters of doctrine, preferred to live by themselves along the Connecticut River. A year later, others who differed from the Boston elders in opinions regarding more vital points of dogma formed the Providence Plantations as a refuge for those who desired religious liberty. The Southern colonies were settled more slowly, the formal organization of colonial governments (the Carolinas in 1663 and Georgia in 1733) being brought about partly by the necessity of counteracting the extension of the Spanish settlements north and west from St. Augustine (founded in 1565). St. Augustine and Chamita, New Mexico (founded 1598), are the oldest European towns in the United States. Santa Fé was founded in 1605.

The Dutch promptly organized trading posts along the river explored by Hudson in 1609, and sent over a large body of colonists during the next 10 years to hold the country. Rivalry with the English on the east, and with the Swedes, who settled on the Delaware in 1638, prepared the way for the absorption of the latter by the Dutch in 1655, and in turn for the occupation of the Dutch territory by the English in 1664.

French trappers and frontiersmen wandered up and down the Mississippi and along its western tributaries in steadily increasing numbers from the time of La Salle's voyage down the river in 1682. By 1803, the year of the Louisiana purchase, these men and their descendants were scattered widely over the western plains, drawing their supplies from the large village at St. Louis or the small town of New Orleans. Poli-

I. Independent States of the American Continent and Islands:

	Area in square miles	Population	Date
United States	2,974,000	91,972,000	1910
Alaska	591,000	64,000	1910
Hawaii	6,400	192,000	1910
Porto Rico	3,600	1,118,000	1910
Canal Zone	474	75,000*	1911
Total	3,579,474	93,421,000[1]	
Mexico	767,000	15,115,000	1910
Guatemala	48,000	1,992,000*	1910
Salvador	8,000	1,161,000*	1912
Nicaragua	49,000	600,000*	1910
Honduras	46,000	553,000	1910
Costa Rica	23,000	388,000	1911
Cuba	44,000	2,220,000	1910
Haiti	11,000	2,029,000	1909
Santo Domingo	19,000	675,000*	1912
Panama	32,000	336,000[2]	1911
Colombia	461,000	5,476,000	1912
Venezuela	394,000	2,743,000*	1912
Brazil	3,290,000	23,071,000*	1911
Ecuador	115,000	1,500,000*	1910
Peru	695,000	4,500,000*	1908
Bolivia	708,000	2,450,000*	1912
Chile	292,000	3,415,000	1910
Argentina	1,153,000	7,171,000*	1910
Uruguay	72,000	1,177,000	1911
Paraguay	172,000	715,000*	1908
Total for Independent States	11,977,174	170,708,000	

* Estimated.

[1] Not including persons in military and naval service abroad, the Philippines, Guam, and Tutuila.

[2] Canal zone not included.

SOUTH AMERICA
SCALE OF STATUTE MILES
0 200 400 600 800 1000
SCALE OF KILOMETERS
0 200 400 600 800 1000 1200 1400 1600 1800
Important towns are shown in heavy face type
Railways shown thus
Longitude West from Greenwich
80° 70° 60° 50° 40°
CARIBBEAN SEA
PACIFIC OCEAN
ATLANTIC OCEAN
EQUATOR
VENEZUELA
COLOMBIA
ECUADOR
PERU
BRAZIL
BRITISH GUIANA
DUTCH GUIANA
FRENCH GUIANA
Brazilian Guiana
Matto Grosso
Grão Pará
Maranhão
Piauhy
Ceará
Rio Grande do Norte
Parahyba
Pernambuco
Bahia
Amazonas
Gulf of Darien
Gulf of Guayaquil
Gulf of Venezuela
Orinoco Delta
Mouths of the Amazon R.
Mouth of Tocantins R.
Falls of the Madeira
Falls of Augusta
Plateau of Matto Grosso
Serra Geral Mts.
Serra Pacaraima
Serra Parima
Andes Mts.
Cordillera of Huanuco
Cordillera of Vilcanota
Cordillera of Cochabamba
Cordillera of Chichas
Cordillera of Sahama
Cordillera of Tres Cruces
Cordillera of Lipez
Cordillera of Atacama
Cordillera of Famatina
Cordillera of Aconcagua
Cordillera of Tupungato
Cordillera of Maipo
Cordillera of Portillo
Cordillera of Uspallata
Cordillera of Mendoza
Cordillera of Tontal
Cordillera of Chillan
Cordillera of Antuco
Cordillera of Peuenche
Cordillera of Villarica
Cordillera of Llanquihue
Cordillera of Osorno
Cordillera of Tronador
Cordillera of Huemules
Cordillera of Cochrane
Cordillera of Paine
Cordillera of Sarmiento
Cordillera of Darwin
Cordillera of Vicuña Mackenna
Cordillera of Alacalufes
Cordillera of Pelvoux
Cordillera of Ventisquero
Cordillera of Skyring
Cordillera of Otway
Cordillera of Magdalena
Cordillera of Reyes
Cordillera of Merida
Cordillera of Perija
Cordillera of Oca
Cordillera of Mitu
Cordillera of Huallaga
Cordillera of Huayhuash
Cordillera of Blanca
Cordillera of Huanuco
Cordillera of Vilcanota
Cordillera of Cochabamba
Cordillera of Chichas
Cordillera of Sahama
Cordillera of Tres Cruces
Cordillera of Lipez
Cordillera of Atacama
Cordillera of Famatina
Cordillera of Aconcagua
Cordillera of Tupungato
Cordillera of Maipo
Cordillera of Portillo
Cordillera of Uspallata
Cordillera of Mendoza
Cordillera of Tontal
Cordillera of Chillan
Cordillera of Antuco
Cordillera of Peuenche
Cordillera of Villarica
Cordillera of Llanquihue
Cordillera of Osorno
Cordillera of Tronador
Cordillera of Huemules
Cordillera of Cochrane
Cordillera of Paine
Cordillera of Sarmiento
Cordillera of Darwin
Cordillera of Vicuña Mackenna
Cordillera of Alacalufes
Cordillera of Pelvoux
Cordillera of Ventisquero
Cordillera of Skyring
Cordillera of Otway
Cordillera of Magdalena
Cordillera of Reyes
Cordillera of Merida
Cordillera of Perija
Cordillera of Oca
Cordillera of Mitu
Cordillera of Huallaga
Cordillera of Huayhuash
Cordillera of Blanca
MARTINIQUE (Fr.)
SANTA LUCIA (Br.)
BARBADOS (Br.)
ST. VINCENT (Br.)
GRENADA (Br.)
TOBAGO (Br.)
TRINIDAD (Br.)
PORT OF SPAIN
CURACOA (Dutch)
BUEN AIRE (Dutch)
ORCHILLA (Dutch)
LOS ROQUES (Dutch)
LA GUAIRA (Dutch)
TORTOLA (Br.)
MONTSERRAT (Br.)
ANTILLES (Fr.)
HONDURAS
Pt. Gallinas
Santa Maria
Cartagena
Maracaibo
Barquisimeto
Valencia
Caracas
Barcelona
Guiana
Calaboso
Cuidad Bolivar
Orinoco R.
Essequibo R.
GEORGETOWN
New Amsterdam
Mackerie
PARAMARIBO
CAYENNE
C. Orange
Counani
Maraca I.
Amapa
Tumuc Humac Mts.
Mt. Roraima
Buenaventura
Antioquia
Medellin
Tolima (Vol)
Bogotá
Socorro
Sogamoso
Cucuta
Merida
Barinas
Apure R.
Meta R.
Atures
Cassiquiare
Rio Negro
Fernando
Zapurara
Esmeralda
Caruchas
Waracapur
Conception
Tumaco
Pasto
Almaguer
Popayan
Caqueta R.
Japura R.
Putumayo R.
Iça R.
Napo R.
Tigre R.
Pastaza R.
Morona R.
Huallaga R.
Ucayali R.
Urubamba R.
Apurimac R.
Beni R.
Madre de Dios R.
Mamore R.
Guaporé R.
Itenez R.
Paraguay R.
Tapajos R.
Xingu R.
Tocantins R.
Araguaya R.
Gurupy R.
Pará
Belem
Breves
Pto. de Moz
Cametá
Alcantara
Turyassu
Parnahiba
Tutoya
Viana
Caxias
Imperatriz
Chapada
Theresina
Sabral
Ceara
Aracaty
Fernando Noronha (To Brazil)
Assu
Rio Grande do Norte
Natal
C.S. Roque
Toures
S. Bernardo
S. Joao
S. Felix
Carolina
Remanso
Pilao Arcado
Barra
Joazeiro
Pernagua
Jatoba
Pelras
Maccio
Penedo
Queimadas
Cachoeira
Urubu
Carunhanha R.
Contas
Januario
Leopoldina
Palma
Barra
Santa Marjao
Porto Imperial
Tapuraquinho
Tapuranbinho
Barbacal
Barcellos
Ayrão
Obidos
Villa Bella
Serpa
Santarem
Alhenirin
Manaos
Borba
Teffe
Coari
Codajas
Fonteboa
Tunantins
Ega
Jurua
Juruá
Tapura
Jutahy
Solimoens
Amazonas
Iça
Yurimaguas
Moyobamba
Chachapoyas
Lumbayque
Pacasmayo
Huaura
Huacho
Callao
LIMA
Canete
Chincha
Pisco
Ica
Nazca
Arequipa
Ayacucho
Cuzco
Sta Rosa
Reyes
Trinidad
Laures
Maldonado
Marcapata
Carabaya
Sorata
Inquisivi
Larecaja
Cochabamba
Oruro
Potosi
Sucre
Tarija
Villa Bella
Beira
Guapore
Mamore
Madeira
Diamantino
Mojito Grosso
Cuyaba
Matto Grosso
Corumba
Albuquerque
Miranda
Nioac
Aquidauana
Coimbra
Xarayes
Paraguay
Assumption
Concepcion
Villa Rica
Villa Real
Encarnacion
Corrientes
Goya
Esquina
Curuzu Cuatia
Paso de los Libres
Uruguay R.
Parana R.
Paraguay R.
Pilcomayo R.
Bermejo R.
Salado R.
Dulce R.
Gran Chaco
Mendoza
San Juan
San Luis
Rio Cuarto
Cordoba
Rosario
Santa Fe
Buenos Aires
Montevideo
Maldonado
Rocha
Cape Corrientes
Cape Blanco
Cape Parina
Cape Pilar
Cape Horn
Cape Virgins
Cape Orange
Cape Roque
Cape St. Augustine
Cape Frio
Cape Corrientes
Cape Blanco
Cape Parina
Cape Pilar
Cape Horn
Cape Virgins
Cape Orange
Cape Roque
Cape St. Augustine
Cape Frio
COCOS I.
MALPELO I.
GORGONA I.
GALAPAGOS IS.
DULEPPER I.
WENMAN I.
ISABELA I.
S. CRISTOBAL I.
STA. CRUZ I.
ST. PAUL (To Brazil)
Manta
Chimborazo
Guayaquil
Cuenca
Loja
Zamora
Esmeraldas
Tumaco
Pasto
Almaguer
Popayan
Caqueta R.
Japura R.
Putumayo R.
Iça R.
Napo R.
Tigre R.
Pastaza R.
Morona R.
Huallaga R.
Ucayali R.
Urubamba R.
Apurimac R.
Beni R.
Madre de Dios R.
Mamore R.
Guaporé R.
Itenez R.
Paraguay R.
Tapajos R.
Xingu R.
Tocantins R.
Araguaya R.
Gurupy R.

PACIFIC OCEAN
ATLANTIC OCEAN
TROPIC OF CAPRICORN
ST. FELIX (To Chile)
ST. AMBROSE (To Chile)
JUAN FERNANDEZ GROUP
MAS-A-FUERA I. (To Chile)
MAS-A-TIERRA I. (JUAN FERNANDEZ) (To Chile)
Valparaiso
SANTIAGO
Aconcagua
Mendoza
Nevado Mt.
Concepcion
MOCHA I.
Valdivia
CHILOE I.
Gulf of Corcovado
CHONOS ARCH.
Taytao Pen.
Gulf of Penas
CAMPANA I.
WELLINGTON I.
MADRE DE DIOS ARCH.
HANOVER I.
QUEEN ADELAIDE ARCH.
Strait of Magellan
DESOLATION I.
SANTA INES I.
Cockburn Channel
LONDONDERRY I.
HOSTE I.
C. Horn
NAVARIN I.
STATEN I.
TIERRA DEL FUEGO
Grande Bay
Port Gallegos
C. Virgins
Puerto Deseado
S. Julian B.
Santa Cruz
Gulf of St. George
C. Tres Puntas
New Gulf
Valdes Pen.
S. Matias Gulf
Blanca Bay
Carmen de Patagones
Bahia Blanca
C. Corrientes
BUENOS AIRES
Rosario
Santa Fe
Parana
Corrientes
ASUNCION
Salta
Tucuman
Cordoba
Mendoza
Villa Rica
Concepcion
Ft. Olimpo
Tarija
Oruro
La Paz
Cochabamba
Sucre
Potosi
Tupiza
Jujuy
Rivadavia
Cafayate
Belen
Famatina
Chilecito
Jachal
San Juan
Villa Maria
Rio Cuarto
Mercedes
Rio Grande
Pelotas
Porto Alegre
Rio Grande do Sul
Montevideo
Maldonado
Colonia
Paysandu
Salto
Durazno
Florida
CASTILLOS, L.
L. Mirim
L. Patos
Rio Pardo
Sao Leopoldo
Vacaria
Lages
Desterro
Blumenau
Joinville
Paranagua
Curitiba
Ponta Grossa
Castro
Sorocaba
Santos
Sao Paulo
Campinas
Rio de Janeiro
Petropolis
Campos
C. Frio
Macahe
Victoria
Ouro Preto
Diamantina
Bello Horizonte
Caldas
Pocos de Caldas
Uberaba
Franca
Ribeirao Preto
Araraquara
Barretos
Jaboticabal
Araguary
Tres Lagoas
Corumba
Cuyaba
Rio Paraguay
Rio Paraguay
Rio Parana
Rio Uruguay
Rio Negro
Rio Colorado
Rio Salado
Rio Chubut
Rio Chico
Rio Deseado
Rio Santa Cruz
Rio Gallegos
Rio Grande
Rio Iguassu
Rio Tiete
Rio Sao Francisco
Rio Doce
Rio Pardo
Rio Jequitinhonha
Rio Mucury
Rio Grande
Rio Paraguassu
Rio Contas

II. European Dependencies:

	Area in square miles	Population	Date
BRITISH POSSESSIONS:			
Canada:			
Ontario	407,000	2,523,000	1911
Quebec	707,000	2,002,000	1911
Nova Scotia	21,000	492,000	1911
New Brunswick	28,000	351,000	1911
Manitoba	252,000	455,000	1911
British Columbia	356,000	392,000	1911
Prince Edward Island	2,100	93,000	1911
Saskatchewan	252,600	492,000	1911
Alberta	255,000	374,000	1911
Northwest Territories	1,242,000	17,000	1911
Yukon	207,000	8,000	1911
Total for Canada	3,729,100	7,199,000	
Newfoundland	42,700	238,000	1911
Labrador	120,000	4,000	1911
Bermudas	19	19,000	1911
British Honduras	8,600	40,000	1911
Bahamas	4,400	56,000	1911
Barbados	166	172,000	1911
Jamaica [1]	4,400	831,000	1911
Windward Islands:			
Grenada	133	67,000	1911
St. Vincent	150	42,000	1911
St. Lucia	233	49,000	1911
Trinidad, Tobago	1,754 / 114	330,000	1911
British Guiana	90,277	296,000	1911
Falkland Islands	6,500	3,300	1911
Leeward Islands:			
Antigua [2]	170	39,000	1911
Virgin Islands	58	5,600	1911
Dominica	291	34,000	1911
St. Christopher	65	26,300	1911
Nevis	50	13,000	1911
Anguilla	35	4,000	1911
Montserrat	32	5,600	1911
Total for British Possessions	4,009,247	9,473,800	
FRENCH POSSESSIONS:			
St. Pierre and Miquelon	96	6,000	1907
Guadeloupe	688	212,500	1911
Martinique	385	184,000	1911
Guiana	34,060	32,000	1907
Total	35,229	434,500	
DANISH POSSESSIONS:			
Greenland, Santa Cruz	46,740	13,500	1911
St. Thomas, St. John	138	27,086	1911
Total	46,878	40,586	
DUTCH POSSESSIONS:			
Surinam (Guiana)	46,000	86,200	1911
Curaçao [3]	403	54,500	1910
Total	46,403	140,700	
Total for Dependent States	4,137,757	10,089,586	
Total for American Continent and Islands	16,115,231	180,797,586	

[1] Including Caicos Islands.
[2] Including Barbuda and Redonda.
[3] Including the islands of Bonaire, Aruba, St. Martin, St. Eustache, and Saba.

tics was largely responsible for the annexation, in 1845, of Texas, and the same force, acting in advance of economic or agricultural reasons, led to the organization of the emigrant aid societies in 1854 to hasten the settlement of Kansas and Nebraska. Gold was discovered in California at least as early as 1841, but it was the dramatic discovery in 1848, at Sutter's Mill, that excited the world. Its discovery in Nevada a decade later, and in the Klondike in 1897, resulted in opening up those regions. For further information, see special articles under the political divisions of the continent.

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AMERICA. An American national hymn, by the Rev. Samuel F. Smith (1832). The melody, ascribed to Henry Carey (1742), is identical with that of the English national anthem, "God Save the King," and, popular in France from 1775, became national in Denmark, Germany, and Prussia. Consult E. Bohn, *Die Nationalhymnen der europäischen Völker* (Breslau, 1908).

AMERICA. The name of the schooner-yacht which in the international yacht race of 1851 won the cup since known as the "America's Cup." See YACHT.

AMERICAN, THE. A novel published in 1877 in Henry James's "earlier manner." The central character, Christopher Newman, while traveling in Europe for pleasure, falls in love with a Frenchwoman of noble birth. The way in which James brings out the inevitableness of Newman's failure in his suit for her hand is the striking feature of the book.

AMER'ICAN ALL'SPICE. See CALYCANTHUS.

AMERICAN AL'OE. See AGAVE.

AMERICAN AS'SOCIA'TIONS AND SOCI'ETIES. For descriptions of associations and societies whose official titles begin with the word "American," see names of subjects in which such organizations are interested. Example: For the American Academy of Political and Social Science, see POLITICAL AND SOCIAL SCIENCE, AMERICAN ACADEMY OF.

AMERICAN BAP'TIST MIS'SIONA'RY UNION. See MISSIONS.

AMERICAN BLIGHT. A term used abroad for the injurious effects upon trees or plants of plant-lice of the cosmopolitan genus Schizoneura, especially *Schizoneura lanigera*. For a general description of the ravages of plant-lice and the best methods for their destruction, see APHID. Consult *Circular No. 20*, Div. Entom., U. S. Dept. Agriculture (Washington, 1898).

AMERICAN BOARD OF COMMIS'SION-

ERS FOR FOR'EIGN MIS'SIONS. See MISSIONS.

AMERICAN COM'MONWEALTH', THE. A historical and critical work on the social and political institutions of the United States, by the Right Hon. James Bryce (q.v.). It was first published in 1888. A much enlarged edition appeared in 1893–95, and a new edition, completely revised by the author and with additional chapters, was published in 1910. Whether considered as a text-book for colleges and universities, or as a guide for the average reader who wishes to understand the structure and true spirit of the institutions of the United States, *The American Commonwealth* is probably the most authoritative and widely read work on the subject of which it treats.

AMERICAN COUS'IN, OUR. One of the best known plays of the English dramatist, Tom Taylor (1858), very popular a generation ago. The unimportant character, Lord Dundreary, became in the clever creation of E. A. Sothern a great part. For Americans, however, the drama must always possess melancholy associations, for it was while enjoying its presentation that Lincoln was assassinated.

AMERICAN FLAG, THE. See FLAG.

AMERICAN FORK. A city in Utah Co., Utah, 32 miles south of Salt Lake City, on the Denver and Rio Grande and the San Pedro, Los Angeles, and Salt Lake railroads (Map: Utah, C 2). Pop., 1900, 2732; 1910, 2797.

AMERICAN IN'STITUTE OF THE CITY OF NEW YORK. An organization to promote, by means of exhibitions and fairs, the interests of agriculture, commerce, manufactures, and arts in the State and country. The institute was founded in 1828, and its fairs attracted wide attention from investors and capitalists. Among the inventions which received early recognition from the institute were the McCormick reaper, the sewing machine, Colt's fire-arms, the type revolving and double power printing press machines, the first anthracite coal burning stove, the Morse telegraph, the stocking loom, the telephone, and the Francis metallic lifeboat and life-saving appliances. The American Institute now embraces in its organization five sections: The Farmers' Club, the Electrical Section, the Horticultural Section, the Photographic Section, and the Polytechnic Section. It has a valuable scientific library of over 15,000 volumes.

AMERICAN IP'ECAC. See GILLENIA.

AMER'ICANISMS. Words and phrases peculiar to the United States. They are classified by one writer on this subject (Bartlett) as follows: 1. Archaisms, obsolete, or nearly so, in Great Britain. 2. English words used in a different sense. 3. Words used in the original sense in the United States, although not in Great Britain. 4. English provincialisms adopted into general use in America. 5. Newly coined words owing their origin to productions or circumstances of the country. 6. Words derived from European languages, especially the French, Spanish, and Dutch. 7. Indian words. 8. Negroisms. 9. Peculiarities of pronunciation. Accepting for the present this arrangement, we may cite as examples of archaisms, *fall*, for autumn, *freshet*, to *lam*, in the sense of to beat, to *squelch*, and to *tarry*. These are only a few; for an American philologist has stated that of the words, phrases, and constructions found in the Bible and Book of Common Prayer, "about one-sixth, which are no longer used in England in ordinary prose-writing, would apparently be used without thought or hesitation by an American author." Among the many English words used in a different or perverted sense are *barn* for stable; *boards*, for deals; *buggy*, a four-wheeled vehicle—in England, two-wheeled (but the word itself is Anglo-Indian); *calico*, printed cotton, in England means unprinted; *clever*, for good-natured—in England, generally, intelligent or skillful; *corn*, for maize, whereas in England it means wheat, in Scotland, oats, and in Ireland, barley; *cracker*, for biscuit; *depot*, for station; *dress*, for gown; *forehanded*, well-to-do—in England, means timely, early; *hack*, a hackney coach—in England, a hired horse; *homely*, plain-featured—in England, homelike or unadorned; to *jew*, to haggle—in England, to cheat; *likely*, for promising; *lumber*, for timber; to *mail*, for to post; *notify*, to give notice—in England, to make known; *pond*, a natural pool of water—in England, artificial; *reliable*, for trustworthy; *saloon*, for tap-room; *smart*, for talented; *smudge*, a smoldering fire used to drive away insects—in England, simply an overpowering smoke; *store*, for shop; *tavern*, for inn (a tavern in Great Britain provides no lodgings); *temper*, with us meaning passion, is in England control of passion; *ugly*, for ill-natured; *venison*, deer's flesh—in England, meat of any wild animal; *track*, for line; *vest*, for waistcoat. We use also, in large number, different words for the same thing, as *conductor*, for guard; *editorial*, for leader; *elevator*, for lift; *horse-car*, for tram, and *sleeper*, for tie. One must here note that *argot* and genuine slang are scarcely to be regarded as necessarily either American or British, for in the underworld of both nations they are intelligible. So *graft*, *the push*, *in the swim*, *the stir* (prison) and hundreds more.

Examples of words retaining here their old meaning are: *Fleshy*, in the sense of stout; *offal*, the parts of a butchered animal not worth salting; *sick*, in the sense of ill; and *wilt*, in the sense of wither. On the other hand, to *heft*, meaning with us, to weigh by lifting, keeps, in England, its original meaning, to lift. Many words called archaic or provincial by English writers are widely current among Americans in both speech and literature—among them adze, affectation, angry (wound), andiron, bay-window, bearer (at a funeral), to blaze (a tree), burly, cesspool, clodhopper, counterfeit money, cross-purposes, deft, din, hasp, loophole, ornate, ragamuffin, shingle, stand (speaker's), stock (cattle), thill, toady, tramp, truck, and underpinning. Among newly coined words and expressions are these, showing plainly their origin on the frontier or in the forest: backwoods, cache, clearing, to draw a bead, to fight fire, a gone coon, salt-lick, hogwallow, logging camp, prairie schooner, raft (of dead trees), squatter, squaw-man, the timber, and trapper. Ranch life has given us such words as corral, cowboy, roundup, and stampede; the mining regions, bed-rock, diggings, to pan out, to prospect, and to stake a claim. From the farm and plantation we have obtained among others, bagassee, broom-corn, Hessian fly, Indian meal, and truck-patch; while trade has supplied us with bogus, drummer, posted up, and to settle (a bill). Many others might be added from the language of Wall Street. Our political terms and phrases include the following, most of which are the subject of special articles in this ENCYCLOPÆDIA; Agri-

cultural wheel, barnburner, bloody shirt, boodle, buncombe, carpet-bagger, caucus, copperhead, to eat crow, dark horse, doughface, favorite sons, fence-riding, F. F. V.'s, filibuster, fire-eater, gerrymander, half-breed, hoodoo, stalwart, hunker, jayhawker, Ku-Klux-Klan, loco-foco, log-rolling, Lynch law, Teddyite, graft (London argot), Mugwump, omnibus bill, pipe-laying, plank, primary, reconstruction, salt river, shin-plaster, spellbinder, squatter sovereignty, Greenbacker, wire-puller, Yazoo fraud.

Words derived from foreign languages are numerous and one philologist (W. W. Crane) asserts that, though few are intelligible to English people, they are more extensively used by Englishmen than is generally supposed, and "form the really distinctive features of what may be termed the American language." Thus, from the Spanish we have in corrupted or contracted form, beno (*vino*), creole (*criollo*), garrote (*garrota*), jerked beef (*charqui*), key, a small island (*cayo*), lasso (*lazo*), mustang (*mesteño*), pickaninny, contracted to *pickney* in S. C. (*pequeño niño*), Sambo (*Zambo*, a person of negro and Indian blood); stampede (*estampedo*); and such literally appropriated words as adobe, bonanza cañon, beano (*vino*) and mesa. From the French have been obtained among many, bayou (*boyau*, a trench), cache or cash (*cacher*), chowder (*chaudière*), shivaree (*charivari;* Low Lat. *charivarium*), metif, an Indian half-breed (*métif* or *métis*), mascot, and the identical butte, levee, portage, prairie, and voyageur. From the Dutch have come boss, an overseer or superior (*baas*); used also in England but there derived from South African Dutch; cold slaw, cabbage salad (*kool slaa*); cruller (*kruller*, to twist); hook, a point of land (*hoek*, a corner); noodles, an imitation of macaroni (*noodlejes*); overslough, to supersede or defeat (*overslaan*, to skip or pretermit); stoop or stoup, the step or steps of a house (*stoep*). Kill, a small stream, retains both its old sound and spelling, and Santa Claus (*Klaas*) receives as much respect as before the slight change in his name. The Germans have contributed bummer (*bummler*, a braggart, a loafer), pretzel, and dude.

From the Indian we have chinquapin, a kind of oak (Va., Algonquian, *che-chicnamin*); hominy (Va., Algonquian, *custathominy*); moccasin (Mass., Algonquian, *mockisin*); opossum (*appassum*); pow-wow (*powcan*, a prophet or conjurer); raccoon (Algonquian, *aroughcūn*); sachem (*sakemo*); skunk (Abnakis, *secancu*); succotash (Nanaheganset, *mesicmotash*); toboggan (*odabogan*); tomahawk (Algonquian, *tamahagan*, a war-club); wigwam (Natic, *weecwahm*), tepee and wick-i-up, and mush (Alaskan, meaning "start," "get-up" as addressed to an animal). Among words introduced or invented by the Southern negroes are: brottus, a small gift (Ga.); buccra, a white man; corn (harvest) songs (Md.); cracklings or goody-bread, bread containing roasted pork-rinds; enty? is that so? (Sea Islands); goober, a peanut (W. African *guja*, or Guinea *gobbe-gobbe*, Va. and N. C.); lagniappe, a tradesman's gratuity (Sp. *ñapa*, La.); moonack, a mythical animal; pickaninny, and pinder, a peanut (Fla.); while the Chinese word kowtow or kotow, salutation by prostration, has (or had) a limited use in the sense of obsequious politeness.

In the matter of pronunciation, slight differences exist. The word *trait*, for instance, is pronounced *tray* by the English, the *i* in *sliver* is lengthened by them, and *schedule* is commonly pronounced *shedule*. We may mention here that *cheerful* retains in some parts of the South its old pronunciation, *cherful*. In the pronunciation of proper names, English and American usages frequently disagree. In England Ralph is pronounced Rafe; Brownell, Parnell, etc., are accented on the first syllable; Powell is Pool, and Howells is Hools (both of these Welsh); the last syllable of Gladstone is sounded short. With English surnames and geographical names cultivated Americans should seek to follow English usage. In Christian names Englishmen generally use only the first, while Americans always give the full form. In England we read of Ralph Emerson, Edgar Poe, etc. What have been termed by Grant Allen "Americanisms in spelling," examples of which are *labor*, *offenses*, and *theater*, are undoubtedly the result of the extensive use of Webster's spelling-books and dictionary and the recent agitation for a simpler spelling, as *tho*, *thru*, etc.

Americanisms are classified by Reeves as follows: (1) Eastern dialects; (2) Southern; (3) Western; (4) Pacific or mining; and he adds as a possible (5) English-Dutch (German) of Pennsylvania. This convenient arrangement enables us to separate such words and phrases as are limited to particular sections or localities (provincialisms) from those that may be called national. Beginning with New England, we have: to *admire*, for to like, e.g., "I should admire to go"; to *allot*, or 'lot, for intend; *barm*, for yeast; *be*, for am or are; *bettermost; blob*, a blossom; *blowth*, blossoming time; *bungtown copper*, a counterfeit; to *calculate*, for to infer or suppose; *empti'n's*, any dregs; to *fail up;* to *fay*, for to fit; *fore-chamber*, a front bedroom (Me.); *gawnicus*, a dolt; *grayslick*, a glassy stretch of water (Me.); *Hessian*, as a term of reproach; *like*, without a specified object, as, "How did you like?" (a place, person); *long-favored*, tall; *mush-muddle*, a potpie (Cape Cod); *pew-cart*, a box-like carriage (Nantucket); *pleasant*, for pleasing; *pokeloken*, a marsh (Me.); *priest*, for a clergyman of any denomination; *pung*, a kind of sleigh; *rifle*, a whetstone for scythes; *sconce*, for discretion, like the French *bonne caboche;* to *seep*, to pour through a sieve or hole; *slip*, for pew; *spero*, a commonplace entertainment, "small doings" (Vt.); *staddle*, a sapling; *suant* or *suent*, level, uniform; to *sugar off*, to boil maple syrup down until it grains; *tackling*, for harness; *timbers*, for skeleton of a whale; *torsh*, the youngest child (Cape Cod); to *train*, to move briskly (like the militia on "training day"), to frolic; *vestry*, the chapel or lecture-room of a non-liturgical church; *v'y'ge*, for voyage; *wopper-* (or *whopper-*) *jawed; wicket*, a hut or shelter of boughs (Me.); *winegar*, for vinegar (Essex Co., Mass.); *York shilling*, ninepence. In New York State, among localisms derived from the Dutch, are *bockey*, a gourd-dipper; *fyke*, a bow-net; *hoople*, a child's hoop; *pile*, an arrow, and *scup*, a swing, a name still used by children of foreign parentage on the "east side" of New York City. *Slip*, an opening between wharves, is apparently an indigenous English word; the provincial English *duff*, dough or paste, signifies, in the Adirondacks, fallen and matted hemlock needles; and *dimpy* (probably from the English *dimpsy*, a kind of preserve) is the name given in some places to a tea-party, or a small social gathering at which refreshments are

served. New Jersey, settled, like New York, both by English and Dutch, preserves in remote localities some Old World words, or perversions of the same; for example, *blickie*, a tin pail; to *heir to*, to inherit; *jag*, a small load; *mux*, disorder, and *piece*, a cold meal hastily prepared, or one for farm hands. Examples of the provincialisms of Pennsylvania, which were introduced by the English, Scotch-Irish, and Germans, and in many instances have been carried beyond her borders by emigration, are: *afternight*, for after candle-light; *Aprile*, for April (Cumberland valley); *barrick*, a hill; *bealing*, suppurating; *brickle*, brittle; *dipsey*, the sinker of a fishline; *dozy*, timber brittle from decay; *fouty*, trifling; to *get shut*, to get rid; *gums*, for overshoes (eastern Pa.); *horsebeast;* to *lift*, a collection in church, to take up; *once*, immediately; *outcry*, public auction; *riffles*, ripples; *scrapple*, an article of food (Philadelphia); *slave*, a fierce dog, i.e., needing to be chained (western Pa.); to *smouch*, to kiss; *sots*, common yeast; to *top* (a candle), to snuff; to *threap*, to argue; *yammer*, a whine or whimper; *pig-people* (New Jersey), the same as "poor white" in the South.

The South has retained fully as many old English words and pronunciations as New England and has originated some of the most expressive terms used in ordinary conversation, a number of which, by migration, have been domesticated in the West and on the Pacific coast. Among them are *afeared*, afraid; *amber*, expectoration produced by chewing tobacco (Va., Carolina); *beast*, horse; *branch*, a stream of any size; *bucket*, pail; *brogan*, a kind of boat (Chesapeake Bay); *castaway*, overturned; *centrical*, central (Va.); to *chunk*, to throw a missile; *coppen*, cow-pens; *complected*, having a certain kind of complexion; *condeript*, thrown into fits (Ky.); *corn-dodger; cracker*, a poor white (Ga., Fla.); *dinghy*, a kind of row-boat (Fla.); *dismal*, a swampy tract of land (N. C.); *docious*, for docile; *donock*, or *donnock*, a stone (Southwest); *escalan*, a kind of coin (La.); *evening*, afternoon (also in Illinois); *feaze* or *feeze*, *faze*, an excited state; *fice* or *phyce*, a small dog, cur; *French*, anything distasteful (Va., Md.); *grundpy*, groundpea (Tenn.); *gum* or *bee-gum*, a hive made from a hollow tree; *gumbo*, okra, or a dish made of it; *gumbo*, a patois; *hammock* or *hummock*, a peculiar kind of land, often hilly (Fla., Texas); *hoe cake*, a corn cake once baked on a hoe; *holpen*, helped (biblical); *honeyfogling*, for cheating or coaxing; *hot*, hit; *howdy*, how do you do?; *human*, for person; *Jeames*, James (Ind., Va.); *kiver*, cover; *lane*, any inclosed road; *lightwood*, pine chips or knots; *marooning*, picnicking or traveling by carriage; *mammoxed*, seriously injured; *marvel*, for marble; *maverick*, an unbranded yearling (Texas and Southwest); *million*, melon; *needcessity*, necessity; *or'nary*, contemptible; *paint*, a spotted horse; *peart*, lively, brisk; *pine-tag*, pine needle; a *polt*, a blow; *pone*, bread of Indian meal; *powerful*, very; *quarters*, farm buildings or out-houses inhabited by negroes; *rance sniffle*, a malignant act (Ga.); *rantankerous*, quarrelsome (Ga., but also N. Y.); to *reckon*, to suppose or conclude; *rock*, stone; *roustabout, savigerous* or *survigrous*, fierce, alert (so cited by Mrs. Trollope); *slash*, low ground or an opening in the woods; *right smart*, great or considerable; to *scringe*, to flinch (Texas); *skygodlin*, obliquely (Texas); *swash*, a narrow channel of water; *tackey*, neglected or dowdy; to *tarrify*, to coerce; to *tote*, to carry; *trash*, worthless or low-born persons, especially *poor white trash;* to *up*, used as a verb; *used*, used to; *you all*, of any number of persons; *you-uns*, for you.

The West, using the term in its old sense, which included the interior States as well as the Northwest and Southwest, in addition to words derived from the French and Spanish, some of which have already been cited, has brought into its vocabulary many peculiar words and expressions. Such are *after-clap*, a demand made after a bargain is closed; *Arkansas toothpick*, a kind of bowie-knife; *bad man*, a murderer; *bell mare*, the horse leading a drove of mules (Southwest); to *bear off*, to separate a stray "brand" by riding between it and the herd (Southwest); *bodewash* (*bois de vache*), dried cow-dung used as fuel (Southwest); to *build*, to make shoes (Ohio); to *buss*, to strike; *catawampous* or *catawamptious*, terribly or completely; *country*, for State or section; *cowbrute* (Mo.); *doggery*, a grogshop; *drink*, river; *galoot;* to *take a gird*, for to make an effort; to *hustle; keener*, a sharp man; *lave!* (lève), get up! or rise up! (Mississippi valley); *lococd*, for frenzied, Sp. *loco* (Kansas and Southwest); *long sweetening*, molasses (Iowa, from New England); *main traveled road*, highway; *naked possessor*, one without title to his farm (Southwest); *oldermost*, oldest; *plumb sure;* to *pull foot*, to hasten; to *raise*, to obtain; *robbilæ*, pemmican boiled with flour and water (Northwest); to *slosh 'round*, to brag, also to frequent saloons (South and West); *sugar* or *sugar-tree*, maple; *sun-up*, sunrise; *swinger*, the middle horses in a team of six; *tenderfoot*, a newcomer; to *trash* (to cover) *a trail; every whipstick*, for continually, often; to *want down* or *up* (Ill.); *worm* (or snake) fence; to *zit*, to sound like a bullet striking the water. The Pacific slope is responsible for *adobe*, soil from which *adobe* bricks are made; to *bach*, to camp out without ladies; *Bostons*, white men in general (Or. Indian); *coulee, cooley*, a rocky valley (Or. and Wis.); *claim*, land to which one has a legal right; *claim-jumper*, one who forcibly takes another's claim; to *coyote*, to sink a small shaft (Cal.); *diggings*, a particular locality; *hardpan; heeled*, for armed; *pay-streak*, a profitable lode or vein; *rusher*, a person going to the mines; *tanglefoot*, bad liquor. Local usage differs greatly in connection with articles in common use. The Eastern *paper bag* is in the central West a sack, and in portions of the South a *poke;* a *scuttle* or *pail* is a bucket. The British *perambulator* is in the East a baby-carriage, and in the Central West a baby buggy or cab. A *comfortable* is a comfort. A distinction, furthermore, should be made between words that are used in large cities and those that are in the main confined to small communities. In the country, people *hire help* and *keep girls;* in the cities they have *servants* or *maids;* the city *nurse* is lengthened in the country to *nurse-girl*. The original English *folks* is now a provincialism in this country. Most of the New England words and forms used by Lowell in the *Biglow Papers* are provincialisms. Some Eastern provincialisms are in general use in the Central West.

Early writers on Americanisms were wont to stamp every odd or vulgar word and expression as American, with the lamentable result, as Richard Grant White complained, of creating a belief that there is a distinctive American lan-

guage, "a barbarous, hybrid dialect, grafted upon English stock;" the truth being that most of the so-called Americanisms were brought to this country by its early settlers, English, Scotch-Irish, Dutch, Germans, etc., and that many of them are now used only by the unlettered. The language of the "stage Yankee," and that of the characters in dialect-stories, Northern and Southern, are with few exceptions English, provincial or obsolete in the mother country, and not "American" in the true sense of the word. In the county of Suffolk, according to Lounsbury, the following "Americanisms" were current as recently as 1823: *Apple-fritters, by gum, chaw, cute, darnation, gal, gawky, hoss, ninny-hammer, ride like blazes, sass* (sauce), *sappy* and *tantrum*. White prepared a long list of words and phrases supposed to be indigenous, and proved their British origin by citing early dates at which they appear in literature, or the names of authors in whose works they occur. Selecting from this list, and indicating by the letter "a." words known to be ancient, by "m." such as are here used in provincial speech, and by "Bible," King James' version, we submit the following: To *admire*, in the sense of to wish eagerly (Chapman's *Homer*, 1655); to *advocate* (Milton); *apart*, aside (Bulwer); *baggage*, luggage (Fielding, T. Hughes); *blizzard* (m.); *blow*, boastful talk (a., m.); to *bolt*, to rush or escape (Dryden); *bosom*, applied to a man (Shakespeare); *bulldoze* (W. Scott); *bureau*, for chest of drawers (Fielding, Hare); *by the skin of one's teeth* (Bible); *catamount* (a.); *chaw* (1530, m.); *chore*, light work (Ben Jonson); *clean gone* (Bible); *clever*, good-natured (Elizabethan writers); *conclude*, resolve (Tyndale, Froude); *crevasse* (Chaucer); *deck of cards* (Shakespeare); *divine*, clergyman (W. Scott, G. Eliot); *elect*, for conclude or determine (Lord Thurlow, Ruskin); to *enjoy poor health* (m.); *fall*, for autumn (Cairne, 1552; Froude); *feel to*, as in the expression, "I feel to rejoice" (m.); to *fellowship* (Chaucer); *fix*, to put in place or order (Farquhar, Sterne); *fleshy*, stout (Chaucer, Professor Owen); *folks*, people (Byron, Bulwer Lytton); *gent* (Pope); *a good time* (Swift); *grain*, any cereal (Wiclif); *guess*, think or suppose (Wiclif, Milton, A. Trollope); *gumption* (a., m.); *heft* (Sackville, T. Hughes); *help*, servant (T. Hughes); *human*, person (Chapman's *Homer*); *hung*, hanged (Shakespeare, C. Reade); to *hustle* (a.); *illy* (a., m.); *influential* (W. Thompson, c.1760); *improvement*, of an occasion, etc. (Defoe, Gibbon); *institution*, in the sense of an establishment of foundation (Beatty, 1784; Trollope); *interview*, to meet for conversation (Dekker); to *let on*, to divulge (m.); to *let slide* (Gower); *limb*, leg (Fielding); *love*, like (Cowper); *lucrative* (Bacon); *mad*, angry (Bacon, Middleton); *magnetic*, as an adjective (Donne); to *make a visit* (m.); *metropolis*, the chief city of the State (Milton, De Quincey, Macaulay); *million*, melon (Pepys); *musicianer* (Byron); *nice*, pleasing or agreeable (a., m.); *notify*, to give notice (m.); *notions*, for small wares (Young); *overly*, excessively (m.); *parlor*, for drawing-room (G. Eliot, Helps); *peruse*, scan or read (W. Scott); *professor* of religion (Milton); *pumpion* (pumpkin) pie (1615); *quit*, leave off (Ben Jonson); *railroad*, railway (J. H. Newman, Mrs. Trollope); *rare*, underdone (Dryden); *reliable* (Richard Montague, 1624; Gladstone); *reckon*, suppose or conclude (Bible, W. Scott); *rock*, stone (a.); *run*, a small stream (a.); *sick*, ill (Bible, Evelyn); *skedaddle* (m.); *slick* (a.); *span new* (Chaucer); *spell*, a period of time (a.); *spruce*, neat (Evelyn); *spunky* (Burns); *swop, swap* (B. Jonson, Dryden); to *take on*, to wail or grieve (a.); *tend*, attend (Shakespeare); *town*, as a geographical division (Wiclif); *well*, prefacing a sentence (Disraeli); *Whittling* (Walpole); and the writer would add the following which are sometimes ridiculed as outlandish products of the New World: *A howling wilderness* (Bible); *Mr. —— and lady* (Thackeray); and to *set store by*, in the sense of to prize or appreciate (Mrs. Oliphant). Gilbert M. Tucker says that the 460 words in Elwyn's *Glossary of Supposed Americanisms* are all of British origin; that in Pickering's work (1816) not more than 70 words out of the 500 are really American; and that out of the 5000 or more entries in Bartlett's *Dictionary*, only about 500 are genuine and distinct Americanisms now in decent use. Most New Englanders, said James Russell Lowell, speaking of colloquialisms still heard in Massachusetts, stand less in need of a glossary to Shakespeare than many a native of the old country. It may be added that many words formerly termed Americanisms are as commonly used in England as here, though not in polite speech or literature; e.g., *bamboozle, chockful, duds*, and *sight* for number, while, on the other hand, such old forms as *axe* for ask, and *housen* for houses, are frequently heard in England and rarely here.

Richard Grant White and T. R. Lounsbury limit the term "Americanisms" narrowly. According to the former, they must not have been transplanted, but must be perversions or modifications of English words or phrases, and must be used in the current speech or literature of the United States at the present day. "Words which are the names of things peculiar to this country are not Americanisms, except under certain conditions (*maize, squaw, wigwam*). They are merely names which are necessarily used by writers and speakers of all languages. If, however, any such word is adopted here as the name of a thing which already had an English name (*wigwam*, for hut or public hall; *squaw*, for wife), it then becomes properly an Americanism. *Indian*, and names compounded of *Indian*, were given by Europeans. Indian pudding is an American *thing*, but its name is not an Americanism." As he rejects *Indian summer, paleface, succotash, tomahawk*, and the rest, White asks, "What have we to do with the Indian?" and proceeding, crosses from the list of cherished "Americanisms," *bronco, lacrosse, stampede*, and their kin; *abolitionist, border-ruffian, gerrymander, reservation*, etc., as well as *groundhog, long-moss, pine barrens*, and *saltlick*, to go further, besides refusing to discuss such words as *intervale* and *water-gap*, because they are "legitimate English." Lounsbury, like White, objects to the expression, "the American language," and remarks of the so-called "Yankee dialect" that it is never "the characteristic tongue of any one man, or of any one class, or of any one district." He doubts whether the term "Americanisms" can be regularly applied to *cent, congress, mileage, nullification*, and so on, and prefers to call them "American contributions to the common language."

American newspapers are largely to blame

for the mongrel and high-sounding words heard in the United States, especially those derived from the Latin or the Greek. The oratory of political campaigns gives rise to not a few astonishing Americanisms and our humorists have coined many more that are beloved by the public. Persons of fair education, who, as we learn from their talk, *engage* in *avocations*, *reside* in a *mansion*, wear *pants*, *donate* to charities, ride to the *metropolis* in a *smoker*, *retire* to bed, and have *proclivities*, must be expected to use also *enthuse*, *funeralize*, *saleslady*, and *shootist*, when they find them in their favorite journals; but criticism under this head comes with little grace from the English, whose *leaderette* is as absurd as our *editorial paragraph*, and *agricultural laborer*, a clumsy name for him whom we term a *farmhand*. Our colleges, Yale in particular, are prolific in slang, some of which, as to *rattle*, in the sense of to confuse, soon become public property. Most of our colloquial expressions are short-lived, but the following may be instanced as having been in use for a long period: to *absquatulate; baggage-smasher;* to *bark up the wrong tree; bottom dollar; caboodle;* to *boost;* to *cavort; conniption fit;* not to *care a continental; a continental darn;* to *chip in; coon*, a colored man; a *coon's age*, an indefinitely long time; to *dust*, to leave quickly; to *euchre out;* to *flash in the pan; flatfooted; gum game; highfalutin; last o' pea time; level best;* to *liquor;* to *moosey*, to leave quickly; *hike*, to tramp; *obligated;* to *paddle one's own canoe;* to *pan out; picayune*, small, mean; to *raise Cain; right away;* to *run*, in the sense of to manage or conduct; to *salt* a mine; *sample room*, drinking-bar; *shoddy*, applied to a person; to *smile*, to drink spirits; *sockdologer*, a finishing blow or argument; to *sour on; a square meal;* to *strike oil*, to get rich suddenly; to *stump*, to puzzle, or challenge; to *talk turkey*, to brag; *tuckered out;* to *vamose* (Sp. *vamos*), to leave quickly; to *weaken*, to yield or give out; to *squeal*, to betray.

T. W. Higginson (see *Bibliography, infra*), in examining a glossary of the slang used about 1798 by British prisoners in the Castle in Boston Harbor, now Fort Independence, discovered a number of words that had been classed as of recent origin, the most familiar of which are *grub*, victuals; *douse the glim*, put out the light; and *spotted*, for found out. Also some that are not given in any English glossaries, as *briar*, a saw; *nipping-jig*, the gallows; and *wibble*, a dollar. Most of these expressions belong to the *argot* of thieves.

When we remember that the dialects of the countries in England have marked differences—so marked indeed that it may be doubted whether a Lancashire miner and a Lincolnshire farmer could understand each other—we may well be proud that our vast country has, strictly speaking, only one language. It is remarkable that the influx of European immigrants has not resulted in some States in reducing English to a *patois*, if not in extinguishing it, or in giving it scant room in a mongrel vocabulary. Again, it might reasonably be expected that, in the course of three centuries, the political and social changes which we have undergone, and the peculiar circumstances attending the settlement of new regions, would have separated us so widely from the mother country that, in spite of kinship and commercial intercourse, some radical differences in language would have been evolved. The reason for a general standard in America is found in the wide use of text-books, such as the old Webster's speller; and because of the increasing foreign element in this country, our public schools are forced to devote much time to the teaching of English, a thing regarded in England as more or less unnecessary, because the stock is homogeneous. What has been styled "the American worship of the dictionary" has at least given us a definite standard and prevented anything like a patois. Increased intercourse with the English and a wider reading of English popular writers have tended to graft upon our speech a large number of words that would once have been unintelligible or at least purely British. Kipling, Conan Doyle, and Henry James may be cited as the three writers most responsible for this growing likeness of usage.

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AMERICANISTS, International Congress of, is an organization to promote the investigation of the origin and history of the native races of North and South America. The first congress was held in 1875, at the call of the

French Society of Americanists, an organization still in existence. As used by this society the term "Americanist" applies to any student of American anthropological problems. Previous to 1900 the organization was distinctly European, but at that date it was reorganized to hold biennial alternate meetings in Europe and America, the session of 1914 being in Philadelphia, Pa. The various American and European governments appoint two officials to attend the sessions in addition to the regular members.

AMERICAN LEGION. See LEGION, AMERICAN.

AMERICAN KNIGHTS, ORDER OF. See KNIGHTS OF THE GOLDEN CIRCLE.

AMERICAN LITERATURE. A term applied rather loosely to the body of writings in the English language produced in the territory now occupied by the United States. It includes a period extending from 1608, when Captain John Smith's *True Relation* was published in London, to the present day. Strictly speaking, the works of Smith and of those of his contemporaries who did not make a permanent sojourn in the New World, belong rather to British than to American literature. Again, it is plain that the term "literature" must be used with considerable latitude, if it can be made to include the news-letters, the bare annals, the topographical treatises, the controversial pamphlets, the sermons and other theological lucubrations that form the bulk of the writings produced by the colonists of the seventeenth and eighteenth centuries. The paucity of the materials at their command has, however, induced American literary historians to give a hospitable reception to almost everything that can be called a book written in the American colonies or about them, whether published in England or at home after Stephen Daye had set up his press at Cambridge, Mass., in 1639.

Surprise has sometimes been expressed at the fact that Englishmen, contemporaries of Shakespeare and Milton, should, in their new environment, have written practically nothing of æsthetic value. The excuse is usually made for them that they had many more necessary things to do, such as felling the forests and keeping off the Indians. This excuse is certainly applicable, but it may be doubted whether the Puritan or the Cavalier stock that settled America would have been noted for great contributions to English literature had they remained in the mother country. The companions of Bradford and Winthrop would have done what writing they did on theological subjects; the companions of Captain Smith and the younger sons of royalist country gentlemen would have written little more than they did in Virginia. The colonial literature of the seventeenth century is chiefly valuable to the historian and the antiquarian. The early colonists wrote for utilitarian purposes. The Virginians wrote to convey information to their friends at home and to encourage emigration; the Puritans wrote for these reasons and also to defend and expound their theology and to train up the new generations in the ways of the old. For literary art in itself, or indeed for any art, they had little care, but when, as not infrequently happened, the men who wrote were interesting or great in their private or public capacities, they managed to impart some of their finer qualities to their writings, which may not exactly live, but are, at least, worthy of remembrance if not of perusal by the reader interested in the history of his country.

The portion of this early literature produced by the southern and middle colonies is comparatively meagre. Captain Smith's works, which culminate in the composite *General History of Virginia, New England and the Summer Isles* (1624), are quaint and crude, but full of their adventurous and magniloquent author's energy. William Strachey's account of the famous wreck of Sir Thomas Gates (1610) may possibly, some think probably, have given Shakespeare hints for his description of the storm in *The Tempest*. Nothing so interesting was in all probability produced in Virginia until 1649, when a certain Colonel Norwood narrated to his relative, Sir William Berkeley, the adventures that had befallen him during and after his shipwreck. The same picturesque Governor Berkeley is one of the protagonists in the next Virginian tract of importance—the so-called *Burwell Papers*, descriptive of Bacon's Rebellion (1676). Only two interesting books are credited to Maryland during this century, John Hammond's *Leah and Rachel* (1656) and George Alsop's quaint *Character of the Province of Maryland* (1666). The Carolinas were settled too late to produce anything of consequence. The same thing is true of the Middle colonies, although Daniel Denton's *Brief Description of New York* (1670) is not uninteresting and Gabriel Thomas's *Account of Pennsylvania and New Jersey* (1698) does not lack sprightliness. Consult the books by W. P. Trent cited in the bibliography below.

An abundance rather than a lack of writings confronts the student of the seventeenth-century New England. The histories composed by Gov. William Bradford of Plymouth and Gov. John Winthrop of Massachusetts have many merits, but are on the whole fatiguing reading. The sermons and theological treatises of such representative divines as Thomas Hooker, Thomas Shepard, John Cotton, Peter Bulkeley, and their compeers furnish interesting passages for our anthologies, but are rarely read *in extenso*. The works of Roger Williams are probably treated in a similar fashion; but the loss falls upon the reader as well as upon the fame of that truly great man. Another writer who deserves more attention than he receives is Daniel Gookin, who wrote two books about the Christian Indians, for whom he labored in conjunction with that famous apostle, John Eliot. But unquestionably the most interesting book in prose produced in New England during the seventeenth century was Nathaniel Ward's *Simple Cobbler of Agawam* (1647), a whimsical compound of satire and invective that is almost without parallel. John Josselyn's *New England's Rarities Discovered* (1672) and his *Account of Two Voyages* (1674) deserve mention also as almost turning credulity into artistic virtue.

But the early New Englanders wrote verse as well as prose, especially verse of an elegaic nature. In 1640 appeared the astonishingly crude *Bay Psalm Book*. Ten years later Mrs. Anne Bradstreet's *Tenth Muse Lately Sprung up in America* was published in London, accompanied by poetical panegyrics that made the modest woman blush. Mrs. Bradstreet was not without genuine powers, as her later works showed; but she followed bad models, had no eye for the beauties of nature, and is in consequence al-

most unreadable to-day. This fate has not befallen Michael Wigglesworth's *Day of Doom* (1662), a New England Inferno which long continued to be popular. Its quaint stanzas are perused to-day with sensations quite different from those produced by them 200 years ago; but they are still read, and even quoted for amusement—a fortune not accorded to the amiable Wigglesworth's other performances. Wigglesworth is, however, almost a great poet when he is compared with contemporaries like Peter Folger, Franklin's grandfather, whose *Looking-Glass for the Times* (1677) is almost the *ne plus ultra* of doggerel. Perhaps the only poems of any decided merit composed in America during the seventeenth century are an anonymous epitaph on Bacon, given in the *Burwell Papers*, and an *Elegy on the Rev. Thomas Shepard* (1677), by the Rev. Uriah Oakes, President of Harvard.

The close of the seventeenth century in New England is marked for us by the famous persecutions for witchcraft which have given so sinister a reputation to many good men, especially to the two Mathers, Increase and Cotton. These are in some ways the most important divines of early New England, although they mark the decline of the theocracy rather than its culmination. Both were voluminous writers, and both treated in particular the two topics uppermost in the New England mind: to wit, the struggles of the saints against witches and fiends and against the savage Indians. All the dominant ideas of the times are found embodied in the younger Mather's encyclopædic *Magnalia Christi Americana* (1702), a chronicle which is not altogether authoritative as to facts, but is typical of its fantastic author and of the Brahmin caste he represented. Typical of the old order that was passing, and of the new that was coming in, is Judge Samuel Sewall's *Diary*, which ran from 1673 to 1729. Sewall is the Pepys of his time, and many a quaint page can be extracted from his jottings; but he should also be remembered as perhaps our first abolitionist, his short tract, *The Selling of Joseph*, dating from 1700. Another early diarist is Mrs. Sarah Kemble Knight, who wrote a sprightly account of a journey she took on horseback in 1704 from Boston to New York. Even in New England secular writing became more popular as the eighteenth century advanced, which is what one might expect, since the colonies were growing prosperous and were being affected by the utilitarian tendencies of the epoch. There is a considerable amount of verse, none of it of much consequence, and there is quite a mass of history, particularly of narratives dealing with Indian atrocities. Probably the most important poets are the Rev. Mather Byles and his contemporary, Joseph Green, but they succeeded best in trifles. The most scientific historian of the period is the Rev. Thomas Prince; the most interesting is the quaint Scotchman, William Douglas, whose *Summary* dates from 1747–51.

But theology did not vanish from New England with the weakening of the theocracy. The Rev. John Wise, with his *Churches' Quarrel Espoused* (1710) and his *Vindication of the Government of New England Churches* (1717) showed himself to be the peer of any of his forerunners and gave lessons in statesmanship to the revolutionary leaders who were to follow him. Greater than Wise was Jonathan Edwards, the most original theologian and metaphysician that the New World has produced. In his juvenile papers Edwards anticipated Berkeley; in his personal memoranda and occasionally in his formal treatises he showed that he was a poet-mystic and a lover of nature rare for his times; in his *Narrative of Surprising Conversions* (1736) he displayed a remarkable psychological acumen. He is, of course, best known to-day by his *Freedom of the Will* (1754), which is still a powerful piece of exposition, although its conclusions seem monstrous and untenable, and by his minatory sermons, which, like the famous one preached at Enfield, Conn., held his awe-struck hearers suspended over the very mouth of hell. Edwards's theology is now antiquated, but his works contain the germs of nearly all subsequent theological speculations, and they are a well of inspiration to thoughtful readers. Consult Wendell and Greenough, *A History of Literature in America*.

The only American colonial who ranks with Edwards as a writer and thinker, Benjamin Franklin, while also a New Englander, is always regarded as a representative of the Middle colonies. Other interesting writers were grouped about him in Philadelphia, but New York and New Jersey produced few of any consequence. As a student of nature Franklin was only the foremost of an interesting group of men such as James Logan, John Bertram, and John Winthrop, of Harvard. As a writer and thinker on political subjects he exemplified the spirit of the age that was to produce publicists like John Dickinson, whose *Letters from a Farmer* (1767) focused the spirit of resistance; Samuel and John Adams, Jefferson, Hamilton, and Madison—men whose political writings, culminating in *The Federalist* (1788), astonished Europe and reached what perhaps is the high-water mark in this species of composition. For, as is well known, the eighteenth century was not less predominantly political than the seventeenth had been theological. It was also utilitarian, and so Franklin, who thoroughly summed up his age, was the creator of Poor Richard, whose *Almanac* may almost be said to be the foundation stone of popular education in America. It is probably his delightful *Autobiography*, however, that gives Franklin his position as the writer of the only literary classic produced in America before the nineteenth century. Taken along with his letters, this book, in both style and substance, furnishes us with one of the most remarkable self-revelations in literature. We read from a sense of duty a few authors of our Revolutionary period, like the satirists Francis Hopkinson and John Trumbull, author of *McFingal* (1775–82); we know *The Indian Burying Ground*, and a few other verses of the patriotic poet, Philip Freneau; we remember from our histories that the ill-fated Thomas Godfrey was the author of our first true poetical tragedy, *The Prince of Parthia* (1765); we smile at the mention of Joel Barlow's *Vision of Columbus* (1787), which developed into his formidable epic, *The Columbiad* (1807); but for many of us the true American literature of the eighteenth century is represented by the miscellaneous writings of Franklin.

This, however, is not altogether fair. Several of Franklin's contemporaries deserve to be remembered as writers of interest and of some importance. Among these are the Quaker John

Woolman; the loyalist historian of Massachusetts, Thomas Hutchinson; the patriotic historian and portentous dramatist and poet, Mrs. Mercy Otis Warren; the negro poetess, Phillis Wheatley, whose imitative verses astonished the learned of her day; the laborious poet, Rev. Timothy Dwight, whose *Conquest of Canaan* (1785), together with the productions of the so-called "Hartford Wits," was intended to lay the foundation of a real American literature and has at least been buried sufficiently deep for that purpose; the novelist, Mrs. Susanna Haswell Rowson, whose *Charlotte Temple* (1790) is still read—all these and a few other writers should be remembered before we accuse the eighteenth century in America of literary barrenness. These are not a tithe of the authors whom a serious literary historian would feel obliged to treat, and even we must add to them such a conscientious, if dull, historian as the Rev. William Stith, of Virginia, the distinctly more picturesque defender of the Old Dominion, Robert Beverley, and of the genial cavalier, Col. William Byrd, of Westover, whose *History of the Dividing Line* (1729) between Virginia and North Carolina is a remarkably entertaining production. To these Southern historians the name of Dr. David Ramsay, of South Carolina, should be added; but it is of more importance not to forget the greater works of two citizens by adoption—the Englishman, Thomas Paine, and the Frenchman, Hector St. Jean de Crèvecœur. Paine's *Crisis* and his *Common Sense* (1776) did perhaps more to make independence the goal of the American Revolutionists than any other contemporary writings, and it was the spirit of the Revolution that animated his later but less acceptable books. Crèvecœur's *Letters from an American Farmer* (1782) are full of an idealism more charming than can be found in Paine and of a love of nature almost worthy of Thoreau himself.

The confused period between the close of the Revolution and the beginning of the nineteenth century was naturally not propitious to literature. But many of the writers mentioned in the last paragraph did their best work in it, and to them we may add the names of Royall Tyler, whose play, entitled *The Contrast* (1786), was the first American comedy of importance; Noah Webster and Lindley Murray, famous later for their works in lexicography and grammar; Jeremy Belknap, author of one of the best of our early State histories, that of New Hampshire (1784); William Dunlap, whose *History of the American Stage* (1832) is still important, and Joseph Dennie, a writer of a mildly Addisonian type, whose *Portfolio*, founded in 1801, marked, with the contemporaneous establishment of the New York *Evening Post*, the great aid that journalism would give to literature throughout the new century.

But a more conspicuous writer than any of these, our first novelist, Charles Brockden Brown, had written his three most important novels, *Wieland*, *Ormond*, and *Arthur Mervyn* in the three closing years of the eighteenth century. He published three other novels in 1801, and his literary activity, which was mainly associated with Philadelphia, promised much for the new Republic. But his work was cut short by ill-health and an early death, and to modern readers his stories, while marked by distinct imaginative power, are too plainly connected with the extravagant school of Godwin and Mrs. Radcliffe to be attractive. Brown deserves, however, to be remembered as the first American who made the profession of letters a success, and he was a genuine predecessor of Hawthorne and Poe.

The opening decade of the nineteenth century was one of great political importance; but it is marked by few literary names of note, John Marshall's *Life of Washington* (1804) being less important than his judicial decisions, and the writings of the Rev. M. L. Weems and William Wirt not meaning much to the sophisticated readers of a century since. But in 1809 a work that will probably never lose its interest made it certain that American literature, in the true sense of the term, had been born. In this year Washington Irving gave the world "Diedrich Knickerbocker's" *History of New York*. Irving may be a little out of fashion to-day with some readers, and he may seem almost as much a British as an American classic; but a classic he is, whose style has perhaps not been surpassed, and whose essays, short stories and works of travel, biography, and history must be read by all cultivated Americans. During his long life he was the worthy head of the Knickerbocker school of writers who made New York the literary centre of the country before the rise of New England Transcendentalism.

It was more than a decade, however, after Irving's success before a really great writer arose to keep him company. Such poets as Washington Allston, John Pierpont, and Mrs. Sigourney, and such a dramatist as John Howard Payne, cannot send us back, with any great enthusiasm, to the second decade of the century just passed. It is true, nevertheless, that the founding of the *North American Review* at Boston in May, 1815, was an important event, and that, by publishing two years later the youthful Bryant's *Thanatopsis*, it introduced to the world a poet of dignity and power, who, if not precisely great, was at least able to interpret pleasingly and satisfactorily to Americans the natural beauties of their native land. Two other poets, inferior to Bryant, yet still remembered, Joseph Rodman Drake, author of *The Culprit Fay*, and Fitz-Greene Halleck, author of an elegy on Drake and some stirring lyrics, also made their appearance in this decade.

When James Fenimore Cooper published *Precaution*, in 1820, he gave the public no evidence that one of the greatest of modern writers of fiction had arisen. A competent reader of *The Spy*, which was issued the very next year, might, however, have perceived the fact. Two years later, *The Pilot* and *The Pioneer* showed that although Cooper might be essentially a follower of Scott, and although his style might be often slipshod and his power of characterization, especially in the case of women, almost *nil*, he was, nevertheless, master in his own splendid domain—the sea, the forest, and the prairie. The *Leatherstocking Tales* have been frequently called the real American epic, and a recognition of the truth of this statement would prevent many persons from underrating the genius of one of the few Americans who have won a world-wide fame by their writings. America has produced several authors of finer genius than Cooper possessed, but perhaps none of larger.

Besides Cooper the third decade of the last

century brought into notice the poet James Gates Percival, who unfortunately did not deserve the reputation he speedily acquired. A less highly praised poet, Edward Coate Pinkney, is now more interesting on account of his small but genuine lyric vein. The same decade counts among its worthies the indefatigable historiographer, Jared Sparks, and the admirable student of Spanish literature, George Ticknor. Lydia Maria Child, Edward Everett, the elder William Ellery Channing, and Bronson Alcott also made their appearance as writers; and Poe and Hawthorne published juvenile works that are now very rare. But perhaps the best-known production of the period is Webster's reply to Hayne, which struck the keynote that was to dominate our literature for the next generation and of which President Lincoln, in 1861, ordered a million copies to be printed and distributed.

The year 1831 saw the establishment of William Lloyd Garrison's *Liberator* and the publication of Whittier's first book, *Legends of New England*. Both men were to do a great work for the anti-slavery cause, and Whittier in especial was to endear himself to his native section as its true poet laureate. The writer who best represented New York at this period was Nathaniel Parker Willis, poet, traveler, and journalist. But he, though still interesting, has greatly declined in reputation. The same thing is true of those representative ante-bellum Southern writers, William Gilmore Simms, of South Carolina, and John Pendleton Kennedy, of Maryland, who, with Robert Montgomery Bird, of Pennsylvania, formed a group of romancers inferior indeed to Cooper, yet worthy of being read, at least in their best novels, such as *The Yemassee, Horse Shoe Robinson*, and *Nick of the Woods*. Besides these writers, who began their careers in the thirties, we should recall the historian George Bancroft, whose *History of the United States* remains eminently valuable, though dull and incomplete.

The Transcendental movement in New England, culminating in *The Dial* of the early forties, is, of course, the prime fact of American literary history before the Civil War. Yet many of the writers more or less connected with it, such as the critics George Ripley and Margaret Fuller, and the poets C. P. Cranch and Jones Very, have long since become mere names to most readers. The poet-naturalist, Thoreau, however, has not only held his own, but has gained ground year by year, and Emerson has taken his place with Hawthorne and Poe in the very front rank of American writers. Throughout his long life, Emerson was to his countrymen and to many Europeans not merely a great writer but an inspiring seer, and there are not wanting readers to-day who consider him, in his double capacity of philosopher and poet, the greatest of American men of letters. Since the publication of *The Scarlet Letter* (1850), this position has been assigned to Hawthorne by the majority of his countrymen, while foreign readers, especially in France, have unhesitatingly assigned it to Edgar Allan Poe, whose haunting poems and tales have seemingly exerted a greater literary influence than the works of any other American.

More influential, so far as the culture of the American people is concerned, has been the poetry of Henry Wadsworth Longfellow. It has been recognized by the critics that Longfellow's genius was at first overestimated; but critical depreciation has probably been carried too far, and it seems quite likely that the best loved of American poets will continue to rank not far below the greatest of his contemporaries. Much the same thing may be said of Oliver Wendell Holmes, whose *Autocrat of the Breakfast Table* (1858) has lost little or nothing of its popularity. As a poet also, Holmes, though he may most fairly be called the laureate of Boston, still has a hold upon the heart of the nation, and he should perhaps be better known as a novelist than he is; for his *Elsie Venner* (1861) is a striking book, though described by one of Holmes's friends as "a medicated novel."

James Russell Lowell by his *Fable for Critics* and the first series of *The Biglow Papers* (1848), had proved himself to be our greatest poetical humorist and satirist before the Civil War began. That cataclysm inspired him to write his great odes, and later he became easily the first of American critics and letter-writers, and one of the first of American publicists. He is too near us for a proper estimate to be made of his rank in our literature, but it would appear that his fame as humorist, essayist, and epistolary master is secure. Secure, too, seems the fame of those admirable historians William H. Prescott and John Lothrop Motley, although some of the former's works have suffered as technical history through the discoveries of modern investigators. Their junior, Francis Parkman, is, however, generally regarded as their superior, his great series of histories dealing with the struggle between French and English for the mastery of the New World being as fascinating and at the same time as scientifically thorough as any other historical compositions.

All the writers treated in the immediately foregoing paragraphs won at least a partial recognition before the Civil War. Their fame has not, however, entirely cast in the shade such writers as Richard Henry Dana, Jr., author of *Two Years Before the Mast* (1840), and Herman Melville, whose *Typee* (1846), *Omoo* (1847), and *Moby Dick* (1851), are among the best books of adventure in our literature. Nor is the work of Bayard Taylor, Donald G. Mitchell, Richard Grant White, James T. Fields, Thomas Wentworth Higginson, and Charles Eliot Norton, to be omitted even in so brief a sketch as the present. Mention should be made also of George William Curtis, E. P. Whipple, and the two Southern poets, Paul H. Hayne and Henry Timrod, as well as of the worthy Philadelphia dramatist and poet, George Henry Boker. Two other writers who emerged before the Civil War claim attention. One, Mrs. Harriet Beecher Stowe, stirred the sympathies of the civilized world by her pathetic story of American slavery, *Uncle Tom's Cabin* (1852); the other, Walt Whitman, by his *Leaves of Grass* (1855–83), poetically expressed the democratic ideal in a way that appealed profoundly to European readers; won him quite a large circle of devotees at home; and bids fair to secure for him a high place in American poetry.

The most noteworthy name in the decade to which the Civil War belongs is that of Samuel L. Clemens, who, over the pseudonym of "Mark Twain," won a world-wide reputation as a humorist and writer of fiction. Two other humorists who filled a large place in their day, whatever their future place may be, are Henry

W. Shaw (1818–85), better known as "Josh Billings"; and Charles Farrar Browne (1834–67) ("Artemus Ward"). With them appeared a number of authors whose later and more mature work has made them known throughout the country. One of the most important stories of the decade—important rather in its practical effect than by its literary value—was *The Man Without a Country* (1863), by Edward Everett Hale. Appearing at a time when the feelings of the nation were so divided, it did much to strengthen a spirit of loyalty to the Union. Two other writers, who first came to notice in the sixties, were cut off in what promised to be most fruitful careers—Theodore Winthrop, the novelist, whose *John Brent* (1862) was full of racy vigor, and Sidney Lanier, regarded by some critics as the most important American poet of the last 40 years.

Since 1870 the number of publications has been constantly and rapidly increasing, and two dominant types have appeared—the local short story and an exaggerated form of the romantic novel. As the Middle and Western States became more settled, a new type of literature arose, which was especially adapted to the new conditions. As early as 1868 a magazine, *The Overland Monthly*, had been established in San Francisco; and in it appeared the vivid, racy, unconventional story, *The Luck of Roaring Camp*, by Bret Harte. From the appearance of this tale may be dated the vogue of the short story dealing with the local conditions in various sections of the United States. Following Bret Harte, many writers appeared all over the country, each depicting the life and manners of his own particular section. For the most part, they emphasized local conditions by employing the dialect peculiar to their division of the country. Among the more successful of these dialect writers were Joel Chandler Harris, with his *Uncle Remus* stories; Edward Eggleston, the author of *The Hoosier Schoolmaster* (1871), and other tales of the Middle West; G. W. Cable, who so skillfully depicted the French Creole life of New Orleans; and Mary Noailles Murfree, better known under her pseudonym "Charles Egbert Craddock," whose novels of the mountain whites of Tennessee, Kentucky, North Carolina, and Georgia first attracted the attention of the country to these peculiar people. But although the majority of short-story writers used dialect forms, there were a number who generally adhered to more conventional styles of expression, depending upon their power of characterization and the enumeration of salient details to give the necessary semblance of reality. Among these were Harold Frederic, who dealt with the crude life of west-central New York, producing at least one notable book (1896) in *The Damnation of Theron Ware* (republished in England under the title *Illumination*); Hamlin Garland, who wrote of the Northwest; Thomas Nelson Page, who made his own the landed gentry of Old Virginia; James Lane Allen, who depicted the people of Kentucky; and Mary E. Wilkins, who with deserved success wrote her vignettes of the narrower life of New England. F. R. Stockton drew with much quaint humor some familiar and very characteristic American types in *Rudder Grange;* and Ernest Thompson Seton described the lives of wild animals by the original and interesting method of looking at their environment from their own assumed standpoint.

Besides these writers there were a few successful authors whose works cannot be classified under any one division. First of these is Gen. Lew Wallace, whose *Ben Hur* (1880), a tale of the early days of Christianity, was immensely popular. It was a forerunner of the reaction against the short dialect story; for just as the psychological novel had given place to the story, so it in turn was to be superseded by the unalloyed romance. A prolific and interesting writer was Francis Marion Crawford, who was an exponent of the theory that a novel should be essentially a drama, in which descriptions should take the place of scenery, a notion admirably carried out in his most powerful work, *Greifenstein.* At the same time William Dean Howells and Henry James were working along lines parallel yet clearly separated. The former practically created the novel of American social life with men and women rather than incidents for material; and in his stories commonplace occurrences charm through his skillful realization of the characters. Mr. Howells in his many novels of American life has done for our country what Balzac did for France in his *Comédie Humaine.* Moreover, in such books as *The Rise of Silas Lapham,* he has caught and fixed with remarkable success the characteristics of an era that will soon be known only by these works of genius. Henry James has been characterized as the "creator of the international novel." His psychology is admirable though almost too subtle and his style is refined to a degree. Mrs. Wharton, first noticed as a follower of Henry James, shows in her later works but little of his influence. *The Valley of Decision* (1903), a story of Italy in the eighteenth century, attracted notice. *The House of Mirth* (1905), a story of "society" life in New York, was considered at the time the finest American novel recently written. Gertrude Atherton in her best writing reveals the days of Spanish California, and in *Senator North* there is a very striking study of an individual who has an admixture of black blood.

In 1894 *The Prisoner of Zenda,* by an English author, Anthony Hope Hawkins, being well received by a public tired of psychology and dialect, and eager for tales of adventure, in welcome contrast with the commonplace civilization of the day, made the romantic novel popular. Winston Churchill, Mary Johnston, Bertha Runkle, Charles Major, Maurice Thompson, S. Weir Mitchell, Paul Leicester Ford, and many others wrote historical romances, of which hundreds of thousands of copies were sold within very short periods. The beginning of the twentieth century was marked by the introduction of the novel dealing with the individual who is in revolt against existing social conditions. Although this perhaps is not yet a clearly defined department of fiction, *Unleavened Bread* (1900), by Robert Grant, *A Singular Life* (1895), by Elizabeth Stuart Phelps, and *A Gentleman from Indiana* (1900), by Booth Tarkington are all novels which show the same general tendency to emphasize individualism.

At present skillful craftsmen in fiction multiply, and a group of recent cultivators of the field may be mentioned. Margaret Deland (1857—), through her "Old Chester" stories, has a niche of her own among our twentieth-century story-tellers. For the light clever fiction of Richard Harding Davis (1864—) and Robert W. Chambers (1865—) the public has shown a

prodigious liking. Kate Douglas Wiggin (Mrs. George C. Riggs) (1857—) has won and held a large audience with stories of California, New England, and old England. Gertrude Atherton (1857—), a stronger novelist, but of uneven quality, writes indifferently of East and West, or of life abroad, and in *The Conqueror* produced an impressive historical novel. A novelist —primarily of American history—whose work improves in successive books, is Winston Churchill (1871—); his *The Crisis* is of the best of Civil War stories. A Southern novelist of manners of the days during and since the War is Ellen Glasgow. Another Southern novelist is Mary Johnston (1870—), who brings together war time incidents of fact and fiction with striking panoramic effect. David Graham Phillips (1867–1911) stands out from the company of mere clever writers by his rude force, his definiteness of social and moral aim, and his vocal Americanism. As purely American as Phillips, is Robert Herrick (1868—), with his novels depicting, particularly, the Middle West. The ranch and the mines of the far West are the themes of the unmistakably indigenous work of Owen Wister (1860—). In 1910 America lost by the death of Sydney Porter, "O. Henry," a short-story writer of extraordinary variety and ingenuity, and perhaps the most popular practitioner of the *genre* in this country. Frank Norris's novels, written between 1897 and 1902, notably *The Pit*, are sensational but strong; and *The Call of the Wild*, *The Sea Wolf*, and other tales of life in Alaska, the Yukon, etc., by Jack London (1876—) are stirring and adventurous.

Humor of a distinctively national stamp has been a pretty constant property of American literature from Benjamin Franklin to Mark Twain and beyond. Most of our greater writers —Irving, Lowell, Holmes, and Bret Harte among them—were humorists incidentally, not primarily; but there is a group of men who were humorists first and last. To this group belong, in addition to Mark Twain, Josh Billings, and Artemus Ward, mentioned all of them above, Edgar Wilson Nye (1850–96), "Bill Nye"; George Ade (1866—); and Finley Peter Dunne (1867—), "Mr. Dooley." Bill Nye and George Ade descend too often in their extravagant horseplay to the level of the newspaper comic supplement. Mr. Dooley is easily the first of our present-day humorists, and in his inimitable Irish-American idiom has satirized the foibles and idols of the hour in a running fire of racy and brilliant papers that mayhap will survive both.

In turning to poetry one is struck with the dearth of really important names. Among any number of versifiers, musical but commonplace, E. C. Stedman, R. H. Stoddard, T. B. Aldrich, Richard Watson Gilder, H. C. Bunner, and Richard Hovey are amongst those whose poetry has risen above the ordinary level. An exception is to be made in the case of W. D. Howells's *Stops of Various Quills*, a book now little read, but for technique and deep feeling worth the whole body of other contemporary American verse. Others of the older singers are still heard, among them James Whitcomb Riley (1853—), while Cincinnatus Heine Miller (1841–1913), "Joaquin Miller," has recently sung his last song. William Vaughn Moody (1869–1910), perhaps more the poet than any other American of his generation, leaves behind him his friend, Edward Arlington Robinson (1869—), who may be characterized in like terms. The work of Madison Cawein (1865—) should have honorable mention, as also that of Ridgely Torrence (1875—), Louis Vernon Ledoux (1880—), Emily Dickinson, Josephine Preston Peabody, and Percy Mackaye (1875—).

In historical composition there has been a marked inclination to follow the example set by the English historian, J. R. Green, and not only to weigh carefully the dramatic events of political history, but also to study with equal thoroughness the character of the people themselves. This tendency has been especially evident in the works of John Fiske, John Bach McMaster, Woodrow Wilson, and Edward Eggleston, all of whom have added much to our knowledge of conditions and men at the beginnings of our national life, and in the elaborate researches of Justin Winsor. Another historical writer of great importance is James Ford Rhodes, the historian of the Civil War and the period of Reconstruction, whose work, beginning with the Compromise of 1850, is the most richly documented American history that has yet been produced. Mention should also be made of William M. Sloane, the author of a monumental biography of Napoleon, now superseded by the English biography of J. H. Rose; William A. Dunning with his minute researches in the history of the Civil War; Woodrow Wilson, whose *History of the United States* is one of the few that cover the whole period of our national existence; H. W. Elson, whose book is equally comprehensive and still more popular; while Harry Thurston Peck in his *Twenty Years of the Republic* (1885–1905) attempted, not unsuccessfully, the difficult task of writing a contemporaneous history with impartiality and lucidity.

Literary criticism has had many representatives; but since James Russell Lowell's death American literature has found no one fitted to succeed him. The best-known critics who enjoyed a certain amount of authority in late years were William Dean Howells, Henry James, Brander Matthews, George E. Woodberry, Harry Thurston Peck, William C. Brownell, Norman Hapgood, James Huneker, F. M. Colby, and Paul Elmer More. In recent criticism, however, there is a note of individual preference at times almost emotional, and an absence of definite æsthetic standards, such as those which characterized the work of Sainte-Beuve and Brunetière in France and of Matthew Arnold and Courthope, in England. Consult H. H. Boyesen, "American Literary Criticism," in his *Silhouettes* (1894); and the article CRITICISM.

In conclusion, the most important developments since 1870 are New England's loss of literary supremacy; the wide distribution of literary activity; the decline of the essay as a recognized medium of purely literary expression; the predominance of light fiction, and an unparalleled increase in the number of books, newspapers, magazines, and other periodicals. In the early twentieth century the serious book has largely yielded to the magazine, and the magazine to the "literary supplement" of the newspaper; just as the legitimate drama had been supplanted successively by the light comedy, the vaudeville, and the moving-picture show. Many take a pessimistic view of American literary tendencies, but it is likely that the great increase in the number of those who read something will end in a greater demand for serious

literature, as discrimination is developed by comparison and criticism.

Bibliography. For the best account of Colonial and Revolutionary literature, consult: Tyler, *History of American Literature* (4 vols., New York, 1878–97); for a good general survey, Richardson, *American Literature* (New York, 1887–88); Nichol, *American Literature* (Edinburgh, 1882); Wendell, *A Literary History of America* (New York, 1900); C. Noble, *Studies in American Literature* (New York, 1898); Katherine Lee Bates, *American Literature* (New York, 1898); Brownell, *American Prose Masters* (1909); Trent, *Southern Writers* (1910); for poetry, Stedman, *Poets of America* (Boston, 1885); Stedman, *An American Anthology* (New York, 1901); Rittenhouse, *The Younger American Poets* (1904); for prose, Carpenter, *American Prose* (New York, 1898); for anthologies of prose and verse, Stedman and Hutchinson, *Library of American Literature* (11 vols., New York, 1888–90); Duyckinck, *Cyclopædia of American Literature* (New York, 1865). The best series of monographs on American authors is the American Men of Letters Series (Boston) and the American section of the English Men of Letters Series (New York). See also Whitcomb, *Chronological Outlines of American Literature* (New York, 1894); Trent, *History of American Literature* (New York, 1904); Vincent, *American Literary Masters* (1906); and the biographical notices at the end of articles relating to important writers in the present work. Allibone's *Critical Dictionary of English and American Literature*, with supplementary volumes, appeared in 1891 and contains 93,000 titles.

AMERICAN MERCHANT MARINE. See UNITED STATES, *Shipping;* SHIPPING SUBSIDIES.

AMERICAN MUSE'UM OF NAT'URAL HIS'TORY. See MUSEUM.

AMERICAN NOTES. By Charles Dickens, published in 1842, after his first visit to the United States. They excited resentment in America.

AMERICAN PAR'TY. This party is generally considered as being the same as the Know-Nothings. The terms were not synonymous at first, but later came to be. (See KNOW-NOTHINGS.) The American Party was an expansion of the Know-Nothings into a national political organization. It came into existence soon after the election of 1852, which witnessed the end of the Whigs. The increasing agitation against slavery and the opposition to the Fugitive Slave Law were bound to produce a new party to oppose the Democrats. This party was the result. Its cardinal principles were opposition to foreigners and to the Roman Catholic church. The only national election in which it played an important part was that of 1856. Its candidates were Fillmore and Donelson, and they polled nearly a million votes. See Woodburn, *American Politics* (New York, 1903); Stanwood, *History of the Presidency* (Boston, 1898).

AMERICAN PEACE SOCIETY. See PEACE MOVEMENT, INTERNATIONAL.

AMERICAN RIV'ER. A river in north central California (Map: California, C 2). It rises in Eldorado County and flows southwesterly toward the Sacramento River, into which it empties a little above the city of Sacramento. Gold has been frequently found along its banks.

AMERICAN SYC'AMORE. See PLANE.

AMERICAN SYS'TEM. See TARIFF.

AMERICAN U'NIVER'SITY. An institution of higher learning under the auspices of the Methodist Episcopal Church, situated at Washington, D. C., chartered in 1893. Its plans include the College for Graduate Study, providing (1) an institute for research, (2) courses of lectures, and (3) a system of fellowships. A Board of Award, consisting of seven, supervises its academic work and nominates to the fellowships. The plan of organization provided that for entrance to all courses the bachelor's degree, or its equivalent in scholarship, should be required. The assets in 1913 amounted to $3,000,000. Chancellor, 1913, Franklin Hamilton, Ph.D.

AMERICAN WINE. See WINE.

AMERICA'S CUP. See YACHT.

AMERICUS. A city and the county-seat of Sumter Co., Ga., 71 miles by rail southwest of Macon, at the junction of the Central of Georgia and the Seaboard Air Line railroads (Map: Georgia, B 3). It is in an agricultural region, producing cotton, corn, watermelons, pecans, and peaches. The chief industries of the city include cotton oil, fertilizer, metal and monument works. Americus is the seat of a State agricultural college, and has a fine Y. M. C. A. building, a Carnegie library, and a palatial hotel. Eleven miles north of the city lies historic Andersonville (q.v.). Settled in 1832, Americus was incorporated in 1855. It is governed by a charter of 1889, which places the mayor's term at two years, and provides for a city council of six members elected on a general ticket, with full power of appointment. The city owns and operates its water works. Pop., 1900, 7674; 1910, 8063; 1913 (est.), 11,000.

AMERIGHI, ä'mâ-rē'gê, MICHELANGELO. See CARAVAGGIO.

AMERIGO VESPUCCI, ä'mâ-rē'gō vĕs-pōōt'-chē. See VESPUCIUS, AMERICUS.

AM'ERIND. A name suggested as a designation for the American Indians (including the Eskimo and the Fuegians), as distinguished from the natives of India and the adjacent regions. It is compounded from the two words, *American* and *Indian*, and originated with Major J. W. Powell, Director of the Bureau of American Ethnology, and an American lexicographer. See article AMERIND in *Handbook of Amer. Inds. N. of Mexico*, Pt. I (Washington, 1907), p. 49.

AMERLING, ä'mĕr-ling, FRIEDRICH VON (1803–87). An Austrian portrait and figure painter. He was born at Vienna and studied at the academy there. He then worked with Sir Thomas Lawrence in London and with Horace Vernet and also studied in Italy (1831), where he was influenced by Venetian color. On his return to Vienna his portrait of the Archduke Rudolph of Austria (1832) won the favor of Emperor Francis I, who ordered a portrait of himself enthroned in the royal regalia (1833). He painted several other portraits of the Emperor and became in consequence the principal portrait painter of the Viennese aristocracy. The years 1841–44 were spent chiefly in Florence and Rome, where he began to paint single figure subjects with great success. Of his portraits, which number about 1000, are those of Prince Schwarzenberg, Princess Khevenhüller, the sculptor Thorwaldsen, the poet Grillparzer, Prince Liechtenstein, and several of the artist himself. His figure subjects include a "Lute Player," the painter's brother as a "Fisher Boy," and the "Apostle Paul" (the last two in the Imperial Gallery, Vienna), and "The Greek Girl." His

portraits are rich in color and the well-characterized sitters are elegant in bearing; but the pose, especially of the woman, is often affected and theatrical. Consult the painter's *Life* by his friend Frankl (Vienna, 1889); Pollak, *Oesterreichische Künstler* (Vienna, 1905).

AMERSFOORT, ä'mērz-fōrt. An ancient town in the province of Utrecht, Netherlands, 15 miles by rail northeast of Utrecht on the Eem, which flows into the Zuider Zee (Map: Netherlands, D 2). The town is situated in a fertile plain at the foot of sandy hills. Tobacco is much grown in the district, and cotton and woolen goods, leather, soap, glass, beer, etc., are manufactured. The Catholic church of St. Mary, built in the fourteenth century, was partly destroyed by an explosion in 1787, but its Gothic tower was not injured. This tower is 312 feet high, has excellent chimes, and is considered the finest in Holland. There is also a fine museum, and a college of Jansenists. Pop., 1890, 15,500; 1900, 19,089; 1911, 23,997.

AMERY, ā'mēr-ĭ, Leopold Charles Maurice Stennett (1873—). An English historian and publicist, born at Gorakpur, India, and educated at Harrow and at Balliol College, Oxford. He traveled in the Near East in 1897–98, after being elected a fellow of All Souls College, Oxford, and in 1899 joined the staff of the London *Times*. For this paper, at the outbreak of the Boer War, he organized the staff correspondence in South Africa. He contested seats in Parliament in 1906, 1908, and 1910, and in 1911 was elected from South Birmingham as a Unionist. In addition to the monumental *Times History of the War in South Africa*, which fills seven volumes and is considered an exhaustive and definitive treatment of the war, he wrote *The Problem of the Army* (1903); *Fundamental Fallacies of Free Trade* (1906); *The Great Question* (1909); *The Case against Home Rule* (1912); *Union and Strength* (1912).

AMES, āmz. A city in Story Co., Iowa, 37 miles north of Des Moines, on the Chicago and Northwestern Railroad (Map: Iowa, D 3). It is the seat of the State College of Agriculture and Mechanic Arts (founded in 1869), which has an enrollment of over 2500 students and occupies a plant covering more than 1000 acres. Ames possesses a Carnegie library and owns and operates its water works and electric light plant. Its chief industry is the manufacture of banners and pennants. The Lincoln Highway passes through the city. Pop., 1890, 1276; 1900, 2422; 1905, 3292; 1910, 4223; 1913 (est.), 5000.

AMES, Adelbert (1835—). An American soldier. He was born at Rockland, Me., and graduated at West Point in 1861. He was wounded at the first battle of Bull Run and afterward served with distinction at Malvern Hill, Antietam, Fredericksburg, Chancellorsville, Gettysburg, and Petersburg. He was brevetted (March 13, 1865) major-general of volunteers for conduct at Fort Fisher, and on July 28, 1866, became a lieutenant-colonel in the regular army. He was afterward Provisional Governor of Mississippi from 1868 to 1869, and was Commandant of the Fourth Military District (including Mississippi) from 1869 to 1870, and was a United States Senator from 1870 to 1873, when he became Governor of Mississippi by popular election. His administration of affairs soon antagonized the whites, who accused him of favoritism to the negro population, and a bitter race war ensued, culminating in the Vicksburg riot of Dec. 7, 1874, and in numerous minor conflicts between Democrats and Republicans. Finally, in 1876, the Democrats having secured a majority in the Legislature, Ames was impeached, and resigned on condition that the charges against him be withdrawn. (See Mississippi.) He then removed to New York, and, later, to Lowell, Mass., and during the Spanish-American War served as brigadier-general of volunteers.

AMES, Fisher (1758–1808). An American orator and Congressman. He was born at Dedham, Mass., April 9, 1758. He graduated at Harvard in 1774, began the practice of law in 1781, and soon became favorably known through his trenchant newspaper articles in condemnation of Shays's Rebellion (q.v.) and in favor of a strong government. This local reputation was increased by his efforts in favor of the Federal constitution in the Massachusetts Convention of 1788, the immediate result of which was his election to Congress, where he served for eight years, becoming known especially as an accomplished public speaker. In his later years he served in the Massachusetts Council, delivered a eulogy on Washington before the Legislature, and produced a number of essays; but he took no part in active politics. In 1804 he declined the presidency of Harvard. He died July 4, 1808. A single volume of his *Works* was published in Boston (1809), and later his son, Seth Ames, edited his writings and speeches in more extended form, with a memoir by J. T. Kirkland (Boston, 1854).

AMES, Herman Vandenburg (1865—). An American scholar and educator, born in Lancaster, Mass. Having graduated from Amherst College in 1888, he took advanced courses at Columbia and Harvard universities, receiving the degree of Ph.D. from Harvard in 1891. After teaching for three years in the University of Michigan, he went abroad for further post-graduate work at Leipzig and Heidelberg. He became assistant professor of history in Ohio State University (1896), and, in the University of Pennsylvania, successively instructor in American constitutional history (1897), assistant professor of American history (1903), and professor of American constitutional history (1908). Professor Ames was also made dean of the Graduate School at Pennsylvania in 1907. Besides his other activities, he lectured at summer sessions of Columbia and the University of Wisconsin and became member and officer of many historical societies. In addition to contributing frequently to periodicals and editing *State Documents on Federal Relations, The States and the United States* (1906), he wrote: *The Proposed Amendments to the Constitution of the United States*, which received a prize of the American Historical Association (1897); *Outline of Lectures on American Political and Institutional History during the Colonial and Revolutionary Periods* (3d ed., 1908); *Syllabus of American Colonial History* (with W. T. Root, 1912).

AMES, James Barr (1846–1910). An eminent American educator and legal scholar. He was born in Boston, graduated in 1868 at Harvard and in 1872 at the Law School of the University, and in 1868–69 was an instructor in a private school at Boston, and from 1871 to 1872 was tutor in German and French at Harvard. In the same institution he was appointed successively instructor in history (1872), asso-

ciate professor of law (1873), and professor of law (1877). In 1895 he became dean of the Harvard Law School. He published various articles in the *Harvard Law Review* and similar periodicals and compiled and edited numerous valuable collections of cases on torts, trusts, and suretyship, and other legal questions. A man of profound but unaffected scholarship and a teacher of rare power and distinction, he exerted a wide and lasting influence on the development of the law of this country. His scattered essays on legal topics were collected and published after his death as a memorial to his genius, under the title *Essays in Legal History* (Boston, 1912). It is not too much to say that they constitute the most important contribution to legal scholarship that has yet been made in America. He received the degree of LL.D. from New York University (1898), the University of Wisconsin (1898), and the University of Pennsylvania (1899).

AMES, Joseph (1689–1759). An English antiquary and bibliographer, born at Yarmouth. He was in some sort of mercantile pursuit, and in addition to various other compilations published the *Typographical Antiquities* (1749), regarded as forming the foundation of English bibliography.

AMES, Joseph Alexander (1816–72). An American portrait painter. He was born in Roxbury, N. H., and was a pupil of Washington Allston in Boston. Of varied talents, he painted figure, genre and landscape, but his portraits are his best work. In 1848 he went to Rome, where he painted a picture of Pope Pius IX. On his return to America he lived successively at Boston, Baltimore, and New York, where he was elected a member of the National Academy of Design in 1870. His best portraits are those of Emerson, Rachel, Ristori, Clarence A. Seward, Webster, Choate, and President Felton of Harvard; his figure subjects, "Miranda" and the "Death of Webster."

AMES, Joseph Sweetman (1864—). An American physicist and educator, born at Manchester, Vt. He graduated in 1886 at the Johns Hopkins University; became professor of physics there (1899), and director of the physical laboratory (1901). Professor Ames was elected an honorary member of the Royal Institution of Great Britain. He became assistant editor of the *Astro-Physical Journal* and associate editor of the *American Journal of Science;* editor-in-chief of the *Scientific Memoir Series;* editor of J. von Fraunhofer's memoirs on *Prismatic and Diffractive Spectra* (1898); author of *The Theory of Physics* (1897), *Elements of Physics* (1900), *The Induction of Electric Currents* (2 vols., 1900), *Text-Book of General Physics* (1904).

AMES, Mary Clemmer (Mrs. Edmund Hudson) (1839–84). An American author, best known by her "Woman's Letter from Washington," contributed for many years to the New York *Independent.* She was born at Utica, N. Y., and at an early age married the Rev. Daniel Ames, from whom she was divorced in 1874. Her early newspaper experience was gained on the Springfield *Republican,* the New York *Press* (1865), and the Brooklyn *Daily Union* (1869–71). In 1871 she received $5000 for her work, the largest salary ever paid a newspaper woman up to that time. In later life she removed to Washington, where her home was a literary and social centre, and in 1883 she married Edmund Hudson, editor of the *Army and Navy Register.* Her works include *Victoria* (1864) and *Eirene* (1870), novels; *Ten Years in Washington* (1871); *Memorials of Alice and Phœbe Cary* (26th ed., 1885), of whom she had been an intimate friend; a volume of poems (1872); *Outlines of Men, Women, and Things* (1873); *His Two Wives* (1874); and *Poems of Life and Nature* (3d ed., 1886). Her complete works were published at Boston (4 vols., 1885). Consult Hudson, *Memorial Biography of Mary C. Ames* (Boston, 1886).

AMES, Nathan P. (1803–47). An American manufacturer of firearms, ordnance, and cutlery. In early life he owned extensive cutlery works at Chicopee Falls, Mass., but afterward removed to Cabotville (now Chicopee). The works were supplemented in 1836 by a bronze foundry, where most of the brass guns for the United States army were cast. There also the statues of DeWitt Clinton, in Greenwood Cemetery, Brooklyn; of Washington, in Union Square, New York; and of Franklin, in School Street, Boston, were cast.

AMES, Oakes (1804–73). An American manufacturer and legislator. He was born at Easton, Mass., and at an early age entered his father's workshop, where he soon familiarized himself with every detail of the shovel business, which, upon the discovery of gold in California and the impetus thereby given to railroad building, soon became a most important industry. He served in the cabinet of the Governor of Massachusetts in 1860. Four years later, after others had failed, he was called upon by President Lincoln and others to build the Union Pacific Railroad, which great undertaking he successfully completed on May 10, 1869. He had invested $1,000,000 in the enterprise and had pledged the remainder of his fortune for the same purpose. He was censured by the Forty-second Congress for participation in the Credit Mobilier (q.v.), but afterward was vindicated in a resolution passed by the Massachusetts Legislature (May 10, 1883). From 1862 to 1873 he represented the second Massachusetts district in Congress. He bequeathed $50,000 to children of North Easton, Mass. A fine monument in his memory was erected by the Union Pacific Railroad at Sherman, Wyoming, the highest point reached by the railroad. Consult *Oakes Ames: A Memoir* (Cambridge, 1884).

AMES, Oliver, LL.D. (1831–95). The thirty-first Governor of Massachusetts, a son of Oakes Ames. He was trained in his father's manufactory and upon his death undertook the discharge of the numerous financial obligations incurred by the building of the Union Pacific Railroad and other enterprises, paying within a few years debts aggregating millions of dollars. In 1882, after being a member of the State Senate for two years, he was chosen Lieutenant-Governor of Massachusetts, serving for four successive terms, and in 1886 was elected Governor, to which office he was reëlected in 1887 and 1888.

AMES, William (1576–1633). An English Puritan clergyman and writer on moral philosophy, born in the county of Norfolk and educated at Christ College, Cambridge. He was compelled to leave England because of persecution for nonconformity, and then became professor of theology in the University of Franeker, Friesland, from 1622 to 1632. He was famous in his time as a master of theological controversy and is considered to have had a great influence

on the religious thought of Europe. His best-known work is *De Conscientia, eius Iure et Casibus* (1632).

AMES, WINTHROP (1871—). An American theatrical manager, born at North Easton, Mass. After he graduated from Harvard in 1895 and had spent an additional year of special study at the university, he was engaged in editorial and publishing work in the general field of art and architecture for some eight years. His chief interest, however, lying in the theatre and its management, he undertook, in 1904, the direction of the Castle Square Theatre in Boston, a house devoted especially to producing good plays at popular prices. Mr. Ames's Boston success induced the founders of the New Theatre in New York City to select him (1908) as director of their ambitious enterprise. While artistically successful, his management of this theatre was, from a variety of reasons, so unprofitable financially that the project had to be abandoned in 1911. (See DRAMA.) Mr. Ames built, in 1912, a small but elegant playhouse which he called The Little Theatre, there presenting some of the most notable dramatic productions seen in New York City in a number of years. He also built the Booth Theatre (1913).

AMESBURY, ămz'bĕr-ĭ. A town in Essex Co., Mass., on the Boston and Maine Railroad, 42 miles northeast of Boston (Map: Massachusetts, F 2). It has a public library, operates its own water works, and manufactures carriages, electric automobiles, automobile fittings, hats, reed and rattan goods, mirrors and reflectors, motor boats and dories, brass castings, shoes, and hinges. The government is administered by town meetings, held annually. Originally a part of Salisbury, Amesbury was virtually separated as New Salisbury in 1654 and was incorporated in 1666 and named (from Amesbury, England) in 1667. There is here a monument erected to Josiah Bartlett, who was born in Amesbury. John Greenleaf Whittier lived here from 1836 until his death in 1892. Pop., 1890, 9798; 1900, 9473; 1910, 9894; 1920, 10,036. Consult J. Merrill, *History of Amesbury* (Haverhill, 1880).

AM'ETHYST (Gk. *ἀμέθυστος, amethystos,* a remedy against drunkenness, from *ἀ, a,* priv. + *μέθυ, methy,* wine). A violet blue or bluish-violet variety of quartz, the color of which is believed to be due to manganese oxide. It is one of the most widely used of the semi-precious stones, rings, pendants, necklaces, and other articles of jewelry. The ancients imagined it to possess the property of preventing drunkenness, and some of those addicted to that habit wore it on their persons. Amethyst frequently occurs lining the interior of balls or geodes of agate and in veins and cavities in various rocks. The finest specimens are from Scotland, Siberia, India and Ceylon. In the United States the amethyst is found in many localities, but seldom of sufficient clearness or color to be used as a gem. The Lake Superior crystals, from the slaty formations around Thunder Bay, are perhaps the best known, and annually thousands of dollars' worth is sent from this locality to be sold at Niagara Falls and other tourist resorts. The Oriental amethyst is a purple variety of corundum.

AM'ETRO'PIA (Gk. *ἀ, a,* priv. + *μέτρον, metron,* measure, or *ἀμέτρος, ametros,* disproportionate + *ὤψ, ōps,* eye). Any departure from the normal refractive condition of the eye or emmetropia. In emmetropia, in the absence of accommodative effort, i.e., when the eye is at rest, parallel rays of light are focused on the retina. In ametropia the retina may lie behind the principal focus of parallel rays, in which case the eye is said to be myopic; or in front of this focus, when it is called hyperopic. In the one case the eyeball is too long, in the other too short. See HYPEROPIA; MYOPIA; ASTIGMATISM; VISION.

AMGA, ăm-gä'. A river in the territory of Yakutsk, Siberia, rising in the Aldan Mountains, flowing toward the northeast, and joining the Aldan, a tributary of the Lena (Map: Asia, N 2).

AMHARA, ăm-hä'rȧ (the high lands). The central division of Abyssinia, occupying the territory around Lake Tsana (Map: Africa, H 3). The capital is Gondar. See AMHARIC LANGUAGE.

AMHARIC (ăm-hä'rĭk) **LAN'GUAGE.** A modern Semitic dialect which derives its name from the people of Amhara (q.v.), one of the divisions of Abyssinia. Next to the Arabic, Amharic is the most widely spread of the Semitic languages. It has displaced in popular usage the original language of Abyssinia, the Ethiopic or Geez, and is now the spoken tongue, whereas the Geez is only used in the liturgy. For many years Amharic had no writing, so that it changed very much in its forms, conjugations, and even in the meanings of its roots. Moreover, its vocabulary received non-Semitic additions from the surrounding African tribes. Hence it is that Amharic is the least Semitic of the Semitic languages, and this appears very strongly in the syntax. When the Amharic language began to be written, the Ethiopic or Geez letters were used. A literature has grown up in comparatively modern times. Its oldest documents are some war songs from the fifteenth and sixteenth centuries, published by Guidi, *Le canzoni geez-amarina in onore di Rè-Abissini* (1889); *Documenti amarina* (1891). With the seventeenth century begins the creation of a purely Amharic literature, partly under the influence of European missionaries. The translation of the Bible was made by missionaries. Of grammars there are those of Ludolph (Frankfort, 1698); Isenberg (London, 1842); Massaja (Paris, 1867); Prätorius (Halle, 1879); Guidi (Rome, 2d ed., 1892); Mondon-Vidailhet (1898); Apevork (1905); Mahler (1905); of dictionaries, Isenberg's (London, 1841); A. d'Abbadie's (1881). See AFRICAN LANGUAGES.

AM'HERST. A district of Lower Burma (q.v.), British India.

AMHERST. A town in Hampshire Co., Mass., 16 miles north of Springfield, on the Boston and Maine and Central Vermont railroads (Map: Massachusetts, C 3). The scenery is picturesque, with beautiful views of the Connecticut valley, Mount Holyoke, and other mountains. It is the seat of Amherst College and of the Massachusetts Agricultural College (qq.v.). Straw hat manufacture is the principal industry. Probably settled as early as 1703, Amherst was part of Hadley and was known successively as New Swamp, Hadley Farms, East Farms, and East Hadley until, in 1759, it was incorporated as a district under its present name, given by Governor Pownall in honor of Gen. Jeffrey Amherst (q.v.). In 1776 it became a town. The government is administered by town meetings. Amherst is rich in Revolutionary tradition. Pop., 1890, 4512; 1900, 5028; 1910, 5112; 1913

(est.), 5308. Consult Carpenter and Morehouse, *The History of the Town of Amherst* (Amherst, 1896); Walker, *Historic Homes of Amherst* (Amherst, 1905).

AMHERST, formerly FORT LAWRENCE. A port of entry and the chief town of Cumberland Co., Nova Scotia, Canada, near the head of Cumberland Basin, and on the Inter-Colonial Railway (Map: Nova Scotia, E 3). It is 138 miles by rail north by west of Halifax, and has car shops, woolen mills, boot and shoe factories, iron foundries, engine and boiler works, tanneries, trunk factories, etc. An important trade in lumber and coal is carried on. Pop., 1901, 4964; 1911, 8973; 1913 (local est.), 10,320.

AMHERST, JEFFREY, BARON (1717–97). An English soldier. He was born at Riverhead, Kent, and for some time was a page in the household of the Duke of Dorset. He entered the army as ensign in 1731, soon became an aid-de-camp of General Ligonier, and in the War of the Austrian Succession served at Dettingen, Fontenoy, and Roncoux, and in the Seven Years' War at Hastenbeck. In 1758 Pitt raised him from the rank of Lieutenant-Colonel to that of Major-General, and put him in command of the expedition against Louisburg, which, after a short siege, surrendered on July 27. In September he replaced Abercromby as Commander-in-Chief of the English forces in America and in 1759 led the expedition against Ticonderoga and Crown Point, gaining possession of the former July 23 and of the latter August 1. In the following year he commanded in person the forces before Montreal and on September 8 compelled the French to capitulate and surrender Canada with all its dependencies to the British crown. For his services he was appointed Governor-General of British North America, was formally thanked by Parliament, and was made a Knight of the Bath. Having no knowledge of Indian warfare and scorning to avail himself of the undisciplined colonial militia, he proved unfit for the task of suppressing the conspiracy of Pontiac (q.v.) and returned to England in 1763, where, as the conqueror of Canada, he was received with the greatest enthusiasm. He was absentee Governor of Virginia from 1763 to 1768, was appointed Governor of Guernsey in 1770, and became a Privy Councilor in 1772. From 1772 to 1782 and from 1783 to 1793 he was acting Commander-in-Chief of the British Army. He became a General in 1778, was Commander-in-Chief 1793 to 1795, and was made a Field-Marshal in 1796. For his record as an officer in America, consult Parkman, *Montcalm and Wolfe* (Boston, 1884), and *The Conspiracy of Pontiac* (Boston, 1851).

AMHERST, WILLIAM PITT, EARL OF (1773–1857). A British diplomatist and statesman. He succeeded his uncle Jeffrey as Baron Amherst in 1797. In 1816 he was sent as ambassador to China, where he refused to perform what he thought a degrading act of kneeling, which was required of all who would see the Emperor. For this he was not allowed to enter Peking, and the object of his mission was frustrated. On the way home he was wrecked. Another ship, in which he returned, touched at St. Helena, where he had several interviews with Napoleon. He was Governor-General of India from 1823 to 1828, and for his services in conducting the first Burmese War he was created an earl in 1826. Consult Mrs. A. I. Ritchie, *Lord Amherst and the British Advance Eastward* (1842).

AMHERSTBURG. A town and port of entry in Ontario, Canada, on the Detroit River, 4 miles above Lake Erie, and on the Michigan Central Railroad (Map: Ontario, A 5). The town has steamer connection with Detroit, Mich. It has a public library and is the seat of a United States consul. Amherstburg is the centre of a farming district in which corn and tobacco are raised. There are grazing lands and limestone quarries in the vicinity, and the industries include saw and flour milling and manufactures of iron and cement. This town is one of the oldest settlements in upper Canada. It was dismantled by the British in 1813 and a week later was destroyed by General Harrison, of the United States army. Pop., 1901, 2222; 1906 (local est.), 2480; 1911, 2560.

AM'HERST COL'LEGE. A leading American college, situated at Amherst, Mass., and founded in 1821 by Congregationalists in the interest of Christian education. Up to the year 1906 the graduates numbered 4700, of whom 1411 entered the ministry, while an equally large number became teachers. The unusual educational influence wielded by Amherst for half a century was due to a considerable extent to two of its presidents, Edward Hitchcock and Julius H. Seelye. The former was probably the most distinguished American geologist of his time, and the latter united with a broad scholarship in the humanities great ability as a practical educator. Amherst has never endeavored to become a university, but has steadily increased in efficiency as a non-specialized and non-technical liberal college. In 1912 the faculty numbered 48, and the students 421. The total value of the buildings and grounds is about $1,000,000; the interest of over $300,000 is used to aid needy students; the annual income of the college is about $150,000, and the entire property under the control of the college aggregates $3,500,000. The library contains 100,000 volumes and is the largest belonging to any purely collegiate institution in the country. Of accessories to the college may be mentioned the Hitchcock ichnological cabinet, the Adams collection in conchology, the Shepard meteoric collection, and an extensive and valuable geological and mineralogical collection gathered largely by the personal efforts of Prof. Benjamin K. Emerson. The Pratt Gymnasium, athletic field, and college hospital are the gifts of the sons of the late Charles Pratt of Brooklyn, N. Y. The presidents have been: Zephaniah Swift Moore, D.D., 1821–23; Heman Humphrey, D.D., 1823–45; Edward Hitchcock, D.D., LL.D., 1845–54; William A. Stearns, D.D., LL.D., 1854–76; Julius H. Seelye, D.D., LL.D., 1876–90; Merrill Edwards Gates, LL.D., Ph.D., 1890–99; George Harris, D.D., LL.D., 1899–1912; Alexander Meiklejohn, Ph.D., LL.D., 1912. Consult Tyler, *A History of Amherst College* (New York, 1896, 1910).

AM'ICABLE NUM'BERS (Lat. *amicabilis*, friendly). Two numbers, each of which is the sum of the factors of the other, are called amicable numbers, as 220 and 284, e.g.:

$$220 = 1+2+4+71+142$$
$$284 = 1+2+4+5+10+11+20+22+44+55+110$$

The classification and fanciful name are due to the Pythagoreans, who made much of number mysticism.

AMICE, ăm'ĭs. See COSTUME, ECCLESIASTICAL.

AMICI, ä-mē'chē, GIOVANNI BATTISTA (1786–

1864). An Italian astronomer and optician. He was born at Modena, where he was afterward professor of mathematics at the university. In 1831 he was appointed superintendent of education and subsequently became director of the observatory and professor of astronomy at Florence. The various pieces of physical and astronomical apparatus designed or constructed by him include a reflecting telescope, an achromatic microscope, polarization apparatus, a micrometer for telescopes, and a reflecting prism. He published papers on observations on double stars, the moons of Jupiter, the sun, and on various botanical subjects, such as the circulation of the sap in plants.

AMICIS, ä-mē′chês, EDMONDO DE (1846–1908). One of the most popular of modern Italian authors. He was born at Oneglia, in Liguria, Oct. 21, 1846. In 1861 he graduated from the military academy at Modena, with the rank of sublieutenant, and five years afterward participated in the battle of Custozza. For a while he edited a Florentine journal, *L'Italia Militare*, and subsequently took part in the Roman occupation of 1870; but having achieved some success with a volume of sketches of army life, *Bozetti* (1868), he abandoned both the military and the journalistic career, and undertook a series of voyages to England, Holland, Spain, Africa, Turkey, and South America. Almost all these gave him material for brilliant and widely popular volumes of travel, such as *La Spagna* (1873), *Ricordi di Londra* (1874), *L'Olanda* (1874), *Marocco* (1875), and *Constantinopoli* (1877). These volumes have been translated into many languages. They show a keen power of observation, a genial humor, and a broad spirit of tolerance, which would justify their popularity even without the warm coloring and glowing vividness of description, in which respect his style challenges comparison with that of Théophile Gautier. Other writings include *Ritratti letterari* (1881), a series of personal impressions of well-known writers, including Zola and Dumas *fils;* a sympathetic and semi-humorous volume on friendship, *Gli Amici* (1882), and a number of historical novelettes, collected under the title *Alle porte d'Italia* (1888). In his later years De Amicis became deeply interested in educational and economic questions, and in many ways his greatest literary success is a simple little volume, *Cuore* ('The Heart of a Boy'), intended primarily for children, and recording the events of a single school year as told from day to day by one of the pupils. In Italy it has passed through 300 editions, and it has been translated into 20 languages. Educational problems also gave De Amicis his subject for his more serious attempts at fiction, *La maestrina degli operai* (1895), and *Il romanzo d'un maestro* (1895). The last-named volume shows a strong tendency towards socialism, which he openly avowed and regarded as a valuable source of literary inspiration. His later volumes are: *Memorie* (1899); *Speranza e glorie* (1900); *Ricordi d'infanzia e di scuola* (1901); *Lotte civili,* a defense of socialism (1901); *Capo d'anno* (1901); *Un salotto fiorentino del secolo scorso* (1902); *Nel giardino della follia* (1902); *L'idioma gentile* (1904); *Nel regno dell' Amore* (1905).

AMI′CUS CU′RIÆ (Lat. friend of the court). One, usually a counselor at law, who volunteers information, or gives it at the request of the court, upon some matter of law in regard to which the judge is doubtful or upon matters of fact of which the court may take judicial cognizance. The *amicus curiæ* cannot add anything to the record or increase the power of the court to dispose of the matter in hand. He has, in general, no control over an action, as has the attorney of record; but in some cases, as when letters of administration have been issued without authority, he may move to set the proceeding aside. By an early English statute any barrister was permitted, as *amicus curiæ,* to move to quash an improper indictment. See BARRISTER; LAWYER.

AM′IDAS, PHILIP. See AMADAS, PHILIP.

AM′IDAVAD′ (*amadavat,* Indian name; the bird was first imported from the city of Ahmedabad). A cage-bird (*Estrilda* or *Sporœginthus amandava*), one of the small weaver-finches of India, called also strawberry finch, having a pretty song and a social disposition, so that it is a favorite for aviaries. The plumage is most brilliant, the prevailing colors being fiery red, black, and yellow. It requires the food and care given to a canary. See CAGE-BIRDS.

AM′IDES or **AC′ID AM′IDES** (derived from *ammonia*). An interesting class of organic compounds formed by the substitution of organic acid radicles for one or more hydrogen atoms in ammonia (NH_3). For example, acetamide, the amide of acetic acid, has the formula CH_3CONH_2. A number of interesting derivatives of the amides have been obtained by replacing the hydrogen of the NH_2 group. Thus, from acetamide, CH_3CONH_2, compounds may be readily obtained, represented by the following formulæ: $CH_3CONH(CH_3)$, methyl-acetamide; $CH_3CON(CH_3)_2$, di-methyl-acetamide; $CH_3CONHAg$, silver-acetamide; $CH_3CONHBr$, bromine-acetamide, etc.

The following are the principal general methods by which primary acid amides may be prepared:

1. When the ammonium salts of many fatty organic acids are distilled, they lose the elements of water, and the corresponding amides are formed. Thus, acetamide is made by distilling ammonium acetate, the reaction taking place according to the following chemical equation:

$$\underset{\text{Ammonium acetate}}{CH_3COONH_4} - H_2O = \underset{\text{Acetamide}}{CH_3CONH_2}$$

Rosanoff, Gulick, and Larkin have shown that the preparation of an amide from the ammonium salt of the corresponding acid is improved both in ease of operation and in yield of amide by using that acid itself as a catalytic agent. The process has been used in the commercial manufacture of acetamide since 1911.

2. The chlorides of acid radicles are treated with ammonia. Thus, benzamide (the amide of benzoic acid) is readily improved by slowly adding benzoyl chloride to strong ammonia in the cold, the reaction taking place as follows:

$$\underset{\text{Benzoyl chloride}}{C_6H_5COCl} + \underset{\text{Ammonia}}{NH_3} = \underset{\text{Benzamide}}{C_6H_5CONH_2} + \underset{\text{Hydrochloric acid}}{HCl}$$

When acid amides are boiled with dilute acids or alkalies, they take up the elements of water and are reconverted into the ammonium salts of the corresponding acids. The free acids themselves are obtained when amides are treated with nitrous acid. (See AMINES.) When treated with powerful dehydrating agents, such as phosphorus pentoxide, amides are converted into the corre-

sponding nitrils. Thus acetamide, CH_3CONH_2, changes into CH_3CN.

The amides are all soluble in alcohol and in ether, and many are more or less soluble in water. Most of them are solid crystalline substances that can be distilled without decomposition.

The *acid amides* should be distinguished from the *amido-acids* (now more frequently referred to as *amino-acids*); compounds of the latter class may be obtained by treating the halogen-substitution products of acids, or of esters, with ammonia, while, as stated above, the acid amides are produced by the action of ammonia on the chlorides of acid radicles. The following two equations may serve to show the formation of, and the difference in chemical constitution between, an acid amide and an amido-acid:

$$\underset{\text{Acetyl chloride}}{CH_3COCl} + NH_3 = \underset{\text{Acetamide}}{CH_3CONH_2} + HCl$$

$$\underset{\text{Mono-chloro-acetic ester}}{CH_2ClCOOC_2H_5} + NH_3 = \underset{\text{Amido-acetic ester}}{CH_2NH_2COOC_2H_5} + HCl$$

AM'IDO-AC'IDS. See AMIDES.

AMID'SHIP, or MIDSHIP. See SHIPBUILDING.

AMIEL, à'myĕl', HENRI FRÉDÉRIC (1821–81). A Swiss essayist, poet, and professor of æsthetics. He was born at Geneva, Sept. 27, 1821, and died there, May 11, 1881. He is remembered almost solely for his *Journal intime*, a diary of 1700 pages of manuscript, posthumously published in part in 1883–84 and translated into English in 1889, with a critical study by Mrs. Humphry Ward. This journal, through its singular clearness, keenness of insight, and sensitiveness to impression, is the complete revelation of a cast of mind that felt itself peculiarly modern and peculiarly entitled to be self-distressed. It expresses with masterful passion and original power the spiritual yearning and despair of a pure soul gasping in a rationalistic atmosphere. Thus Amiel is a curious projection into reality of the Shakespearean Hamlet, in whom morbid introspection numbs action. He is more fascinating than stimulating, more sombre than pessimistic, more subtle than strong. His thoughts will be cherished for the beauty and perfection of their form rather than for any tonic quality in their teaching. Less read (poetical) works of his are the poems *Grain de Mil, Il Penseroso*, and *Charles le Téméraire*. There is a *Life of Amiel*, by Vadier (Paris, 1885). Consult also, Bourget, *Nouveaux Essais* (Paris, 1885), Matthew Arnold's essay on Amiel, in *Essays in Criticism*, and the Introduction by E. Scherer.

AMIENS, à'myăN' (from the Lat. *Ambiani*, the name of a Belgic tribe; literally 'dwellers on the water'; compare Gadhel, *abhain, abhuinne*, water, a river). The capital of ancient Picardy and of the present French department of Somme, situated on the river Somme, 81 miles by rail from Paris (Map: France, N., H 3). The residential section is well built with wide, well-paved streets and fine squares. The business part of the town is crossed by several canals and is rather unattractive. The old town is surrounded with boulevards, which occupy the site of the ancient fortifications, and there is in the western part an extensive pleasure ground, the Promenade de la Hotoie, used for public concerts and festivals. The world-famous cathedral is situated in the eastern part, facing the Place Nôtre Dame. Besides being the largest ecclesiastical edifice of France, the cathedral of Amiens is also one of the finest specimens of Gothic architecture (q.v.) in Europe. Its construction was begun in 1220 by the architect Robert de Luzarches, and was continued by Thomas de Cormont and his son Renault. It was finished in 1288, but many additions have been made since; the two side towers of the façade are without spires. The length of the cathedral is 470 feet, that of the transept 213 feet, and the width of the nave 144 feet. The façade has three lofty porches profusely decorated with statuary and other sculptural ornaments. The central spire over the transept is very slender and 360 feet in height. The interior is also very imposing. The nave is 147 feet high, and the vaulting is supported by 126 columns. There are numerous chapels, and the transepts are covered with fine reliefs. At the sides of the nave are placed bronze statues of the two founders of the cathedral, and there are also large marble statues at the entrance to the choir. Besides the cathedral the most noteworthy buildings are the town hall (begun in 1550) and the Château d'Eau, where the water works of the city are situated. Of educational establishments Amiens has lycées for boys and girls, a preparatory medical school, a theological seminary, a school of music, a municipal library, with about 100,000 volumes and nearly 600 manuscripts, and the museum of Picardy, containing collections of antiquities, sculptures, and paintings. Amiens was of considerable industrial importance as early as the twelfth century, and in the sixteenth century it became one of the largest centres of the textile industry in France. At present the chief manufactures are linen, woolens, silk, velvet, and shoes. It is the seat of a bishop and of a court of appeals. Agglomerated pop., 1911, 79,070; total municipal, 87,100; counted apart, 6107; total, 93,207, as compared with 90,753 in 1901.

Amiens was anciently known as Samarobriva and was the capital of the Gallic Ambiani. Cæsar included it in Gallia Belgica, and it became a Roman stronghold; Marcus Aurelius adorned it. In the fifth century it fell into the hands of the Franks. In 1185 Philip Augustus, in consolidating the kingdom, induced Philip of Alsace to cede it to the crown. From 1435 to 1477 the city was in the possession of the dukes of Burgundy. Taken by the Spaniards in 1597, it was besieged and recaptured by Henry IV. It was the capital of Picardy until 1790. In November, 1870, it was captured by the Prussians. The famous Treaty of Amiens between Great Britain on one side and France, Spain, and Holland on the other, in which Great Britain recognized the changes made by France in the map of Europe and gave up most of her recent conquests, was signed in the hôtel de ville on March 27, 1802. Among notable men born in this city was Peter the Hermit. Consult A. de Calonne, *Histoire de la ville d'Amiens* (1900).

AMIN'ADAB SLEEK. See SLEEK, AMINADAB.

AMINE, à-mēn'. The name of two characters in the *Arabian Nights*. 1. In the *History of Sidi Nouman*, his wife, whose habit of eating only so much rice as she could pick up on a bodkin excited his suspicions, and who, he discovered, partook of ghoulish feasts in the cemetery. She used also to lead her three sisters about like hounds. 2. In the story of *Three*

AMIENS CATHEDRAL

Ladies of Bagdad, the half-sister of Zobeide and wife of Amin, the Caliph's son, who becomes estranged from her, but is reconciled.

AMINES (derived from *ammonia*). A general term applied in organic chemistry to an important class of basic compounds derived by substituting hydrocarbon radicles like methyl (CH_3), ethyl (C_2H_5), etc., for one or more of the hydrogen atoms of ammonia (NH_3). The compound CH_3NH_2 is called methyl-amine; the compound $(CH_3)_2NH$, di-methyl-amine; the compound $(CH_3)_3N$, tri-methyl-amine. An amine derived by replacing one hydrogen atom of ammonia is called a *primary amine;* one derived by replacing two hydrogens is called a *secondary amine;* one derived by replacing all of the hydrogen of ammonia is called a *tertiary amine.*

The amines may be readily prepared by the action of halogen substitution products of the hydrocarbons upon ammonia (Hofmann's method). Thus, by the action of mono-iodoethane (ethyl iodide) upon ammonia, one or more ethyl groups (C_2H_5) are introduced into the molecule of ammonia (NH_3), according to the following chemical equations, which usually take place simultaneously:

1. $C_2H_5I + NH_3 = C_2H_5NH_2 + HI$
   Ethyl-iodide · Ammonia · Ethyl-amine · Hydriodic acid

2. $2C_2H_5I + NH_3 = (C_2H_5)_2NH + 2HI$
   Di-ethyl-amine

3. $3C_2H_5I + NH_3 = (C_2H_5)_3N + 3HI$
   Tri-ethyl-amine

As the amines are powerful bases, they combine, of course, with the hydriodic acid formed in these reactions, producing salts like $C_2H_5NH_2HI$, from which the amines are readily isolated by distilling with caustic alkalies.

Simultaneously with the above three reactions, a fourth reaction takes place: viz., between the halogen substitution product of the hydrocarbon and the tertiary amine produced in the third reaction. This fourth reaction, in the case of tri-ethyl-amine, is represented by the following equation:

4. $C_2H_5I + (C_2H_5)_3N = (C_2H_5)_4NI$
   Ethyl-iodide · Tri-ethyl-amine · Tetra-ethyl-ammonium iodide

The compound formed in this reaction is evidently ammonium iodide (H_4NI), all the hydrogen of which has been replaced by ethyl-groups (C_2H_5); it is therefore named tetra-ethyl-ammonium-iodide. When treated in aqueous solution with silver hydroxide, it is transformed into tetra-ethyl-ammonium hydroxide $(C_2H_5)_4NOH$. Bases like $(C_2H_5)_4NOH$, derived from ammonium hydroxide by substituting hydrocarbon radicles like methyl (CH_3), ethyl (C_2H_5), etc., for all of its hydrogen, are termed *quaternary ammonium bases.*

The above method of preparation of the amines and the substituted ammonium salts may also serve in determining the nature of an amine. An example will render this clear: an amine found in herring-brine has the molecular formula C_3H_9N; is it the primary amine $C_3H_7NH_2$ (propyl-amine), or the tertiary amine $(CH_3)_3N$ (tri-methyl-amine)? To answer this question the amine may be treated with methyl iodide, and, when the reaction is completed, the resulting substance analyzed. The formation, as a final product of the reaction of the compound $C_5H_{12}NI$, proves that the substance C_3H_9N, found in herring-brine, is a tertiary amine $(CH_3)_3N$, for only one methyl group (CH_3) is required to transform it into the substituted ammonium iodide $C_4H_{12}NI$ $[(CH_3)_4NI]$; while if it were the primary amine, $C_3H_7NH_2$, the number of methyl-groups taken up would be three, and the compound $C_6H_{16}NI$ $[C_3H_7(CH_3)_3NI]$ would be formed. The number of groups, like methyl, ethyl, etc., taken up by an amine thus generally determines its nature.

The nature of amines is also shown by their behavior toward nitrous acid, the three subclasses of amines being characterized as follows:

1. Primary amines are converted by nitrous acid into the corresponding alcohols; thus, ethyl-amine is transformed into ethyl alcohol, according to the following chemical equation:

$$C_2H_5NH_2 + HNO_2 = C_2H_5OH + H_2O + N_2$$
Ethyl-amine · Nitrous acid · Ethyl alcohol

just as ammonia is transformed into water:

$$NH_3 + HNO_2 = H_2O + H_2O + N_2$$
Ammonia · Nitrous acid · Water

2. Secondary amines are converted by nitrous acid into compounds containing the group NO, and called *nitroso-amines;* thus, di-ethyl-amine, $(C_2H_5)_2NH$, is transformed into ethyl-nitroso-amine, according to the following equation:

$$(C_2H_5)_2NH + HNO_2 = (C_2H_5)_2N.NO + H_2O$$
Di-ethyl-amine · Ethyl-nitroso-amine

3. Tertiary amines are not affected by nitrous acid.

It has been stated above that when ethyl-iodide or similar substances are treated with ammonia, four reactions take place simultaneously, and a mixture of four compounds is obtained: viz., the salts of a primary, a secondary, and a tertiary amine, and a substituted ammonium iodide. The separation of the four compounds may be effected by the following method: 1. The mixture is distilled with caustic potash, which leaves the substituted ammonium iodide undecomposed as a residue, while the salts of the three amines are decomposed, and a mixture of the amines in the free state passes over in the distillate. 2. When the distillate is treated with ethyl-oxalate, the primary amine (say, ethyl-amine) is converted into a derivative of *oxamide* (the di-amide of oxalic acid, $\left|\begin{matrix}CONH_2\\CONH_2\end{matrix}\right.$), according to the following equation:

$$2C_2H_5NH_2 + \left|\begin{matrix}COOC_2H_5\\COOC_2H_5\end{matrix}\right. = \left|\begin{matrix}CONHC_2H_5\\CONHC_2H_5\end{matrix}\right. + 2C_2H_5OH;$$
Ethyl-amine · Ethyl-oxalate · Ethyl-oxamide · Alcohol

while the secondary amine (say, di-ethyl-amine) is converted into a derivative of *oxamic acid* (the mono-amide of oxalic acid, $\left|\begin{matrix}CONH_2\\COOH\end{matrix}\right.$), according to the following equation:

$$(C_2H_5)_2NH + \left|\begin{matrix}COOC_2H_5\\COOC_2H_5\end{matrix}\right. = \left|\begin{matrix}CON(C_2H_5)_2\\COOC_2H_5\end{matrix}\right. + C_2H_5OH;$$
Di-ethyl-amine · Ethyl-oxalate · Ethyl-di-ethyl-oxamate · Alcohol

the tertiary amine is not affected by treatment with ethyl-oxalate, and as it is much more volatile than both ethyl-oxamide and ethyl-di-ethyl-oxamate, it may be readily separated from these compounds by distillation. Finally, the two compounds derived respectively from the primary and secondary amines may be readily separated, since ethyl-oxamide is solid, while ethyl-di-ethyl-oxamate remains liquid on cooling the mixture. The primary and the secondary amines may be obtained separately in the free state by distilling the substances thus separated with caustic potash, the reactions taking place, respectively, according to the following two equations:

$$\begin{matrix}\mathrm{CONHC_2H_5}\\ |\\ \mathrm{CONHC_2H_5}\end{matrix} + 2\mathrm{KOH} = 2\mathrm{C_2H_5NH_2} + \mathrm{K_2C_2O_4}$$

Ethyl-oxamide — Ethyl-amine — Potassium oxalate

$$\begin{matrix}\mathrm{CON(C_2H_5)_2}\\ |\\ \mathrm{COOC_2H_5}\end{matrix} + 2\mathrm{KOH} = (\mathrm{C_2H_5})_2\mathrm{NH} + \mathrm{K_2C_2O_4} + \mathrm{C_2H_5OH}$$

Ethyl-di-ethyl-oxamate — Di-ethyl-amine — Potassium oxalate — Alcohol

The amines are much more powerful bases than ammonia. Their odor resembles that of ammonia, from which, however, the gaseous amines may be readily distinguished by their inflammability. Many liquid and solid amines, too, have been obtained. All of the amines known have been made by artificial chemical processes, and certain amines are found among the products of decomposition of nitrogenous substances. The quaternary ammonium bases (such as tetra-ethyl-ammonium-hydroxide) are similar, and even more powerful in their action than caustic potash.

Amines containing a benzene-nucleus are classed with the so-called aromatic compounds of organic chemistry and are subdivided into *amido-compounds* and *aromatic amines* proper, according as their nitrogen is linked to the nucleus immediately, or through the medium of CH_2-groups. Ordinary aniline is an example of amido-compound, its formula being $C_6H_5NH_2$. Benzylamine, $C_6H_5CH_2NH_2$, is a true aromatic amine. The aromatic amido-compounds undergo an interesting transformation when treated with nitrous acid in the cold, the resulting substances being known as *diazo-compounds* (q.v.).

AMINO-ACIDS. See Polypeptides.

AMIN'TA. A celebrated pastoral play by Torquato Tasso, produced at Ferrara in 1573. It is an allegory, presenting the characters of the court where Tasso lived.

AMINTE, ä'măNt'. 1. In Molière's *Les précieuses ridicules* (q.v.), the sentimental name taken by the girl Cathos. 2. A character in Molière's *L'Amour médecin.*

AMIN'TOR. The hero of Beaumont and Fletcher's *Maid's Tragedy* (q.v.), a young nobleman who, though betrothed to Aspatia, yet by the King's command marries Evadne, the heroine.

AMIOT, ä'myō'. See Amyot.

AMIRANTE, ăm'ĭ-rănt', or **AD'MIRAL, IS'LANDS.** A group of islets in the Indian Ocean in lat. 5° S. and long. 53° E. (Map: Africa, K 5). They are of coral formation, belong to Great Britain, and are dependencies of the Seychelles. All the islands are fertile, and the small population is engaged in agriculture and fishing.

AMIS ET AMILES, ä'mē' zā ä'mēl', also called Amis et Amiloun. A *chanson de geste,* dating from the twelfth or thirteenth century. It consists of about 3500 verses, chiefly decasyllabic. Amis and Amiles are two noble knights whose close resemblance and whose friendship and mutual sacrifices are the theme of the poem. They first escape the machinations of the treacherous Hardré while in the service of Charlemagne, whose niece is given in marriage to Amis. Bellicent, the Emperor's daughter, loves Amiles, who is thereby brought into great peril, but he is rescued by Amis and obtains the princess. Amis, however, in fighting in place of his friend, has had to perjure himself. For this he is punished with leprosy, of which at last he is cured by the blood of Amiles's two sons, voluntarily sacrificed by their father. These then are miraculously restored to life.

AM'ISH CHURCH, The. See Mennonites.

AMISH CHURCH, The Old. See Mennonites.

AMISTAD (ä'mē'städ') **CASE,** The. A case before the United States Supreme Court involving the legal status of kidnapped negroes. In 1839 some slaves recently kidnapped from Africa, who were being carried from Havana to Puerto Príncipe, Cuba, in the Spanish schooner *Amistad,* killed two of the crew, the others escaping, and ordered two whites, their owners, whose lives they spared, to steer the vessel to Africa. The latter steered north instead, and in August the vessel was captured off Long Island by a United States warship. President Van Buren wished to surrender the negroes to the Spanish government, in accordance with the treaty of 1795, as "property rescued from pirates"; but the Supreme Court finally decided (in March, 1841) that the blacks, having been originally kidnapped, were by international law, which then prohibited the slave trade, free men. The case was argued before the Supreme Court with great ability by John Quincy Adams and aroused much excitement throughout the country, especially among the radical abolitionists, who advocated violent measures to secure the release of the negroes. Consult: Peters, *Reports of United States Supreme Court XV* (Washington, 1828–43); Barber, *History of the Amistad Captives;* an interesting article in vol. xxii (N.S.) of *The New England Magazine* (Boston, 1900); *Executive Document 185,* 26th Congress, 1st session.

AMITE, ä-mēt'. A town and the parish-seat of Tangipahoa parish, La., 68 miles northwest of New Orleans, on the Illinois Central Railroad, and on the Tangipahoa River (Map: Louisiana, E 3). It is the centre of a prosperous agricultural community, producing fruit, vegetables, corn, and cotton. Numerous artesian wells are used for irrigation. Amite was almost destroyed by a cyclone in 1908 and was rebuilt in less than a year. Pop., 1900, 1547; 1913 (est.), 2200.

AM'ITO'SIS (Gk. *á, a,* priv. + *mítos, mitos,* a thread of the warp). A division (rare) of the animal or plant cell by simple constriction without the formation of nuclear figures. See Cell; Mitosis.

AMITYVILLE. A village in Suffolk Co., N. Y., 33 miles by rail east of New York City, on the Long Island Railroad (Map: New York, B 3). It is on the south shore of Long Island, on Great South Bay, and the excellent bathing, boating, and fishing facilities make it a popu-

lar summer resort and place of residence. There are sanitariums, an infirmary, an academy, and several club buildings. Pop., 1890, 2293; 1900, 2038; 1910, 2517; 1913, 2850.

AM'LET, Dick, or Richard. In Vanbrugh's play, *The Confederacy* (q.v.), the dissipated son of a vulgar old woman, who is proud of him and gives him money with which to play the fine gentleman. His breeding betrays itself, however, and he marries the daughter of Grife the Scrivener.

AM'LETH, or Hamleth. Prince of Jutland, supposed to have lived in the second century B.C. According to Saxo Grammaticus, he was the son of Horvendill and Gerutha; and after the murder of his father by his uncle Fengo, who married Gerutha, he feigned himself a fool to save his own life. Saxo relates a number of little things regarding Amleth, which are a curious medley of sharp and lively observation and apparent madness. We are told that, on one occasion, when he visited his mother, suspecting that he was watched, he began to crow like a cock and dance idiotically about the apartment, until he discovered, hidden in a heap of straw, a spy in the person of one of Fengo's courtiers, whom he immediately stabbed; he then so terrified his mother by his reproaches, that she promised to aid him in his intended revenge on his father's murderer, and, according to the old chronicler, really did so. Scandinavian traditions confirm the existence of a prince of this name. In the vicinity of Elsinore is shown a suspiciously modern-looking pile of stones, which bears the name of Hamlet's grave. Saxo himself does not mention the manner or circumstances of Amleth's death; but the French translator, Belleforest, says, in his *Histoires tragiques* (1564), that he was murdered at a banquet. Most of the recent historians of Denmark consider the history of Amleth fabulous. As the ultimate source of Shakespeare's tragedy of *Hamlet*, it possesses a perennial interest for all the civilized world. There are two Hamlet sagas in Icelandic, one of which, the romantic *Ambales Saga*, has been edited and translated, with an introductory essay, by I. Gollancz (1898).

AM'LWCH, ăm'lŭk. A seaport town of Anglesey, North Wales, on the northern coast of the island, 14 miles northwest of Beaumaris (Map: Wales, B 3). It is a busy but rather dirty town, and derived its importance and wealth almost entirely from the rich Parys and Mona copper mines in the vicinity. Copper-smelting was carried on extensively in Amlwch, but this industry has died down considerably. A harbor, capable of receiving vessels of 600 tons burden, was formed by excavation out of the solid slate rock, at the expense of the mining companies. Some slate is quarried, and there are iron foundries and tobacco and fertilizer works. Pop., 1891, 5400; 1901, 5300; 1911, 4837.

AM'MAN. See Rabbah.

AMMAN, Jobst (Jost, Jos, Justus) (1539–91). A German engraver and designer of the Renaissance. He was born at Zürich, the son of a professor, and grew up in the cultured circle about Zwingli. His teachers in art are unknown, but his earliest independent work is certain designs for stained glasses, executed in Basel (1557) and now in the Museum there. In 1561 he was at Nuremberg, probably in the atelier of the engraver Virgil Solis, whom he succeeded as illustrator for the publisher Feyerabend. For the latter he designed the wood cuts for the Frankfort *Bible* of 1565 and the etchings for Frunsberger's *Kriegsbuch* (1573). In 1577 he became a citizen of Nuremberg, where he was held in the highest honor by distinguished contemporaries. They hailed him "absolutissimus pictor" and as the Apelles of his day, but modern criticism takes a less exalted view. His drawing is indeed fair, his execution spirited, his manner neat and decided; but his elongated figures are often mannered, and the enormous volume of his work, necessitated by financial straits, injuriously affected its quality. But considered as illustrations, his thousands of drawings are charming and interesting in the extreme. They show a rich, full knowledge of life, a sparkling humor, and form an incomparable source of the history of civilization. His aquarelles and wash drawings are of particular charm. Some are family trees and family books of Nuremberg patricians, still in private possession there; others are taken directly from life, like "The Entrance of Emperor Maximilian II into Nuremberg," containing 450 figures, in the cabinet of prints in Munich, which possesses other fine examples. But of greatest importance are his drawings for wood cuts, through which he exercised the widest popular influence of any artist of his day. He drew directly on the wood, and sometimes even cut the engravings himself, as in the *Kartenspielbuch* (1588). Of special importance are the 115 wood cuts of the arts and trades, with text by Hans Sachs (Frankfort, 1568), and his *Book of Hunting* (1584). His best etchings are in Jamnitzer's *Book of Perspective* (1568). Consult Ammann, *Geschichte der Familie Amman von Zürich* (Zürich, 1904), and Andresen, *Der deutsche Peintre-Graveur* (Leipzig, 1864–66).

AMMAN, Johann Konrad (1669–1724). A Swiss physician and one of the earliest writers on the instruction of the deaf and dumb. In his work, *Surdus Loquens* (1692), he describes the process employed by him in teaching, which consisted principally in fixing the attention of the pupils on the motions of his lips and larynx while he spoke and inducing them to imitate him until they could utter distinct words. He practiced in Holland.

AMMANATI, ăm'mâ-nä'tê, Bartolommeo (1511–92). An Italian architect and sculptor, born at Settignamo; one of the foremost artists of the late Renaissance, at first a pupil of Baccio Bandinelli, and afterward, at Venice, of Sansovino, whom he assisted in connection with the Library of St. Mark. On his return to Florence he came under the influence of Michelangelo's Medici Sacristy sculptures. Like other sculptors of his time, he was much influenced by the discovery of the Farnese Hercules in 1540. He went to Rome and collaborated with Vignola at the Villa of Pope Julius III. He returned to Florence in 1557, became architect of Cosmo de' Medici, and devoted himself thenceforth to the beautifying of his native city. His Santa Trinità Bridge, several fountains, and small private palaces (Pucci, Giugni) are successful; but his great courts of the Pitti Palace and Santo Spirito are less commendable; in the first-named he sought to combine the massive rustications of Brunelleschi's front of the same palace with the classic orders, inspired perhaps by Sammichele's fortified city gates at Verona. He afterward redeemed himself in the simpler court of the Collegio Romano at Rome (1582), and in the Ruspoli Palace (1586).

AM'MEN, Daniel (1820–98). An American naval officer. He was born in Brown Co., Ohio, entered the naval service as midshipman in 1836, and by successive promotions rose to the rank of rear-admiral in 1877. He took part in the Wilkes exploring expedition (1838–42) and in 1853 on an expedition to the Paraguay River. In 1861–62, and again in 1863–64, he served in Admiral Dupont's blockading squadron, and as commander of the gunboat *Seneca* participated in the reduction of Port Royal (Nov. 7, 1861), and took command of the forts after their surrender. He commanded the monitor *Patapsco* before Fort Macallister (March 3, 1863), and before Fort Sumter (April 7, 1863); and in the two attacks on Fort Fisher (December, 1864, and January, 1865), was in command of the *Mohican*. He served as chief of the Bureau of Yards and Docks from 1869 to 1871 and of the Bureau of Navigation from 1871 to 1878, when he retired to private life. He designed the "Ammen life raft" and the ram *Katahdin* and wrote *The American Inter-Oceanic Ship Canal Question* (1880); *The Atlantic Coast* (1883), a discriminating account, from the standpoint of a naval specialist, of the operations of the Federal navy along the Atlantic coast during the Civil War; *Country Homes and their Improvement;* and *The Old Navy and the New* (1891).

AMMERGAU (ăm'mẽr-gou) **MYSTERY.** See Passion Play.

AM'METER, or **AMPERE'METER** (*ampère* + Gk. *μέτρον, metron,* measure). An instrument which is used to measure the intensity of an electric current and which indicates this quantity directly in amperes (q.v.). Ammeters are constructed in numerous forms, which are based for the most part on the galvanometer (q.v.), on the intensity of attraction for soft iron exerted by a hollow coil of wire carrying a current, or on the electro-dynamometer. As the galvanometer is used to detect and measure minute currents, so the ammeter is employed in testing and engineering to indicate large currents, and to enable an observer to read directly in amperes the current flowing at any instant in a circuit. A good form of ammeter is the Weston instrument, made in the United States and used all over the world. It consists of a voltmeter (q.v.), or portable galvanometer, whose movable coil is connected in parallel with a low resistance formed by one or more copper wires. As the current in a circuit depends upon the fall in potential across a constant resistance (in this case the copper wire), the operation of the instrument will readily be seen. Numerous other forms of ammeters are constructed, the simplest of which consist of a coil of wire through which the current passes, inclosing a soft iron core suspended by a spring. The amount that this core is attracted is indicated by a pointer on a scale, which can be made regular by constructing the core of suitable shape. In other ammeters a magnetic needle is placed between the poles of a strong permanent magnet and is surrounded by coils through which the current passes. This current in passing deflects the needle by an amount depending upon its intensity. The dynamometer or some modification of it, is often used to measure alternating currents and consists of two coils, one of which is free to revolve against the action of a spring. When the current passes through the two coils, which are normally at right angles, there is a tendency for the movable coil to take a position parallel to the other, and the amount of motion depends upon the intensity of the current.

AM'MIA'NUS MAR'CELLI'NUS. The last Latin historian of the Roman Empire. He flourished in the latter half of the fourth century and wrote a history of Rome from the accession of Nerva (96) to the death of Valens (378), designed as a continuation of the histories of Tacitus; the work was called, apparently, *Rerum Gestarum a Fine Corneli Taciti Libri.* When complete, it was in 31 books, of which only 18 (14–31) are extant, covering the last 25 years of contemporaneous history (353–378). Ammianus Marcellinus was himself a Greek, born of good family, at Antioch; but he had served for years in the army, and had risen to rank in the Eastern and Gothic campaigns before he settled down in Rome to a quiet and studious life. His book is of great importance as the conscientious work of an experienced man; but the Latin is rude, and the style is heavy and dull. The account of the events of Julian's reign is especially valuable. The edition by Gardthausen (Leipzig, 1875), long standard, has now been supplanted by that of an American scholar, C. U. Clark (Berlin, 1910). Consult also A. M. Harmon, "The Clausula in Ammianus Marcellinus," *Transactions of the Connecticut Academy of Arts and Sciences,* vol. xvi, pp. 119–245 (1910), a study of the rhythm that characterized Ammianus's prose. There is an English translation by C. D. Yonge, in Bohn's *Classical Library* (London, 1862).

AMMIRATO, ăm'mê-rä'tô, Scipione (1531–1601). An Italian historian of some merit. He was born in Lecce, in the kingdom of Naples, and after living in Venice, Rome, and Naples, settled at Florence. In Venice he aided in editing an edition of Ariosto. His reputation, however, rests mainly upon his *Istorie fiorentine,* which in 1570 he was commissioned to write by the Grand Duke Cosimo I, and which covers the history of Tuscany from the earliest times down to 1574. It shows distinct ability and historical acumen and is based upon original documents and other authentic sources. First complete edition, Florence, 1641–47; best modern reprint, Turin, 1859. He wrote also some discourses on Tacitus, and genealogies of the Florentine and Neapolitan families. In 1595 he was made a canon of the cathedral of Florence.

AM'MON. An Egyptian deity. His name (Egyptian *Amon,* later *Amûn*) was explained by the priests as meaning 'the hidden,' 'mysterious'; but this etymology is not reliable. Originally Ammon was merely the local god of Thebes; but after the Theban dynasties became rulers of all Egypt (beginning with the eighteenth dynasty, about 1600 B.C.), he became the official head of the pantheon and national deity of Egypt. His worship spread throughout Ethiopia and Libya, and he had a famous oracle in the Libyan Desert. The Greeks identified him with their supreme god Zeus, and named Thebes, his original seat of worship, Diospolis. In the Old Testament the city is called No-Amon, 'The City of Ammon.'

Although not originally a solar divinity, later theological schools ascribed a solar character to this god, and he was called Ammon-Rê, i.e., 'Ammon the Sun.' In his statues Ammon is generally represented in human form, with skin of a

bluish tint, and wearing a peculiar headdress, from which rise two immense feathers, while a long and narrow band hangs down behind. He often appears in the form of his sacred animal, the ram, or as a ram with a man's head. Among the Greeks and Romans, the Libyan type, with a human head bearing a ram's horns, became popular. For illustration, see EGYPT. See ANDROMEDA.

AMMON, OTTO (1842—). A German anthropologist and editor. He was born at Karlsruhe and was educated as a civil engineer, which profession he followed from 1863 to 1868. He then became a publisher and editor, but in 1883 began to devote himself to literary work and afterward made several important contributions to sociological and anthropological literature. He was the discoverer of the so-called "Ammon's law," that the Teutonic race betrays almost everywhere a marked tendency toward city life, which he has demonstrated in a series of interesting measurements of the physical characteristics, especially of the head, of thousands of conscripts in the Baden army, showing radical differences between the form of the head in city and country and between the upper and lower classes in the larger towns. His chief works are: *Die natürliche Auslese beim Menschen* (Jena, 1893); *Die Gesellschaftsordnung und ihre natürlichen Grundlagen* (June, 1895; 3d ed., Jena, 1900). *Zur Anthropologie des Badenes* (Jena, 1899); and important articles as follows: "Die Geschichte einer Idee," *Rundschau* (Berlin, 1896), on the physical types of city populations; "Der Abänderungsspielraum," *Naturwissenschaftliche Wochenschrift* (Berlin, 1896); "Die Menschenrassen in Europa," *Rundschau* (Berlin, 1896); *Die Körpergrösse der Wehrpflichtigen in Baden, 1840–64* (Karlsruhe, 1849); *Anthropoligische Untersuchungen der Wehrpflichtigen in Baden* (1890).

AMMO'NIA. See ANTIDOTE.

AMMONIA (Gk. ἀμμωνιακόν, *ammōniakon*, rock-salt), NH_3. A colorless, pungent, combustible, gaseous compound of nitrogen and hydrogen. It was known to the ancients as volatile alkali and is said to have been called *vehement odor* by Pliny. Its name is believed to be derived from Zeus Ammon, near whose temple in Libya, Upper Africa, it was first produced by burning camels' dung. Others derive it from Ammonia, a Cyrenaic territory. In 1774 Priestley obtained it by boiling its aqueous solution and collecting the gas, which he termed *alkaline air*, over the mercurial pneumatic trough. Scheele showed that it contained nitrogen, and Berthollet, in 1785, demonstrated its composition. Free ammonia does not occur in nature, but its salts are found in the atmosphere and in rain-water, in mineral and sea waters, in most plants, and as a product of the decay of nitrogenous organic bodies.

It may be made by heating ammonium chloride with lime. The principal commercial source of ammonia has until recently been from the destructive distillation of coal in gas making. In the distillation of coal in a retort, there is obtained, first, illuminating gas, and, secondly, a liquor which contains ammonia. Allowing this liquid to settle, the aqueous portion separates, from which free ammonia is first expelled by means of steam, after which the liquor is treated with lime and further steam to expel the fixed ammonia. The steam, ammonia, and other gases are passed through strong sulphuric acid in lead tanks, and the crystals of ammonium sulphate which then form are removed from time to time by means of ladles, while the free ammonia is collected in water yielding aqueous ammonia or hartshorn, a transparent, colorless, alkaline liquid with an acrid, caustic taste and pungent odor. When exposed to the air, it loses ammonia, and when reduced to minus 40° C. it freezes.

On account of its nitrogen content, ammonia, in the form of its salts, is an extremely important ingredient of artificial fertilizers. The world's demand for nitrogenous fertilizers is rapidly growing, and the consumption in 1911 amounted to $190,000,000. The value, therefore, of an industrial method for making ammonia artificially (synthetically) from hydrogen, which is a by-product in many industries and can be obtained cheaply, and from nitrogen, of which the atmosphere contains an unlimited supply, promises to be very great. Such a synthetic process has been invented by Professor Haber (q.v.) of Berlin and Dr. Carl Bosch of the *Badische Anilin und Soda Fabrik*, and is now used on an industrial scale. It has long been known that minute quantities of ammonia are produced by the silent discharge or by a series of electric sparks in a mixture of hydrogen and nitrogen. In 1881 minute traces of ammonia were obtained by Johnson, by passing a mixture of the component gases over spongy platinum. But the history of the new synthetic ammonia industry commences really in 1904, when Haber and Van Oozdt undertook a purely scientific study of the subject. Many reactions are known which do not proceed to completion. For example, if we should mix 60 grams of acetic acid with 46 grams of alcohol and allow the mixture to stand for an indefinite period of time, 40 grams of the acid would combine with 30⅔ grams of the alcohol, and there the reaction would stop. In scientific language one would say, "The reaction has reached equilibrium" (for the theory of chemical equilibria, see REACTION). Haber undertook an investigation of the chemical equilibrium of the combination of hydrogen and nitrogen. But while the combination of acid and alcohol just referred to stops after no less than 67 per cent of the substances have combined, Haber found that the combination of hydrogen and nitrogen stops after only 0.02 per cent have combined. In other words, for every 100 parts of ammonia that should have been obtained if the reaction proceeded to completion, only 0.02 parts were actually obtained on account of the reaction reaching an inconvenient equilibrium. In 1908 Haber and Le Rossignol found that even that small yield had been overestimated, and so on the face of it the manufacture of synthetic ammonia appeared to be a dream. And yet four years later, in 1912, the building of a large industrial plant for the manufacture of synthetic ammonia was begun at Oppau, near Ludwigshafen-on-the-Rhine in Germany.

The general theory of chemical equilibria permits of foreseeing that the equilibrium of hydrogen and nitrogen combination would be greatly influenced by the temperature at which the reaction takes place, and that the lower the temperature the greater would be the percentage yield of ammonia. The case of ammonia is, therefore, quite similar to that of sulphuric acid, for here too the yield of sulphur trioxide from a given quantity of sulphur dioxide and

oxygen is the greater the lower the temperature. Another prediction of the theory of chemical equilibria is that the yield of ammonia will be the better the greater the pressure under which the components are caused to combine. Experiment soon confirmed the correctness of both of these theoretical deductions. Thus, at 800° C. (1472° F.) and under a pressure of one atmosphere the yield of ammonia was only 0.01 per cent, while at 500° C. (932° F.) the yield rose to 0.13 per cent. Again, when at 800° C. the pressure was raised from 1 to 100 atmospheres, the yield of ammonia rose from 0.01 to 1.1 per cent; and when the pressure was similarly increased at 500° C., the yield rose from 0.13 to *10.8 per cent.* The dream of the synthetic production of ammonia was thus turning into a reality. But there were still immense difficulties to overcome. In the first place, at temperatures low enough to give a good yield, the velocity of the reaction is impracticably small for commercial purposes. The only way to hasten a reaction without raising the temperature is to employ catalyzers. Theoretically the phenomena of catalysis are still, unfortunately, quite obscure (see CATALYSIS); hence, at this point the practical investigation, no longer guided by the light of scientific theory, must needs assume the form of a blind search. Thousands of trials were made, and a number of substances were found that greatly hastened the reaction. While platinum was found to be almost worthless, the similar metal osmium appeared as the best catalyzer of ammonia formation. However, this metal is too rare and costly to be of practical promise. But uranium, manganese, pure iron, and certain other cheap and readily procurable substances were found to be sufficiently powerful catalyzers, and it was further discovered that the admixture to them of traces of certain other substances (certain metals, caustic soda, lime, common salt, etc.), called "promoters," increased their catalytic power still further. On the other hand, the catalyzers, as well as the reacting gases themselves, must be all but absolutely free from certain impurities (sulphur, phosphorus, arsenic, and other metalloids) which act as powerful "poisons." Thus, the presence of only 0.01 per cent of sulphur in iron renders it useless as a catalyzer. The difficulty of preparing on an industrial scale substances of such extraordinary degree of purity, and of guarding against the veriest traces of impurity finding their way to the catalyzer and reacting gases during operation, discouraging as it seemed at first, was finally overcome. To-day the new industry, with its great promise for the future, stands as a monument of the ultimate practical utility to mankind of the abstract thought of "pure science."

Another promising method of making ammonia consists in the action of water or alkalies upon many nitrides (compounds of nitrogen with other elements), particularly the nitrides of calcium, aluminium, silicon, and titanium. Calcium nitride is readily produced by the action of nitrogen upon calcium carbide; the nitride of silicon is produced by the action of nitrogen and carbon upon silica (sand); etc. This method, too, is now used more or less on an industrial scale.

Dry ammonia can be liquefied by pressure, provided the temperature does not exceed 130° C. (266° F.), which is its "critical temperature." The liquid has a specific gravity of only 0.63 at 0° C. Its vapor pressure equals one atmosphere at —32° C., which is therefore its boiling point. In many ways liquid ammonia greatly resembles water. Thus its molecules, like those of water, are associated into complexes, its latent heat of vaporization is very high (see REFRIGERATION, the use of ammonia in the Carré and Linde processes for the production of artificial cold), and it exhibits many abnormalities of physico-chemical behavior similar to those of water. This suggested an investigation of liquid ammonia as a solvent. The study was taken up by E. C. Franklin with collaborators and yielded a variety of interesting results. For example, pure ammonia, like pure water, is a very poor conductor of the electric current. But when a salt is dissolved in it, the conductivity becomes very good, showing that salts are dissociated in ammonia as well as in water.

Ammonia gas is extremely soluble in water (one volume of water dissolves under certain conditions 700 to 800 volumes of the gas). The solution gives a "strongly alkaline" reaction with litmus, and yet ammonia, or rather its hydrate, ammonium hydroxide NH_4OH, existing in solution must be recognized as a very weak base. This is shown by the electrical conductivity of the solution being very small by comparison with a solution of sodium or potassium hydroxide, and also by the fact that these latter alkalies, when added to the solution of an ammonia salt, deprive this salt of its acid almost completely.

Ammonium sulphate, which is a white crystalline compound, is largely used both alone and in mixtures as an artificial fertilizer; it is also used in the manufacture of alum and in the preparation of other ammonium salts. Ammonium chloride, called also *sal ammoniac*, is used in pharmacy, in dyeing, and as a convenient source of ammonia. Ammonium carbonate, called also *sal volatile*, is used for scouring wool, for dyeing, and as a baking powder. Consult: Arnold, *Ammonia and Ammonia Compounds* (London, 1889); Lunge, *Coal Tar* (London, 1882); Berntheen, "Synthetic Ammonia" in *Transactions of the Eighth International Congress of Applied Chemistry*, vol. xxviii, p. 182 (New York, 1913); Haber and Van Oozdt, *Zeitschrift für anorganische chemie*, vol. xliii, p. 111 (1904); Haber and Le Rossignol, *Berichte der deutschen chemischen Gesellschaft*, vol. xl, p. 2144 (1907); Haber and Le Rossignol, *Zeitschrift für Elektrochemie*, vol. xiv, p. 181 (1908); Haber, *Zeitschrift für Elektrochemie*, vol. xvi, p. 244 (1910).

AMMO'NIAC (Lat. *ammoniacum*, Gk. ἀμμωνιακόν, *ammōniakon*, gum-ammoniac), or GUM AMMONIAC. A gum-resin, used medicinally in certain plasters. It is obtained from the *Dorema ammoniacum*, an umbelliferous plant found in Persia and Turkestan. The gum is made by drying the milky juice of the plant. It occurs in commerce either in tears, or in masses formed of them, but mixed with impurities. It is whitish, becoming yellow by exposure to the atmosphere, is softened by the heat of the hand, and has a peculiar heavy smell and a bitter taste.

AM'MONI'ACAL COP'PER CAR'BONATE. See FUNGICIDES.

AMMON'IFICA'TION. The term applied to the transformation of organic nitrogenous compounds into ammonia through the action of micro-organisms. See NITRIFICATION.

AM'MONITE (derived from *ammonia*). A trade name of a fertilizer rich in nitrogen (13 to 14 per cent), obtained largely from rendering establishments and beef-extract factories. It is practically identical with the "dried meat meal" or "azotin" found on the market as a fertilizer. See MANURES AND MANURING.

AMMONITES, ăm'mŏn-īts. A people allied to the Moabites, and also (though less closely) to the Israelites. According to Gen. xix. 38, they were descendants of Ben-Ammi, the son of Lot, and while this account is fanciful, there is no reason to doubt the relationship implied between Ammonites and Moabites. The Ammonites inhabited the country east of the Jordan, between the rivers Arnon and Jabbok, i.e., the desert country east of Gad. Their chief city was Rabbath Ammon (Deut. iii. 11; Ezek. xxi. 20), known as Philadelphia in the time of the Greek occupation and at present as Amman. The relation between the Ammonites and Israel was almost continuously hostile. Jephthah defeated them with great slaughter (Judg. xi. 4–33; xii. 28 may be a later interpolation); they were also overcome by Saul (1 Sam. xi. 1–11) and were subdued with great severity by Joab and David (2 Sam. xii. 26–31). A precious stone from the crown of the statue of Milkom, their god, which weighed a talent of gold, was placed on David's head, and the Ammonites were put to forced labor. After the disruption of Solomon's kingdom the Ammonites attacked Gilead, perhaps together with the Assyrians (2 Kings xv. 29; 1 Chron. v. 26), for which they are denounced by the prophets Amos (i. 13), Zephaniah (xxviii., xxix.), Jeremiah (xlix. 1–7), and Ezekiel (xxi. 28–32). In the days of Jehoshaphat the Ammonites made an abortive attempt to attack Judah (2 Chron. xx. 1–30), and later they were defeated by King Jotham (2 Chron. xxvii. 5). After the captivity an Ammonite, Tobiah, was among the enemies of Nehemiah, though he maintained friendly relations with the nobility and priesthood in Jerusalem (Neh. iv. 1–15; vi. 17; xiii. 4). In the days of Judas Maccabæus the Ammonites, together with their Syrian allies, were thoroughly routed by the Jews (1 Maccabees v. 6). Justin Martyr affirms that in his time (about 150 A.D.) the Ammonites were still numerous. The chief deity worshiped by the Ammonites was Milkom, which signifies 'king' (1 Kings xi. 5, 7–33), who bore the same relation to his people as Chemosh did to Moab and Yahwe to Israel. He was the natural protector to whom they looked for succor in distress. Of the rites of the Ammonites we know very little, but the worship was probably similar to that of the Moabites as well as to that of the Israelites in the early stages of their history. The Ammonitish language, likewise, was practically identical with Moabitish and ancient Hebrew, the differences between them being merely of a dialectical order. See the commentaries on Gen. xix. 38, by Dillmann, Delitzsch, Gunkel, Holzinger, Skinner, and Driver.

AMMONITES, ăm'ō-nī'tēz. A generic name given by Lamarck and L. von Buch to a group of tetrabranchiate cephalopod shells found in the Mesozoic rocks of Europe. A still earlier name applied to them by the alchemists and others of the Middle Ages was Cornu Ammonis, from a fancied resemblance to the horns of Zeus Ammon. The term "Ammonites" has, as a generic name, fallen into disuse, for more recent researches have shown that Von Buch's name included a large array of species that present characters not only of a generic but also of family rank. The name is, however, still used in a loose way to distinguish those Mesozoic cephalopods, with complicated suture lines, from the Palæozoic Goniatites with more simple sutures. Von Buch's three genera, Ammonites, Ceratites, and Goniatites, with their numerous species, have been broken up into a host of new generic terms, about 50 in number, and these latter have been grouped into about 90 families, all of which are included in the order Ammonoidea. For the structure of the shell, the distribution of the species, and the geological history of the group, see CEPHALOPODA.

AMMO'NIUM (from *ammonia*), NH_4. A chemical radicle composed of one atom of nitrogen and four atoms of hydrogen. This radicle or atomic group acts like the univalent elements sodium and potassium and is contained in ammoniacal salts. An amalgam, too, has been obtained in which it exists in direct combination with mercury. Ammonium amalgam is a pasty, lustrous, metal-like substance formed by passing an electric current through ammonium chloride in contact with mercury. It can also be obtained by the action of sodium amalgam (liquid) upon a strong aqueous solution of ammonium chloride: the sodium amalgam turns into ammonium amalgam and becomes rigid. It is an unstable body, which readily decomposes, giving off ammonia and hydrogen.

AMMO'NIUM. See SIWAH.

AMMONIUM SULPHATE. A high-grade nitrogenous fertilizer (about 20 per cent nitrogen), obtained largely as a by-product of gas works, coke ovens, etc. See MANURES AND MANURING.

AMMO'NIUS (Gk. Ἀμμώνιος, *Ammōnios*). An Alexandrian philosopher of the third century A.D., surnamed Saccas ('sack-carrier'), because, it is said, he had been a porter in his youth. He was of Christian parentage, but, according to his most eminent pupil, Plotinus, his studies led him to abandon Christianity for the old Greek religion; this is denied, however, by Eusebius and St. Jerome. Longinus says that as a philosopher he surpassed all his contemporaries; his teaching was directed chiefly toward harmonizing the doctrines of Plato and Aristotle, and through his disciples he became the founder of the Neo-Platonic school of philosophy. Among his pupils were Origen the Neo-Platonist, Origen the Christian, Longinus, Herennius, Theodosius, Antoninus, and Plotinus. Ammonius left no writings, but his esoteric teachings were spread by Origen and Herennius, and especially by Plotinus.

Ammonius was the name of several other learned men in the later periods of Greek history: Ammonius, a Peripatetic philosopher of the first century, the teacher of Plutarch, the first, so far as we know, to give to the teachings of Plato that religious-mystic coloring which became predominant later; Ammonius, a Christian philosopher of Alexandria in the third century, who wrote a work on the agreement of the teachings of Moses and Jesus, and composed a harmony of the Gospels; Ammonius, son of Hermeas, a Peripatetic philosopher of the fifth century A.D., disciple of Proclus and author of commentaries on Aristotle; Ammonius, the famous surgeon of Alexandria, who lived in the latter half of the first century B.C.—he first prac-

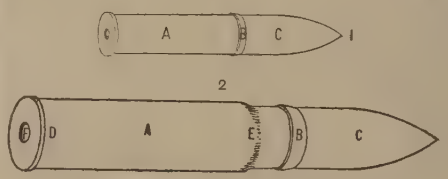
ticed lithotomy; Ammonius, the grammarian, pupil of Aristarchus, and his successor as head of the Alexandrian school.

AM'MONOID'EA. An order of tetrabranchiate cephalopods, equivalent in rank to the Nautiloidea. It contains more than 5000 species, all of which are extinct and found in a fossil state in marine rocks of Devonian and Carboniferous, and abundantly in those of Mesozoic age of all parts of the world. The form of the animal in this order is unknown; but from the structure of the shell it is supposed to have a form like that of its only living ally, the nautilus, though of a more delicate construction, and to have been a crawler instead of a swimmer. The shell is coiled in a single plane, with its apex in the centre of the coil, and it is usually compressed into a discoid. This discoid form is in some phylogerontic or senile types of Mesozoic Age changed to a turreted or irregular or straight shell. The 5000 species of the order are grouped under about 500 genera and some 98 families, according, chiefly, to the form and mode of development of the so-called suture lines, which are the lines of union of the internal septal walls with the inner wall of the shell. The order is of peculiar interest, in that, of all groups of animals, it furnishes the finest illustrations of evolution, and the laws of growth and decline, of ontogeny and phylogeny; in other words, of bioplastology. For more particular information and illustrations, see CEPHALOPODA.

AMMONOO'SUC, UPPER, LOWER, and WILD. The name of three rivers in New Hampshire. The UPPER AMMONOOSUC rises in the Randolph range of the White Mountains, flows to the north, then turns westward, draining an area of 252 square miles in Coos County, and empties into the Connecticut below Groveton (Map: New Hampshire, G 3). The LOWER AMMONOOSUC rises in the west slope of the Presidential Range in Coos County, flows westward, enters Grafton County, and then flows southwestward for a total length of nearly 100 miles, emptying into the Connecticut at Wells River (Map: New Hampshire, F 4). The WILD AMMONOOSUC flows into the Lower Ammonoosuc near Bath.

AMMOPH'ILA (Gk. *ἄμμος, ammos,* sand + *φίλος, philos,* friend, loving). A genus of grasses distinguished by a spike-like panicle and by the character of the glumes, which are nearly equal, keeled, longer than the paleæ of the single floret, and surrounded at the base by a tuft of hairs. *Ammophila arenaria* or *Ammophila arundinacea,* formerly called *Arundo arenaria*—a grass about two to three feet high, with rigid bluish leaves, the edges of which are rolled in, and creeping rootstocks—is frequent on sandy shores of Great Britain and the Continent of Europe. It is sometimes called beach grass, sea reed, or sand reed, and sometimes mat grass, because the culms are wrought into foot-mats, coverings for stairs, etc. It is also called *marram,* by which name it is designated in laws both English and Scottish, by which the destruction of it was prohibited under severe penalties, because of its great utility in fixing the shifting sand. In Holland and in Norfolk, as well as in the United States, it is extensively employed—along with the sea lyme grass (q.v.)—in preserving the banks of sand which prevent the inroads of the sea. It is of little value as food for cattle, although they eat the very young leaves. The fibre has been used instead of flax, but is too short. Beach grass has been used in the manufacture of paper of coarse quality.

AM'MUNI'TION (Fr. *amunition,* probably by wrong division of *la munition* into *l'amunition;* from Lat. *munire,* to fortify, defend). A term which embraces all the ordnance stores used in the actual firing of guns of every sort and calibre, and which includes gunpowder, projectiles, primers, and their accessories. When the powder, projectile, and primer are so combined in a single piece as to be ready for firing as soon as placed in the gun, the packages so formed are called *fixed ammunition;* the term is also extended to ammunition for large guns in which the powder is inclosed in a primed metallic case, but loaded separately from the projectile. This type is now very little used. In small arms the ammunition is invariably of the fixed type. For heavy guns the ammunition is almost universally fixed for calibres of less than four inches. Above this, the practice is not uniform in all countries or in all classes of



FIXED AMMUNITION—UNITED STATES NAVY.

1. One-pounder. 2. Six-pounder, three-inch and four-inch.

A. Brass cartridge case, bottle-necked at E.
B. Rotating band (copper).
C. Projectile.
D. Base of cartridge case.
E. Bottle-neck of cartridge case.
F. Primer.

guns. In the United States naval guns of 1899 and later models, fixed ammunition is used for calibres not exceeding four inches; guns of five-inch calibre on the recent battleships have charges in primed brass cartridge cases, but the projectile is not attached to it but is separately loaded into the gun. Some guns of five-inch calibre and all larger pieces have the charges put up in cartridge bags. A form of lock, which automatically ejects the primer, assists to make the loading with powder in bags about as rapid as if it were incased in metal. The metallic cartridge cases used for fixed ammunition are now generally made of hard drawn brass of the best quality, stamped from sheets or plates of varying thickness, depending upon the calibre of the gun for which they are designed. The circular disk cut from the sheet or plate is first given the form of a shallow cup and then drawn out and pressed into finished shape. The cases usually have a rim around the base, but some have a groove, called a *cannelure,* sunk into and surrounding the base; the chief use of both rim and cannelure is to enable the extractor to take hold of and extract the empty case after firing; but the rim also assists to hold the case in its proper position in the gun. The high velocity given the projectile in a modern gun entails the use of a relatively large charge of powder; to hold this, and to avoid undue length of case, which involves unnecessary weight and introduces difficulties in connection with vibrations and pressures,

the case is increased in diameter over the powder and drawn down to form a bottle-neck where it grips the projectile. No paper cases are used for military or naval arms, but the cases for the ammunition of breech-loading shot-guns have the cylindrical portion of cardboard or *papier-maché*, the base being of brass formed in the manner already described.

Gunpowder (see EXPLOSIVES; GUNPOWDER), the propelling force in all military weapons in general service, is put up, for guns of large calibre, in bags made of some sort of cloth, usually serge or silk. For convenience of handling, the charges are divided into sections when the weight of the full charge exceeds 100 pounds. Powder charges, when in bags, are stowed in water-tight copper tanks in compartments or buildings called magazines; on shipboard, magazines are placed below the water line, near the bottom of the ship, and as far away as practicable from the heat of boilers and engines, and are artificially cooled by refrigerating apparatus. Temperatures exceeding 90° F. injuriously affect the stability and ballistic qualities of the powder. Such temperatures do not render a well-made powder dangerous until long after its ballistic properties are ruined. Great care is also taken to keep hygrometric condition of magazines constant, as this is quite as important as the temperature in securing even combustion and pressures in the gun. In fortifications the magazines for war service are below ground or behind ample protections. Fixed ammunition is stored in rooms similar to magazines, as are also projectiles.

Powder charges, whether in metallic cases or in bags, are ignited by primers; these are of four types: percussion, friction, electric, and combination (percussion and electric). Percussion primers resemble miniature fixed ammunition; in the United States navy percussion primers are used only in one-inch, three-inch, and six-inch powder ship guns and in three-inch ship and field guns. They are about an inch long, one-fifth of an inch in diameter in the body, and enlarged considerably at the base; they contain 42 to 270 grains of fine powder in the body, and a primer cap in the head, which will ignite when struck by the firing pin of the gun lock. Friction primers are of the same shape and size, but are ignited by the friction caused by drawing a serrated strip of metal through the fulminate in the primer head. Their use in the United States navy has been discontinued, but they are still in some favor in other services. Electric primers differ from those already mentioned in being ignited by an electric spark instead of by friction or percussion. Single and double wire systems are employed; in guns which do not use fixed ammunition the current, furnished by a dry battery, or the dynamo, passes through a single insulated copper wire into the primer; there it encounters resistance in the shape of a bridge of platinum wire, and thence escapes through the metal of the primer to the gun and so to earth; in passing through the platinum bridge it heats the latter white hot and thus causes ignition. In guns using fixed ammunition, the electric primer is screwed or pressed into the base of the powder case; the current enters the primer through the electric primer connection, which is similar to the percussion firing pin, but is insulated in order to carry the current. The combination primer is the kind principally used in large guns of recent type in the United States navy. It is arranged to be fired either by percussion or electricity. Electric primers are also used, but to a less extent.

Ammunition Supply. Ammunition for the supply of the artillery of the United States land service may be divided into two classes: (1) ammunition supply for all sea-coast guns permanently mounted in fortifications; (2) the ammunition supply for the mobile army, including small arms, field artillery, heavy field artillery, and siege artillery, all of which accompany an army in the field. The supply for sea-coast guns is stored in magazines under the emplacements of the guns. For calibres up to and including 4.7-inch, fixed ammunition is used, while separate loading of charge and projectile takes place for calibres above 4.7-inch.

The ammunition supply for the mobile army includes ammunition for small arms (rifles, machine guns, and pistols) and ammunition for the field artillery, which in the United States includes the following calibres: 2.95-inch mountain gun, 3-inch field gun, 3.8-inch field howitzers. These all employ fixed ammunition, and the weights of projectiles are as follows: 12 lbs., 15 lbs., 30 lbs., respectively. Such artillery forms the divisional artillery, accompanying a division in the field. In addition, in the rear of a field army with the auxiliary troops, there are the 4.7-inch gun using fixed ammunition, and the 6-inch howitzer, with weights of projectiles, 60 lbs. and 120 lbs., respectively. These two arms are classed as heavy field or siege artillery, but are sufficiently mobile to accompany or follow an army in the field.

The question of maintaining a sufficient supply of ammunition has become one of increasing importance and difficulty, on account of the increasing demands for artillery support in battle, which demands have been met by recent improvements in ordnance affording greater rapidity of fire in both small arms and artillery. The supply of ammunition is maintained as follows: 1st. By *combat trains* composed of ammunition wagons (q.v.) which accompany battalions of infantry (two to each battalion) and squadrons of cavalry (one to each squadron), and caissons (12 to each battery) which accompany artillery to the vicinity of the fight. 2d. By *ammunition trains* which are held in rear to resupply the combat trains.

The ammunition of a normal division of about 18,000 men requires, for small arms, three wagon companies (81 wagons in all); for artillery, 2 wagon companies (54 caissons in all): a total of 135 wagons. In addition to this, the depots established in rear of the army must be kept supplied from arsenals in order to meet the rapid consumption of ammunition at the front. The ammunition and combat trains, with the ammunition carried on the person and on the guns, provide for 330 rounds per rifle and 464 rounds per gun.

The difficulty of devising practical methods and means of supplying a moving army composed of several divisions is apparent. In modern armies the study of this subject has been given the greatest attention.

The question of ammunition was one of the subjects of the Peace Congress held at The Hague in the summer of 1899, and strong recommendations were made to discountenance the use of explosive or expanding bullets. The English in the Sudan, and in smaller Indian punitive

expeditions, found that the smallness, shape, and velocity of a modern rifle bullet had not a sufficiently deterring effect on the charging masses of tribesmen, and frequently used the so-called dum-dum bullet, which is made of softer metal and expands on contact. During the Boer War dum-dum and explosive cartridges were frequently found after the various battles, each side charging the other with having used them. In modern wars the small, clean-cut wounds caused by the bullets of high-power rifles have been found fatal only in a small percentage of cases. Instances are frequent where men continued to fight for some time after being hit.

In England, and Europe generally, all government-made ammunition is manufactured at the government arsenals. See ARSENAL.

The word "ammunition" is still retained in the English services in its early English form, as pertaining to certain forms of military supplies; ammunition shoes, ammunition socks, ammunition bread, ammunition shirts, etc., as distinct from the same articles supplied from purely civil sources. See PROJECTILES; FUZE; PRIMER; CARTRIDGE; ORDNANCE; ARTILLERY; COAST ARTILLERY.

AMMUNITION CHESTS. Boxes containing ammunition, packed so as to be fitted for transport by either elephant, camel, bullock, packhorse, or mule; or in the case of horse and field artillery so arranged that the gunners may utilize them for seats or pack them in caissons. In the United States Field Artillery the words "ammunition chests" designate specifically the rectangular steel boxes permanently fastened to the limbers and caissons. The limber chest carries 36 rounds, the caisson chest 70 rounds, each round being provided with its own compartment. Seats for cannoneers are provided on the lids of these chests.

AMMUNITION WAG'ON. A specially built wagon for the safe and speedy transport of ammunition. The general use of rapid-fire rifles and guns has made the question of suitable wagons, capable of carrying the large quantities of ammunition demanded by modern arms and warfare, one of the most important features of a campaign. Such wagons need great strength, easy draught, flexibility, and adjusted balance. They must also be so arranged that the shells and fuses are held firmly in place. In the United States army vehicles carrying artillery ammunition assigned to batteries are called caissons. Twelve caissons accompany each battery of four guns. Two ammunition wagons carrying small-arm cartridges accompany each battalion of infantry. Only one such wagon is assigned to a squadron of cavalry. See AMMUNITION.

AMNESIA, ăm-nē'zhĭ-ȧ, loss of memory of words; sensory aphasia. Three clinical forms of amnesia are recognized, viz., simple loss of memory for words; word-blindness, or inability to comprehend written or printed words; and word deafness, loss of power to understand spoken words. Senile changes, injuries or tumors of the brain, some insanities, and even fatigue or the exhaustion of disease may cause amnesia. See APHASIA.

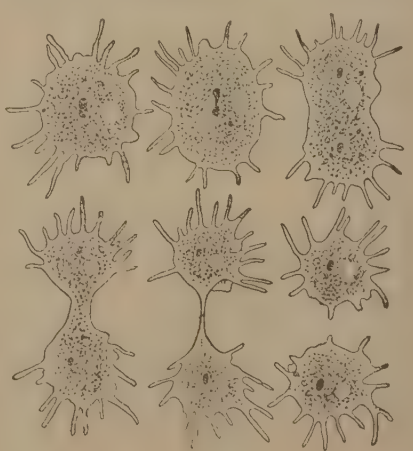
AM'NESTY (Gk. *ἀμνηστία, amnēstia,* forgetfulness, from Gk. *ἀ, a,* priv. + *μνᾶσθαι, mnasthai,* to remember). An act of State granting oblivion for past offenses, and generally employed where pardon (q.v.) is extended to whole classes or communities instead of to individuals before trial and conviction. The President may grant amnesty by a general proclamation for offenses against the United States, except in cases of impeachment; and the Supreme Court has held that Congress also may pass acts of general amnesty. (Brown *vs.* Walker, 161 U. S. 591, 1895.)

AMNESTY PROCLAMA'TION. An executive order issued by President Johnson, May 29, 1865, defining in exact legal form, and to some extent narrowing, the terms of general pardon granted by President Lincoln in 1863 to Confederates who took the oath of allegiance to the Constitution of the United States. Although several classes of men were especially excepted from this amnesty, the free use of the pardoning power by the President prevented proscriptions. In 1872 Congress passed an amnesty act of the broadest scope, pardoning practically every one who had taken part in the Civil War against the United States.

AM'NION (Gk. *ἀμνίον*). The membrane which immediately invests the embryo, appearing very early in the development of the latter and adhering closely to it. As gestation proceeds, this membrane secretes from its inner surface a fluid which separates it from the fœtus. This fluid, the *liquor amnii,* supports and at the same time gives free movement to the fœtus, preserves it from injury, and maintains around it an equable temperature; and later, during labor, becomes, with its inclosing membranes, an important dilator of the genital canal. See EMBRYOLOGY; CAUL.

AM'NIO'TA. See EMBRYOLOGY.

AMŒ'BA (Neo-Lat.; Gk. *ἀμοιβή, amoibē,* change, alternation). A microscopic animalcule or single-celled organism, classified among the lowest Protozoa, which inhabits fresh water or occasionally moist earth. It appears in water under great magnification as a clear, translucent, highly refracting body. It is made up of a substance that does not mix with water, is viscid like glue, and has a specific gravity a little greater than water, namely, about 1.015. Under the highest power of the microscope, particularly after death, the body is seen not



AMŒBA.

Beginning at the upper left-hand figure, the successive drawings show the progress of a division of an amœba through its nucleus into two.

to be perfectly homogeneous, but to be made up of films inclosing water-filled spaces. This structure may be imitated by making a fine mixture of oil and potassium carbonate and letting it stand in water. The potassium carbonate is hygroscopic, and eventually an emulsion is produced in which the oil stands to the water in the same relation that the protoplasmic films do to the water spaces. The cytoplasm is not all of the same kind. Near the centre is a specialized portion known as the nucleus, the protoplasm outside of which is called cytoplasm. Between nucleus and cytoplasm a constant interchange of material is taking place in the living cell, and the two parts are interdependent.

A living amœba under appropriate conditions exhibits a continual movement of the protoplasm. The very structure favors a constant movement, as witness the artificial emulsion, whose outline is constantly changing. In amœba processes (pseudopodia) are thrust out at certain points of the body, and others behind them are retracted, and thus a change occurs in the centre of the mass and locomotion is effected. Amœba is irritable, i.e., it is affected in a definite manner by external conditions; it "responds" to them by moving with reference to them. Without a stimulus there would probably be no movement at all. If the stimulus comes upon the organism from one side, it may move toward or from that side. Thus the amœba moves from the point of contact of a needle or from the source of light, or it moves so as to keep in water of a medium temperature. Thus we see that protoplasm early had the capacity of appreciating external conditions and moving with reference to them.

The amœba is, by its movements, constantly expending energy. Also, its plasma is undergoing constant destruction and must be reformed. Food here serves two purposes: (1) it serves as fuel; (2) it forms new protoplasm. There is no proper oral aperture, and the food is merely taken into the interior of the body by a process of intussusception—any portion of the surface being chosen for this purpose, and acting as an extemporaneous mouth. Sometimes the ingestion of food takes place chiefly at the posterior end of the body. When the particle of food has been received into the body, the aperture by which it was admitted again closes up, and the discharge of solid excreta is effected in an exactly similar but reverse manner. Food stuffs that are ingested become dissolved (digested) and penetrate the plasm films. Here they are burned (oxidized) and carbon dioxide, water, urea, and other substances are produced. These get back into the water spaces and are finally thrown out with the "contractile vacuole." This process is excretion. But in the plasma film, where the food stuff was burned, there is an increase of temperature. This heat is used in part in chemical work—in the building up of new living molecules from food stuffs. Here, then, is a great chemical laboratory in the protoplasm.

"The 'contractile vesicles' are cavities within the endosarc, of which ordinarily only one is present in the same individual, though there may be two or more. In position, the contractile vesicle, or 'pulsating vacuole,' as it is often called, is usually placed toward the hinder end of the body, as is also the nucleus."

Reproduction takes place by simple division, each amœba, as it reaches maximum size, splitting in two, as shown in the illustration. See CELL; PROTOZOA.

AM'ŒBE'AN VERS'ES (Gk. *ἀμοιβαῖος, amoibaios*, responsive, alternate). A species of pastoral poetry in which two persons answer each other alternately, as in some of the *Idyls* of Theocritus, the third, fifth, and seventh *Eclogues* of Vergil, the ninth ode of the third book of Horace's *Odes*, and in Catullus, 62. The first singer might select any theme and any form of verse; he might vary the theme at will. The other was bound to answer on the same or a kindred theme, to employ the same form of verse and the same number of verses, and yet in force and spirit to outdo the first. Poems of this sort presuppose skill in improvisation.

AMOL, ä-mōl'. A Persian town, in the province of Mazanderan, situated on both banks of the Heraz, a short distance from its fall into the Caspian Sea (Map: Persia, D 3). It contains fine bazaars and a number of ruins and old tombs, including that of Mir Bursuk, who died in Amol in 1378, and whose memory is held in great reverence by the natives. Pop., about 10,000.

AMOLE, ä-mō'lā. The Mexican name for soapwort (q.v.).

AMO'MUM (Lat. Gk. *ἄμωμον, amōmon*, an Indian spice-plant). A genus of about 55 species belonging to the family Zingiberaceæ, and natives of Asia, Africa, and Australia. Among them is the plant yielding cardamom and grains of paradise (q.v.).

AM'ON. A King of Judah (c.639–637 B.C.), son of Manasseh. After a short reign he fell a victim to a court intrigue. His death was avenged, and his son Josiah succeeded him on the throne. He was buried in the garden of Uzzah.

AMONTONS, ä'môn'tôn', GUILLAUME (1663–1705). A French physicist and inventor. He devoted himself to physical research, investigating the phenomena of friction and perfecting many instruments used in experimental philosophy. With the aid of the barometer he studied the variations of atmospheric pressure and, by the use of a thermometer of his own invention, discovered independently, though simultaneously with Halley, that the boiling point of water varies with the external pressure of the atmosphere and hence with the elevation. He also invented an ingenious method of telegraphic communication, a new hygrometer, etc. He wrote *Remarques et expériences physiques sur la construction d'une nouvelle clepsydre, sur les baromètres, les thermomètres, et les hygromètres* (1695), besides contributions to the *Mémoires* of the Académie des Sciences.

AMORES. See OVID.

AM'ORET. In Fletcher's *Faithful Shepherdess* (q.v.), a shepherdess betrothed to Perigot at the "Virtuous Well" and after many troubles, patiently borne, united to him.

A'MORET, or **AMORET'TA.** In Spenser's *Faerie Queene*, the twin sister of Belphœbe (q.v.), brought up by Venus and Psyche. She loves Sir Scudamore, but is imprisoned by the enchanter Busirane; in the end, however, she is happily married, appearing as the type of feminine affection.

AMORETTI, ä'mô-rĕt'tē, CARLO (1741–1816). An Italian naturalist and author. He was born near Genoa and died at Milan. He was a member of the order of St. Augustine, professor

of law at the University of Parma, and afterward curator of the Ambrosian Library at Milan. He is remembered chiefly for a good biography of Leonardo da Vinci (1784), and various treatises on natural science, including a study of the natural history and geography of lakes Como, Maggiore, and Lugano, entitled *A Journey from Milan to the Three Lakes* (1794).

AMORGOS, ȧ-môr'gŏs (Gk. *'Αμοργός*). The most easterly island of the Cyclades, Greece, having an area of 52 square miles, with its greatest length from northeast to southwest (Map: Greece, G 5). The island is crossed by a mountain range and yields olive oil, wine, fruit, and grain. Its chief town is Korax, or Chora, on the eastern coast. Amorgos was famous in antiquity for the fine quality of its flax. Pop., 1907, 2627. Consult H. Hauttecœur, "L'Île d'Amorgos," in *Bulletin de la Société royale belge de géographie,* vol. xxiii (Brussels, 1899), and J. Delamarre, "Amorgos," in *La Revue de Philologie,* vol. xxv (Paris, 1901).

AMORITES (Heb. *amorim,* Bab. *amurru,* Eg. *'mr,* probably *amur*). The name of a Semitic people in Syria and Babylonia. From the earliest times the inhabitants of Babylonia seem to have designated Syria as "the land of the Amorites." Lugalzaggisi of Erech, Sargon of Akkad, Gudea of Lagash, Gimil Sin of Ur, and the Elamitish King Kudur Mabuk speak of their expeditions against this country. It was chiefly northern Syria, including the Phœnician coast, that was reached by these raids. In the Amarna letters this district is also described as the land of the Amorites. Abd Ashirat and his son Aziru, who caused so much trouble to the Egyptian governors, were Amorites. From the tablets found by Winckler at Boghazkeui in Asia Minor, the ancient capital of the Hittite Empire, we know that Aziru, "king of the land of Amurru," was able to leave his throne to a line of descendants, Temen Teshub, Abi Teshub, and Bentashina, who ruled under Hittite suzerainty, in the city of Amur, probably Kadesh on the Orontes. Bentashina even made raids into Babylonia so far as the city of Akkad (see Accad), for which complaint is lodged with his over-lord, Hattushil. (See Hittites.) The Egyptian inscriptions of Seti I, Rameses II, and Rameses III inform us of the causes that led to the overthrow of the dynasty founded by Aziru. It went down before the attacks of the Peoples of the Sea. The Egyptian sovereignty which Aziru had exchanged for the Hittite was probably imposed on the Amorites as a result of the numerous campaigns waged against the powerful prince of Kadesh by Thothmes III (1501–1447 B.C.) in the land of Amur. The Assyrian kings Tiglath-Pileser I, Adadnirari III, Sargon II, and Sennacherib use as terms to denote Syria "the land of the Amorites" and "the land of the Hittites." According to Genesis xiv. there were Amorites in Hebron and Hazazon-Tamar (i.e., Engeddi) in the days of Amraphel and Abraham (c.2100 B.C.). At the time of the Hebrew invasion there were two Amoritish kingdoms east of the Jordan, those of Og in Bashan and Sihon in Heshbon, which were conquered (Num. xxi. 21 ff.). To the latter an old song refers which may go back to the time of the conquest (Num. xxi. 27–30). Amoritish city-kingdoms also existed in the West Jordan country against which the invaders fought, many of them succumbing only in the reign of David. They were gradually absorbed in Israel and Judah and are referred to in later times only as a people of the past that once possessed the land, along with Canaanites and others (e.g., Amos ii. 9, 10). The proper name of the chief god of the Amorites was Amur, and his consort was Ashirat.

Amorites also formed an element of the population of Babylonia. In fact, the first Babylonian dynasty, whose most famous king was Hammurapi (q.v.), was Amoritish. Many of the officials were Amorites. There was a secretary of the Amorites, as there was one of the Aramæans. Names compounded with that of their great god Amur are frequent, and men and women of "the children of the Amorite" appear in a contract. Whether these Amorites invaded Babylonia from the desert or came from Syria cannot yet be determined. Clay maintains that they brought from Syria to Babylon a high civilization. This is not capable of proof. But it is significant that the most powerful and brilliant of early Babylonian dynasties was Amoritish. Until recently the Amorites were known only through casual references to them in the Old Testament. The Hebrews themselves knew little of their early history. In the light of recent discoveries they are seen to have played a very important part in history. The old etymologies of their name 'the highlanders,' 'the tall ones,' have no value. Consult: Ed Meyer, *Geschichte des Altertums* (2d ed., 1909); Clay, *Amurru, the Home of the Northern Semites* (1909); Schmidt, *Messages of the Poets,* pp. 320 ff. (1911); Böhl, *Kanaanär und Hebräer,* pp. 31 ff. (1911). See Arabic Language and Literature.

AM'OROUS BIG'OT, The. A play by Thomas Shadwell, presented in 1690.

AMOR'PHA. See Indigo.

AMOR'TIZA'TION. The charging off or redeeming of capital investment in a plant or mine during the life of the property. Dividends on investments of limited life, such as mines, should be considered as interest on the investment plus the return of capital. When the dividends from a mine investment amount to 10 per cent, the life of the property must be 17.7 years to return the capital and 6 per cent interest on the investment providing the remaining 4 per cent of dividend is invested as received at 4 per cent interest. A dividend of 15 per cent when subdivided into 7 per cent income from investment and 8 per cent as return of capital requires, when the 8 per cent is reinvested at 4 per cent interest, 10.3 years for the entire return of the original investment.

A'MORY, Blanche. A character in Thackeray's *Pendennis* (q.v.), really named Betsy; an insincere and selfish girl, whose emotions are all shams.

AMORY, Robert (1842–1910). An American physician. He was born in Boston and studied medicine at Harvard and later in Paris and in Dublin. In 1869 he was made lecturer at Harvard College on the physiological action of drugs. He was also for some time professor of physiology at the Bowdoin Medical School. Besides a translation from the German of Russ's *Lectures on Physiology* (1875), Dr. Amory published a number of interesting papers on the physiological action of various chemical substances. He also wrote a volume on poisons, forming part of Wharton and Stillé's *Medical Jurisprudence.*

AMORY, Thomas (1691?–1788). An Irish author, called the "English Rabelais," and supposed by certain authorities to have been slightly

insane. He was the son of Counselor Amory, who was appointed by William III secretary for the foreign estates in Ireland. His birthplace is not known, but in 1757 he was living in seclusion in Westminster. It is supposed that he sketched portions of his own career in his *Life of John Buncle* (2 vols., 1756–66), which is a literary curiosity. A sketch of his life appeared in the *Saturday Review*, May 12, 1877.

AMORY, THOMAS COFFIN (1812–89). An American lawyer and author. He was born in Boston, Mass., and after graduating at Harvard (1830) held various posts in connection with the municipal government of Boston, and served in the State Legislature. In addition to official reports and addresses, his publications include the *Life of James Sullivan* (Boston, 1859); *Military Services and Public Life of Major-General John Sullivan* (Boston, 1868); *The Transfer of Erin, or The Acquisition of Ireland by England* (1877); pamphlets on subjects connected with the Revolutionary War, among which was a *Life of Sir Isaac Coffin* (1886), and numerous poems, of which the best known is *William Blackstone, Sole Inhabitant of Boston* (2d ed., 1877).

AMOS. A Hebrew prophet of the eighth century B.C., author of the biblical book which bears his name. According to his own statement he was not a prophet by profession, but a herdsman and tender of sycamore trees (i. 1; vii. 14). His home was at Tekoa, but it is not certain whether this place is in Judah, near Bethlehem, or in Israel. He prophesied during the reigns of Uzziah in Judah and Jeroboam II in Israel (about 750 B.C.). In a discourse at Bethel he denounced the moral delinquencies and foretold the punishment, first of several surrounding nations including Judah, then of Israel itself, on account of the various sins which had brought the anger of Yahwe upon the kingdom. For this he was taken severely to task by Amaziah, who charged him with delivering his oracles for money and asked him to go elsewhere and prophesy, which only brought upon the head of the chief priest at Bethel a still fiercer denunciation. The style of Amos is remarkable for its clearness and picturesque vigor and abounds with images taken from rural and pastoral life. While Amos is the first of the prophets who wrote as well as spoke, the editing of his prophecies belongs to a period long subsequent to his death. Hence modern critics have detected in them numerous additions, insertions, and changes, made by various hands. Amos ix. 8–15 seems very clearly to point to the exile, when the tent of David, i.e., the Davidic dynasty, had fallen, and the people were in special need of encouragement. For recent discussions of the problems involved, consult G. A. Smith, "The Twelve Prophets" in *The Expositor's Bible*, vol. i (New York, 1896–97); H. G. Mitchell, *Amos* (Boston, 1899); Driver, *Joel and Amos* (1897); the commentaries of Nowack (1903); Marti (1904); and W. R. Harper, *Amos and Hosea* (1905).

AMOS JUDD. A skillful story by J. A. Mitchell (q.v.) of Hindu mysticism in New England surroundings.

AMOSKEAG, ăm'ŏs-kĕg'. See MANCHESTER, NEW HAMPSHIRE.

AMOUR, L'. A novel by the famous French historian Jules Michelet (q.v.), published in 1859, when he was 61 years of age. It is devoted to the ideal of the family.

AMOY, ă-moi' (the local pronunciation of *Hai-mun*, or Gallery Gate). A Chinese city at the southern end of the island of the same name, in lat. 24° 28′ N., long. 118° 4′ E., in the province of Fukien (Map: China, E 7). The island of Haimun is 40 miles in circumference. It is opposite the centre of the island of Formosa, with which it carries on considerable trade. Its harbor is a fine one, and much of the trade to Chang-chu-fu on the Pei-chi (Dragon) River, at the mouth of which Amoy is situated, passes through this port. Amoy is the ancient centre of the tea trade. The Portuguese came here in 1644, but were expelled for their cruelty. The English traded here until 1730, when they were ordered to remove to Canton. Nearly all the tea brought to Boston harbor by the British ships in 1773 was from Amoy, in the neighborhood of which it was grown. All the tea now exported to the United States from Amoy is grown in Formosa and sent here for reshipment. Even this trade is being gradually lost since the harbor at Kelung, Formosa, has been deepened, and it is expected that it will be entirely ruined when the harbor improvements at Kelung and at Tamsui shall have been completed. The British treaty of 1842 made Amoy one of the five ports opened to foreign commerce, and the treaty of Tien-tsin in 1858 confirmed and extended the privilege. Amoy has long been the centre of flourishing Christian missions in Fukien. In 1882 a British engineer discovered coal and iron within 40 miles of Amoy, in an area of 50 square miles and within 20 miles of water traffic. The harbor is large, safe, and picturesque. There are three granite docks built by foreigners, an English church and club, and a daily newspaper. One hundred thousand emigrants pass through Amoy every year to Singapore, and about 25 per cent of those who leave the port do not return. It is estimated that over 2,500,000 of Amoy people were abroad in 1905. Four-fifths of the families have some members abroad, but for whose remittances the distress would be terrible. Pop., 1911, 114,000.

AM'PELIDA'CEÆ. See VITACEÆ.

AMPE'LIUS, LUCIUS. A Roman writer, who lived between the second and fourth centuries A.D. He was the author of a note-book, *Liber Memorialis*, which contained, in 50 chapters, a condensed and meagre summary of various astronomical, geographical, mythological, and historical writings. The *Liber* is, for the most part, too inaccurate for use as a work of reference, but it is valuable as the only ancient work which mentions the celebrated sculptures of Pergamus, discovered in 1878 and now at Berlin (see PERGAMON). It is usually appended to editions of Florus, and has been edited with notes by Beck (Leipzig, 1826). The best text is that of Wölfflin (Leipzig, 1853).

AM'PELOP'SIS (Gk. *ἄμπελος, ampelos*, vine + *ὄψις, opsis*, appearance). A genus of vine-like, woody plants much used for ornamental decoration of buildings. It includes the Virginia creeper, or American woodbine, and the Japanese ivy or Boston ivy, which is probably the favorite of all the hardy vines grown in cities in the eastern United States. It is especially effective for a considerable area from Massachusetts to Florida and on the Pacific coast, but north of the Ohio and west of the Mississippi River it is tender. In autumn the dying leaves of ampelopsis turn a most brilliant red and yellow. A single fossil species of this genus,

Ampelopsis tertiaria, has been recognized in the White River beds of the Tertiary in Wyoming.

AMPERE, ăm-pār′ (derived from the name of Ampère). The practical unit employed in measuring the intensity of an electric current, and technically defined as one-tenth of the C.G.S. electromagnetic unit (see ELECTRICAL UNITS) of current. By intensity of current is meant the quantity of electricity which passes any cross section of the wire or conductor in the course of one second of time. The current depends upon the resistance of, and the difference of potential at the ends of, the conductor, varying inversely as the former and directly as the latter. From Ohm's law that $C = \frac{E}{R}$, when C is the current, E the difference of potential, and R the resistance, we have amperes $= \frac{\text{volts}}{\text{ohms}}$. A current of electricity can do work in decomposing certain chemical substances into their respective elements; consequently, by measuring the amount of a substance so decomposed in unit time, we can ascertain the strength of the current. The ampere, accordingly, was defined by the London Conference of 1908 as the amount of a constant current which, when passed through a solution of nitrate of silver, in accordance with standard specifications, deposits silver at the rate of 0.001118 of a gram per second. The instrument used in such a determination is called a "silver voltameter" (q.v.). Within the past few years it has been proved that the quantity of silver deposited in a voltameter depends upon many conditions previously unsuspected, such as the age of the solution, the construction of the voltameter, etc. For full details as to our present knowledge of the subject, the reader should consult the *Bulletins* of the Bureau of Standards, Washington, D. C.

AMPÈRE′, ăm-pār′, ANDRÉ MARIE (1775–1836). A distinguished French physicist, mathematician, and naturalist, born at Lyons. The death of his father under the guillotine in 1793 made a deep and melancholy impression on the mind of the young man, and he sought solace in the study of nature and the Latin poets. In 1801, after he had been engaged for some time as private mathematical tutor at Lyons, he became professor of physics in the Central School of the department of Ain at Bourg. He was afterward professor of mathematics at Lyons. He was called to Paris, where he distinguished himself as an able teacher in the Polytechnic School. He began his career as an author by the essay on the mathematical theory of chances, *Sur la théorie mathématique du jeu* (Lyons, 1802). In 1814 he was elected a member of the Academy of Sciences and in 1824 was appointed professor of experimental physics in the Collège de France. Science is largely indebted to Ampère, especially for his electro-dynamic theory and his original views of the identity of electricity and magnetism, as given in his *Recueil d'observations électro-dynamiques* (Paris, 1822) and his *Théorie des phénomènes électro-dynamiques* (Paris, 1826). Ampère was the inventor of the astatic needle (q.v.), which made possible the modern astatic galvanometer (q.v.). He was the first to show that two parallel conductors carrying currents traveling in the same direction attract each other, while if traveling in opposite directions they repel each other. Ampère also formulated the theory that there were currents of electricity circulating in the earth in the direction of its diurnal revolution which attracted the magnetic needle. The ampere (q.v.), or unit of the strength of an electrical current, is named after him. Ampère's scientific papers are largely contained in the *Annales de Physique et de Chimie*. A eulogy by Arago, delivered shortly after his death, which contains an account of his life, will be found translated into English in the annual report of the Smithsonian Institution for 1872 (Washington, 1872).

AMPÈRE, ăn′pâr′, JEAN JACQUES ANTOINE (1800–64). A French academician, essayist, literary historian, and professor in the Collège de France. He was born at Lyons, the son of André Marie Ampère. His essays, collected as *Littérature et voyages* (2 vols., 1834), attest his knowledge of foreign countries and their literatures. Better known are the essays on the formation of the French language, *Histoire de la formation de la langue française* (1841) and *La Grèce, Rome et Dante* (1850). Ampère was a judicious critic, a profound scholar, and master of a precise style. Consult Potton, *Etudes sur la vie et les travaux de Jean Jacques Ampère* (Paris, 1867); while notices of him are found in Sainte-Beuve's *Portraits Littéraires*, vol. iv, and in *Nouveaux Lundis*, vol. xiii.

AMPERE, ăm-pār′, TURNS. In problems involving the magnetic field produced by a current flowing in a coil of wire, two of the factors necessary are the strength of current in amperes, and the number of turns or revolutions that the conductor through which the current passes makes in forming the coil or solenoid. Their product is known as the ampere turns.

AM′PHIARA′ÜS (Gk. *Ἀμφιάραος, Amphiaraos*). A Greek chthonic divinity. At Oropus he had a celebrated oracle, healed the sick, and was honored with games. He was worshiped elsewhere also as a hero and prophet. In legend Amphiaraüs is prominent in the war of the Seven against Thebes, into which he was forced by the treachery of his wife, Eriphyle, who was bribed by Polynices. As he fled from the victorious Thebans, Zeus caused the earth to open and engulf him with his horses and chariot. He was a descendant of the seer Melampus, and son of Oïcles and Hypermnestra. According to later writers, he took part in the Calydonian hunt and the Argonautic expedition. See ADRASTUS; ÆSCHYLUS; ETEOCLES AND POLYNICES; SEVEN AGAINST THEBES.

AMPHIB′IA (Gk. *ἀμφί, amphi*, on both sides + *βίος, bios*, life). A class of vertebrates intermediate between fishes and reptiles. It was made by Linnæus to comprise reptiles, amphibia, and cartilaginous fishes, but has been restricted, until now it is equivalent to Batrachia, and includes frogs, toads, newts, salamanders, the snake-like Gymnophiona and gigantic extinct forms, the Stegocephali. As adults, many, but not all of them, are able, either by the possession of lungs or by means of skin respiration, to come from water to land; hence their name.

Distinctive Characteristics. All the free-developing amphibia possess gills in the larval stage that, in some forms, persist throughout life. The skin is soft and glandular and serves in part or wholly to aërate the blood. The outer layers of the skin become cornified and are periodically shed, and in a few cases there is a bony dermal skeleton. The paired fins of fishes are replaced by pentadactyl legs. In some forms, as in sirens, one pair of limbs may be wanting,

and in such forms as Gymnophiona both pairs may be lacking. The mouth is terminal, and the teeth are firmly ankylosed to the supporting bones. The tongue, when present, is bifid and is so fixed at the front of the mouth that the free end turns backward. The mouth and pharynx are ciliated and into them open the internal nares. The alimentary tract is nearly straight in the elongated forms, or it may be much convoluted, as in the case of vegetable-feeding tadpoles. There are a two-lobed liver and a pancreas. The lungs are thin-walled sacks that may have internal folds, but some salamanders are lungless. The heart is usually composed of two distinct auricles, one ventricle, and a conus arteriosus. The red blood corpuscles are oval, nucleated, and large in comparison with those of warm-blooded vertebrates.

Breeding Habits. The eggs may be fertilized internally or externally, just as they are being deposited in the water. In most cases they are left to chance, but in some species are carried in strands, or otherwise cared for by the male or female. A few have brood pouches, and one toad rears its young in pits in the skin of the back. A few forms bring forth their young in an active condition. The gill-bearing or larval stage (axolotl) of *Amblystoma tigrinum* is capable of breeding, and under certain conditions may undergo its metamorphoses. (See AXOLOTL.) The eggs are pigmented and usually undergo total and unequal segmentation. They possess a large amount of yolk, so much in a few cases, such as pipa, that the embryo lies coiled over the egg as though it were a fish. The blastula and gastrula stages are present, but are modified in form and manner of development by the presence of the yolk; the medullary groove develops by a pair of upfoldings along the middle of the back, and by fusion of head and body the tail becomes marked off; on the neck are two or three pairs of external gills. At about this time the tadpoles hatch and begin to swim about or adhere to weeds by means of the sucker on the ventral surface of the head. At first the tadpole has no mouth, but soon one develops; the external gills dwindle and are replaced by the internal, which are covered by a fold of skin. The hind limbs are the first to appear externally, lungs develop, and the larva can breathe both on land and in water. The gills of the Anura continue to dwindle, and likewise the tail is gradually and completely absorbed. Tadpoles as well as some adult amphibia have the power of reproducing lost parts. See TOAD.

The early stages of amphibians are not always passed in water. Some of the European salamanders are viviparous, the young being born all developed, but still requiring water. The young of the viviparous Cæcilidæ, however, take to a terrestrial life as soon as they are born. So, too, certain frogs (e.g., *Rana opisthodon*, of the Solomon Islands) hatch from eggs laid out of the water as perfect, air-breathing frogs. In many species, as in the persistent gilled Urodela, the adult lives chiefly in the water; in other cases, as in the other Urodela, the Cæciliidæ, and the Anura, the adult lives on land.

Habits. The adult Amphibia feed on worms, slugs, and insects. Hence they are all useful to agriculture. None has a poisonous bite, but all trust largely for safety to acrid or poisonous secretions from the skin glands. The tadpoles subsist almost entirely on water vegetation, such as algæ. In cold or dry seasons Amphibia preserve themselves by burrowing down into mud and earth, and there fall into a lethargic sleep. Most Amphibia keep near water, and their young develop in it. A few forms that live in mountains, in trees, or on dry, porous volcanic islands, bring forth their young well enough developed to breathe air, thus approaching a reptilian condition of development. Many, but not all, amphibians are nocturnal, being most active in their search for food or mates in the early morning or evening hours.

Geographical Distribution. The amphibia thrive best in warm and moist countries. A few live in the temperate zone, some frogs penetrating far north, but not so far as the polar regions. The order of relative abundance of amphibia in the different countries is as follows: Tropical America, India, Africa, Australia, North America, Europe. Many families and genera have a very limited range, since, although fresh water is a necessity to them, the sea is a complete barrier to their spread. Salamanders are confined mainly to Europe and North America, and only toads and frogs are of world-wide distribution.

Classification. There are four orders of Amphibia: the Urodela, possessing a tail throughout life (newts and salamanders); the Anura, without tail in the adult stage (frogs and toads); the Gymnophiona, snake-like, without limbs, and blind, and the Stegocephalia, and other extinct often gigantic tailed forms fossil in the Carboniferous, Permian, and Trias rocks. The existing species number about 1000.

Ancestry. The Amphibia have doubtless sprung from fish-like ancestors, and the link with that ancestry is found in the fossil group of Stegocephalia, whose head carries great plates. The piscine group from which the Amphibia arose must have been either the Dipnoi, which are to-day largely air-breathers, or the Crossopterygii. Gadow, in 1901, gave the following features of Amphibia as those that proclaim their piscine descent: (1) the possession by the heart of a long conus arteriosus (anterior to the ventricle) provided with, in many cases, numerous valves, on at least (in Anura) one series at the base, another at the beginning of the truncus where the arches branch off; (2) the strictly symmetrical arrangement of these arches; (3) the three-chambered heart is still like that of Dipnoi; (4) the occurrence of as many as four or even five branchial skeletal arches in the larval stage; (5) the glottis (or entrance to windpipe) is supported by cartilages which themselves are derivatives of posterior visceral arches; (6) the development (in Urodela as in Stegocephalia) of the vertebræ from four pairs of elements called arcualia, and the formation of the intervertebral joints by a split across the intervertebral ring of cartilage; (7) the hypoglossal nerve still lies outside and behind the skull as a cranial nerve; (8) the presence of lateral sense organs; (9) the possession of external gills, as in Dipnoi and Crossopterygii. It is frequently assumed that the first Urodela were aquatic creatures, provided with a finned tail and small lungs. Gadow believes these to be larval acquisitions, not ancestral reminiscences. The fact that the ancestors of Amphibia evolved the pentadactyl condition proves that they were land animals. The evolutionary change through which the early Amphibia passes are thus enumerated by Gadow.

1. "Terrestrial, with two pairs of pentadac-

tyloid limbs; breathing by lungs only; with a fully developed apparatus of five pairs of gill arches, which during the embryonic life perhaps still carried internal gills, with or without several pairs of gill clefts. Reduction of the dermal armor and of the cutaneous scutes had taken place.

2. "Additional respiratory organs were developed by the embryo, in the shape of external gills; these were at first restricted to embryonic life (as in the existing Apoda), but were gradually used also during the aquatic life of the larva. These external gills, together with the lungs, have superseded the internal gills, of which there are now no traces either in Urodela or in Anura.

3. "Some Urodela, retaking to aquatic life, retained and further enlarged the external gills into more or less permanent organs. The majority of Urodela hurry through the larval, aquatic stage, and some—e.g., *Salamandra atra*—became absolutely terrestrial. The possession of unusually long external gills by this species and by the Apoda indicates that these organs are essentially embryonic, not larval, features."

Bibliography. The foremost systematic writers upon this group are G. A. Boulenger, of the British Museum, and E. D. Cope. The latter has completely monographed North American forms in "Batrachia of North America," *Bulletin 34, United States National Museum* (Washington, 1889). This discusses the larger relations of the group and gives an extensive bibliography. For a still more recent general treatise consult H. Gadow, "Amphibia," *Cambridge Natural History*, vol. viii (Cambridge, 1901), and "Amphibia," by Lydekker, Cunningham, Boulenger, and Thompson (London, 1912). For a more popular treatment, consult Dickerson, *The Frog Book* (New York, 1906). See ALIMENTARY SYSTEM (*Evolution of*) and similar articles relating to comparative anatomy.

AMPHIBIA, FOSSIL. See STEGOCEPHALIA.

AMPHIBIOUS PLANTS. Plants that are able to thrive either with their leaves submerged or completely exposed to the air (see also AQUATIC PLANTS). In some plants both air and water leaves are of the same size and form, but in other instances they exhibit striking differences of structure. Often, as in the mermaid weed (*Proserpinaca palustris*), or in one of the watercresses (*Radicula aquatica*), the water leaves are finely dissected; but the forms produced in the air are quite entire. The water buttercups, *Ranunculus multifidus* and *R. aquatilis*, show similar variations. Some of the arrowheads, like *Sagittaria heterophylla*, produce early in the season narrow grass-like leaves quite below the surface of the water, but somewhat later the leaves emerge from the water and have broad arrow-shaped blades. In other cases, like that of the water smartweed (*Polygonum amphibium*), the principal difference between the water and the air forms is in the entire absence of hairs from the aquatic form and the decided pubescence of the aërial foliage. The causes of these variations in the leaves of amphibious plants are not fully known, but it has been demonstrated that transpiration is one of the most important factors.

AMPHIBOLE (Gk. *ἀμφίβολος, amphibolos*, doubtful, ambiguous; alluding to its being easily confounded with augite). An important group of rock-making minerals closely allied to the pyroxene (q.v.) group. The amphiboles are metasilicates, principally of calcium, magnesium, or iron, and sometimes also of manganese, sodium, and potassium. The group is subdivided according to the forms of crystallization. Those that crystallize in the orthorhombic system include anthophyllite and its variety Gedrite; the monoclinic section includes the typical mineral amphibole with its varieties, as well as glaucophane, crocidolite, and certain other minerals; while the triclinic section includes ænigmatite. All of these minerals have a common prismatic cleavage of from 54° to 56° and also agree in their optical characters and chemical composition.

The most important member of the group is the mineral amphibole, which gives its name to the series. The several varieties of amphibole are divided into two groups, according as they do or do not contain aluminum. The non-aluminous varieties include tremolite, a calcium magnesium silicate that is usually white to dark gray in color, and is found both in crystals and massive; actinolite, a calcium magnesium and iron silicate of varying shades of green; grünerite, an iron silicate which is of a brown color that occurs in fibrous masses. The aluminous varieties include the several varieties of hornblende, which comprises the dark green and black varieties, known as common horneblende (black), pargasite (green and blue), and edenite (white, gray, and pale green). These minerals are found in crystalline metamorphic limestones, granitic, and schistose rocks, and in volcanic or igneous rocks. Nearly every member of the group has several varieties, each of which, besides having a separate name, differs from the type by some slight variation in color, optical properties, or chemical composition. Many varieties of amphibole have been cut as gem-stones.

AMPHIB'OLITE. A group of metamorphic rocks characterized by the presence of amphibole (q.v.) in large amount and by a more or less marked foliation or parallel arrangement of the constituents. According to the nature of the amphibole, and to some extent dependent upon the associated minerals, several varieties of amphibolite may be distinguished, such as actinolite-schist, tremolite-schist, glaucophane-schist, and hornblende-schist, which are the more common ones. The name "hornblende-schist" properly belongs to the variety having the common iron-alumina amphibole, but is sometimes used by petrographers in a larger sense as practically synonymous with amphibolite. The different members are all hard and rather tough rocks, resistant to rupture except in the case of the very schistose types which may be cleaved quite readily in a single direction. The amphibole is usually developed in blades or prisms, without crystal terminations, arranged in parallel order that simulates the bedded structure of sedimentary rocks. Their grain varies from coarse to fine, the finer sorts being, perhaps, the more common. Their color is white or grayish in the iron-free tremolite-schist, pale to bright green in actinolite-schist, blue when the amphibole belongs to the glaucophane variety, and dark green to black when common hornblende is the chief ingredient. The associated minerals include feldspar, quartz, and mica of chief importance, besides chlorite, garnet, iron oxides, pyrite, and others in moderate to small amounts.

The amphibolites are of secondary origin and may be formed from either igneous or sedimen-

tary rocks, as has been demonstrated in numerous instances. The change involves in either case a thorough rearrangement of the chemical constituents, sometimes with the introduction of new material, and a recrystallization which destroys the fabric or texture of the parent rock. The agencies productive of such transformation are mainly heat and pressure, under conditions that obtain in the deeper parts of the earth's crust. (See METAMORPHISM.) Among igneous rocks the change is more frequent in the case of varieties like gabbro, dolerite, and pyroxenite that contain relatively large amounts of the iron-magnesia minerals, whereas in the feldspathic varieties, like granite, syenite, and diorite, the end result is usually a gneiss. In large bodies of igneous rock it is not uncommon to find that the process of metamorphism has not been complete throughout, but has been more effective on the borders than in the interior: thus may be observed a gradual transition from amphibolite, on the one hand, to a rock which still preserves its original characters. Of sedimentary strata impure limestones and calcareous clays are most liable to conversion into amphibolite under regional metamorphic influences. The development of tremolite and actinolite is often noticeable in limestones, also around the borders of an igneous intrusive.

Amphibolites are quite widely represented in the older geological formations. They occur in the Adirondacks and along the metamorphic belt of the Appalachians, in the Lake Superior region, and various other parts of the world where the rocks have been subjected to shearing and compression incident to the upraising of mountains. Economically they are not of much importance in themselves, although they may inclose important ore-bodies; the productive iron formations of the Lake Superior region include a rock known as grünerite-schist which is allied to actinolite-schist. By alteration under surface influences amphibolites yield hydrated compounds like talc, chlorite, and serpentine. In the western Adirondacks are large bodies of fibrous talc that have been derived mainly from alteration of tremolite-schist.

AMPHICTYON. See AMPHICTYONIC COUNCIL.

AMPHIC'TYON'IC COUN'CIL, AMPHIC'TYONY (from *Amphictyon;* see below). A name given to various confederations of Greek States, but applied usually to a celebrated religious congress of the confederated tribes of ancient Greece, which met twice every year, at Delphi and Thermopylæ. The meetings at Delphi took place in the temple of Apollo, those at Thermopylæ in the temple of Demeter, which was in the village of Anthela. The congress was composed of the deputies of 12 tribes, whose names are given differently in different authors. The list of Æschines (containing but 11 names) is as follows: Thessalians, Bœotians, Dorians, Ionians, Perrhæbians, Magnetes, Locrians, Œtæans, Phthiots, Malians, and Phocians. The twelfth tribe was probably either the Dolopians or the Ænianians. Each tribe sent as delegates two members, who possessed equal authority. Tradition connects the origin of the Amphictyonic Council with Amphictyon, son of Deucalion. We may at least be sure that the institution was one of great antiquity. Its importance declined in the course of time, and by the third century B.C. it had lost much of its old authority. The duties of the Council were primarily religious and were connected with the care of the temple of Apollo at Delphi and the protection of the holy lands, treasures, and other perquisites of the god. It was also intrusted with the preparation and direction of the Pythian Games. The duty of protecting the property of Apollo carried with it the power to prosecute and punish all who in any way injured the majesty of the god. Thus the Council possessed important judicial rights, and, since it also had power to regulate matters relating to peace and war among the different members of the federation, it in time acquired political importance also. The members bound themselves by an oath not to destroy any city of the Amphictyons or cut off their streams in war or peace; also, if any State should break this oath, to unite in proceeding against and destroying such a State. Such a war was called a Holy War. There were in early times various other amphictyonies, or associations of tribes, among the Greeks, as at Argos, Onchestus, Delos, and elsewhere, but little is known of these. The correct form of the name, which, however, is not found till 380 B.C., is *Amphictiones* and signifies 'Neighbors.' Consult Tittmann, *Ueber den Bund der Amphictyonen* (Leipzig, 1880), and Freeman, *History of Federal Government* (2d ed., London, 1893).

AMPHICTYONY. See AMPHICTYONIC COUNCIL.

AMPHI'CYON. A slow and clumsy carnivore chiefly of the Miocene horizons; a giant dog in many respects, with teeth which combined the characters found in dogs and bears.

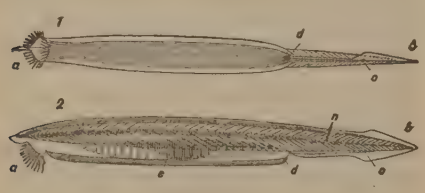
AMPHIL'OCHUS (Gk. *Ἀμφίλοχος, Amphilochos*). In legend, a son of Amphiaraüs, and, like him, worshiped as a prophet at Oropus and elsewhere; one of the Epigoni, and founder of Amphilochian Argos in Ambracia. Another group of legends connected Amphilochus with Cilicia and Pamphylia, whither he was said to have gone after the Trojan War, in which he took part as a suitor of Helen. With Mopsus, he founded Mallus, but later they quarreled and killed each other. Their graves were shown at Mallus, where was also an oracle of Amphilochus.

AM'PHINEU'RA (Gk. *ἀμφί, amphi,* around + *νεῦρον, neuron,* sinew, nerve). An order of mollusks, characterized by the peculiar arrangement of the nervous system. There are two lateral and two ventral nerve trunks bound together by numerous commissures and provided with ganglion cells throughout their whole length. Anteriorly these cords pass into the cerebral ganglion, which, however, is often hardly more than the upper half of a ring which encircles the œsophagus. The amphineura are bilaterally symmetrical and have the foot somewhat like that of the gastropods. They either have a shell of eight pieces or there is no shell at all. They are all marine forms, chiefly of the warmer seas, and rarely reach a large size. There are two distinct sub-orders, the Polyplacophora, or Chitons (q.v.), and the Aplacophora, or Solenogastres. The latter are degenerate, or are Amphineura whose development has been arrested at an early stage; they are worm-like animals of small size, without a shell, the foot, mantle, and mantle-cavity greatly reduced, and in some forms almost wanting. Only a few recent species are known.

AMPHI'ON (Gk. *Ἀμφίων*). In mythology, son of Zeus and Antiope, twin brother of Zethus. The story of Antiope and her sons existed in many local forms, but the accepted ver-

sion of later times was found in the *Antiope* of Euripides, of which only fragments have been preserved. Antiope, fleeing from her father, the river-god Asopus, who had threatened to punish her for yielding to Zeus, who had visited her under the form of a satyr, went to King Epopeus, at Sicyon. Dragged thence by her uncle, Lycus of Thebes, she bore the twins on Mount Cithæron, where they were exposed, but found, and reared by a shepherd. Story made Amphion the son of Zeus, Zethus the son of Epopeus. Antiope, cruelly mistreated by Lycus and his wife Dirce, fled to the mountain, and found there her sons. To avenge her wrongs, the twins tied Dirce to the horns of a wild bull, and captured Lycus, who surrendered Thebes, which they fortified. Amphion charmed the stones into place by his lyre. The characters of the brothers are sharply contrasted: Zethus is the rough huntsman, and Amphion is the gentle musician. Amphion and Zethus were honored at Thebes as Dioscuri, as Castor and Pollux were at Sparta. Amphion married Niobe and was killed by Apollo, or committed suicide when his children were killed. The punishment of Dirce is the subject of a celebrated group of statuary —"The Farnese Bull"—by Apollonius and Tauriscus of Tralles, found in the Baths of Caracalla in Rome in 1546 and now in the Naples Museum. It is a work of the early part of the first century B.C., but has been much restored.

AM'PHIOX'US (Gk. *ἀμφί, amphi,* at both ends + *ὀξύς, oxus,* sharp). A small, bilateral, translucent, marine animal, about two or three inches long, thought by some to be an offshoot of the primitive vertebrate stock, and by others to be a degenerate, primitive vertebrate. The amphioxus, or 'lancelet,' has no well-defined brain, but a persistent and unsegmented notochord. The muscles are arranged in 62 V-shaped myomeres dovetailed into one another. The single mouth and anus are in the median line. There are no limbs, ears, sympathetic nerves, or genital ducts. The gill slits, which are numerous and supported by bars, open from the mouth into the atrial chamber, which has one opening to the exterior, the atrial pore. The best-known species is *Amphioxus lanceolatus,* which dwells



AMPHIOXUS.

1. Ventral view of the entire animal lying on its side. 2. Side view. *a,* anterior end, showing cirri about the hooded mouth; *b,* caudal fin; *c,* anus; *d,* atripore or excurrent orifice for the water constantly taken in at the mouth; *e,* generative organs; *n,* notochord.

buried in sand near the seashore line. Its food, which consists mainly of diatoms, is sucked into its mouth. The adults swim about in the evening only, but the young are very active. The segmentation of the egg is complete, and results in the formation of a blastosphere, which invaginates to form a gastrula. The medullary groove is formed by a sinking of the ectoderm along the mid-dorsal line. The cavity of the gastrula becomes the gut of the adult. In the active early life of the embryo the ectoderm is ciliated. The simplicity of its development has made the amphioxus a favorite object of study for the descriptive and experimental embryologist. If the two cells which are the result of the first segmentation are separated, each cell will develop into a complete individual one-half the size of the normal embryo. Incomplete separation results in the formation of double or Siamese-like twins. Compare BALANOGLOSSUS; and consult A. Willey, *Amphioxus and the Ancestry of the Vertebrates* (New York, 1894). See the articles on the evolution of the alimentary, circulatory, muscular, nervous, and respiratory systems, under ALIMENTARY SYSTEM, etc.

AMPHIP'ODA (Gk. nom. neut. pl., from *ἀμφί, amphi,* around + *πούς, pous,* foot). An order of crustaceans, distinguished by the sessile, lateral eyes and the greatly compressed body. They are mostly of small size, and some are very minute. Their name alludes to the peculiar arrangement of the so-called walking-feet, four pairs of which point forward and three backward. The abdomen, or "tail," is also a powerful locomotive organ, and assists the animal in jumping, which is its usual mode of progression. Even in swimming its movements are chiefly a succession of jumps. The amphipods are usually plainly colored, but some forms are very handsome. A large number of species is known, but zoölogists are by no means agreed as to their classification, some making only two and some as many as nine, families. They occur in both fresh and salt water and are especially abundant along sandy beaches, where they skip about in such a lively manner that they are called beach-fleas or sand-hoppers. Amphipods are also found living in sponges and jellyfish and as true parasites on the skin of whales. They are widely distributed over the world, occurring even in the Arctic regions, and are of great practical importance as food for fishes. See BEACH-FLEA; CRUSTACEA.

AMPHIP'OLIS (Gk. *Ἀμφίπολις*). A city of ancient Macedonia, situated in a deep bend of the river Strymon, about 3 miles from the sea (Map: Balkan Peninsula, D 4). Its position on terrace-like hills in a bend of the river made it important as the port of entry for the fertile Strymon valley and Thrace; the neighborhood yielded timber for ships, as well as gold and silver. It belonged originally to the Edonians, a Thracian people, and was called, on account of the roads which met here, *Ἐννέα Ὁδοί* ('Nine Ways'). Aristagoras of Miletus, who first attempted to colonize it, was cut off with his followers by the Edonians. The Athenians next tried to gain possession of it. Their first army, amounting to 10,000 men, was utterly cut to pieces at Drabescus, 465 B.C., but their second, under Hagnon, son of Nicias, was successful, 437 B.C. The Thracians were expelled and a new city was built, to which Hagnon gave the name Amphipolis, because it had the river on both sides. Owing to its mixed population, Amphipolis was not friendly to Athens, and in 424 B.C. readily joined the Spartan Brasidas (q.v.). The Athenian general, Cleon, having been sent to recover the city, was defeated and slain in a battle fought near its walls in 422 B.C.; Brasidas also fell in the engagement. Though nominally restored to Athens by the peace of Nicias (q.v.), Amphipolis seems to have remained independent until its surrender to Philip of Macedon. At Amphipolis was situ-

ated the chief mint of the Macedonian kings: under the Romans it was the capital of eastern Macedonia. In the Middle Ages it was called Popolia. Its site is now occupied by a Turkish town, but a few of its ruins are still visible. Consult Leake, *Travels in Northern Greece* (London, 1835), and Heuzey and Daumet, *Mission archéologique en Macédonie* (Paris, 1876).

AM'PHISBÆ'NA (Gk. *ἀμφίς, amphis*, on both ends + *βαίνειν, bainein*, to go). The type genus of a family of degraded, limbless lizards, of the general appearance of snakes or worms, found only in the West Indies and South America. The best known of the 30-odd forms is the sooty or dusky species, *Amphisbæna fuliginosa*. The body is 18 to 24 inches long and nearly the same thickness throughout; head small, eyes small, ears covered with skin, and tail very short. It tunnels under ground, feeding on insect larvæ and worms. As it moves either way with equal ease, rumor gave it two heads, and asserted that when cut in twain the parts would find each other and reunite. Its dried and pulverized flesh was supposed to possess miraculous curative properties.

AMPHIS'SA (Gk. Ἄμφισσα). The official name of Salona, the capital of the Greek nome of Phocis (Map: Greece, D 3). It is situated 31 miles northeast of Lepanto, at the western foot of the Parnassus, a few miles from the site of Delphi. The town lies in a fertile plain and has trade in tobacco and grain. A road runs to the harbor of Itea, 5 miles to the south, on the Bay of Salona. It is on the site of the ancient Amphissa, which was an important post in the ancient wars against Philip of Macedon. Pop., 1896, 5416.

AM'PHITHE'ATRE (Gk. *ἀμφιθέατρον, amphitheatron*, a double theatre, from *ἀμφί, amphi*, around + *θέατρον, theatron*, a place for seeing; hence, a place, of whatever shape, entirely surrounded by seats for spectators). 1. An architectural structure invented by the Romans for exhibiting gladiatorial combats, fights of wild beasts, and other spectacles. (See GLADIATOR.) These contests were at first given in the Circus (q.v.), later, in the Republican period, in the Roman Forum (q.v.), within hastily contrived wooden scaffoldings; in other Italian towns, too, the gladiatorial combats were long given in the Forum. But in 59 B.C., according to Pliny, *Historia Naturalis*, xxxvi, 117–120, Curio, wishing to surpass all his predecessors in the sumptuousness of his shows, erected two wooden theatres, back to back, where dramatic performances were given simultaneously; and when these were over the two theatres were made to revolve and close up. Their tiers of seats inclosed an arena suited for the contests which then followed. This story, however, is regarded by good authorities as the outcome of a false interpretation of the term *amphitheatrum*, common in modern as in ancient times, by which amphitheatre is interpreted as a double theatre. The elliptical shape of the amphitheatre would have been the natural result of holding the gladiatorial combats in the rectangular Forum; the elliptical shape met the two needs of an amphitheatre—that of confining the combatants to a small space, and that of giving every spectator a good view. Perhaps the model was found in the cities of Campania; for Pompeii had an amphitheatre as early as 70 B.C. Cæsar first erected, in 46 B.C., a permanent structure of this kind in wood. Still, combats of gladiators and wild beasts continued to be given in the Circus and the Forum. In 30 B.C., under Augustus, Statilius Taurus built the first amphitheatre that was partly of stone, in the Campus Martius: it remained the only one in Rome not entirely of wood until the erection of the Coliseum by Vespasian, whose son and successor, Titus, dedicated the edifice in 80 A.D. Even the upper part of the Coliseum itself was originally of wood until the restoration, after a great fire, in 223. The example of Rome was followed by all the cities of any importance throughout the Empire, where the love of bloody sports, so repugnant to the Greeks, spread rapidly. Amphitheatres were erected throughout Italy and Sicily (Verona, Puteoli, Capua, Pola, Syracuse, Pompeii, Tusculum, etc.), Spain (Tarragona, Italica), France (Arles, Nîmes, Bordeaux, Saintes, etc.), England (Silchester, Cirencester), Germany, North Africa (El-Jemm), Asia Minor (Pergamum, Cyzicus), Greece (Corinth, Sparta). The ruins of almost 100 have been found. Those that are well preserved are among the finest remains of Roman architecture. Whenever possible, the natural incline of a hillside was utilized to save expense, by cutting part of the seats in the natural rock (so, for example, at Pompeii). But in most cases the amphitheatres were entirely free-standing structures of elliptical shape, built of brick, stone, and marble (so at Rome and Verona). The Coliseum (or Colosseum) at Rome seated 87,000 persons, according to a document of the fourth century; but Hülsen believes that there were that number of running feet of benches and that only about 50,000 persons could be seated. Its greatest length is 616 feet, its greatest breadth 510 feet. Several others are of about the same size, as, for example, those at Pozzuoli, Capua, Italica, Verona, Tarragona, El-Jemm. The exterior wall of the Coliseum, nearly 160 feet high, was divided into four stories; the three lower ones consisted of series of arches framed by engaged columns and entablatures, the lowest, Tuscan-Doric; the second, Ionic; the third, Corinthian, according to a common Roman usage. The upper story (added, as already stated, in 223, to replace the original wooden superstructure), was broken merely by windows and pilasters, as well as by the high masts to support the awnings. The lowest arcades served as entrances; four, unnumbered, were main entrances; 76 were numbered entrances leading to the staircases. The arcades of the second and third stories opened on the covered promenade galleries, passageways, and staircases; between each pair of columns stood a statue. On the outside of the topmost story or attic is a row of consoles, in which are sockets for the masts that supported the great awnings (*velaria*), which protected the spectators from the sun when necessary. How these were stretched we do not positively know; it may well be that they covered only the seats, being supported at the inner end by masts on the podium or just behind it. Other amphitheatres vary, from two stories at Nîmes to three at Verona, three and a basement at Pola, and four at El-Jemm. The arrangements were as follows at the Coliseum: There were four tiers, or stories, of seats, forming the *cavea* and corresponding to the four external stories. Under them were five concentric corridors communicating with the staircases; and the raking vaults that support the seats and staircases are one of the most superb and impressive parts of

the structure. The interior of the *cavea*, or place for the spectators, had three sections: the lower one, or *podium*, with the seats and thrones of honor; the *mœniana*, or stepped tiers of seats, occupying the height of two stories; and the *porticus*, or portico. The podium was a platform, about 12 feet high, immediately above and around the arena, reserved for the Emperor and other persons of greatest distinction, including the Senators, and crowned with special boxes and balconies. The *mœniana* were in two horizontal sections, where the spectators could be seated according to their rank; the first 14 rows behind and above the podium were given to the equites, or knights (see EQUESTRIAN ORDER), the rest to inferior citizens. Behind and above the second *mœnianum* there was a wall 16 feet high, pierced by windows and doors leading to a corridor. On this wall rested a Corinthian colonnade, which, together with the exterior wall of the whole structure, carried a flat roof. In the portico thus formed were the seats of the women; on the flat roof of the portico was standing-room for the lowest portion of the community. Each row of seats was numbered and the places marked. A large *personnel* kept order. The central space, measuring 280 by 176 feet, in which the contests took place, was called the *arena* (q.v.). Under it was an elaborate system of substructures, not only for under-draining, but also for housing men and animals, with wells, windlasses, and inclined planes for hoisting the animals, and other means of communicating with the arena—such as the *vomitoria*—and with the outside—such as passages to the imperial palaces. Especially interesting is a row of beasts' dens following the oval outline of the arena above. The seats of the Coliseum are not preserved; in the amphitheatres at Verona and Nîmes they have been, and both of these, as well as that at Arles, have been more or less restored and are often employed to-day for public spectacles. Neither is the entire circuit of outer wall as well preserved in the Coliseum as at these cities or at Pola. At Capua and Pozzuoli the substructures of the arena are in perfect condition.

2. A hall for public lectures or demonstrations in an institution of learning, having the seats in successive curved tiers, the room being usually of semicircular plan or approximating this: a famous example is the lecture-hall of the Ecole des Beaux-Arts at Paris, with superb mural decorations by Delacroix. In hospitals and schools of medicine and surgery the principal operating-room or room for surgical and anatomical demonstrations is often called the amphitheatre.

Consult: Friedländer, *Sittengeschichte Roms* (Leipzig, 1881–90); there is a much later edition, the eighth about 1912, translated in four volumes by Magnus, Freese, and Gough under the title, *Roman Life and Manners under the Early Empire* (London, 1910–13); De Ruggiero, *Dizionario epigrafico* (Rome, 1887–93); Middleton, *Remains of Ancient Rome* (London, 1892); Daremberg and Saglio, *Dictionnaire des antiquités grecques et romaines* (Paris, 1881–92); Durm, *Die Baukunst der Römer* (Darmstadt, 1887); Guadet, *Théorie de l'Architecture* (Paris, 1904); Baumeister, *Denkmäler des klassischen Alterthums* (Munich, 1885–88); Lanciani, *The Ruins and Excavations of Ancient Rome* (New York, 1897); Platner, *The Monuments and Topography of Ancient Rome* (New York, 1911); Babucke, *Geschichte des Kolosseums* (Königsberg, 1899).

AM'PHITRI'TE (Gk. *'Αμφιτρίτη*). The daughter of the sea-god Nereus and of Doris, the wife of Poseidon, and mother of Triton. Amphitrite was worshiped only in company with Poseidon and appears with him on many painted votive tablets from Corinth. Her marriage with Poseidon forms the subject of a fine Roman marble relief, in Munich, representing her as drawn in a car by Tritons, surrounded by Nereids and sea monsters. She appears with Poseidon also in representations of assemblies of the gods.

AMPHIT'RUO, or AMPHIT'RYON. A comedy or burlesque by Plautus, based on the legend of Jupiter and Alcmene, Amphitryon's wife. Its Greek prototype is unknown. It has been well edited by Palmer (London, 1890).

AMPHIT'RYON, or AMPHIT'RUO (Gk. *'Αμφιτρύων*, Lat. *Amphitryo* or *Amphitruo*). Legendary son of Alcæus of Tiryns. He accidentally killed Electryon, father of Alcmene, King of Mycenæ, for which deed he was expelled from Mycenæ. He took refuge in Thebes with his wife Alcmene. Here she became the mother of Heracles by Zeus and of Iphicles by Amphitryon. Amphitryon's tomb and the ruins of his house were shown in Thebes in the days of Pausanias. See AMPHITRUO.

AMPHITRYON. 1. A comedy of Molière, produced in 1668, and taken from that of Plautus. 2. An opera by Grétry, the words being by Sedaine, produced in Paris, 1781. 3. A comedy by Andrieux, presented in 1782. There are also operas with this title in Italian, Portuguese, and Swedish.

AMPHITRYON, OR THE TWO SO'CIAS. A comedy by Dryden, with musical portions, produced in 1690. It was adapted from Molière's play.

AM'PHIU'MA (corruption from Gk. *ἀμφί, amphi*, on both sides + *πνεῦμα, pneuma*, breath, referring to the gill). A genus of tailed amphibia that loses its tadpole gills, but retains in the adult stage one gill slit on each side of the neck; hence it is half-way between the mudpuppy (Necturus), which retains its external gills throughout life, and the newts, which retain neither gills nor slits. See CONGO-SNAKE.

AM'PHORA (Gk. *ἀμφορεύς, amphoreus*, Homeric *ἀμφιφορεύς, amphiphoreus*, from *ἀμφί, amphi*,

AMPHORÆ.

on both sides, and *φέρειν, pherein*, to carry). Among the Greeks and Romans, a large vessel,

usually made of clay, with a narrow neck and two handles. Many amphoræ ended in a sharp point below for insertion in a hole in a stand or in the ground. The pointed form of the amphora was used for preserving wine and oil, as in the Panathenaic amphoræ. A peculiar tall and slender form was the Loutrophoros, which was used for water for the bridal bath and to mark the graves of the unmarried. The amphora appears in a great variety of forms among the Greek painted vases. Amphora was also a liquid measure in Rome, equivalent to 26.26 litres, or about seven gallons. Among the Romans wine, oil, fruits, nuts, and other small objects were transported regularly in amphoræ, even across seas, so that the carrying capacity of a vessel was reckoned at so many hundred or thousand amphoræ. The name was also given sometimes to the Attic metretes—equal to about 11 gallons. In modern times *anfora* is the name of a wine measure in Venice. See VASE.

AM'PLIFICA'TION (Lat. *amplus*, large + *facere*, to make). A term in rhetoric, meaning that an idea, an opinion, or an inference is presented to the mind accompanied by accessory circumstances. Its aim is to make a powerful and vivid impression on the reader or the hearer. It is generally produced by breaking up general statements into particulars, by employing some form of repetition, by adding illustrative details, and by quotation. This is called also the dynamic method of rhetoric, and is especially effective in addressing juries or popular assemblies. The most remarkable instance of amplification in English oratory is to be found in Daniel Webster's thrilling address to the jury in the famous case of the shocking Knapp-Crowninshield murder (1830). Consult Genung, *The Working Principles of Rhetoric* (Boston, 1901).

AM'PLITUDE (Lat. *amplitudo*, from *amplus*, large). In astronomy, the angular distance of a heavenly body at the time of its rising or setting from the eastern or the western point of the horizon. When the sun is in the equator (i.e., at the time of either equinox), it rises exactly east and sets exactly west, except for the small effects of refraction (q.v.). Therefore, at these times the amplitude is *zero*. Its amplitude is at the maximum at midsummer and again at midwinter; and that maximum depends upon the latitude of the place, being 23½° at the equator and increasing to lat. 66½°, where it becomes 90°. The amplitude of a fixed star remains constant all the year round.

AMPTHILL, ămt'hĭll, FIRST BARON. See RUSSELL, ODO WILLIAM LEOPOLD.

AMPUL'LA (dimin. of *amphora*, or rather of the older form *ampora;* in Greek, λήκυθος, *lēkythos*). Apparently a generic term among the ancient Romans for any little bottle of earthenware, glass, or other material, used for holding liquids, especially oil for use after the bath, or ointments; a common form was that of a tall, slender, narrow-necked vessel with a handle. The *ampulla Remensis* (the holy vessel, Fr. *la sainte ampoule*) was the name of that famous vessel in which was contained the unguent (believed to have been brought by a dove from heaven) that anointed Clovis (q.v.), King of the Franks, at Rheims in 496 A.D., and with which every succeeding monarch of France, down to Louis XVI, was anointed at his coronation. This ampulla was shattered, along with a great many more valuable things, at the Revolution of 1789; but a fragment of it was preserved by some devout royalist, and handed over at the restoration to the Archbishop of Rheims. Curious to say, a little of the miraculous substance still remained, and, being mixed with oil, was used to anoint Charles X in 1825.

AM'PUTA'TION (Lat. *amputare*, to lop off, cut around). The cutting off of a part which, by its condition, endangers the safety, health, or comfort of the patient. Injury, gangrene, and malignant growths are the most frequent causes for amputation. The amputation of a limb was in ancient times attended with great danger of the patient dying during its performance, as surgeons had no efficient means of restraining the bleeding. They rarely ventured to remove a large portion of a limb, and when they did so, cut in the gangrened parts, where the vessels would not bleed; the smaller limbs they chopped off with a mallet and chisel; and in both cases had hot irons at hand with which to sear the raw surfaces, boiling oil in which to dip the stump, and various resins, mosses, and fungi, supposed to possess the power of arresting hemorrhage. Some tightly bandaged the limbs they wished to remove, so that they mortified and dropped off; and others amputated with red-hot knives, or knives made of wood or horn dipped in vitriol. The power of controlling hemorrhage was obtained by the invention of the ligature by Paré in the sixteenth century, and by the invention of the tourniquet (q.v.) in 1674 by a French surgeon, Morell. The ancient surgeons endeavored to save a covering of skin for the stump, having the skin drawn upward by an assistant before making the incision. In 1679 Lowdham, of Exeter, suggested cutting semicircular flaps on one or both sides of a limb, so as to preserve a fleshy cushion to cover the end of the bone. Both these methods are now in use, and are known as the "circular" and the "flap" operations; the latter is most frequently used.

A "flap" amputation is performed thus: The patient being placed in the most convenient position, an assistant compresses the main artery of the limb with an elastic band or a tourniquet. Another assistant supports the limb. The surgeon with one hand lifts the tissue from the bone, and transfixing with a long narrow knife, cuts rapidly downward and toward the surface of the skin, forming a flap; he then repeats this on the other side of the limb. An assistant now draws back these flaps, and the knife is carried round the bone, dividing any flesh still adhering to it. The surgeon now saws the bone. He then seizes the larger blood vessels with artery forceps and ties them with ligatures. All the vessels being secured, after removal of the tourniquet, the flaps are stitched together and a suitable dressing applied. With the advent of antiseptic methods and anæsthetics, and a better understanding of the processes of tissue repair, the necessity for amputation has greatly diminished, particularly in military surgery. Modern high velocity missiles are aseptic, and often bore a clean hole through a bone without shattering it; and the immediate application of an emergency dressing or "first aid packet" insures prompt healing.

AM'PYX (Gk. ἄμπυξ, a woman's head-band, a snood). A characteristic Ordovician genus, comprising about 50 species, restricted to North America and Europe, of blind trilobites, in which the central portion (*glabella*) of the head shield is often armed with a cylindrical or angu-

lar sharp spine, the length of which in many species exceeds that of the entire body. Long curved spines are also developed upon the genal angles or posterior corners of the sides of the head shield. The thoracic portion of the body is short, consisting of five or six segments, and the tail shield is triangular and unarmed. For illustration, see TRILOBITA.

AMRAPHEL, ăm'rā-fĕl. A King of Shinar, i.e., Babylonia, who, according to Genesis xiv, invaded Palestine, together with Chedorlaomer, King of Elam, Arioch, King of Ellasar, and Tidal, King of Goiim. There is no account of this expedition in Babylonian literature, and none of the names has been identified with certainty. But it does not seem improbable that the account of such an expedition has been drawn from Babylonian sources. The names of the four kings inspire confidence. Ed. Meyer in 1884 called attention to the genuinely Elamitish character of the name Chedorlaomer (Kudur Lagamar); and Schrader three years later identified Amraphel with Hammurabi. Dhorme has suggested that the Hebrew form of the name is due to the last sign *bil* having been written *bi*, as sometimes happens, and this sign has also the value of *pil*. Another manner of writing it was Hammurapi. If the expedition is historical, it must have taken place before the thirtieth year of the King's reign. The discovery by King that the second Babylonian dynasty was at least in part contemporaneous with the first has reduced his date, which may now be placed with some degree of confidence in 2124–2081 B.C. It still remains doubtful whether any light is thrown by this identification on the historic character or date of Abraham. See HAMMURAPI; ARIOCH; CHEDORLAOMER; and consult Dhorme in *Revue Biblique*, p. 205 (1908).

AMR IBN AL-AS, ăm'r 'b'n ăl ăs (died 663 A.D.). An Arabian general. He was one of Mohammed's disciples, though before his conversion in 629 A.D., a furious opponent. Chiefly to him were the Prophet's successors indebted for the conquest of Syria. In 640 he led 40,000 men into Egypt and within three years effected the subjugation of the country. In 642, after a siege of 14 months, he took Alexandria, losing 23,000 men. In the struggle between Ali and Muawiya for the caliphate, Amr sided with the latter and to him was due the triumph of the Umayyads over the Alids. From 661 to his death he was Emir of Egypt and by his wise administration facilitated the conversion of the country to Islam. He is credited with projecting a canal to unite the Mediterranean and Red seas and is charged with causing the destruction of the famous library at Alexandria; but the charge may well be dismissed, as it was not advanced until six centuries after his death. Consult Sir William Muir, *The Caliphate* (London, 1891).

AMR IBN KULTHUM. A famous Arabic poet whose chief work was given a place in the Muallakat (q.v.). He lived in the sixth century A.D. and was head of the Taghlib tribe. His mother was Laila, the daughter of a poet, al Muhalhil. Because of an insult to her he slew Amr ibn Hind, one of the Lahmid rulers at Hira in 570. Consult Rothstein, *Die Dynastie der Lahmiden in al Hira*, p. 100 (Berlin, 1899).

AMRITSAR, ŭm-rĭt'sär (*Umritsar*). A city of the Punjab, India, in lat. 31° 40′ N. and long. 74° 45′ E., on the Sindh, Punjab, and Delhi Railway (Map: India, B 2), 330 miles by rail northwest of Delhi. It is the capital of a district of about 1600 square miles area, with a population of over 1,000,000, and of a division with an area of 5354 square miles and a population of about 2,750,000, both of the same name. Amritsar is, next to Delhi, the richest and most prosperous city in northern India, being connected with Lahore, the capital of the Punjab, distant 36 miles to the west, by a canal, and possessing considerable manufactures of cotton, silks, shawls, carpets, etc., and carrying on a large trade. It is the religious centre of the Sikhs—a distinction which, along with its name, it owes to its "pool of immortality," on an islet of which stands the marble Darbar Sahib, the chief temple of the Sikh faith, maintaining an establishment of over 500 priests and founded in 1574 by the minor apostle Guru Ram Das. Amritsar is a favorite pilgrim resort; and it was the place where, perhaps to bind the Sikhs more firmly, was signed the treaty of 1846, providing for the cession to the British of the territory between the Beas and the Sutlej. The huge Govindgarh, or fortress, built in 1809, is the most prominent feature of Amritsar. The town has a good water supply in connection with the Bari Doab Canal. It is a municipality of the first class and is the seat of a native college. Pop., 1901, 162,429; 1911, 152,756.

AMRU-'L-KAIS, ăm'rōō-'l-kīs' (written also **IMRU'LKAIS** and **AMRULCAIS**). By many esteemed the greatest of Arabian poets. He was the son of Hujr and belonged to the South Arabian family of the Kinda. His life falls in the sixth century. One of his ancestors established a principality in Nejd; but their power dwindled more and more, and Amru-'l-Kais struggled in vain to recover it. About 530 he was invited by Justinian to Constantinople, where he spent many years. Before leaving he left his daughter and treasure with the Jewish ruler Samu'al ben Adia, who preferred to have his son die rather than to hand over what had been intrusted to him to Harith, the Ghassanid. He was made Phylarch of Syria by Justin II and is said to have died in Ancyra from poison sent him because he had seduced a princess in Constantinople. He was the author of the first poem in the collection called the Muallakat (q.v.). See Sir William Jones, *The Moallakat* (London, 1782); W. Ahlwardt, *The Diwan of the Six Ancient Arabic Poets* (London, 1870); G. de Slane, *Le divan d'Amro'l Kais* (Paris, 1837); F. Rückert, *Amrilkais, der Dichter und König* (Stuttgart, 1843).

AMRUM, ăm'rōōm, or **AMROM,** ăm'rōm. One of the north Frisian Islands, on the west coast of Schleswig, Germany, south of the Sylt, an island of the same group (Map: Denmark, B 4). The island is about 6 miles long and has an area of about 8 square miles. On the west side are high sand-dunes. It is unproductive. The fishing and oyster gathering were formerly considerable, but have dwindled away. Except for a little grazing land, the island is important only as a watering place. Pop., 1900, 900.

AMSDORF, ăms'dōrf, NIKOLAUS VON (1483–1565). A German Protestant reformer, an early and determined supporter of Luther. He was born at Torgau, Dec. 3, 1483, educated at Leipzig, and was among the very first students of the university at Wittenberg (1502), where he afterward taught philosophy and theology. He was with Luther at the Leipzig disputation (1519) and the Diet of Worms (1521) and was

in the secret of his Wartburg seclusion. He assisted the first efforts at reformation in Magdeburg, Goslar, and Einbeck. He was active in the Smalkald debates and spoke strongly against the bigamy of the Landgrave of Hesse. He was made Bishop of Naumburg in 1542, but was driven away in 1547 by the Imperial party during the Smalkaldic War, and took part in founding the University of Jena. In 1552 he became superintendent at Eisenach, where he died unmarried, May 14, 1565. He superintended the publication of Luther's works and opposed Melanchthon on the separation of the High-Lutheran party. He is the author of the familiar dictum, "good works are prejudicial to salvation," by which he meant those works which man thinks in themselves certain to save his soul. For his biography, consult: T. Pressel, *Leben und ausgewählte Schriften der Väter und Begründer der lutherischen Kirche* (Elberfeld, 1862); also Meurer, vol. iii (Leipzig, 1863).

AMS'LER, SAMUEL (1791–1849). A prominent line engraver of the German school, born at Schinznach, Switzerland. After preliminary training with Lips at Zürich, he studied at the Munich Academy under Hess. Proceeding to Rome in 1816, he came under the influence of Thorwaldsen and Cornelius. His technique, modeled upon that of Dürer and Marcantonio, is powerful and sure, and he is very faithful to the originals followed. His chief works include engravings of "Alexander's Triumphal Procession" by Thorwaldsen, Dannecker's "Christ," and Overbeck's "Triumph of Religion and the Arts." He is especially known as an engraver of the works of Raphael.

AM'STERDAM (earlier *Amstelledamme*, the dam or dyke of the Amstel). The chief city of the Netherlands, situated at the confluence of the Amstel with the Y or Ij (pronounced eye), an arm of the Zuider Zee (Map: Netherlands, C 2). Amsterdam has an area of 18⅛ square miles and has the shape of a semicircle, its diameter being the Y or Ij. The town is further cut up into six other concentric zones by canals. Other canals (or *grachten*) split up the city into 90 islands, crossed by about 300 bridges. Along these, rows of trees are planted, making the finest avenues of the city, of which the Singelgracht, 7 miles long, the Prinsengracht, the Keizersgracht, and the Heerengracht, which is 147 feet wide, are the most handsome. The bridge over the Amstel, the Hoogeslüs, has 32 arches, is 620 feet long, and affords a fine view of the city and harbor. In the southern part of the city some of the canals have been drained and filled in to form broad streets, as also a portion of the Y, which now is the site of the central railroad station. The great square of Amsterdam is the so-called Dam, getting its name from its position on the west side of the old wall that is popularly believed to be the site of the city's first foundations. Around it are the royal palace, the exchange, and the Nieuwe Kerk (New Church), and from it as a centre radiate the principal streets and street-car lines of the city. Here is the monument to the loyalty of Holland during the Belgian revolution of 1830–31. It is called Het Metalen Kruis ('the metal cross'), a reminiscence of the commemorative war medals then issued. Here, too, for one week in summer the boys of the city have the privilege of playing, because, it is said, in 1622 some boys here discovered a conspiracy of the Spaniards against the town.

Many of the buildings of the city are in the Dutch brick style of the seventeenth century. They are all built on piles, because of the loose, shifting nature of the sandy soil. It is necessary to go down from 14 to 60 feet before a firm foundation can be secured. An interesting part of the city is the Jewish quarter, the Jews having formed an important element of the inhabitants from the middle of the seventeenth century. In this part of the city Rembrandt lived and Spinoza was born.

Among the ecclesiastical structures of the city, the Nieuwe Kerk (New Church), or St. Catharine's Church, a cruciform basilica in the late Gothic style, erected in 1408–78, is the finest. The interior contains interesting remnants of old stained glass, a beautifully carved pulpit, executed by Vinckenbrinck in 1649, and monuments to Admiral de Ruyter and the famous Dutch poet Vondel. Here the Dutch sovereigns are enthroned. The Oude Kerk (Old Church), or St. Nicholas's Church, a Gothic structure dating from about 1300, is noticeable for handsome stained-glass windows of the sixteenth and seventeenth centuries, and contains several monuments to naval heroes. In the Jewish quarter the synagogue of the Portuguese Jews is interesting, as being built in imitation of Solomon's Temple; it also boasts a considerable number of costly vessels. The handsomest secular edifice is the royal palace, built by Jacob van Kempen in 1648–55 as a *stadthuis*, or town hall, a massive structure resting on a foundation of 13,659 piles, and surmounted by a round tower rising 187 feet from the base and commanding an extensive view. The gilded vane of the tower represents a merchant vessel. The building is adorned with numerous statues, bas-reliefs, and mural paintings, the interior profusely decorated by eminent Dutch sculptors (especially Artus Quellinus) and painters of the seventeenth century. All the principal apartments are lined with white Italian marble and richly adorned with sculptures, especially the magnificent reception room, an apartment of great splendor, and one of the largest halls in Europe, measuring 120 feet in length, 57 feet in width, and 100 feet in height. The building was converted into a royal residence in 1808, being presented by the city to King Louis Bonaparte. The Rijks-Museum, a stately edifice, erected in 1877–85, in the early Dutch Renaissance style, with various Gothic and Romanesque characteristics, is richly adorned with the work of Dutch architects, painters, and sculptors, including allegorical bas-reliefs, encaustic paintings, and figures in colored tiles, symbolic of the Dutch towns and provinces. The museum contains one of the most important collections of paintings and engravings in the world. The works of Rembrandt are especially well represented, and besides his most celebrated work, the so-called "Night Watch," include "De Staalmeesters" ('Syndics of the Cloth Hall'), "The Jewish Bride," and one of his most finished portraits, that of "Elizabeth Bas." Van der Helst's "Banquet of the Civic Guard," is another highly prized gem of this collection, which abounds in select paintings by the most famous Dutch and Flemish masters. The museum further includes an interesting department showing the development of ecclesiastical art in the Netherlands from the Carolingian period to the seventeenth century, and a valuable collection of objects of industrial art. In the

Fodor Museum may be seen 161 admirable paintings by modern Belgian, Dutch, and French artists; about 300 drawings by old masters, and about 100 engravings. The Six Gallery is a small but extremely valuable collection of paintings by the old Dutch masters, while the modern Dutch artists may be studied to great advantage in the Municipal Museum, containing about 200 select specimens.

Amsterdam has long been renowned as a centre of learning. The school known as the Athenæum Illustre of Amsterdam, which was founded in 1632, in 1877 was reorganized as the University of Amsterdam. Its library now has 148,000 volumes, including the Rosenthal collection of 8000 works on Jewish literature. It is rich in manuscripts and original letters. Amsterdam possesses excellent facilities for medical study; her hospitals are famous. Other educational institutions are state, normal, industrial, and commercial schools, the National Academy of Arts, the Royal Academy of Sciences, the Royal Dutch Geographical Society, a school of navigation, and a municipal school for primary teachers, and a school of acting. The Botanical Gardens rank among the foremost in Europe, and are equipped with a library and ethnographical museum. They were established by the society Natura Artis Magistra, founder also of the Zoölogical Gardens. There are numerous other institutions of learning and scientific societies, the most remarkable of the latter being the Maatschappij tot nut van't Algemeen, or Society for the Public Welfare, which has spread over all Holland. It was founded at Edam in 1784 and moved to Amsterdam in 1787. It aims at bettering the education and culture of the people and strives toward this end in every possible way.

Amsterdam has six theatres, one of them owned by the city. Prominent among the benevolent institutions are the various orphan asylums, one of which, the Diaconic Asylum, erected in 1889, has about 1200 inmates.

For centuries Amsterdam has been the centre of Dutch industry, and its diamond-polishing factories are the most extensive in the world. These are exclusively in the hands of the Portuguese Jews and employ upward of 12,000 workmen. Machinery manufacture, ship building, and iron molding are important industries, and there are large refineries for borax and camphor, producing over 22,000 tons annually. The preparation of rice for the market amounts to 23,000 tons yearly, and besides, there are large glass-blowing establishments and many breweries and lumber mills. Other manufactures are articles of gold and silver, silk, porcelain, and carpets, cordials, chocolate, tobacco, leather, dyestuffs, astronomical instruments, chemicals, cobalt blue, stearine and sperm candles, and sailcloth.

Amsterdam's commercial importance has advanced rapidly since 1865. Since 1876 the short North Sea Canal has been in operation, running to an artificial harbor of 250 acres on the North Sea. The celebrated North Holland Canal (1825) has been supplanted by it for most of the sea traffic. The Merwede Canal to Gorinehem was built in 1892. Within the city much attention is paid to dredging and improvement of the canals centring to the north in the three islands, near which are the docks of the various steamship lines that connect the city with all the great ports of the world. Here, too, are the naval docks and stores, a vast system of docks for merchant shipping, granaries, and railway terminals for the reception of coal and iron ore, raw materials, etc. Another canal connects Amsterdam with Utrecht. There is a floating dry dock on the north bank of the Y for ships of 4000 tons and of 16 feet draught, while another dock of twice the size has been constructed. Amsterdam had need of such improvements, for her percentage of shipping entering Holland was 18.8 in 1889 and 6.66 in 1899; by 1911 it had risen to 13.5. In 1911 the total tonnage, entered and cleared, was 3,411,000.

The chief trade is with the Dutch East Indies, and the imports are mainly tropical products, such as raw sugar, Java and Sumatra tobacco, coffee from Brazil and Java, tea, chemicals, cinchona, and other drugs, lumber, and rice. Other articles of import are machinery and manufactured articles, wheat, glassware, and petroleum. In addition to the colonial products —coffee, tobacco, drugs, and rice—Amsterdam exports such Dutch products as cheese, beer, and manufactured articles mentioned above.

Amsterdam is the chief financial centre of the Netherlands. Its stock exchange, once the centre of the world's banking transactions, is still of considerable importance. There are many other financial and commercial institutions, and the city is the seat of the Bank of the Netherlands established in 1814 on the model of the Bank of England. It has full control of the country's paper money. It is the successor of the famous Bank of Amsterdam, founded in 1609 and dissolved in 1796, which played so important a rôle in the history of banking.

Amsterdam has a complete network of communications with the interior through railway and steamship lines, while various electric lines traverse her streets. There is also a suburban steam railroad.

Amsterdam's new method of fortification merits some attention. In 1870 the old walls had all been razed, and since then a system of dikes and sluices has been devised whereby the surrounding country may be flooded; so that now there is only one fort, that at the entrance to the harbor.

Upward of one-fifth of the population of Amsterdam are Catholics, and the Jews form nearly one-ninth. There are, besides, many Germans. Pop., 1879, 316,000; 1900, 510,900; the census of Dec. 31, 1909, showed 566,131 inhabitants, and the estimate of Dec. 31, 1911, 580,960; Dec. 31, 1920, 642,162.

History. We first hear of Amsterdam in the thirteenth century. Giesebrecht II of Amstel built a castle there in 1204 to protect the town, and in 1240 his son, Giesebrecht III, for the purpose of keeping out the sea, constructed a dam, which gives the town its name. The count of Holland, Floris V, gave the city free trade with his territories, and Amsterdam became part of the County of Holland in 1347. From now on the town increased rapidly, and, though devastated by fire in 1421, it was influential enough to obtain from Maximilian I the right of bearing the imperial crown as its crest. After the war of independence, when Antwerp succumbed to the Spaniards, Amsterdam became the chief commercial centre of the North; and after the foundation of the Dutch East and West India companies, in the first quarter of the seventeenth century, with their headquarters in the city, it attained still greater

prosperity. Even the wars with England in 1652–64 and 1665–67 did not long hinder its progress. The decline of the city came in the latter part of the eighteenth century, as a result chiefly of the war with England of 1780–84 and the alliance with France. Its commerce disappeared entirely after it became a part of the French Empire in 1810, only to be revived in the second half of the nineteenth century by the building of the great canals to the sea and to the Rhine system.

AMSTERDAM. A barren islet of volcanic origin, in the Indian Ocean, situated in lat. 37° 52′ S. and long. 77° 37′ E. It covers an area of about 25 square miles and, together with the adjacent island of St. Paul, forms a dependency of Mauritius. Both islands lie about midway between the Cape of Good Hope and Tasmania. It was discovered by Van Diemen in 1663, and came under French control late in the nineteenth century.

AMSTERDAM. A city in Montgomery Co., N. Y., 33 miles by rail northwest of Albany; on the Mohawk River, the Erie Canal, and the New York Central and Hudson River and the West Shore railroads (Map: New York, F 3). Prominent features include St. Mary's Catholic Institute, the Fort Johnson Museum, homes for aged women and children, and two hospitals. Amsterdam has factories producing knit goods, carpets, rugs, wagon springs, linseed oil, brooms, silk gloves, paper boxes, etc. First settled about 1778 and known as Veedersburg until 1804, Amsterdam was incorporated as a village in 1830, and as a city in 1885. Pop., 1890, 17,336; 1900, 20,929; 1910, 31,267; 1920, 33,524.

AMSTERDAM, University of. A Dutch university founded by the city of Amsterdam in 1632 as the Athenæum Illustre, in 1867, after a checkered existence, it was reorganized, and in 1877 was raised to the dignity of a royal university, ranking with those of Leyden, Groningen, and Utrecht. In 1911–12 it had 1130 students and an income of over 600,000 florins. Its faculties include law, medicine, mathematics and science, arts, and theology. Its administration is in the hands of a "Curatorium" of five members and a secretary, chosen by the crown. The professors form the Senate, with a Rector Magnificus as their head, and a Secretary of the Senate. The library is large and includes a number of special collections, particularly in Hebrew and on medicine.

AMU, ä-mo͞o′, or **AMU DARYA,** ä-mo͞o′ där′yä (ancient Oxus). A large river of Central Asia, which has its source in the Pamir plateau between India and Bokhara, flowing thence northwest in the Aral Sea. In its course through the mountains it is joined by the Surkhab from the region of the Alai and Trans-Alai Mountains, by the Kafirnahan and Surkhan from the Hazrot Sultan chain, and by numerous smaller streams, but after emerging from the outer slopes it receives no important tributaries. The Zerafshan on the north and the Murghab on the south, which formerly drained into the Amu, now lose their waters in the desert regions at some distance from its bed. It is navigable by light-draught boats for nearly one-half of a total length of about 1600 miles, but its chief importance is as a reservoir for irrigation rather than as a commercial highway. Some geographers assert that the course of the Amu has been changed within historic times, holding that, as late as the first half of the sixteenth century, it flowed into the Caspian Sea, and that the course has been changed twice to the Aral Sea. Consult: Sir H. C. Rawlinson, "The Road to Merv," in the *Proceedings of the Royal Geographical Society*, new series, vol. i, p. 161 (London, 1879); Krapotkin, "The Old Beds of the Amu-Daria," *Geographical Journal*, vol. xii (London, 1898).

AMUCK′, or **AMOK′,** Running (Javanese *amook*, to kill). A practice in Java among those in whom a ferocious madness is produced by long use of opium. The sufferer rushes abroad, armed with some weapon, usually a *kris* or large dirk, striking indiscriminately at all whom he encounters. When one is seen to start on his madness, the people cry "amok" and immediately hunt the maniac to death. Probably in many cases this is deliberate on the victim's part, as a means of suicide.

AM′ULET (Lat. *amuletum*, from Ar. *hamalet*, that which is suspended). Any object worn as a charm, or sometimes placed in a building to ward off evil. Amulets originated at an early date in the Orient, and regard for them is among the earliest superstitions of the Babylonians and Egyptians. The magical formulas connected with them are frequent in early Babylonian texts. Their religion included belief in a multitude of spirits present everywhere and influencing every act. Hence the necessity of preserving the house, property, and person by images and formulas, and these were from the beginning connected with medicine. Not only among the ancient Egyptians but also among many savage peoples of to-day, a large proportion of the forms of ornamental art were originally amulets, i.e., possessed of magical efficiency. (See Animism, Fetish.) Even the monotheistic Hebrews were not free from the taint, and the so-called *phylacteries*, with passages from sacred writ, were an adaptation of these magical beliefs. The Greeks and Romans inherited the same beliefs in a modified degree. Perhaps the most general evil to be guarded against by amulets at all times was the Evil Eye, which is still so firmly believed in throughout Latin countries. There were various classes of amulets. First came certain precious or other stones supposed to possess mysterious helpful properties: agates for spiders' and scorpions' stings, and for protection against thunderstorms; diamonds for melancholy; jasper for the tongue-tied and to bring on rain; amethyst against drunkenness, and, with certain inscriptions and figures, as antidotes to poisons, hail, and locusts, etc. One of the most permanent of all such beliefs is that in the beneficial effects of coral. Metals, also, and plants, were used as amulets. So were various parts of certain animals, such as hyena teeth or marrow, wolves' fat, rats' ears, foxes' tongues, and bats' heads. Most efficacious of all are the teeth of different animals. After these natural objects come artificial ones. A large proportion of ancient jewelers' work was undoubtedly made in connection with the wearing of amulets, especially necklaces, rings, bracelets, earrings, and other pendants. Other ways of carrying amulet material was in gold balls or *bullæ*, or in sachets. The formulas carried were usually inscribed, not on paper, but on some durable substance—metal, terra cotta, ivory, precious stones. Trinkets of every variety and shape—crescents, disks, pendants—were hung about the necks of children and adults as charms; and

few went without them. Figures of gods and genii had magic virtue as well; so did verbal formulas. (See ABRACADABRA, and ABRAXAS.) Many of such tiny images are found on necklaces. Anchors and horseshoes, heads and figures of animals, votive hands and feet, thunderbolts, vases, and many other objects, all had their specific values. The amulets not only were suspended around the neck, worn in jewelry, and sewed in the clothing, but also were affixed to furniture and walls, painted or carved on doors and walls, and buried in the ground. They even followed the deceased to his grave. Christianity was as unable as Judaism to eradicate the practice; so it sought to mitigate it by legislation and by offering devotional substitutes in the form of sacred relics or formulas from the Bible. These substitutes were carefully distinguished from the heathen amulets which the clergy were forbidden in the fourth century to make, under pain of deprivation of holy orders, and the wearing of which was solemnly condemned by a council in 721. But in the East the practice still flourishes, as well as in parts of southern Europe. Consult King, *History of Precious Stones and Gems* (London, 1873), and Kunz, G. F., *The Curious Lore of Precious Stones* (Philadelphia, 1913).

AMUNDSEN, ä'mŭn-sĕn, ROALD (1872—). A Norwegian explorer, born at Borge, Norway. He was educated for the naval service of Sweden-Norway, and became a second lieutenant. In 1901 he made observations on the East Greenland current which were considered valuable. He was permitted to join the *Belgica* expedition to the Antarctic in 1897–99, and was first officer of the ship throughout that expedition, which explored the region west of Graham Land. He sailed from Norway, June 17, 1903, in the ship *Gjöa,* for the purpose of relocating the position of the north magnetic pole to the north of the American mainland and making a magnetic survey of that region. Sir James C. Ross, in 1831, had fixed the position of the magnetic pole on the west coast of Boothia. Amundsen made his headquarters on the southeast side of King William Land, and, by many excursions, he was able to prove that the north magnetic pole has no immovable and stationary position but in all probability is in continual movement. His numerous observations during 19 months were taken to Norway, where their study is not yet completed. Captain Creak, the British authority on terrestrial magnetism, wrote in 1906 that years would elapse before the observations would be in form to yield the definite information expected.

During this work Lieutenant Hansen charted the east coast of Victoria Land, which had never been surveyed, as far north as the seventy-second parallel. The land formerly seen by Dr. Rae at the south end of Victoria Strait proved to be a group of over 100 small islands. The feature of Amundsen's work, however, which excited most general attention was his achievement of the Northwest Passage. In the summer of 1905 his party made their way from King William Land westward through the channels between the American mainland and the islands, reaching near Herschel Island on August 13, waters that are visited every year by San Francisco whalers.

After his return to Europe Amundsen began preparations for his proposed five years' drift on Nansen's ship, the *Fram,* across the north polar area to make a scientific study of all the natural phenomena that could be observed. His plan was endorsed by leading geographers, but the necessary funds had not been provided up to 1910. The explorer, however, sailed from Norway on August 9, that year, though lacking $40,000 worth of equipment that he deemed necessary for the northern undertaking. He believed he had ample supplies for an attempt on the south pole, but he did not announce his purpose until he reached Madeira, when he wrote to Nansen that he thought his chances for reaching the south pole were good, and success in that field would doubtless bring him the funds needed for the northern project. His comrades agreed to stand by him in the new venture, and the *Fram* sailed for the Antarctic.

The Bay of Whales, 115 miles west of King Edward VII Land, became Amundsen's base of operations. He had conceived the daring idea of planting his winter camp on the surface of the great ice barrier. He arrived in the Bay of Whales on Jan. 14, 1911. Fourteen days later all the material for his house, all the supplies for nine men for two years, had been taken to the top of the ice, the house erected, and Amundsen and his landing party and 97 Eskimo dogs were established in their winter camp.

Amundsen remained in the Antarctic a few days over a year. While the climax of his work was the discovery of the south pole, the whole period was marked by first-rate achievement and the best of good fortune, much of which could not have been his if he had not prepared for every undertaking with exhaustive attention to detail. His equipment met every requirement. He had placed his whole trust in Eskimo dogs and skis with the result that he was able to plant his supply stations far to the south, each depot so well marked by flags and signs that he could find it later even in dense fog. His dogs were so well and carefully kept that they were able to render the best service. Before the sun disappeared his party had secured 66 tons of fresh seal meat for men and dogs.

On Dec. 14, 1911, Amundsen and his four comrades reached the south pole after a journey of 863 miles from their camp. When they reached the end of the ice barrier and began to ascend the slope of the Antarctic continent, they were still 335 statute miles from the pole. Mounting to the plateau, the highest altitude attained was 11,124 feet above sea level; and from this place they traveled to the pole over an even plain at practically the same level. Many mountain ranges and isolated peaks rose to heights of 16,000 feet and more. The large area of new land discovered and scientific contributions to several departments of knowledge placed this expedition among the most successful of polar enterprises. After his return from the south pole Amundsen lectured in most countries of Europe and North America and in Australia. His book, entitled in the English edition "The South Pole" (1913), was published in several languages.

When Amundsen returned home, the Norwegian government appropriated a sum of money practically adequate for the needs of his proposed drift across the Arctic Ocean; one of the geographical societies also contributed $25,000 towards the work. The explorer expected in 1914 to push the *Fram* into the ice of the Arctic Ocean north of Bering Strait.

AMUR, ä-mōōr'. A province of eastern Si-

beria (q.v.), situated north of the Amur River; area, 174,427 square miles. It was ceded by China to Russia in 1858. The capital is Blagovyeshchensk. Pop., 1891, 87,705; 1897, 120,306; 1912, 230,200.

AMUR. A river of eastern Asia, formed by the junction of the Shilka and Argun rivers, near the Russian village of Ust-Strielka, at the north end of the Khingan Mountains, lat 53° 20′ N. and long. 121° 28′ E. (Map: Asia, N 4). From the point of junction of the two rivers the Amur flows at first east and then southeast along the northern boundary of Manchuria, to about parallel 48° N. and long. 131° E. at Ekaterino-Nikolsk, where it turns east-north-east, and at about 137° northeast, and near Fort Nicolayevsk, in lat. 53° 20′ N., it empties into the strait which separates the island of Saghalin from the mainland, near the point where that channel opens into the Sea of Okhotsk. Including its headstream of Argun, the Amur has a total length of nearly 2800 miles, and its basin is estimated at more than 770,000 square miles. The principal tributary of the Amur is the Sungari, which joins it on the right near the point at which the Amur begins its great bend toward the north and soon after passes through a gorge 140 miles long. Another important affluent from the right is the Ussuri. The chief affluents on the left are the Zeya and the Bureya. The river is very wide in the lower part of its course, and there are many islands in it. The great station of the steamers that navigate the Amur and the Ussuri is Khabarovsk (formerly called Khabarovka), which is connected by rail with Vladivostok. On the left bank of the Amur, near the parallel of 50°, is Blagovieshtchensk, the capital of the Amur territory. A short distance below this town, on the opposite bank, is Aigun. The Amur is navigable for smaller vessels through its entire course, and steamers can ascend the Shilka beyond the town of Strietensk. As far as the mouth of the Zeya, vessels drawing as much as eight feet can go. The Amur is open for navigation for only about six months in the year. The region through which it flows is partly covered with thick forests, and but few settlements are found on its banks. Gold is mined in some quantity on its upper waters.

As early as 1636, several Russian adventurers, attracted by rumors of the wealth of the regions to the southeast of Lake Baikal, made excursions into the Chinese territories on the Lower Amur by way of the Shilka River. In 1649 Khabarov descended the Amur, subdued the native tribes, and erected a number of forts at the junction of its tributaries In 1658 Nertchinsk on the Shilka was founded, and about 1665 Fort Albasin was erected. The Chinese, who had watched the Russian advance with great uneasiness, now took up arms, attacked Fort Albasin repeatedly, and in the peace of Nertchinsk (1689) succeeded in closing the Amur to the Russians, who for more than 150 years made no conquests in Manchuria, and contented themselves with extending their influence through commerce, missionary work, and diplomacy. With the appointment of Count Nicholas Muravieff to the governorship of East Siberia, active operations recommenced. A line of forts was constructed on the Amur, the coast of the Gulf of Tartary, and the island of Saghalin. In four expeditions undertaken in 1854 and subsequent years Muravieff established the authority of Russia over the Amur region, and some slight attempts were made at colonizing the country with Russian settlers. With the English and French marching upon Peking, China could not resist the Russian encroachments. The treaties of Aigun and Tien-tsin concluded in 1858, and the supplementary treaty of Peking in 1860, in ceding eastern Manchuria to the Russians, merely gave formal recognition to an accomplished fact. By these treaties Russia obtained possession of all the country between the Pacific and the Amur, the Ussuri and the Tiumen rivers down to the Korean frontier. In this manner the long-desired goal of Russian foreign policy, an outlet and an ice-free port on the Pacific, was attained. The new territory was divided into two regions, the Amur Territory and the Maritime Province. In 1861 Vladivostok was founded; it became the chief military centre and arsenal of the Russians in the East, until supplanted after 1898 by Port Arthur. During the Boxer uprising of 1900 the Chinese bombarded the town of Blagovieshtchensk on the eastern bank of the Amur. This was followed by the Russian occupation of Manchuria and the chain of events leading to the Russo-Japanese War. Consult: Collins, *Voyage down the Amur* (New York, 1866), and *Exploration of the Amoor* (1864); Andree, *Das Amurgebiet* (Leipzig, 1876).

AMURATH, ä′mo͞o-rät′, or **MURAD′ I** (1319–89). Sultan of the Ottoman Empire from 1359 to 1389, succeeding his father Orkhan. He was the first to lead a powerful Turkish army into Europe and in 1361 took Adrianople and fixed there his residence. He completed the subjugation of Asia Minor, and in 1389 his army dealt a crushing blow to the kingdom of Servia in a battle fought at Kossovo. The great Sultan himself was slain on the field of battle, stabbed, according to the common account, by a wounded Servian nobleman as he was surveying the scene of his victory. Amurath was remarkably able, but is said to have been absolutely illiterate, signing treaties by dipping his hand in ink and making a mark with three fingers together, with the fourth finger and thumb stretched wide apart. Consult Hammer-Purgstall, *Geschichte des osmanischen Reiches* (Pesth, 1840).

AMURATH, or **MURAD II** (1403–51). The tenth Sultan of the Turks. He succeeded his father, Mohammed I, in 1421. In 1422 he contended against a pretender, Mustapha (the legitimate Mustapha having previously died), but overcame him without bloodshed. He took Salonica from the Venetians in 1430 and opened the way for subjugating Greece. He went on successfully, on the whole, till 1442, when he was defeated by Hunyady; in 1444 he was obliged to make peace with the Christians. At that time he lost a son, and abdicated in favor of another son, Mohammed, only 14 years old. The Hungarians renewed the war almost immediately, and, hastening from retirement, he overwhelmed them in the battle of Varna, Nov. 10, 1444, where Ladislas, King of Hungary and Poland, fell. He again retired and again came forth to quell an insurrection of the Janissaries. He invaded Albania and was defeated by George Castriota (Scanderbeg); but he retired only to gain a great victory over his formidable adversary Hunyady at Kossovo, in 1448. He was the first Ottoman monarch who caused bridges of great length to be built, and in his reign

poetry, jurisprudence, and theology began to flourish. Consult Lane-Poole, *Turkey* (New York, 1889), and Halil Ganem, *Les Sultans Ottomans*, 2 vols. (Paris, 1901–02).

AMURATH, or **MURAD III** (1545–95). A Sultan of the Turks. He succeeded his father, Selim II, in 1574. He was a feeble, uxorious, superstitious man. His reign was marked by great reverses in Hungary, counterbalanced by territorial gains in Persia and Asia Minor. He made commercial treaties with the Western Powers and was also the first to feel the tyranny of the Janissaries.

AMURATH, or **MURAD IV** (1611–40). A Sultan of the Turks. He succeeded his uncle, Mustapha, in 1623. He is known as "the Turkish Nero," and, like his Roman namesake, he began his reign with great promise; but the mutinous behavior of his soldiers, and the frequent rebellions that marked the first years of his rule, made him a tyrant of extraordinary cruelty. His greatest exploit was the retaking of Bagdad from the Persians (1638), after an assault lasting 30 days, an occasion on which he slaughtered 30,000 of the inhabitants.

AMURATH V (1840–1904), Sultan of Turkey. He was the son of Sultan Abd ul Medjid and was born Sept. 21, 1840. After the accession of his uncle, Abd ul Aziz, in 1861, he was kept in forced retirement, but was placed upon the throne by a revolution May 30, 1876. He showed strong symptoms of insanity, however, and was deposed August 31 of the same year.

AMUSSAT, ä'mü'sä', JEAN ZULÉMA (1796–1856). A French surgeon. He entered the army, was assistant surgeon under Esquirol in the Salpêtrière Hospital, and prosector at the Paris faculty of medicine. He improved and invented many surgical instruments and was the first to show the importance of torsion of arteries in hemorrhage. He wrote on the nervous system, lithotomy, etc. An operation for opening the large intestine at a point where it is not covered with peritoneum was perfected and first practiced by Amussat. It is still performed, and it bears his name. Among his publications are researches regarding the nervous system (1825), and a memoir on the torsion of arteries (1829), the latter winning a prize from the Institute.

AMY'CLÆ (Gk. *Ἀμύκλαι, Amyklai*). 1. An ancient town of Laconia, on the eastern bank of the Eurotas, 2½ miles southeast of Sparta, in a richly wooded and fertile region. It was early a famous city and after the Dorian conquest seems to have maintained its independence as an Achæan town until the development of the Spartan power. In the neighborhood of Amyclæ have been found important remains of Mycenæan civilization, including the gold cups of Vaphio. At Amyclæ was an ancient temple of Apollo, containing a primitive bronze image of the god (*xoanon*) standing on an elaborate bronze throne. It was the work of Bathycles. Pausanias has given a description of it, important in the history of early Ionic art. At Amyclæ were celebrated annually the Hyacinthia, in memory of Hyacinthus (q.v.). 2. AMYCLÆ, or Amuclæ, an ancient city on the coast of Latium, Italy, said to have been built by a colony from the Greek Amyclæ. It had ceased to exist before the time of Varro. Tradition said that after many false alarms of the approach of the enemy it was decreed that no one at Amyclæ should announce the approach of an enemy. Hence, when the enemy did appear, they found it easy to take the town. This story is, however, an invention, to explain the phrase *tacitæ Amyclæ*, which somehow had become proverbial to express profound silence.

AMYG'DALIN (Lat. *amygdala*, Gk. *ἀμυγδάλη, amygdalē*, almond), $C_{20}H_{27}NO_{11}$, $3H_2O$. A crystalline substance existing in the kernel of bitter almonds and in various other plants. It is obtained, by extraction with boiling alcohol, from the paste of bitter almonds, which remains after the fixed oil has been separated by pressure. The alcoholic solution usually contains more or less oil, which must be removed by decantation or filtration; it is then evaporated till a syrup is left, from which the amygdalin may be obtained by the addition of ether; amygdalin is insoluble in ether and is, therefore, precipitated by it from its solutions. Amygdalin has a somewhat bitter taste, but is not poisonous. It may be dissolved in water for any length of time without undergoing any change; but if some emulsin (or some dilute mineral acid) be added to the solution, a sort of fermentation is set up, and the amygdalin gradually undergoes decomposition into benzaldehyde (q.v.), glucose, and hydrocyanic or prussic acid. Now, as emulsin, too, is one of the constituents of bitter almonds, when the paste of bitter almonds is brought into contact with water, a poisonous liquid is obtained. Emmerling has succeeded in producing amygdalin synthetically, from mandelic nitril glucoside and ordinary glucose, by means of maltase, an enzyme contained in yeast.

AMYG'DALOID (Gk. *ἀμυγδάλη, amygdalē*, almond + *εἶδος, eidos*, shape). A name given in geology to igneous rocks, generally of a basaltic nature, which contain numerous almond-shaped or spheroidal cavities filled with foreign minerals, such as quartz, calcite, or some one of the zeolites. These cavities are regarded as the result of the escape of gases when the rocks cooled, at which time the crystallization of the minerals also took place, these being for the most part similar in composition to the rock.

AM'YL (Lat. *amylum*, from Gk. *ἄμυλον, amylon*, starch + *ὕλη, hylē*, material), C_5H_{11}. A radicle, or group of atoms, found in the molecules of many carbon compounds.

AMYL AL'COHOL. A name applied to eight alcohols having the same molecular composition ($C_5H_{11}OH$), but more or less different chemical and physical properties. Seven of these alcohols have actually been prepared; the possibility of the existence of the eighth is indicated by the structural theory of compounds. The most important amyl alcohols are the two found in fusel oil, which is produced as an impurity during alcoholic fermentation. Of these, one is called iso-butyl-carbinol, $(CH_3)_2\,CH.CH_2.CH_2OH$; the other, secondary butyl-carbinol $CH_3.CH^2CH\text{-}(CH_3).CH_2OH$. Iso-butyl-carbinol boils at 131° C., has a specific gravity of 0.810, and is optically inactive; it forms the predominating constituent of fusel oil. Secondary butyl-carbinol boils at 128° C., and imparts to fusel oil, of which it forms 10 to 20 per cent, the property of turning the plane of polarized light to the left. The esters (compound ethers), formed by the union of amyl alcohols with some of the acids of the acetic acid series, have highly aromatic odors, resembling those of the apple, the pineapple, the strawberry, the banana, and other fruits. Fusel oil is therefore used in

making artificial fruit essences, which are now generally employed for flavoring syrups, confectionery, etc.

AM'YLENE HY'DRATE. See AMYL ALCOHOL.

AM'YL NI'TRITE. An extremely volatile, pale yellow, oily liquid, with an aromatic taste and fruity odor. It is formed by the action of nitric acid upon amylic alcohol (fusel oil). As it rapidly deteriorates, it is necessarily kept in "small, dark, amber-colored and glass-stoppered vials, in a cool and dark place." The drug is also put into closed glass capsules, or "pearls," which may be crushed in a handkerchief when desired for use. Though occasionally administered internally, it is usually given by inhalation. A moderate amount inhaled causes immediate flushing of the face, a feeling of fullness and pain in the head, tumultuous heart action, labored breathing, and a soft and full pulse. If continued, the head seems distended as though it would burst, and the other symptoms increase. Within a few minutes all these symptoms disappear except the headache, which may last several hours. Poisonous doses cause pallor, irregular breathing, muscular relaxation, and death. Xanthopsia, or yellow vision, sometimes follows inhalation of amyl nitrite, but this is transitory. The chief use of amyl nitrite is to relieve attacks of angina pectoris. It is also valuable for aborting epileptic seizures, especially when there is an aura, or peculiar sensation denoting the approach of one of these. In seasickness, and such spasmodic conditions as asthma, tetanus, or strychnine poisoning, it is occasionally effective. See NITROGLYCERIN.

AMYLOP'SIN. A ferment or enzyme contained in the pancreatic juice which has the property of converting starch into sugar. See DIGESTION; PANCREATIN.

AMYNTAS, à-mĭn'tăs, **I** (Gk. *'Αμύντας*). King of Macedonia from about 540 to 498 B.C. In token of submission to the Persians about 513 B.C., he presented earth and water to the ambassador, Megabazus, whom Darius, on his return from the Scythian expedition, had left at the head of 80,000 men in Europe. He remained subject to the Persian King.

AMYNTAS II (or **III**). King of Macedonia from about 394 to 369 B.C., son of Philip, the brother of Perdiccas II. He succeeded his father in Upper Macedonia and obtained the crown of the entire country by the murder of the usurper, Pausanias (393 B.C.). Soon after his accession he was driven from Macedonia by the Illyrians, but by the aid of the Thessalians was restored to his kingdom. Afterward he entered into an alliance with the Spartans. He left three sons, Alexander, Perdiccas, and Philip the Great. Some authorities call him Amyntas III; according to them Amyntas II ruled from about 394 to 389.

AMYNTAS III (or **IV**) (–336 B.C.). Grandson of Amyntas II, son of Perdiccas. On the death of his father, in 360 B.C., he was the lawful heir to the throne, which was, however, usurped by his uncle, Philip, father of Alexander the Great. He was put to death in the first year of the reign of Alexander the Great (336 B.C.), who charged him with having conspired against his life.

AMYNTOR, GERHARD VON. A German writer. See GERHARDT, DAGOBERT VON.

AMYOT, à'myō', JACQUES (1513–93). Tutor of King Charles IX, of France, Bishop of Auxerre, and Commander of the Order of the Holy Ghost, born at Melun, and professor of Greek and Latin at Bourges. He is remembered chiefly for his translations of the Greek romances, *Theagenes and Chariclea* (1547), and *Daphnis and Chloë* (1559), together with *Diodorus Siculus* (1554), *Plutarch's Lives* (1559), and *Plutarch's Morals* (1572). This Plutarch was the basis of North's English version (1575) used by Shakespeare. It was much admired for its personal touch and was used by Corneille. It outranks Amyot's other translations among French classics.

AMYOT, à'myō', or **AMIOT,** JOSEPH MARIA (1718–93). A celebrated French Jesuit and Oriental scholar. He lived as a missionary in China from 1750 to the time of his death. His knowledge of Chinese dialects enabled him to collect many valuable notices of antiquities, history, language, and arts in China. His writings include large contributions to the *Mémoires concernant l'histoire, les sciences, les arts, les mœurs, et les usages des Chinois par le missionnaires de Pekin* (1776–1814). His *Dictionnaire Tatar-Mantchou-François* (1789–90) was edited by Langlés.

AM'YRAL'DISM. See AMYRAUT.

AMYRAUT, à'mē'rō', MOSES (MOÏSE) (1596–1664). A French Protestant theologian and metaphysician. He was born at Bourgueil, near Tours. His father set him to study law, and he made rapid progress in the University of Poitiers. He became a licentiate in law (1616), but the reading of Calvin's *Institutes* induced him to leave law for theology, and he studied at Saumur and "sat at the feet of the great Cameron," a pupil as great as his master. There he became a pastor in 1626; in 1633 professor of theology. He was co-professor with Louis Capel and Josua de la Place. Their life-long friendship was beautiful and remarkable, as is their memory as joint authors of the *Theses Salmurienses.* In 1631 Amyraut published *Traité des religions* (Saumur), still a living work; and thenceforward he was foremost in provincial and national synods. The esteem in which he was held was shown when the Charenton synod of 1631 chose him to present to the King the *Copy of the Complaints and Grievances for the Infractions and Violations of the Edict of Nantes.* Before this time all save Roman Catholic deputies had addressed the King on their knees; but Amyraut refused to speak unless he could stand as did the Romanists, and carried the day, his rehearsal charming even his adversaries. His oration is an historic landmark of French Protestantism. He held fast to Calvinism, but with an unusual liberality. He was repeatedly accused, but never convicted, of heresy, because in his *Traité de la prédestination* (1634) he advocates a modification of the strong predestination theory of the Synod of Dort by the "Universalismus hypotheticus," i.e., the theory that God offers salvation to all under the conditions of faith. This is known as Amyraldism and found many adherents—among them Baxter, Andrew Fuller, and the New England divines. He died at Saumur, Jan. 8, 1664. He left many religious works.

AN, or **ON.** The Egyptian name of Heliopolis.

A'NA. A termination added to the names of remarkable men, to designate collections of their sayings, anecdotes, etc.; as in the works entitled *Baconiana, Johnsoniana.* Such titles were first used in France, where they became common

after the publication of *Scaligerana* by the brothers Dupuy (The Hague, 1666). In English literature there are many works of this kind. America, also, has its *Washingtoniana*, while Jefferson's *Anas* are well known to students of the history of American politics.

AN'ABAP'TISTS (Gk. *ἀναβαπτίζειν, anabaptizein*, to rebaptize). A term applied generally in Reformation times to those Christians who rejected infant baptism and administered the rite only to adults; so that when a new member joined them, he or she was baptized, the rite as administered in infancy being considered no baptism. Still, because all other branches of the Church considered this a *second* baptism, the term *Anabaptist*, i.e., one who baptizes *again*, was naturally applied to them. The name is, however, not now used by the present Baptists.

The Anabaptist movement was not the product of the Reformation. It was a combination of two factors, the religious and the social, both of which came from times previous to the Reformation. On the religious side it was the successor of the various groups of *brethren* and *Friends of God*—unorganized movements, mostly of humble men, who insisted upon religion as a personal relation between man and God, repudiated the exclusive claims of the Church, and fostered a pure and pious life by Bible reading and, where possible, a single common worship. The social side was the outgrowth of the unrest of the artisans and peasants under the growing oppression of the rich. The Reformation, by casting society into a seething pot, brought all kinds of discontent to the surface. The social unrest soon found expression in the "Peasants' War" (q.v.) (1525), in which demands for both religious and economic reforms were voiced. The religious side was represented in a great number of individuals and loosely organized "praying circles," not separated from the Church, but looking askance upon its ritual and denying miraculous efficiency to the sacraments. This led in time to the denial of infant baptism and the demand for adult baptism only. The logical result of this was the rebaptism of those who had been baptized in infancy, whence the name Anabaptists. The name, however, as so often happens, indicates only an incidental part of the movement. The essential element of the movement was not a question of baptism, but of individual religion as against ecclesiasticism and the connection of church and state. In the theology there was much variety, from a sincere acceptance of the Apostles' Creed in most of north Europe to a frank anti-trinitarianism, especially among the humanists of Italy. Luther, who was conservative in theology and as ardent an advocate of church and state as any Catholic, soon lost sympathy with the Anabaptist movement. Lutheranism represented the upper social classes and the princes; Anabaptism, the peasant and artisan classes, though with a sprinkling of humanists. Organization began in 1524, when delegates from a wide circle met at the house of Hübmaier in Waldshut, and tried to lay down rules of living from the Bible, but did not form a church organization. A second conference was held at Augsburg in 1526, and a general synod at Augsburg in 1527. Here a simple statement of doctrine was framed, much like that now held by the Moravians (q.v.), and an organization formed, which in general was of the Presbyterian order. From this time Anabaptists, already widespread, grew rapidly till they extended from England to Italy, from the Netherlands and Switzerland to Poland and Hungary. Their opposition to the state churches made them everywhere subject to persecution, often to death with torture. The darkest pages of the Reformation history are those which tell the story of the sufferings of the Anabaptists, under both Catholic and Protestant governments. It is not surprising that so loosely organized a movement of religious enthusiasts should have furnished some cases of fanaticism. It was formerly common to judge the whole movement by these extreme instances, but a better knowledge of the facts has led historians to a more lenient estimate. It is true that some, especially in the early days, dreamed dreams and saw visions and hoped for the speedy coming of the earthly kingdom of Christ. Such were the "prophets of Zwickau" (1520), in Saxony, at whose head was Thomas Münzer (q.v.). They gained a notoriety by coming to Wittenberg, where for a time they won some sympathy from Melanchthon. The extreme of fanaticism occurred in Münster, where the Anabaptists laid aside their usual doctrine of non-resistance and defended themselves by force of arms. The leaders were the Protestant minister Rothmann, and the burghers Knipperdolling and Krechting, the tailor, John Bockelson of Leyden, Gerritt Kippenbrock of Amsterdam, a bookbinder, and Matthys of Haarlem. With their adherents they soon made themselves masters of the city. Matthys regarded himself as a prophet, and when he lost his life in a sally against the Bishop of Münster, who was besieging the town, Bockelson and Knipperdolling took his place. The churches were now destroyed, and 12 judges were appointed over the tribes, as among the Israelites; and Bockelson (1534) had himself crowned King of the "New Sion," under the name of John of Leyden. As the siege went on, the strain of the situation grew more severe. Then came one of those strange turns which sometimes occur in a crowd under excitement. John of Leyden proposed that, under the circumstances in the town, polygamy should be allowed. The matter was debated for eight days, and at last his opponents accepted his position. This event is not to be excused, but the whole Anabaptist movement should not be pilloried in history on account of the one moral aberration of the half-crazed population of a besieged town. Anabaptists generally were especially pure in morals. Soon after, the town fell (1535), the leaders were executed with torture, and the kingdom was wiped out in blood.

Most of the Anabaptists were not fanatics, but simple Christians, trying to live according to the New Testament and making much of the "inner light" of the Spirit. Their creed can be learned from Zwingli's attack upon them. See the English translation in Jackson's *Selections from Zwingli*, pp. 123–258 (New York, 1901). This humble folk were treated like criminals, because the authorities recognized that their principles, though in no way sinful, were subversive of the tyrannical government they exercised. Anabaptists must die because they would not submit to the established order. To this day the advocates of the state church look askance at them. At first among them the mode of baptism was not considered important

and so not much discussed. It was by pouring or sprinkling.

A new era for the Anabaptists begins with Menno Simons. (See MENNO.) Surrounded by dangers, Menno succeeded, by prudential zeal, in collecting the scattered adherents of the sect and in founding congregations in the Netherlands and in various parts of Germany. He called the members of the community "God's congregation, poor, unarmed Christians, brothers"; later, they took the name of Mennonites, and at present they call themselves, in Germany, Taufgesinnte; in Holland, Doopsgezinden—corresponding very nearly to the English designation Baptists. This, besides being a more appropriate designation, avoids offensive association with the early Anabaptists. Menno expounded his principles in his *Elements of the True Christian Faith.* This book is still an authority among the body, who lay particular stress on receiving the doctrines of the Scripture with simple faith and acting strictly up to them, setting no value on learning and the scientific elaboration of doctrines. They reject the taking of oaths, war, every kind of revenge, divorce (except for adultery), infant baptism, and the undertaking of the office of magistrate; magistracy they hold to be an institution necessary for the present, but foreign to the kingdom of Christ; the Church is the community of the saints, which must be kept pure by strict discipline. With regard to grace, they hold it to be designed for all, and their views of the Lord's Supper fall in with those of Zwingli; in its celebration the rite of feet-washing is retained. In Germany, Switzerland, and Alsace their form of worship differs little from the Lutheran. Their bishops, elders, and teachers serve without pay. Children receive their name at birth, baptism is performed in the place of worship, and adults that join the sect are rebaptized. (See MENNONITES.)

Almost the only split among the early Continental Baptists on doctrinal grounds was that which took place in Amsterdam in 1664. Arminianism had not been without its influence, especially among the Waterländers, originally more liberal in their views. A leading congregation accordingly divided into two parties, one (Galenists, from Galenus, their leader) advocating freer views in doctrine and discipline; the other (Apostoolists, from Samuel Apostool) adhering to absolute predestination and the discipline of Menno. The liberal party rejected creeds as of human invention, adopted much of the philosophy and theology of England, and exercised no little influence on the intellectual progress of Holland. These two parties gradually absorbed the other sections of the Baptists in the Netherlands; and about the beginning of the nineteenth century a union took place by which all the congregations now belong to one body.

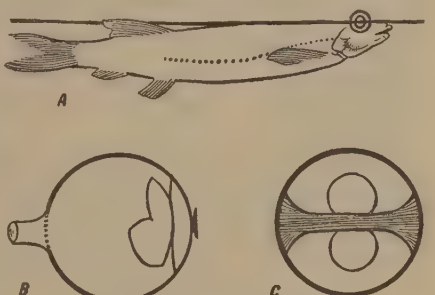
For the modern denomination called Baptists, see BAPTISTS. For the Anabaptists of the Reformation consult Lindsay, *History of the Reformation,* vol. ii (New York, 1907).

ANABARA, ȧ-nȧ'bȧ-rȧ'. A river in Siberia, emptying into the Arctic Ocean (Map: Asia, L 1), and forming the boundary between the government of Yeniseisk and the territory of Yakutsk.

A'NABAS, AN'ABAT'IDÆ. See CLIMBING FISH.

ANAB'ASIS (Gk. *ἀνάβασις,* from *ἀνά, ana,* up + *βαίνειν, bainein,* to go). The name of two historical works. 1. The *Anabasis of Cyrus,* written by Xenophon early in the fourth century B.C., which gives a narrative of the unfortunate expedition of the younger Cyrus against his brother, the Persian King Artaxerxes, and of the retreat of his 10,000 Greek allies under the command of Xenophon. See CYRUS THE YOUNGER. 2. The *Anabasis of Alexander,* written by Arrian, 166–168 A.D., and giving an account of the campaigns of Alexander the Great. See ARRIANUS.

AN'ABLEPS (Gk. *ἀναβλέπειν, anablepein,* to look up). A genus of cyprinodont fishes, the four-eyes, remarkable for the incomplete division of the eye into an upper smaller and a lower larger part, the best-known species being *Anableps anableps.* The division of the eye is effected by the growth of two processes of the iris toward each other across the pupil, and a corresponding band of the conjunctiva across the cornea. As they are surface fish, and swim



ANABLEPS TETRAOPTHALMUS.

A. Attitude in swimming. B. Vertical section of the eye through the lens, showing the lenticular form of the upper half receiving light through the air, and the suborbicular shape of the lower half receiving light through water. C. Diagram of the eye across the front, showing external dark band. (After Tegetmeier.)

with their eyes partly projecting above the water, the upper part serves the purpose of seeing in the air and the lower for seeing in the water. They occur in shallow water along the coast and in the rivers of tropical America. It is impossible for them to dive to any depth and they progress by a succession of short skips or jumps along the surface. They can also make their way very rapidly over mudflats.

ANAB'OLISM (Gk. *ἀναβολή, anabolē,* something heaped up), and CONSTRUCTIVE METABOLISM. Terms applied to the chemical processes of the living body, which result in the formation of more complex compounds from simpler ones. See METABOLISM.

ANAB'RUS. See LOCUST.

ANACAONA, ä'nȧ-kä'ō-nȧ, or GOLDEN FLOWER. An Indian princess, sister and wife respectively of Behechio and of Caonabo, caciques of Haiti when Columbus discovered the island (1492). She succeeded her brother as ruler of his tribe, and after the death of Caonabo was on friendly terms with the Spanish until 1503, although many of her subjects revolted under the foreigners' ill-treatment. In the latter year she gave a feast in honor of Ovando, the Spanish Governor, but in the midst of the festivities was arrested and put to death by his order. She composed ballads and narrative poems.

AN'ACAR'DIA'CEÆ (Gk. *ἀνά, ana* [like] unto + *καρδία, kardia,* heart), SUMACH FAMILY. A family of dicotyledonous plants, consisting mostly of trees and shrubs, with acrid, resinous, or milky sap, in some instances very irritating and poisonous. The leaves are usually alternate, rarely opposite; flowers small, polygamous, diœcious, or perfect. This family embraces about 50 genera and 500 species, most of which occur in the tropics of both hemispheres, the only prominent genus indigenous to the United States being *Rhus;* the *Sumach* and *Poison Oak* (q.v.). The genera of the family are grouped into a number of sections, the more important of which are: Mangiferæ, of which *Mangifera* and *Anacardium* are the principal genera; Spondieæ, represented by *Spondias;* Rhoideæ, the chief genera of which are *Pistacia, Rhus, Cotinus,* and *Schinus;* and Semecarpeæ, represented by *Semecarpus.* The entire family abounds in resins and tannins, furnishing the source whence some of the most valuable lacquers, varnishes, and tanning materials are obtained, while some species produce wholesome and pleasant fruits, some of which are extensively grown in the tropics. For detailed economic descriptions, see CASHEW NUT; PISTACIA; MASTIC; HOG PLUM; POISONOUS PLANTS; MANGO; SUMACH, and other names mentioned above.

AN'ACAR'DIUM. See CASHEW NUT.

ANACHARIS, ā-năk'ā-rĭs (Neo-Lat. from Gk. *ἀνά, ana,* up + *χάρις, charis,* grace). An old name for a genus of plants now called *Elodéa* (or *Philótria*), and belonging to the family Hydrocharitaceæ. The best-known species is *Elodea* (*Anacharis*) *canadensis,* a native of North America, where it grows entirely submerged in the water of ponds and slow-flowing streams. The plant is a much-branched perennial, with long, slender stems that bear numerous small sessile, linear-oblong leaves arranged either in whorls or oppositely upon the axis. The small flowers appear upon the surface of the water for a short period of time sufficient for pollination, after the accomplishment of which act the female flowers are withdrawn beneath the surface; a case similar to that in the eel-grass (*Vallisneria,* q.v.). This plant was introduced into Great Britain about 1842, and because of its rapid growth has become a serious obstacle to navigation in many of the tidewater streams. *Elodea* is a good example of a plant, innocuous in its native country, which has been introduced elsewhere and found there such a congenial habitat as to enable it to become a most obnoxious weed.

ANACHARSIS, ăn'ā-kär'sĭs (Gk. *Ἀνάχαρσις*). A Scythian, the brother of King Saulius, said by Plutarch and Diogenes Laertius to have visited Solon at Athens, to have lived with him on terms of intimacy, and also to have been initiated into the Mysteries. From the early fourth century B.C., the tendency to idealize the barbarian peoples of the North assigned to him the highest qualities; his love of learning is said to have caused him to travel through many lands; he was numbered among the Seven Wise Men; and from Aristotle's time many wise sayings and proverbs were attributed to him. They are edited by Mullach, *Philosophorum Græcorum Fragmenta* (Paris, 1860–81). Under the title *Voyage du jeune Anacharsis en Grèce,* Jean Jacques Barthélemy, a well-known French author (q.v.), wrote in 1789 a description of Greek life and manners, displaying learning and good taste, but disfigured by many anachronisms. Anacharsis is made to visit Athens only a few years before the birth of Alexander the Great, and the features of several distinct periods in Grecian history are confusedly regarded as having been contemporaneous. The book, therefore, will not bear a critical examination; but it has contributed its share toward an improved knowledge of ancient life, and has given rise to several similar works, such as the *Gallus* and the *Charicles* of Becker.

ANACHARSIS CLOOTS. See CLOOTS.

ANACH'RONISM (Gk. *ἀναχρονίζεσθαι, anachronizesthai,* to refer to wrong time, from *ἀνά, ana,* back, against + *χρόνος, chronos,* time). An error in chronology. Sometimes an anachronism is purposely made for the sake of effect, or to bring certain events within convenient compass for dramatic purposes. Shakespeare, in his *Julius Cæsar,* makes the "clock" strike three; and Schiller, in his *Piccolomini,* speaks of a "lightning-conductor" as known 150 years before its invention. These discrepancies, however, do not seriously injure the general truth of a poetical work. The anachronism is more offensive when, in a work which pedantically adheres to the costumes and other external features of old times, we find a modern style of thought and language, as in the old French dramas of Corneille and Racine. In popular epic poetry anachronism is a common feature. Thus, Achilles is always young; Helena, always beautiful, etc. In their versions of old classic traditions the writers of the Middle Ages converted Alexander, Æneas, and other ancient heroes into good Christian knights of the twelfth century. In the *Nibelungenlied* Attila and Theodoric are good friends and allies, though the latter began to reign some 40 years after the former. At the end of the poem, the heroine, who must have been nearly 60 years old and had passed through great affliction and sorrow, is still the "beautiful Queen Kriemhild." Many ludicrous examples of anachronisms may be found in old Dutch paintings; e.g., Abraham, Isaac, and Jacob in modern costumes, and Adam in Paradise, armed with a musket.

ANACHUANA, ä'nä-chwä'nä. A village and bay, on the northern coast of the Isthmus of Panama, just west of Cape Tiburon.

AN'ACLE'TUS I, SAINT, otherwise CLETUS. Second or third Bishop of Rome. A martyr under Domitian. Others say that he succeeded Clement I as fifth Bishop of Rome, and was martyred under Trajan. His day is July 13.

ANACLETUS II (?–1138). Anti-pope, by name Peter Pierleoni. He sprang from a rich and powerful Roman Jewish family, studied in Paris, became Cardinal in 1116, was chosen Pope in 1130 by a faction of cardinals opposed to Innocent II, and was sustained by the Roman and some other states. He maintained himself at Rome against the arms of Lothaire, the opposition of other kings, and the clergy in general. He died Jan. 25, 1138.

AN'ACOLU'THON (Gk. *ἀν, an,* priv. + *ἀκόλουθος, akolouthos,* following, attending). A term employed both in grammar and in rhetoric to denote the absence of strict logical sequence in the grammatical construction. Such inconsequences, to which some languages lend themselves more readily than others, abound in the classic Greek writers as well as in the Elizabethans who caught their spirit. Languages characterized by grammatical rigidity (Latin,

German, and Russian, for instance) are ill adapted to this kind of license. Of course, in colloquial speech nothing is more common than anacoluthon, but careful writers in all languages shun it. The following from Disraeli illustrates the fault: "*Lost* in profound reverie, *the hours* flew on."

AN'ACON'DA (origin unknown; possibly native name). Any large crushing snake, a boa. More especially the great South American waterboa (*Eunectes murinus*), called in Brazil Sucuriu, which is closely allied to the boa constrictor, and is sometimes 20 feet long. Its nostrils are capable of being closed while in the water. It haunts the banks of streams in Guiana and Brazil, where it preys on the animals that live in the water or come to the banks to drink. When on land it is rather helpless. It is rich brown, beautifully decorated by a double series of dorsal blotches and with irregular ring-spots along the sides. Consult Mole and Ulrich, *Proceedings Zoölogical Society of London* (1894). See BOA, and Plate of BOAS.

ANACONDA. A city and the county-seat of Deer Lodge Co., Mont., 26 miles west by north of Butte, on the Butte, Anaconda, and Pacific, the Chicago, Milwaukee, and St. Paul, and the Northern Pacific railroads (Map: Montana, C 3). It has parks, a race track, and fair grounds, the Hearst Free Library, two opera houses, and a daily newspaper. Deposits of gold, lead, silver, and sapphires are found in the vicinity, and the city is noted for its copper-smelting works, which have a daily capacity of some 12,000 tons of ore and are the largest in the world. The copper produced by the Washoe Reduction Works, of the Anaconda Mining Co., comprises 10 per cent of the world's output of copper. Railroad shops, brass and iron foundries, machine shops, refractory brick works, and a brewery, further represent the industrial interests. Founded in 1884, when the reduction works were established, Anaconda has developed with the copper industry. The mining company owns all the public utilities. Altitude, 5280 feet. Pop., 1890, 3975; 1900, 9453; 1910, 10,134; 1913 (est.), 12,500; 1920, 11,668.

ANACOR'TES. A city in Skagit Co., Wash., 90 miles north of Seattle, on the Great Northern Railroad, and a port on the Inland Navigation Company, the Pacific Coast Steamship Company, the Alaska Pacific Steamship Company, and the Island Navigation Company lines (Map: Washington, C 2). The leading industries of the city include lumber mills, salmon canneries, cod-fish plants, box factories, oil and glue factories, glass works, a ship yard, etc. Ample water power is available in the Skagit valley, within a radius of 25 miles. Among the notable features of the city are the Carnegie library, Deception Pass, the city park, and Cap Santa Park. The government of the municipality is vested in a mayor and seven councilmen. Pop., 1890, 1131; 1900, 1476; 1910, 4168; 1913 (est.), 6000.

ANAC'REON (Gk. *'Ανακρέων, Anakreōn*) (c.570–490 B.C.). One of the most esteemed lyric poets of Greece. He was born at Teos, a seaport of Ionia, and spent part of his youth in Abdera (q.v.), to which place most of his fellow townsmen emigrated when their city was taken by the Persians in 545 B.C. He was patronized by Polycrates, the ruler of Samos (533–522), who invited him to his court; and there he sang in light and flowing strains the praise of wine and love. After the death of Polycrates, he went to Athens (521 B.C.) and was received with distinguished honor by Hipparchus. After the fall of Hipparchus he accepted an invitation from Echecrates, a Thessalian prince, to make his home with him. Great honors were paid to him after his death. Teos put his likeness upon its coins, and Pausanias (q.v.) saw a statue to him on the Acropolis of Athens, which represented him in a half-drunken condition. The Alexandrians knew five books of his poems; but we have only two poems complete, and a few scanty fragments. The collection of poems known as Anacreontics gives weak imitations of his work, dating from the Alexandrine period to late Byzantine times; as has been well said, "The extraordinary fame of the Tean bard in modern times is largely due to the admiration of poems which Anakreon did not write, an admiration that is at once vicious on the stylistic side and ignorant of the debased form in which the *Anakreonteia* are composed." The genuine fragments are published in Bergk's *Poetæ Lyrici Græci*, vol. iii, 5th ed., Leipzig, 1900). They have been paraphrased in English by Thomas Moore. Anacreon's poems are marked by sweetness, urbanity, exquisite simplicity, and by a delicate and airy touch; he deals chiefly with love and wine, but shows also a marked capacity for satire. See H. W. Smyth, *Greek Melic Poets* (New York, 1900).

ANACREON MOORE. The Irish poet, Thomas Moore, not only translated Anacreon, but wrote English poems in imitation of his beloved master. The following epigram, contained in an after-dinner speech, is said to have given rise to the nickname:

> "Oh, weep not for Anacreon dead!
> Oh, mourn not for Anacreon fled!
> The joys long dead will Time restore
> For we have one Anacreon Moore."

ANACREONTICA, ANACREONTICS. See ANACREON.

ANACRU'SIS (Gk. *ἀνάκρουσις*, a pushing up or back). A metrical term adopted in 1798 by Gottfried Hermann (q.v.) as a result of his philosophical study of metrical problems. Stated simply, it means that the first syllable of a line of verse is not to be regarded as anything more than a sort of preliminary to the actual metrical entity, like the upward movement of the bâton of a musician in directing an orchestra. This notion, which has been generally though not universally accepted, revolutionizes the technical structure of both ancient and modern poetry and tends to change what was formerly known as iambic verse into verse that is trochaic. (See IAMBIC MEASURE.) Its application may be illustrated by taking the following familiar line from Gray's *Elegy* and "scanning" it according to the older system, and again, by the use of an anacrusis as by Hermann:

× × × × ×
The cur | few tolls | the knell | of part | ing day.

This is an iambic line pure and simple. As Hermann would have it, the first syllable is an anacrusis, and the rest of the line becomes trochaic, thus:

> ´ ´ ´ ´ >
The | curfew | tolls the | knell of | parting | day.

It is worthy of remembrance that none of the ancient authorities on metrical questions had

any conception of an anacrusis, and that, when read, the listener is not conscious of any difference between the two lines. The whole matter is purely technical. For practical illustrations see VERSIFICATION.

AN'ACYC'LUS. See PELLITORY OF SPAIN.

AN'ADAR'KO. A city and the county-seat of Caddo Co., Okla., 50 miles from Oklahoma City, on the Chicago, Rock Island, and Pacific Railroad, and on the Washita River (Map: Oklahoma, C 3). Anadarko has two government Indian schools, a fine county court house, a park, and a Chautauqua auditorium. It is in the centre of the richest agricultural county in the State, producing corn, wheat, cotton, alfalfa, and a great variety of vegetables and fruit. Both the water works and lighting plant are owned by the city, power being obtained by means of a dam across the Washita River. The industries of the city include cotton gins, oil and flour mills, and grain elevators. Pop., 1900, 2190; 1910, 3439; 1913 (est.), 4000.

ANADIR, ä'nȧ-dēr', or ANADIR BAY. A sea or large gulf of northeastern Asia, constituting the northwestern part of Bering Sea (Map: Asia, Siberia, R 2). It is about 480 miles in circumference and about 250 miles wide, and is frequented by whalers.

ANADIR. A river in the extreme northeast of Siberia, rising in the mountain lake Ivashkino. It flows first in a southwesterly and then in an easterly direction, mostly through rocky, snowy regions, for a distance of about 400 miles, and empties into the gulf of the same name, in lat. 64° 40′ N. It drains an area of about 115,000 square miles, and the Mayin, the Bielaya, and the Krasnaya are the principal tributaries. Consult Krahmer, "Der Anadyr-Bezirk nach A. W. Olssufjew," in vol. xlv, *Petermann's Mitteilungen* (Gotha, 1879).

ANADYOMENE, ăn'ȧ-dī-ŏm'ê-nē (Gk. *ἀναδυομένη*, from *ἀναδύεσθαι*, *anadyesthai*, to rise). A name applied to Aphrodite emerging from the sea. The ancients used the word especially to denote a celebrated painting by Apelles (q.v.), representing the goddess as she was rising from the sea, and wringing out her long hair with both hands. It was painted for the temple of Asclepius on the island of Cos. Augustus bought it for 100 talents of remitted taxes and placed it in the temple of Julius Cæsar in the Forum at Rome; by Nero's time it was practically ruined and was replaced by a copy made by Dorotheus. It is frequently mentioned in the Greek Anthology, but the allusions do not furnish the data for accurate reconstruction of the painting. The name is frequently applied to similar representations of Aphrodite rising from the waves or standing in a shell and wringing the water from her hair; the relation of these to the painting by Apelles cannot be determined.

ANADYR, ä'nȧ-dēr'. See ANADIR.

ANÆ'MIA (Gk. *ἀν*, *an*, priv. + *αἷμα*, *haima*, blood) is a depraved condition of the blood, the term covering several distinct disorders, characterized either by a deficiency in volume or in some of the normal constituents. A reduction in the number of red blood corpuscles is called *oligocythemia;* in the white corpuscles, *leucopenia; oligochromenia* is applied to a lowered percentage of hemoglobin; while a diminution of the volume of blood is termed *oligemia.* In medicine anæmias are divided somewhat arbitrarily into two general types—*primary*, or *idiopathic*, and *secondary* anæmias. The primary anæmias, *pernicious anæmia*, splenic anæmia, leukæmia, and Hodgkin's disease—are due to disease of the blood-making tissues, notably the spleen, lymph glands, or bone marrow, and are generally fatal. Pernicious anæmia is a disease of middle life, brought on by chronic indigestion, intestinal poisoning (auto-intoxication), chronic malaria, prolonged mental strain or worry, and other similar causes. The chief blood changes consist in a marked reduction of the number of the red cells, and changes in the heart, liver, and blood-making organs. There are usually great pallor, shortness of breath, weakness, and palpitation of the heart. *Secondary anæmia* is a symptom found in many diseases and conditions, as malaria, hemorrhage, jaundice, poisoning by lead, mercury, copper, or arsenic; further, it may be due to improper food, insufficient sunlight, or to blood-sucking intestinal parasites; or, finally, it may occur during Bright's disease, diabetes, or cancer. The symptoms are similar to those of pernicious anæmia, but less severe. The curative treatment of the secondary anæmias consists in allowing the patient fresh air, good nourishment, and materials which promote the formation of the deficient elements of the blood, such as iron and arsenic. See CHLOROSIS. For "Miners' Anæmia," see ANKYLOSTOMIASIS.

ANA'ËROBES. See RESPIRATION.

AN'ÆSTHE'SIA (Gk. *ἀν*, *an*, priv. + *αἴσθησις*, *aisthēsis*, feeling, sensibility, or ANALGESIA). A loss of sensibility to external impressions. Anæsthesia means, properly, the loss of the sense of touch; analgesia, the loss of the sense of pain. The terms are often used interchangeably, and anæsthesia has come to mean the loss of sensibility to all kinds of sensory impressions. Tactile, pain, heat, cold, and muscular senses are those usually affected. All these sensations are received by special sense organs situated on the outside of the body or in mucous membranes. From the sensory end organs the paths for these sensations pass into the spinal cord and thence up to the brain. Disease or injury in any part of the path may produce a loss of these sensations. Thus, if a nerve which contains sensory fibres is injured, the parts whose sensory nerves are detached from the brain lose all sensibility. In a certain rare disease (syringomyelia) there is loss of pain sense and of the sense of heat and cold, but not of tactile sense. Should accident or disease occur still higher up in the sensory area of the brain, or in areas where sensory fibres come together, as in the medulla and internal capsule, one side of the entire body may become anæsthetic. Such extreme grades of anæsthesia are infrequent, but there is almost no area in the body which may not lose its sensibility by accident or disease. Even in "functional" diseases, as hysteria, in which no known changes have taken place in the nervous tissues, loss of sensibility may occur. For *Artificial anæsthesia*, see ANÆSTHETIC. See also SENSATION.

AN'ÆSTHET'IC (for derivation see ANÆSTHESIA). A general term embracing two great groups of anæsthetics: (1) local anæsthetics, affecting a restricted area; (2) general anæsthetics, temporarily affecting the sensibility of the entire body. Cold is one of the safest local anæsthetics, in the form of cold water or cracked ice. Various freezing mixtures, such as ether spray or ethyl chloride spray, are even more valuable, but require skill and experience in use, or the part may be frozen and thus injured. Carbolic acid, creosote, thymol, and vola-

tile oils, containing phenol-like bodies, are local anæsthetics. These, when applied, have the power of paralyzing the sense organs of the skin and mucous membranes. Their use is attended with danger, however, and they should be administered by a physician only. The most important of the local anæsthetics is cocaine (q.v.), which has the peculiar and useful property of being able to paralyze sensory nerves alone. In a weak solution it is injected under the skin, which it renders anæsthetic, relieving pain, as in neuralgia, and permitting operations on the part. Applied to the mucous membrane, it destroys all feeling, and can be used in the eye, ear, nose, mouth, rectum, vagina, urethra, and bladder, to overcome pain or permit operations. Dr. J. Leonard Corning, of New York, in 1885, discovered that when injected in weak solution into the spinal canal, it produced a loss of all sensation below the place of injection. Extensive operations have been performed under spinal anæsthesia, and children have been born without pain to the mother; but there are some serious disadvantages in this medullary narcosis. Eucaine and stovaine have replaced cocaine for this purpose, having been found safer.

It is probable that for thousands of years the natives of India have used Indian hemp for the relief of pain, while the inhabitants of China have used opium from the poppy plant. In all ages and among all peoples, alcoholic drinks have been used to diminish sensibility to pain.

In 1800 Sir Humphry Davy, experimenting with nitrous oxide (q.v.) or laughing gas, suggested its usefulness as an anæsthetic. In 1844 Dr. Horace Wells (q.v.), an American dentist, demonstrated that the gas may be actually employed for painless extraction of teeth. In 1828 Dr. Hickman suggested carbonic acid gas. As early as 1795 Dr. Pearson had used the vapor of sulphuric ether for the relief of spasmodic affections of the respiration. The fact that sulphuric ether could produce insensibility was known to Faraday in 1818 and was shown by the American physicians, Godwin (1822), Mitchell (1832), Jackson (1833), Wood and Bache (1834); but it was first used to prevent the pain of an operation by Dr. Crawford W. Long (q.v.), of Georgia, who removed a tumor from a patient under ether in 1842. Unfortunately Long did not publish his discovery to the medical world and failed to utilize his opportunity. Upon the suggestion of Dr. Jackson, Dr. W. T. G. Morton (q.v.), a dentist of Boston, after experimenting privately, introduced ether anæsthesia into general use in 1846. At the request of Dr. John C. Warren, Morton administered ether in an operation at the Massachusetts General Hospital on Oct. 16, 1846. In December, 1846, Robinson and Liston, in England, operated on patients rendered insensible by the inhalation of ether vapor. This substance was extensively used for a year, when Sir J. Y. Simpson, of Edinburgh, discovered the anæsthetic powers of chloroform (see CHLOROFORM), and introduced the use of it into his own department, midwifery. Since that time chloroform has been the anæsthetic in general use in Europe; but ether is preferred in America, except for children and parturient women. Chloroform should not be given where there is weak action of the heart from disease. No anæsthetic should be given in case of chronic or severe kidney disease. Consult Sir Frederick Hewitt, *Surgical Anæsthesia* (4th ed., London, 1912), and R. W. Callum, *The Practice of Anæsthetics* (New York, 1909).

AN'AGAL'LIS. See PIMPERNEL.

ANAGNI, â-nä'nyê. An episcopal city in south Italy, situated on a hill 1510 feet above sea level, 36 miles southeast of Rome (Map: Italy, H 6). It is the site of Anagnia which Vergil mentions as "wealthy Anagnia." The city is intimately connected with papal history, as it is the birthplace of four popes, and others here sought asylum in times of persecution. The Cattedrale di Santa Maria is the most noteworthy edifice. It was erected in the eleventh century and was restored in 1350. Its style is pure, and it contains many interesting antiquities. Anagni is the residence of many noble Italian families. Pop., 1881, 8023; 1901, 10,059; 1911, 10,429.

ANAGNIA. See ANAGNI.

AN'AGRAM (Gk. *ἀνά, ana,* backward + *γράμμα, gramma,* writing). The transposition of the letters of a word, phrase, or short sentence, so as to form a new word or sentence. It originally signified a simple reversal of the order of letters, but has long borne the sense in which it is now used. The Cabalists attached great importance to anagrams, believing in some relation of them to the character or destiny of the persons from whose names they were formed. Plato entertained a similar notion, and the later Platonists rivaled the Cabalists in ascribing to them mysterious virtues. Although now classed among follies, or at best among ingenious trifles, anagrams formerly employed the most serious minds, and some of the Puritan writers even commended the use of them. Cotton Mather, in his elegy on the death of John Wilson, the first pastor of Boston, in New England, mentions:

> His care to guide his flock and feed his lambs
> By words, works, prayers, psalms, alms, and *anagrams.*

The best anagrams are such as have, in the new order of letters, some signification appropriate to that from which they are formed. It was a great triumph of the mediæval anagrammatist to find in Pilate's question, "*Quid est veritas?*" ('What is truth?') its own answer: "*Est vir qui adest*" ('It is the man who is here'). Anagrams, in the days of their popularity, were much employed, both for complimentary and for satirical purposes; and a little straining was often employed in the omission, addition, or alteration of letters, although, of course, the merit of an anagram depends much upon its accuracy.

Isaac D'Israeli (*Curiosities of Literature,* vol. iii) has a chapter on anagrams, which, as an exercise of ingenuity, he ranks far above acrostics. Among a great many considered by him worthy of record, are the following: the mistress of Charles IX of France was named Marie Touchet; this became *Ie charme tout* ('I charm every one').

On a visit to King's Newton Hall, in Derbyshire, Charles II is said to have written on one of the windows, *Cras ero lux* ('To-morrow I shall be light'), which is the anagram of *Carolus Rex.*

Anagrams have now gone out of fashion, or rather have been relegated to the puzzle column of the magazine for the household. And yet even in this century writers have formed their pen-names by recombining the letters of their real names. For example, Bryan Waller Proctor is still called Barry Cornwall; add *poet,* and the anagram becomes complete. Besides D'Israeli,

cited above, consult Wheatley, *On Anagrams* (Hartford, 1862).

AN'AHEIM. A city in Orange Co., Cal., 27 miles by rail southeast of Los Angeles; on the Southern Pacific and the Atchison, Topeka, and Santa Fe railroads (Map: California, H 9). It is in a fertile valley and has fruit canning and drying interests, and a large trade in oil, oranges, lemons, walnuts, and farm and dairy products. Sugar, beer, wines, and brandies are manufactured. The city owns and operates its water works and electric light plant. Anaheim was settled by 50 German families in 1857 on a coöperative basis, and in 1878 was incorporated as a town. An interesting account of its early history is given in *Nordhoff, Communistic Societies of the United States* (New York, 1875). Pop., 1900, 1456; 1910, 2628.

ANAHUAC, ä'nä-wäk'. A Mexican term applied to the great central plateau of Mexico, which comprises nearly half of the total area of the Republic. Roughly speaking, it lies between 15° and 31° N. lat. and long. 95° and 110° W., while its altitude ranges between 6000 and 9000 feet. The plateau is the granary and stock-raising centre for the country, whose chief cities are mainly situated upon it. The name "Anahuac" was the Aztec term for all Mexico.

ANAÏTIS, ăn'ā-ī'tĭs. The ancient Persian goddess of waters, whose worship was widely spread in the East in early times. The Avesta (q.v.) celebrates her praise as the celestial stream *Ardvi Sura Anahita* 'the lofty, mighty, and undefiled,' and describes her descent from the heavens. She appears as *Anahata* in the cuneiform inscriptions of the Persian King Artaxerxes II (fourth century B.C.). Her name as *Ἀναιτις, Anaïtis,* is in Strabo, Plutarch, and elsewhere, and she became familiar in Greece as Venus Anaïtis (*Ἀφροδίτη Ἀναΐτις, Aphroditē Anaïtis*). She was the patron of fecundity and secured for pregnant women an easy delivery. Consult Windischmann, *Die Persische Anahita oder Anaïtis* (Munich, 1856), and Jackson, *Iranische Religion,* in Geiger and Kühn's *Grundriss der iranischen Philologie,* vol. ii (Strassburg, 1896–1904).

AN'AKIM (Heb. children of Anak, i.e., the long-necked, a giant). Represented in the Old Testament as a race of giants (Num. xiii. 33; Deut. ii. 10–12, etc.), one of whose strongholds was Kirjath-Arba, or Hebron, in southern Palestine (Josh. xiv. 12–15), but who were spread over the mountains of Judah and Israel. Anakim is an indefinite designation like Rephaïm for miscellaneous groups of the pre-Israelitish inhabitants of Palestine. They are said to have been conquered by Joshua together with the rest of the Canaanitish peoples (Josh. xi. 21), though according to verse 22 a remnant survived in the Philistine cities of Gaza, Gath, and Ashdod.

ANAL'CITE, Analcime, or Cubicite (Gk. *ἀν, an,* priv. + *ἀλκή, alkē,* strength; refers to its weak electricity when heated or rubbed). A common zeolite mineral, chemically a hydrated silicate of sodium and aluminum. It crystallizes in isometric forms, commonly the trapezohedron. Its lustre is vitreous, its color white, greenish, or faintly red. It occurs with other zeolites.

AN'ALEM'MA (Gk. *ἀνάλημμα,* a support, prop; a sun-dial). A name given to an orthographic projection of a sphere upon the plane of a meridian, the point of sight being assumed at an infinite distance on a line normal to the given plane and passing through the centre of the sphere. The term was also applied to the sun-dial, but more often to an instrument of brass or wood, on which the above projection could be drawn and which was used for astronomical purposes. The term is further employed to designate a scale, often seen on terrestrial globes, showing the declination of the sun and the equation of time for various days of the year.

AN'ALGE'SIA. See Anæsthesia.

ANAL'OGISTS. See Philology.

ANALOGISTS. See Anomalists and Analogists.

AN'ALOGUE (Gk. *ἀνά, ana,* according to + *λόγος, logos,* due ratio). A term in comparative anatomy. Organs are *analogous* to one another, or are *analogues,* when they perform the same function, though they may be altogether different in structure; as the wings of a bird and the wings of an insect. Organs, again, are *homologous,* or *homologues,* when they are constructed on the same plan, undergo a similar development, and bear the same relative position, and this independent of either form or function. Thus, the arms of a man and the wings of a bird are homologues of one another. See Homology.

ANAL'OGY (Gk. *ἀναλογία, analogia,* equality of ratios). In general, an agreement or correspondence in certain respects between things in other respects different. Euclid employed it to signify proportion, or the equality of ratios, and it has retained this sense in mathematics; but it is a term little used in the exact sciences, and of very frequent use in every other department of knowledge and in human affairs. In grammar we speak of the analogy of language; i.e., the correspondence of a word or phrase with the genius of the language, as learned from the manner in which its words and phrases are ordinarily formed. (See Phonetic Laws.) In philosophy analogy presupposes a rule inferred from observation of instances and is the application of this rule to other instances not precisely but somewhat similar. We venture upon this application with more or less confidence according to the degree of ascertained similarity and according to the extent of observation from which our knowledge of the rule has been derived. John Stuart Mill, in his *Logic,* states the formula of analogy in this way: "Two things resemble each other in one or more respects; a certain proposition is true of the one, therefore it is true of the other." What makes analogical reasoning successful at all is the fact that superficial resemblances often point to fundamental identity in type. Analogical reasoning is the assumption of a deeper significance in similarities than our knowledge of the facts warrants. When this assumption is justified by the event, the analogy has been fruitfully suggestive; when it is not, the analogy has been misleading. Even when analogy leads to discovery, it does this merely by suggestiveness; the final establishment of the truth analogically suggested is never accomplished by analogy, but by some stricter logical method. Thus, reasoning from analogy indeed warrants only probable conclusions; but the probability may become of a very high degree, and in the affairs of life we must often act upon conclusions thus attained. Reasoning from analogy, however, requires much caution in the reasoner. Yet even when its conclusions are very uncertain, they often serve to guide inquiry and lead to discovery. Many of the most brilliant discoveries

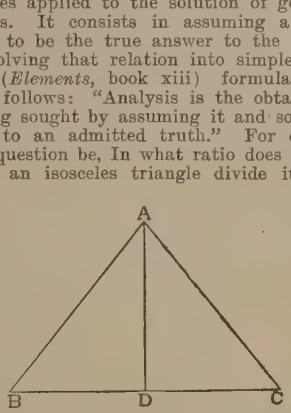
recently made in natural science were the result of investigations thus directed. (For the "Analogies of Experience" in Kant, see F. Paulsen, *I. Kant*, Eng. trans., 1902. See also Bacon's *Novum Organum*, Aph. ii, 27, Fowler's ed.) In law, reasoning from analogy must often, to a certain extent, be admitted in the application of statutes to particular cases. Upon similar reasoning the practice of medicine very much depends. In literary criticism it is also often necessary for purposes of interpretation, the sense of the author in a passage somewhat obscure being in some measure determined according to passages in which he has expressed himself more clearly. The application of this rule to the interpretation of Scripture is a point of difference between Protestants and Catholics, the latter insisting upon the interpretation of difficult passages by ecclesiastical tradition and authority. Protestant theologians have very generally employed, with reference to this rule of interpretation, the phrase "analogy of faith," deriving it from Rom. xii. 16; but the meaning of the expression in that verse is disputed. The opposite of analogy is *anomaly* (Gk. irregularity); and this term is used not only in grammar, but with reference to objects of natural history which in any respect are exceptions to the ordinary rule of their class or kind. In physiology analogy is similarity of function between organs which are structurally or morphologically different; e.g., the tail of a fish and that of a whale are analogous organs; in this usage analogy is opposed to homology, which refers to the structural similarity of organs that may even perform different functions; e.g., the wing of a bird and the arms of a man.

ANALOGY OF RELIGION, THE. The popular name of a famous theological treatise by Joseph Butler, Bishop of Durham. The full title is, *The Analogy of Religion, Natural and Revealed, to the Constitution and Course of Nature.* (For a statement of the leading aim of the *Analogy*, see JOSEPH BUTLER.) The book is in two parts. The first treats of the analogy between natural religion, implying belief in God as the Creator and Governor of the universe, and what is known as natural law; the second discusses the analogy between revealed religion and natural law. Butler's argument is not directed against atheistic or pantheistic opponents of Christianity, but against the deists of his time, notably, Matthew Tindal and John Toland (qq.v.), whose works were written to disprove the necessity of revelation in religion.

ANALYSIS (Gk. *ἀνάλυσις*, a resolution into parts, from *ἀνά, ana*, up + *λύειν, lyein*, to loosen). A term frequently employed in general philosophy and in the sciences, as the opposite of the term "synthesis." In philosophy the term "analysis" is generally applied to the mental act of distinguishing within a given object its various characteristics; thus, the process by which we recognize that an apple is a thing whose attributes are sweetness, roundness, rosiness, etc., is said to be a process of analysis. On the contrary, the process by which we recognize that various properties together form the characteristics of a single object is termed "synthesis"; thus the consolidation, in our mind, of the several characteristics of an apple into a single concept, is a synthesis. The two processes are complementary aspects of the same mental act. It should be borne in mind that analysis does not really destroy the unity of a given object; it merely recognizes various distinctions within that unity. Nor does synthesis fuse into indistinguishableness the characteristics it starts with; it correlates them into a unity, but in that unity the identity of each part is fully preserved.

In mathematics the term "analysis" is employed, on the one hand, to denote a potent method of discovery and demonstration; on the other hand, and more or less inaptly, to designate collectively several important branches of modern mathematics.

The method said to be analytic consists in resolving a given relation into its mathematical elements. Analysis in this sense of the term is sometimes applied to the solution of geometric questions. It consists in assuming a certain relation to be the true answer to the question and resolving that relation into simple truths. Euclid (*Elements*, book xiii) formulates this idea as follows: "Analysis is the obtaining of the thing sought by assuming it and so reasoning up to an admitted truth." For example, let the question be, In what ratio does the altitude of an isosceles triangle divide its base?



The simple answer that suggests itself through the inspection of a figure is that the base is bisected. Assume this to be so. In that case the two triangles into which the altitude divides the given triangle are identically equal, because their sides are respectively equal; and therefore the two angles made by the altitude and the base are also equal. But the latter conclusion is an evident truth if we remember that the altitude of a triangle is a line perpendicular to its base. We therefore infer that our assumption was correct and that the base is really bisected. Furthermore, by reversing the above process we can now demonstrate our assumed truth synthetically; i.e., reconstruct it from the simple, admitted truths, to which the analysis has led.

Now, although the demonstrations of geometric theorems, and perhaps most of the theorems themselves, were originally discovered in the manner just indicated, by analysis, most of the ordinary text-book demonstrations are undoubtedly syntheses, for they gradually lead from the mathematical elements—the axioms—to more or less complex truths. Geometry is therefore spoken of as a synthetic science. However, the *reductio ad absurdum*, which is not infrequently employed, is a purely analytical method, differing only in form from the type of analysis considered above. The suggested relation is, namely, assumed to be not true, but false, and this is shown to lead to absurd conclusions—the inference being that the suggested relation is necessarily true.

In designating a part of mathematical science, the term "analysis" is applied, on the one hand, to the theory of functions (including series,

logarithms, curves, etc.), on the other hand, to the mathematics of infinitesimal quantities, comprising the differential calculus, the integral calculus, and the calculus of variations. Algebra, although usually limited to equations, includes in the wider sense of its name the branches just enumerated. Indeed, it is because of their relation to algebra that these branches have been united under the general term "mathematical analysis." Algebra itself, however, is far from being uniformly analytical, and many an instance of pure synthesis may be found in any of the branches of applied algebra, say in analytical geometry. In general, there is no branch of human thought in which the method of analysis, or that of synthesis, is used exclusively. The complete abolition of either of these methods would involve not a small diminution in our power of establishing interesting truths.

In discussions concerning the methods of science, the processes of analysis and synthesis are often erroneously identified with those of induction and deduction. The reason of this lies mainly in the fact that there has been considerable disagreement as to the proper definition of the terms in question. The distinction between the two pairs of antithetic terms becomes perfectly clear, however, if we define analysis as leading from the compound to the elementary, and synthesis as leading from the elementary to the compound; induction as leading from the particular to the general, and deduction as leading from the general to the particular. As thus defined, analysis, as well as synthesis, may be coincident, though not identical, with either induction or deduction. Thus, to turn for an illustration again to mathematics, the ordinary demonstration of a geometric theorem is a deduction; for what can be more general in character than the axiomatic truths from which the theorem is deduced? But the demonstration is also a synthesis; for what can be more elementary than those axioms which are used in reasoning up to the theorem? On the other hand, Newton's binomial theorem, as often demonstrated in text-books of algebra, presents an instance of synthesis coincident with induction. The general relation expressed by that theorem is induced by the examination of a number of particular instances. But the demonstration is also a true synthesis, for it combines a number of relations into one.

More or less extensive discussions of the analytical processes of philosophy may be found in the following works: R. H. Lotze, *Logic* (Eng. trans., Oxford, 1888); F. H. Bradley, *Principles of Logic* (London, 1883); L. T. Hobhouse, *Theory of Knowledge* (London, 1896), and Bosanquet, *Logic* (Oxford, 1888). See also Analytic Judgment; Judgment; Knowledge, Theory of; Logic.

ANALYSIS, Chemical. The art of determining the chemical composition of substances. The derivation of the word "analysis" (see preceding article) suggests that chemical analysis necessarily requires the breaking up of substances into their constituent parts. In practice the term is used in a wider sense and is often applied to methods of testing that involve no processes of separation. In most cases, however, one or the other constituent is actually isolated, or some constituents of the original substance, which would interfere with the examination, are actually removed.

An analyst may restrict himself merely to determining what are the constituents of the substance submitted to him; in that case the analysis is *qualitative.* Or he may also determine the relative amounts of some or all of the constituents; then the analysis becomes *quantitative.* In some cases he can only state what elements are present, and in what quantities they enter into the composition of the given substance. The analysis is then said to be *ultimate.* In most cases, however, he further tries to determine in what combinations and in what conditions in respect to their capacity of forming combinations the elements exist in the given substance; and then the analysis is termed *proximate.* The ultimate analysis of organic substances is of great importance and has been brought to high perfection. (See Carbon Compounds.) On the other hand, the proximate analysis of organic substances is often a task beyond the power of analytical chemistry. Attempts, however, have been made to treat this subject, too, in a systematic manner.

Preliminary Examination of Inorganic Substances. When a substance is submitted for qualitative analysis, the chemist first notes its color and form—the latter with the aid of a simple magnifying glass. The substance is then usually subjected to an examination by means of the blowpipe (q.v.) or the non-luminous gas-flame. (See Flame.) Blowpipe analysis has been elaborated into a systematic scheme for the detection of all the important metallic and of some acidic radicals, and has proved of great value, especially to the mineralogist. (See Mineralogy.) The chemist, as a rule, makes only a brief examination to determine the general nature of the substance and to answer such questions as whether water, organic matter, silicates, complex cyanides, large quantities of an easily reducible metal, sulphur and arsenic, are or are not present, such constituents often rendering necessary a modification of the usual scheme of systematic analysis. Heating a small portion of the substance in a closed glass tube reveals the presence of most kinds of organic matter by the smell and separation of carbon, and the presence of water by the drops which condense in the cooler part of the tube. Heating on charcoal with a reducing flame, sometimes with the aid of fluxes, shows the presence of metals that give volatile oxides, the latter forming characteristic coats on the charcoal; and the same test makes it possible to detect any important quantity of an easily reducible metal, metals in the free state being readily identified by their lustre and physical properties. The behavior of the substance when fused with a bead of sodium metaphosphate or of sodium carbonate shows whether a silicate or much silica is present, etc. Often additional special tests are made. For example, gently warming a small portion of the substance with concentrated sulphuric acid may serve to detect volatile acidic substances, such as sulphurous acid and nitrous acid, which might be lost in the regular processes or appear in another form.

If the substance submitted for analysis is a liquid, its color and odor are noted, its reaction toward litmus is ascertained, a portion is evaporated to dryness, and the solid residue, if there is any, is subjected to the preliminary examination as in the case of any other solid.

Qualitative Inorganic Analysis. Before a systematic qualitative analysis of a solid substance can be undertaken, the substance must be

obtained in solution. Sometimes substances submitted for analysis are found to be directly soluble in water. In most cases, however, substances cannot be dissolved unless transformed chemically. Since most chlorides and most inorganic acids are soluble in water, the desired transformation can usually be effected by treating the finely powdered substances with aqueous hydrochloric acid, which converts the metals or metallic oxides present into chlorides, while the acids originally combined in the substance are set free. In case metals (such as silver) are present, which form insoluble chlorides, or in case non-metals (such as sulphur or arsenic) are present, or in case hydrochloric acid does not attack the substance, nitric acid is used. By this the metallic compounds present in the substance are transformed into nitrates, and all normal nitrates are soluble in water; on the other hand, the non-metals present are mostly changed into the corresponding oxygen acids, which are likewise soluble in water—sulphur, for instance, being transformed into sulphuric acid. Many important and familiar substances, however, resist the action of both of these acids. A few, as gold and platinum, will dissolve, forming soluble compounds in a mixture of hydrochloric and nitric acids, the so-called aqua regia, which, on warming, gives off free chlorine. But other substances, such as glass, porcelain, and many natural silicates, resist the action of acids almost entirely. Such substances are usually broken up by melting them with carbonates of the alkali metals and potassium nitrate, or by treatment with hydrofluoric acid. Subsequent treatment with water and hydrochloric acid then usually yields the required solutions.

Let us suppose that we have obtained a clear solution in nitric acid, which may contain all the more familiar metals and is free from organic matter. To this solution we add hydrochloric acid; if we obtain a white solid substance, which does not dissolve in a moderate excess of acid, we know we must have present some or all of the three metals, lead, silver, or mercury in the univalent form, since, of all the more familiar metals, only these three form insoluble, or nearly insoluble, chlorides. The solid precipitate is separated from the liquid by filtration, and we have then on the filter a solid which may consist of any or all of the chlorides of lead, silver, and univalent mercury. A study of the properties of these chlorides shows that lead chloride is freely soluble in hot water, while the other two are not. Therefore, if the mass is treated with hot water, the lead chloride, if present, will dissolve, and can be filtered off while the other two remain behind. The liquid is then examined for lead, which is easily done, since all metals which could interfere with the test have been separated. Further, since silver chloride is known to be easily soluble in aqueous ammonia, while mercurous chloride is converted into a black, insoluble mass containing free mercury, one might assume that treatment of the two chlorides with ammonia solution would effect an easy separation of silver chloride from mercurous chloride. This case, however, well illustrates one of the difficulties of analytical work. If the amount of mercurous chloride is large in proportion to the amount of silver chloride, the metallic mercury set free by the action of ammonia causes the formation of metallic silver, which is practically insoluble in ammonia. If, therefore, ammonia has failed to extract anything from the precipitate in question, we cannot conclude that silver is absent. We must, then, treat the black mass with a mixture of nitric and hydrochloric acids, which dissolves the black substance containing mercury; while the silver, if at all present in the original substance, remains behind, again in the form of silver chloride, but this time unmixed with anything else. Such cases frequently occur. So often is the behavior of a substance toward a reagent modified by the presence of other substances, that no scheme of analysis worked out at the writing table possesses any value until thoroughly tested in the laboratory.

The filtrate obtained on precipitating out the three metals just spoken of is treated with sulphuretted hydrogen. This precipitates a second group of metals, which are separated from one another by methods analogous to those employed for the first group. The filtrate obtained on precipitating out the metals of the second group is usually treated with ammonium sulphide, and the filtrate from the ammonium sulphide group with ammonium carbonate. Thus the metals that may be present in the original substance are separated into several groups and then special methods are employed to separate and test for the several metals composing each group.

The acid radicals are tested for in a somewhat similar manner, but usually less systematically; because by the time all the metals present have been identified, the analyst usually is able to exclude the possibility of the presence of a large number of acids.

The spectroscope (q.v.) is usually applied to identify the metals potassium and lithium, and is quite indispensable when substances are to be examined to ascertain whether they are in the purest condition possible, since the instrument is capable of revealing the presence of the merest traces of substances. See SPECTRUM ANALYSIS.

The system of analysis usually followed may be carried out mechanically and almost without intelligence, if the substance examined contains only the more familiar metals and acids, and those in considerable quantities. In fact, qualitative analysis is criticised by teachers on this account, when used as a discipline, or as a means of acquiring a scientific knowledge of chemistry. The ordinary scheme, however, overlooks even some elements of common occurrence, as titanium; and when the chemist has to take into consideration small amounts and the less familiar elements, all his chemical knowledge and acuteness find full field for exercise.

It may be seen from the above that the chemist relies on two sets of properties for the identification of a substance: First, those that belong to the substance itself under ordinary conditions; for example, the yellow color and the lightness of sulphur. Such properties may be called properties of condition. On the other hand, if sulphur is heated sufficiently without access of air, it assumes the form of a red vapor; if heated with access of air, it forms with the oxygen of the air a colorless gas possessing a characteristic odor. The first of these changes is physical; the second, chemical. Physical or chemical changes may thus serve to bring out certain properties that are just as characteristic of the substance as the properties of condition. Such properties may be called properties of reaction. They are far more numerous than properties of condition and far more useful to the analyst. In the case of

sulphur, for instance, the properties of condition are only apparent when the sulphur is in a nearly pure form; but the two properties of reaction just mentioned as an example enable us to identify sulphur even when mixed with so much foreign matter that the characteristic color and lightness are quite masked.

Quantitative Analysis. Before beginning a quantitative analysis the chemist must know, in part at least, the qualitative composition of the substance to be analyzed. This knowledge may be obtained by a special qualitative analysis, or, more frequently, from the results of numerous analyses of similar substances.

Methods of quantitative analysis which involve weighing (see BALANCE) are termed *gravimetric.* Methods that involve measuring the volumes of solutions are termed *volumetric.* Finally, methods involving the decomposition of substances by means of an electric current are termed *electrolytic.*

As an illustration of the methods of gravimetric analysis, we may take the analysis of an alloy of silver and copper, such as is used for silver coins in the United States. If high-class weights and a balance are at the disposal of the analyst, not more than half a gram (less than one-fourth of a dime) is the most suitable weight to be taken of the alloy. If the weights or the balance is inferior, a larger amount must be taken, so that the errors of weighing may remain proportionately small. The alloy is dissolved in nitric acid, the insoluble residue (carbon and tin oxide) filtered off and weighed, and the filtrate is treated with hydrochloric acid to precipitate silver chloride, just as in qualitative work. In quantitative work, however, certain precautions must be taken in carrying out this simple operation. Thus, only a slight excess of hydrochloric acid must be added, since silver chloride is somewhat soluble in a large excess of that acid; the liquid must be vigorously stirred and warmed to cause the precipitate to assume a form in which it can be easily filtered and washed, etc. The silver chloride is then filtered off, dried, ignited, and weighed, proper corrections being made for the weight of the ash of the filter. The amount of silver in the alloy is then readily calculated from the weight of silver chloride yielded. The filtrate from the silver chloride contains copper and usually a small amount of lead. The exact amount of copper contained in this filtrate may be best determined by electrolysis. For this purpose the filtrate is first evaporated to dryness, in order to get rid of the hydrochloric acid; the residue is taken up with dilute nitric acid, and the solution thus obtained is subjected to the action of an electric current passing between two carefully weighed platinum terminals immersed in the liquid. The copper is thus deposited in the metallic state on the electro-negative terminal, while the lead is deposited in the form of lead dioxide on the terminal connected with the positive pole. The gain in weight of the terminals gives directly the weight of copper and permits the calculation of the weight of the lead.

Another method, involving the fusion of substances by heat and usually termed the "fire method," is applied chiefly to the determination of metals in ores, and is especially useful in the case of gold and silver ores. Thus, the amount of silver in an ore free from gold may be easily and quickly found by heating a weighed portion of the ore with metallic lead and a little fused borax in an oxidizing atmosphere. The lead melts, the ore floats on the surface, sulphur and arsenic are volatilized as oxides, the lead is partly oxidized, and the oxide of lead forms a liquid slag with most of the constituents of the ore. At the end of the operation a lead button is obtained, containing the silver. This button is placed on a porous support made of bone-ash (calcium phosphate) and again heated in an oxidizing atmosphere. The lead melts and oxidizes, part of the oxide passes off as gas and part sinks into the porous support, while the silver remains behind as a metallic button, which can be weighed. If gold is present, it is found and weighed with the silver, and then separated by a wet process.

Although gravimetric methods are the more generally applicable, volumetric methods are much more commonly used in the every-day work of the technical analytical chemist. Hundreds of volumetric determinations are made daily in all great manufacturing centres for every one gravi-metric determination. As an illustration of volumetric analysis, we may take a method used for the determination of iron in iron ores and applicable to all iron ores found in the United States, except those containing titanium. The process depends on the fact that when a solution of potassium permanganate is added to an acid solution of iron in the ferrous state, the iron is changed into the ferric state, while the strongly colored permanganate is transformed into an almost colorless manganous salt, the volume of potassium permanganate solution thus decolorized being proportional to the amount of ferrous iron present in the acid solution. This fact is made use of by the analyst in the following manner: He first determines the maximum volume of the given permanganate solution which can be completely decolorized by a known amount of iron. For this purpose, say, 300 milligrams of pure iron are dissolved in hydrochloric acid and some metallic zinc is added in order to make certain that all the iron is present as ferrous chloride, $FeCl_2$ (and not as ferric chloride, $FeCl_3$). The given permanganate solution is then slowly added from a burette to the solution of iron until the disappearance of the color has ceased to take place. The burette then shows what volume of the permanganate solution can be decolorized by 300 milligrams of iron dissolved as a ferrous salt. Suppose the volume of permanganate solution thus measured is 40 cubic centimeters. Then it is evident that one cubic centimeter of the solution could be decolorized by 7.5 milligrams of iron. A weighed portion of the ore to be examined, say, 500 milligrams of it, is now treated in exactly the same manner as were the 300 milligrams of iron; i.e., the ore is dissolved in hydrochloric acid, its iron is carefully reduced to the ferrous state, and the permanganate solution is slowly added from the burette until no more can be decolorized. Suppose the volume of the permanganate solution decolorized this time is 41 cubic centimeters. Then, since 7.5 milligrams of iron are required to decolorize every cubic centimeter of the permanganate solution, it is evident that the 500 milligrams of the ore must contain 307.5 (i.e., 7.5×41) milligrams of iron and hence the ore is reported to contain 61.5 per cent of iron.

Special Methods of Analysis. Any physical property which depends on the amount of substance present, and is capable of measurement,

may be used for quantitative determinations. Thus, the specific gravity of liquids, which can be readily determined with great accuracy, is extensively used to determine the amount of the dissolved substance in pure or nearly pure solutions. In this manner the amount of alcohol, potassium, or sodium hydroxide, common salt, and, indeed, of all the more familiar salts contained in aqueous solutions, may be determined more readily than in any other way. For determinations of this kind, when no high degree of accuracy is required, the hydrometer is extensively used in chemical laboratories. (See HYDROMETER; ALCOHOLOMETRY.) Among other properties used may be mentioned the coefficient of refraction, the optical rotatory power—much used in determining the strength of sugar solutions (see SUGAR), the intensity of the color or the degree of opacity of solutions and of liquids containing solids in suspension, the electrical conductivity, the boiling point of solutions, the melting point of solids, etc.

Analysis of Gases. The analysis of gases differs from that of solids and liquids in that it is more easy to measure than to weigh gases, and hence the results are usually given in percentages by volume. For many gases reagents are known which absorb the gas readily and completely. Thus, a mixture of carbon dioxide, ethylene, oxygen, carbon monoxide, and nitrogen may be analyzed by bringing a measured volume into contact with caustic potash (which absorbs the carbon dioxide), then with fuming sulphuric acid (which absorbs the ethylene), then with an alkaline solution of pyrogallol (which absorbs the oxygen), then with a solution of cuprous chloride (which absorbs the carbon monoxide), and noting the contraction caused by each treatment. The nitrogen remains behind unabsorbed. Hydrogen and marsh-gas are usually determined by combustion with oxygen. Gases very soluble in water, such as sulphur dioxide, are absorbed in that liquid, and then the amount dissolved is determined by a volumetric process. Carbon dioxide in air offers a special case. As in normal air only 3 parts in 10,000 are present, the ordinary process of measuring the volume before and after treatment with caustic potash requires special apparatus and great care to get good results. Usually a large volume is treated with a measured quantity of a solution of barium hydroxide of known strength, a portion of the barium hydroxide being thus converted into insoluble barium carbonate, and the rest estimated volumetrically.

When the highest degree of accuracy in gas analysis is required, the gases must be confined over mercury; further, only solid absorbents must be used, and careful corrections must be made for changes of pressure and temperature. When water is used to confine the gas, some inaccuracy is introduced, since all gases are more or less soluble in water. In technical work, however, a very high degree of accuracy is but rarely required. The technical analysis of gases has assumed great practical importance, owing to the extension of the use of gaseous fuels.

Accuracy. The accuracy of analytical work varies within wide limits, according to the purpose which an analysis is intended to serve. The most accurate analyses are those made to determine the proportions by weight, in which the various elements unite with each other. Thus, the proportion in which silver and chlorine unite forms one of the best determined constants of nature. In determining the proportion in which magnesium unites with chlorine, a series of determinations has been obtained agreeing so perfectly with each other that a loss or gain of only one-twentieth of a milligram of the magnesium chloride analyzed corresponds to the difference between the highest or lowest results and the average. No such accuracy is attainable in commercial or technical work. Nor, if attainable, would it be of any value, since it is but seldom possible to obtain samples representing precisely the average composition of large quantities of material.

The aim of the commercial and technical analyst is usually, not to attain extreme accuracy, but to obtain results which he knows to be correct within certain limits. Thus, if an analyst is required to find the percentage of copper in a sample representing a large cargo of ore, in order to fix its commercial value, he can determine the copper by the electrolytic method to within about one part in 400 without undue expenditure of time or labor. If the object of the analysis is to enable the superintendent of the smelting furnace to make up charges of a suitable content of copper, a much quicker volumetric process is used; the results are then less accurate than those of the electrolytic process, but still much more accurate than is necessary for the purposes of the smelter. When it becomes necessary to determine the amount of substances which occur in relatively very small quantities, it is impossible to avoid relatively large errors. For instance, in determining the amount of phosphorous in a specimen of steel, where the total amount is only about one part in 1000, the analyst is not surprised to find that, in spite of all care, differences of 2 per cent occur between the results of determinations made carefully and under exactly the same conditions.

History. Systematic chemical analysis dates only from the latter half of the eighteenth century, although chemists of an earlier period had accumulated observations which made it possible to test for the presence of many substances. Bergman (1735–84) first attempted to give a plan for systematic qualitative analysis of inorganic substances in the wet way. Until the work of Lavoisier (1743–94) had shown the importance of relations by weight, quantitative determinations attracted little attention, although such determinations were by no means entirely wanting. After the triumph of Lavoisier's views, the importance of quantitative analysis was fully seen; and the labors of Klaproth (1743–1817), Proust (1755–1826), and Vauquelin (1763–1829) rapidly enriched chemistry with new methods. But it is to Berzelius (1779–1848) that quantitative analysis owes the heaviest debt. Berzelius published tables of the atomic weights of all the elements well known at that time, and some of his values for these important constants have scarcely been improved on since. In the course of these researches an immense number of new methods were developed. Two of his pupils, Heinrich Rose (1795–1864) and Friedrich Wöhler (1800–82), not only added to the methods in use, but published comprehensive works on inorganic analysis. The final edition of Rose's work, published after his death by his pupil, R. Finkener, remains an invaluable work to the analyst of to-day. Although K. R. Fresenius (1818–97) added many new methods, his great service, which secures

him a conspicuous place in the history of analytical chemistry, was the collection and comparison of the various methods in use, the publication of text-books, which have formed the models of most others since published, and the founding of a periodical devoted to analytical chemistry. The last editions of his standard works are in the hands of every analyst.

Volumetric analysis was introduced by Gay-Lussac (1778–1850); but although he gave the first of his important processes to the world as early as 1824, it was not until the publication of Fr. Mohr's text-book on the subject that volumetric analysis began to rank in importance with gravimetric methods. The ultimate analysis of organic bodies was attempted with some success by Lavoisier and Berzelius. Gay-Lussac, in 1815, introduced the use of cupric oxide, and Liebig (1803–73) gave the process essentially its present form. Dumas (1800–84) introduced, in 1830, the method for the determination of nitrogen by direct measurement of the liberated gas, which is still preferred in strictly scientific work to the easier method devised by Kjeldahl.

Many attempts were made to analyze gases in the eighteenth century and in the beginning of the nineteenth, but it is to Bunsen (1811–99) that we owe the perfection of the methods at present in use for gas analysis. The first edition of his text-book, *Gasometrische Methoden*, was published in 1857. The improvements since that time have been principally in the direction of adapting the methods to rapid work for technical purposes.

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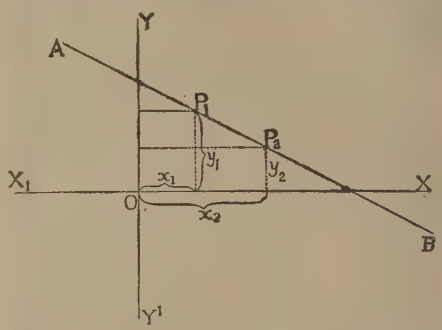
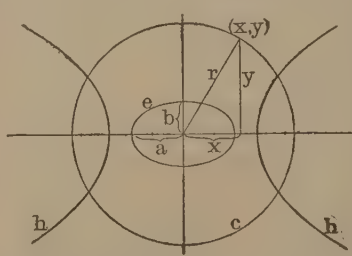
AN'ALYT'IC GEOM'ETRY. Geometry treated by means of algebra. Geometric conditions are expressed by equations which, after certain transformations, are interpreted again in geometric concepts. The powerful algebraic method is thus made use of for discovering and demonstrating in a simple and easy manner the most complicated relations existing between quantities in space.

The interpretation of geometric relations in algebraic terms is effected by the use of some system of coördinates (q.v.). The primitive system of coördinates, called rectangular coördinates, originated in early times, both oblique and rectangular systems being used by the Greeks. In this system the position of a point (as P_1,



in the figure) is determined by its distance from the fixed axes XX_1 and YY^1 in the plane, called *axes of coördinates*, which intersect at right angles in a point O, called the *origin*. The distance x_1 of P_1 from YY^1 is called the *abscissa* of P_1, and the distance y_1 from XX_1 is called the ordinate. The two lines x_1,y_1, are called the coördinates of P_1. Similarly, the coördinates of P_2 are x_2, y_2. P_1, P_2, or the points (x_1, y_1), (x_2, y_2) are sufficient to determine the straight line AB. The algebraic equation (q.v.), $y = ax + b$, a, b, being constants, will be satisfied by various values of x and y. The various values of x, as x_1, x_2, x_3—taken with the corresponding values of y, as y_1, y_2, y_3—will represent a series of points (x_1, y_1), (x_2, y_2), (x_3, y_3), lying in a straight line. That is, an algebraic equation of the first degree is represented by a straight line. In a similar manner an equation of the second



degree is represented by a curve. In the figure, c is a circle whose equation is $x^2 + y^2 = r^2$, r being the radius of the circle. This is evident by reference to the figure, since the coördinates of any point (x, y) form the sides of a right-angle triangle of hypotenuse r, so that $x^2 + y^2 = r^2$. The curve e is an ellipse whose equation is $b^2x^2 + a^2y^2 = a^2b^2$, a being the semi-major axis and b the semi-minor axis. The curve h is an hyperbola whose equation is $b_1^2x^2 - a_1^2y^2 = a_1^2b_1^2$. If the equations $x^2 + y^2 = r^2$ and $b_1^2x^2 - a_1^2y^2 =$

$a_1^2 b_1^2$ are solved for x, y, their roots are the coördinates of the points of intersection of the curves c, h. These values may be real or imaginary; if real, the curves cut in real points, as in the case of c, h; if imaginary, the curves are said to cut in imaginary points, as in the case of e, h.

The practical work of plotting a curve may be explained by referring to a particular example; thus, to represent graphically the equation $2x^2 - 3y^2 = 10$. Rearranging and solving the equation for y, $y = \pm \frac{1}{3}\sqrt{6(x^2 - 5)}$. Therefore, by giving x various values (noticing that $x^2 > 5$ for real values of y) we have corresponding values of y as follows:

$x = \pm\sqrt{5}, \pm\sqrt{6}, \pm\sqrt{7}, \pm\sqrt{8}, \pm\sqrt{9}.$
$y = 0, \pm\frac{1}{3}\sqrt{6}, \pm\frac{2}{3}\sqrt{3}, \pm\sqrt{2}, \pm\frac{2}{3}\sqrt{6}.$

Taking the approximate square roots, and laying off the abscissas and ordinates as indicated, and then connecting the successive points, the graph is an hyperbola, like h shown in the figure.

The power of the analytic forms to express geometric relations may be seen from the following: Let $z_1 = 0$ and $z_2 = 0$ represent the equations $a_1x^2 + b_1y^2 - c_1 = 0$ and $a_2x^2 + b_2y_2^2 - c_2 = 0$. Any values of x, y satisfying these two equations will evidently satisfy the equation $(a_1x^2 + b_1y^2 - c_1) - k\ (a_2x^2 + b_2y_2^2 - c_2) = 0$, k being any constant. But this equation is $z_1 - kz_2 = 0$. Hence, if $z_1 = 0$, $z_2 = 0$ are the equations of any two curves, any point common to the two satisfies the equation $z_1 - kz_2 = 0$, and, therefore, this is the equation of a curve passing through all intersections of the given curves. In the same way, equations of any degree may be represented and discussed.

The position of a point in space of three dimensions may be expressed in terms of its distances from three fixed planes. In this way the properties of spheres, ellipsoids, and other solids are expressed by equations. In space of four dimensions the coördinates of a point are (x, y, z, w), and in space of n dimensions $(x, y, z, \ldots)$; n quantities), although we cannot draw the figures.

The ellipse, hyperbola, and parabola, being sections of a right circular cone, are known as *conic sections* (q.v.). They were chiefly investigated by purely geometric methods until the appearance of Descartes's *Discours* (1637). In the extensive development of analytic geometry since Descartes, a large number of coördinate systems have been introduced, the most important being the polar, generalized, homogeneous, Lagrangian, Eulerian, barycentric, and trilinear coördinates.

The most comprehensive English works are those by Salmon, *Treatise on the Conic Sections* (Dublin, 1879); *Higher Plane Curves* (1873); *Treatise on the Analytic Geometry of Three Dimensions* (Dublin, 1874). Other noteworthy works are: R. F. A. Clebsch, *Vorlesungen über Geometrie* (Leipzig, 1876); M. Chasles, *Traité de géométrie supérieure* (Paris, 1880); and among recent elementary works are those of C. Smith, Briot, Bouquet, Townsend, Stande, Niewenglowski, and Scott. For a further discussion, see GEOMETRY; COÖRDINATES.

ANALYTIC JUDG'MENT. In Kantian philosophy, a judgment in which the predicate is the definition (q.v.) or part of the definition of the subject. All other judgments are synthetic. The distinction between analytic and synthetic judgments is open to serious objections if the distinction is to be made absolute. Concepts (q.v.) vary from mind to mind, and even in the same mind from time to time. To the laboratory chemist, perhaps the most essential mark in the concept water is expressed in the formula H_2O; i.e., water is conceived to be a chemical union of oxygen and hydrogen in definite proportions. But the non-scientific man may have a clear idea of what he means by water and can perhaps define his concept. In such a case the definition would not include any reference to oxygen and hydrogen. Thus, the judgment that water is a certain chemical combination of oxygen and hydrogen, while an analytic judgment for the chemist, may be a synthetic judgment for the person who has not yet studied chemistry. Analysis and synthesis in logic are concomitant aspects of the same operation; every analytic judgment may be viewed as at the same time synthetic, and every synthetic judgment is also analytic. Consult E. Caird, *The Critical Philosophy of Immanuel Kant* (2 vols., New York and London, 1889). See the authorities referred to under ANALYSIS.

AN'ALYT'IC LAN'GUAGES. See PHILOLOGY.

AN'ALY'ZER. That part of a polariscope (q.v.) which is used for examining light after it has been polarized. (See LIGHT.) It may be a movable mirror, a plate of tourmaline, a doubly refracting crystal, or a Nicol prism. The latter is most frequently employed for this purpose.

ANAM'. See ANNAM.

ANAMALAI, â-nâ-mâ-lī', HILLS. A mountain chain in south India, in Coimbatore district, Madras. It is a continuation of the western Ghats below the Palghat Pass and contain several lofty peaks. Valuable teak forests are on their sides, and there are many wild beasts.

ANAMIRTA, ăn'â-mĭr'tâ. See COCCULUS INDICUS.

ANAMMELECH, â-năm'ê-lĕk. A divinity worshiped by the inhabitants of Sepharvaim, who were deported to Samaria (2 Kings xvii. 31). It was probably the goddess Anath, the spouse of Melek. She may have been identical with the Anathyaho, or Anath, spouse of Yaho, worshiped by the Jews of Elephantine in the fifth century B.C. See ELEPHANTINE PAPYRI.

ANAMORPHISM. See METAMORPHISM.

AN'AMO'SA. A city and the county-seat of Jones Co., Iowa, about 40 miles (direct) southwest of Dubuque, on the Wapsipinicon and Buffalo rivers, and on the Chicago and Northwestern, and the Chicago, Milwaukee, and St. Paul railroads (Map: Iowa, F 2). It is the seat of a State reformatory. Anamosa has a considerable trade in building stone and manufactures school supplies, butter tubs, hoods, and spades. The city owns its water works. Pop., 1900, 2891; 1905, 2878; 1910, 2983.

ANA'NAS. See PINEAPPLE.

AN'ANI'AS (Gk. *'Ανανίας*, transliteration of Heb. word, 'Yahwe hath been gracious'). 1. One of the members of the early Church at Jerusalem who conspired with his wife, Sapphira, to make a false statement respecting their gift of property to the community of the brethren and was, with her, struck dead (Acts v. 1–11). 2. A disciple at Damascus mentioned in connection with Saul's experience in that place (Acts ix. 10–17; xxii. 12–16). 3. A high priest at Jerusalem, mentioned in connection with Paul's appearance before the Sanhedrin and

later, before Felix, at Cæsarea (Acts xxiii. 2–5; xxiv. 1; cf. Josephus, *Ant.* xx, 6. 2).

ANANIEV, or **ANANYEV,** ȧ-nän'yĕf. A town in the government of Kherson, Russia, about 220 miles northwest of Kherson, on the banks of the Tiligula, 95 miles north of Odessa (Map: Russia, C 5). There is little manufacturing, and the only trade is in agricultural products. It has a mixed population of Russians, Jews, and Rumans, numbering in all about 17,000 in 1897, as against 14,200 in 1885. Ananiev was annexed to Russia in 1792.

ANAPA, ȧ-nä'pȧ. A small seaport on the north coast of the Black Sea, in the Kuban territory, Russia (Map: Russia, E 6). An old rampart, now serving as a promenade, is a feature of the town. A trade in grain and fish is carried on. Founded by the Turks as a fortress in 1781, Anapa was repeatedly attacked by the Russians in their wars with Turkey. It was finally taken and annexed in 1829. In 1854, at the approach of the allied fleet, Russia evacuated it, after destroying its fortifications. Pop., about 7000.

AN'APÆST (Gk. *ἀνάπαιστος, anapaistos,* struck back, i.e., a dactyl [q.v.] reversed, from *ἀνά, ana,* back + *παίειν, paiein,* to strike). The name of a measure, or foot, in Greek verse, consisting of two short syllables and one long syllable; thus ⏑ ⏑ —. It has been called the marching rhythm, as the language of the chorus in Greek tragedy fell into anapæsts on entering or leaving the orchestra. It was also the prevailing measure in the parabasis of Aristophanic comedy, corresponding to the modern topical song. By analogy, the name is also employed to designate in modern verse a trisyllabic measure of two unstressed syllables followed by a stressed syllable; for example: *"I am mŏn | arch of áll | I survéy."* See VERSIFICATION.

ANAPHRODISIACS, ăn-ăf'rō-dĭz'ĭ-ăks (Gk. *ἀν, an,* priv. + *ἀφροδισιακός, aphrodisiakos,* pertaining to Aphrodite, goddess of love). Substances used to lessen the sexual desire. In the first place, all causes of genital irritation should be removed. Careful cleansing should be insisted on, and in many cases circumcision is needed. Saccharine or highly acid urine should be corrected. Distention of the bladder should be avoided if possible. Vesical calculus, worms, hemorrhoids, and anal fissure may all act as causes of sexual excitement and should be treated if present. Constipation should be relieved. The clothing, especially at night, should not be too warm, and the bed should be hard. The diet should be restricted in amount and chiefly vegetable, while spices and stimulants of all kinds should be avoided. Hard mental work and abundant exercise, especially with the arms, are strongly indicated. Ice, applied locally, and cold baths, local or general, are very potent. Besides these measures, some drugs are of value. The best are probably the bromides. They should be given in full doses, and if necessary pushed to the physiological limit. Tobacco, conium, gelsemium, and belladonna are valuable in certain individuals. The nauseants are valuable temporary expedients, but cannot be used in a prolonged treatment. It must be remembered that nymphomania and satyriasis are due to cerebral conditions and occur during attacks of insanity or during delirium produced by alcohol and other drugs.

ANAPHYLAXIS. A hypersensitive condition induced in certain animals or individuals by the injection of horse serum or other foreign albumen. If a guinea pig is injected with a small dose of horse serum and after a certain interval receives a second dose, symptoms of severe and often fatal intoxication ensue. The first dose produces no disturbance, but renders the animal abnormally sensitive to a second injection. Anaphylaxis is often confused with serum sickness, to which it has some relation. The use of antitoxin or other serums is sometimes attended by unpleasant phenomena, such as fever, urticaria, itching, œdema, joint pains, glandular enlargements, etc., but these symptoms come on after a single dose. Repeated injections of antitoxin, however, predispose an individual to serum intoxication. See RICHET, CHARLES.

ANARCHIDAS, ȧ-när'kĭ-dȧs. See WOLF-FISH.

AN'ARCHISM (Gk. *ἀν, an,* priv. + *ἀρχή, archĕ,* power, sovereignty). A system of social doctrines, and a propaganda based thereon, the essential features of which are the abolition of all constituted authority and the complete emancipation of the individual from every form of control, political, social, or religious. The social state which anarchism seeks to realize is denominated anarchy, a term which connotes, according to the expositors of anarchistic doctrines, not disorder, as in the popular conception, but the most perfect conceivable social order.

On the political and moral side anarchism is antithetical to socialism, as the latter term is commonly understood. Anarchism demands the utter abolition of the state, while socialism would not merely make use of the state for purposes of social reorganization, but would endow it with far greater powers than it possesses at present. Socialism, its orthodox supporters claim, would greatly reduce the importance of the judicial functions of the state, since with the abolition of private property the greater number of disputes and crimes that now occupy the courts would disappear. The administrative functions of the state, on the other hand, would be vastly increased in importance, since it would undertake the management of all productive property, determine the degree in which wants are supplied, and regulate the distribution of the productive resources of society. According to the anarchist view, the socialistic system would destroy liberty and is therefore scarcely preferable to the existing order. In the words of Bakunin "liberty without (economic) socialism is equivalent to privilege, injustice; socialism without liberty amounts to slavery and brutality."

In party organization and tactics socialism and anarchism differ radically. Socialistic parties are closely organized, as a rule; the party platform is held to be binding upon all members, and heretics are visited with prompt expulsion. Anarchism has no binding program, no tests of regularity. Each anarchist is a law unto himself. In practice the anarchists form small groups or circles, which meet for discussion and for the working out of plans of action. The meetings are usually secret, and membership in the group is rarely made public. This is chiefly a result of the hostility of the public authorities which in most countries carry on a more or less consistent policy of suppressing anarchism. The groups in the several cities are federated loosely, sometimes along national, but more frequently along international lines. Propaganda is carried on partly by lectures, partly

by pamphlets secretly printed and distributed through subterranean channels, partly by newspapers. The latter are liable to frequent suppression by the public authorities and change their names and places of publication with bewildering rapidity.

On the economic side anarchism is closely related to socialism. Both anarchism and socialism demand the abolition of private property in the means of production. As there is a socialistic school that would carry the principle of socialization even to goods for consumption, so there is an anarchistic school that would abolish all private property whatsoever. In both schools the main tendency is to limit socialization to the means of production. Both schools look upon the present economic system as a product of historical forces that are almost spent and believe that a revolution is impending. Both schools agree in forecasting a state in which production will be carried on for the common good of those engaged in the actual work of producing. Socialists, however, look upon the coöperative state as an organization dominated by the collective will expressed in political terms. The anarchistic principle of organization is free association based upon mutual interests. According to the anarchistic doctrine, every considerable enterprise will be carried on by a group, the membership of which will be continually changing, as men find that interest or whim draws them elsewhere. But it is assumed that under anarchism interests would soon reach an equilibrium, and economic society would become extremely stable and orderly without the slightest interference with individual liberty.

Organized socialism repudiates the idea that there is any relation between socialism and anarchism, and in the history of the socialistic movement there have been frequent conflicts between the two principles. The issue was first drawn in the Congress of the International Workingmen's Association at Basel in 1869, when the representatives of Marx routed Bakunin and his followers. In 1872, at the Congress of The Hague, Bakunin and his followers were expelled from the association. Since that time there have been periodic expulsions of anarchistic elements from the social democracy in most of the countries of northern Europe. In the United States also anarchism has been generally overthrown by socialism. In Italy, Spain, and Greece, as well as in Latin America, the anarchistic element is dominant in the socialistic party. Anarchistic elements also appear to be making head in France and Belgium, under the form of syndicalism (q.v.), and in the United States in the Industrial Workers of the World (q.v.).

History of the Theory. Greek philosophy, while in its main currents rather socialistic and certainly constructive, was not without its representatives of extreme individualistic theory (Zeno, and among the early Christian philosophers, the Gnostics). A mystical theory of the rights of the individual, which resembles idealistic anarchy, was held by some of the Christian writers of the Middle Ages (Joachim, 1200; Amalric of Bène; the Adamites, 1421; Chelcicky, 1420; and others). The first modern writer of scientific repute is Godwin, who, in his *Political Justice* (1793), proceeds on the doctrine of natural rights and regards all government as a sort of necessary tyranny, to be reduced to its lowest terms. This doctrine can be traced through a large number of writings, down to Herbert Spencer's ideas of liberty and the sphere of the state. As a social movement anarchism received its first impetus from Proudhon (q.v.). Proudhon thought he saw in anarchy the only way to free the laborer from the encroachments of the capitalist and to guarantee to every man the right to development. Property, in the sense of income-yielding wealth, he described as robbery and advocated its abolition. The state also should be abolished. Individual or associated enterprise, assisted by gratuitous credit provided by mutual associations, formed the basis of his scheme of economic reorganization. Although Proudhon was regarded by the authorities as a dangerous revolutionist, he deprecated all forms of violence and placed his reliance chiefly in education as a means of social reform. Proudhon's ideas found disciples in Germany in Moses Hess, who published *Philosophie der That* and *Sozialismus* (1843), and Karl Grün, both of whom developed the better side of Proudhon's teaching and proposed needed radical reforms. Anarchistic doctrine assumed its later violent form under the hands of Bakunin (q.v.), who from 1861 to his death in 1876 carried on an extraordinary propaganda and organized a following throughout Europe. Bakunin demanded the abolition of the state and of all forms of property and the reorganization of society on the basis of a federation of communes. Revolutionary anarchism gained a considerable number of adherents in Germany through the propaganda carried on by "Max Stirner" (Johann Kaspar Schmidt), who proposed to abolish the state and private property and to erect a new social order upon a basis of individual interests—"a union of egoists." Two disciples of Bakunin, Prince Kropotkin and Elisée Reclus, have made important contributions to the theory of economic organization under anarchy. In the United States Proudhon's doctrine was taken up by B. R. Tucker, of Boston, who published a translation of Proudhon's *What is Property?* (1876), and *Economic Contradictions* (1888), and also a translation of Bakunin's *God and the State* (1883). Tucker edited a periodical entitled *Liberty*, which began publication in Boston in 1881, but was afterward removed to New York City.

Propaganda of the Deed. The point of chief interest in anarchistic tactics is the employment of violence especially against rulers and high officials of government, euphemistically described by anarchists as "the propaganda of the deed." In 1876 two Italian followers of Bakunin, Carlo Calfiero and Enrico Malatesta, urged, in the Congress of Berne, that revolution is the only efficient means of anarchistic propaganda. In the following year an uprising of Neapolitan peasants, apparently instigated by Califiero and Malatesta, occurred near Benevento. In 1878 two anarchistic attempts were made upon the life of Emperor Wilhelm I, and in 1878 and 1879 attempts were made to assassinate Alphonso XII of Spain. King Humbert of Italy narrowly escaped assassination in 1878. The propaganda of the deed was adopted by the French anarchists in 1882. Dynamite was employed for the first time by anarchists around Monteeau in the conduct of a strike.

In March, 1892, there was a series of explosions in France. For one of these Ravachol was executed (June 11, 1892), and others im-

prisoned. There were serious disturbances and explosions in Spain and Italy. In February, 1893, bombs were exploded at Rome. At Barcelona, on September 23, a bomb was thrown into a group of staff officers at a military review, which wounded several officers, one of whom was Captain-General Martinez Campos, and killed one guard. For this, Codina and five accomplices were shot May 21, 1894. A general conspiracy was unearthed at Vienna, September 23. On November 7 a bomb was thrown into the pit of a Barcelona theatre, which killed 30 and wounded 80. Salvada French was executed for this crime. On December 9, at Paris, during a session of the Chamber of Deputies, a bomb was thrown from the gallery. A woman, perceiving the intentions of the thrower, grasped his arm, causing the bomb to strike a chandelier and explode harmlessly. Vaillant, whose real name was Königstein, a man of German descent, was immediately identified as the thrower, and was executed Jan. 10, 1894, his last words being "Vive l'anarchie!" The French government had previously passed a law making such attempts capital offenses, even though no one was killed. A week after the execution of Vaillant, and in revenge for his execution, a man named Emile Henry exploded a bomb in the café of the Hôtel Terminus, severely wounding many guests. Henry was executed May 21, 1894. In March, 1894, a bomb exploded before the Chamber of Deputies at Rome, but did no great harm. On June 16 an attempt was made on the life of Crispi. For this Paul Fega was sentenced to 20 years' imprisonment. President Carnot of France was assassinated June 24 by an Italian anarchist, Santo Caserio. He died the following day. Caserio was guillotined August 15. A plot against the French Premier Dupuy was frustrated. Active measures were taken against the anarchists, particularly in Italy, where some 2000 suspects were arrested during the summer. The year 1895 was comparatively quiet. In 1896, 11 were killed and 40 wounded by an explosion at Barcelona. For this, which was the result of a conspiracy, 5 men were shot, 13 imprisoned for over 10 years, and 7 for less than 10 years. The premier of Spain, Señor Cânovas del Castillo, was assassinated Aug. 8, 1897, by an Italian, Michele Angiolillo, who was executed 11 days after the crime. On Sept. 10, 1898, the Empress of Austria was assassinated in Switzerland by an Italian, Luccheni, who had come thither intending to kill the Duke of York, but, not finding him, vented his fury upon the Empress. Luccheni was immediately apprehended and sentenced to solitary confinement for life. The death of the Empress caused the summoning of an anti-anarchist conference, attended by representatives of the various governments. The sessions were held at Rome, November 24 to December 21. The results were not made public. King Humbert of Italy was assassinated July 29, 1900, by a countryman, Angelo Bresci. Bresci had been living in America and went to Italy intending to assassinate the King. The murderer was sentenced to life imprisonment. On May 31, 1906, the wedding day of Alfonso XIII of Spain and Princess Ena of Battenberg, a bomb was exploded near the royal carriage on its way from the church at Madrid where the marriage was performed. About 20 persons of the royal escort were killed. In 1909 serious riots occurred in Barcelona that were ascribed, though not on very satisfactory grounds, to the teachings of the anti-clerical Francisco Ferrer (q.v.). Ferrer had been engaged in anarchistic propaganda at an earlier period of his life, but had abandoned anarchism in order to devote himself to scientific education. None the less he was arrested, tried, and executed Oct. 12, 1909. In November, 1910, an attempt was made by a group of anarchist socialists to assassinate the Mikado. Twenty-five of the conspirators were sentenced to death; only 12 of them, however, were executed. On March 18, 1913, King George of Greece was assassinated at Salonica by an anarchist named Aleko Schinas.

United States. America has witnessed but two such outrages. The first was the famous Haymarket explosion at Chicago on May 4, 1886. This occurred at a large assembly of workingmen. The speakers began uttering revolutionary sentiments, and the gathering was ordered to disperse by the police. An unknown person threw a bomb, killing seven policemen and wounding 60. In the mêlée following, some workmen were killed and others wounded. For this seven were condemned to death, and one (Neebe) to 15 years' imprisonment. Ling committed suicide the day before the time set for the execution. Spies, Parsons, Fisher, and Engel were hanged Nov. 11, 1887, the sentences of Schwab and Fielden having been commuted to life imprisonment. Later Governor Altgeld pardoned Neebe, Schwab, and Fielden. The second was the murder of President William McKinley, at Buffalo, N. Y., Sept. 6, 1901, by Leon F. Czolgosz, who was executed by electricity Oct. 29, 1901. As a result of the ensuing agitation against anarchism, a law was enacted by Congress in 1902 excluding anarchists from the classes permitted to immigrate into the United States.

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ANASAR'CA. A form of dropsy in which there is an accumulation of fluid in the loose tissues of the body. See DROPSY; ŒDEMA; BRIGHT'S DISEASE.

AÑASCO, ä-nyäs'kô. A town in the west central part of Porto Rico, on the Añasco River, a few miles from its mouth, and 6 miles north of Maguayez (Map: Porto Rico, A 2). It is the centre of a fertile agricultural region which produces sugar, tobacco, coffee, and vegetables of all kinds. The town has six public schools, a church, and a large sugar-grinding plant. Pop., 1899, 2483; 1910, 3064.

ANASTASIA, ăn'ăs-tā'shĭ-ȧ (?–597). A Greek saint. Her beauty attracted the Emperor Justinian, and in order to escape his dishonorable attentions she retired to Alexandria, where she lived 28 years, disguised as a monk. The date of her commemoration is March 10.

ANASTASIA, SAINT. A Christian martyr, slain during the reign of Nero (54–68 A.D.). She is said to have been a pupil of St. Peter and St. Paul. The date of her commemoration is April 15.

ANASTASIA THE YOUNGER. A noble

Roman woman who suffered martyrdom during the Diocletian persecution (303 A.D.); the wife of Publius, a pagan, who informed against her as a Christian. Two letters written by her in prison are preserved in Suidas. The Greeks commemorate her as a saint on December 22; the Latins, on December 25.

ANASTASIUS, ăn'ăs-tā'shĭ-us. A romance by Thomas Hope, an English author and virtuoso (q.v.). It describes the adventures of a Greek youth who, after being acquitted by a Turkish magistrate before whom he was brought for an alleged offense, becomes a soldier of the Sultan and fights under the Turkish flag. In Constantinople he engages in different occupations that are either trifling or discreditable; then, after professing the Mohammedan faith, he travels in Sicily, Italy, and eastern countries and dies in obscurity and neglect. In literary circles the author has ever since been known as "Anastasius" Hope.

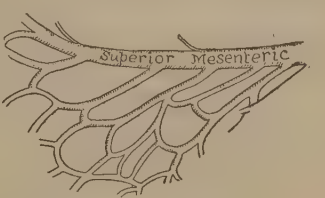
ANASTASIUS. The name of four popes and one antipope.—ANASTASIUS I, Pope from 398 to about 402. He healed an unseemly strife at Rome by ordering the priests as well as the deacons to stand bowed while the Gospel was read in the Church service. He was vehemently opposed to the doctrines of Origen, one of whose works (*Peri Archon*, i.e., 'Concerning Principles') he condemned as heretical. He is praised by Jerome, who calls him a man of a holy life, of a "rich poverty," and of an apostolic earnestness. He died December, 401, or April, 402. His letters and decretals are in Migne, *Patrol. Lat.*, XX.—ANASTASIUS II, Pope from 496 to 498. He was born in Rome. He endeavored to heal the breach with the Eastern church, but the attempt was so ill-judged that Dante puts him in Hell. He died in November, 498.—ANASTASIUS III, Pope from 911 to 913. He was born in Rome.—ANASTASIUS IV, Pope from 1153 to 1154. He healed two important ecclesiastical quarrels by recognizing Wichmann as Archbishop of Magdeburg, and William as Archbishop of York. He died in Rome Dec. 3, 1154. His letters are in Migne, *Patrol. Lat.*, clxxxviii. —The Antipope ANASTASIUS was opposed to Benedict III in 855, but speedily degraded.

ANASTASIUS I (c.430–518). Emperor of the East. He was proclaimed Emperor at Constantinople on the death of Zeno, in 491. He was a native of Dyrrachium, but had spent most of his life in public office at Constantinople. He was over 60 years old at his accession, and was noted for his ability, integrity, and justice. "Reign as you have lived" was the cry with which he was greeted on his first public appearance. He married the widow of Zeno, but had no children. His reign was troubled by local revolts, by a war with Persia in 502–505, and by invasions of Huns, Slavs, and Bulgarians. To check the last, Anastasius built, in 512, the wall which bears his name, 35 miles west of Constantinople. Yet his reign was a very prosperous one. He was unpopular with some, because he was suspected of being addicted to the Monophysite heresy (q.v.); with others, because he was thought to be too puritanical. He suppressed gladiatorial combats with wild beasts and licentious dances. He erected fortresses on the boundaries, restored ruined cities, suppressed some of the most obnoxious taxes; yet he left the treasury, which he had found empty, filled with 320,000 pounds of gold; and a well-disciplined army of 150,000 men. He preserved the Empire intact, having governed it wisely, leniently, and justly. See Gibbon, *Decline and Fall*, edited by Bury, vol. iv (London, 1898), and Bury, *Later Roman Empire* (London, 1889).

ANASTASIUS II (died 721). Emperor of the East, elected to the throne of Constantinople by the Senate and people in 713. He organized a formidable naval force, which mutinied at Rhodes and proclaimed Theodosius, a person of low birth, Emperor. Theodosius took Constantinople six months later and deposed Anastasius (716), who escaped to Thessalonica and became a monk. In 721 he headed a revolution against the Emperor Leo and was captured and put to death by the latter.

ANASTASIUS THE LIBRA'RIAN (BIBLIOTHECARIUS) (?–886). A librarian of the Vatican, and abbot of Santa Maria Trans Tiberim, Rome. He was present in 869 at the eighth Council of Constantinople, whose canons he translated into Latin. He wrote a *Historia Ecclesiastica* (edited by Fabretti, 1649, and the *Liber Pontificalis*, biographies of the popes from St. Peter to Nicolas I.

ANAS'TOMO'SIS (Gk. *ἀναστόμωσις*, an opening of the mouth, from *ἀνά*, *ana*, again + *στόμα*, *stoma*, mouth). An anatomical term used to express the union of vessels which carry blood or other fluids, and also, for convenience' sake, the junction of nerves. The veins and lymphatics



ARTERIES ANASTOMOSING.

anastomose to form large single trunks as they approach their ultimate destinations. The arteries break up into small branches, for the supply of the tissues, and each small vessel again communicates with others given off above and below. At each large joint there is a very free anastomosis, so that the safety of the limb beyond may not be entirely dependent on a single arterial trunk, exposed to all the obstructive influences of the different motions of the limb. After a main artery has been permanently obstructed, the anastomosing vessels enlarge, so as to compensate for the loss; but after a time only those whose course follows that of the parent trunk remain enlarged, and the others gradually regain their ordinary dimensions.

AN'ATASE. See OCTAHEDRITE.

ANATH'EMA (Gk. *ἀνάθεμα*, or *ἀνάθημα*, *anathēma*, that which is set up, offered, or dedicated, from *ἀνά*, *ana*, up + *τιθέναι*, *tithenai*, to put, set, place). A word originally signifying some offering or gift to Deity, generally suspended in the Temple. Thus, we read in Luke xxi. 5 that the Temple was adorned "with goodly stones and gifts" (*anathemasi*). It also signifies a sacrifice to God; and, as the animals devoted to be sacrificed could not be redeemed from death, the word was ultimately used in its strongest sense, implying eternal perdition, as in Rom. ix. 3, Gal. i. 8–9, and other places. In the Catholic church a distinction has been made between excommunication and anathema-

tizing; the latter being the extreme form of denunciation against obstinate offenders. The synod of Elvira (306) anathematized those who placed libelous writings in the Church and those who read them; the Nicene Council (325), the Arians; and so later councils and synods those who seriously offended. Thus, that of Paris (846) forbids anathematization to bishops without the consent of their archbishop and fellow bishops, on account of its being a "condemnation to eternal death."

AN'ATHOTH. A town in Palestine, 2½ miles northeast of Jerusalem, and one of the places assigned to the Levites (Josh. xxi.; 1 Chron. vi. 60). It was the birthplace of Jeremiah (Jer. i. 1), as well as the home of Abiathar, the high priest (1 Kings ii. 26), of Abiezer (2 Sam. xxiii. 27), and of Jehu (1 Chron. xii. 3), all prominent in the days of David. The name appears to be the plural of Anath, the Syrian goddess of war, whose name occurs also in Beth-Anath, Samgar ben Anath, and Anammelech (q.v.). It was an important place, being reoccupied after the exile (Ezra ii. 23; Neh. vii. 27). On its site stands at present the little village of Anata, at the top of a hill commanding a view of the Dead Sea. Building stones for Jerusalem are still supplied from a quarry at Anata. It was at Anathoth that Jeremiah bought a field, as a symbol of the assured return from the Babylonian captivity (Jer. xxxii. 7).

ANAT'IDÆ (Lat. *anas*, duck). The family of ducks, geese, and swans (qq.v.). See ANSERES.

ANATOLI, ä'nâ-tō'lē, JACOB BEN ABBA (1194–1256). Hebrew translator of Arabic scientific literature and allegorical commentator. He was born in southern France and was invited by Emperor Frederick II of Hohenstaufen to Naples, where he devoted himself chiefly to the translation of Arabic authors or Arabic versions of Greek writers into Hebrew. He was related by marriage to Samuel ibn Tibbon, the translator of Maimonides, and became a great admirer of the Jewish philosopher. Under his influence he wrote his *Malmad ha-talmidim*, 'Goad to the students,' a collection of exhortatory addresses intended to stimulate study. In this work he shows his familiarity with Plato, Aristotle, Averroes, and Christian scholars. He speaks in the highest terms of Michael Scot. Anatoli translated Averroes, Ptolemy's *Almagest*, Al Fargani's *Elements of Astronomy*, and Al Farabi's *Treatise on the Syllogism*. Consult Steinschneider, *Die Hebräischen Uebersetzungen des Mittelalters und die Juden als Dolmetscher* (Berlin, 1893).

AN'ATO'LIA (Gk. Ἀνατολή, *Anatolē*, a rising, east, i.e., from Constantinople; from ἀνά, *ana*, up + τέλλειν, *tellein*, to make to arise, to rise). The modern name for Asia Minor; Turkish, Anadoli. It embraces the western peninsula of Asia, bounded by the Armenian highlands on the east, Syria and the Mediterranean on the south, the Ægean Sea on the west, and the Black Sea and the Sea of Marmora on the north. Its area is 193,590 square miles (Map: Turkey in Asia, D 3). It constitutes the western prolongation of the high table-land of Armenia, with its border mountain ranges. The interior consists of a great plateau, or rather series of plateaus, having an average elevation of about 3000 feet, with bare steppes, salt plains, marshes, and lakes; the structure is volcanic, and there are several conical mountains, one of which, the Argish (or Ergish) Dagh (Argæus), with two craters, rises about 10,000 feet above the plain of Kaisarieh, which has itself an elevation of between 2000 and 3000 feet. The plateau is bordered on the north by a long train of parallel mountains, which skirt the coast of the Black Sea and extend all the way to the Mediterranean and which are cut up into groups by cross valleys. These ranges vary greatly in height, the greatest elevation in the extreme east being about 12,000 feet. They sink abruptly down on the north side to a narrow strip of coast; their slopes toward the interior are gentler and bare of wood. Similar is the character of the border ranges on the south, the ancient Taurus, only that they are more uniform and on the average much higher, although their loftiest summits do not rise above the highest peak of the northern mountains. The Taurus and Anti-Taurus are crossed by several good passes, the most important and famous being the Gölek-Boghaz, or 'Cilician Gates,' 30 miles north of Tarsus, the pathway of all armies, traders, or travelers for ages, the route to and from the Euphrates valley. The western border is intersected by numerous valleys, opening upon the Archipelago, through the highlands of the ancient Caria, Lydia, and Mysia, to the northern part of which mounts Ida and Olympus belong. Between the highlands and the sea lie the fertile coast lands of the Levant. The western coast of Anatolia is remarkably indented and fringed with the islands of the Archipelago. The rivers of Anatolia are not navigable; the largest are the Yeshil-Irmak (Iris), the Kizil-Irmak (Halys), and the Sakariah (Sangarius), flowing into the Black Sea; and the famous Ghediz-Tchai (Hermus), and Menderes (Mæander), into the Ægean. The largest of the salt lakes are Tuz-Tchöllü, Bei-Shehr, and Egerdir.

The climate bears, on the whole, a south European character; but a distinction must be made of four regions. The central plateau, nearly destitute of wood and water, has a hot climate in summer and a cold one in winter; the southern coast has mild winters and scorching summers; while on the coast of the Ægean there is the mildest of climates and a magnificent vegetation. On the northern side the climate is not so mild as on the western; yet the vegetation is most luxuriant, and a more delightful or richer tract than the coast from the Sea of Marmora to Trebizond is hardly to be found. The whole peninsula is subject to earthquakes.

In its flora and fauna Anatolia forms the transition from the continental character of the East to the maritime character of the West. The forest trees and cultivated plants of Europe are seen mingled with the forms peculiar to the East. The central plateau, which is barren, except when assisted by irrigation, has the character of an Asiatic steppe, more adapted for the flocks and herds of nomadic tribes than for agriculture; the southern and western coasts, on the contrary, are characterized by a luxuriant vegetation, which includes the southern fruits of Europe with a slight admixture of the tropical plants of Africa.

Mining is little developed in Anatolia, although its mineral wealth is large and varied, including deposits of coal, lead, manganese, copper, iron, gold, salt, petroleum, meerschaum, and many others. The agricultural products include the common grains, fruits in

great variety and abundance, tobacco, cotton, and poppy-seed. Much silk is produced. Among the exports are prunes, figs, olives, poultry, eggs, skins, cattle, carpets, silk, gums, wax, drugs, nuts, sponges, and minerals. Transportation facilities are still inadequate; the railways had in 1910 a total length of 1474 miles.

The population of Anatolia, according to recent estimates, is over 9,089,200, composed of a number of different races. Turks are found all over the country, and occupy the foremost position, both in commercial and in political life. The Turkomans, who are akin to the Turks, are mostly nomadic. Greeks and Armenians constitute a considerable fraction of the population, and commerce is to a great extent in their hands. Other elements are Kurds, Yuruks, Lazes, Jews, and Circassians. About four-fifths of the inhabitants are agriculturists or herdsmen. Among the cities are Smyrna, Scutari, Brusa, Kaisarieh, Adana, Konieh, Sivas, Manissa (Magnesia) Aidin, Trebizond, Amasia, Tokat, Angora, Adalia, Ismid, and Kutaia.

This region was an early seat of civilization. The country has passed under the supremacy of one race after another, and it has been the scene of numerous wars, both in ancient and in modern times. The west coast was early lined with opulent Greek cities, the seats of poetry, learning, and the arts, and great centres of colonization. In the first half of the sixth century B.C. the kingdom of Lydia, under Crœsus, attained the height of its splendor. Crœsus was conquered by the Persians who extended their sway over the whole peninsula. The rule of Macedon succeeded that of Persia. After the disruption of Alexander's Empire the Seleucid kings of Syria were dominant. By the side of the Seleucid realm various states arose, Pergamon, Bithynia, Cappadocia, and Pontus. The Romans first carried their arms into Asia Minor at the beginning of the second century B.C., when they vanquished Antiochus the Great of Syria. In the following century Pontus was a mighty realm under Mithridates the Great, who succumbed to the arms of Pompey. After 395 A.D. Asia Minor formed part of the Greek, or Byzantine, Empire. Under the Byzantines it received the name of Anatolia. In the eleventh century the Seljuks made themselves masters of the region, where they established the sultanate of Rum, with its capital first at Nicæa and then at Iconium. The close of the thirteenth century witnessed the beginnings of the power of the Ottoman Turks, who in the course of the following century established their sway over Asia Minor, which now became a great base whence Mohammedan conquests were carried on in Europe. Since 1453 the Ottoman Turks have ruled Anatolia from Constantinople. The ancient divisions of this region were Pontus, Paphlagonia, Bithynia, Galatia, Lycaonia, Phrygia, Cilicia, Caria, Pisidia, Pamphylia, Cappadocia, Mysia, and Lydia.

Consult: Percy, *The Highlands of Asiatic Turkey* (London, 1901); Oberhummer and Zimmerer, *Durch Syrien und Kleinasien* (Leipzig, 1898); K. Kaunenberg, *Kleinasiens Naturschätze* (Berlin, 1897); J. Bryce, *Trans-Caucasia and Ararat* (London, 1896); H. C. Barkley, *A Ride through Asia Minor and Armenia* (London, 1891).

ANAT'OMY. The science that treats of the structure of organic forms, so called from dissection (Gk. *ἀνά, ana*, apart + *τέμνειν, temnein*, to cut), formerly the sole method of investigation. It is distinguished as Human, Animal, or Plant Anatomy, according to the organisms under consideration; as Normal or Pathological Anatomy according as these are in health or diseased; as Macroscopic or Gross Anatomy when it deals with structure visible to the naked eye; and as Microscopic or Minute Anatomy when the microscope is used as a means of research. This last division is known as Histology, in view of the delicate webs of structure or tissues (*ἱστός, histos*, web) it investigates. Comparative Anatomy (see ANATOMY, COMPARATIVE) involves a comparison of the different forms of animals and plants, and Developmental Anatomy or Embryology an account of the different forms assumed by a single individual during its growth.

Other designations applied to anatomy have reference to its application. Dissection and the preparation of anatomical specimens is often called Practical Anatomy; the arrangement of the facts of structure according to their bearing upon the diagnosis and treatment of disorders is Applied Anatomy, which may be divided into Surgical Anatomy, that dealing with structure accessible for surgical operations, and Medical Anatomy, that relating to structure which can be reached only indirectly. The consideration of the deeper relations and causes of structure is called Philosophical Anatomy, or Morphology, and a purely speculative or theoretical disquisition of this kind is termed Transcendental Anatomy.

Anatomy may be treated in two different ways —as Descriptive or Systematic Anatomy, that arranges the facts of the science with reference to the structural affinities of organs forming the systems of the body, or as Topographical or Regional Anatomy, that considers the organs merely with reference to their exact situation and relations to each other. Descriptive Anatomy is usually subdivided into Osteology (see BONE and SKELETON), that treats of the osseous system; Syndesmology, that treats of the ligaments; or Arthrology, that considers the ligaments and joints; Myology, that treats of the muscles; Neurology, of the nerves; Angeiology, of the vessels; Splanchnology, of the viscera.

HISTORY

The knowledge of anatomy possessed by the ancients was slight. The importance of exact information not being generally recognized, and the dead body being held especially sacred, examination of the cadaver was rare and attended with great difficulties. It is among the Greeks that the first traces of the science are found. Hippocrates (460–360 B.C.) and his school appear to have had some knowledge of the skeleton and of the larger viscera; Aristotle (384–323 B.C.) examined a large number of animals and had some remarkably just ideas as to their genetic relationships; Herophilus (c.300 B.C.) and Erasistratus of Alexandria investigated the vessels and the glandular organs. At the Alexandrian school dissection was first publicly practiced, and there a considerable advance was made in the knowledge of the human body. Only fragments of the writings of this time have come down to us. Herophilus described the sinuses of the dura mater, the retina, the lacteals, and the lymphatics, and admitted that the arteries contained blood, his predecessors having held that, like the air-tubes of the lungs, they normally carried air during life. Erasistratus con-

sidered the brain as an organ for the transformation of the "vital spirits" received from the air into "animal spirits" and distinguished between nerves of motion and those of sensation.

The prejudice against dissection appears to have finally overcome the progress achieved by the Alexandrian school, and the belief became current that the healing art depended upon metaphysical conditions impossible to elucidate by an examination of structure. The next considerable advance was made by Claudius Galen (q.v.) of Pergamus (131–201 A.D.), who compiled much from Celsus and others, and was the author of the first systematic treatise that has come down to us. He appears to have examined apes rather than man, but correctly described most of the bones, joints, muscles, cranial and spinal nerves, and many features about the brain and its membranes. He performed a great service for anatomy by clearly and exactly describing what he had actually inspected and by recording his observations in a methodical manner. These very merits, however, caused the almost universal acceptance of his erroneous physiological speculations, which gave rise to false ideas of the structure of the circulatory apparatus that prevailed until the middle of the seventeenth century. He taught that after digestion food is carried to the liver by the portal vein, and there converted into crude blood having nutritive properties due to "natural spirits"; that from the liver it passes to the right side of the heart, where a portion enters the venous system, in which it ebbs and flows, affording nutrition to the body, another portion passing through invisible pores in the septum of the heart to its left side, where it becomes mixed with air drawn in from the lungs by the pulmonary veins, and thus receives the "vital spirits," and is freed from impurities (fuliginous vapors) by the "innate heat" of the heart; thus vitalized and clarified, it passes into the arterial system, in which it also has an oscillatory motion, endowing the body with the higher functions of life, while in the brain it is further elaborated to "animal spirits" that are conveyed throughout the body by the tubular nerves to impart movement.

The irruption of the northern barbarians arrested all attempts at scientific research, and it was not until after the renaissance of letters and science at the hands of the Arabs, who resuscitated the learning of the ancient Greeks, that further advances were made. At Salerno and Montpellier active medical schools were established, and some attempt was made to revive the study of anatomy. Frederick II, Emperor of Germany (1215–50), is said to have forbidden any one to practice surgery without a competent knowledge of anatomy, and to have provided that every five years there should be held at Salerno a public dissection, to which physicians and surgeons from all parts of the Empire were invited. At Montpellier the cadavers of criminals were regularly dissected. The Senate of Venice decreed in 1308 that a human body should be dissected annually. Doubtless autopsies were occasionally held to determine deaths by poisoning, which were not infrequent at this period. At the University of Bologna Mundinus dissected several bodies publicly and published, in 1315, an imperfect little handbook based upon Galen and Arabian authors. At Prague dissection was practiced from the very foundation of the university (1348), at Vienna as early as 1404, at Tübingen from 1482, and at London from 1540. At Padua (1490) Benedetti erected an anatomical amphitheatre and made public demonstrations. Somewhat later Berengarius of Carpi is said to have dissected more than 100 cadavers. Vidius, from whom the Vidian nerve and Vidian canal are named, professor at Pisa, Guintherius of Andernach (1487–1574), professor at Louvain, and Jacobus Sylvius (1478–1555), professor at Paris, as well as many others, dissected from time to time. There was, however, nothing like a careful and systematic examination of the structure of the body. It was considered sufficient to open the great cavities and display the viscera, which were examined in the most superficial manner. Great reliance was placed upon Galen and Hippocrates, supplemented by their Arabian commentators, and their authority was rarely questioned.

Andreas Vesalius (1514–64) (q.v.) of Brussels was the first to proclaim openly the new doctrine, that the structure of man should be learned by a thorough inspection of the human body rather than by reference to ancient authorities. He dissected frequently in public at Padua, Pisa, and Verona, and published, in 1543, his great work, *De Humani Corporis Fabrica*, the first careful and complete description of the body of man based upon actual observation. This work was illustrated by excellent plates made by Stephen von Calcar, a pupil of Titian. Many of Galen's errors were corrected, and the student was urged again and again to verify each statement by reference to the only prime authority, the body of man itself.

A storm of opposition was at once raised. Sylvius, a pronounced Galenist, declared Vesalius to be an impious madman, whose breath poisoned Europe, and he strove in every way to discredit his work. Others, more rational in their opposition, pointed out errors in Vesalius's own book. The ardent young Fleming, impatient and chagrined at this, resigned his chair at Padua and retired to the court of Philip II, at Madrid, where he tried to continue his studies. His enemies did not scruple to attempt to rouse the Inquisition against him. Philip interrogated the faculty of the University of Salamanca, then the leading theological school in Europe, as to whether dissection was permissible. After due deliberation a reply was given, that, since a knowledge of anatomy is useful to man, dissection may be allowed (1556).

The atmosphere of the Spanish court was far from congenial to scientific pursuits. Vesalius contemplated a return to Italy; but coming back from Palestine, whither he had gone, as is supposed, in fulfillment of some vow, he was shipwrecked, and died on the island of Zante. He was the founder of modern anatomy in the sense that he broke with tradition and substituted actual investigation for reliance on authority.

The contemporaries and successors of Vesalius aided much in placing Gross Anatomy upon secure and lasting foundations. The most illustrious among these were Eustachio (c.1520–74) (q.v.), Fallopio (c.1523–62) (q.v.), and Fabricius (1537–1619).

Eustachio made many corrections of the work of Vesalius and was besides an original investigator of great force. From plates prepared by him (but not published until the eighteenth century), it appears that he anticipated many discoveries ordinarily ascribed to anatomists of a later period; but the Eustachian tube, which he

accurately described, is said to have been previously discovered by Alcmæon about 500 B.C.

Fallopio named the Fallopian tubes (previously discovered by Herophilus) and the seminal ducts and gave a good description of the organ of hearing, discovering in the temporal bone the aqueduct and hiatus that commonly bear his name.

Fabricius of Aquapendente erected at Padua an anatomical amphitheatre. He studied the development of the fœtus and of the embryo chick, described the muscular coat of the alimentary canal and of the bladder, and especially the valves of the veins first discovered by Stephanus of Paris in 1545 and in some situations figured by Vesalius in the second edition of his work. Fabricius supposed that they were for the purpose of retarding the oscillatory flow of the venous blood.

It fell to a pupil of Fabricius, William Harvey, to explain them more satisfactorily and to free anatomy from some of the false notions that survived from the Galenical teaching. From about 1615 to 1628 Harvey demonstrated by public lectures and by published experiments the true circulation of the blood. The lesser or pulmonary circulation had been mentioned by Servetus in 1553 in an obscure pamphlet, and by Realdus Columbus in 1559, but was not generally accepted. Cæsalpinus, in some controversial works published in 1571 and 1593, suggested the probability of a systemic as well as a pulmonary circulation and was the first to use the term *circulatio* in this connection. Yet the Galenical theory of the oscillatory movement of the two kinds of blood and the necessary supposition of orifices in the septum between the cavities of the heart were still taught. Vesalius, it is true, had said that he could not find the orifices and somewhat satirically wondered at the wisdom of the Almighty, who had made them so small that they could not be seen. Harvey, to use his own words, "taught anatomy, not from books, but from dissections; not from the suppositions of philosophers, but from the fabric of Nature," and in a series of most carefully conducted investigations and vivisections succeeded in showing that the blood makes a complete circuit of the body as well as of the lungs. Harvey's work led to a more careful examination of the heart and blood vessels. Stephen Blancaard, in 1675, first effectively demonstrated the finer vessels by injection, a method used by Frederick Ruysch (1638–1731) to show their presence in great numbers in almost every part of the body. The lymphatics, casually seen by several ancient observers, were first carefully studied by Caspare Aselli in 1622. The thoracic duct, discovered first by Eustachius in the horse, was seen in the dog by Pecquet (1627–74) and traced through the diaphragm to the *receptaculum chyli*. It was first observed in man by Jan van Horne (1621–70), professor at Leyden. Still under the hallucination caused by the Galenical theories, anatomists thought that both lacteals and thoracic duct could be traced to the liver. Rudbeck discovered the general lymphatic system in 1651.

A clearer idea of the gross anatomy of the brain, especially of its internal cavities, was due to the descriptions of Francis Boë (Du Bois), usually known as Franciscus Sylvius (1614–72), professor at Leyden, whose name survives in the aqueduct, fissure, fossa, and artery of Sylvius. The science of chemistry was at this time gradually emerging from the superstitions of alchemy, and Sylvius is also famous for being among the first to attempt to differentiate the structures and fluids of the body by means of their chemical reactions. Vieussens (1641–c.1720) of Montpellier also increased the knowledge of the nervous system, both central and peripheral, describing the anterior pyramids, the olive, and the anterior medullary velum which sometimes bears his name. To Thomas Willis (1621–75) (q.v.) of London, sometime professor at Oxford, is due a systematic description of the brain and its cavities, together with a classification of the cranial nerves in which he finally separated the sympathetic cord from that series. He recognized that the brain becomes gradually more complicated as we ascend the animal scale and that it is more easily understood by a study of the lower and more simple forms. The decussation of the pyramids was first described by Duverney (1648–1730), demonstrator at the Jardin du Roi, afterward the Jardin des Plantes, at Paris. The doctrine of the "animal spirits," supposed to fill the ventricles of the brain and to be distributed by the nerves, was first seriously attacked by Wepffer (1658).

The advance of the physical sciences instituted by Galileo (1564–1642) had a profound effect upon anatomy. The new developments in optics were now called on to contribute to the problems of structure. The optical properties of the crystalline lens were now described by Kepler (1571–1630) (q.v.), the eminent astronomer, who denied that it is the seat of vision as supposed by Hippocrates; the image on the retina was demonstrated by Scheiner (1575–1650); Descartes (1596–1650) showed the eye to be a camera obscura and suggested that accommodation is produced by a change in the convexity of the lens. He also made some very acute observations on the structure and functions of the nervous system, marred, however, by metaphysical speculations that were attacked by Stensen, who declared that in order to determine the functions of organs we must first ascertain their structure.

A new instrument of research which the Italians, impelled by the zeal imparted by Galileo, were the first to apply to scientific uses, was now introduced. This was the microscope, hitherto merely an optical curiosity. The magnifying power of convex lenses was known to the ancients, for even in the ruins of Nineveh a polished rock crystal lens has been found, and there is good reason to believe that similar instruments were used in ancient Egypt and in Greece. Spectacles were used in Europe as early as the thirteenth century, and the compound microscope was invented about 1590 by Hans and Zacharias Janssen of Middleburg, Holland. No means for correcting chromatic and spherical aberration being then known, the first instruments were clumsy and imperfect; consequently, many investigators preferred to use the simple microscope, especially after Leeuwenhoek had shown what excellent results could be obtained with small but accurate lenses.

Among the first and most acute observers was Marcello Malpighi (1628–94), professor at Bologna, Pisa, and Messina, a man of extraordinary acuteness of intellect, combined with an indomitable zeal for natural research. He left his mark in almost all departments of biology. He was an accomplished botanist, and by his researches among plants laid the foundations of

the modern cell-theory; he was an entomologist, devoting himself to an exhaustive study of the anatomy and development of the silkworm; he was an embryologist, being the first to build upon the incomplete studies of Harvey and Fabricius and describe adequately the changes of the chick in the egg; he was a pathologist, studying carefully post-mortem appearances and the causes of disease; he was also a comparative anatomist, drawing many of his conclusions as to the structure of man from an examination of animals.

Before Malpighi's time but little was known regarding the structure of glands. Under this designation were included many non-glandular organs, like the tongue and the brain, the latter being supposed to secrete not only the animal spirits but the nasal mucus, or *pituita*, which was believed to pass down through holes in the cribriform plate of the ethmoid bone. Sylvius had, it is true, distinguished as conglomerate glands aggregations like the pancreas and the salivary glands, and as conglobate glands those of the lymphatic ducts. The ducts of some of the larger glands were unknown, the liver was considered a great blood-making organ that received the bile elaborated by the gall-bladder for the purpose of combining it with the blood, and the mechanism of secretion was wholly misunderstood. Wirsung discovered the pancreatic duct in 1642, but supposed it to be a lymphatic vessel leading to the liver; Wharton described the submaxillary duct in 1652; Steno, the parotid duct (previously thought to be a tendon) in 1661; Bartholin, the sublingual duct; Bellini, the straight tubules of the kidney in 1662; Peyer, the closed follicles of the intestines in 1677, and Brunner, the duodenal glands in 1682. Schneider (1614–80), professor at Wittenberg, finally described the pituitary membrane of the nasal passages and settled the origin of the nasal mucus. It was Malpighi, however, who first united these scattered observations and gave a clear idea of the structure of acinous glands. It was during his researches on this subject that he discovered the acinous structure of the lung and demonstrated that there are no visible orifices by which air can pass from the vesicles into the pulmonary veins. Here, too, he first observed, in the lung of the frog, the capillary blood vessels "distributed in a ring-like fashion," thus justifying Harvey and forever settling the question of the circulation of the blood. He described most of the structure of the kidney as it is known to us to-day, and in the spleen discovered the bodies that bear his name. He saw and described the red blood corpuscles, unaware that they had been previously discovered by Swammerdam, a Dutch anatomist, in 1658. Extending his researches to the skin, he discovered the rete mucosum, or Malpighian layer, and the papillæ, which he surmised were organs of touch. He elucidated the structure of the liver, which Glisson (1597–1677), professor at Cambridge, had already carefully described, showing that it is an acinous gland of peculiar construction, and, by tying the bile duct, demonstrated that the bile is formed in the liver and not in the gall-bladder.

As a consequence of the increase of the power of vision by the use of the microscope, the phenomena of fecundation and the development of the embryo began to receive attention. Spermatozoa were discovered in 1677 by a pupil of Leeuwenhoek, and De Graaf, discovering the ovisacs (Graafian follicles) about 1672, supposed them at first to be ova. Naboth, too, discovering the closed follicles of the neck of the uterus, supposed them to be ova (*Ovula nabothi*). The ova of the lower vertebrates were, of course, well known, and the phenomena of their development were specially investigated by Malpighi. Van Horne, of Leyden, probably saw the human ovum in 1668, but it was not unmistakably recognized until Von Bär demonstrated it in 1827.

During the course of this investigation two schools arose—the Animalculists and the Ovists, who respectively maintained the superior efficacy of the male or female elements. Attempts were made to explain the transmission of hereditary qualities from parent to child. Aristotle, having studied the development of the egg, had declared that the embryo primitively consisted of simple, undifferentiated material, from which, by successive stages, the adult was formed (theory of post-formation or epigenesis). Opposed to this was another contention, that either the male or the female elements must possess in miniature all the organs of the adult (theory of preformation).

A further result of microscopic research was an enlarged view as to the distribution of living things. The discovery by Leeuwenhoek (1632–1723) that organic infusions soon become replete with living forms when exposed to the air, led to the revival of the ancient notion of the spontaneous generation of living from non-living matter. This led to fanciful theories regarding fecundation that were not overthrown until Spallanzani (1729–99) showed that living forms do not develop in infusions that have been boiled and then excluded from the air, and that filtered seminal fluid lost the power of impregnation. Following up the researches of Hartsoeker (1656–1725), he also demonstrated that ordinary air teems with living particles that enter the human body and pass into infusions. This doctrine was termed panspermatism, and developed afterward into the modern "germ theory," which has had a profound influence upon pathological anatomy.

The following discoveries of this period may be briefly noted: Ole Worm (1588–1654), professor at Copenhagen, discovered the intercalary (Wormian) bones of the skull; Clopton Havers, of England, in 1692, the Haversian canals and the intimate structure of bone; Hooke (1635–1703), the primitive fibrillæ of muscle; Kerkring (1640–93), the valvulæ conniventes of the small intestine; Winslow (1669–1760), of Paris, the foramen connecting the two cavities of the peritoneum; Douglas (1675–1742), of London, the recto-uterine pouch and several other features of the peritoneum and the abdominal wall.

The classification of animals by their anatomical structure, attempted first by Aristotle, was revived by several authors during the eighteenth century, and notably by Karl von Linné (Linnæus) of Råshult, in Sweden (1707–78), who considered that each particular species was immutably established at the creation, man being placed at the head in the order Primates. Buffon (1707–88), however, supposed that variations occur from changes of environment, and even hinted that all species may have originated from a primitive common stock. This was afterward more boldly advocated by Lamarck (1744–1829), who was the first to maintain systematically the mutability of species, and to look

upon man as derived from a common stock with other organisms, conceiving that the ancestral record of all might be represented as a branching tree. To this was opposed the authority of the great comparative anatomist Cuvier (1769–1832), who caused these views to sink into obscurity for a time.

The controversy concerning the early development of the human body was renewed during this period. The weight of authority was overwhelmingly in favor of the theory of preformation, notwithstanding the absurdities to which it committed its advocates. Its most earnest supporter was Haller (1708–77) (q.v.), professor at Göttingen, a man of remarkable learning and indefatigable research, who did much to further exactitude in anatomical knowledge and was the leading physiologist of his time. He made many anatomical discoveries in all parts of the body and finally overthrew the doctrine of "animal spirits," which had ruled all investigations of the nervous system since the days of Hippocrates. He declared, however, that the body of our primitive mother Eve must have contained in miniature all individuals of the human race that had existed since her time and that were hereafter to exist! This was the less excusable, as Kaspar Friedrich Wolff, a young medical student, had published in 1759, as his graduation thesis, a remarkable essay, the *Theoria Generationis*, in which he showed by accurate and conclusive observations that the organs of the body are developed from membranous sheets (the blastodermic membranes) and not from preformed rudiments. He even anticipated the cell theory of the next century by stating that these membranes are themselves composed of globules (cells). Wolff made many other important investigations, and his name has been perpetuated in that of the Wolffian body or primordial kidney. Such was the opposition with which his views were received that he was unable to obtain a professorship in Germany and went to Russia. It was not until Meckel called attention to his work in 1812 that his merits were fully recognized.

Aristotle, Eustachio, and Fallopio had surmised that the organs of the body might be composed of simpler elements; Boerhaave (1668–1738) supposed that everything could be reduced to vessels and fibres; Haller (1708–77) classified structures according to their properties; Bonn 1738–1818) considered that membranes are the anatomical basis of structure. It remained, however, for Bichat (1771–1802) to establish clearly the doctrine that the body with all its organs is made up of a small number of simple tissues. This he did by an examination of their chemical, physical, and vital properties, dispensing wholly with the use of the microscope, then a very imperfect instrument. He applied these views to the elucidation of the anatomy of organs affected by disease, a subject previously studied by Morgagni (1682–1771) and by John Hunter (1728–93). Bichat's death, at the early age of 31, caused by imprudent exposure in the dissecting room, was a great loss to anatomical science.

The science of chemistry had now advanced to a point where it could throw much light upon the composition of the animal body. Four great organic gases had been discovered: carbon dioxide (imperfectly known to Van Helmont in 1640) by Black in 1757, hydrogen by Cavendish in 1766, nitrogen by Rutherford in 1772, oxygen by Priestley in 1774. Lavoisier (1743–94) showed the importance of all these gases to the animal economy. Fourcroy (1755–1809) was practically the first to investigate the composition of organic products.

The investigation of the human body by so many competent and careful observers gave a new scope to anatomical teaching. It was seen that no proper knowledge of anatomy or surgery could be obtained without the use of the cadaver. At first legal enactments and social ostracism were directed against those who practiced dissection; but on the continent of Europe public dissections were frequently held from the time of Vesalius, and as men of commanding intellect like Malpighi, Stensen, Boerhaave, Morgagni, Haller, Bichat, Hunter, and many others devoted themselves to the pursuit of anatomy, the social stigma was gradually removed. On the Continent laws were early enacted by which the bodies of prisoners and paupers were turned over for anatomical purposes. In Great Britain, however, this was not done, and bodies were quite commonly obtained by robbing graves. When, in 1827, the University of Edinburgh made dissection compulsory, and this example was followed by the other large schools in the United Kingdom, the demand for cadavers became so great that it was practically impossible to supply it without breaking the law. A set of ruffians known as "resurrectionists" became established in every large city, and no cemetery was safe from their depredations. In Edinburgh two scoundrels named Burke and Hare made a business of enticing poor and friendless persons into their haunts, smothering them, and selling their bodies to the medical schools for dissection. Similar cases were those of Bishop and Williams in London. A remedy for this was found in an anatomy act passed in 1832, which legalized dissection and authorized the use of available material under certain restrictions.

Improvements in the microscope made about 1824 gave a new impetus to research. Earlier observers (Hooke, 1665; Grew and Malpighi, 1671; Wolff, 1759) had dimly surmised that organic forms were composed of elementary units, but Schwann, in 1839, was the first to demonstrate this for animals in a satisfactory manner. Observations by Von Mohl, Purkinje, Leydig, Kölliker, Virchow, and Max Schultze soon placed this fact beyond cavil, and thus was established the celebrated cell theory, which declared all organized beings to be composed of essentially similar minute units. This led to great improvements in microscopical technique and the investigation of the chemical properties of cells. Stilling invented section cutting in 1842; Gerlach, carmine staining in 1858; Recklinghausen, silver staining in 1860; Waldeyer, double staining with aniline dyes in 1863, and Golgi, bichromate of silver staining in 1873.

With the establishment of the cell theory came some remarkable generalizations, which have had a profound effect upon anatomy. According to the views advanced by Herbert Spencer, Milne-Edwards, and others, the human body is to be considered as a cell community, in which the laws of division of labor and of differentiation that in human society cause specialization into trades, classes, and employments are applied to the morphological units, the cells. Certain cells become specialized for special functions, and thus are produced the diversified forms of the tissues of the body.

Another remarkable result of the improved methods of investigation was that the body of animals was shown to be developed from a single cell, the ovum. The series of phases by which this astonishing change is effected occupied the attention of many investigators, notably Pander; Von Bär, who established the theory of the germinal layers or blastodermic membranes; Serres, who pointed out the great similarity between the successive phases of the embryo and the series of animal forms now existent on the globe, and a great number of others in all civilized nations. Many details of this wonderful series of changes have yet to be supplied, but the general features of it are now firmly established.

A great impulse was also given to Pathological Anatomy. The phenomena of disease were now traced to the cells, and a knowledge of their anatomical changes was found to be essential. In 1836 Cagniard de la Tour discovered the yeast plant, and many fanciful theories of fermentation and disease were overthrown. Pasteur (1822–95) demonstrated that all fermentations and putrefactions are caused by minute spores that swarm in ordinary air. The parasitic character of many disorders now became evident, and the foundation was laid for modern aseptic surgery. See HISTOLOGY; PATHOLOGY.

It was not until 1859 that the knowledge hitherto obtained was fully applied to the elucidation of the causes of bodily structure. In that year Charles Darwin published the *Origin of Species*, and followed it in 1871 with *The Descent of Man*. These works advanced beyond the position of Lamarck, in that they showed an efficient cause for the cumulative variation of structure among organisms. This is the "struggle for existence" which results in the extinction of those forms not suited to the environment. Unlike the speculations of many previous writers, these views were advanced with extreme caution and supported by a great number of careful observations. They were accepted by a large body of naturalists and caused a renewal of activity in anatomy and the allied sciences. It became evident that fully to understand the structure of man it was necessary to ascertain the laws of development both in the embryo and in the animals from which the human stock may be derived. Comparative Anatomy, Embryology, and Palæontology thus became powerful coadjutors to Human Anatomy.

The importance of the study of the varieties of man now became recognized. Previous workers in this field were Camper (1722–89), the inventor of the facial angle; Blumenbach (1752–1840), who divided mankind into five races; and Retzius (1796–1860), the inventor of the cephalic index for comparing crania. In America Samuel G. Morton became widely known by his great collection of crania, now in the Academy of Natural Sciences in Philadelphia. His *Crania Americana* and *Crania Ægyptiaca* were important contributions. His collections were, in 1856, described and commented on by another anatomist, J. Aitken Meigs, who did much to establish the modern methods of the mensuration of the skull. Jeffries Wyman, of Harvard University, was a man of great erudition and philosophical insight and as a morphologist had no superior among the anatomists of his day. He was the first to describe the arrangement of the bony spiculæ in the neck of the human femur and to contrast it with that in those animals that do not assume the erect posture. He gave the first scientific description of the anatomy of the gorilla, and wrote on symmetry and homology in the limbs, on the vertebral theory of the skull, on teratological subjects, on spontaneous generation, and on the anatomy of the Hottentot. The question of the unity or diversity of origin of the human race, which was closely connected with the origin of species, excited considerable attention in America about the middle of the nineteenth century. J. C. Nott and George R. Gliddon were the joint authors of two important works on this subject, entitled *Types of Mankind* and *Indigenous Races of the Earth*. This study was greatly stimulated by the discovery of human remains in strata belonging to previous geologic epochs, particularly at Engis and Spy in Belgium, Neanderthal near Düsseldorf, at many places in France, and in South America. Finally, the prediction of Morton, made 40 years before, was verified by Dubois, who found, in the Eocene strata of Java, fossil remains of a remarkable transition form between apes and man (1890–95). This department of anatomy was greatly advanced by the zeal and energy of Paul Broca (1824–80) of Paris, who systematized the methods in vogue and invented many new ones for the examination of the human body.

The localization of all active properties in the cells gave renewed impetus to the study of the structure of these "elementary organisms." At first this structure was believed to be comparatively simple, the protoplasm of which the living substance is composed being apparently a structureless jelly having peculiar physical and chemical properties. Further advances toward perfecting the microscope and microscopic technique have shown this to be a mistake. That protoplasm has definite structure is now agreed by all; the details of the structure are still in dispute. Eminent in this investigation were Carl Heitzmann (1830–96) of New York, Flemming of Kiel, and Bütschli of Heidelberg. The phenomena of indirect cell division (*karyokinesis*) were first connectedly observed by Schneider in 1873 and have been especially investigated by Van Beneden, Boveri, Fol, Oscar Hertwig, and Rabl. The ultimate constitution of the cell received a great deal of attention. Nägeli, in 1884, framed an hypothesis that protoplasm is composed of certain elementary units, termed *micellæ*, whose combination produces its physical and vital properties much as a combination of molecules produces the physical properties of inorganic bodies. Similar, more widely developed theories were framed by De Vries, Hertwig, Weismann, and others. Weismann attempts to explain the phenomena of heredity by supposing that bodily characters are caused by architectural peculiarities inherent in the original generative cells. This is, therefore, a reappearance of the theory of preformation so prevalent during the eighteenth century. Experiments by Hertwig appear to have disproved Weismann's views. Great activity in the investigation of the structure of cells still continues. In America Wilson of New York and Whitman of Chicago have made important contributions to our knowledge of this subject. Heitzmann of New York is well known for his attack upon the cell theory as commonly taught, holding that the cells of the body are connected by minute threads of protoplasm; a theory that has recently been confirmed to a limited degree.

The great strides made in our general knowledge of structure during the nineteenth century

can only be briefly mentioned. The structure and development of bone were elucidated by Goodsir, Purkinje, Sharpey, and Kölliker, the osteoblasts being discovered by Gegenbaur in 1864. The mechanism and development of joints were studied by Braune of Leipzig, Sutton of London, Dwight of Boston, and Bernays of St. Louis. The minute anatomy of muscle is still under consideration, and has been investigated by Krause, Ranvier, Cohnheim, and many others; Humphrey and Huxley (q.v.) in England and Gegenbaur in Germany have written on the general morphology of the muscular system, and Gruber, Theile, Testut, and Ledouble have investigated muscular anomalies. The structure of the capillary blood vessels was first correctly demonstrated by Treviranus in 1836. The blood platelets, or hematoblasts, were discovered by Max Schultze in 1865. In 1884 Metchnikoff, then professor at Odessa, laid the foundation of our modern conceptions of the defensive functions of the blood by demonstrating that the white blood corpuscles and cells of lymph glands have the property of destroying bacteria introduced into the tissues (phagocytosis). The lymphatics were investigated by Kölliker, Ranvier, and Sappey.

In the nervous system the discoveries have been many and brilliant, completely revolutionizing previous notions of its structure. Gratiolet first showed the convolutionary pattern of the brain; Broca was the first to prove that certain motor faculties may be localized upon the cerebral cortex—a subject upon which extensive researches have been made by Fritsch and Hitzig, Ferrier and Horsley. Ehrenberg of Berlin appears to have been the first to describe, in 1833, the large cells of the cerebral cortex and of the spinal cord. The axis cylinder process of nerve cells was discovered by Wagner of Göttingen, Marshall Hall (q.v.) of London was the first to demonstrate reflex movements, Prochaska to discover the differential function of the anterior and the posterior roots of the spinal nerves. By degeneration experiments instituted by Waller, by noting the myelination of nerve fibres as done by Flechsig, and by comparative studies it became possible to trace in the central nervous system the paths by which sensations are received and motor influences discharged.

Improvements in technical methods finally made it possible to trace the processes of nerve cells to their minutest ramifications. This gave rise to the neurone theory, which holds that the nervous tissue is composed of independent cells or neurones that may ramify extensively, some of the ramifications passing into nerve fibres and forming their active conducting elements. This theory has been applied with success to explain the architecture of the nervous system—a subject that is widely engrossing the minds of anatomists, and from which important results are expected in the future.

In the organs of special sense the new ideas of the constitution of the nervous system have elucidated many difficult problems. The anatomy of the ear has been studied by Rüdinger, Helmholtz (q.v.) of Berlin, Retzius of Copenhagen, and Ayers of Cincinnati. The organ of Corti was discovered by the Marchese di Corti in 1851. Schwalbe of Strassburg first saw the taste-buds of the tongue in 1867, Meissner and Wagner the tactile corpuscles in 1852. Galgi described the nerve endings in tendons in 1878, and Ruffini those of the fingers in 1893. The teeth have been a special object of research with the American anatomists Ryder, Osborn, and Cope, especially with reference to the mechanics of their development.

The researches of American anatomists have borne fruit in other fields. W. E. Horner of Philadelphia discovered the tensor tarsi, or deep layer of the orbicularis palpebrarum, and William Clay Wallace of New York was the first to show the real nature of the ciliary muscle (1835). E. C. Spitzka of New York made important additions to our knowledge of the anatomy of the nervous system. It is to Henry J. Bigelow of Harvard University that we owe the first accurate description of the ilio-femoral ligament of the hip-joint and its application to the reduction of dislocations. His work on the hip, published in 1869, completely revolutionized surgical practice in this matter. It should not be forgotten, however, that Reid, of Rochester, N. Y., had previously, in 1851, shown many of the facts afterward more completely stated by Bigelow. In the realm of comparative anatomy, and especially of palæontology, Joseph Leidy, O. C. Marsh, Harrison Allen, and Edward D. Cope have done much to extend the fame of American science.

Bibliography. Among the recent works on human descriptive anatomy may be mentioned: Quain, Gray, and Morris, in English; Testut and Poirier, in French; Gegenbaur and Rauber, in German. On topographical anatomy, McClellan and Treves, in English; the American *Surgical Anatomy* of Deaver; Tillaux, in French, and Hyrtl, Gerlach, and Merkel, in German, are good works. There is no satisfactory treatise on the history of anatomy. A fairly complete résumé is found in vol. i of *The Reference Handbook of Medical Sciences* (New York, 1913). See ABDOMEN.

ANATOMY, COMPARATIVE. The science that treats of the structure of organisms with the aim of discovering their evolutionary history and of determining what parts are fundamental and primary and what have undergone modifications due to functional changes. This, at least, has been the aim of comparative anatomy since the doctrine of evolution has guided anatomical research. In the early half of the nineteenth century the aim of comparative anatomy was to assist taxonomy, or the natural classification of organisms, by giving a basis for separating the more essential parts (to be used as the basis of the larger groups) from the less essential parts (the basis of the smaller groups). In the latter half of the nineteenth century the aims of comparative anatomy were fostered by the newer science of comparative embryology, which added a new source of evidence for tracing evolutionary history. Together these sciences constitute comparative morphology. In this work the facts which might have been brought together into a general article under this title are distributed under more special headings. Thus, for the history and general scope of comparative anatomy, see ANATOMY; for the comparative anatomy of the several parts of the body, see respectively SKELETON; ALIMENTARY SYSTEM; MUSCULAR SYSTEM; NERVOUS SYSTEM; CIRCULATORY SYSTEM; RESPIRATORY SYSTEM; REPRODUCTIVE SYSTEM; EXCRETORY SYSTEM, and similar titles in connection with human anatomy and physiology, and in zoölogy and embryology. Consult: Cuvier, *Leçons d'anatomie comparée* (1st ed., 5 vols., Paris, 1800–05; 2d ed., 8 vols., 1836–44); Meckel,

System der vergleichenden Anatomie (Halle, 1821–29); Owen, *Comparative Anatomy of Vertebrate Animals* (4th ed., London, 1871); Huxley, *Anatomy of Invertebrates* (London, 1877); Huxley, *Anatomy of Vertebrate Animals* (London, 1871); Gegenbaur, *Elements of Comparative Anatomy* (trans., London, 1878); Wiedersheim, *Comparative Anatomy of Vertebrates* (trans., London, 1898); Wiedersheim, *Lehrbuch der vergleichenden Anatomie* (Jena, 1866); Lang, A., *Textbook of Comparative Anatomy* (of Invertebrates) (trans., London, 1891–96).

ANATOMY OF ABUS'ES, The. A work by the Puritan Philip Stubbes, published in 1583, condemning many of the customary amusements of the time. A reply to it, by Nashe, was entitled *Anatomie of Absurditie* (1589).

ANATOMY OF MEL'ANCHOLY, The. A celebrated and curious work by Robert Burton (1577–1640), first published in 1621 and many times thereafter. It treats, as its full title explains, of "all the Kindes, Causes, Symptomes, Prognostickes, and Severall Cures" of melancholy. It appeared under the pseudonym of Democritus Junior, a name which indicates its author's attitude. There is an extended preface, not the less interesting for being autobiographical. The body of the book is in three methodically arranged parts, dealing successively with (1) the causes and symptoms of melancholy; (2) its cure; (3) amorous and religious melancholy. Throughout there are a wealth of historical and literary lore and a quaint and penetrating humor, which have made the book a favorite with many of the finest minds. Dr. Johnson and Charles Lamb especially have recorded their admiration of it. The five editions succeeding the first one included changes of text by Burton himself. Since his time it has been variously abridged.

ANATOMY OF PLANTS. See Morphology.

AN'AXAG'ORAS (Gk. *Ἀναξαγόρας*) (c.500–428 B.C.). The last great philosopher of the Ionian school. (See Greek Philosophy.) He was born between 500 and 496 B.C. at Clazomenæ, in Ionia, the son of Hegesibulus. His family was wealthy and distinguished, so that the young Anaxagoras was able to devote himself to intellectual pursuits. Soon after the Persian Wars he moved to Athens, where he lived and taught many years, thus transplanting philosophy from Ionia to Attica, which was destined to be its home for many centuries. Among his pupils were some of the most distinguished Athenians, Pericles, Euripides, possibly Socrates and Archelaus. But after about 30 years' residence he was charged with impiety toward the gods, apparently by the opponents of Pericles, who took advantage of Anaxagoras's novel explanations of natural phenomena to injure the statesman through his friend. The eloquence of Pericles, however, secured a reduction of the sentence from death to banishment for life, and Anaxagoras, after some wanderings, settled at Lampsacus, on the Hellespont, where he died in 428 B.C.

The teachings of Anaxagoras cannot be exactly determined in all points. Of his work *On Nature*, in which he set forth his system, we have only fragments. But it is clear that he made a distinct advance over the earlier Ionian philosophers in that he defined a new principle, *intelligence* or *mind* (*νοῦς*), as operating on *matter*, thus introducing a dualistic explanation of the universe in contrast to the materialistic monism of his predecessors. This dualism was further developed by Plato and Aristotle. The varied processes of change, growth, and decay were apparently explained to be the combining and separating of matter under the directing influence of intelligence. It was taught that matter is single in its nature and consists of an infinite number of invisible atoms inconceivably small (*σπέρματα*, 'seeds,' named *ὁμοιομερῆ* by Aristotle); these in their original condition make the unformed primitive material, existing in mass and possessing no characteristics. When acted on by intelligence, they form the individual objects we see about us; i.e., bars of gold, or iron, or copper are made up of the same material, but in each case intelligence has caused a result different from the others; and further, the processes of change produced by the spiritual principle are what we call natural phenomena. Intelligence acts from a point, the pole, setting the "seeds of matter" into spherical motion. By this movement the lighter parts are separated from the heavier, the former to be the clear, glowing upper air (ether), the latter to gather in the centre, and, by cooling, to become water, earth, stones, and minerals. The heavenly bodies are masses of stone cast from the revolving earth into the fiery ether, where they are heated and continue their courses, the sun being a mass larger than the Peloponnesus. Anaxagoras's notions with regard to the moon's light, the cause of the rainbow, of winds, and of sound were fairly accurate. Plants, the lower animals, and man, he said, owe their existence and continued life to the Supreme Intelligence which resides in them. In his doctrine of atoms, his "seeds," Anaxagoras approaches the teaching of the Atomic school. (See Democritus.) Naturally Anaxagoras did not conceive the nature of his spiritual principle clearly enough to be able to explain details satisfactorily, as Aristotle remarks in his *Metaphysics;* but his great service was that he turned philosophy from thought about things to the consideration of thought itself, and made that one of the most important subjects of speculative inquiry thereafter. Anaxagoras was also classed by Eudemus among the Greek geometricians. Plutarch ascribes to him a work on the quadrature of the circle and asserts, on the authority of Vitruvius, that he wrote a treatise on perspective. Consult Zeller, *Geschichte der griechischen Philosophie* (Leipzig, 1893); Diehls, *Doxographi Græci;* Gomperz, *Greek Thinkers.* The fragments have been edited by Schaubach (Leipzig, 1827); Schorn (Bonn, 1829); Ritter and Preller, *Historia Philosophiæ* (7th ed., Gotha, 1888); and Lange, *History of Materialism* (Eng. trans., Boston, 1886).

AN'AXAR'CHUS (Gk. *Ἀνάξαρχος, Anaxarchos*). A Greek philosopher, follower of Democritus, inclined to skepticism. He was a native of Abdera, and accompanied Alexander the Great in the Asian expedition and was highly prized by him as a counselor and friend. He is said by Cicero to have been cruelly put to death by the Cyprian prince Nicocreon. Consult Zeller, *Geschichte der griechischen Philosophie* (Leipzig, 1893); Gomperz, *Greek Thinkers.*

ANAX'IMAN'DER (Gk. *Ἀναξίμανδρος, Anaximandros*) (610–546 B.C.). A Greek mathematician, astronomer, and philosopher. He was born at Miletus, the son of Praxiades, and was a disciple and friend of Thales, whom he succeeded as the head of the Ionian school. (See Greek Philosophy.) He is said to have dis-

covered the obliquity of the ecliptic and certainly taught this doctrine. He appears to have been the first to introduce in Greece the *gnomon* (an instrument for determining the solstices) and the *polos* (sun-dial). The invention of geographical maps is also ascribed to him. According to Simplicius and Diogenes, Anaximander approximated the size and the distances of the planets, constructed astronomical globes, and wrote in prose a work on geometry. He seems to have conceived of the universe as a number of concentric cylinders, of which the outer is the sun, the middle the moon, and the innermost the stars. Within all these is the cylindrical earth. As a philosopher, he speculated on the origin (*ἡ ἀρχή, hē archē*) of the phenomenal world, and found that origin in the infinite or in the limitless, or the indeterminate (*τὸ ἄπειρον, to apeiron*). This principle of Anaximander is generally supposed to have been much the same as the chaos of other philosophers. By it Anaximander meant an endless unlimited mass undetermined by qualities, in no way subject to age or decay; it embraced all things and gave them motion. Through this motion the world came into being. When destroyed, things were absorbed again into the indeterminate. From his basic principle he conceived all opposites, such as hot and cold, dry and moist, to proceed through a perpetual motion and to return to it again. Of the manner in which he imagined these opposites to be formed, and of his hypothesis concerning the formation of the heavenly bodies from them, we have no accurate information. It would seem, however, that he did not believe in the generation of anything in the proper sense of the word, but supposed that the infinite atoms or units of which the *ἀρχή*, or primary matter, is composed, merely change their relative positions in obedience to a moving power residing in it. Consult: Zeller, *Geschichte der griechischen Philosophie* (Leipzig, 1893); Gomperz, *Greek Thinkers;* Diehls, *Doxographi Græci;* Neuhaüser, *Anaximenes Milesius* (Bonn, 1883).

ANAXIMENES, ăn'ăks-ĭm'ē-nēz (Gk. *Ἀναξιμένης*). A Greek rhetorician and historian, born in Lampsacus, Asia Minor, in the fourth century B.C. He was a pupil of Zoïlus and Diogenes the Cynic; is said to have taught Alexander rhetoric and to have accompanied him in the Persian expedition. He wrote histories of Philip of Macedon, of Alexander, and of Greece, of which a few fragments exist. The history of Greece, in 12 books, began with the origin of gods and men and was carried down to the battle of Mantinea. The rhetoric addressed to Alexander, found among the writings of Aristotle, has also, since the sixteenth century, been attributed to him; it is independent of Aristotle's *Rhetoric* and may have been published before that work. Consult: Spengel, *Rhetores Græci* (Leipzig, 1847); Cope, *Introduction* to his edition of Aristotle's *Rhetoric;* Ipfelkofer, *Die Rhetorik des Anaximenes* (Wurzburg, 1889). Only fragments of the work, which deals with the practical art of oratory, exist.

ANAXIMENES. A Greek philosopher, who was born at Miletus, in Asia Minor, and flourished about 546 B.C. He was a pupil of Anaximander (q.v.). He held air, which is so necessary to life, to be the first cause of all things, or the primary form of matter, from which all things are formed by compression or by rarification; all things, therefore, are forms of air, differing from one another in the degree to which the air has been compressed. He followed Anaximander, then, in seeking a first principle (*ἀρχή*) as the cause of all things; he differed from him in finding that principle in a particular element. Consult: Zeller, *Geschichte der grieschischen Philosophie* (Leipzig, 1893); Diehls, *Doxographi Græci;* Gomperz, *Greek Thinkers.*

AN'BURY (probably from AS. *ange,* vexation, trouble + berry). A disease of cabbage, turnips, and other cruciferous plants. See CLUB ROOT.

ANCACHS, ân-kächs'. A maritime department of Peru, bounded by the department of Libertad on the north, Huánuco and Junin on the east, Lima on the south, and the Pacific on the west (Map: Peru, B 5). The greater portion of the surface is mountainous, but there is some good arable land. The mineral deposits are reputed to be important, but are little worked. Cattle raising and agriculture are prominent industries. There is a railway line running through the State from Chimbote to Huaráz, the capital. Area, 16,500 square miles. In 1896 the population was estimated to be 428,703.

ANCÆ'US (Gk. *Ἀγκαῖος, Ankaios*). A name of two of the Argonauts (q.v.) of Greek legend. 1. A son of Poseidon, who became steersman of the Argo after the death of Tiphys. He is noted for the prophecy that he should not live to taste wine from his own vineyard. At the moment when at length he did lift a cup of its vintage he was told that "there's many a slip 'twixt the cup and the lip," and just then the noise of a wild boar which had got into the vineyard called him away. He was killed by the animal and so fulfilled the prediction. 2. A son of Lycurgus the Arcadian. He was killed by the Calydonian boar.

ANCELOT, äns'lō', JACQUES ARSÈNE POLYCARPE (1794–1854). French dramatist, novelist, and poet, born at Havre, who won fame and a pension in 1819 by his tragedy *Louis IX.* His other serious dramas are not noteworthy; but an epic, *Marie de Brabant,* and a novel *L'homme du monde* (1829), attracted attention. The Revolution of 1830 cost him his pension, and he became a fertile purveyor of light dramas, farces, and vaudevilles of doubtful morality. Very readable are the graceful verses of his epigrammatic satires, *Epîtres familières* (1842); but *Louis IX,* his first considerable work, remains his best. He was admitted to the French Academy (1841). He had already received (1825) the cross of the Legion of Honor. His wife, Marguerite Louise Virginie Chardon (1792–1875), collaborated with him and wrote independently plays and novels.

AN'CESTOR (ME. *ancessour,* from Lat. *antecessor,* a predecessor, foregoer). In the English law of inheritance, the person from whom one may inherit real property. It is the correlative of "heir." The term is sometimes loosely used as signifying a progenitor; but properly, in legal usage, an ancestor need not be a progenitor, as one may inherit from his collateral relatives as well as from an ancestor in the direct line. See HEIR: SUCCESSION.

ANCESTOR WORSHIP. Religious regard paid to forefathers, actual or supposed. A brief statement of the distribution of ancestor worship will also serve to indicate the various forms assumed by that cult. We find it in Polynesia and Melanesia, where ancestral cults appear in

most diverse aspects, from a rudimentary offering consisting of some food thrown backward over one's head in the course of a meal, to elaborate rituals with special priests and shrines. Among the South African Bantu ancestor worship appears in the guise of a religious regard paid to animals in whom ancestral souls are believed to be incarnated. In Ashanti and Dahomey the cult of ancestors has taken the form of elaborate burials (especially in the case of kings) associated with monstrous bloody sacrifices. In Egypt the regard for ancestors led to an unprecedented development of the art of embalming and preserving the corpse, as well as to high architectural achievement. In India we find, perhaps, the purest spiritual type of ancestor worship; whereas in China the cult was intimately associated with the institution of the family and exerted a far-reaching influence on the social life of the people.

Ancestor worship as a most important type of religion and ritual was first brought into prominence by Herbert Spencer, who regarded the most primitive form of ancestor worship, namely, the fear of the ghost, as the root of all religion from which nature worship, fetichism, idolatry, and all the higher forms of religion had sprung. Spencer's derivation of animal worship from ancestor worship, the so-called "misinterpretation of nicknames" theory, enjoyed for a time great notoriety if not recognition. In that theory Spencer made use of the well-known tendency of savages to apply animal names as nicknames. This and the alleged inability of primitive language and primitive thought to differentiate between a name and a thing named, led to the belief in animal ancestry. The descendants of a man called "Wolf," after the lapse of two or three generations, deemed themselves the descendants of a wolf, etc. If the ancestor had been famed for his character or achievements, religious regard would be paid to his memory. Thus a cult of the wolf would arise.

Spencer's position was very popular towards the end of the last century, but it cannot be sustained in the light of more recent knowledge. Whereas fear of the dead is, no doubt, a common feature in primitive life, it is far from being universal. Ancestor worship, moreover, is not found among the most primitive tribes, and the more pronounced varieties of the cult occur only among peoples who are fairly advanced. In view of the multiplicity of sources from which religious emotions and rites may develop, it is quite artificial to look for the source of all religion and of all cult to the worship of ancestors. Animal worship and nature cults must have developed innumerable times from other sources than ancestor worship, and often, no doubt, in the absence of the latter. Sir Henry Maine was probably right in maintaining that a strong development of the family was a necessary condition of genuine ancestor worship.

Various beliefs and cults may bear a superficial resemblance to ancestor worship, a resemblance, which, on analysis, proves illusory. Thus the *Di Manes* of the Romans must probably be conceived as undifferentiated hosts of disindividualized spirits. The propitiation of the dead at burial may not be designed to honor the dead, but to purify the living (as in early Rome). On the other hand, ancestor worship may be disguised in the form of another cult, as happens in the case of the Bantu referred to before. An important part in ancestral cults is often played by different kinds of burial: inhumation, deposition in urns, aërial burial, etc. See BURIAL.

Intimately associated with ancestor worship, although not coextensive with it, are the beliefs in a future life and in immortality. On these topics, as well as on ancestor worship proper, consult J. G. Frazer's Gifford Lectures on *The Belief in Immortality and the Worship of the Dead*, vol. i (1913).

A possible, although not a necessary, development of ancestor worship is idolatry.

For Greek, Hebrew, Persian, etc., ancestor worship, see general articles under these headings.

ANCHIETA, ăn-shyā′tȧ, JOSÉ DE (1533–97). A Portuguese Jesuit missionary, called "Apostle of Brazil"; related to Loyola. He was born at Luguna, in Teneriffe, Canary Islands, and in 1553 went to Brazil, where he founded the first college for the conversion of natives and was appointed Governor of the converted Indians. Both the Portuguese and savages ascribed to him the working of miracles. He died near Espirito Santo. His work on the *Natural Productions of Brazil* was published by the Academy of Sciences at Madrid and was reprinted in Lisbon in 1812. Consult Rodriguez, *Vida del Padre J. de Anchieta* (1618), and Vasconcellos, *Vida do Padre Joseph de Anchieta* (1620).

ANCHISAURUS, ăŋ′kĭ-są′rŭs (Gk. *ἄγχι, anchi*, near + *σαῦρος, sauros*, lizard). The best-known of the dinosaurian reptiles that lived on the marshes, flood-plains, and beaches of the Connecticut estuary during the Triassic period. Two species are known, quite perfect skeletons of both of which have been found; the larger, *Anchisaurus colurus*, having had a slender, delicate body about 6 feet long, which length is hardly one-tenth that of many of the enormous dinosaurs found in the Jurassic rocks of the Western States. These carnivorous Anchisauri had small, bird-like heads with large eyes and beaked jaws, each provided with 18 teeth, and had long, slender, bird-like necks. The form and number of the bones of the tail indicate that this member was slender, round, and usually carried free from the ground. Anchisaurus, with its short fore legs, that seldom touched the ground, and its four-toed hind feet, the first digits of which were so weak as to render them incapable of making impressions upon the firm, moist sands of the beach, was in all probability the reptile that made many of the well-known "bird-tracks" of the Connecticut Valley sandstone. See DINOSAURIA.

ANCHISES, ăŋ-kī′sēz (Gk. *Ἀγχίσης, Anchisēs*). In Grecian legend, a descendant of the royal house of Ilium (Troy) as grandson of Assaracus, and the father by Aphrodite (Venus) of the Trojan hero Æneas. He had been commanded not to reveal the maternity of the child, but disclosed the secret to his companions, and was made blind and crippled (one legend says killed) by lightning from Zeus. At the fall of Troy his son bore him away on his shoulders, and Vergil describes their voyage to Italy and Sicily, where the old father died and was buried at Drepanum (Trapani). Engraved Roman gems frequently picture Æneas carrying Anchises out of Troy; one fresco at Pompeii showed the same scene.

ANCHITHERIUM, ăŋ′kĭ-thē′rĭ-ŭm (Gk. *ἄγχι, anchi*, near + *θηρίον, thērion*, wild beast). One

of the three-toed fossil horses of Middle Miocene Tertiary time, remains of which have been found in North America and Europe. The animal was of the size of the Shetland pony, and had the middle toe of each foot well developed, while the lateral toes, one on each side of the middle toe, though of a length sufficient to reach the ground, were of such delicate construction as to be incapable of supporting any weight. Anchitherium was at one time thought to be one of the ancestors of the modern horse, but is now considered to represent an offshoot from the main line of evolution of the horse, although it lived at the same time and in company with the direct horse ancestors. A complete skeleton of Anchitherium affine, found at Pawnee Buttes, Colo., in 1901, is on exhibition in the American Museum of Natural History in New York City. For descriptions of other forms of fossil horses, the reader is referred to the article on HORSE, FOSSIL.

AN'CHOR (Lat. *ancora*, Gk. ἄγκυρα, *ankyra*, akin to Eng. *angle;* literal meaning, 'something crooked, hooked'). A heavy instrument designed to rest on the sea bottom, and, by means of a cable or rope, hold a vessel, buoy, or other floating object in a desired position. Anchors for buoys frequently consist merely of heavy blocks of stone or of concrete, but those for ships are now almost invariably of iron or steel. Many forms of anchors were used by the ancients. The earliest consisted of stones, or baskets of stones, which acted merely as weights without hooking into the ground; these were followed by hooked sticks, weighted to make them sink and having only one arm. Other arms were eventually added, so that the anchors resembled the modern grapnel. The earliest recorded use of anchors was by the Egyptians on their Red Sea galleys, while the Greeks are credited with having used the first iron anchor. Greek vessels had several anchors, one of which, called the "sacred anchor," was never let go until the ship was in dire distress; and a similar custom was, for many years, observed in the British navy. All sea-going vessels ordinarily carry several anchors. Two of these, at least, are carried well forward, one on each bow, and are therefore called *bowers*, and are designated as the *port bower* or *starboard bower*, according to the side of the ship on which they are carried. In addition to these, large vessels carry one or two anchors of about the same size, called *sheet* anchors. They are stowed like the *bowers*, but usually some distance farther, aft, and, not being intended for immediate use, are generally securely lashed in place.

A *stream* anchor is a light anchor, not more than half as heavy as one of the bowers and usually about one-fourth. It is often very useful. Very light anchors are called *kedges*. In the United States navy the weight of a battleship's bower or sheet anchor is from 14,000 to 18,000 pounds. Stream anchors (the term "stream" is not now much used) weigh from 1,000 to 3,000 pounds, and kedges from 100 to 1,000 pounds. Smaller anchors are carried for the boats. For the purpose of grappling and holding to such objects as a vessel's rigging, trees on shore, chains, and the like, a small instrument called a *grapnel* is used. It has no stock, but has several arms, each sharply pointed. They were much used in "cutting out" expeditions in the days when such enterprises were common. The grapnel, with a short length of chain attached, as the enemy would have severed a rope with their cutlasses, was thrown into the rigging of the ship attacked. This enabled those of the attacking party, in a tideway, or when the ship attacked was moving, to keep alongside until they could clamber on board. Grapnels are still issued for use in boats in the United States navy, and a large folding grapnel, with straight hinged arms, is used to some extent in naval boats in place of an anchor of the customary shape. Anchors were formerly made of wrought iron, but are now very largely made of cast or forged steel. There are two types in use, the old, or ordinary type, in which the stock is at right angles to the arms, and patent anchors, which either have no stock at all, or one lying in the same plane with the arms. The shape of the ordinary anchor is familiar, and is shown in Fig. 1.

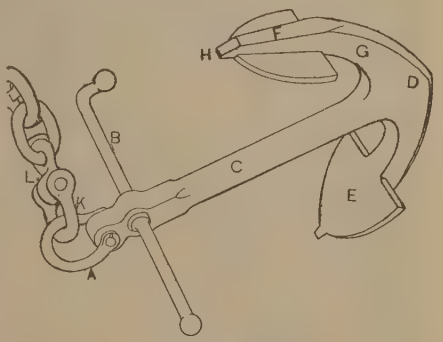


FIG. 1. ANCHOR.

A	Ring	*F*	Fluke
B	Stock	*G*	Arm
C	Shank	*H*	Bill
D	Crown	*K*	Shackle or Jewsharp
E	Palm	*L*	Club-link

The main body is called the *shank;* at one end it joins the arms, and at the other is pierced by a hole through which passes the iron (or steel) *stock*. The latter has a ball cast on one end; the other end is bent at right angles a few inches from its extremity, and also terminates in a ball, but the ball is removable. The stock is held in position in the shank by a raised lug, or shoulder, on one side, and by a key on the other. The bend at the end permits it to be partly drawn out and folded down along the shank. At the other end of the shank from the stock are the *arms*, which are cast or forged

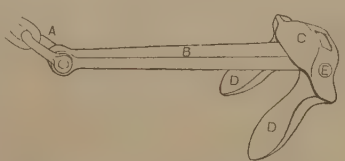


FIG. 2. PATENT ANCHOR.

A	Ring	*C*	Crown
B	Shank	*DD*	Flukes
		E	Pivot

in one piece with it. They taper slightly towards their ends, which are called *pees*, or *bills*, and on the side towards the shank have shield-shaped

pieces called the *flukes*. The faces of the flukes are called *palms*. The middle of the curve of the arms, opposite to and in line with the shank, is called the *crown*.

Patent anchors differ in details of design, but in all of them the arms are pivoted to the shank, usually by a very heavy bolt. The flukes are enlarged, and lie in the same plane with the arms and shank when the former are in mid-position. When the anchor is on the bottom, the arms turn, the flukes droop, and, pointed downward, are forced into the ground. To assist in preventing the anchor from being capsized by a side pull on the chain, some patent anchors are fitted with short stocks, which lie in the same plane as the arms when the latter are in mid-position. When an anchor of ordinary type is let go, it strikes on the crown and then falls over and rests on one end of the stock. The first pull of the chain *cants* it (i.e., tilts it over), laying the stock flat on the bottom and pointing one of the bills fair for entering the ground. Additional pulls serve to drive the bill and fluke into the ground to a depth which depends upon the strain upon the chain and the softness of the bottom. The principal points of excellence in an anchor are: Holding-power under various conditions, strength, quick-holding, quick-tripping, exemption from fouling, facility of stowing, facility of sweeping, canting, facility of fishing in a heavy sea, and facility of transport in, or by, boats. Slight differences of design make considerable difference in the holding-power of anchors. For an ordinary anchor the most favorable angle for the palm is thought to be a little less than 45 degrees from the middle line of the shank, but in most patent anchors the flukes are permitted to droop not more than 35 degrees. The shank of all anchors projects a short distance beyond the stock, where it is fitted with a heavy ring or shackle called the *ring;* the ring in turn is secured to the chain by a heavy shackle called the *jews-harp*, the jaws of which embrace the club, or body, of a *club-link;* beyond this there is sometimes an open link, and then follows the *chain*. The latter differs from ordinary chain in having a cross-piece in each link called a *stay pin*, the purpose of which is to prevent the chain from *kinking*, to which ordinary chain is liable, and which would be a most serious matter in an anchor chain, because it not only might cause the chain to part under the pull of the ship, but in letting go the anchor a *kink* formed in the *chain-locker* (the box or compartment in which the chain is stowed) might jam in a chainpipe in the deck, or in the hawsepipe, with disastrous consequences.

In the navy and in most vessels of the merchant service the anchor chain was formerly divided into lengths of 15 fathoms (or 12½ fathoms in England), called *shots*, each shot being joined to the succeeding one with a shackle. At 7½ fathoms from the anchor, and again at 37½ fathoms, were placed swivels, to prevent the chain from getting kinks by twisting. In the United States navy the present practice is to place a swivel at 5 fathoms and neither shackle nor swivel between that and 45 fathoms. This is to facilitate getting up the anchor. Neither swivels nor shackles fit the wildcat closely, and, if the pull is heavy, they are apt to slip and cause delay. Merchant ships anchor less frequently and in less exposed places than those which men-of-war are frequently compelled to accept for anchorage ground, consequently less attention is paid to the details of the *ground-tackle* (i.e., anchors, chains, etc.) of merchantmen. When expecting to remain in port for more than a few days, especially if the harbor or anchorage ground is contracted, or if there is a strong tidal or river current, vessels frequently resort to *mooring*. The length of chain varies with the depth of water and other considerations, but a moor at 45 fathoms is common practice. After dropping one anchor the ship *veers* (i.e., lets run out) chain until about 90 fathoms are laid out; then the other anchor is let go; now, by *heaving in* on the first chain to 45 fathoms and *paying out*, or veering on the second to 45 fathoms, the ship is brought to a middle position between her anchors, and in swinging to the tide or wind will cover very much less ground than if *riding* to a single anchor, and her chain cannot sweep over an anchor and *trip* it (i.e., cause it to let go its hold).

When the ship swings, however, she may not merely move back and forth, but may turn all the way round (e.g., heading north, she may swing until she heads east, then south, and then —instead of going back to east and then north—continue the circle by heading west and then north); this will cause the chains to cross, or if the operation continues, to wind themselves around each other and give what is called a *foul hawse*. This must be cleared by unshackling and unwinding one of the chains, the operation being called *clearing hawse*. To avoid the labor of this, and it is a very laborious task with heavy chain, a *mooring swivel* is frequently used. This is a swivel having two shackles at top and two at the bottom; the chains leading to both anchors are opened at the 45 fathom shackles, and the parts leading from the anchors *bent* (i.e., joined) to the lower shackles of the mooring swivel while the inboard ends (i.e., those extending from the ship) are bent to the upper shackles of the swivel. The ship is now free to swing without fouling her chains, as the swivel turns with her.

Patent anchors are much used, as they are convenient in more ways than one. When on the bottom, there is no arm sticking up in which the chain can catch as the ship swings, or on which she might strike if the water is shallow. When hoisted, the absence of a stock at right angles to the arms facilitates storage; and in most recent ships the anchor is pulled up, without *catting* or *fishing*, into a recess for it in the bow, which is made by enlarging the hawsepipe. Anchors are hoisted by means of a capstan or windlass. The former is shaped somewhat like a huge hour-glass, but is stouter in the middle, and carries about its lower edge a recess with ridges on the upper and lower flanges; this arrangement, in which the chain fits, is called the *wildcat*. Windlasses are like capstans, but are turned on the side, and usually have two or more wildcats. On vessels in which steam gear is not fitted to the capstan, the latter is turned by hand; long wooden bars, called *capstan bars*, are fitted into recesses in the head of the capstan and held in place by a small rope called the *swifter*, which passes through a score, or groove, in their outer ends. Small windlasses are operated by levers like pump brakes, which turn the windlass barrel by means of racks and pawls. In the older ships the first operation of getting up the anchor consists in *bringing-to* the

chain (i.e., in pulling up slack chain from the locker and putting it in the wildcat of the capstan); large ships are now usually fitted with steam windlasses, on which the chain is always in place. The next process is to release the chain from the *bitt* and *stoppers*. The former is a heavy, cylindrical iron casting securely bolted to the deck; in the older ships the chain usually has one turn around it, but when the ship is pulling heavily at her anchor, owing to a strong current or heavy sea, the chain is *double-bitted* (i.e., has two turns). The *stoppers* are short lengths of heavy wire rope hooked to rings in the deck at one end and lashed with rope to the chain at the other; there are usually several stoppers on the chain, and if there is no *controller* (an iron contrivance to hold the chain from running) forward of the bitts, a stopper must now be put on the chain there. The chain in then *unbitted* (i.e., thrown off the bitt); the slack is taken in until the strain is on the windlass, or capstan, and all stoppers taken off. The *heaving in* then begins; when the chain has been hove in until any further pull is liable to cause the anchor to trip, or the ship to drag, it is said to be *hove short* or *at a short stay* (the terms *astay* and *at a long stay* are not much used); and its direction, making an angle of about 45 degrees with the surface of the water, is about parallel to the fore stay of a rigged ship.

If everything is ready for leaving the anchorage, the heaving continues until the chain is vertical, or, in nautical terms, *up and down* (the anchor is then said to be apeak), the anchor is *broken out* and hoisted to a convenient position at or into the hawsepipe, when it is said to be *up*.

In old-type ships a tackle called the *cat* was next used; a hook on the lower block of the *cat-fall* was inserted in the ring of the anchor, and the latter was *catted* by being pulled up to the *cathead*, which projected slightly from the ship's side; the *fish* tackle was then hooked to the crown, and the other end of the anchor pulled up until the shank was about horizontal and the inboard arm rested on an inclined iron plate called the *bill-board*, the latter operation constituting *fishing*. The anchor was now secured by small chains, one in the ring called the *ring-stopper;* and the other, around the shank close to the outboard arm, called the *shank painter*. One end of each of these chains led to a trigger, by striking which the anchor was *let go* with ease and certainty. Under some circumstances it was desirable to *cockbill* the anchor before letting it go. This was done by easing away the shank painter until the anchor hung at the cathead by the ring-stopper; it was then said to be *a-cockbill*. In later ships there was secured on the shank of the anchor, at the balancing point, a link called the *balance-link*. When the anchor was hove up to the hawsepipe (i.e., the cast-iron pipe in the ship's bow through which the chain passes), the cat was hooked to the balance-link, and the anchor lifted in a horizontal position and put in place on the bill-board. Instead of a cathead, this form of cat requires a heavy *cat davit*, or derrick, standing 8 or 10 feet above the deck, and mounted upon a swivel stand. In modern ships cat and fish davits and derricks are unnecessary, as the anchor is pulled directly into the hawsepipe. In *letting go* the anchor it is necessary to control the speed of the chain as it goes out. For this purpose it was formerly *bitted* (single-bitted, with one turn around the bitt); this prevented the velocity of the chain from becoming too great. When a sufficient quantity of chain had run out, the brake was put on the windlass, and the *compressor* (a curved arm which grips and holds the chain) *hauled to*. The stoppers were then put on and the chain was *secure*. In recent ships the windlass or capstan brake suffices to check or stop the chain.

A *sea anchor* is variously constructed; usually it floats, and is made up of spars and canvas, or something that will not sink and will offer resistance to the water; but it is sometimes made of materials too heavy to float and is then held up more or less by the pull on the anchor rope. Its object is to keep a boat or ship with her bow up to the seas and so enable her to ride them better and roll and wallow about less; and it accomplishes this by being placed in or below the surface of the water, so that it tends to drift more slowly than the boat or ship which is exposed to the force of the wind and of the waves.

Mooring anchors are of various types and are designed for permanent moorings; they are used for holding in place large mooring buoys to which ships may secure themselves in lieu of anchoring, or as anchors for buoys marking a channel or shoal. As has already been stated, some mooring anchors consist merely of a heavy stone, or block of concrete, but others are of the mushroom, or screw, form.

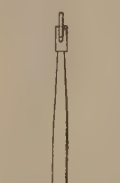


FIG. 3. MUSHROOM ANCHOR.

Mushroom anchors of one type have a saucer-shaped head, from the concave side of which extends the shank, which has a shackle in the end for the chain; the other type consists merely of the iron saucer, with the shackle on the convex side; in this second type the anchor holds largely by suction. Screw anchors, as their name implies, are shaped like screws with very broad flanges and are screwed down into the mud by means of a long bar called the key.

AN'CHORAGE, or **ANCHORAGE GROUND.** That portion of a harbor or roadstead best suited for anchoring vessels; or, in harbors where there is much commerce or traffic, that portion in which vessels are permitted to anchor. A good anchorage is one in which the water is of sufficient but not excessive depth; in which the bottom is of such a character as to enable the anchor to enter in and hold (i.e., the *holding ground* is good), and which is protected from the open sea. The practice of indicating upon charts by means of an anchor the best anchorage in any particular locality still obtains, but is falling somewhat into disuse, owing to the more definite information now given by charts and sailing directions.

AN'CHOR CHAIN. See ANCHOR.

ANCHOR DAV'IT. See ANCHOR; DAVIT.

ANCHOR ICE. See ICE.

AN'CHORITE, or **AN'CHORET** (Gk. *ἀναχωρητής, anachōrētēs*, a recluse, retired man, from *ἀνά, ana*, back + *χωρεῖν, chōrein*, to give way, retire). Literally a person who withdraws from society; a hermit. The name was applied to those hermits who began to appear in the Christian Church in the third century,

living in solitude, and not, like the monks or cenobites, in communities. During the first two centuries Christians generally thought it enough to withdraw from the world by refusing to participate in heathen festivals and amusements; but extreme views became gradually prevalent, and were connected with a belief in the merit of celibacy, of abstinence from particular kinds of food, of self-inflicted tortures, etc. The persecutions to which Christians were subjected drove some into the solitude of deserts; afterward the glory of a life spent in loneliness and austerity became a substitute for that of the martyr's death. The general corruption of society also caused many earnest and well-meaning persons to shun it. The ascetics (see ASCETICISM) set the example of retiring from cities to rural districts and villages; the anchorites went further, and sought to withdraw themselves altogether from mankind; and if the reputation of sanctity which was connected with a life of solitude constituted its chief attraction to some, there can be no doubt that many chose it in the hope of thereby attaining real sanctity. Many of the anchorites voluntarily subjected themselves to the vicissitudes of the weather, without proper habitation or clothing, restricted themselves to coarse and scanty fare, wore chains and iron rings, and some dwelt on the top of pillars for many years (see PILLAR SAINTS) as extraordinary and conspicuous examples of mortification and penance, of whom the most famous is St. Simeon Stylites in the early part of the fifth century. St. Antony of Egypt (q.v.) was one of the first and most celebrated anchorites. The deserts of Egypt were their first home. Thence they spread throughout the Eastern church, but were always rare in the Western church. The anchorites were not always able to preserve their solitude unbroken. The fame of their sanctity drew many to visit them; their advice was often sought; and the number of their visitors was much increased by the belief that diseases, particularly mental diseases, were cured by their blessing. Sometimes, also, they returned for a short time to the midst of their fellow men to deliver warnings, instructions, or encouragements, and were received as if they had been inspired prophets or angels from heaven. The number of anchorites, however, gradually diminished, and the religious life of convents was preferred to that of the hermitage.

AN'CHOR WATCH. A portion of the crew kept on deck during the night when at anchor. During prolonged heavy weather or unfavorable conditions the anchor watch may be kept on deck during the day. In the merchant service one or two men form the ordinary anchor watch; in the navy, four to a dozen or more; though in either case these numbers may be increased under special circumstances. The duties of the anchor watch are to *veer* chain (see ANCHOR), if occasion demands it, spread or take in awnings, cover hatches, secure loose articles if the wind and sea rise; and, in fact, act as a general guard when the greater part of the crew is asleep.

ANCHOVY, ăn-chō'vĭ (of uncertain origin, perhaps, literally, a dried or pickled fish, from Basque *antzua,* dry). A small fish (*Engraulis enchasicholus*) belonging to the Engraulididæ, a family closely related to the herring. It resembles the latter in general appearance, but is thicker in proportion, and is about 6 inches in length, having a pointed head with the upper jaw projecting, and a widely forked tail. It abounds in the coast waters of southern Europe, and especially in the Mediterranean, where extensive fisheries are carried on, particularly near Leghorn. They approach the coast from the oceanic depths to spawn in early summer and are caught in seines, to which they are attracted by strong lights in the fishing-boats. Anchovies are salted in small barrels and have been much used for sauces, etc., since ancient times. There are several nearly related species both on the Atlantic and Pacific coast of America and in other countries, where they also form an important food preparation.

ANCHOVY PEAR (so named from being pickled, see ANCHOVY), *Grias cauliflora.* A plant of the family Myrtaceæ. It grows in boggy places in the mountainous districts of Jamaica and other West Indian islands, attains a height of 50 feet, and has great oblong leaves 2 or 3 feet in length. The flowers are numerous, on short peduncles; they are large, whitish, and sweet-scented; the corolla consists of four petals, and the calyx is four-cleft. The fruit is an ovate drupe of a brownish russet color, crowned with the persistent calyx; the stone is marked with eight ridges. This fruit is pickled and eaten like the East Indian mango and resembles the mango in taste.

ANCHU'SA, ăn-kū'sà. See ALKANET.

ANCHYLOSIS, ăng'kĭ-lō'sĭs. See ANKYLOSIS.

AN'CIENT DEMESNE, dê-mēn' (OF. *demaine,* Lat. *dominium,* Eng. *domain*). In English law, estates of great antiquity, constituting the ancient patrimonial possessions of the crown. Manors (q.v.) of ancient demesne date back to the reign of Edward the Confessor or of William the Conqueror, and appear in Domesday Book under the description of *Terræ Regis.* Though they might be alienated and held by a subject, they were properly kept in the King's hands for the maintenance of the royal dignity. Whether held by a subject or by the King, they enjoyed certain rights and immunities which were not shared by other manors, even when held by the King; especially the right to administer their own justice, free from the interference of the ordinary royal tribunals. Two important and distinctive varieties of tenure developed on these ancient demesne lands: one a privileged form of customary tenure (q.v.), midway between copyhold (q.v.) and socage (q.v.) tenure, which came to be known as *customary freehold;* and the other a peculiar form of socage tenure, which received the name of *tenure in ancient demesne.* Though these *tenures* still survive in England, they have been shorn of most of their peculiar characteristics and assimilated to the more usual tenures. Consult Pollock and Maitland, *History of English Law* (2d ed., London and Boston, 1899).

ANCIENT LIGHTS. Windows that have existed so long that they have acquired an indefeasible right to the light which enters them, free from interference by the owner of the premises over which the light comes. The easement of ancient lights, so called, is the right gained by the owner of a dwelling or other building to restrain his neighbor from interfering with windows which have been in existence from time immemorial. The term does not, therefore, describe a peculiar and distinctive right, but only a method by which the familiar easement of light may, like other easements, be acquired—

the method, namely, of prescription (q.v.). Ancient lights belong to the class of negative easements, which cannot generally be acquired by prescription in the United States. In England they are now regulated by statute (the Prescription Act, 2 and 3 Will. IV, c. 71), which dispenses with the old requirement of use and enjoyment from time immemorial and calls for an existence of only 20 years to create the easement. See EASEMENT; LIGHT, EASEMENT OF; PRESCRIPTION. Consult Gale, *Treatise on the Law of Easements* (8th ed., London, 1908), and Goddard, *Treatise on the Law of Easements* (7th ed., London, 1910).

ANCIENT MAR'INER, THE. A poem by Coleridge, published (1798) in the *Lyrical Ballads* by himself and Wordsworth. It is founded on the sailor's superstition of the sinfulness of killing an albatross and rehearses the sufferings consequently undergone.

ANCIENT OF DAYS. A designation of God in Dan. vii. 9, 13, 22. It represents him as "the aged," "the advanced in days," possibly in contrast with the new divinities Antiochus Epiphanes had sought to introduce among the Jews. In the Ethiopic Enoch the expression "head of days" is not a translation of the term in Daniel, for which the Ethiopic Bible uses another phrase, but probably inspired by it, meaning, not "the old head," but "the Lord of Days." Consult Schmidt, *The Original Language of the Parables of Enoch*, p. 343 (1908).

ANCIENT OR'DER OF HIBER'NIANS. See HIBERNIANS, ANCIENT ORDER OF.

ANCIENTS, COUNCIL OF. The upper House of the Legislative Assembly in France, under the Directory, from 1795 to 1799. The chief function of the Ancients was the approval or rejection of measures submitted by the lower House, the Council of Five Hundred.

ANCILE. See SALII.

ANCILLON, äN'sē'yôN', CHARLES (1659–1715). A French Protestant and educator, born in Metz. Having studied law at Marburg, Geneva, and Paris, he was chosen by his co-religionists to plead their cause before Louis XIV on the revocation of the Edict of Nantes. He is better known as an educator in Prussia, where, in 1687, he was placed in charge of the *Académie des nobles* by the Elector Frederick. With Leibnitz he founded the Academy of Berlin. His writings include *Histoire de l'établissement des Français réfugiés dans les états de Brandebourg* (1690).

ANCILLON, JOHANN PETER FRIEDRICH (1767–1837. A Prussian statesman and historian. He was born in Berlin, a descendant of David Ancillon (1617–92), a French Protestant, who emigrated from Metz after the revocation of the Edict of Nantes, and who became pastor of the French congregation in Berlin. Intermediate members of the same family occupied the same pastorate or were in the service of the Prussian government. Friedrich studied theology, philosophy, and history, and in 1792 was appointed teacher of history in the Berlin Military Academy, as well as preacher to the French congregation. The publication of his *Tableau des révolutions du système politique de l'Europe depuis le XV siècle* (4 vols., 1803–05) secured him the appointment as royal historiographer as well as tutor of the Crown Prince. In 1832 he became Minister of Foreign Affairs, and occupied that place until his death. He was a man of conservative views and a defender of the monarchy.

ANCKARSTRÖM, or ANKARSTRÖM, än'kär-strēm, JOHAN JAKOB (1762–92). The assassin of King Gustavus III of Sweden. He was a page at court and later an ensign in the Life-Guards, but in 1878 retired from military service with the rank of captain. Of haughty temper, angered at the policy of repression pursued by the crown toward the nobility, he was frequently brought to trial for incendiary speeches. In 1791, with Count Horn, Count Ribbing, Lieutenant-Colonel Liliehorn, and others, he formed a conspiracy for the murder of the King. Chosen by lot to accomplish the deed, at a ball held in the Stockholm opera-house, he approached the King and mortally wounded him with a shot from a pistol (March 16, 1792). He was condemned to death and executed at Stockholm.

ANCON, än-kōn', or PORT ANCON. A seaport of Peru, in the department of Lima, 30 miles by rail northwest of Lima. During the construction of a coast-line railway excavation near Ancon brought to light an old burial place in which were found articles illustrating many branches of ancient Peruvian life and customs. Pop., 3000.

ANCONA, ăn-kō'nȧ (the name alludes to its situation at the bend of the sea-coast; Gk. *ἀγκών, ankōn*, angle, corner). The capital of the province of Ancona, in central Italy, in the compartimento of the Marches, 132 miles, (185 by rail) northeast of Rome, lat. 43° 37′ N. and long. 13° 31′ E. It is an episcopal city, and, next to Venice, the most important Italian port on the Adriatic (Map: Italy, H 4). It is beautifully situated in the form of an amphitheatre between two promontories. The harbor has been greatly improved by the government in recent years and is now deep enough for large vessels. It is defended from naval attack by forts and from the violence of the sea by two moles. The ancient mole was built by Trajan and on it stands a triumphal arch of Parian marble designed by Apollodorus. The modern mole with the lighthouse was built by Clement XII and its triumphal arch was designed by Vanvitelli. The cathedral of St. Cyriac, built in the eleventh and twelfth centuries on the site of the temple of Venus mentioned by Catullus and Juvenal, contains 10 of its columns, with a very ancient dodecagonal dome. The town hall was built in the thirteenth century, restored in the fifteenth, and partially modernized in 1647. The museum contains many valuable antiquities and some valuable paintings. The principal industries are sugar refining, shipbuilding, and the manufacture of paper, sail cloth, and silk. The exports are small; the imports are salt fish, coffee, iron and steel, wheat, raw sugar, and coal. Regular steamship communication is maintained with the principal Mediterranean ports. The United States maintains there a consular agency.

Ancona is supposed to have been founded by Syracusans who had fled from the tyranny of Dionysius the Elder. It was destroyed by the Goths, rebuilt by Narses, and again destroyed by the Saracens in the tenth century. It afterward became a republic and was later annexed to the States of the Church. In 1798 it was taken by the French, who in 1799 surrendered it to the Russians and Austrians after a long and gallant defense. In 1832, when the Roman frontiers were in the possession of the Austrians, a French squadron appeared before the

harbor and landed 1500 men, who took possession of the town. It remained in their hands until 1838, when both French and Austrians retired from the Papal States. In 1849 a revolutionary garrison in Ancona capitulated after enduring a siege by the Austrians of 25 days. Pop., 1881, 48,000; 1901, 56,835; 1911, 63,100.

ANCONA, ALESSANDRO D' (1835—). A distinguished Italian critic, journalist, and professor at the University of Pisa. He was born in Pisa. During the days preceding the war of Italian independence he was active in politics, but after the peace of Villafranca he retired from political life, and for awhile edited the leading Florentine journal, *La Nazione.* In 1861 he was called to the chair of literature at the university in his native city. At the age of 18 he published a life and critical edition of the works of the Dominican philosopher, Tommaso Campanella. Among the many volumes which he has since produced, special mention should be made of *I precursori di Dante* (1874), *Origini del teatro in Italia* (1877), *La poesia popolare italiana* (1878); *Manuale della letteratura italiana* (1892–95).

ANCORA, ăn-kō'rȧ (It.). A former synonym of the French word *encore,* 'again,' and used in demanding the repetition of a song, for which the French now, however, use the word *bis,* 'twice.'

ANCRE, ăN'kr', CONCINO CONCINI, MARQUIS D'. (?—1617). A Florentine adventurer, who went to the French court in 1600 with Maria de' Medici, Queen of Henry IV. With his wife, Leonora Galigai, he exercised an unhappy influence in promoting the disagreement between the King and Queen. When, after Henry's death, the Queen became regent, Concini, as her favorite, obtained possession of the reins of government and in 1613 was made a Marshal and Prime Minister. He bought the marquisate of Ancre, in Picardy, and took his title from it. Because of his rapacity he became an object of detestation equally to the nobility and the people. A conspiracy was formed against him, to which the young King, Louis XIII, was privy, and he was assassinated in April, 1617, on the bridge of the Louvre just as he was leaving it. Vitry, a captain of the royal bodyguard, accomplished the murder. His wife was soon afterward accused of witchcraft and was executed. Consult Bazin, *Histoire de France sous le règne de Louis XIII* (Paris, 1837–42).

ANCREN RIWLE, ăN'krĕn rōōl; *ME. pron.* ăN'krĕn rų'le (Rule of Anchoresses). An exposition of duties and rules of life, said to have been drawn up by Simon of Ghent, Bishop of Salisbury (1297), for a religious community of women at Tarrant-Kaines in Dorsetshire.

AN'CRUM MOOR. A moor in Scotland a little northwest of Jedburgh (q.v.). It was, in 1545, the scene of the defeat of 5000 English under Sir Ralph Evers and Sir Brian Latoun by a Scottish force under the Earl of Angus and Scott of Buccleuch. A defaced monument marks the spot where a Scottish maiden, named Lilliard, is said to have done prodigies of valor.

ANCUD, ăn-kōōd' (formerly San Carlos). Capital of the province of Chiloe, Chile (Map: Chile, C 12). It is situated on the north side of the island of Chiloe, which lies near the mainland, about 575 miles south from Valparaiso, with which it is connected by steamship line. It is about 4000 miles from Panama and has an excellent harbor, some manufactures and fishing interests. It was much frequented as an anchorage in the days of Antarctic whale fishing. It was settled in 1768; was the last stronghold of the Spaniards in Chile during the war of the rebellion, surrendering to the revolutionists in 1826. Pop., 1905, town, 4000; municipality, 25,000.

AN'CUS MAR'CIUS (?–614 B.C.). According to Roman tradition, the son of Pompilia, daughter of King Numa Pompilius, and the fourth King of Rome. Following the example of Numa, he endeavored to restore the almost forgotten worship of the gods and the cultivation of the arts of peace among the Romans. But, despite his inclination for peace, he was engaged in several wars with the neighboring Latin tribes, whom he subdued and reduced to order. These Latins Niebuhr (q.v.) considers to have formed the original plebeians. Against the Etruscans he fortified the Janiculum, connected it with Rome by a wooden bridge, and gained possession of both banks of the Tiber as far as its mouth, where he founded Ostia as the port of Rome. He built the first Roman prison of which we read, a proof that civilization had really commenced, inasmuch as offenses then formally ceased to be regarded as private and personal matters and were treated as crimes against the community. A prison, said to be his, is still in existence near the Forum. He reigned 24 years. It is needless to add that the kings of Rome, as we know them, are not historical characters.

ANCY'RA. See ANGORA.

ANCZYC, ăn'chĭts, WLADYSLAW LUDWIK (1823–83). A polish writer, born at Vilna. He studied pharmacy, but turned to literature, and wrote a number of popular Polish comedies, which are marked by keen characterization and forceful style. His works include *Bureaucracy* (1848), *The Peasant Aristocrats* (1851), *The Inhabitants of Lobsow* (1857), *The Raftsmen* (1875), *The Peasant Emigration* (1876). Of his poems, the narrative *The Tyrteuz* (1883) is perhaps the best known. His labors included also a libretto for the opera *Dutch Voyevoda.* Besides this and other original writing, he translated into Polish many German and French classics, including Victor Hugo's *Ruy Blas.* He edited one popular and one children's magazine, and, under the pseudonym of *Kazimierz Góralazyk,* a number of books for popular reading.

ANDALUSIA, ăn'dȧ-lōō'shĭ-ȧ (Sp. *Andalucía* for Vandalusia, the Land of the Vandals). A region in the southern part of Spain, a part of the old Roman province of Bætica, which comprises the present provinces of Almería, Málaga, Cádiz, Huelva, Seville, Córdoba, and Jaén (Map: Spain, C 4). Its area is 33,697 square miles. The region is divided into Upper and Lower Andalusia. The former comprises the mountainous regions of the Sierra Morena on the north and the Sierra Nevada on the south, with the valley of the upper stream of the Guadalquivir. Lower Andalusia consists chiefly of the valley of both sides of the lower Guadalquivir. The lower regions have a very mild, almost African, climate. On the Atlantic coast the temperature is much lower, and in the highlands snow is not infrequent. The soil is very fertile, both in the mountain valleys of Upper Andalusia and in the deep valleys along the Guadalquivir, and the warm climate allows of the cultivation of many southern fruits. Oranges, lemons, palms, olives, and sugar are cultivated successfully,

while wheat, corn, and other grains ripen as early as April and yield abundant crops. The districts along the coast are generally unfruitful and in some cases utterly unfit for cultivation because of salt lakes and marshes. In ancient times the fertility of Andalusia was proverbial, as evidenced by the names applied to the region such as "granary," "wine cellar," and "gold purse" of Spain. Even at present Andalusia is one of the most fertile parts of Spain; nevertheless, famine conditions prevailed in 1905, and thousands were obliged to emigrate. Cattle-raising is highly developed, and Andalusian breeds of horses, mules, and bulls have long been famous. The people are graceful, and their attire picturesque. Their language is Spanish with a slight admixture of Arabic. Pop., Dec. 31, 1910, 3,828,916.

History. Andalusia, which was overrun by the Vandals in the early part of the fifth century, was probably the Tarshish of the Bible, its name in classical geography being Tartessis (a very ancient town near the mouth of the Guadalquivir having borne the name of Tartessus). From the Carthaginians, who established themselves there in the third century B.C., the country passed to the Romans, who called it Bætica, from the river Bætis (Guadalquivir). Under the Empire it attained great prosperity and assimilated rapidly the civilization of the Romans. The Vandals remained but a short time in the country and were succeeded by the Visigoths, who ruled Spain till the invasion of the Arabs, in 711. The name of Andalusia is inseparably connected with the glory of Saracen and Moorish civilization in mediæval Spain. Within its borders were situated Córdoba, Seville, Granada, and Jaén, the centres of Mohammedan culture, industry, and commerce. By contrast with the gloom and emptiness of the Dark Ages in northern Europe, history has cast almost a fairy light on the plains of "smiling" Andalusia, the home of learning and art, of chivalry and humane toleration. Córdoba was the Athens of the West, the seat of the arts and sciences; and later still, under the Spaniards even, "when the sun of Raphael set in Italy, painting here arose in a new form in the Velasquez, Murillo, and Cano schools of Seville, the finest in the Peninsula." The decadence of Andalusia set in with the downfall of the caliphate of Córdoba in the eleventh century and the disruption of Spanish Islam into a number of independent principalities. One by one the cities of Andalusia passed into the power of Castile. Granada alone and the surrounding *vega* held out for two centuries after Córdoba, Seville, and Cádiz had fallen. The noblest of the Moorish race, fleeing before the Christian advance, crowded into Granada, and the genius of an entire nation made its home within the walls of a city; the lustre which it shed over Granada, however, was but the hectic flush of the dying Moorish civilization. In 1492 Granada was taken by the forces of United Christian Spain. Consult Murray, *The Cities and Wilds of Andalusia* (London, 1853), and Laine, "Sur les routes d'Andalousie" in *La Nouvelle Revue*, No. 115 (Paris, 1898).

ANDALUSITE, ăn'dă-lū'sīt (discovered in Andalusia). An anhydrous aluminum silicate that crystallizes in the orthorhombic system, and is usually found in coarse, square, prismatic forms, white or light gray, green, violet, or red in color. A variety known as chiastolite or macle, is characterized by dark-colored, organic inclusions, arranged symmetrically to the long axis of the crystal, and shows on a fracture a clearly marked cross or square figure. This variety has been found in several localities, as Lancaster and Sterling, Mass.

ANDAMANS, ăn'dă-mănz. A chain of islands politically attached to British India, situated toward the east side of the Bay of Bengal, between 10° and 14° N. lat. and about 93° E. long., 680 miles south of the mouth of the Ganges (Map: Asia, J 7). The group covers an area of 2508 square miles, and consists of the Great and Little Andamans, divided by the Duncan passage. Three large islands, the North, Middle, and South, and several smaller ones constitute the Great Andamans; the chief of the Little Andamans are Interview, Outram, and Henry Lawrence. With the Nicobar Islands (q.v.), they form a province under a chief commissioner resident at Port Blair. Stewart Sound is the centre for commerce in lumber. Since 1858 the islands have been a penal settlement of India. Except where clearings have been made, the surface is densely covered with forests yielding valuable timber. Of this about 160 square miles is under reserve. Hemp, coconuts, aloes, tea, potatoes, and artichokes are the chief agricultural products, and the cultivation of cacao, indigo, and coffee has been successfully introduced. Port Blair (pop., 1912, 15,600) on the east side of South Island, and Port Cornwallis, on the same side of North Island, have two fine natural harbors. The principal islands have monthly steamboat communication with Calcutta.

Ethnography. The Andamanese, also called Mincopies, are a physically uniform Negrito race, whose stature, however, has a wider range than is generally thought. Their head form tends to be brachycephalic, suggesting relationship with some of the natives of the Nicobar Islands to the south, and with broad-headed Negritos elsewhere. Giuffrida-Ruggeri (1913), the latest anthropological classifier, makes the Andamanese a subdivision of the Asiatic variety of his *Homo sapiens pigmæus* (one of the great divisions of mankind, as one species). Their language, which has several dialects, seems to be unrelated to any other tongue. Their culture is very primitive, but their weapons and industrial and art products show that they have not neglected their environment. They have also, though known only to some of the older members of the more secluded communities, a mythology, with characteristic folk-lore tales. The intelligence of these people has been underestimated. The census of 1901 gives the aborigines as 1882, of whom 842 were females, divided into 12 small tribes. Lying in the route of the Arabs eastward and of the Malays westward, these islands bear traces of the influence of both, and since the establishment of the British penal colony, there is growing up a very mixed race of hybrids. The Andamanese have inhabited their territory since prehistoric times. Flower (1879) and Keane (1896) both hold that they represent a primitive or generalized type, from which, on the one hand, the African negroes, and on the other the Melanesians, may have proceeded. (See NEGRITOS.) The population of the Andamans, with the Nicobars, in 1911, was 26,459. A large part of these are convicts who are employed in reclaiming land and erecting government buildings. The Andamans are mentioned

by Arabic geographers of the ninth century, by Marco Polo in the thirteenth, and Conti in the fifteenth, who gives the signification of the name as 'Gold Islands.' Hopetown, on Viper Island, was the scene of the assassination by a Mohammedan convict of Earl Mayo, Governor-General of India, while on an official tour of inspection in 1872. Consult: Man, *The Aborigines of the Andaman Islands* (London, 1885), and "The Andaman Islands," in *The Indian Antiquary* (vols. xxviii and xxx, Bombay, 1899 and 1900); also Kloss, *In the Andamans and Nicobars* (1903) and the works of Portman, including his *Notes on the Languages of the South Andaman Group* (Calcutta, 1898).

ANDANTE, ȧn-dän'tȧ (It. going, moving, from *andare*, to walk, go). In music, one of the five principal tempos. It implies a somewhat slow and gentle movement, intermediate between adagio (than which it is faster) and allegro (than which it is slower). Originally it denoted a moderately animated time, and in works of masters of the eighteenth century it is to be interpreted in this sense. In certain phrases the older meaning still holds to-day. Thus, *poco andante* means 'somewhat animated,' *più andante* 'faster,' *meno andante* 'slower.' *Andantino*, a diminutive of *andante*, bears the same relation to the primitive word as *adagietto* to *adagio*. Andante also means the slow movement or section of a musical composition.

ANDANTINO. See ANDANTE.

ANDAQUI, ȧn-dä'kē. An important Indian confederacy formerly holding the head-streams of the Caquetá and Magdalena rivers and the adjoining mountain region in southern Colombia. Before the period of the Spanish conquest the tribes had attained some degree of civilization, attested by the ruins of temples and other edifices, with gigantic statues carved from the living rock yet to be seen in their ancient territory. A wild and warlike remnant survives in the inaccessible fastnesses at the head of Fragua River, still guarding, according to a local legend, a cavern in which are piled up the golden treasures of their ancestors. The language shows some similarities to the Chibcha, but appears to constitute a distinct stock, the Andaquian. See an account of the Andaqui and their language in *Bull. Amer. Ethnol. Soc.*, vol. i, pp. 53–72 (New York, 1860–61).

ANDAS'TEE. See CONESTOGA.

ANDELYS, LES, lȧ'zän'd'-lē'. A town in the department of Eure, France, 20 miles northeast of Evreux, on the right bank of the Seine (Map: France, N., G 3). It consists of Grand and Petit Andelys. The former dates from the sixth century and contains the fine collegiate church of Notre Dame, built from the thirteenth to the sixteenth centuries, noted for its superb stained-glass windows and valuable paintings. Petit Andelys clusters around the famous Norman castle of Gaillard, built by Richard Cœur de Lion in 1195, to command the navigation of the Seine and act as a stronghold for Normandy against the French monarchs. Trade is in cloth and grain, and there are manufactures of thread and leather. Pop., 1901, 4539; 1906, 5514; 1911, 5530.

ANDENNE, ȧn'dĕn'. A town of Belgium, in the province of Namur, on the right bank of the Meuse, 10 miles by rail east of Namur (Map: Belgium, D 4). It has manufactures of paper, porcelain, and tobacco pipes, the latter being its most famous product. There are beds of pipe-clay, quarries of marble, and lead, iron, and coal mines in the neighborhood. Pop., 1900, 7711; 1910, 7803.

ANDER, ȧn'dĕr, ALOYS (1817–64). A famous Austrian tenor, born at Liebititz, Bohemia. He appeared at Vienna in 1845 and was first to sing there the rôle of John of Leyden in Meyerbeer's *Le Prophète*. His voice was not strong, but was of excellent quality.

ANDERAB, ȧn'dĕr-ȧb', or **INDERAB,** ĭn'-dĕr-ȧb'. A town of Afghanistan, on the northern slope of the Hindu-Kush Mountains and on the north bank of the Anderab, or Inderab, River, 85 miles north of Kabul (Map: Afghanistan, L 3). It is surrounded by gardens, orchards, and vineyards and is an important post in the commerce between Persia and India. Pop., estimated at 6000.

ANDERLECHT, ȧn'dĕr-lĕkt. A manufacturing suburb of Brussels, Belgium (Map: Belgium, C 4). It has numerous manufacturing establishments, consisting mostly of spinning and weaving mills, dyeing works, and breweries. Pop., 1890, 32,300; 1910, 63,328.

ANDERLEDY, ȧn'dĕr-lā'dē, ANTONIUS MARIA (1819–92). A general of the Jesuits, born at Brieg (Valais), Switzerland. He entered the order of Jesuits in 1838, and studied philosophy and theology at Rome and Freiburg. In 1848 he came to the United States, where he was pastor at Green Bay, Wis., and in 1851 returned to Germany, where, until 1853, he directed Jesuit missions. From 1853 to 1856 he was rector of the Jesuit seminary at Cologne. In 1856 he was appointed rector of the seminary at Paderborn, and in 1865 assumed the professorship of moral theology at the Seminary of Maria-Laach, of which he was made rector in 1869. He was appointed, in 1870, assistant to J. P. Beckx, general of the Jesuits, whom he succeeded in 1887.

ANDERMATT, ȧn'dĕr-mȧt, or URSEREN (the Italian Orsera). The chief town of the Urseren valley, in the canton of Uri, Switzerland, 4 miles south of Göschenen (Map: Switzerland, C 2). It is 4738 feet above sea level and is well fortified, for it is at the intersection of three of the most important Alpine highways, the road through the St. Gotthard Pass, that to the Rhone valley, and the upper Alps road going toward the valley of the Rhine. The St. Gotthard Tunnel passes underneath the valley. The town has an active transit trade and is a summer resort and a centre for winter sports. Pop., 994.

ANDERNACH, ȧn'dĕr-näg. An ancient town in the Prussian Rhine province, situated on the left bank of the Rhine, about 10 miles northwest of Coblentz and near the mouth of the Nette. The town has manufactures of chemicals, perfumeries, cigars, millstones, exported to distant parts of the world, and *tuffstein*, or trass, an indurated volcanic mud, which, when pulverized and mixed with lime, makes a mortar or cement for constructions under water, and which is used largely in the construction of dikes and sea walls. There is also trade in wine and grain. Pop., in 1890, about 6000; in 1905, 8802. Andernach was the Antunnacum of antiquity, one of the fifty forts of Drusus. Parts of the old walls remain and preserve its mediæval appearance to some extent. The parish church of St. Genoveva, with four towers, one of which dates back to the Carlovingian period, and ruins of the old castle of the archbishops of Cologne, are

interesting. After a restoration the Rhein-Tor was gutted by fire in 1907. Late in the fifteenth century Andernach was captured by the Electorate of Saxony. The French burned it in 1688.

ANDERSEN, ăn'dĕr-sen, HANS CHRISTIAN (1805–75). A celebrated Danish writer styled the "children's poet," whose best poetry is his prose. He was born at Odense, Denmark, April 2, 1805. The child of poor and shiftless parents, he had little instruction and few associates, but his dramatic instinct was stimulated by La Fontaine and the *Arabian Nights* and a visit of a theatrical company to Odense, in 1818, led him to seek his dramatic fortune in Copenhagen (1819), where for four years he worked diligently, but produced nothing of note. He gained a scholarship, however, and friends, who in 1829 enabled him to publish *A Journey on Foot from Holm Canal to the East Point of Amager*, an arabesque naïvely plagiarized and parodied from the German romanticists. *Fantasies and Sketches*, sentimental and rather mawkish poems, followed in 1831, after which he made a tour of Germany, the first of many wanderings. This inspired *Silhouettes*, a book with admirable pages of description. In 1835 he essayed the *Fairy Tales*, by which he was to achieve world-wide recognition. The classic *Tinderbox* and *Big Claus and Little Claus* are also of this year. He was, however, disposed to underrate his "sleight of hand with fancy's golden apples," devoting himself to novels, *The Improvvisatore* (1835), *O. T.* (1836), and *Only a Fiddler* (1837), which gave him a European reputation for picturesque description, humor, and pathos of the romantic type. In the last, there are interesting autobiographical touches; but there is no clear character-drawing in any of them, and this lack made his repeated dramatic essays uniform failures. He was still to write delightful impressions of travel, as in *A Poet's Bazaar* (1842), *In Sweden* (1849), and *In Spain* (1863). He wrote other novels, *The Two Baronesses* (1849) and *To Be or Not To Be* (1857), and an epic failure, *Ahasuerus* (1847); but the *Picture Book Without Pictures* (1840) had revealed his best talent to him as an interpreter of child nature. Between 1852 and 1862 he printed nine small volumes of stories and finished the last of them in 1872. His last years were unharassed by criticism and attended by all the honor and love that should accompany old age. His literary jubilee occurred in 1869, and he died at Copenhagen, Aug. 4, 1875, after a brief and painless illness.

In appearance, Andersen was limp and very ungainly. His nose was large, his neck and limbs long and lank, and his hands and feet very large; yet he fancied himself distinguished looking and had a child's delight in dress and decoration. His character, too, hovered between the child-like and the childish. He never realized the limitations of his genius. Curiously enough, he did not like children, and he was not personally attractive to them. He was a shrewd observer, but self-absorbed and out of touch with his political generation. His literary style is faulty, but it reflects marvelously the vivid imagery of juvenile fancy. He had at his finger-tips all the venerable devices of the nursery to spur attention and kindle sympathy. No writer looks at nature so wholly with the child's eyes as he, none so interpenetrates narration with the smiles, the fears, and the very intonations of childhood. His personifications may tease the adult fancy, but they are the natural drama of children. Andersen's works are Englished in ten uniform but unnumbered volumes. Mary Howitt's is still the best of many translations of the *Tales*, though it is far from faultless. A sumptuous centenary edition of the *Tales* appeared (1900) under the patronage of the Danish government simultaneously in six languages. Andersen's *Autobiography* was compiled by Jonas (Berlin, 1879). R. Nisbet Bain's *Life of Andersen* (New York, 1895) is the best in English.

ANDERSEN, ăn'dĕr-sen, KARL (1828–83). A Danish poet. He was born at Copenhagen, studied law there, and was subsequently appointed curator of the royal museums at the castle of Rosenborg. He first became known through his *En Krands paa en Arbejders Kiste* ('A Wreath for a Laborer's Coffin,' 1857). He also published *Lyriske Smaadigte* ('Shorter Lyrics,' 1863), *Poesier* ('Poems,' 1870), *Genrebilleder* ('Genre-Pictures,' 1876–81), and other works. He made a collection of Icelandic sagas (1864) and translations of Servian folk-songs.

ANDERSON. A city and railroad centre, the county-seat of Madison Co., Ind., 36 miles northeast of Indianapolis, on the Central Indiana, the Cleveland, Cincinnati, Chicago, and St. Louis, and the Pittsburgh, Cincinnati, Chicago, and St. Louis railroads, and on the east fork of the White River (Map: Indiana, D 2). An abundant supply of natural gas promotes the manufacturing industries, which include automobiles, silos, bottles, magnetos, files, tile, cheese-cutters, electric and gasoline motors, pumps, paper boxes, steel and wire nails, mattresses, street cars, etc. The city is the centre of an extensive system of interurban electric railways, the power for the operation of which is supplied by a million-dollar plant. Anderson is the seat of an industrial school and has a Carnegie library and a fine high school building. Near the city are interesting mounds of the so-called "mound-builders." Anderson was settled in 1823, was incorporated in 1865, and is governed under the charter of 1865, which provides for a mayor, elected every four years, and a city council of six members, controlling all appointments. The city owns and operates the water works and electric light plant. Its growth has been very rapid. Pop., 1880, 4126; 1890, 10,741; 1900, 20,178; 1910, 22,476; 1913 (est.), 25,000; 1920, 29,767.

ANDERSON. A city and the county-seat of Anderson Co., S. C., about 100 miles (direct) northwest of the State capital, on the Blue Ridge and the Charleston and Western Carolina railroads (Map: South Carolina, B 2). It has city and school libraries, three splendid school buildings and churches, a fine city hall, hospital, and county court house. The city is in a fertile cotton-growing and agricultural region and has several large wholesale stores. Among its industrial establishments are cotton and cotton-seed oil mills, employing 4900 persons, factories for the manufacture of fertilizers, spring beds and mattresses, overalls, collars, and other articles of apparel, lumber and flour mills, and machine shops. A notable feature of the city is a superb electric power station, 10 miles distant on the Seneca River, controlled by a private corporation. The government, under a charter of 1882, is administered by a mayor, elected every two years, and a municipal council. Town meetings are held when neces-

sary. Anderson was settled in 1827 and has become an important cotton centre. A large part of the population lives outside the city limits, which are restricted to one mile. For two decades Anderson has been the most rapidly growing city in South Carolina, and the county ranks second in the United States in the production of cotton. Pop., 1890, 3018; 1900, 5498; 1910, 9654; 1913 (est.), 17,861; 1920, 10,570.

ANDERSON, Alexander (1775–1870). The earliest wood engraver in the United States, also a line engraver. He was born in New York City, the son of a printer, and as a schoolboy his favorite occupation was copying engravings. At 12 he improvised his own copper plate, upon which he drew with a graver made from a pocket knife. In 1789, at his father's wish, he began the study of medicine. He first saw wood engravings by Bewick (q.v.) in 1793 and immediately made trial of boxwood blocks, which were henceforth his favorite medium. The following year he illustrated in this technique the *Looking Glass for Men* for the publisher Durrell. In 1795 he was licensed to practice medicine, and although he was highly successful, he retired from practice in 1798, after the death of his wife, parents, infant son, and brother from yellow fever. During the years following he illustrated many works, chiefly after English originals; such as Bewick's *Quadrupeds* (1810), on the whole an excellent copy; Holbein's *Dance of Death*, published under the title of *Emblems of Mortality* (1810), and *Shakespeare's Plays*, illustrated after Thomson (1812). From 1820 he devoted himself exclusively to wood engraving. The best of all his productions are two fine and spirited cuts, the "Return from the Boar Hunt" after Ridinger, and Teniers's "Water Fowl," both published in 1818. Unfortunately there was no demand for work of such size and excellence by American publishers. He was elected honorary member of the National Academy of Design in 1843, and died, Jan. 17, 1870, at Jersey City.

Anderson was in the truest sense a pioneer; he is the "father of wood engraving" in the United States. Entirely self-taught, he modeled his art upon that of Bewick, whom he approaches only in his very best work. Considering the difficulties surmounted, his achievements are indeed remarkable; but he was constantly handicapped by the poor and cheap character of the illustrations demanded by the American book trade of his day. The volume of his work is enormous. Consult: Lossing, *Memorial Address on Alexander Anderson*, published by the New York Historical Society (1872); *Early American Wood Engravings by Alexander Anderson and Others* (New York, 1877); F. M. Burr, *Life and Works of Alexander Anderson* (New York, 1893); Linton, "The History of American Engraving," in *American Art Annual*, vol. i, part i.

ANDERSON, Sir Edmund (1530–1605). An English jurist, Chief Justice of the Court of Common Pleas in 1582, distinguished for zeal in the cause of the Established Church, and notorious for harshness toward Catholics and other dissenters. In his attitude at the trials of Robert Brown, the founder of the Brownists, and of John Udall, concerned in the authorship of the Martin Marprelate pamphlets, he showed a spirit of brutal vindictiveness bent on conviction. He was one of the commissioners in 1586 to try Queen Mary of Scotland and afterward to try Sir Walter Raleigh. He was a man of extraordinary legal learning.

ANDERSON, Edwin Hatfield (1861—). An American librarian, who was born in Zionsville, Ind., and graduated from Wabash College in 1883. After spending a year at the New York State Library School at Albany, he was, in 1885, cataloguer at the Newberry Library in Chicago; from 1892 to 1895 librarian of the Carnegie Free Library at Braddock, Pa.; and for the next decade librarian of the Carnegie Free Library at Pittsburgh, which he had organized. Temporarily he abandoned library work to engage in zinc and lead mining in Missouri, returning to his earlier vocation in 1906 as director of the New York State Library and Library School. After a five years' service in this office he was chosen assistant director, and, on the death in 1913 of John S. Billings (q.v.), director, of the New York Public Library. In 1901–02 Mr. Anderson was president of the Keystone State Library Association and in 1903–04 was a member of the Pennsylvania Public Records Commission. He was president of the New York Library Association in 1908.

ANDERSON, Elizabeth Garrett (Mrs.) (1836—). An English physician and pioneer of woman's rights, born in Suffolk. In spite of hostile public opinion and the opposition of the medical schools, she began the study of medicine in 1860. After a course of private instruction, she was repeatedly refused admission to examinations by the Royal College of Physicians and many other bodies, so that it seemed as if she would not be able to gain the necessary diploma permitting her to practice medicine. In 1865, however, she obtained the license of the Society of Apothecaries, and in the following year was made general medical assistant in St. Mary's Dispensary in London, an institution which later developed into the New Hospital for women. She passed the medical examinations of the University of Paris and received the degree of M.D. in 1870. She was senior physician of the New Hospital in 1866–90, dean of the London School of Medicine for Women in 1883–1903, and president of the East Anglian branch of the British Medical Association in 1896–97. Mrs. Anderson was the first woman in England to be honored with the office of mayor, having been elected in 1908 head of the city government of Aldeburgh.

ANDERSON, Galusha (1832—). An American theologian. He was born at North Bergen, N. Y., and was educated at the University of Rochester and the Rochester (Baptist) Theological Seminary. He held several pastorates, became president successively of the universities of Chicago (1878–85) and Denison, Ohio (1887–90), professor of practical theology at Chicago in 1892–1903, when he became emeritus professor. His writings include: *The Elements of Chrysostom's Power as a Preacher* (1903); *Ancient Sermons for Modern Times*, a translation from Asterius (1904); *When Neighbors Were Neighbors, a Story of Love and Life in Olden Days* (1911).

ANDERSON, George B. (1831–62). A Confederate soldier. He was born at Wilmington, N. C., graduated at West Point in 1852, and in 1855 was appointed first lieutenant, serving as regimental adjutant after 1858. He resigned in 1861 to enter the Confederate service and soon became a brigadier-general and was placed in general command of the North Carolina coast

defenses. While leading a brigade at the battle of Antietam (Sept. 17, 1862), he was fatally wounded, and died on October 16.

ANDERSON, James, LL.D. (1739–1808). A Scotch writer on political economy and agriculture. He was born at the village of Hermiston, near Edinburgh, and lost both his parents when very young, so that the management of a large farm, which had been in the possession of the family for a long time, devolved upon him. Recognizing the practical importance of a knowledge of chemistry to a farmer, he attended the chemistry class in the University of Edinburgh and brought the results of his study to bear on his profession. He invented, at an early period of life, the small two-horse plow without wheels, commonly called the Scotch plow, which is generally admitted to have been one of the most useful improvements in agricultural implements ever introduced. In 1780 the University of Aberdeen bestowed on him the degree of doctor of laws. In 1784, on account of his pamphlet, entitled *Encouragement of the National Fisheries*, he was engaged by the government to make a survey of the western coast of Scotland, with special reference to that object. He next began, in 1791, the publication of a periodical called *The Bee*, which was continued for three years. In 1797 he went to London, where he pursued his literary occupations with such intense assiduity that his health gradually gave way. He died on Oct. 15, 1808. In his essay entitled *An Inquiry into the Nature of the Corn Laws, with a View of the Corn Bill Proposed for Scotland* (1777), Anderson anticipates the doctrine of rent later identified with the work of Ricardo. His other writings include: *Observations on the Means of Inciting a Spirit of National Industry* (1777); *An Account of the Present State of the Hebrides* (1785); *Observations on Slavery* (1789); *Recreations in Agriculture, Natural History, Arts, and Miscellaneous Literature* (6 vols., 1799–1802).

ANDERSON, Sir James (1824–93). A Scotch navigator. He was born at Dumfries and in 1851 entered the service of the Cunard Company. He commanded successively four vessels of that line and so distinguished himself by his excellent judgment and high skill that, in 1865, he was selected to command the *Great Eastern* when it was chartered to lay the Atlantic cable (see Atlantic Telegraph), and thenceforth his name became intimately associated with that vessel.

ANDERSON, John, F.R.S. (1726–96). A Scotch professor of natural philosophy in the University of Glasgow, and founder of Anderson's College (now merged in the Glasgow and West of Scotland Technical College). He was born in the parish of Roseneath, Dunbartonshire. He studied at the University of Glasgow, in which, in his thirtieth year, he was appointed professor of Oriental languages. Four years later (1760) he was transferred to the chair of natural philosophy. He was greatly interested in the practical application of science, and in a spirit of philanthropy he instituted a lecture course for artisans, in addition to his usual lectures, which were erudite and technical. He continued these twice every week during the session to the end of his life. His valuable work, entitled *Institutes of Physics*, appeared in 1786. Shortly before the French Revolution he invented a form of gun whose recoil was stopped by the condensation of air within the body of the carriage; but, after having endeavored in vain to attract the attention of the British government to it, he proceeded to Paris in 1791 and, being a sympathizer with the Revolution, presented his model to the National Convention. It was hung up in their hall with the following inscription over it: "The gift of Science to Liberty." Afterward, when the allied forces had drawn a military cordon around the frontiers of France to prevent the introduction of French newspapers into Germany, Anderson ingeniously suggested the expedient, which was adopted and proved quite successful, of making small balloons of paper, to which newspapers and manifestoes were tied, and letting them off, when the wind was favorable, for Germany. By his will he directed that the whole of his effects, of every kind, should be devoted to the establishment of an educational institution in Glasgow to be known as Anderson's University.

ANDERSON, John (1833–1900). A Scotch scientist, born at Edinburgh. He studied at Edinburgh University and from 1864 to 1886 was professor of comparative anatomy at the Calcutta Medical College and curator of the government museum. As scientific officer, he accompanied expeditions to western China in 1868–69 and in 1874–75. In 1881 he was commissioned to make an investigation of the marine animals of the Mergui archipelago. He was a fellow of the Royal Society and a contributor to scientific journals and published *Mandelay to Momen* (1875), *Anatomical and Zoölogical Researches* (1878), *Two Expeditions to Western China* (1876), *Fauna of Mergui and its Archipelago* (1889, and *Herpetology of Arabia, with a Preliminary List of the Reptiles and Batrachians of Egypt* (1896). His observations in the Mergui archipelago appeared in vols. xxi and xxii of the *Journal* of the Linnæan Society.

ANDERSON, John Fisher (1873—). An American physician and bacteriologist, born in Fredericksburg, Va., and educated in the public schools of that and other cities. Having studied medicine at the University of Virginia and taken his degree in 1896, he was appointed passed assistant surgeon in the United States Public Health and Marine Hospital Service, being assigned in the same year (1898) on epidemic duty in connection with yellow fever. He was quarantine officer in the Dry Tortugas (1898–99); sanitary observer at Glasgow, Oporto, and Liverpool (1899–1900); and sanitary attaché at the United States consulates at Barcelona, Marseilles, and other European cities (1900–01). During his service abroad he carried on studies at the Thompson-Yates Laboratory and the School of Tropical Medicine in Liverpool and at the Patologische Institut in Vienna. In 1902 he was appointed assistant director of the Hygienic Laboratory at Washington and in 1909 director. In 1913 he was in immediate charge of the government investigation into the sensational claims of Dr. F. F. Friedmann to the discovery in a "turtle serum" of an absolute cure for tuberculosis. He wrote many articles and bulletins showing the results of original investigations upon the effects of serums, toxins, and anti-toxins; typhoid fever bacteria in mills; tubercle bacilli, etc. In 1912 he collaborated with T. B. McClintic on *A Method of Standardizing Disinfectants*.

ANDERSON, John Jacob (1821–1906). An American author. He was born in New York City and graduated at its Normal School. For

30 years he was attached to, and for 20 years was principal of, a large grammar school in New York. He wrote many text-books of history, including *Pictorial School History of the United States* (1863), *A School History of England* (1870), *Manual of General History* (1867), *Complete Course in History* (1881), *A History of France* (1877), and *A History of the State of New York* (1902).

ANDERSON, Larz (1866—). An American diplomat, born in Paris, France. He graduated at Harvard in 1888. After traveling for two years he was second secretary of the United States legation in London (1891–93), and first secretary of the United States embassy in Rome (1893–97). During the Spanish-American War he served as adjutant-general of United States Volunteers. He was Minister to Belgium (1911) and Ambassador to Japan (1912 to March, 1913).

ANDERSON, Martin Brewer (1815–90). An American preacher and educator, born at Brunswick, Me. Graduating at Waterville College (now Colby University) in 1840, he was for two years tutor of Latin, Greek, and mathematics, and for seven years professor of rhetoric and lecturer on modern history, at his alma mater. In 1850 he became editor of the New York *Recorder* (later the *Examiner*), a weekly Baptist paper. Called in 1853 to be the first president of the University of Rochester, he remained in this office for 35 years, until failing health compelled his resignation. A few years after the Civil War Dr. Anderson was urged to accept the presidency of Brown University. This highest honor which his denomination could confer upon him he was induced to decline because of the great need at Rochester. A vigorous and popular preacher, though never ordained to the ministry, Dr. Anderson was chosen president of the American Baptist Home Missionary Society in 1864 and of the Missionary Union in 1869. For 37 years he was a trustee of Vassar College and for 13 years a member of the New York board of charities. Selections from his numerous *Papers and Addresses* were published in two volumes in 1895, Wm. C. Morey, ed. Consult Asahel C. Kendrick, *Martin B. Anderson* (Philadelphia, 1895).

ANDERSON, Mary Antoinette (1859—). An American actress, born at Sacramento, Cal. Her father, General Anderson, was killed in the Civil War, while serving on the Confederate side. Her mother married Dr. Hamilton Griffin and removed with him to Louisville, Ky. She was educated at the Ursuline Convent and the Academy of the Presentation Nuns in Louisville, and at the age of 13 began to study for the stage under Charlotte Cushman. She made her début in the character of Juliet at Louisville, Nov. 27, 1875, with success. In 1876 she traveled through the West, and in the season of 1877–78 appeared in Philadelphia, New York, and Boston. In 1884–85 she played at the Lyceum Theatre, London, and in the character of Rosalind, in *As You Like It*, opened the Memorial Theatre at Stratford-on-Avon. From 1885 to 1889 she played in Great Britain, her chief parts being Julict, Bianca in *Fazio*, Julia in *The Hunchback;* Evadne, Meg Merrilies, Pauline, Galatea, Clarice, in *Comedy and Tragedy;* Parthenia, Rosalind, and Perdita in *A Winter's Tale*, in which she achieved her greatest success. Illness in 1889 compelled her to retire from the stage. In 1890 she married Antonio Navarro de Viana, of New York, and soon decided not to return to the stage. Consult Mary Anderson's Autobiography, *A Few Memories* (1896), and William Winter, *Stage Life of Mary Anderson* (1886).

ANDERSON, Melville Best (1851—). An American educator, born in Kalamazoo, Mich. He was educated at Cornell, Göttingen, and Butler universities, and became a professor in the last-named institution in 1877. During the years 1880–91 he held professorships successively at Knox College, Purdue University, and the State University of Iowa. He then accepted the chair of English literature in Leland Stanford, Jr., University and occupied it until 1910, when he was made professor emeritus. For 10 years he was engaged in making a triple-rime translation of Dante's *Divine Comedy*, and also at various times translated and edited a number of French works. In addition, he edited a volume of Bacon's *Essays* (1890) and wrote *Some Representative Poets of the Nineteenth Century* (1896) and *The Happy Teacher* (1910).

ANDERSON, Rasmus Björn, LL.D. (1846—). An American scholar, author, and editor. He was born at Albion, Wis. In 1866 he received an M.A. from Luther College (Decorah, Iowa), and in 1888 an honorary LL.D. from the University of Wisconsin, where from 1875 to 1883 he was professor of Scandinavian languages and literature. From 1885 to 1889 he was United States Minister to Denmark. In 1898 he became editor at Madison, Wis., of *Amerika*, a Norwegian journal. His publications include: *The Scandinavian Languages* (1873); *America Not Discovered by Columbus* (1874); *Viking Tales of the North* (1877); *Norge i billeder* (1899); *Norse Mythology* (1901); *Bygdejœvning* (1903), and translations of Brandes's *Eminent Authors in the Nineteenth Century*, and of the works of Björnson (7 vols.).

ANDERSON, Richard Henry (1821–79). A Confederate soldier. He was born in South Carolina, graduated from West Point in 1842, and served as second lieutenant in the Mexican War. He took part in the southern line of operations and became first lieutenant in 1848 and captain in 1855. He resigned from the regular army (May, 1861), became a Confederate brigadier, assisted in the bombardment of Fort Sumter, and served with great gallantry throughout the war, distinguishing himself especially at Fair Oaks, Gaines's Mill, Frazier's Farm, Bull Run, and Gettysburg, where he commanded a division. He rose to the rank of major-general (August, 1862) and of lieutenant-general (May, 1864). In the final campaign he commanded the fourth corps of General Lee's army.

ANDERSON, Robert (1750–1830). A Scotch editor and biographer of the English poets. He was born at Carnwath, Lanarkshire; studied theology and afterward medicine in the University of Edinburgh, and became a physician, but soon after his marriage ceased practicing and from that time devoted himself to literature. His most important work was the compilation of *A Complete Edition of the Poets of Great Britain with Prefaces Biographical and Critical* (14 vols., 1792–1807). He edited the *Edinburgh Magazine* and in that capacity became the friend of many young writers, notably Thomas Campbell, who dedicated his first volume of verses to him. Consult Beattie, *Life and Letters of Campbell* (1849); *Poetical Works of Robert Anderson with the Life of the Author by Himself* (1820).

ANDERSON, ROBERT (1805–71). An American soldier. He was born near Louisville, Ky., graduated at West Point in 1825, and served in the Black Hawk War of 1832 as colonel of the Illinois volunteers. At this time Abraham Lincoln was twice mustered out of service and in by him when acting as assistant inspector-general. He was instructor of artillery practice at West Point, 1835–37; served in the second Seminole War, 1837–38, and in 1838 was brevetted captain and became assistant adjutant-general on General Scott's staff. He took part in the Mexican War and was severely wounded at Molino del Rey. In November, 1860, he took command in Charleston harbor, and was for 15 weeks confined to Fort Sumter by the Confederates. On April 14, after a bombardment of 36 hours, he was compelled to evacuate the fort. (See FORT SUMTER.) He was appointed brigadier-general in the United States army in May, 1861, and sent to command the Department of Kentucky, and then the Department of the Cumberland; but, owing to the failure of his health, he was relieved from active duty in October, 1861, and was retired from the service in October, 1863. In 1865 he was brevetted major-general. He translated and adapted from the French *Instructions for Field Artillery* (1840) and *Evolutions of Field Batteries* (1860). His *Reminiscences of the Black Hawk War* are included in the *Collections of the Wisconsin Historical Society* (1883–85), and his letters, under the title, *An Artillery Officer in the Mexican War, 1846–47*, were published in 1911 in New York. Consult Eba Anderson Lawton, *Major Robert Anderson and Fort Sumter, 1861* (New York, 1911).

ANDERSON, RUFUS, D.D., LL.D. (1796–1880). Secretary of the American Board of Commissioners for Foreign Missions. He was graduated at Bowdoin College (1818) and Andover Theological Seminary (1822), and after acting as assistant (1822–32), became full secretary, and so continued until 1866, when he retired. He was lecturer on Foreign Missions in Andover Theological Seminary 1867–69. He was one of the great missionary secretaries and historian of the American Board (3 vols., 1872–74). He inspected the Board's stations and has left the memorial in his *Observations upon the Peloponnesus and Greek Islands* (1830), *A Heathen Nation* (the Hawaiians) *Civilized* (1870), and in the history mentioned above. He died in Boston, May 30, 1880.

AN'DERSONVILLE. A village in Sumter Co., Ga., 62 miles south of Macon, notable as the site of a Confederate military prison during the Civil War (Map: Georgia, D 3). When established in November, 1863, the prison was an unsheltered inclosure occupying about 22 acres and crossed by a small stream about 5 feet wide and 1 foot deep. Subsequently the area was increased to about 27 acres, though a part of this was rendered unavailable by the establishment of a "dead line," the crossing of which by a prisoner meant immediate death. Into this area sometimes as many as 33,000 Federal soldiers were crowded, forced for the most part to live without shelter, fully exposed to the heat of summer, the frosts of winter, and the frequent storms, while they suffered terribly from the effects of insufficient and improper food. Amid surroundings of indescribable filth, they died by thousands, of diarrhœa, scurvy, dysentery, and fevers. The first prisoners arrived on Feb. 15, 1864, and the last in April, 1865, the total amounting to 49,485, of whom more than 12,800, or 26 per cent, died in confinement. In the autumn of 1864 many of the prisoners were removed to Millen, Ga., and Florence, S. C., where the conditions were much less severe. A Confederate medical commission, composed of Dr. G. S. Hopkins and Surgeon H. E. Watkins, reported in 1864 that the abnormal death rate was due (1) to "the large number of prisoners crowded together," (2) to "the entire absence of all vegetables as diet, so necessary as a preventive to scurvy," (3) to "the want of barracks to shelter the prisoners from sun and rain," (4) to "the inadequate supply of wood and good water," (5) to "badly cooked food," (6) to "the filthy condition of the prisoners and prison generally," and (7) to "the morbific emanations from the branch, or ravine passing through the prison, the condition of which cannot be better explained than by naming it a morass of human excrement and mud." The post was in command of Gen. W. S. Winder, while Henry Wirz, a Swiss, was the prison superintendent. The latter was convicted by a special military court, in session from August to October, 1865, of "maliciously, willfully, and traitorously conspiring to injure the health and destroy the lives" of Union soldiers at Andersonville, and of "murder in violation of the laws of war," and on November 10 was hanged. Subsequently, the tract of land where the bodies had been hastily buried was turned into a national cemetery. Of the graves, 12,789 have been identified and marked with tablets, while 921 remain unknown. Consult Chipman, *The Horrors of Andersonville Rebel Prison* (San Francisco, 1891); Spencer, *A Narrative of Andersonville* (New York, 1866), and Stevenson, *The Southern Side, or Andersonville Prison* (Baltimore, 1876). Partisan accounts are numerous. For an impartial one see Rhodes, *History of the United States*, vol. v (New York, 1904).

ANDERSSEN, än'dĕr-sen, ADOLF (1818–79). A famous German chess-player, born in Breslau. He studied philosophy and mathematics at Breslau and taught at the Friedrichs-Gymnasium there. In 1851 he defeated Staunton at London. In 1858 he lost to Morphy, at Paris. He won two first prizes in the World's Tournament at London in 1862, and was victorious at Baden-Baden in 1870. He was noted for the brilliancy of his style of play. His *Sixty Chess Problems* is full of deep and ingenious combinations. He also wrote several papers on the theory of chess. Consult Bachmann, *Adolf Anderssen* (Ausbach, 1902).

ANDERSSON, än'dĕr-sŏn, KARL JOHAN (1827–67). A Swedish naturalist and South African traveler. In 1850 he joined Francis Galton in a journey in southwest Africa, continued alone through 1853–54, and on his return to England published *Lake Ngami; or, Explorations and Discoveries during Four Years' Wanderings in the Wilds of Southwestern Africa* (1855). He made a journey to Lake Ngami in 1858 with Green, the elephant hunter. On his return he published a book on the Okavango River (1861). In May, 1866, he went on an exploration to the Kunene for the purpose of establishing commercial intercourse with the Portuguese settlements north of that river. He came in sight of the stream, but was too feeble to cross it, and died in trying to return to Cape Town. After his

death his *Notes of Travel in South Africa* (1876) were published.

ANDERSSON, Nils Johan (1821–80). A Swedish botanist, born at Gärdserum, Småland. In 1846 he was an instructor in botany at Upsala and in 1847 taught in an elementary school at Stockholm. From 1851 to 1853 he was botanist to the Swedish circumnavigatory expedition, which he described in *En Verldsomseg-ling* (3 vols., 1853–54). He was appointed an adjunct professor and demonstrator of botany at Lund in 1855, and in 1856 professor and curator of the botanical collections at the Academy of Sciences, Stockholm, and instructor in the Bergiani horticultural school. He also published *Salices Lapponiæ* (1845), *Conspectus Vegetationis Lapponiæ* (1846), *Atlas öfver den Scandinaviska Florans Naturliga Familjer* (1849), *Monographia Salicum Hucusque Cognitarum* (1867), and other works.

ANDES, ăn'dēz (deriv. uncertain, usually explained as Copper Mountains, from the Peruvian word *anti,* copper; cf. in Germany *Erzgebirge,* Ore-Mountains, and *Bleiberg,* Lead-Mountain). The great mountain chain of South America, extending closely parallel with the Pacific coast and nowhere far from it, from Cape Horn to the northwest coast of the South American continent. Its length is about 4500 miles, extending in latitude from 56° 30′ S. to 11° N. In a way it may be regarded as continuous with the Cordilleras of North America, the two forming a well-nigh continuous mountain system 9000 miles in length, stretching from Cape Horn to the Aleutian Islands. The average breadth may be set at 150 miles, although this differs greatly in different parts of the system. Its average height of 12,000 feet is subject to the same qualification. Following the coast, the system trends a little west of south through Colombia and Ecuador, but on entering Peru it turns to the southeast, in which direction it extends through that country and part of Bolivia. Through south Bolivia, Chile, and Argentina its trend is nearly south, but it swings in a broad curve to the eastward near Magellan Strait.

The mountain system rises abruptly on both sides throughout its course. Everywhere it presents a steep wall to the Pacific, and on the east it drops abruptly to the Amazon valley; farther south, in Argentina, the land rises somewhat to meet it, and there are outlying ridges, but the main ascent is everywhere steep. The southern part of the system consists of a single range, with here and there outliers of comparatively little height, but from northern Chile and Argentina to Colombia, it consists of a high, broad plateau, capped by two or three ranges, with hundreds of high volcanic peaks, some active, others dormant or extinct.

Geologically the system is of recent origin, although its age has not been closely determined. The material of which it is composed is in the main granites, with schists, slates, and other metamorphic rocks and the oldest of stratified rocks; here and there upturned beds of more recent formation, up to the Jurassic, lie upon the flanks of the ranges, while in Peru the eastern range is composed largely of Silurian beds. Over all, in the neighborhood of the volcanic peaks, which are very numerous in all parts of the range, are spread lava, pumice, scoria, and ashes, in many places burying deeply the metamorphic rocks. Near the northern end, in Colombia and Venezuela, the eastern branches are composed of recent stratified rocks. For detailed description it will be convenient to refer to the countries traversed by this mountain system, and this order will be followed, commencing at the north.

Colombia and Venezuela. The Andes originate on the north in Colombia and Venezuela in several distinct ranges, which, trending south to southwest, meet and coalesce in the Pasto Knot in southwest Colombia. The westernmost range of magnitude is the Cordillera Occidental, which rises just east of the mouth of the Atrato, and trends southward, parallel to the coast, throughout Colombia. In this are summits 10,000 and 11,000 feet in height, the highest peaks being in the southern part. Near the boundary line with Ecuador it is cut through by the Rio Patia, which flows south and west into the Pacific. East of the Cordillera Occidental, and separated from it by the narrow valley of the Cauca, a branch of the Magdalena, is the Cordillera Central. This range rises from the lowlands between the Cauca and the Magdalena and attains a great height, with Chumbal, 15,715 feet; Guacau, 16,683 feet; Guican, 15,748 feet; Santa Marta, 19,029 feet; Santa Isabel, 16,732 feet; Herveo, 18,045 feet; Ruiz, 17,388 feet; Sugar-loaf, 16,000 feet; Tolima, 18,425 feet, and many others of equal height. The range is composed mainly of crystalline schists, while the higher peaks are volcanoes, which have spread lava and ashes over many parts of the range. East of the Cordillera Occidental and across the valley of the Magdalena is the Cordillera de Bogota, originating in several ranges in the north of Venezuela, which trend in a general southwest direction and come together at various points; the principal ones are the Parija and Merida ranges, which unite near Bogota, beyond which point the range is single. Its highest peak is Cocui, 16,680 feet high. The range is in the main composed of strongly folded Cretaceous and Tertiary beds, and contains no volcanoes.

Ecuador. The Andes of Ecuador form two ranges, the Cordillera Occidental, the continuation of the range of the same name in Colombia, and the Cordillera Oriental, or Real; the two are separated by a high plateau, from 70 to 100 miles wide, with an average elevation of 8000 feet; connecting cross ranges divide this plateau into 10 basins or high mountain valleys. The western range is composed of porphyries, diorites, and greenstone, and the eastern and higher range is composed of gneiss, schist, and granite. Above them tower many high volcanic cones, which have spread lava and ashes over great areas. The great peak of the western range is Chimborazo, 20,517 feet; with Cotocachi, 16,300 feet; and Pichincha, 15,918 feet, the last named near the city of Quito, while in the eastern range are Cotopaxi, 19,580 feet; Antisana, 19,335 feet; Cayambe, 19,186 feet; Altar, 17,736 feet; Illiniza, 17,380 feet; and Carahuairazo, 16,515 feet, with the active volcanoes Tunguragua, 16,579 feet, and Sangai, 17,120 feet. The cross ranges also contain many volcanic peaks, indicating that the whole region must once have been the centre of tremendous volcanic activity.*

Peru. In Peru, Bolivia, and the northern

* It must be remembered that there is always considerable variation in measurements of very high peaks, due to refraction, changing air pressure, etc. Only a *series* of careful measurements, either by triangulation, barometer, or hypsometer, can approach accuracy.

part of Chile the system is much broader and more complex. The Andes of Peru consist of three ranges, the two westernmost being the Maritime or Black, and the Central Cordillera, trending parallel to one another and to the coast, and in the north separated only by a narrow, high plateau, known as the Puna, with an average height of 12,500 feet, and in the south by the narrow valley of the Rio Huay. The Eastern Cordillera, though otherwise continuous, is cut through by no less than six of the head tributaries of the Amazon. The broad, elevated region lying between this and the Cordillera Central, known as the Sierra, is broken by mountain spurs, with broad valleys and plateaus. East of the Eastern Cordillera, or the Andes, as it is locally known, are several lower ranges, trending parallel with the system and separating tributaries of the Amazon. The Maritime and Central Cordillera are composed of crystalline and volcanic rocks, with stratified beds of Jurassic age resting upon their outer flanks. The Eastern Cordillera is composed mainly of stratified beds of Silurian age, with some intrusions of granite. These ranges are connected at the mountain knot of Cerro de Pasco, 14,293 feet high, and again farther to the southeast, at the Knot of Vilcanota, 17,390 feet. South of this latter peak the Central and Eastern Cordillera inclose the lofty plateau on which is Lake Titicaca, situated partly in Peru and partly in Bolivia, and 12,466 feet above the sea. North of the Cerro de Pasco, the Sierra comprises the upper valley of the Marañon, the largest and longest of the head branches of the Amazon, which cuts through the Eastern Cordillera just south of the Ecuador frontier. Between the Cerro de Pasco and the Knot of Vilcanota, the Sierra is drained by the head streams of the Ucayali, a large tributary to the Amazon. These streams also cut gorges through the eastern range. This region was the site of the ancient Inca civilization and is still thickly settled. Among the high peaks of this part of the Andes are Huascaran, 22,051 feet; Huandoy, 21,089 feet; Misti, 20,013 feet; Chacani, 19,820 feet; and Tutupaca, 18,960 feet.

Bolivia. In Bolivia the system comprises two main ranges, one of which is formed by the coalescing of the two westernmost of the Ecuador ranges. These ranges are widely separated and inclose a broad, greatly elevated plateau, 125 miles in breadth in the northern part, and nearly 300 miles in the south, with an altitude of almost 13,000 feet. The plateau of the Andes has here the greatest lateral extent and altitude in the entire system. The Western range has an average altitude of 15,000 feet, while the Eastern, or Cordillera Real, is still higher, having peaks exceeding 20,000 feet; among them are Illampu, 21,490 feet; Illimani, 21,930 feet; Ancohuma, 21,490 feet; Haina, 20,171 feet; Paniri, 20,735 feet; Licancaur, 19,521 feet; Sajama, 21,047 feet; Isluga, 17,060 feet; and Cacaca, 20,250 feet, all of them near Lake Titicaca. East of this range are several lower subsidiary ranges, which form a complicated system. Lake Titicaca drains southeastward into Lake Poopo, a sink which collects the waters from a large area of the plateau. In the Cordillera Real and the lesser ranges to the east, rise tributaries of the Madeira, one of the main branches of the Amazon, and of the Pilcomayo, tributary to the Plata.

Chile and Argentina. The broad, high plateau, with its bordering ranges and subsidiary eastern ranges of Bolivia, extends southward into these countries, gradually narrowing and decreasing in altitude, until in lat. 32° the Andes become reduced to a single range, except for spurs and outliers, most of which are of comparatively little importance. In the northern part the altitude of the ranges decreases greatly, Juncal, in lat. 26°, having a height of 17,530 feet, and Copaipó volcano, 19,700 feet. Farther south, in the neighborhood of Santiago, the mountains again become loftier. Here are Mercedario, 22,315 feet; Tupungato, 20,286 feet; San José, 20,020 feet; and Aconcagua, 22,860 feet; this latter peak is the highest summit of the entire system and of the whole continent, so far as known. Still farther south, the range again diminishes in height. In lat. 34° is Maipo volcano, 17,670 feet; in lat. 36° is Descabezado, 12,760 feet; in lat. 42° is Tronador volcano, 9790 feet. Here begins the remarkable fiord coast, which extends south to Cape Horn. The heavy precipitation on the west side of the range here produced in past times extensive glaciers, which chiseled the mountains far down below sea level, producing many islands, and an intricate system of mountain-walled channels. These glaciers have been able, by reason of their rapid descent, to cut back their heads across the range in many places, so that now, after their recession, many of the streams which have succeeded them rise far to the east of the Andes, upon the plains of Argentina, and flow through the range to the Pacific. In this region the mountains become still lower, their height ranging from 4000 to 8000 feet, until they finally disappear at Cape Horn.

The lower limit of perpetual snow, although an extremely indefinite line, varying from year to year with exposure and precipitation, has in general, in equatorial regions, an altitude of about 15,500 feet, but ranges 1000 feet on each side of this figure, being higher on the east and lower on the west side of the range. In other words, it is higher where the precipitation is abundant, and lower where it is scanty. It diminishes as the latitude increases, being about 13,000 feet in the latitude of Santiago, and falling to 3000 feet near the southern point of the continent. Glaciers are found on all the high peaks, even those in equatorial regions, which exceed 13,000 feet in height. Here, however, they are small, descending the mountain slope only a few thousand feet. In southern Chile, on the west side of the range, are many of considerable size, originating upon mountains of inferior height, and descending to sea level, even entering the sea, at the heads of fiords.

Volcanoes. One of the striking features of the Andes is its great number of active and extinct volcanoes. Probably not over 60 are now known to be active, but the extinct ones are numbered by hundreds, and have played a very important part, though a secondary one, in creating the present conformation of the mountain system. Three principal centres of volcanic activity are recognized: one in the Andes of the north, in Colombia and Ecuador, extending in latitude from 5° N. to 3° S.; a second in Peru, Bolivia, and northern Chile, extending from 15° to 28° S.; and a third in central Chile, extending from 32° to 40° S. The highest peaks of the Andes are of volcanic formation, and their peculiar conical forms are distinctive features of the Andean landscape. Many of the most

prominent and highest ones have been mentioned; it remains to speak of those which are now active, or which have been active within historic times, and briefly describe their eruptions.

The northern group, mainly comprised in Ecuador, is the most imposing collection of active and extinct volcanoes on earth. Of these, Cotopaxi, Tunguragua, Sangai, and Pichincha have repeatedly been in eruption in historic times, but most, if not all, of the others have for a long time been quiescent. The Altar, a truncated mountain, 17,736 feet in height, is said to have once been the highest in the region, but after a long period of eruption it collapsed within itself. Ruiz, in Colombia, is still smoking, and Tolima is not quite extinct, but as late as 1829 was in eruption. In 1849 Purace, in southern Colombia, suddenly exploded, flooding the neighboring country and covering it with ashes. A similar eruption took place in 1869. Imbabura, in Ecuador, is said to have discharged a deluge of mud and water at the time of the great earthquake in 1868. Antisana is reported as having been in eruption in 1590, and even now sulphurous fumes arise from it. Cotopaxi, always smoking, has been repeatedly in eruption, although its great eruptions have occurred at intervals of centuries. The last one was in 1877. Tunguragua also is active at irregular intervals, the latest eruption being in 1886. Sangai sends off steam constantly with tremendous force and noise. Pichincha has, since its eruption in 1660, given off nothing but steam and a little ashes.

The middle volcanic group is found in both the eastern and western Cordilleras; in Peru it includes Sarasara, Atchatayhua, Corupuna, Ampato, Chachani, and Misti, all now quiescent. Omate and Tutupaca have been in eruption in historic times; indeed, the former was one of the most active in Peru. In Bolivia are Mount Sorata, or Illampu, Sajama, Aucaquilcha, Chachacomani, Huiana, Cacaca, Mesada, and Illimani, while in northern Chile are many volcanic cones, some of great height; among them are Tacora, 19,750 feet, Chipicani, Pomerape, Parinacota, Iquima, 20,275 feet, and Toroni, 21,340 feet, all in the western range. In the eastern range are Tuachela, Olca, Mino, and Ollagua, all smoking or emitting lava. South of Ollagua are at least 30 extinct volcanoes, exceeding 16,500 feet in height; among them are Autopalla, 20,920 feet, Socompa, 19,620 feet, and Llullaillaco, 21,670 feet.

In the central Chilean region are Tupungato, San Jose, Maipo, Tinguiririca, all supposed to be extinct. Las Damas and Peteroa are said to have been in eruption in the last century. The volcanoes grouped about Descabezado are quiescent, though appearances indicate recent eruption. Chilean ranges contain several vents, from which lava and ashes have been ejected in recent years. Autuco also has had eruptions within historic times. Farther south, Villarica volcano has frequently been seen in eruption. In all probability, other active volcanoes exist in the fiord region of South Chile, although none has yet been reported.

Hydrography. The Andes system is the source of most of the larger streams of South America. Through nearly its whole extent, wherever the system comprises more than a single main range, the westernmost of these ranges separates the drainage to the Atlantic from that to the Pacific. In Ecuador, however, no fewer than seven of the 10 high valleys between the ranges are drained westward, and in southern Chile, as has been seen, glaciers have eroded their sources back across the whole range to the Argentina plains. The western streams are short, and owing to the light rainfall on most of the western slope, have small volume. Hence their cutting power is slight. On the other hand, the streams to the east are long, with great drainage basins, and, except in Argentina, are supplied with abundant precipitation by the trade winds. Hence they are powerful streams of large volume and have eroded their courses far up into the mountains.

The Andes of Colombia are drained northward to the Caribbean Sea by the Magdalena, Cauca, and Atrato rivers, and eastward to the same body of water by the Orinoco, and to the Atlantic by the Negro and Yapurá, great branches of the Amazon. The system in Ecuador, Peru, and most of Bolivia is drained eastward by countless tributaries of the Amazon, among which are the Napo, Marañon, Ucayali, Beni, and Mamore. Of these, the Marañon heads between the ranges far to the south, near the Knot of Cerro de Pasco, flowing northwest within the mountain system for 400 miles before breaking through the eastern range into the Amazon basin. The Huallaga, Mantaro, Apurimac, and Urubamba, tributaries of the Marañon, also head between the ranges, cutting gorges through the eastern range. In Bolivia and northwest Argentina is a great region, 800 miles in length, lying between the ranges, with an average altitude of 13,000 feet, which has no drainage to either ocean. In this region is the great Lake Titicaca, which drains by the Rio Desaguadero to Lake Poopo, where the drainage of this semi-desert region is collected. This lake in earlier times drained to the Amazon, but by shrinkage in volume its outlet has been closed, and now it discharges only by evaporation. The eastern slope of the Andes in southern Bolivia and northern Argentina is drained to the Plata, while farther south shorter streams, the Rio Colorado, the Negro, Chubut, and the Deseado, and the Arroyos Bayo and Salado, and other smaller streams, carry the drainage directly to the Atlantic.

Climate. The climate of the Andes differs widely in different parts, with latitude, altitude, and exposure. The eastern slope of the system from the northern end southward to lat. 25°, comprising the portions drained by the Orinoco and Amazon, and lying almost entirely within the tropics, has a heavy, and in many localities a profuse, rainfall. Farther southward in the temperate zone, in the region of prevailing westerly winds, the rainfall on this side of the range diminishes, becoming very light in Argentina, with only eight inches or less in the driest parts. On the west side of the system the rainfall conditions are very nearly reversed, though in the north, in Colombia, the tropical rainfall passes around the end of the range and extends down the western side for some distance, giving to the valleys of the Magdalena, Cauca, and Atrato abundant moisture, and extending southward along the coast as far as Guayaquil, Ecuador. Thence southward, the western coast is an arid and desert region, as far as lat. 30° S. Below this point the precipitation increases, as the westerly winds bring moisture, and the southern coast is well watered.

From Guayaquil a cooler climate is reached

either by going south or by going directly up the mountains. The base of the mountains, within the tropics, has a mean annual temperature of 80° F. or more, while in southern Argentina it is not more than 25°. Within the tropics the temperature ranges from 80° at the base of the mountains to 20° or less at their summits, a range due to altitude alone. Upon the Titicaca plateau Arctic conditions prevail, with frost every month of the year. Where the rainfall is copious, as it is on the eastern side within the tropics, the range of temperature between summer and winter is slight, while upon the west coast, in the same latitudes, where desert conditions prevail, the range is very great. In general, as the mountains are ascended, the contrasts of temperature become greater, owing to the rarefaction of the air. At great altitudes, even, the contrast between day and night is great. South of the latitude of Coquimbo, 30° S., these temperature conditions are reversed, the west slopes having the smallest annual and diurnal range.

Means of Communication. Routes of travel across the Andes are few in number, the passes are very high, and the roads traversing them are, as a rule, very bad. Communication between the peoples on the two sides of the mountains is slight. The high land between the ranges is the best settled part of these sparsely settled countries, and the inhabitants of these elevated regions have some intercourse with the western seaboard, but very little with the low country to the east. But with the development of the mining industry in the mountains and the exploitation of the rubber resources of the upper waters of the Amazon, means of communication across the range are being continually improved. In Colombia the main routes of travel follow the valleys of the Cauca and the Magdalena, while the chief route across the Cordillera Central is via Quindio Pass, connecting Cartago, on the Cauca, with the valley of the Magdalena and ultimately with the capital, Bogota. In Ecuador the main routes pass north and south through the succession of mountain valleys, connecting with the coast at Guayaquil, by railroad from Chimbo, or northward down the Cauca and Magdalena. The most frequented eastward route crosses the Eastern Cordillera between Saraurcu and Antisana and reaches navigable water in the Napo at Puerto Napo. In Peru the plateau within the ranges is connected with the coast by two railways, which are marvels of engineering. The Oroya Railway connects Lima and Callao with Oroya and Concepcion, crossing the Western Cordillera at an altitude of 15,665 feet, in a distance of 106 miles from Lima. The second railway connects Mollendo on the coast with Lake Titicaca. It crosses the Western Cordillera at an altitude of 14,666 feet and terminates at the little town of Puno, on the shore of Lake Titicaca, 12,540 feet high. Several other short lines run from the coast to the foot of the mountains and even some distance into them, following the stream valleys; among them is the line up the Rio Santa to Huaraz.

The somewhat broken character of the ranges in Peru and Bolivia has made the plateau easier of access than it is farther north, and there are many roads and trails from the coast to the summit; but routes of communication to the east, to the country about the upper waters of the Madeira and Plata, are almost entirely lacking. From Autofagasta in northern Chile, on the coast, a railway has been constructed to Oruro, on the plateau, north of Lake Poopo. This road has a total length of 560 miles, making it much the longest of the Andean lines. In central Chile and Argentina a transcontinental railway from Buenos Ayres to Santiago, was completed in November, 1909. It crosses the Andes at Uspallata or Cumbre Pass, not far from Santiago, at an altitude of 12,340 feet. This is the most frequented pass in Chile, as almost all the transcontinental travel goes over it. In 1912 was opened a line from Arica, Chile, to La Paz, Bolivia. It has a length of 266 miles, and much Bolivian trade follows this route.

Flora. In plant life the Andes is the richest of all the mountain systems in the world. Not only do these mountains sustain at their bases the flora of all climates, from the equatorial zone at the north to the cold zone at the south, but they possess these zones in altitude as well; and moreover, certain species of plant life are peculiar to this special region. Plant life is especially prolific in the rainy regions of Venezuela, Colombia, Chile, and Bolivia. In Colombia the palms and their associated tropical flora extend upward on the Andean slopes to an altitude of about 4500 feet, while above this is a mixed sub-tropical belt, extending to an altitude of nearly 12,000 feet, in which grow the cinchona, tree fern, and wax palm, and still higher up, at an altitude of 10,000 to 12,000 feet, the higher Andean bush growth, including the Andean rose; a species of bamboo also grows at these high altitudes.

Farther to the south, in the region of less rainfall, the flora on the east and west sides of the Andes is quite different. On the west side, in lower Ecuador and Peru, the plant life is poor and is that peculiar to a semi-desert region; but it extends up to high altitudes, lichens being found at 18,500 feet altitude; while on the moister Bolivian and Brazilian side the various altitudinal zones occur, beginning with the rich flora of western tropical Brazil and extending up to the true Andean flora. In northern Chile and western Argentina, where there is a rather light rainfall on both sides of the Andes, there is a continuation of the sparser vegetation of the relatively dry region, and the flora of the two sides of the Andes differs less than elsewhere. In the Chile-Argentina region there is a great contrast between the rich vegetation on the moist Chilean side and the thin vegetation on the dry slopes of Argentina. In the southern part of this Andean region great forests of stunted beech and firs occur in the lowlands and extend part way up the mountain slopes. Southward along the Andean chain the altitudinal zones diminish in width in about the same ratio as the decrease in altitude of the snow line, so that in the south, by making an ascent of less than a vertical mile, one can pass through as many vegetation zones as would be encountered in an ascent of three miles under the equator. The upper limit of tree growth, or the timber line, is a far more definite line than the snow line, yet in many places it is not easy to define. It ranges in the Andes from an average of 11,500 feet under the equator, down to about 3000 feet near Cape Horn. It is higher, for apparent reasons, on the moist than on the dry side of the range; thus, in Ecuador it ranges nearly 1000 feet higher upon the east side than upon the west.

Fauna. In the northern Andes of Venezuela and Colombia, where the tropical and sub-tropical forests extend up to an altitude of 10,000 feet, we find the fauna of tropical America existing up to similar high altitudes. The jaguar, puma, bear, ocelot, monkey, tapir, ant-eater, and capibara are found in these forests. Bird life is abundant, many hundreds of varieties of humming birds are found ranging up to seven inches in length, and the bat family is well represented. Snakes, saurians, and turtles are met in great numbers at lower altitudes. Above 6000 feet in altitude there is a great diminution of animal life. In Ecuador there occur certain representative species of the southern Andes, such as the llama and the condor. Insect life also continues very abundant, and fish are found up to an altitude of 14,500 feet. In the Peruvian and Bolivian Andes on the Pacific side, the fauna, like the flora, is limited, but on the eastern or Brazilian slope is exceedingly rich. The vicuña, guanaco, and alpaca are still found in the wild state, and with them are found the chinchilla and viscacha. On the Bolivian slopes the fauna is much more abundant than in Peru. Farther south on the Andean chain the fauna is less rich, and the larger animals of the northern Andes are not found. Herds of guanacos are numerous, and birds are present in great variety and large numbers, but the reptiles show a decided change of form. At the extreme south the land fauna is but poorly represented.

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ANDES. See ANGERS.

ANDES. See VERGIL, PUBLIUS VERGILIUS MARO.

ANDESINE. See FELDSPAR.

AN'DESITE. A volcanic effusive rock of porphyritic texture composed essentially of lime-soda feldspar (andesine) with black mica (biotite), hornblende, or augite imbedded in a ground mass of smaller crystals or rock glass. The structure may be, but is not necessarily, porous; in most cases the crystals of andesine are arranged roughly parallel, giving the rock its characteristic fluxion or andesitic structure. This structure is due to the flow of the once molten mass in the form of lava. In composition this family of rocks shows wide variations, limited, however, by the rhyolites (q.v.) and trachytes (q.v.) on the one hand, and the basalts on the other. Fairly rich in silica and alumina, they contain moderate amounts only of the heavier and darker bases, viz., iron, lime, and magnesia. They contain from 60 to 70 per cent of silica, 13 to 18 per cent of alumina, 4 to 9 per cent of iron, 3 to 6 per cent of lime, 5 to 9 per cent of alkalies, and smaller percentages of magnesia. They owe their name to their extensive development in the Andes of South America, though they occur extensively throughout the entire Cordilleran system of mountains, in South, Central, and North America. See RHYOLITE; TRACHYTE.

ANDI'RA (Neo-Lat. probably from the native Brazilian name). A genus of about 20 species of tropical American and African trees of the family Leguminosæ, having almost orbicular, one-celled, one-seeded pods. *Andira inermis* grows in low savannahs in the West Indies and is there called cabbage tree or cabbage-bark tree. It is a tree of considerable height, having pinnate leaves, with 13–15 ovate-lanceolate leaflets and panicles of reddish-lilac flowers. Its bark, called cabbage bark, or worm bark, is a powerful anthelmintic, and although it has been discarded from the pharmacopœias of Great Britain, it still finds a place in those of other countries, along with Surinam bark, the bark of *Andira retusa* of Surinam. Similar properties reside in the bark of several species of the allied genus *Geoffroya*.

AND'IRON (OF. *andier*, from Low Lat. *anderia*, a fire-dog; the Fr. *landier* stands for *l'andier*). A metal utensil used in burning wood in an open fireplace. It consists of a horizontal bar supported on three short legs with an upright standard at one end. Andirons are employed in pairs, one andiron being placed on each side of the hearth, with the uprights in front and the horizontal bars extending backward into the fireplace, the logs or sticks of wood resting across the horizontal bars. It is usual to make the uprights of various ornamental designs, and, often, to cover them with copper, brass, or silver. Andirons are manufactured by forging, wrought iron being the material of which they are most commonly made. Handirons, fire-dogs, and dog-irons are colloquial names for andirons.

ANDIZHAN, än'dē-zhän'. Capital of the district of Andizhan, territory of Ferghana, Russian Turkestan (Map: Central Asia, Afghanistan, M 1). It is about 42 miles from Margelan, the capital of the territory, and is the eastern terminal point on the Transcaucasian Railway. Cotton is the principal article of commerce. In December, 1902, 1021 lives were lost in an earthquake (3342 in district). The Russians obtained possession of it in 1875. Pop., 1897, 46,680; 1908, 74,316.

ANDKHUI, ând-kōō'ē. A town of Afghan Turkestan, in the border province of Maimene, about 200 miles south of Bokhara (Map: Central Asia, Afghanistan, K 3). It lies on the trade route between Bokhara and Afghanistan. The surrounding region is notably unhealthful, but is fertile. Andkhui is reputed to have been founded by Alexander the Great. Pop., about 15,000, chiefly Mohammedans.

ANDLAU, äN'dlō', GASTON HABDOUIN JOSEPH, COMTE D' (1824–94). A French general, born at Nancy. He attended, for a time, the military school at Saint-Cyr, and later, in active service, distinguished himself as a captain in the Crimean War. At the outbreak of the Franco-Prussian War he was appointed a colonel on the general staff of the Army of the Rhine, and subsequently he fought in the battles before Metz. He was elected a Senator in 1876, and promoted to be a general of brigade in 1879. He was involved in the so-called *affaire des décorations*, in which General Caffarel was found guilty of selling decorations of merit, and fled

to South America. He died at Buenos Ayres. He published *De la cavalerie dans le passé et dans l'avenir* (1869) and *Organisation et tactique de l'infanterie française depuis son origine* (1872).

ANDLAW-BIRSECK, änt'läv-bēr'sĕk, FRANZ XAVER, BARON VON (1799–1876). A German diplomat and author. He was born at Freiburg and in early life studied jurisprudence at the university there and at Landshut and Heidelberg and in 1824 entered the public service of Baden. From 1826 to 1830, and again from 1832 to 1835, he was secretary of the embassy at Vienna. He was appointed Minister at Munich in 1838; Minister at Paris in 1843, and in 1846 Ambassador Extraordinary at Vienna. He retired in 1856 and subsequently published: *Erinnerungsblätter aus den Papieren eines Diplomaten* (1857); *Mein Tagebuch 1811–61* (1862); *Die byzantinischen Kaiser; ihre Palast- und Familiengeschichten* (1865); *Sieben heilige Fürsten* (1865).

ANDOCIDES, ăn-dŏs'ĭ-dēz (Gk. *Ἀνδοκίδης, Andokidēs*) (born c.440 B.C.). An Athenian, of high family, the least of the Ten Attic Orators. In 415 he was involved with the younger members of the aristocratic party in the charge of mutilating the Hermæ. (See ALCIBIADES.) The charge sprang from the fact that the Hermes before his house was left unmutilated. To protect himself, he betrayed some of his associates, but suffered partial loss of civic rights and went to Rhodes, where he engaged in trade. From 407 he lived in Elis. The amnesty of 403 allowed him to return to Athens. In 399, however, when he had gained prominence in public life, he was charged with impiety because, though barred from the Eleusinian Mysteries by the decree of 415, he had nevertheless attended the festival. By his speech *On the Mysteries* he secured his acquittal. In 391 he was sent to Sparta to negotiate a peace. On his return he was unable, in spite of his speech *On the Peace*, to persuade the Athenians to accept the treaty, was charged with mismanagement, and, it is said by some, was banished. The date of his death is unknown. Three of his speeches are extant: *On his Return* (410 or 409), *On the Mysteries* (399), *On the Peace* (391). The oration *Against Alcibiades* is spurious, and the authenticity of *On the Peace* has been doubted by Sittl, *Griechische Litteratur*. Consult Jebb, *Attic Orators* (London, 1876–80), and Blass, *Attische Beredsamkeit* (Leipzig, 1887–98).

ANDORRA, ăn-dōr'rȧ. A republic in the valley of the same name in the eastern Pyrenees, between the French department of Ariège, and Catalonia, in Spain (Map: Spain, F 1). The valley is inclosed by mountains, through which its river, the Balira, breaks to join the Segre at Urgel. It leads a semi-independent existence under the protection of France and the Bishop of Urgel. Its area is 175 square miles, and it is divided into six parishes. There is much excellent pasture; vines and fruit trees flourish on the lower grounds, and the mountains contain rich iron mines. The limited area of arable land makes the republic partly depend upon France for its grain. The chief industry is the production of coarse cloth. Small quantities of wool, ores, cloth, and dairy products are exported.

Andorra was declared an independent state by Charlemagne, in reward for services rendered to him by its inhabitants when he was marching against the Moors. In 1278 Andorra was transferred to the Comte de Foix and the Bishop of Urgel and was administered by two *viguiers* appointed by them. During the French Revolution the relations between Andorra and France were interrupted on account of the latter's refusal to accept the annual tribute, which was considered incompatible with a republican form of government. In 1806, however, the former relations were renewed, and the free importation of cereals from France was allowed in consideration of an annual tribute of 960 francs. The republic is governed by a sovereign council of 24 members, chosen for a period of four years by the heads of the communities. The council is presided over by two syndics, both chosen by the members of the council, one for life and the other for a term of four years. There are two judges called *viguiers*, of whom the first, a French subject, is appointed by France, and the second, a native, by the Bishop of Urgel. There is also a civil judge, appointed by France and the Bishop of Urgel alternately. Under each *viguier* is an inferior judge called a *bailie;* there is an appeal from his judgment to the civil judge, and finally to the Court of Cassation at Paris, or to the episcopal college at Urgel. In criminal cases there is no appeal from the Court of the Republic itself, in which the first *viguier* presides. The revenue of the state is derived from lands and from some inconsiderable taxes. The Bishop of Urgel receives from the republic an annual sum of 460 francs. The manner of life of the Andorrans is very simple. There are schools, but education is in a low state. Every able-bodied citizen of the republic is liable to military service between the ages of 16 and 60. In the Carlist wars the neutrality of Andorra was strictly respected, though various complications resulted from its connection with the Bishop of Urgel. The capital, Andorra, is situated in the mountains and has a population of about 1000. The population of the republic is 5231. Consult: Spender, *Through the High Pyrenees* (London, 1898); Deverell, *History of the Republic of Andorra* (Bristol, 1885); Tucker, *The Valley of Andorra* (Cambridge, Mass., 1882).

AN'DOVER. A municipal borough and market town in the county of Hampshire, England, 12 miles northwest of Winchester, on the river Anton (Map: England, E 5). It has manufactures of iron and malt. There are remains of Roman villas in the vicinity. Pop., 1901, 6509; 1911, 7596.

ANDOVER. A town of Essex Co., Mass. It includes several villages and lies south of the Merrimac. The town proper is 23 miles north of Boston, on the Boston and Maine Railroad, and on the eastern bank of the Shawsheen River (Map: Massachusetts, E 2). It produces linen, twine, and shoe-thread, woolen goods, rubber goods, printers' ink, brushes, automobile tubes, and other manufactures. Andover is the seat of the Phillips Academy for boys, founded in 1778, and Abbot Academy for young ladies. It has a public library and owns and operates its water works. The government is administered by town meetings, annual and special, which elect as executive officers three selectmen, make appropriations, and transact other business. First settled in 1643, Andover was incorporated as a town in 1646. It was within the area especially affected by the witchcraft delusion of 1692, and three of its citizens were con-

victed and executed at Salem, many more being tried and acquitted. On March 5, 1698, it was attacked by Indians, who killed five of the inhabitants and burned a number of the buildings. Consult Abbot, *History of Andover* (Andover, 1829), and Bailey, *Historical Sketches of Andover* (Boston, 1880). Pop., 1890, 6142; 1900, 6813; 1910, 7301.

ANDOVER THE'OLOG'ICAL SEM'INARY, situated in Cambridge, Mass., whither it was removed in 1908 from Andover, Mass. Not only one of the oldest but one of the most famous theological schools in America, founded in 1807. Although under the control of Congregationalists, it is free to Protestants of all denominations. All applicants must present a college diploma. The Seminary is affiliated with Harvard University, and Andover students are admitted to all courses offered by the Harvard faculties of Arts and Sciences and Divinity. The Harvard theological collections are housed in the Andover building with the Andover collections, and the united library contains about 110,000 volumes, including rare and precious editions and collections. In 1913 there were seven professors, two lecturers, and one instructor. The buildings are valued at $300,000. The endowments are about $745,000. President, Albert Parker Fitch, D.D. See Woods, *A History of Andover* (Boston, 1884).

ANDOVER THEOL'OGY. See New Theology.

ANDRADA E SILVA, ân-drä'dâ ē sēl'vâ, Bonifacio José d' (1765–1838). A Brazilian statesman and author, born at Santos. He studied in Europe, became professor of geognosy and metallurgy in the University of Coimbra, Portugal, and perpetual secretary of the Academy of Sciences at Lisbon. Having returned to Brazil in 1819, he advocated independence and in 1822 and 1823 was Minister of the Interior under Dom Pedro I. From 1823 to 1829 he was in banishment in France by reason of his liberal views. He published *Poesias d' Americo Elyseo* (Bordeaux, 1825), and writings on mineralogy.

ANDRADE, ân-drä'dâ, Francesco d' (1859–1921). A distinguished Portuguese baritone. He was born in Lisbon, but received his musical education in Italy under Miraglia and Ronconi. He made his début at San Remo as Amonasro in *Aïda* and rapidly became famous over all Europe. In Germany he is regarded as the greatest living baritone. He is not connected with any opera house, but appears only as "guest."

ANDRAL, äN'drâl', Gabriel (1797–1876). A celebrated French physician, member of the Institute, born in Paris. In 1823 he published the first volume of his *Clinique médicale.* In 1827 he was appointed professor of hygiene in the University of Paris, and in 1830 professor of internal pathology. His paper *Sur l'anatomie pathologique du tube digestif* ('On the Pathological Anatomy of the Alimentary Canal') was greatly admired, and in 1829 he produced a *Précis élémentaire* on the same science. His *Clinique médicale* treats principally of diseases of the chest, abdomen, and brain. In 1839 Andral succeeded Broussais in the chair of pathology and general therapeutics. His other works include *Projet d'un essai sur la vitalité* (1835), an edition of Lænnec's *Traité de l'auscultation médiate ou traité du diagnostic des poumons et du cœur* (1836), *Cours de pathologie interne* (1836–37), *Sur le traitement de la fièvre typhoïde par les purgatifs* (1837), *Traité élémentaire de pathologie et de thérapeutique générale* (1843). His father, Guillaume Andral, was also a physician of note.

ANDRASSY, än'drä-shĭ, Gyula or Julius, Count (1823–90). An Hungarian statesman, born at Zemplén. He was in the Presburg Diet in 1847–48, and in the revolution of 1848 became an earnest adherent of the popular cause and was sentenced to death for his part in the uprising. He fled from the country and remained an exile in France and England until the general amnesty of 1857. Returning home, he was elected a member of the Diet in 1861 and was vice president of this body in 1865.

After the reconstruction of Austria-Hungary on a dual basis, Andrassy became Hungarian Prime Minister, and under his direction the Hungarian Constitution was developed to include such liberal measures as the freedom of the press and the right of public meeting. He also carried a law abolishing the political and civil disabilities of Jews, a measure bitterly opposed by all the Hungarian aristocrats. Andrassy succeeded Count Beust in 1871 as Minister of Foreign Affairs of the Austro-Hungarian Empire. Acting in harmony with Bismarck, he drew up and presented to the Porte in 1876 the famous "Andrassy Note," which set forth the irreducible minimum of reforms demanded by the Christian Powers in respect to Bosnia and Herzegovina. In 1878 he was the chief representative of Austria-Hungary at the Congress of Berlin and negotiated with Bismarck in 1879 the Austro-German alliance. He brought about the occupation of Bosnia-Herzegovina by the dual monarchy, but the step was so unpopular that it was partly the cause of his resignation in 1879. In his place in the Upper House he regained his popular influence as a leader of reform, and his death was considered a national calamity. The making of the Hungarian State and Constitution was largely the result of Andrassy's efforts. Consult: Benjamin Kallay, *Memoirs* (1891); Mano Konyi, *Recollections of Count Andrassy* (1891); E. von Wertheimer, *Graf Julius von Andrassy; sein Leben und seine Werke,* vol. i (Stuttgart, 1910).

ANDRASSY, Julius (1860—), son of the preceding, entered the Reichstag in 1884, became under-secretary in the ministry of Wekerle in 1892, secretary of education in 1893, and in the following year Hungarian Minister near the person of the King. He left the Liberal party in 1898, but returned in 1899 after the fall of the Bánffy ministry. In 1905 he was one of the leaders of the Coalition which brought about the fall of the Liberal Sisza ministry. In 1906 he became Minister of the Interior in the compromise Wekerle cabinet and held that office until the fall of the ministry in 1909. In 1912 he represented Austria in the diplomatic endeavor to prevent the outbreak of the Balkan War. He wrote *Ungarns Ausgleich mit Oesterreich vom Jahre 1867* (1897); *The Development of Hungarian Constitutional Liberty* (Eng. trans. of Hungarian text, London, 1908).

ANDRÉ, äN'drâ', Charles (1842—). A French astronomer, born at Chauny (Aisne). In 1877 he became professor of astronomy at Lyons, and director of the observatory in that city, in which capacity he visited the Rocky Mountains and Australia to observe the transit of Venus. Among his principal works is *L'as-*

tronomie pratique et les observations en Europe et Amérique depuis le milieu du XVIIe siècle jusqu'à nos jours (5 vols., 1874–82).

ANDRÉ, ăn'drâ *or* ăn'drĭ, JOHN (1751–80). An English soldier in the American Revolution who met his death under circumstances which have given his name a place in history. He was born in London of Genevese and French parentage, entered the English army at the age of 20, and in 1774 joined his regiment in Canada. He was captured by General Montgomery in November, 1775, at St. Johns, and until December, 1776, when he was exchanged, he was held as a prisoner at Lancaster, Pa. He was promoted to be captain in 1777, and soon afterward became an aid to Gen. Charles Grey. In the following year he was raised to the rank of major, and was appointed adjutant-general of the English army in America and aid to Sir Henry Clinton. During the negotiations between Clinton and General Arnold, in 1780, for the betrayal into the hands of the British of West Point, with its stores and magazines, including nearly the whole stock of powder of the American army, Major André acted as the confidential agent of General Clinton and attended to most of the correspondence. In order to perfect plans for carrying out the plot, André, under the assumed name of "John Anderson," left New York on September 20, ascended the Hudson in the British sloop-of-war *Vulture*, and on the 21st and 22d met Arnold in secret and made the necessary arrangements. During their interview the *Vulture* was forced down stream by the fire of an American battery, and André, armed with a pass from Arnold and disguised (against General Clinton's explicit instructions) as a civilian, started on horseback for New York, carrying several incriminating papers, in Arnold's handwriting, concealed in his boots. Near Tarrytown at 9 A.M. on the 23d—when almost within sight of the British lines—he was captured by three American militiamen (John Paulding, David Williams, and Isaac Van Wart), who found the documents and, refusing all bribes, handed their prisoner over to Lieutenant-Colonel Jameson, by whom Arnold was blunderingly notified and thus enabled to escape. A military court, presided over by Gen. Nathanael Greene, and consisting of six major-generals and eight brigadiers, convened on September 29, at Washington's request, and unanimously convicted André of being an English spy. In accordance with military usage, he was therefore condemned to be hanged, and on October 2 the sentence was carried out at Tappan, N. Y., André behaving with the utmost courage and serenity and calling upon the American officers to witness that he died like a brave man. His fate aroused much sympathy everywhere, and his death was passed into history as one of the most pathetic incidents of the Revolutionary War; but it is now generally recognized, both in this country and in England, that Washington could not have acted otherwise than as he did, and that, by the rules of war, André clearly brought upon himself the punishment he received. A monument was erected to André's memory in Westminster Abbey, and in 1821 his body was disinterred at Tappan and conveyed to a grave near the monument.

André had a singularly attractive personality, which has added much to the general interest in his fate. Vivacious, witty, and strikingly handsome, he had, moreover, a charm of manner which made him a general favorite in the English army and endeared him even to the American officers who came in contact with him during his captivity. He was, besides, remarkably versatile and, in particular, had considerable literary, artistic, and musical talent. A fluent and pleasing writer, he carried on much of Clinton's correspondence and wrote many fugitive verses, some of which, such as *The Cow Chase*, *Yankee Doodle's Expedition to Rhode Island*, and *The Affair between Generals Howe and Gadsden*, were very popular at the time in the English army. During the winter spent by the English in Philadelphia he was the life and soul of all the gayeties and festivities there, and took the leading part in the famous "Mischianza"—a pageant given in honor of the departing Lord Howe. Interest in André has been much heightened, also, by the romantic story of his early attachment to a Miss Honora Sneyd, of Lichfield, England, who was subsequently married to the father of Maria Edgeworth.

In vol. vi of the *Memoirs of the Historical Society of Pennsylvania* (1858) is the "Case of Major André, with a Review of the Statement of it in Lord Mahon's History of England," by Charles J. Biddle—an essay containing a full narrative of the case, with a discussion of all the questions of law and duty raised in connection with it. Consult also an excellent work by Sargent, *Life and Career of Major John André* (new ed., New York, 1902); Lossing, *Two Spies* (New York, 1886); and André's *Journal* (Boston, Mass., The Bibliophile Society, 1904). Many of the documents relating to André's capture, trial, and conviction are contained in H. W. Smith's *Andreana* (Philadelphia, 1865), and in Dawson, *Papers Concerning the Capture and Detention of Major John André* (Yonkers, 1866).

ANDRÉ, än'drâ', LOUIS JOSEPH NICOLAS (1838–1913). A French general, born at Nuits-St. Georges (Côte-d'Or). He served through the siege of Paris, in 1893 became brigadier-general and head of the École Polytechnique, and in 1899 was made general of division. In May, 1900, he entered the Waldeck-Rousseau cabinet as minister of war, retaining his post under the Combes ministry. He was active in combating anti-Republican agitations in the army and resorted to a system of espionage over army officers which led to violent debates in the chamber of deputies in the fall of 1904. Following an assault at the hands of a Nationalist deputy, he resigned, November 14.

ANDREA, ân-drā'â, GEROLAMO MARQUESE D' (1812–68). An Italian Cardinal. He was born at Naples, educated at the Collège La Flèche, France, and was early appointed Archbishop of Mytilene *in partibus infidelium*. In 1852 he was appointed Cardinal-abbot of Subiaco, and Prefect of the Congregation of the Index, and in 1860 Bishop of Sabina. He took sides with the Patriotic party in 1859 on the question of the national unity of Italy, and at the same time counseled extensive liberal reforms in Church policy. He was suspended from his diocese and abbacy and threatened with permanent deposition from office. He ultimately submitted, and in 1868 was rehabilitated, without, however, being restored to his diocese and the abbacy of Subiaco.

ANDREA DEL SARTO. See SARTO.

ANDRE'Æ, JAKOB, called SCHMIDTLEIN (1528–90). A German theologian. He was born at Waiblingen; graduated at Tübingen; preached in Stuttgart and Tübingen, and

was very active in promoting the Reformation throughout Württemberg, where he was court preacher. He attended the diets of Ratisbon and Frankfort (1557) and Augsburg (1559), became professor of theology in the University of Tübingen (1562), and provost of the church of St. George. He was active in Protestant discussions and movements, particularly in the adoption of a common declaration of faith by the two parties, the Formula of Concord (1577). In the latter part of his life he traveled in Bohemia and Germany, working for the consolidation of the Reformation, conferring with pastors, magistrates, and princes. He was the author of more than 150 works, nearly all polemical and vigorously written, for the most part directed against Calvinism. For his life, consult Schmoller (Gütersloh, 1890).

ANDREÆ, Johann Valentin (1586–1654). A German theologian, born at Herrenberg, near Tübingen. He studied at Tübingen, obtained ecclesiastical preferments in the Protestant church of his native country, and became chaplain to the court at Stuttgart, where he died. His writings are remarkable for the wit and humor, as well as for the learning, acuteness, and moral power, which they display. He was erroneously regarded as the founder, or at least the restorer, of the order of the Rosicrucians (q.v.), and this opinion seemed to be supported by reference to three publications: the *Chymische Hochzeit Christiani Rosenkreuz* (1616), the *Fama fraternitatis R. C.*, i.e., *Rosaceæ Crucis* (1614), and the *Confessio fraternitatis R. C.* (1615), of the first of which he acknowledged himself the author, and the other two have so much resemblance to it as to be evidently from the same pen. His intention seems to have been not to promulgate secret societies of mystics and enthusiasts, but to ridicule the follies of the age. He attacked Rosicrucianism itself in some of his later writings. Among the best of his works are his *Menippus s. Satyricorum Dialogorum Centuria* (1617) and *Mythologia Christiana* (1619). He wrote an allegoric poem called *Die Christenburg* (Stuttgart, 1836). For his life, consult Glökler (Stuttgart, 1866).

ANDREÆ, Laurentius, or Lars Andersson (1480–1552). A Swedish reformer. He was born at Strengnäs, about 40 miles west of Stockholm, 1480; died there April 29, 1552. He studied at Rome, but came home a Protestant, and introduced the reformed faith into Sweden, 1523. He was made Chancellor by Gustavus Vasa, who desired him to translate the Bible, in which work he was assisted by Olaus Petri (New Testament, 1526; Old Testament, 1540). After 1540 he lost the royal favor and lived in retirement.

ANDREANI, än'drâ-ä'nē, Andrea (died, 1623). The most prominent Italian wood engraver in chiaroscuro. The year of his birth is unknown, but his earliest block is dated 1584, his latest 1611. He was born at Mantua and was active chiefly at Florence, Siena, and Mantua. His chief works include the "Pavement of Siena Cathedral," twelve vast prints after Beccafumi; "The Deluge," and "The Destruction of Pharaoh's Host" (1585), both large prints after Titian; and Mantegna's "Triumph of Cæsar" (10 prints, 1598), his best work. Andreani frequently signed blocks which he did little more than retouch. He was one of the world's greatest masters of chiaroscuro engraving. (See Wood Engraving.) He excelled especially in the arrangement of light and shade, but his drawing was also correct and sure. From using a similar monogram, his work has sometimes been mistaken for that of Albrecht Altdorfer.

ANDREA PISANO. See Pisani.

ANDREASBERG, än'drâ-äs'bĕrk, Sankt. A town of Hanover, Germany, in the Harz Mountains, about 27 miles northeast of Göttingen. It was settled as the centre of a rich mining district, yielding iron, copper, silver, lead, cobalt, and arsenic. It lies at the south foot of the Brocken. Its location, 1825 feet above the sea, and its fine climate have made it a tourist and health resort. Pop., about 4000.

AN'DREAS CHES'NIUS. See Duchesne, André.

ANDREE, än'drâ, Karl Theodor (1808–75). A German geographer and journalist. He studied history at Jena, Göttingen, and Berlin, and from 1830 to 1855 was active in journalism. He then gave his attention to geographical and ethnological studies, publishing among other works, *Nordamerika in Geographischen und Geschichtlichen Umrissen* (1851; 2d ed., 1854), *Buenos Aires und die Argentinische Republik* (1856); *Geographie des Welthandels* (1867–77; new ed. by Franz Heiderich and Robert Sieger, 1909). In 1861 he founded the *Globus*, a geographical and ethnological publication.

ANDREE, Richard (1835–1909). A German ethnographer and geographer, son of the preceding, born in Brunswick. He studied natural sciences at Leipzig, and from 1859 to 1863 worked as a foundryman in Bohemia, for the purpose of studying the German-Czech race conflict. He was editor of the *Globus* from 1891 to 1903. In 1902 he became professor at the University of Munich. The books embodying the results of his observations in Bohemia are written from the German nationalist point of view. They include *Nationalitätsverhältnisse und Sprachgrenze in Böhmen* (1870) and *Tschechische Gänge* (1872). His later and better-known works comprise *Zur Volkskunde der Juden* (1881), *Die Metalle bei den Naturvölkern* (1884), *Die Masken in der Völkerkunde* (1886), *Die Flutsagen* (1891), and *Braunschweiger Volkskunde* (1896).

ANDRÉE, än'drâ, Salomon August (1854–97?). A Swedish scientist and aëronaut, born at Grenna. He studied at the technical college in Stockholm and was a member of the Swedish meteorological expedition in 1882–83. Between 1892 and 1895 he made several balloon journeys and finally decided to attempt to reach the North Pole by means of a balloon, partly directed by sails and guide-ropes. On July 11, 1897, accompanied by two friends, Strindberg and Fränkel, he made the start from Dane Island, northwestern Spitzbergen. Four days afterward a carrier pigeon, shot on the sealer *Alken*, was found to convey in a small tube a message written by Andrée two days after the ascent. The message gave the position of the party as lat. 82° 2′, long. 15° 5′ E., or 145 miles north and 45 miles east of the starting point. Of the thirteen buoys carried in the balloon, five have been discovered on coasts near Spitzbergen. Two contained dispatches, both dated July 11. The "polar buoy," which was to be cast overboard from the highest latitude attained, was found empty, at Spitzbergen, Sept. 11, 1899. Consult Kullenbergh, *Andrée, hans Lif och Person* (Göteborg, 1898), and *Annual Report of the Smithsonian Institution for 1898* (Washington, 1898).

ANDRÉEV, ăn-drā′yĕf, Leonid Nikolaevitch (1871–1919). A Russian writer of the new school. He was born at Orel and studied law at the universities of Moscow and St. Petersburg. The struggle for existence caused him to attempt suicide at 23. Finding his law practice very unremunerative, he became police-court reporter for a Moscow daily, performing the routine of his humble calling without attracting any particular attention. His first story published was *About a Poor Student*, a narrative based upon his own experiences. It was not, however, until Gorky discovered him by stories appearing in the Moscow *Courier* and elsewhere that Andréev's literary career really began. From that day to his death he was one of the most prolific writers in Russia, producing short stories, sketches, dramas, etc., in frequent succession. His first collection of stories appeared in 1901 and sold a quarter million copies in a short time. Andréev was hailed as a new star in Russia, where his name soon became a by-word. Even outside of Russia his work is better known than that of any of his contemporaries, translations having appeared in all European languages. The following are available in English: *The Red Laugh* (1905), a gruesome narrative of the Russian-Japanese War; *The Burglar* (*Current Literature*, May, 1905), a sentimental sketch; *His Excellency the Governor* (*Harper's Weekly*, Feb. 9 to March 2, 1907), a short story depicting the fear of death; *To the Stars* (*Poet Lore*, Winter, 1907), a four-act poetic drama; *Lazarus* (*Current Literature*, May, 1907), a bold version of the biblical story; *The Life of Man* (*Oxford and Cambridge Review*, Midsummer, 1908), a five-scene mystery play; *The Seven Who Were Hanged* (1909), a story dealing with capital punishment; *Judas Iscariot and the Others* (1910), an attempt to re-create a universal tradition; *A Dilemma* (1910), a story of murder and madness; *Anathema* (1910), a tragedy in seven scenes; *Silence and Other Stories* (1910), tales of horror; *Life is so Beautiful to the Resurrected* (*Current Literature*, September, 1910), a fantasy; *Love of One's Neighbor* (*The Glebe*, January, 1914), a satire.

Andréev occupies a most peculiar position in modern Russian literature. Although he started out in the traditional Russian vein, he soon startled his readers by his eccentricities, which have grown even faster than his fame. As a writer he baffles classification. He is not a realist in the ordinary sense of the term, nor is he a romanticist. He is an unmistakable mystic, whose philosophy, so far as can be inferred from his works, is that of fatalism; most of his heroes land either in the grave or in the madhouse. Moreover, he seems to be notably deficient in synthetic power and normal human sympathy; hence he has not created any real characters nor given us any types, while the writing of novels seems to be entirely beyond him. He has unusually keen analytic power, however, and is undoubtedly an original and very brilliant writer, though he can hardly be ranked among the truly great Russian writers with whom he is erroneously compared by non-Russian readers. Indeed, it is not altogether likely that Andréev's sudden fame will endure beyond his day and generation.

ANDREINI, ăn′drā-ē′nē. A family of Italian actors and playwrights.—Francesco Andreini (c.1548–1624), a Pistoian, whose real name was Francesco dei Cerarchi dal Gallo, began life as a soldier and was captured by the Turks. Escaping from slavery, he joined, about 1577, the famous comic company of the Gelosi and became celebrated in the part of the braggart Captain Terror of Hell Valley. In 1604 he retired from the stage and devoted himself to literary work, publishing among other things his most famous work, *Le bravure del capitan Spavento* (Venice, 1607), which was translated into French by Jacques de Fonteny (Paris, 1608), and his *Ragionamenti fanastici* (Venice, 1612). His wife Isabella (1562–1604), daughter of Paolo Canali of Venice, one of the most celebrated women of her time, by her wonderful voice, her beauty and wit, became the mainstay of the Gelosi. At her death in Lyons a medal was struck in her honor bearing the words *Æterna Fama*. Her writings include the pastoral drama *Mirtilla*, a number of lyrics, and a collection of letters.—Their son, Giambattista Andreini (1578–c.1650), on the dissolution of the Gelosi in 1604, founded the company of the Fedeli, where, in the rôle of Lelio, he came to European fame, filling brilliant engagements at Paris under Louis XIII, at Milan and Mantua and in Germany. He is the author of several comedies in the style of his time. To offset the agitation made against the comedy by moralists, he composed a number of religious dramas, the most noted of which is the *Adamo* (Milan, 1613), from which many critics, from the time of Voltaire on, have insisted that Milton derived the conception of his *Paradise Lost*. Andreini's *Teatro celeste* was published at Paris in 1625. His wife, Virginia Andreini (c.1583–c.1628), was equally famous in the Fedeli in the part of Florinda. Her reputation as a singer was made in the *Arianna* of Rinuccini-Monteverdi, at Mantua in 1608. Her portrait was painted by Bronzino, and she was celebrated by many poets of the time, notably by Marino. For the Andreini family consult: E. Bevilacqua, "Giambattista Andreini e la compagnia dei Fedeli" (in the *Giornale storico della letteratura italiana*, vol. xxiii, p. 76, and vol. xxiv, p. 82); E. Allodoli, *Giovanni Milton e l'Italia* (Prato, 1907); W. Smith, *The Commedia dell' arte* (New York, 1912); and Rasi, *Comici italiani* (Florence, 1897).

ANDREOLI, ăn′drā-ō′lē, Giorgio (c.1465–c.1555). An Italian designer and maker of majolica ware, one of the most famous of the Renaissance. He was born at Intra on Lago Maggiore (not at Milan, as is usually supposed), and settled in 1485 at Gubbio, where the potter's art was under the enlightened patronage of the Duke of Urbino. In 1498 he became a citizen of Gubbio and in 1518 invented his remarkable lustre, the chief characteristics of which are its beautiful gold and carmine colors. Good examples of his majolica may be found in the local museums of Gubbio, Urbino, Arezzo, and elsewhere in Italy, and also in the principal museums of decorative art in Europe, such as Berlin, Vienna, Paris, and South Kensington. Not all works fired with his lustre were designed by him, for potters of the neighboring cities brought their work to him to be fired. He was assisted in his work by his brothers Salimbene and Giovanni, and after his death it was continued by his son Vincenzo.

ANDRÉOSSI, ăn′drā′ō′sē′, Antoine François, Count (1761–1828). A French statesman, born at Castelnaudary, in Languedoc. He was the great-grandson of François Andréossi, who,

with Riquet, constructed the canal of Languedoc in the seventeenth century. He entered the army as a lieutenant of artillery in 1781, joined the revolutionists, rose rapidly in military rank, served under Bonaparte in Italy and Egypt, accompanied him on his return to France, and took part in the *coup d'état* of the eighteenth Brumaire. He was Ambassador at London during the Peace of Amiens, and was made Governor of Vienna after the battle of Wagram. He was for some time Ambassador at Constantinople, from which he was recalled by Louis XVIII. He was raised to the peerage by Napoleon after the return from Elba. After the battle of Waterloo he advocated the recall of the Bourbons, but as deputy from the department of Aude he generally sided with the opposition. He was a man of eminent scientific attainments and distinguished himself as a member of the institute founded at Cairo. He wrote extensively on military history, with particular reference to the artillery arm; and also a *Histoire du Canal du Midi*, in which he asserted the right of his great-grandfather to honors long enjoyed by Riquet. Consult Marion, *Notice nécrologique sur le Comte Andréossi* (Paris, 1846).

ANDRÉS, ân-drās', Juan (1740–1817). A Spanish scholar, born at Planes (Valencia). He entered the Jesuit order and after its expulsion from Spain (1767) withdrew to Italy, where for a time he taught philosophy in the College of Ferrara. Afterward he was royal librarian at Naples. In 1815 he became blind. His works are: *Prospectus de Philosophiæ Universæ Publica Disputatione Proposita in Templo Ferrariensi* (1773); *Saggio della filosofia di Galileo* (1776); and *Dell' origine, dei progressi e dello stato attuale d' ogni letteratura* (7 vols., 1782–99).

AN'DREW (Gk. *'Ανδρέας, Andreas*). An Apostle, brother of Simon Peter, born in Bethsaida of Galilee. He was originally a disciple of John the Baptist, but was one of the first called of the disciples of Jesus, and was finally chosen by him from among his larger following to the apostolic office. (See list of apostles in Mark iii. 13–19, with Matthew and Luke parallels.) During the ministry of Jesus he is connected with incidents recorded in John iv. 8; xii. 22; Mark xiii. 3, 4. In Acts he is mentioned only in a list of apostles (i. 13). Subsequent tradition regarding his preaching in Scythia, northern Greece, and Epirus, and suffering martyrdom on a cross shaped like the letter X about 70 A.D., is worthless. See Apostle.

ANDREW I. King of Hungary from 1046 to 1061, and cousin of St. Stephen, the apostle of Christianity in Hungary. He owed his choice to the party in opposition to German influence and the spread of Christianity. When firmly established on the throne, he interdicted the pagan cults. Andrew fought with varying fortunes against Henry III of Germany and against his own brother, Béla, whom he had exiled. He was finally defeated, and Béla succeeded him. See Leger, *History of Austro-Hungary* (Eng. trans., New York, 1889).

ANDREW II (1175–1235). A King of Hungary who ascended the throne in 1205. In 1217 he conducted an unsuccessful crusade against the Moslem powers. In 1222 he had to sign the Golden Bull, called the Magna Charta of Hungary, which defined and confirmed the rights and titles of the bishops and nobles whose revolts had disturbed his reign. See Golden Bull.

ANDREW III (?–1301). The last Hungarian King of the Arpâd family, grandson of Andrew II. He was born in Venice, while his father was in exile, and succeeded Ladislas IV in 1290. He had to defend his crown against the pretensions of Rudolph of Hapsburg and also against a son of the King of Naples, who claimed to be of the house of Arpâd through his mother. The latter was actively supported by Pope Nicholas IV. Andrew made some efforts to develop trade, and his reign was successful on the whole.

ANDREW, A(bram) Piatt, Jr. (1873—). An American economist and public official, born at La Porte, Ind. He graduated from Princeton in 1895; studied at the universities of Halle, Berlin, and Paris in 1897–99; and, just previous to receiving the degree of Ph.D., at Harvard University in 1900. For the following nine years he was instructor and assistant professor of economics at Harvard. On the creation of the National Monetary Commission in 1908 he became its expert assistant and editor of its publications, a capacity in which he compiled and collected one of the most complete libraries of books bearing on finance and banking ever gathered. In 1909 he was appointed Director of the Mint, and in June, 1910, Assistant Secretary of the United States Treasury. The latter office he resigned, however, in June, 1912, at the same time making public a severe criticism of the conduct of the Treasury Department under Franklin McVeagh. He wrote much on economic and financial subjects in reviews and magazines and became an officer of the French Academy and treasurer of the American Red Cross Society. Among his publications are *Banking Systems and Currency Reform* (1910); *Purpose and Origin of the Proposed Banking Legislation: Three Addresses* (1911).

ANDREW, James Osgood, D.D. (1794–1871). A Methodist bishop. He was born in Wilkes Co., Ga., May 3, 1794, became (1816) an itinerant Methodist Episcopal preacher of South Carolina Conference, until consecrated bishop at Philadelphia in May, 1832. On his relations to slavery began the first territorial cleavage of the Methodist Episcopal church. His second wife, whom he married in 1844, was a slaveholder, and in the general conference of 1844 it was declared that "this would greatly embarrass the exercise of his office as an itinerant general superintendent, if not in some places entirely prevent it," and it was resolved "that it is the sense of this general conference that he should desist from the exercise of this office so long as this impediment remains." The Southern delegates protested that the action was extrajudicial and unconstitutional, and the difficulty was finally settled by dividing the churches and property, a church being formed called the Methodist Episcopal Church, South. Bishop Andrew adhered to the South, and continued his episcopal work until 1868, retiring then from age. He died in Mobile, Ala., March 1, 1871.

ANDREW, John Albion, LL.D. (1818–67). An American statesman, "war Governor" of Massachusetts. He was born in Windham, Me., graduated at Bowdoin in 1837, was admitted to the Boston bar in 1840, practiced there 20 years, and took a prominent part in the cases which arose under the Fugitive Slave Law. In 1858 he was a member of the Legislature and in 1860 was a delegate in the Republican Na-

tional Convention and was elected Governor of Massachusetts by the largest popular majority ever given to a candidate. He foresaw the danger of civil war and took immediate steps to perfect the organization of the militia of his State. Within a week after the first call for troops he sent forward five infantry regiments, a battalion of riflemen, and a battery of artillery. In 1861, and yearly until he insisted on retiring in 1866, he was reëlected Governor, and was probably the most efficient of all the "war Governors," continually organizing militia companies and lending aid in every possible way to the Administration. He was at the conference of loyal Governors at Altoona, Pa., in September, 1862, and wrote the address presented by them to the President. He obtained permission from the Secretary of War in January, 1863, to organize colored troops, raised the first colored regiment (the Fifty-fourth Massachusetts Infantry) which participated in the war and sent it to the front early in May. After the war he contended for a policy of conciliation and vigorously opposed all measures likely to humiliate the South. In religion he was Unitarian and presided at the first national conference of that denomination in 1865. He declined the presidency of Antioch (Ohio) College, which was offered to him in 1866. After that time he continued the practice of law in Boston. Consult Chandler, *Memoir, With Personal Reminiscences* (Boston, 1880).

ANDREW, Saint, or The Thistle. See Thistle, Order of.

ANDREW, Saint, The Russian Order of. The most distinguished order in the Russian Empire. It was founded on Dec. 10 (N. S.), 1698, by Peter the Great, and membership in it is confined to members of the imperial family, princes, generals-in-chief, and those of similarly high rank. Grand dukes become Knights of St. Andrew at baptism, and other imperial princes upon obtaining their majority. Membership in St. Andrew's carries with it rights to the important orders of St. Anne, Alexander Nevski, and St. Stanislaus. The badge of the order of St. Andrew is a double spread eagle surmounted by the Russian crown. On the obverse of the medal is an enameled cross upon which is borne the figure of St. Andrew, and at the four corners of the cross are the letters S. A. P. R. (*Sanctus Andreas Patronus Russiæ*). On the reverse of the badge is the inscription (in Russian) "For Faith and Loyalty." See Orders.

ANDREWES, Lancelot (1555–1626). An eminent English prelate. He was born in London, Sept. 25, 1555, and educated successively at the Coopers' Free Grammar School, Ratcliffe, Merchant Taylors' School, London, and Pembroke Hall, Cambridge, of which college, after having greatly distinguished himself by his industry and acquirements, he was in 1576 elected a fellow. On taking orders, 1580, he accompanied the Earl of Huntingdon to the North of England. His talents attracted the notice of Walsingham, Queen Elizabeth's Secretary of State, who appointed him successively, in 1589, to the vicarage of St. Giles, Cripplegate, a prebendary and canon residentiary of St. Paul's, a prebendary of the Collegiate Church of Southwell, and master of Pembroke Hall. The Queen next testified her esteem for his gifts and piety by appointing him one of her chaplains in ordinary and Dean of Westminster. He rose still higher in favor with King James, who was well qualified to appreciate his extensive learning and peculiar style of oratory. He attended the Hampton Court Conference, as one of the ecclesiastical commissioners, and took part in the translation of the Bible. The portion on which he was engaged was the first 12 books of the Old Testament. In 1605 he was consecrated Bishop of Chichester. In 1609 he was translated to the see of Ely, and appointed one of his Majesty's privy councilors both for England and Scotland. To the latter country he accompanied the King in 1617, as one of the royal instruments for persuading the Scotch of the superiority of episcopacy over presbytery. In 1619 he was translated to Winchester. He died in Winchester House, Southwark, London, on Sept. 25, 1626. Bishop Andrewes was, with the exception of Ussher, the most learned English theologian of his time. As a preacher he was regarded by his contemporaries as unrivaled; but the excellent qualities of his discourses are apt to suffer much depreciation in modern judgment from the extremely artificial and frigid character of the style. His principal works published during his life were two treatises in reply to Cardinal Bellarmin, in defense of the right of princes over ecclesiastical assemblies. His other works consist of sermons, lectures, and manuals of devotion. Bishop Andrewes was the most eminent of that Anglican school in the seventeenth century of which the nineteenth witnessed a revival under the name of Puseyism. Its distinctive peculiarities were high views of ecclesiastical authority, and of the efficacy of sacraments, ceremonies, and apostolic succession, and extreme opposition to Puritanism. His works are in the Library of Anglo-Catholic Theology, 11 vols., Oxford, 1841–54. Of most fame are his *Devotions* (many editions, London, 1898); *Seventeen Sermons on the Nativity* (1887). For his life, consult Whyte (Edinburgh, 1896), M. Wood (New York, 1898), and Ottley (Boston, 1894).

ANDREWS, Charles McLean (1863—). A prominent American historian, born at Wethersfield, Conn. He was educated at Trinity College, and was chosen to a chair of history successively at Byrn Mawr College (1889), Johns Hopkins University (1907), and Yale University (1910). He became a member of the public archives commission, and of the committee on documentary publications of the United States government. His publications include: *Historical Development of Modern Europe* (1898); *A History of England for Schools and Colleges* (1903); *Colonial Self-Government* (1904); *Short History of England* (1912); *The Colonial Period of American History* (1912); *Guide to American Materials in the British Archives* (vol. i, 1898; vol. ii, 1912).

ANDREWS, Christopher Columbus (1829—). An American soldier and diplomat. He was born in Hillsboro, N. H., but lived chiefly in Minnesota after 1856. During the Civil War he rose to the regular rank of brigadier-general and at its close was brevetted major-general. He was United States Minister to Sweden from 1869 to 1877, and United States Consul-General to Brazil from 1882 to 1885. His publications include a *History of the Campaign of Mobile* (1867) and *Brazil, Its Condition and Prospects* (1887; 3d ed., 1895).

ANDREWS, Edmund, M.D., LL.D. (1824–1904). An American surgeon, born at Putney, Vt. He studied medicine at the University of

Michigan, where he was afterward made professor of comparative anatomy. In 1856 he removed to Chicago. He was one of the founders of the Chicago Medical College, which at present forms the medical department of the Northwestern University of Chicago. Dr. Andrews was a surgeon during the Civil War, and, in later life, consulting surgeon to several Chicago hospitals. He introduced a number of valuable improvements into the practice of his profession and published a work on rectal surgery.

ANDREWS, Edward Gayer, D.D., LL.D. (1825–1907). An American clergyman; appointed bishop of the Methodist Episcopal Church in 1872. He was born at New Hartford, N. Y., and after graduating at Wesleyan University, Conn. (1847), entered the Methodist Episcopal ministry (1848). In 1854 he became president of Mansfield Female College in Ohio, and for the eight years following was at the head of Cazenovia Seminary. He served as pastor at Stamford, Conn., and Brooklyn, N. Y., from 1864 to 1872, after which he spent many years visiting foreign missions. Bishop Andrews delivered the address at the state funeral of President McKinley in Washington, Sept. 17, 1901.

ANDREWS, Elisha Benjamin, D.D., LL.D. (1844–1917). An American educator, born at Hinsdale, N. H. He served in Connecticut regiments during the Civil War. Graduating at Brown University in 1870 and at the Newton Theological Institution in 1874, he preached for one year and then was president of Denison University, 1875–79. He was professor of homiletics at Newton Theological Institution, 1879–82; professor of history and political economy in Brown University, 1882–88; professor of political economy and finance in Cornell University, 1888–89, and president of Brown University, 1889–98. He resigned as president of Brown in 1897 because of criticism by trustees of his advocacy of free silver, but at that time withdrew his resignation. He was superintendent of schools, Chicago, 1898–1900, and then became chancellor of the University of Nebraska. In 1892 he was a United States commissioner to the Brussels monetary conference and was a strong supporter of international bimetallism. He became a member of the corporation of Brown University in 1900 and was made president of the Association of State Universities in 1904. He retired from the University of Nebraska as chancellor emeritus Jan. 1, 1909. He has published many college textbooks on history and economics; also, *An Honest Dollar* (1889; 3d ed., 1894); *Wealth and Moral Law* (1894); *History of the United States* (2 vols., 1894); *The History of the Last Quarter Century in the United States, 1870–95* (1896; revised under the title *The United States in Our Own Time*, 1903).

ANDREWS, Ethan Allen (1787–1858). An American educator. He was born in Connecticut, and graduated at Yale in 1810. He practiced law for several years, then (1822–28) was professor in the University of North Carolina, after which he taught in New Haven and Boston. He published a number of Latin text-books and in 1850 a Latin-English lexicon, based on Freund, and with Solomon Stoddard, a Latin grammar, long very popular. The lexicon went through many revisions and came to be known as *Harper's Latin Dictionary* (1907). A monograph, *Slavery and the Domestic Slave Trade in the United States*, was printed in Boston in 1836. Consult Hubbard Winslow, *Eulogy on the Late Professor E. A. Andrews* (Boston, 1858).

ANDREWS, Ethan Allen (1859—). An American biologist, born in New York City. He received the degree of Ph.B. from Yale University in 1881 and of Ph.D. from Johns Hopkins in 1887, having in the mean time taken post-graduate studies at Yale, at the Polytechnicum of Hanover, Germany, and, as a fellow, at Johns Hopkins. Appointed assistant professor of biology in the last-named university in 1887, he was made associate professor in 1892 and professor of zoölogy in 1908. He became a member of several scientific societies, and in 1904 was president of the Society of American Zoölogists. He contributed on biological subjects to various journals.

ANDREWS, George Leonard (1828–99). An American soldier. He was born in Bridgewater, Mass., and in 1851 graduated at West Point at the head of his class. For two years (1854–56) he was assistant professor of engineering at West Point. He then resigned from the service and was engaged in engineering work until the beginning of the Civil War, when he entered the Union Army as lieutenant-colonel. He served in the Shenandoah valley in 1861, took part in Pope's campaign in 1862, was raised to the rank of brigadier-general in November, 1862, and bore a prominent part in General Banks's expedition to New Orleans. He was commander of the Corps d'Afrique from 1863 to 1865, and for "faithful and meritorious services in the campaign against Mobile" was brevetted major-general of volunteers in March, 1865. He was United States marshal in Massachusetts from 1867 to 1871, and was professor of French at West Point from 1871 to 1882, and of modern languages from 1882 until his retirement in 1892.

ANDREWS, Loren (1819–61). An American educator and sixth president of Kenyon College. He was born in Ashland Co., Ohio, and was educated at Kenyon College. He took an active interest in the common schools, and it is said that much of the present excellence of the Ohio school system is due to him. His administration at Kenyon College was also very successful. At the beginning of the Civil War President Andrews raised a company in Knox County and was made captain. Afterward, as colonel of the Fourth Ohio Volunteers, he saw severe service in Virginia. He died of camp fever while in active service.

ANDREWS, Lorrin (1795–1868). An American educator. He was born in East Windsor, Conn., educated at Jefferson College and Princeton Theological Seminary, and went as missionary to the Sandwich Islands in 1827. In 1831 he founded what became the Hawaiian University, in which he was professor. He was long privy councillor and judge under the native government. He wrote an Hawaiian dictionary and published part of the Bible in that tongue.

ANDREWS, Saint. See Saint Andrews.

ANDREWS, Saint. University of. See Saint Andrews, University of.

ANDREWS, Samuel James (1817–1906). An Irvingite divine. He was born at Danbury, Conn., July 31, 1817; graduated at Williams College, 1839; practiced law for some years, but turned his attention to theology, and was a Congregational clergyman from 1848 to 1855. In 1856 he became pastor of the Catholic and Apos-

tolic Church (Irvingite) at Hartford, Conn. His publications embrace: *Life of Our Lord upon the Earth, Considered in its Historical, Chronological, and Geographical Relations* (New York, 1863; new and wholly revised ed., 1891); *God's Revelations of Himself to Men* (1885); *Christianity and Anti-Christianity in their Final Conflict* (1898); *The Church and its Organic Ministry* (1899); *William Watson Andrews: A Religious Biography* (1900).

ANDREWS, Stephen Pearl (1812–86). An eccentric writer, and the originator of a system of stenographic reporting. He was born in Templeton, Mass., studied for the bar, and became involved in the abolition agitation, for which he undertook a mission to England. While there he learned phonography, and on his return to America devised a popular system of phonographic reporting. To further this he published a series of instruction books and edited two journals, the *Anglo-Saxon* and the *Propagandist.* He was a remarkable linguist, but an erratic scholar and writer. He devised a "scientific" language, "Alwato," in which he was wont to converse and correspond with pupils. At the time of his death he was compiling a dictionary of it, which was published posthumously.

ANDREWS, Thomas (1813–85). An Irish chemist and physicist, born at Belfast. He studied medicine and the physical sciences at Glasgow, Paris, Edinburgh, and Dublin. After practicing medicine for several years in his native city, he became, in 1845, professor of chemistry at Queen's College, which position he resigned in 1879. Andrews carried out a number of important researches on the heat developed during various chemical transformations and on the nature of ozone. His most important contribution to science, however, was the discovery (1861) of the continuity of the liquid and gaseous states. He was the first to find that for every gas there is a temperature (called the critical temperature) above which the gas cannot be liquefied, no matter how great the pressure exerted upon it. Below that temperature the gas may be partly liquefied, gas and liquid being separated by the surface of the latter. Precisely at the critical temperature, however, the surface of separation disappears, and the substance enters into a homogeneous state, combining the properties both of the liquid and the gaseous states. This continuity of states has led to an attempt to extend to liquids the laws of gases and thus to establish a relationship between the properties of matter in the two states. This attempt, however, has been only partially successful. See Critical Point; Mendeléeff.

ANDREWS, William Draper (1818–96). An American inventor. He was born at Grafton, Mass. In 1844 he invented the centrifugal pump, which made it possible to save from abandoned wrecks goods not injured by water. This pump, patented here in 1846, was manufactured in England as the Gwynne pump. Afterward he invented and patented an antifriction centrifugal pump, made various modifications of the centrifugal pumps, of which the "Cataract" was the most important, and patented a widely used system of gangs of tube wells. His pumps were used on the monitors in the Civil War, and employed in the deepening of the Mississippi River. In 1885 the water supply of Brooklyn was increased by the use of the Andrews gang wells.

ANDREWS, William Watson (1810–97). An American clergyman of the Catholic Apostolic church. He was born at Windham, Windham Co., Conn., graduated in 1831 at Yale, and in 1834 was ordained and installed pastor of the Congregational church at Kent, Conn. He early accepted the tenet of the Catholic Apostolic church, commonly spoken of as the "Irvingites," and in 1849, having given up his charge at Kent, he assumed charge of the Catholic Apostolic congregation in Potsdam, N. Y. He subsequently made his home in Wethersfield, Conn., and traveled much in the Eastern and Middle States as evangelist. Among the congregations established under his direction was one organized at Hartford in 1868. He was an eloquent preacher and a clear and forceful writer. He contributed articles on the Catholic Apostolic church to the *Bibliotheca Sacra* and McClintock and Strong's *Cyclopædia,* prepared for the *Life of President Porter* a chapter on Dr. Porter as "A Student at Yale," and published many reviews, orations, sermons, and addresses, and *The Miscellanies and Correspondence of Hon. John Cotton Smith* (1847). Consult Andrews, *William Watson Andrews: A Memorial* (New York, 1900).

ANDRIA, än'drê-ä. An episcopal city in Apulia, south Italy, 5 miles from Barletta and 31 miles west of Bari, with both of which it is connected by a street railway (Map: Italy, L 6). The chief trade is in almonds, for which the country is famous, olives, grain, cattle, and majolica. Andria was founded about 1050 and was a favorite residence of Emperor Frederick II in the thirteenth century. Nine miles south of the city he built the imposing Castel del Monte, having several beautiful Gothic windows, and still well preserved. Pop., 1901 (commune), 49,569; 1911, 53,274.

AN'DRIA. The earliest extant comedy of Terence, adapted in 166 B.C. from the *Andria* of Menander. It deals with the experiences, at Athens, of a girl from Andros.

ANDRIEUX, än'drê-ĕ', François Guillaume Jean Stanislas (1759–1833). A French dramatist and idyllic poet, born at Strassburg. He took an active part in the Revolution, was of the Council of the Five Hundred (1798), professor in the Polytechnic School (1803), in the Collège de France (1814), member of the French Academy (1816), and its perpetual secretary (1829), collaborating actively in its *Dictionary.* He also wrote several comedies, of which the best is *Molière avec ses amis* (1804); a tragedy, *Brutus* (1794), and poems distinguished for purity of prosody and diction. Of these, *Le meunier de Sans-Souci* (1797) is still remembered, and was paraphrased by Luise Mühlbach. As a lecturer he was singularly attractive.

ANDRIS'CUS (Gk. *Ἀνδρίσκος, Andriskos*). A fuller of Adramyttium, who pretended to be the son of Perseus, King of Macedonia, and assumed the name Philip. He was seized, sent to Rome, and imprisoned; but escaped, and in 149 B.C. defeated the prætor Juventius in battle. He reigned as a cruel and oppressive tyrant for about a year, but was finally conquered in 148 B.C. by Quintus Cæcilius Metellus and again taken to Rome, where he was put to death.

AN'DROCLUS (Aulus Gellius, v, 14), or **ANDROCLES** (Ælian, vii, 48). The slave of a Roman Consul of the Early Empire, who compelled him to fight with a ferocious lion in the Circus Maximus. The beast, far from hurting

him, fondled him like a playful dog. When the Emperor and the people demanded an explanation of such strange actions, Androclus explained that he had escaped from a cruel master in Africa and had taken refuge in a desert cave. One day, a lion entered the cave limping painfully and holding up his paw, from which Androclus extracted a large thorn. The grateful beast never forgot this, and when they met again in the Circus at Rome he testified his recognition. Both slave and lion were freed and afterward were exhibited in the streets of Rome.

ANDROGYNOUS, ăn-drŏj'ĭ-nŭs. See FLOWER; REPRODUCTION.

ANDROMACHE, ăn-drŏm'ă-kē (Gk. *Ἀνδρομάχη, Andromachē*). The wife of Hector and mother of Astyanax, daughter of King Eëtion of Asiatic Thebes. Her father and seven brothers were killed by Achilles, and from that time she clung to Hector with a love whose tenderness and pathos are beautifully depicted in Homer's *Iliad*, especially in her parting with her husband (book vi), and her lament over his body (book xxiv). At the capture of Troy her son was dashed from the walls, and she became the prize of Neoptolemus, son of Achilles, to whom she bore a son, Molossus. Afterward she was the wife of Helenus, Hector's brother, to whom she bore Cestrinus. Her danger from the jealousy of Hermione, wife of Neoptolemus, is the subject of a tragedy by Euripides. See HECTOR; TROJAN WAR.

ANDROM'ACHE. A tragedy by Euripides (q.v.), written probably during the Peloponnesian War, as it contains many unfriendly allusions to Sparta. Its subject is the part of the legend of Andromache in which she is with Neoptolemus, her second husband.

ANDROMAQUE, ăn'drŏ'mâk'. 1. A tragedy by Racine (1667), founded on the classical legend. The story is adapted from Racine in Phillips's play *The Distressed Mother* (1712). 2. An opera by Grétry, presented at Paris in 1780.

ANDROM'EDA (Gk. *Ἀνδρομέδη, Andromedē*). Daughter of the Ethiopian King Cepheus and Cassiopeia. Like her mother, she was remarkably beautiful. When Cassiopeia boasted that her daughter was more beautiful than the Nereids, the latter prayed Poseidon to avenge the insult. Accordingly the territory of Cepheus was devastated by a flood, and a sea-monster appeared, whose wrath, the oracle of Ammon (q.v.) declared, could be appeased only by the sacrifice of Andromeda. Andromeda was fastened to a rock near the sea and left as a prey to the monster; but Perseus, returning from his victorious battle with Medusa, saw the beautiful victim, slew the monster, and received Andromeda as his reward. Our versions of this legend seem largely due to a tragedy by Euripides, which ended with a prophecy by Athena that all concerned would be placed among the stars.

ANDROMEDA. A genus of plants of the family Ericaceæ, represented by a single species, *Andromeda polifolia*, wild rosemary. It is a small evergreen shrub with beautiful rose-colored drooping flowers, is occasionally found in peat bogs in different parts of Great Britain, and common throughout the north of Europe and North America. It has acrid narcotic properties, and sheep are sometimes killed by eating it. The shoots of a closely related genus in like manner poison goats in Nepal, and similar effects are ascribed to the stagger-bush (*Lyonia mariana* or *Neopieris mariana*) and other related species in the United States.

ANDROMEDA. A large constellation of the northern hemisphere situated just south of Cassiopeia and west of Perseus. It contains no stars of the first magnitude, but is noted for its Great Nebula, the brightest of all the nebulæ. In August, 1885, the heart of this nebula was the scene of the outburst of a remarkable *nova*, or temporary new star, which, after increasing in brilliancy from the ninth to the seventh magnitude in less than a month, faded rapidly until, in the following March, it was beyond the range of the most powerful telescopes.

AN'DRONI'CUS. The name of three Byzantine emperors.—ANDRONICUS I (c.1110–85) was the son of Isaac Comnenus. His life was full of vicissitudes. During part of his youth he was a prisoner of the Turks in Asia Minor. He afterward spent some time at the court of his cousin, the Emperor Manuel, and a niece of the Emperor became his mistress. He was appointed to a military command in Cilicia; but, although the favorite of the army, his imprudence and waste of time in dissolute pleasures involved him in defeat. Having engaged in a treasonable correspondence with the King of Hungary and the German Emperor, he was thrown into prison by Manuel, and remained there more than 12 years. At last he succeeded in making his escape and reached Kiev, the residence of Prince Yaroslav. He regained the favor of his cousin by persuading the Russian Prince to join in the invasion of Hungary, but incurred his cousin's displeasure again by refusing to take the oath of allegiance to the Prince of Hungary, the intended husband of Manuel's daughter, as presumptive heir to the Empire. He was sent in honorable banishment to Cilicia, but soon fled to Antioch, where he found a new mistress in a sister of the Empress. The resentment of the Emperor breaking out against him, he sought refuge in a pilgrimage to Jerusalem. His professions of zeal caused his former conduct to be forgotten, and he was invested with the lordship of Berytus (now Beirut); but his profligacy became, if possible, more scandalous than ever. He seduced Theodora, the widow of Baldwin, King of Jerusalem, who lived with him for years as his mistress. The Emperor's anger made the Syrian coast unsafe for him, and he fled with Theodora to Damascus, and finally settled down among the Turks in Asia Minor, with a band of outlaws, making frequent inroads into the Roman province of Trebizond, from which he carried away spoil and slaves. Theodora and her children were at last taken and sent to Constantinople, and thither he followed, imploring the forgiveness of the Emperor, which he obtained; but he was sent to Œnoë, in Pontus. After the death of Manuel popular indignation was excited against the Empress, who acted as regent for her son, Alexius II, and Andronicus was recalled, in 1182, to deliver the Empire from her tyranny. He was appointed guardian of the young Emperor, and soon after his colleague in the Empire. He caused the Empress-mother to be strangled, and afterward Alexius himself, whose widow he married. His reign, though short, was vigorous and restored prosperity to the provinces; but tyranny and murder were its characteristics in the capital. He set no bounds to the gratification of his revenge against all who had ever offended him, and his jealousy of possible rivals was equally sangui-

nary. At last, a destined victim, Isaac Angelus, one of his relatives, having fled to the church of St. Sophia for sanctuary, a crowd gathered, and a sudden insurrection placed Isaac on the throne, while Andronicus was put to death by the infuriated populace, after horrible mutilations and tortures, on Sept. 12, 1185. He was the last of the Comneni that sat on the throne of Constantinople; but the succeeding dukes and emperors of Trebizond were descendants of his son, Manuel. See Diehl, *Figures Byzantines*, vol. ii (Paris, 1909).—ANDRONICUS II (1260–1332), the son of Michael Palæologus, ascended the throne in 1282; but, after a weak and inglorious reign, was driven from it, in 1328, by his grandson.—ANDRONICUS III (c.1296–1341), after a reign equally inglorious, died in 1341. Consult Gibbon, *Decline and Fall of the Roman Empire*, edited by Bury.

ANDRONI'CUS (Gk. Ἀνδρόνικος, *Andronikos*), also called CYRRHESTES, from his birthplace, Cyrrhus, in Syria. A Greek architect, who erected the so-called Tower of the Winds at Athens, a building 42 feet high and 26 feet in diameter, dating from the first century B.C. This tower was an octagonal structure, made of Pentelic marble and surmounted by a figure of Triton, which moved with the wind and pointed with a staff to the direction from which the wind came. On the eight sides of the tower, near the top, were sculptured in relief symbolical figures representing the eight principal winds, and beneath these, on the sides which caught the sun, were sun-dials. The interior contained a water-clock. It was repaired in later ages and is still standing in excellent preservation. It stands to the north of the Acropolis, in the district which, under the Romans, became the centre of commercial life at Athens. In the Middle Ages this structure was called "The Lantern of Demosthenes." See E. A. Gardner, *Ancient Athens* (New York, 1902).

ANDRONICUS OF RHODES. A Greek peripatetic philosopher, who lived at Rome in Cicero's time and employed himself in arranging, criticising, and explaining the works of Aristotle, which for some time had been neglected; a great number of these works he was probably the means of preserving to us. He gave to the Peripatetic school a new bent, the philological. None of the writings of Andronicus is extant; a work *On the Passions*, attributed to him, is a compilation of the Roman imperial period; a paraphrase of the Nicomachean Ethics is the work of Constantine Palæocappa of the sixteenth century. Consult, in general, Zeller, *Geschichte der griechischen Philosophie* (Leipzig, 1893); Susemihl, *Geschichte der griechischen Litteratur in der Alexandrinerzeit* (Leipzig, 1891–92).

ANDRONICUS, LIVIUS. See LIVIUS ANDRONICUS.

ANDRONICUS, TITUS. The hero of the Shakespearean play *Titus Andronicus*.

ANDROPH'ILUS (Gr. *andro-philos*, a lover of mankind). The personification of philanthropy in Phineas Fletcher's *Purple Island*, published in 1633.

AN'DROPO'GON (called so from the bearded male flowers, from the Gk. *ἀνήρ, anēr*, man + *πώγων, pōgōn*, beard). A cosmopolitan genus of grasses, including about 150 species, the relative merits of which vary widely. Some are highly prized for hay and pasturage, as *Andropogon halepense*, or Johnson grass, which has been under cultivation in the United States since about 1830. It yields large quantities of hay, and in Southern States may be cut three or four times a year. On account of its habit of growth —it spreads by its rhizomes—when once established it is difficult of eradication. It is somewhat sensitive to cold and will not persist as a perennial except in warm regions. Recent investigations have shown that Johnson grass, if fed green, is sometimes poisonous to stock. The poisonous action is said to be due to a compound yielding hydrocyanic acid which disappears in ripening or drying. Other species of Andropogon are believed to possess this same property. A grass resembling Johnson grass but without its spreading root-stocks has been recently introduced into the United States under the name Sudan grass. It is a native of Sudan, but the grass has met with favor as a drought-resistant hay plant. It is believed to be a variety of *Andropogon sorghum* mentioned below. A number of species of *Andropogon* are well known in the semi-arid region of the United States under the name of blue-stem grasses, and in these regions are of value. The principal of these species are: *Andropogon nutans*, *Andropogon provincialis*, and *Andropogon scoparius*. Other species are known in the eastern and southern parts of the United States as broom sedge; of these *Andropogon virginicus* is one of the most widely distributed. If cut early, the broom sedges make good hay; but if left too long, the plant becomes so woody as to be refused by all stock. In some systems of classification the sorghums are grouped under this genus. The specific name *Andropogon sorghum* and its variety, *sativus*, comprise under these classifications the saccharine and non-saccharine forms. Among the latter are durra, Millo maize, kaoliang, Kafir corn, Jerusalem corn, broom corn, etc., some of which are valuable for forage in dry countries. Eight or ten species are considered of economic importance in Australia. Two tropical species are widely known, the lemon grass (*Andropogon schœnanthus*) and *Andropogon nardus*, sources of lemon oil and citronella oil, both of which are largely used in making perfumery.

AN'DROS (Gk. Ἄνδρος). One of the islands of the Greek archipelago, the most northerly of the Cyclades, separated from Eubœa by the Doro channel, 6 miles broad (Map: Greece, F 4). The island is 25 miles long, about 9 miles in its greatest breadth, and covers a total area of about 160 square miles. It is traversed by several mountain chains, separated from one another by deep valleys, which yield grain, olives, and other southern fruits and common vegetables. Domestic animals are raised extensively in the northern part, which is inhabited chiefly by Albanians. The chief towns are Gavrion, the best port, Korthion and Andros, the capital. The last mentioned carries on a large trade, is the seat of Greek and Roman Catholic bishops, and has a population (1907) of 8536. The island was originally settled by pirates and subsequently by Ionians. It was successively in the hands of the Athenians, Macedonians, and Romans, and, in 1207, had a prince of its choosing, the Venetian nobleman Marino Dandolo. In 1566 it fell into the hands of the Turks, whose rule, however, was chiefly restricted to the levying of an annual tribute of 30,000 piasters. At present the island forms a part of Greece. Pop., 1907, 18,035. Consult Kopf, *Geschichte der Insel Andros* (Vienna, 1855).

ANDROS, Sir Edmund (1637–1714). A Colonial Governor in America, the son of an officer in the English royal household. In 1674 he was sent to America as Governor of the Colony of New York, and to him Sir Anthony Colve, the Governor during the temporary Dutch supremacy, surrendered without forcible opposition. His commission gave him jurisdiction over Long Island, Pemaquid, and the region between the Connecticut River and the Delaware River. He was thus brought into embarrassing relations with the proprietary government of East Jersey and also became engaged in controversies with the authorities of Connecticut. After the charters of the New England provinces had been declared forfeited by the English courts, the policy of the English administration in furtherance of a strongly centralized colonial system was illustrated by the steps taken to consolidate the lands of New England into one province, the Dominion of New England, over which, in 1686, Andros was made Governor-General with large powers. He was to admit religious toleration, but could suppress all printing, name and change his council at will, and, with their consent, levy taxes and control the militia. When Connecticut refused to recognize his authority, he appeared in the council chamber at Hartford, in October, 1687, with an armed guard, and demanded the surrender of the colony's charter. There long survived a tradition of the hiding of the charter in an oak tree. The leaders, both in Connecticut and in Rhode Island, deemed it prudent to render perfunctory obedience to the one in forcible control of the political situation. In 1688 New York and New Jersey were attached to New England, and Andros's rule was extended over all territory between the St. Croix and the Delaware. On hearing of the revolution in England, the people of Boston imprisoned Andros and some of his officers, April 18, 1689, and Leisler set up a rebel government in New York. In July Andros and a committee of accusers were ordered to England, but the charges were never pressed to a formal trial. The accession of William III made possible the undoing of the work of Andros. The charters of Connecticut and Rhode Island were recognized as in force. Massachusetts received from the King a new charter, and New Hampshire was organized as a distinct royal province. In 1692 Andros came back as Governor of Virginia, where he was popular, retiring in 1698, and acting as Governor of Guernsey, 1704–06. In 1691 he published an account of his proceedings in New England. Whitmore (ed.), *Andros Tracts; with notes and memoir* (Prince Society Publications, Boston, 1868–74). The character of Andros is not viewed as it once was by Americans. The changed view can be found set forth, though not impartially, in Ferguson, *Essays in American History* (New York, 1894).

AN'DROSCOG'GIN. A river rising in Umbagog Lake, which lies on the State lines of New Hampshire and Maine. It is 157 miles long and flows through both States, emptying into the estuary of the Kennebec above Bath (Map: Maine, B 7). Its value for navigation is small, but as the elevation of its source at Lake Umbagog is over 2000 feet, and as the descent is abrupt at many places, until at Auburn, Me., the elevation is but 210 feet, it affords extensive power to the many industries established on its banks.

ANDRO'TION (Gk. Ἀνδροτίων). A Greek orator, praised by Demosthenes and Aristotle, contemporary with Demosthenes, and pupil of Isocrates. When he moved that a crown be presented to the Council of Five Hundred at the expiration of their term of office, he was charged with making an illegal proposal; Demosthenes wrote a speech for one of the accusers, which we still have. He went into exile at Megara, and wrote there, it is said, an annalistic account of Athens from the earliest times, called *Atthis.*

ANDROUET DU CERCEAU, ăn'drōō'ā' dü sâr'sō'. A famous family of French architects of the sixteenth and seventeenth centuries, founded by Jacques Androuet (c.1510–84), called du Cerceau from the circle used as the sign over his workshop. Jacques was one of the leaders in introducing the Italian Renaissance style into France through his works, his writings, and his numerous drawings. He is best known by his *Les Plus Excellens Bastimens de France* (1576–79) and other collections of engravings. He was succeeded by his two sons, Baptiste (c.1544–1602) and Jacques II (died 1614), who took part in many of the great constructions of the time in France, such as the Louvre, the Tuileries, the Pont Neuf, St. Denis (chapel), etc. The third generation was represented by Baptiste's son, Jean (c.1600–16), chiefly noted for the private palaces he built in Paris, such as the Sully and Bellegarde mansions.

ANDRYANE, ăn'drē'ăn', Alexandre Philippe (1797–1863). A French soldier noted for his captivity in the fortress of Spielberg. He was born in Paris, and after serving as an artillery officer until 1815, went to Italy and attempted to incite an insurrection against Austria. He was arrested and condemned to death, but his sentence was commuted by the Emperor of Austria to perpetual imprisonment in the fortress of Spielberg, where for eight years he led a life of torture, vividly described in his *Mémoires d'un prisonnier d'état* (Paris, 1837–38; Eng. trans. by Fortunato Prandi, London, 1848). He was pardoned in 1832 and afterward served with the French army in Italy. After the battle of Magenta he was appointed commissary-general by Napoleon III. In addition to the before-mentioned work he published *Souvenirs de Genève, complément des mémoires d'un prisonnier d'état* (1839).

ANDÚJAR, ăn-dōō'hăr. A town of Andalusia, Spain, in the province of Jaen, 24 miles north-northwest of Jaen, on the right bank of the Guadalquivir, at the base of the Sierra Morena (Map: Spain, C 3). It stands on the highroad at the head of a pass over the Sierra Morena. It is a flourishing town, with fine churches, four nunneries, six monasteries, three hospitals, and a theatre. A promenade extends through the town. There is trade in grain, cattle, pottery, and wine. Alcarrazas, porous stone jars for cooling water, are made here. Andújar is frequented for the mineral springs in its neighborhood. Pop., 1900, 16,302; 1910, 16,499.

ANDVARI, ănd-vä'rē. In Norse mythology, the name of the fish-shaped dwarf who owned the ring, on which he cast the curse of ill-obtained gold, fatal to the possessor. This is the keynote of the remarkable stories of Sigurd Fafnisbane and the German legends presented in musical form by Wagner in an elaborate tetralogy, consisting of *Das Rheingold* (the temptation), *Die Walküre* (Fate), *Siegfried* (the hero), and *Die Götterdämmerung* (the 'Twilight of the Gods,' or end of all things).

AN'ECDOTE (Gk. *ἀνέκδοτος, anekdotos*, unpublished, from *ἀν, an*, negat. + *ἐκ, ek*, out + *διδόναι, didonai*, to give). Procopius called his secret history of Justinian's court *Anecdota*. The name is applied also to portions of ancient writings long unpublished, and a number of such *Anecdota* have been collected in volumes and printed. It ordinarily means some isolated fact, usually of a personal nature, calculated to interest a listener. There are a great many books of anecdotes, the most celebrated in English being the *Percy Anecdotes*. See Hood, *World of Anecdote* (4 vols., Philadelphia, 1901).

ANEGADA, ä'nâ-gä'dà (or 'Drowned Island'). The most northerly of the Virgin Islands, belonging to Great Britain (Map: Antilles, F 3). It is in lat. 18° 45′ N., long. 64° 20′ W., is 12 miles long, and very narrow. The famous Horseshoe Reef surrounds it, and the surf breaks over a great part of the island during a rough sea. The raising of goats and sheep and the production of salt is the occupation of the small number of inhabitants. It is believed that there are mineral deposits, but they have never been exploited.

ANEL, DOMINIQUE (c.1679–c.1730). A French surgeon. He invented a syringe for treatment of *fistula lachrymalis*, but is especially known for his new method of operating for aneurism by ligature of the artery above the swelling, the method later perfected by Hunter. His writings include: *L'art de sucer les playes sans se servir de la bouche d'un homme* (1707); *Nouvelle méthode de guérir les fistules lacrymales* (1713); *Traité de la goutte* (1713).

ANEL'IDA AND AR'CITE. A poem by Chaucer, called also *Queen Anelida and False Arcite*. Anelida is an Armenian queen; Arcite a knight of Thebes. The work is unfinished, but was printed by Caxton. Parts of it have been recognized as taken from Statius's *Thebaid* and Boccaccio's *Teseide*. Chaucer himself acknowledged obligation to Statius and Corinna, a Greek poetess of the fifth century B.C. There is a modern version by Elizabeth Barrett Browning.

ANEM'OGRAPH (Gk. *ἄνεμος, anemos*, wind + *γράφειν, graphein*, to write, record). When a wind vane actuates mechanisms connected thereto so as to write a record of its changes of position upon a sheet of paper moved at a uniform rate by clockwork, the apparatus is called an anemograph. In some cases the travel of the wind in miles or feet is also recorded upon the same sheet of paper by an anemometer, but the combined instrument is still called an anemograph. Some instruments record all the shifting positions of the vane and the continuous motion of the anemometer; others show, once each minute, only the instantaneous position of the vane to the nearest one of the eight points of the compass, the travel of the wind being recorded only by whole miles. An instrument of this type is extensively used by the United States Weather Bureau, and since a material amount of rain does not occur simultaneously with sunshine, both these elements also are recorded by one and the same additional pen on the same sheet of paper with the wind. The instrument then becomes a *meteorograph*, but it is popularly called a "triple register" because it comprises three principal recording parts.

AN'EMOM'ETER (Gk. *ἄνεμος, anemos*, wind + *μέτρον, metron*, measure). An instrument to measure the motion, velocity, or pressure of the wind by some of the effects it produces. The origin of such instruments is remote and obscure, but Hooke's pendulum anemometer, in which the pressure of the wind is indicated by the deflection of a suspended plate, is mentioned as early as 1667. Anemometers indicating the travel of the wind by the rotation of a wheel or arrangement of vanes began to be used about 1724. The cup anemometer, used at the present time in the United States, England, and elsewhere, was designed by Robinson in 1846 after suggestions by Edgeworth. In very recent times devices for measuring air currents by the electrical energy required to keep a wire heated to a constant temperature when exposed to the wind to be measured, have been suggested by Barus and successfully employed by Thomas in the United States and Morris in England. Many details of the history of anemometers are given by Abbe in his *Meteorological Apparatus and Methods* (Report, Chief Signal Officer, 1887, Washington). Numerous forms and varieties have been worked out, but they may all be grouped in four classes according to the particular effect utilized.

1. Pressure of the wind producing deflection or movement of plates, cylinders, spheres, etc., including bridled anemometers.
2. Pressure and suction of the wind causing difference of level in liquid columns.
3. Pressure of the wind causing rotation of vanes or cups.
4. The cooling of electrically heated wire.

The earliest forms belong in class (1), and the model revived in 1861 by Prof. H. Wild is now used in Switzerland and Russia. In this instrument a plane square tablet is suspended vertically from a horizontal axis which is kept by a wind vane always at right angles to the direction of the wind; the tablet is raised by the wind to an inclined position of temporary rest, and its angular inclination to the vertical is noted on a graduated arc. Cylinders and spheres which do not require to be pointed to the wind have been sometimes used instead of the plate.

Pressure and suction anemometers in their best forms are the same in principle and action as the so-called Pitot tube, employed about 1760 by the engineer of that name, for measuring the flow of water in pipes and channels, and frequently used for the same purpose at the present day. The instrument consists essentially of a column of liquid in a U-tube, one branch of which communicates with a thin-walled, clean-cut tube presented squarely to the wind. The wind thus causes an increase of pressure within this branch, while the other branch is usually connected with an aperture in the side of a smooth tube so disposed that the air flows in undisturbed stream lines directly across the opening. Therefore the pressure of the air within the latter tube is the static pressure of the air in motion. This is the only form of anemometer whose mathematical equation can be written at once from what is known of its theory, viz.,

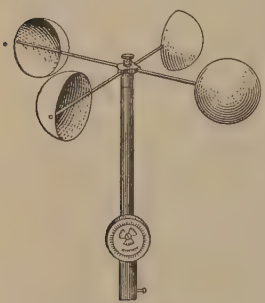
$$v^2 = \frac{2gh}{d}$$

where h is the dynamic pressure as shown by the height of the liquid column, d is the density of the air, and g is the force of gravity.

The Dines pressure-tube recording anemometer, now extensively used in England, is a practical

adaptation of the Pitot tube to produce continuous records and is especially appropriate to the registration of gusts and the continual fluctuation of the wind's force.

Rotation anemometers are those in which the wind sets in motion plane or curved metallic blades. The earliest form resembled that of Dinglinger, mentioned by Leupold in 1724, in that it used the Polish water-wheel with vertical axis, but differed essentially in that Dinglinger prevented the rotation of the arms and measured the pressure required to keep them quiet, whereas d'Ons-en-Bray, in 1734, allowed them to rotate continuously. Since that time two essentially different varieties of the rotation anemometer have been developed, namely, (*a*) those of Schrober and Woltmann, Combes, Casella, Whewell, or Biram, in all which sets of plane plates inclined to an axis are forced to revolve about it by the wind blowing in the direction of the axis. The name "air meter" is frequently given to anemometers of this form, which are much used in studies on ventilation of mines and buildings. The most important meteorological application of this style is that manufactured by Richard for use at the French observing stations. (*b*) The Robinson anemometer, brought out by Dr. Robinson in 1846, but suggested to him by Edgeworth many years before. This has come into very general use by English and American meteorological observers as the Robinson hemispherical cup anemometer. In this instrument a vertical spindle carries at its upper end four horizontal arms at right angles to each other; each arm carries at its extremity a hollow hemispherical cup of thin sheet metal whose circular rim is in a vertical plane passing through the common vertical axis of rotation of the spindle. The wind rotates these cups so that the convex side of each cup goes forward. Numerous experiments have been made to determine the relation between the velocity of the wind and that of the cups. The instrument makers have generally followed Dr. Robinson's conclusion, that the linear motion of the centre of the cup is one-third of that of the wind; we now know that this is true only for anemometers of certain dimensions, i.e., 4-inch cups on arms 6.72 inches long, and for velocities ranging from about 5 to 15 miles per hour.



ROBINSON ANEMOMETER.

The cup anemometer has been experimentally tested on whirling machines and otherwise, at St. Petersburg, at the Deutsche Seewarte in Hamburg, by Dines in England, and by Marvin in the United States. Chree has recently developed a mathematical theory of the instrument that includes a term for the moment of inertia of the revolving system, Marvin's investigations having shown that such a term is necessary. From all these sources of information it is learned that in perfectly uniform winds the general average ratio between the velocity of the wind and that of the cups varies with the length of the arm and the size of the cups between 2.5 and 3.5, so that it is necessary to determine the ratio by actual experiment upon each respective type of anemometer.

Anemometers with heavy cups, i.e., with a large moment of inertia, when exposed to winds of rapidly changing velocity, will run faster than the same instrument if the moment of inertia of the cups is small. This is because a sudden increase in the wind acts strongly on the concave faces of the cups and quickly increases the velocity of rotation, whether the cups are light or heavy; however, when a sudden lull occurs, their inertia keeps a set of heavy cups in relatively rapid motion for a considerable time, thus falsifying the wind motion, whereas a set of light cups quickly slow down to the proper rate. The standard aluminum cups used by the United States Weather Bureau have a moment of inertia of about 59,000 gr. $\overline{\text{cm}}^2$, and extended comparisons show that in the ordinary gusty winds such as occur day by day, the error of indication due to the moment of inertia effect is probably less than 1 per cent of the wind movement.

A new series of investigations by the Weather Bureau are now (1913) in progress, for the purpose of securing tests at velocities up to and beyond 100 miles per hour. At 80 miles per hour the wind velocity is 2.4 times the velocity of the cup centres.

Observations on strong winds on the summit of Mount Washington indicate that the factors used to compute velocities from the anemometer at sea level apply also to that high elevation, so that there is no evidence that the Robinson anemometer is appreciably influenced by changes in the density of the air, notwithstanding that the wind pressures for a given velocity are smaller in proportion to the density.

Hot-wire Anemometer. The hot-wire anemometer is one of the latest forms of anemometer and has been most fully investigated by Prof. J. T. Morris. The apparatus is briefly described by the author as follows: "In its final form the anemometer consists essentially of a small Wheatstone's bridge having two arms of manganin and the other two of platinum. The former material has a negligible temperature coefficient, whilst that of platinum is considerable. The bridge is constructed so that all cold it is out of balance and the current is increased until the temperature rise of the platinum increases the resistance sufficiently to bring the bridge into balance in still air, an operation which gives the zero of the scale. If now the instrument is placed in a current of air, the wires will be cooled—an operation which does not affect the manganin wires, but lowers the resistance of the platinum pair; and to restore the balance the current through the arms of the bridge must be increased. This current is therefore a measure of the velocity of flow." (*Engineering*, vol. 942, p. 892, London, Dec. 27, 1912).

From tests of the anemometer in a wind tunnel Morris found that between small velocities and 40 miles an hour, the velocity of the wind could be represented by an equation of the following form,

$$V = bw^2 - a,$$

where w is the number of watts required to maintain the wire at a constant temperature, and a and b are constants.

ANEMONE, ETC.

1. THE ARETHUSA (Arethusa bulbosa).
2. WIND FLOWER (Anemone nemerosa).
3. MOORWORT (Andromeda Polifolia).
4. BETEL NUT (Areca Catechu).
5. FLAMINGO FLOWER (Anthurium Andræanum).
6. POPPY ANEMONE (Anemone coronaria).

ANEMONE, *Lat.* ăn'ĕ-mō'nē; *Engl.* à-nĕm'ô-nê (Gk. *ἀνεμώνη*, the wind-flower, from *ἄνεμος, anemos*, wind), or WIND-FLOWER. (See PASQUE FLOWER.) A genus of plants of about 85 species belonging to the family Ranunculaceæ, and distributed throughout the temperate and subarctic regions of both hemispheres. They are perennial herbs with lobed to dissected basal leaves, those of the stem forming an involucre, petaloid sepals, no petals, and numerous achenes. (See ACHENE.) The name is said to be derived from the fact that many of the species prefer very exposed situations. Most of them flower early in the spring. One species, *Anemone quinquefolia*, the wood anemone, is a common native of all parts of Great Britain and eastern North America, and its white flowers, externally tinged with purple, are an ornament of many a woodland scene and mountain pasture in April and May. Another species, *Anemone pulsatilla*, or *Pulsatilla vulgaris*, the Pasque flower, adorns chalky pastures in some parts of England at the same season. Its flowers are purple and externally silky. *Pulsatilla patens* is called the American Pasque flower and resembles the European species. The garden anemone is a favorite florist's flower; the varieties are very numerous, and whole works have been published on them and their cultivation, which is most extensively carried on in Holland and has prevailed from a very early period. It is generally supposed that all these varieties have originated from two species, which are natives of the Levant. By cultivation the size of the flower is increased, its form and colors are modified, and many of the stamens are often changed into small petals forming a doubled flower. The cultivation of the anemone requires great attention, the plant preferring light soil. The root, which consists of clustered tubers, is taken up after flowering. The plant is propagated by parting the roots or by seed. In the latter way new varieties are obtained. Seedling plants do not flower till the second or third year. Besides the species which have been named, others occasionally appear as ornaments of our flower gardens. The species of this genus are characterized by the acridity prevalent in the family to which they belong, the rhizomes of *Anemone nemorosa* and others having been recommended in cases of obstinate rheumatism and in tænia. See Plate ANEMONE, ETC.

ANEMONE, SEA. See SEA-ANEMONE.

AN'EMOPH'ILOUS PLANTS (Gk. *ἄνεμος, anemos*, wind + *φίλος, philos*, loving, friend). Plants whose flowers receive pollen by means of wind, in contrast with entomophilous plants, whose agents of pollination are insects. See POLLINATION.

ANEM'OSCOPE (Gk. *ἄνεμος, anemos*, wind + *σκοπεῖν, skopein*, to look at, consider). A wind vane or other instrument which shows the direction of the wind. In its simplest and usual form it is an arrow balanced nicely on an upright rod and free to revolve. The arrow may be attached to a spindle connected with an index or compass scale, which may be either at the bottom of the vertical spindle or at any convenient distance. In the wind vane used by the United States Weather Bureau the arrow head consists of a weighted pointer or rod secured to and balancing a tail piece composed of two thin boards about 6 inches wide and 36 inches long, fastened together near the axis but spreading apart about 5 inches at the outermost extremity for the purpose of steadying the oscillations of the vane. The axis revolves in ball bearings and actuates an arrangement of cams and electric contact springs for automatic registration of wind direction.

The wind vane should be set up in a free and open space at a sufficient height above surrounding buildings or other obstacles to enable it to indicate the true local wind. Other forms of construction and the mechanical explanation of their action are given in Abbe's *Meteorological Apparatus and Methods* (Washington, 1887), and in United States Weather Bureau *Instructions to Observers*. See ANEMOGRAPH.

A'NER. One of the three chiefs making a covenant with Abraham in Hebron (Gen. xiv. 13, 24). Like Mamre and Eschol, this eponym hero probably owes his name to that of a locality. A hill near Hebron still bears the name Ne'r. There was also a city in Manasseh named Aner (1 Chron. vi. 70).

ANERIO, à-nā'rê-ō, FELICE (1560–1614). An Italian composer, a pupil of Mario Nanini. In 1594 he succeeded Palestrina as composer of the Papal Chapel. Ten books of his composition were published in 1585–1622, but many unpublished manuscripts remain in the archives of the Papal Chapel. He was highly esteemed among the composers of the Italian Renaissance.

AN'EROID (containing no liquid, from Gk. *ἀ, a*, priv. + *νηρός, nēros*, liquid + *εἶδος, eidos*, form). A barometer first made in serviceable form by M. Vidi of Paris, in 1848, in which the pressure of the air is measured by the change of form an exhausted metallic box undergoes by the influence of the atmospheric pressure.

FIG. 1. ANEROID BAROMETER.

Construction. In the diagram, Fig. 2, *AA*, is a circular metal box which has been highly exhausted of air and then hermetically sealed. The thin metallic faces are corrugated in concentric rings, so as to increase their flexibility and thus permit considerable motion to and fro under changes of pressure. One face of the box is fixed to the back of the brass case which contains the whole. When the box is exhausted its flexible sides collapse and touch each other, but in use this condition is prevented by the action of a stiff spring, *S*, which pulls the faces apart a certain distance to a position of equilibrium wherein the pressure of the air upon the

flexible sides of the box is just balanced mostly by the strong pull of the spring, but partly also by the feeble reaction of the sides of the box. These faces being neither perfectly flexible nor yet perfectly elastic, their reaction is a disturbing influence that explains the errors of "creep" to which all aneroids are subject in a greater or lesser degree.

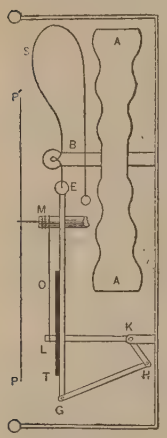


FIG. 2.
DETAIL OF ANEROID.

An increase in the pressure of the air increases the load upon the spring, *S*, and deflects it proportionately. This small motion is slightly magnified by the arm *EG*, securely fixed to the spring *S*, and transmitted through the link, *GH*, to the bent lever, *HKL*, moving in fixed pivots at *K*. From the end, *L*, of the long arm of the bent lever the motion, now further magnified, is transmitted to a little drum, *M*, by means of a very fine chain wound partly around the drum, which is mounted on the axis of the pointer, *PP*, of the instrument. A small hairspring, not shown in the cut, on the axis of the pointer serves to take up all looseness in the several joints of the levers and also winds up the little chain, *O*, on the drum when a fall in pressure occurs. The best aneroids now sold are constructed upon this plan, and the box and springs are highly sensitive to changes of air pressure.

Temperature Compensation. Under a given pressure the steel spring, *S*, will deflect more when warm than cold. To compensate for this disturbing effect of temperature a piece of steel is soldered or brazed to the brass arm, *EG* (as at *T*, Fig. 2). By filing this piece of steel thinner or shorter it is possible almost completely to eliminate the disturbing effects of moderate changes in temperature, and the aneroid is then said to be "compensated," and this word is engraved upon the dial.

Graduation. The scale of the aneroid barometer generally represents inches or millimeters of air pressure as shown by the mercurial barometer, but a second scale showing elevations above sea level is often added. The altitude scale is best engraved in a fixed invariable relation to the pressure scale, but it is often placed on a ring that can be adjusted to various relations to the pressure scale. This pattern offers no real advantage and is likely to cause large errors when the instrument is in the hands of one not versed in its use.

The pressure scale is generally one of equal parts; then the parts of the altitude scale become smaller and smaller with increasing altitude. Aneroids of high grade are now often made with altitude scales of equal parts and carry a vernier to permit of very fine readings. The supposed accuracy thus obtained is illusory and imaginary.

Determination of heights. The mathematical relation between atmospheric pressure and altitude (see HYPSOMETRY) is very complex and cannot be represented with sufficient accuracy for most purposes by a rigid scale of graduations. Suppose one reads the altitude scale of an aneroid day after day at the same place. He will find a variation of elevation of 200 or 300 feet in a few days and even greater variations over longer intervals of time. A single reading, therefore, is a poor approximation to the elevation.

The proper way to determine an elevation barometrically is to ascertain by simultaneous readings the *difference* in air pressure at the station in question and at least one other station whose elevation is known. The *mean* temperature of the column of air between the stations and its moisture content must also be determined or estimated as accurately as possible. These data, by the use of a suitable hypsometric table, give the difference in elevation between the known and the unknown station. When simultaneous barometer readings at two stations cannot be made, the approximate sea level pressure can often be found or interpolated from daily weather maps, if such are available for the region in question. Although the aneroid is very convenient, very sensitive, and unaffected by variations in gravity, yet its instrumental error changes irregularly in a few weeks or months, sometimes in a few days, especially if exposed to rapid and large changes in pressure, as in mountain climbing, balloon ascensions, etc.

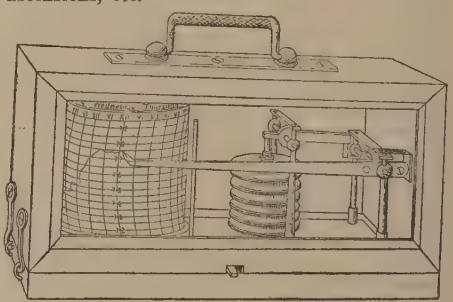


FIG. 3. BAROGRAPH, OR RECORDING ANEROID.

The Bourdon aneroid consists essentially of a portion of a thin hollow ring of elliptical cross-section, such as is used in many forms of steam and other pressure gauges. The ring is exhausted of air and then hermetically sealed, and is therefore a vacuum chamber. Changes of pressure alter the curvature of this ring, whose changes of shape are shown on a magnified scale by a delicate pointer.

The aneroid barometer is also easily arranged to be self-registering, and is then known as a barograph.

Bibliography. For fuller details of the construction and use of the aneroid, consult Abbe's *Treatise on Meteorological Instruments* (Washington, 1887), and the works referred to therein, or any of the larger treatises on experimental physics. See BAROMETER.

AN'EURIN. A Welsh poet, who probably lived c.603. According to the received account, he was the son of Caw ab Geraint, the chief of the Otadini; while others have identified him with Gildas, the historian, and Mr. Stephens, the translator of his poem, makes him Gildas's son. He was present at the battle of Cattraeth as bard and taken prisoner. After his release he returned to Llancarvan and later in life lived at Galloway. He is said to have perished at

the hands of Eidyn ab Einygan. His epic poem *Gododin*, which in its present form contains over 900 lines, and is preserved in a manuscript of the thirteenth century, tells of the defeat of the Britons by the Saxons at Cattraeth; but the obscurity of the language has made it impossible to gain from it a clear account of the defeat, and it has even been maintained that the subject of the poem is the massacre of the Britons at Stonehenge (472). Stephens connects the event with the battle of Dagstan (603). The *Gododin* was published with an English version and notes in 1852, by Rev. J. Williams ab Ithel, and the text appears with a translation in F. Skene's Four Ancient Books of Wales (1866). The Cymmrodorian Society published in 1855 a new edition, with translation by Thomas Stephens. Aneurin is the reputed author of one other poem. Consult Maclean, *The Literature of the Celts* (Glasgow, 1906). See WELSH LANGUAGE AND LITERATURE.

AN'EURISM. A pulsating tumor, consisting of the dilated wall of an artery, or having direct communication with an artery. Arterial walls are composed of three coats, any or all of which may be involved in aneurismal formation. When the whole wall is evenly dilated, a fusiform aneurism is created. A saccular aneurism is one in which the inner and middle coats have given way at one point, making a sac or pouch, limited by the outer coat only. A dissecting aneurism occurs when the inner and part of the middle coat give way, and the blood is forced between the various layers. Cirsoid aneurism occurs when several communicating arterial trunks are dilated. Sometimes a direct communication is found between an artery and a vein, in which case the latter, being exposed to unusual pressure, is apt to become distended and tortuous. Such a condition is called aneurismal varix. A false aneurism is one in which there is rupture of the entire wall of an artery and the blood comes into direct contact with the surrounding tissues. The pathological condition underlying most aneurisms is a weakening of the arterial walls from disease. Arteriosclerosis, favored by age, the excessive use of alcohol, prolonged mental strain, and syphilis are the usual factors. Immediate or exciting causes are sudden strains, injuries, violent exercise, and emotional excitement. Aneurisms prove fatal by pressure on some important part or by rupture. They are cured, sometimes spontaneously, by a deposit, within the sac, of fibrin from the blood—a result the surgeon can promote in various ways. Prolonged pressure on the trunk of the vessel was a favorite method with the older surgeons. The artery may be tied on each side of the sac close to it (method of Antyllus); on the side nearest the heart at some distance from the aneurism (method of Anel); on the distal side near the sac (method of Brasdor); or the first distal branch may be tied off (method of Wardrop). *Aneurismorraphy*, introduced by Matas in 1889, consists in laying open the sac and tying off all vessels leading to it without attempting to preserve the parent artery. In saccular aneurisms, however, where only one opening exists between the sac and the artery, this opening may be closed and the empty sac folded down and sutured. This is known as *endo-aneurismorraphy*, as is the following procedure. The blood is diverted by means of a rubber tube temporarily inserted into the walls of the vessel, on each side of the sac. The latter is then obliterated and the wall of the artery repaired. The rubber tube is then removed and the blood allowed to flow through the natural channel. Endo-aneurismorraphy is now practiced in many cases where extirpation would formerly have been done, and constitutes a great advance in this branch of surgery, since it preserves the blood supply of the part and prevents many complications which are incident to a sudden cutting off of the circulation. Aneurisms inaccessible to surgical attack are sometimes treated by inserting needles into the tumor; or by inserting and coiling fine silver or gold wire within the sac, to promote clotting. Sometimes an electric current is passed through the coiled wire. Internal aneurism requires prolonged rest and the administration of remedies that quiet the heart's action.

ANFOSSI, ân-fôs'sê, PASQUALE (1729–97). An Italian composer. He was born at Naples, was a pupil of Sacchini and Piccini, and wrote *Il finto medico* (presented in 1764) as his first operatic composition. He was appointed chapelmaster at Venice in 1775 and directed the opera at London from 1781 to 1783. Subsequently he was choirmaster in the church of St. John Lateran, Rome. Of his numerous operas, which are marked rather by skillful arrangement than by much originality, the best known were *L'avaro*, *Il curioso indiscreto*, and *I viaggiatori felici*. His sacred compositions are considered less important.

ANGARA, än-gä'rȧ. A river in Siberia, the most important affluent of the Yenisei on its right (Map: Asia, J 3). Properly speaking, there are two rivers by that name: the Upper Angara, rising among the ridges of the Olekma and Vitim Mountains, lat. 57° N. and long. 114° 56′ E., and emptying into the northern end of Lake Baikal; and the Lower Angara, an outlet of the lake, whence it issues as a stream of clear, transparent water, flowing by the city of Irkutsk toward the north, then to the west, for a distance of about 1300 miles. The river is about 9000 feet wide at its broadest part and 1600 feet at its narrowest. It is of sufficient depth for navigation as far as Irkutsk, but has numerous rapids in the middle of its course. Steamers do not ascend farther than its junction with the Ilim. Obstructions in the channel have been removed and the most dangerous rapids have been circumvented so that navigation has been greatly improved. Into the Angara fall numerous considerable tributaries—the largest of which are Irkut, Kitai, Bielaya, Oka, and Tasserva on the left, and Kunda, Yanda, Ilim, and Tchadobetz on the right. It was discovered by the Cossack traders early in the seventeenth century; in 1645 Kolenikoff ascended it as far as the lake of Baikal. The Lower Angara is also called Upper Tunguska.

AN'GEL. An antiquated English gold coin, varying in value from $1.60 to $2.50. It was so called from the figure upon its obverse of the Archangel Michael piercing the dragon. Angels were coined from Edward IV to Charles I.

ANGEL (Gk. ἄγγελος, *angelos*, messenger). The English word denotes a superhuman being intermediate between God and man. But the original meaning was simply that of a "messenger," either human or superhuman. It is doubtful whether the word was used at all in preexilic times as a designation of a being greater than man. In Gen. vi. 2, the term "sons of God" was rendered "angels" by the Greek ver-

sion; in earlier days they were no doubt regarded as divine beings. The "angel of Yahwe" is thought by many scholars to be a manifestation of this deity, and it was probably so understood in antiquity; but the "angel" is likely to have been brought into the text as a substitute for Yahwe himself, appearing in the original form of the narrative. In Jacob's vision the "angels" seem also to have been originally "gods" or "sons of gods." As long as Yahwe manifested himself in human shape, he had no need of a messenger. There were beside him "gods many and lords many" with their habitat in the sky or on the earth, in trees and fountains and stones, by the hearth and in the tomb; but they were not messengers. The gods formed a heavenly council. In the story of the Garden of Eden the divine being who speaks declares: "Man has become like one of us." Possibly the title "Yahwe of hosts" refers to armies of such spirits. But they were simply called *Elohim*, or *Bene Elohim*, "sons of gods," not "angels."

It was the growth of monotheism that forced reflection upon the character of these superhuman beings. The second Isaiah looked upon the gods of the nations as mere lifeless statues. This view could not gain permanent ascendency. It was too superficial. Only the subordination of all spirits to Yahwe was essential. The gods of the peoples ceased to be independent rulers and became Yahwe's servants, henceforth to do his bidding in connection with the natural forces and elements with which they had been previously associated, or as guardians of the nations they had once governed.

In Daniel the celestial princes of Persia and Greece are mentioned, and already in Deut. xxxii. 8, 9, the original text is supposed to have expressed the idea that when the gods divided between themselves the nations Israel fell on Yahwe's lot. The sons of the gods have become angels in the prologue to Job. An increasing emphasis on the divine transcendence caused a reluctance to ascribe to him certain activities. He no longer reveals himself directly, but through an angel, to his prophets; he does not fight his people's battles, but his chief angel stands up for Israel; he no longer tempts to evil or inflicts it himself, but allows an angel, the Satan, to do this. Angels receive individual names, Michael, Gabriel, Raphael, Uriel. Under the influence of Persian thought, the conception of seven archangels is introduced, corresponding to the seven *amesha spentas*, and these angels are spoken of as "watchers." The idea that the angels were created is found in the Book of Enoch and the Book of Jubilees. The fall of the angels is not taught expressly in the Hebrew Bible, though there are hints of conflicts in heaven, and God is said to find wickedness in his angels; the idea is fully developed in the Book of Enoch.

Jesus in his discourses mentions angels, and, indeed, represents each human being as having a celestial patron (Matt. xviii. 10), pictures the angels as rejoicing over the repentance of sinners (Luke xv. 10), and states that those who are permitted to share in the resurrection will be like angels, having no conjugal relations (Matt. xxii. 30). The evangelists expected his return upon the clouds of heaven as the Messiah accompanied by his holy angels. In the Apocalypse angels figure prominently. They also occur frequently in Paul's writings. Angels are said to be created (Col. i. 16), and should not be worshiped (Col. ii. 18). Instead of the earlier conception that God himself had written the decalogue and given the law to Israel, the angels were conceived of as the agencies through which the law was given (Gal. iii. 19). The prevalent interpretation of Gen. vi. 1, as referring to intercourse between angels and women, is supposed by many scholars to be the cause of the commandment to women not to wear veils (1 Cor. xi. 10). The angels are powerful beings, "thrones" and "principalities," and men should not turn away from Christ to these "elementary spirits of the world" (Gal. iv. 3).

In the Christian Church the belief in angels has continued until the present time, though gradually losing its intensity through the accession of martyrs and saints to the class of intermediaries between God and man, and in more recent times through the spread of rationalistic tendencies of thought. An excellent summary of our present knowledge of Jewish angelology is found in Dr. K. Kohler's article on this subject in *The Jewish Encyclopædia;* the relations to Babylonian thought are well treated in R. Stübe's *Jüdisch-Babylonische Zaubertexte* (Halle, 1895), and the relations to Mazdaism in Nathan Söderblom's *La vie future dans le Mazdeisme* (Paris, 1901). The names of angels in the Book of Enoch have been discussed by N. Schmidt in *Old Testament and Semitic Studies, in Memory of W. R. Harper* (1908), and Barton in *Journal of Biblical Literature* (1912). A large number found in Jewish and Mandæan lore have been discussed by Montgomery, *Aramaic Incantation Texts from Nippur* (1913).

The creation of the angels was placed, by the Platonizing Church Fathers, before that of the material world; others assigned to it some one of the six days. Equally various were the opinions as to the nature of the angels. The second Council of Nicæa (787) assigned them a subtle, ethereal, or fire-like body; the scholastics, on the other hand, and the Fourth Lateran Council (1215) maintained their immateriality; while others, owing to the appearing of angels, mentioned in Scripture, attributed to them the power of assuming momentarily the corporeal form.

Some of the patristic writers also spoke of good and bad guardian angels, the former of whom were always ready to prompt to good actions and to avert evil, while the latter were equally quick in bringing about mischief, wickedness, and calamity. From the belief in the guardianship of angels, and their participation in the government of the world, arose naturally the practice of invoking and worshiping them. Ambrose said: "We should pray to the angels who are given to us as guardians" (*De Viduis*, ix). Many Christian teachers condemned it, appealing to Col. ii. 18; and the Council of Laodicea, in the fourth century, called it disguised idolatry. But after the Second Council of Nicæa had conceded that, though angels were not to receive divine worship, they might receive reverential obeisance, the practice mentioned became more and more rooted, and continues in the Greek and Roman Catholic churches to this day.

ANGEL, Benjamin Franklin (1815–94). An American diplomat, born at Burlington, N. Y. He studied law and was admitted to the bar and served as surrogate in 1834–41 and 1844–47. He was sent as United States Consul to Honolulu in 1853. The same year he was special commissioner to China for the settlement of differences

between the Chinese government and American merchants with regard to the levying of export duties. He was Minister to Sweden and Norway in 1857–62; a delegate to the Chicago Democratic convention in 1864; and in 1873–74 president of the New York State Agricultural Society.

AN'GELA MERICI, mâ-rē'chê, SAINT (1470–1540). Founder of the Roman Catholic order of Ursulines (q.v.). She was born at Desenzano, on Lake Garda, was of the Franciscan tertiaries when she founded in Brescia the order in 1535, and died there, Jan. 27, 1540. Consult her life by Sintzel (Regensburg, 1842) and by J. A. At (Notre Dame d'Alet, 1885).

AN'GEL FISH (alluding to its large, wing-like fins), or ANGEL SHARK, or MONK FISH. An elasmobranch (*Squatina angelus* or *squatina*), very closely related to the shark, with a broad and flattened body and with the much enlarged pectoral fins expanded laterally like wings. It attains a size of three to four feet, and is harmless, being sluggish and feeding on crabs and shells, which it crushes with its small, nail-like teeth. It is found in tropical seas, is common in the Mediterranean, and also occurs upon both the eastern and western shores of the warmer parts of North America, keeping near the bottom and being nowhere numerous. It is also known to American fishermen as "monk fish."

Another angel fish in the United States is one of the porgies (*Chætodipterus faber*). See PORGY.

In Bermuda the name is applied to chætodonts of the genus Holacanthus, and especially to the widely distributed emperor fish (*Holacanthus ciliaris*). Goode says that it attains a weight of four pounds and "far surpasses all the other fishes of the region in the delicious flavor and in its lovely hues." A second species is the black angel fish (*Holacanthus tricolor*), which, like the other, is common throughout West Indian waters. See CORAL FISH, and Plate of CORAL FISHES.

ANGELI, än'gĕ-lī, HEINRICH VON (1840—). A historical, genre, and portrait painter. He was born at Odenburg, Hungary, studied in the Vienna Academy and with Leutze at Düsseldorf, where he painted the famous picture, "Mary Stuart at the Reading of the Death Warrant" (1857). In 1859 he went to Munich and in 1862 he removed to Vienna, where he soon won recognition as a painter of portraits, particularly those of royalty. Some of the best of his portraits are those of the Crown Prince Frederick William (1874); General von Manteuffel (1879) and Andreas Achenbach (National Gallery, Berlin); Field-Marshal von Moltke (Museum of Breslau, 1884); "Queen Victoria Enthroned" (1885); "Emperor William II in the Uniform of a General" (1888), and Empress Maria Fedorovna of Russia. His portraits are characterized by a certain elegance of bearing and by picturesque arrangement.

ANGEL'ICA (Lat., angelic, i.e., plant or herb, in allusion to its medicinal qualities). A genus of plants of about 40 species belonging to the family Umbelliferæ. The species are tall perennial herbs, natives of the northern hemisphere and New Zealand. Wild angelica (*Angelica sylvestris*) is a common plant in moist meadows, by the sides of brooks, and in woods throughout many parts of Europe and Asia. The root is perennial, short, ringed, and branched; it is white within, and contains a yellow, milky juice. Garden angelica (*Archangelica officinalis*) is a biennial plant, becoming perennial when not allowed to ripen its seeds. It has greenish flowers in almost spherical umbels. The stem is as high as a man. The fruit is long and straw-colored. The root is long and fusiform, an inch or more in thickness, with thick, irregular rugose rootlets. The whole plant, and especially the root, is aromatic and bitter, containing much resin and essential oil. The root has been admitted into the pharmacopœias as an aromatic stimulant and tonic, and occasionally used in nervous ailments, indigestion, flatulence. The root of *Angelica sylvestris* is sometimes substituted for it, but is much weaker. The garden angelica was at one time much cultivated for the blanched stalks, which were used as celery now is; but its cultivation for this purpose has been almost entirely discontinued. The tender stalks and midribs of the leaves, candied, are still, however, a well-known article of confectionery and an agreeable stomachic; the roots and seeds are employed in the preparation of gin and of "bitters." The plant is a very doubtful native of Great Britain, but is common in many parts of Europe and even in Lapland and Iceland. The Laplanders not only use it as food, but regard the stalks roasted in hot ashes as an efficacious remedy in pectoral disorders. The powdered seeds of the wild angelica are used by the country people in some parts of Europe to kill lice. About 20 species of *Angelica* are natives of North America, *Angelica villosa* and *Angelica atropurpurea* being the best known in the eastern United States. They are perhaps without any important economic value.

ANGEL'ICA. 1. In Boiardo's *Orlando Innamorato* and Ariosto's *Orlando Furioso*, a beautiful and faithless Oriental princess, the mischief-maker who beguiles Orlando. She is noted for her magic ring, which had the power of making its wearer invisible. 2. In Congreve's *Love for Love*, an attractive heiress. 3. A character in Farquhar's *The Constant Couple* and *Sir Harry Wildair*.

ANGELICA TREE. See ARALIA.

ANGEL'IC DOCTOR, THE (Lat. *Doctor Angelicus*). Thomas Aquinas, so called by his admirers; known also as "The Angel of the Schools."

ANGELIC HYMN. Another name for the *Gloria in Excelsis* (q.v.).

ANGELICO, FRA (1387–1455). A Florentine religious painter, the last and greatest of the transition from the Middle Age to the Renaissance in Italy. His original name was Guido da Vecchio, and he assumed the name of Giovanni (John) on entering the convent of Fiesole, whence he is often called Fra Giovanni da Fiesole, or, incorrectly, Fiesole. Angelico refers to the character of the good friar, who was afterward beatified. He was born in 1387 at Vecchio, in the fertile Mugello district, a Florentine possession in Tuscany, and entered the reformed Dominican convent at Fiesole in 1407. The head of this house, the pious and able St. Antoninus, probably had a great influence in forming the young brother's character. As the Order adhered to Gregory XII in the papal schism, the brethren were exiled to Foligno and Cortona in 1409 and did not return to Fiesole until 1418. Angelico's master in painting is unknown, but from the character of his work it is evident he began as a miniaturist. His

style shows Sienese affinities, and he may have been influenced by Lorenzo Monaco. Paintings of his earliest period survive at Cortona: "Madonna and Four Saints" with predella of "Life of St. Dominick," in San Domenico, and a beautiful "Annunciation" with predella of "Life of the Virgin," in the Oratorio dell Gesù. Soon after the return to Fiesole he must have painted four small reliquary panels, the most celebrated of which, the "Madonna of the Star" (see illustration), was recently stolen from San Marco, but speedily recovered (1912). Of a not much later date is the remarkable predella, now in the National Gallery, London, "Christ in Glory Surrounded by Saints and Angels"—266 figures in all. To the Fiesolan period belong also the "Coronation of the Virgin" in the Florence Academy, and the larger and finer example of the same subject in the Louvre; also the impressive "Last Judgment" with its delightful representation of Paradise, in the Florentine Academy. Another version of the same subject, perhaps of a later date, is in the Berlin Gallery. In 1431 Angelico signed the contract for the "Madonna of the Linen Weavers," Uffizi, the chief glory of which is the 12 surrounding angels making music—the best known of all his figures. The works of his early period are Gothic in character and decoration, but from about 1430 Renaissance elements appear.

In 1436 the Dominicans of Fiesole moved to the convent of San Marco in Florence, which the munificence of Cosimo de' Medici converted into a house of their order. Michelozzo was the architect, and his architectural forms greatly impressed Angelico and often appear in his work. He was also influenced by the frescoes of Masaccio, in the Brancacci Chapel, as may be seen by his improved rendition of the nude and of movement. For the high altar of the convent church he painted his well-known "Madonna di San Marco," now in the Florentine Academy, and from about the same time dates the "Deposition" said to contain the portrait of Michelozzo. His many beautiful frescoes at San Marco were the cause of its conversion into a national museum. The cloisters contain, among others, "St. Dominick at the Foot of the Cross" and "Christ as a Pilgrim"; the chapter house, a much larger fresco of the "Crucifixion," and in the cells above are 43 frescoes, painted from about 1438 to 1455. Among the most beautiful of these are the "Noli mi Tangere," "Adoration of the Kings," the "Transfiguration," and the "Virgin Enthroned."

In 1455 Fra Angelico was summoned to Rome by Pope Eugenius IV to fresco the Chapel of the Sacrament in the Vatican, which has unfortunately been destroyed. In the summer of 1447, assisted by his pupil Benozzo Gozzoli, he decorated part of the ceiling of the Chapel of San Brizio in the cathedral of Orvieto with the subjects, "Christ in Judgment," surrounded by angels, and "The Prophets." The following winter he probably began the frescoes of the Chapel of Pope Nicholas V, in the Vatican, with eight scenes from the lives of Sts. Stephen and Lawrence. These are his greatest works and show his art at its zenith; for in them he has achieved the perfect freedom of the Renaissance. In 1449 he was prior of his old convent at Fiesole, where we still find him in 1452. He died in the house of his Order at Rome, and his famous grave slab still rests in their church, Santa Maria sopra Minerva.

The traditional view of Fra Angelico as a man of infinite goodness, sincere piety, and sacramental earnestness in his work has proved the correct one. He was par excellence the religious painter of the Renaissance, and his work was really seraphic. His effects are attained by the wonderful expression of the faces and the beauty of color and arrangement. Although his early paintings are deficient in technique, his progress was constant. He gradually mastered the nude, movement, and perspective, and in his last works, the Roman frescoes, he ranks as one of the foremost painters of the Renaissance. In some respects he was even an innovator, being one of the first to paint the Christ Child as a real infant, and the very first to paint a landscape that can be identified, and to communicate a sense of the pleasantness of nature.

Bibliography. The best biographies of Fra Angelico are the delightful and interesting booklet by Supino (Florence, 1898; Eng. trans., Florence, 1902), and the scholarly effort of Langton Douglas (London, 1901). Other treatises are by Cartier (Paris, 1857; new ed., 1902), Förster (Regensburg, 1859), Goodwin (London, 1861), Phillimore (London, 1881), Ley (London, 1886), Beissel (Freiburg, 1895; 2d. ed., 1905), Tumiati (Florence, 1897), Crawford (London, 1900), Williamson (London, 1901), Niewbarn (Leyden, 1901), Broussole (Paris, 1902), Rothes (Strassburg, 1902), Sortais (Lille, 1905), Cochin (Paris, 1906), Newnes (London, 1906).

ANGELIC SALUTATION. See AVE MARIA.

AN'GELI'NA. 1. In *The Rival Ladies*, by Dryden, a sister of Don Rhodorigo. 2. In Goldsmith's ballad of "Edwin and Angelina" in *The Vicar of Wakefield*, the heroine. 3. A pseudonym used by Harriet Martineau.

ANGELIQUE, ăn'zhă'lēk'. 1. In Molière's *Le malade imaginaire*, the daughter of the "invalid" Argan. 2. In Molière's *Georges Dandin*, the aristocratic wife of the rich peasant who is the principal character.

ANGELL, ān'jĕl, GEORGE THORNDIKE (1823–1909). An American philanthropist. He was born at Southbridge, Mass., and was educated at Brown University, Dartmouth College, and Harvard Law School. After his admission to the bar, in 1851, he practiced in Boston for many years. In 1868, with several other influential persons, he founded the Massachusetts Society for the Prevention of Cruelty to Animals, of which association he was later elected president. In the same year he established the publication entitled *Our Dumb Animals*, the first periodical of its kind. During a visit to England in 1869 he urged the Royal Society to publish the *Animal World* and induced the Baroness Burdett-Coutts to organize the Ladies' Humane Educational Committee of England; and he was instrumental in the formation of many similar societies throughout the United States. In 1882 a movement for the establishment of "Bands of Mercy," with the promotion of kindness to animals as their object, was initiated by him. After 26 years 72,000 of these societies were in active existence. In 1889 he was empowered by the Massachusetts Legislature to incorporate the American Humane Education Society. Mr. Angell has also been instrumental in establishing several public health associations and in promoting the movement directed against the sale of poisonous and adulterated foods. Many

FRA ANGELICO

MADONNA OF THE STAR, IN THE CONVENT OF SAN MARCO, FLORENCE

of his publications have been translated into foreign languages. One of them is the entertaining volume entitled *Autobiographical Sketches and Personal Recollections* (Boston, 1891).

ANGELL, James Burrill, LL.D. (1829–1916). An American educator and diplomat. He was born in Scituate, R. I., graduated at Brown University in 1849, and after travel in the South and in Europe became, in 1853, professor of modern languages and literature in Brown University. He was the editor of the Providence *Daily Journal* from 1860 to 1866, when he was appointed to the presidency of the University of Vermont. In 1871 he became president of the University of Michigan, which under his continued administration came to be one of the foremost universities in the country. He was United States Minister to China from 1880 to 1881, at the same time acting as one of three commissioners to negotiate a new treaty with that government. Dr. Angell was a member of the Anglo-American International Commission on Canadian Fisheries in 1887, and in 1896 he was chairman of the Canadian-American commission on a deep waterway from the great lakes to the sea. He was appointed Minister to Turkey in 1897, but resigned in May, 1898. In 1887 he became a regent of the Smithsonian Institution. In 1909 he was made president emeritus of the University of Michigan. Besides numerous addresses and frequent contributions to magazines, President Angell published *Progress in International Law* (1875), the article on "The Diplomacy of the United States," for the *Narrative and Critical History of America* (1888); *Reminiscences* (1912); *Selected Addresses* (1912).

ANGELL, James Rowland (1869—). An American psychologist. He was born in Burlington, Vt., the son of James Burrill Angell (q.v.), and graduated from the University of Michigan in 1890. Post-graduate studies he took at Michigan, Harvard, Berlin, and Halle universities, and in Paris, Vienna, and Leipzig. In 1893 he was instructor in philosophy at the University of Minnesota, a position which he left in the following year to begin a long service in the University of Chicago—becoming assistant professor of psychology and director of the psychological laboratory (1894), associate professor of psychology (1901), and professor and head of the department (1905). In 1908 he was appointed senior dean of the University of Chicago, and in 1911 dean of the University faculties. He became a member of several learned societies, and in 1906 had tendered to him the presidency of the American Psychological Association. His writings include *Psychology* (3d ed., 1907); *Chapters from Modern Psychology* (1911).

ANGELL, Joseph Kinnicut (1794–1857). An American lawyer. He was born in Providence, R. I., and graduated at Brown University in 1813. He published a *Treatise on the Law Concerning the Liability and Rights of Common Carriers* (2d ed., 1845); a *Treatise on the Common Law in Relation to Water Courses*, with an appendix (5th ed., 1850); *A Practical Summary of the Law of Assignments* (1835); a *Treatise on the Law of Fire and Life Insurance* (1854); with Chief Justice Samuel Ames, a *Treatise on the Law of Private Corporations* (4th ed., 1858), etc. He also edited the *United States Law Intelligencer and Review* (1829–31). Consult S. S. Rider, "Bibliographical Memoirs of Three Rhode Island Authors," in *Rhode Island Historical Tracts*, 11 (Providence, 1880).

ANGELL, Norman. See Lane, Ralph Norman Angell.

AN'GELO. 1. In Shakespeare's *Measure for Measure*, the duke's hypocritical deputy. The Duke frustrates his evil designs, compelling him to give up Isabella and marry Mariana, whom he has deserted. 2. A character in Shakespeare's *Comedy of Errors*.

ANGELO, Michael. See Michelangelo.

ANGELO, Tyran de Padoue. A drama in prose by Victor Hugo, produced by the Comédie Française, April 28, 1835. It was produced later in London (translated by G. H. Davidson) as *Angelo and the Actress of Padua*. The period of the action is the sixteenth century.

ANGEL OF THE CHURCH. The term applied in Revelation to each of the recipients of the Saviour's messages to the Seven Churches of Asia. It is perhaps best to understand it as meaning the presiding officer of the Church, who would naturally be the one to whom a message would be sent, and who may fairly be considered representative of the churches (cf. Rev. i. 20). See Churches of Asia, The Seven.

AN'GELUS, The. A well-known painting by J. F. Millet (1859). It represents two French peasants stopped in their field work for a moment of prayer at dusk by the Angelus bell, which the artist has suggested by the church spire in the distance. It was sold by the artist for a small sum, but in 1889 was bought by the American Art Association for more than 580,000 francs and exhibited in this country. The next year M. Chauchard bought it for $150,000; it is understood that it will ultimately find a place in the Louvre.

ANGELUS BELL, The. A bell rung in all Catholic countries morning, noon, and night to invite the faithful to the recitation of the angelic salutation. Formerly the hours for the ringing of the Angelus were at sunrise, noon, and sunset, but it is now more generally heard at the appointed hours of noon and six o'clock both morning and evening. The bell receives its name from the title given the prayer recited at this time, *Angelus Domini*, also called *Ave Maria*.

ANGELUS DOM'INI (Lat., The Angel of the Lord). The name of a brief prayer repeated by Roman Catholics at the sound of the Angelus bell, at sunrise, noon, and sunset.

ANGELUS SILESIUS, sī-lē'shī-ŭs, Johann Scheffler (1624–77). A German religious poet. He was born in Breslau, studied medicine at Strassburg, Leyden, and Padua, and in 1653 entered the Catholic Church. In 1661 he joined the Minorites and was ordained priest. His earlier writings include a number of pronouncedly mystical poems, such as the *Cherubinischer Wandersmann* (1657), a profound and pantheistic description of the way to God. Subsequently he became a fanatical controversialist. He wrote some stirring hymns, of which some found their way even into Protestant hymnals. There is an edition of his works, by Rosenthal (2 vols., 1862). Consult also: Schrader, *Angelus Silesius und seine Mystik* (1853); A. Kahlert, *Angelus Silesius: Eine litterarhistorische Untersuchung* (1853); the biography by C. Seltmann (Breslau, 1876); Wilhelm Bölsche, "Ueber den Wert der Mystik unserer Zeit," in the new edition of *Cherubinischer Wandersmann* (Jena, 1905).

ANGELY, äN'zh'lē', Louis (c.1788–1835).

A German actor and dramatist. He was born in Berlin and began his career as an actor early in life. He was at first a comedian at the German theatre at St. Petersburg and in 1828 went to Berlin, where for two years he was a rather mediocre actor and afterward skillfully adapted French plays to German conditions. Among his best productions are: *Paris in Pommern, Die Hasen in der Hasenheide, Wohnungen zu vermieten, Sieben Mädchen in Uniform* (very successful), *Von Sieben die Hässlichste,* and *Das Fest der Handwerker,* which is still played. His plays were collected and published under the titles of *Vaudevilles und Lustspiele* (4 vols., Berlin, 1828–42), and *Neuestes komisches Theater* (3 vols., Hamburg, 1836–41).

AN'GER (Icel. *angr,* grief, straits; OHG. *angust;* Ger. *Angst,* anxiety; Lat. *angor,* a choking, strangling, anguish, from the root *ang,* seen in Lat. *angustus,* narrow, close; Gk. ἄγχι, *anchi,* near; Ger. *eng,* narrow, close; AS. *ange, onge,* narrow, strait, troubled). An emotion (q.v.) characterized by a peculiar, aggressive attitude toward its object (usually a person) and by the large number of expressive bodily movements which accompany it. Wundt has attempted a detailed analysis of the emotion. Anger, he finds, belongs to the group of emotions that always refer to some external object. Its various forms differ from one another in three ways. 1. They differ qualitatively, i.e., in the relative amounts of their component feelings. For example, irritation contains a fusion of unpleasantness and excitement, while rage contains unpleasantness and depression. Furthermore, there is a greater amount of unpleasantness in irritation than in rage, so that the former emotion is more subjective—there is a greater consciousness of self. Since, therefore, all forms of anger are objective, and since some forms are further characterized by the dominance of subjective feelings, we may distinguish two classes of anger, the subjective-objective, in which the subjective feelings are most prominent, and the objective-subjective class in which the feelings which refer to the object are so strong that we are scarcely aware of self. 2. They also differ in intensity. Some forms, as rage, are strong; some, as chagrin, are weak; other forms are variable. These two differences, viz., quality and intensity, determine the general character of the emotion. The subjective-objective forms arranged in the order of increasing intensity are: chagrin, irritation, exasperation. The objective-subjective forms arranged in the same order of intensity are: offense, anger, rage. 3. Finally, the various kinds of anger may differ in their modes of occurrence. This difference is determined by the rapidity of the succession of the component feelings. For example, rage may be sudden, it may arise gradually, or it may be intermittent.

The most common bodily accompaniments of anger are vaso-motor disturbances (most easily seen in flushing and pallor), glandular secretion (such as tears and saliva), modifications of respiration, and involuntary movements. Other more or less specific bodily signs are screaming, crying, threatening articulations, trembling, stamping, facial contortions, scratching, striking. The coarser bodily expressions of anger are more moderate in the adult and the cultured than in the child and the primitive man. The efforts of society to secure justice and well-being for the individual destroy many of the sanctions for anger and also control its manifestations. Doubtless the value of anger in the history of the race has been great. It has prevented the encroachments upon the individual which tend toward extermination. Consult W. Wundt, *Grundzüge der physiologischen Psychologie* (Leipzig, 1911).

ANG'ERBO'DA. In Norse mythology, a giantess, mother of Fenrir.

ANGERMANELF, ŏng'ĕr-män-ĕlf'. A river in Sweden, rising on its western boundary (Map: Sweden, G 5). After passing numerous lakes, it enters the Gulf of Bothnia by a large estuary, north of Hernösand. It is about 150 miles long, navigable for small craft for 75 miles, and celebrated for the beautiful scenery of its banks.

ANGERMANLAND, -länt'. A former division of Sweden, now chiefly comprised in the län of Vesternorrland. It extends along the Gulf of Bothnia and is watered by the Angermann River. The district exhibits great variety of wild and beautiful landscape—wood, mount, stream, and lake. It is under a high state of cultivation, produces barley, rye, and peas, and abounds in excellent pasture-land. The inhabitants are known for their sobriety, industrious habits, and general prosperity. The chief town and port, Hernösand, had a population of 9350 in 1910. It stands on the small island of Hernö, near the mouth of the Angermann River, and has weekly steam communication with Stockholm.

ANGERMÜNDE, äng'ĕr-mün'de. A garrison town and railway junction on Lake Münde, capital of a circle of the same name in the province of Brandenburg, Prussia, 45 miles northeast of Berlin by rail (Map: Prussia, E 2). It has iron foundries and manufactures woolen and linen goods. Its principal public building is St. Mary's Church, a lofty Gothic structure of the fourteenth century. Pop., 1895, 7334; 1905, 7589; 1910, 8200.

AN'GERO'NA. An early Roman divinity in some way connected with silence and always represented with her finger on her lips or with the mouth bound with a fillet or gagged. Her festival, the Angeronalia, or Divalia, which was celebrated on the 21st of December, would seem to indicate some relationship with the winter solstice. Later she took on the nature of a goddess of sorrow and disease. See Fowler, *Roman Festivals* (New York, 1899).

ANGERONALIA. See ANGERONA.

ANGERS, äN'zhâ' (the ancient *Andes,* capital of a Gallic tribe, known under the Lat. form *Andecavi*). Formerly the capital of the duchy of Anjou, and now of the French department of Maine-et-Loire, situated on both sides of the navigable river Mayenne, not far from the junction of the Sarthe with it, about 5 miles from its confluence with the Loire and 190 miles southwest of Paris (Map: France, N., E 5). Old Angers, 'the Black City,' is fast disappearing, and a new, bright town taking its place. The cathedral of St. Maurice is one of the oldest surviving structures and is a fine specimen of thirteenth-century Gothic. The castle of Philip Augustus still stands, with its round towers. Angers is the see of a bishop. It has several colleges, a university with faculties of law, mathematics, science, and philosophy, a school of art, a theological seminary, an institution for the deaf and dumb, a botanical garden, a large picture gallery, several museums and theatres, a public library, and several old churches. The ruins of the ancient castle of

Angers, built by St. Louis about the middle of the thirteenth century, are situated on a projecting rock above the river. Sail-making, cotton-spinning, stocking-weaving, the manufacture of umbrellas and parasols, etc., are carried on to a considerable extent, and there is a trade in corn, wine, brandy, flax, hemp, honey, etc. There are important slate quarries in the neighborhood. Angers is the birthplace of René of Anjou, the learned Ménage, the publicist, J. Bodin, and the sculptor David, whose statue was unveiled in the Place de Lorraine, Oct. 24, 1880. Pop., 1901, 82,398; 1911, 83,786. Consult A. Debidour, *La Fronde angevine; la vie municipale au XVII^e siècle* (Paris, 1877).

ANGERS, Auguste Real (1838—). A Canadian lawyer and statesman. He was born in Quebec, educated at Nicollet College, and admitted to the bar in 1860. He soon attained considerable success in legal practice and in 1874 was elected as a Conservative to the Legislative Assembly, taking office in the De Boucherville ministry successively as Solicitor-General and Attorney-General. In 1879 he was elected to the Dominion House of Commons, but in 1880 was appointed a judge of the Superior Court of Quebec, an office which he held for seven years. During 1887–92 he was Lieutenant-Governor of Quebec province, and in 1891 caused much political excitement and criticism by his dismissal of Honoré Mercier, Premier of the province. In December, 1892, he was appointed to the Dominion Senate, when he became a member of the Conservative ministry of Sir John Thompson. He was also a member, successively, of the brief ministries of Sir Mackenzie Bowell and Sir Charles Tupper. Upon the defeat of the Tupper ministry in 1896 he retired to private life.

AN'GEVIN LINE, or **DY'NASTY.** The English kings from Henry II to John, since their family, the Plantagenets, came from Anjou in France.

ANGHIERA, än-gyâ'rȧ, or **ANGHERA,** ȧn-gā'rȧ, Pietro Martire de. See Peter Martyr.

AN'GILBERT, *Fr. pron.* ȧn'zhêl'bâr', Saint (c.740–814). A friend and privy councilor of Charlemagne, the most distinguished poet of his age, who in 790 became Abbot of Centula (the present St. Riquier). In 800 he was present in Rome at the coronation of the Emperor. He was a member of the so-called Academy at the court of Charles, in which he bore the honorary name of Homer. By Bertha, the daughter of Charlemagne, he was father of two sons, Harnid, and Nithard, the historian. His poems, edited by E. Dümmler, are to be found in the *Monumenta Germaniæ Historica.*

ANGI'NA PEC'TORIS (Lat. tightening of the chest or heart), or Stenocardia. It is characterized by intense pain, a sense of constriction, and a feeling of impending dissolution, which occur in paroxysms beginning over the region of the heart, or deep in the chest, and extending toward the left shoulder. The attacks are apt to appear in succession, and ultimately they kill the patient. Attacks occurring in persons showing evidence of arterio-sclerosis are called *true angina;* those occurring in individuals lacking such evidences are termed *false angina.* As to the true pathological basis of angina pectoris we are still uncertain. It is a symptom, not a disease, and is an incident in the progress of circulatory disorders. Changes in the heart, aorta, and arteries, varying from extensive valvular disease to a mild arterio-sclerosis, have been described. These changes are, however, not constant, and are also found in cases which die with no symptoms of angina. There is usually disease of the coronary or heart arteries, of the nature of an arterio-sclerosis or thickening of the walls. This may be especially marked at the origin of the vessels, and diminishes their lumen. Various theories have been advanced as to the true nature of angina. It has been considered as a neuralgia of the cardiac nerves, as a spasm of the heart muscle, as due to extreme dilatation of the heart, and as a temporary anæmia of the heart muscle due to disease or spasm of the vessels supplying it with blood. Angina pectoris is an affection of adult life, occurring most frequently between the ages of 40 and 50. The paroxysms may be induced by any excess in diet, by exertion, as walking uphill or against a strong wind, or by mental emotions. It is therefore advisable for those who have had an attack of angina to lead a quiet, regular life, avoid excesses of all kinds, and particularly refrain from mental excitement. During an attack the physician usually administers morphine, nitrite of amyl, nitro-glycerin, or chloroform.

ANGIOLIERI, ȧn'jô-lyâ'rê, Cecco (c.1250–c.1312). An Italian humorous poet of Dante's time, born at Siena. He sang of his quarrels with his father, his misadventures in love, and the poverty under which he suffered. His verse is original in form. No fewer than three sonnets are devoted to Dante, who, it is inferred, charged him with being a parasite, for in the last of these sonnets Cecco hurls the epithet back at him with a vigor which must have severed their relations once for all. Cecco himself figures in one of the tales of the *Decameron* (ix, 4). Consult Gaspary, *Italian Literature,* Oelsner's translation (London, 1901): D'Ancona, *Studj di Critica e Storia letteraria* (Bologna, 1880).

ANGIOLI'NA. The young wife of the Doge of Venice, Marino Faliero, in Byron's work of that name.

AN'GIO'MA. See Tumor.

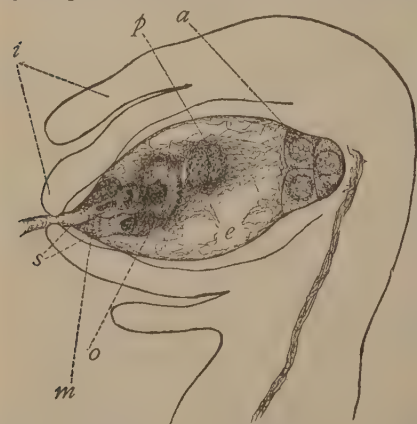
ANGIOSPERMS, ȧn'jī-ô-spĕrmz (Gk. *ἀγγεῖον, angeion,* vessel + *σπέρμα, sperma,* seed). A name applied to the greatest group of seed-plants, Spermatophytes, as distinguished from the other group, Gymnosperms, in which the "seeds are naked." The Angiosperms are estimated to comprise approximately 140,000 species, and they form the most conspicuous part of the vegetation of the earth. Since the Gymnosperms comprise only about 450 living species, it is evident that the Angiosperms are the chief modern representatives of seed-plants. Angiosperms may be said to be the most advanced, the most recent, the most conspicuous, and the most useful of plants. It is among Angiosperms also that the true flowers are developed, with elaborate relations with insects for securing pollination. The group is often called "true flowering plants," because it is characterized by the ordinary conspicuous flower. The two great divisions of Angiosperms are the Dicotyledons and Monocotyledons. The Dicotyledons are characterized by the lateral cotyledons, the organization of the woody bundles of the stem into a hollow cylinder, the open venation (often called "net-veined"), and the five- or four-parted flowers. To this group belong such forms as the common trees (poplars, oaks, elms, etc.), buttercups, roses, peas, umbellifers, heaths, mints, composites, etc. It was once supposed

that the Monocotyledons are the primitive Angiosperms, but more recent investigations, particularly in vascular anatomy, have shown that the Monocotyledons are an offshoot from the Dicotyledons. The latter group, therefore, is the main stock of Angiosperms, including not only the most primitive Angiosperms, but also the most advanced. The Monocotyledons are characterized by the single terminal seed leaf (cotyledon) of the embryo, the scattered woody bundles of the stem, the closed venation (often called "parallel veined"), and the three-parted flowers. To the group belong such forms as the common pondweeds, grasses, palms, aroids, lilies and orchids.

Angiosperms are of every possible variety of habit, from minute floating forms to gigantic trees. The roots, stems, and leaves are more elaborately and variously organized for work than those of any other plant group, and the whole structure of the body is the most complex found in the plant kingdom.

It is among the Angiosperms that "stamens" and "carpels" become definite and distinctly developed. The stamen of the Angiosperm corresponds to a spore-bearing leaf of the fern-plants, but shows no resemblance to an ordinary leaf in form. The region devoted to producing the spores is called the "anther." In observing the development of an anther it is found that four sporangia usually appear, and that as these approach maturity they fuse in pairs, resulting in the appearance of two pollen-sacs, each of which has been derived from two sporangia. Occasionally in Angiosperms the four original sporangia of the stamen remain distinct.

The carpels of Angiosperms give name to the group inclosing the ovules that become seeds, the name "angiosperms" meaning, as has been said, 'seeds in a case.' In this regard they differ decidedly from any carpels which exist among the Gymnosperms, in which group they are flat and

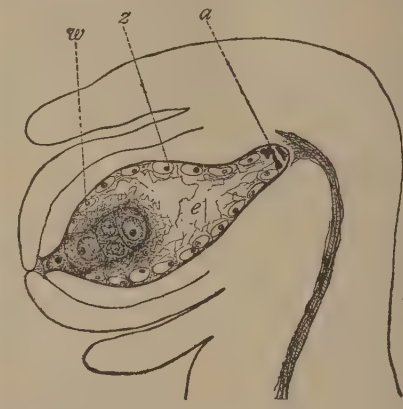


A mature embryo sac (*e*), showing the three antipodal cells (*a*), the two polar nuclei fusing to form the endosperm nucleus (*p*), the two synergids (*s*), the egg (*o*), and the pollen tube entering to discharge its sperm cells. The two integuments (*i*) of the ovule are also shown.

open, exposing the ovules, and giving rise to the name, which means 'seeds naked.'

In order to understand the following statement of the technical characters of angiosperms, it will be necessary to read the articles ALTERNATION OF GENERATIONS, and HETEROSPORY.

In its germination the pollen grain (*microspore*) produces within itself usually three cells, which represent a very much reduced male plant. One of these cells later develops the pollen tube, which penetrates to the egg, while the other two cells are the sperms. The embryo sac within

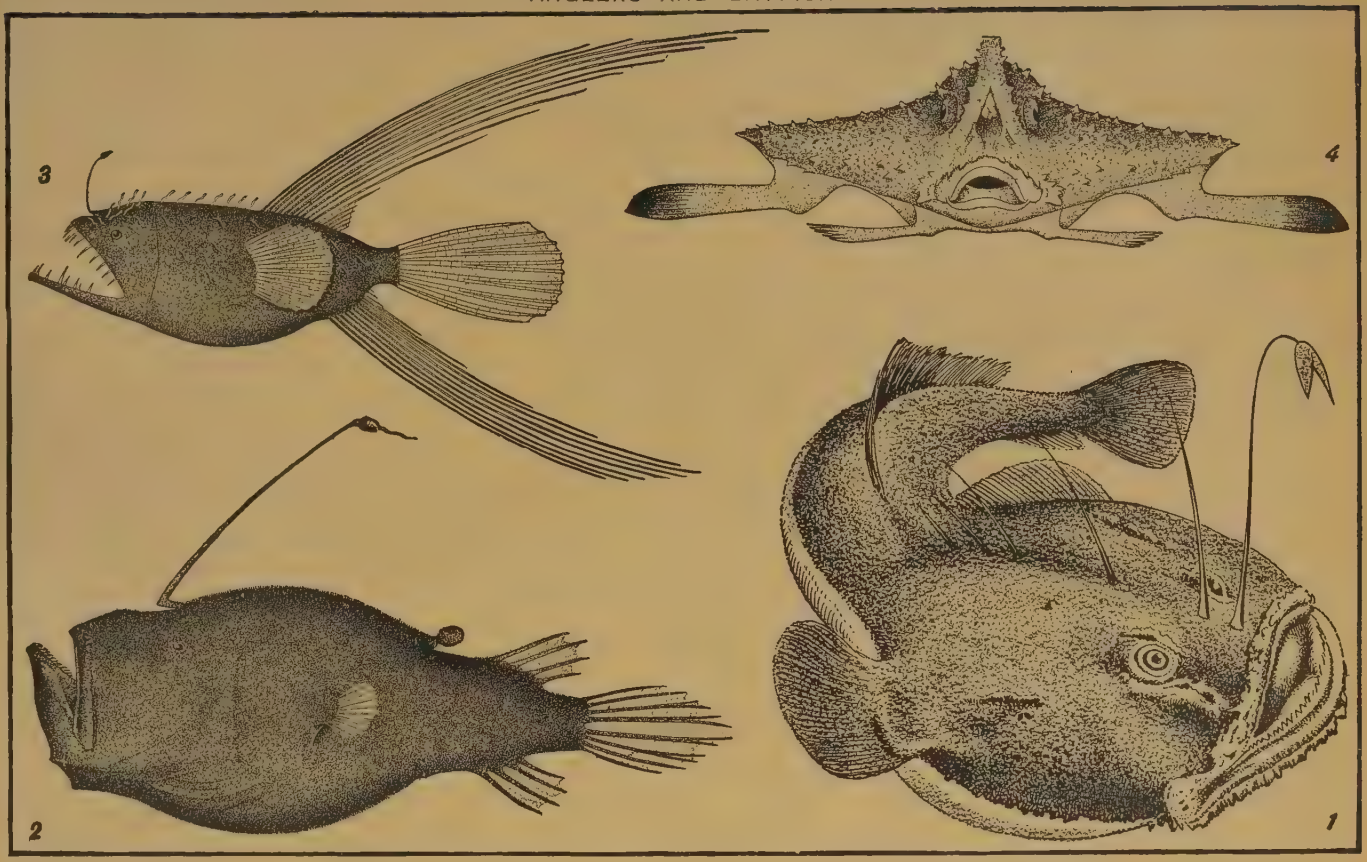


An embryo sac (*e*), showing the young embryo (*w*), endosperm cells (*z*), and the three disorganizing antipodal cells (*a*).

the ovule, which represents a single unshed spore, produces within itself a group of cells, usually seven in number, which represent a reduced female plant. In the end of the sac toward the micropyle (the opening left by integument) the single egg is situated, and associated with it are two other cells called *synergids* (helpers). This group of three cells is called the egg apparatus. At the opposite end of the sac is a group of sterile cells, usually three in number, called the antipodal cells. More centrally placed in the sac is the seventh cell, that has been formed by the fusing of two cells, and, after the fertilization of the egg, is to develop the endosperm (nutritive tissue of the seed). This cell is called the "definitive nucleus" or "primary endosperm nucleus." Before fertilization, the pollen grain containing the male plant is transferred by the wind or by insects to the stigma (receptive region of the pistil), the process of transfer being called pollination (q.v.). After pollination the pollen tube is developed, which penetrates the pistil and finally reaches the ovule, carrying in its tip the two male cells or sperms. The tip of the tube then enters the micropyle, crowds its way to the egg, and discharges its contents. One sperm passes to the egg and fuses with it, this act being called fertilization. The other sperm fuses with the endosperm nucleus, which therefore becomes a triple fusion nucleus. The occurrence of two fusions with the male cells in the embryo sac has been called "double fertilization," but it is very doubtful whether the fusion of the male cell with the endosperm nucleus is to be regarded as true fertilization. In any event, it does not result in an embryo (a young sporophyte), but in a nutritive tissue (endosperm). Consult Coulter and Chamberlain, *Morphology of Angiosperms* (New York, 1903), and Coulter, Barnes, and Cowles, *Text-book of Botany* (New York, 1910).

ANGLAISE, ăn'glāz'. An English country dance (*contredanse*), in 2-4, 3-4, or 3-8 time.

ANGLERS AND BATFISH

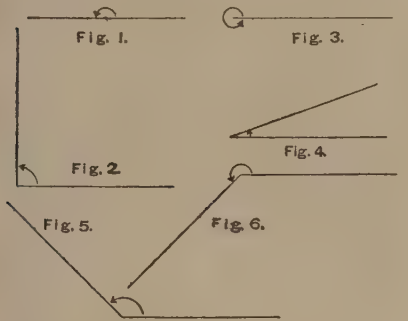


1. ANGLER OR GOOSE FISH (Lophius piscatorius).
2. DEEP-SEA ANGLER (Caulophryne jordani).
3. DEEP-SEA ANGLER (Cryptosurus couesii)
4. BATFISH (Ogcocephalus vespertilio).

It is gay, and probably originated in the older form of the French *rigaudon*. See RIGADOON.

AN'GLE (Lat. *angulus*, a corner, Gk. *ἀγκύλος*, *ankylos*, bent). One of the common geometric concepts. If two lines meet, they are said to form an angle, the lines being called the arms, sides, or legs, and the point of meeting the vertex of the angle. The size of the angle is determined by the amount of turning necessary to carry a moving radius from one arm to the other, and hence is independent of the length of the arms.

If the arms of an angle are in the same straight line on opposite sides of the vertex, a



straight angle (Fig. 1) is formed; half of a straight angle is called a right angle (Fig. 2); two straight angles equal a perigon or angle of 360° (Fig. 3). Angles are also conceived exceeding 360°; thus an angle of 720° is described when a screw is turned twice around. An angle between 0° and 90° is said to be acute (Fig. 4); one between 90° and 180°, obtuse (Fig. 5); one between 180° and 360°, reflex (Fig. 6). Angles are considered as positive if generated by a radius moving counter-clockwise, and negative if the radius moves clockwise. If the arms are straight, the angle is said to be *rectilinear;* if curved, *curvilinear;* if arcs of great circles on a sphere, *spherical.* Curvilinear angles have the same measure as the rectilinear angles formed by tangents to the curves at the vertex. If two planes meet, they are said to form a *dihedral* (Gk. two-seated) angle; this has the same measure as the rectilinear angle formed by two lines in the planes that are perpendicular to the line of intersection of the planes. If three or more planes meet in one point, they are said to form a *solid* angle, the measure of which is the ratio of the intercepted surface to the entire surface of any sphere having the vertex of the angle as its centre. A solid angle is *trihedral, tetrahedral,* etc., according as it is formed by 3, 4, etc., planes. For the various attempts made to define the simple concept angle, consult Schotten, *Inhalt und Methode des planimetrischen Unterrichts* (Leipzig, 1893).

ANGLE, FACIAL. See ANTHROPOMETRY.

ANGLE I'RON. See ROLLING MILLS, for a description of this and other steel shapes.

ANGLE OF EL'EVA'TION, ANGLE OF DEPARTURE, and other terms in Gunnery. See BALLISTICS; GUNNERY.

AN'GLER (the name alludes to its seeming to "angle" for its prey; see below). A singularly ugly and voracious marine fish (*Lophius piscatorius*), also known as goose-fish, monk-fish, all-mouth, and fishing-frog. It is of the order Pediculati, chiefly characterized by the greatly elongated carpel bones, which form a kind of arm supporting the pectoral fins. The angler is a large fish, 3 to 5 feet in length, having the large, flattened head with its wide mouth and projecting lower jaw, and the anterior part of the body, greatly out of proportion to the posterior tapering part. The three anterior spines have become widely separated from the dorsal fin, and shifted forward onto the head, where the most anterior is much elongated, barbel-like, and fleshy at the tip. It is by the brilliant color of this and other worm-like appendages about the mouth that the fish is said to attract smaller fishes and thus make them easy prey. The name "goose-fish" refers to the popular belief that it will seize geese and other swimming birds. As many as seven wild ducks have been taken from the stomach of a single fish. It is a very hardy fish and does not suffer from being out of the water as readily as most fishes. It occurs on the European shores, and on the American coast from Nova Scotia to the Barbados. Some deep-sea fishes of a closely related family (Antennariidæ) are sometimes included under the same name and apparently have similar habits. See FROG-FISH, and Plate of ANGLERS AND BATFISH.

ANGLER, THE COMPLEAT. See ANGLING.

AN'GLES. A Low German tribe who occupied the district of Angeln in Schleswig-Holstein and extended to the west as far as the North Sea. With the Jutes and the Saxons, the Angles passed over in great numbers to Britain during the fifth century, and settled in East Anglia, Northumbria, and Mercia. From them England derives its name (Lat. *Anglia,* AS. *Engla-land*). After these migrations from Schleswig, the Danes from the north entered the deserted districts and mingled with the Angles who remained there. The German language and manners were afterward introduced by immigrant nobles from Holstein and prevailed among the higher classes; but until the nineteenth century the Danish was still generally spoken by the common people. During the nineteenth century the German gained the ascendancy. The modern Angles are said to be of a more passive disposition than the Frieslanders and the people of Ditmarschen, and religious sentiment is very strongly manifested among them. The district called Angeln extends from the Schlei on the south to the Flensburg hills on the north, contains about 330 square miles, and a population of about 38,000. The name has no political or administrative significance. Consult Erdmann, *Ueber die Heimat und den Namen der Angeln* (Upsala, 1891). Kappeln is the chief town.

ANGLESEY, ăn'gl'-sē, or **ANGLESEA** (AS. *Angles' ēg,* the Angles island). A county and island of Wales, separated from the mainland by the Menai Strait (Map: Wales, B 3). Its length is about 20 miles, breadth about 17, coast line about 80, area 276 square miles. The county is divided into three districts, called cantrefs, each subdivided into two cwmwds. The market towns are Amlwch (q.v.), Beaumaris (q.v.), the county town and a municipal borough (pop., 2231), Holyhead (q.v.), an urban district (pop., 10,636), Llangefni, and Llanerchy-medd. Pop., 1891, 50,098; 1901, 50,606; 1911, 50,928. The surface is generally flat, and the soil of indifferent fertility and only partially cultivated, by far the largest part be-

ing under pasture. The principal products are wheat, barley, oats, and potatoes. The mineral deposits of the island are varied, but of less importance than formerly; in the latter part of the eighteenth century the Parys copper mines near Amlwch were considered the most productive in the kingdom. Other minerals that occur are copper, lead, silver, marble, limestone, asbestos, and coal. The island is connected with the mainland by one suspension bridge and the Britannia tubular bridge on the route of the Chester and Holyhead Railway. The island is traversed by two railway lines. There are still to be found some ancient relics of Druidism, which once flourished on the island. The Welsh language is largely spoken by the peasantry. Consult H. L. Jones, "The Mediæval Antiquities of Anglesey," *Archæological Journal*, vol. v (London, 1844).

ANGLESEY, Henry William Paget, first Marquis of (1768–1854). A British general and statesman. He was educated at Oxford and entered Parliament in 1790. He commanded a volunteer corps in Flanders and acquired a high reputation as a cavalry officer in the Peninsular War. At the battle of Waterloo, where he commanded the British cavalry, he lost a leg. On his return to England he received a vote of thanks from Parliament and was made Marquis of Anglesey. In 1828 he was appointed Lord Lieutenant of Ireland at a period when that country was greatly agitated over the question of Catholic emancipation. This he at first opposed, but afterward advocated it, and in consequence was recalled by Wellington in 1829. He was again appointed to the same office under Lord Grey's administration in 1830; but his coercive measures destroyed his popularity, and he resigned his position in 1833. He founded the Irish Board of Education. In 1846 he was made field marshal.

ANGLESITE, ăn'glê-sīt. A lead sulphate that crystallizes in the orthorhombic system and occurs in white, light-yellow, green, and sometimes blue colors. It is formed as a result of the decomposition of galena and was originally found in Anglesea, England, whence its name; it also occurs in Cornwall, Derbyshire, and Cumberland; at various localities in the Hartz; in Hungary; and in the United States, at Phenixville, Pa., at various points in the Missouri lead mines, and elsewhere. Anglesite is useful as an ore of lead.

AN'GLEWORM. An earthworm, when used as fish-bait. See Earthworm.

AN'GLIA, East. A kingdom founded by the Angles before the middle of the sixth century, in the eastern part of central England, comprising the modern counties of Norfolk and Suffolk and equivalent in extent to the modern see of Norwich. It was somewhat dependent on Kent; but about 654 Anglia fell under the sway of Mercia and so continued till Egbert, King of Wessex, conquered Mercia and East Anglia in 825. Alfred the Great gave Anglia to the Danes under Guthrum in 878; but Edward, his son and successor, forced the Danes to acknowledge him in 921. Anglia soon became a part of the West Saxon kingdom.

AN'GLICAN. Belonging to the Church of England or to the other churches in communion with it, in Scotland, Ireland, the colonies, and the United States. The term is sometimes applied to the High Church party. See Anglican Communion; England, Church of.

ANGLICAN CHURCH. See England, Church of.

ANGLICAN COMMU'NION. A term coming to be recognized as the semi-official title of the now world-wide body which is in communion with the Church of England as represented in its centre of unity, the see of Canterbury. It is only in comparatively recent years that this body has come to have anything like a concrete existence, which by the logic of events is crystallizing more and more, in contradiction though it be to the famous Branch Theory on which the claims of the body to be considered a part of the Catholic or Universal Church are based. Its component parts are the Episcopal churches of England, Scotland, Ireland, the British colonies, and the United States, with mission dioceses in various parts of the world. It coheres loosely by means of general agreement in worship and terms of communion, and as an integral body is represented by its bishops from all parts of the world in the Lambeth Conference at irregular intervals. Consult *Official Yearbook of the Church of England;* Tucker, *The English Church in Other Lands* (London, 1886).

AN'GLIN, Margaret (1876—). An American actress, daughter of the Hon. T. W. Anglin, who at the time of her birth, at Ottawa, Canada, was Speaker of the Canadian House of Commons. After studying at the Empire School of Dramatic Acting (New York City), she made her début at New York in *Shenandoah* in 1894. Among her rôles were Roxane, in Richard Mansfield's presentation of *Cyrano de Bergerac* (1898); Mimi, in *The Only Way* (1899); Mrs. Dane, in *Mrs. Dane's Defense* (1900); Mabel Vaughn in *The Wilderness* (1901); the title rôle in Zira (1905); Ruth Jordan in *The Great Divide* (1906). In 1908–09 she went to Australia, where she appeared as Katherine in *The Taming of the Shrew* and Viola in *Twelfth Night;* and in 1910 at the Greek theatre, Berkeley, Cal., she played the title-rôle in a translation of Sophocles's *Antigone.* During the year 1911 she played in *The Rival* and *Green Stockings.* Consult Strang, *Famous Actresses of the Day in America* (Boston, 1899).

AN'GLING (AS. *angel,* fish hook, akin to Eng. *angle,* a corner, bend). The term "angling" has, by common understanding, become restricted to the catching of fish with a rod and line and chiefly as a source of recreation, while fishing may mean any method of taking fish, and frequently implies a commercial enterprise. The term "angle" and its cognate words in most languages are limited to the hook; but it is quite clear that in Anglo-Saxon the word includes as well the line and rod; a definition probably suggested by the position a rod and pendent line take when being used for bait fishing, at which time they form a right angle. Shakespeare refers to the angle in the sense of rod, line, and hook in *Antony and Cleopatra,* and he had good historic basis for selecting angling as a recreation in Egypt, for the mural paintings of the Egyptians make it clear that angling was a favorite pastime of their men of rank. So accurately is the spawning of fish described in the *Bundahish,* a Pahlavi work relating to the creation, as to suggest the existence of angler naturalists among the followers of Zoroaster. Both Greeks and Romans pursued angling for diversion's sake. Many allusions in classical authors justify the inference that the idea expressed by our word "sportsman" had defined

shape in antiquity. From Homer to Oppian there were piscatory poets, who dwelt on the exciting delights of the craft. Oppian's *Halieutica*, a poem of the second century A.D., treats of the natural history of fishes and of the fishing methods of the ancients. The perfect angler is herein defined as "a well-made, active man, patient, vigilant, enterprising, courageous, and full of expedients"; and his outfit is summed up in a couplet—

> "The slender woven net, the osier creel,
> The tapering reed, the line, and barbèd steel."

The earliest mention of fly-fishing occurs in the *Epigrams* of Martial, wherein is sung the rising of the wrasse "decoyed by fraudful flies"; but Ælian, the author of a zoölogy, written about 200 A.D., gives a consummate description of this method of taking a certain species of trout as practiced by the Macedonians. From the angling pictures of Ausonius in the fourth century, there is, with the exception of a brief allusion in *Piers Fulham*, written about the year 1420, a break in the literature relating to this subject, until we reach the interesting work, *A Treatyse of Fysshynge wyth an Angle*, printed in England in 1496 as part of *The Book of St. Albans* (2d ed.) and therefore attributed to Dame Juliana Berners, though she could have had no part in its preparation, and it is most probably a compilation from an earlier work. It was published under the title *An Older Form of the Treatyse of Fysshynge wyth an Angle* in 1883. This treatise presents detailed instructions for the manufacture of tackle, gives faultless directions for fly-fishing, and describes minutely "xij flyes wyth wyche ye shall angle to ye trought & grayllying." The flies have been tied by a modern expert, in accordance with the directions given in the treatise, and they do credit to the taste of the first English authoress. Leonard Mascall's *A Booke of Fishing with Hooke & Line* (1590), the next work of importance in English, is largely a reproduction of the essay of the literary prioress. *The Secrets of Angling*, a delightful poem by John Dennys, appeared in 1613, and in 1651 Thomas Barker's *The Art of Angling*, the first work in which the reel is recognized as essential to success in the capture of large fish with rod and line. Two years later, Walton's *The Compleat Angler; or, the Contemplative Man's Recreation*, was given to the world. It was of this book that Charles Lamb wrote: "It would sweeten a man's temper at any time to read it; it would Christianize every discordant, angry passion." Angling is one of the richest departments of English letters. Westwood and Satchel's *Bibliotheca Piscatoria*, published as long ago as 1883, catalogues over 3000 works more or less concerning fish and fishing. To such as wish to understand the natural history of the objects of their pursuit as well as to master the various methods of capture, the following instructive monographs are recommended in addition to the volumes referred to in this article: G. B. Goode, *American Fishes* (New York, 1888); Seth Green, *Home Fishing and Home Waters* (New York, 1888); *The Angler Naturalist*, and the two volumes of the Badminton Library of Sports, entitled *Fishing;* Henshall, *Favorite Fish and Fishing* (New York, 1908); Aflalo, *Sunset Playgrounds* (London, 1909); S. C. Camp, *Fishing Kits and Equipment* (New York, 1910), and *The Fine Art of Fishing* (New York, 1911); Dimock, *The Book of the Tarpon* (New York, 1911); Rogers, *Sport in Vancouver and Newfoundland* (London, 1912). See Fly Casting; Bait-Fishing; Trolling.

ANGLO-CATHOLIC. A term used for the modern extreme high church party of the Church of England. The basis for the term is the claim that the Church of England is rightfully Catholic, not Protestant. Those who belong to the party use many of the customs and ceremonies of the Catholic church. The use of the term arose in the Oxford movement (q.v.).

AN'GLO-IS'RAELITE THE'ORY. The theory that the English are descended from the Israelites, who were made captives by the Assyrians under Sargon (c.722 B.C.)—the so-called Lost Ten Tribes. The connection is made through Scythians and Saxons. The theory is destitute of scientific proof. For a defense of the view, consult M. L. Streator, *The Anglo-Alliance in Prophecy; or, The Promises to the Fathers* (2 vols., New Haven, Conn., 1900).

ANGLO-JAPANESE ALLIANCE. See Japan.

AN'GLOMA'NIA (a hybrid formation from *Anglo*, English + Gk. *μανία, mania*, madness, frenzy, enthusiasm). A term which designates, in America and other countries, a weak imitation of English manners, customs, etc., or an indiscriminate admiration of English institutions. In German literature, an Anglomania was especially prevalent in the eighteenth century, when translations of English books became numerous and were read with great admiration. The Germans have ascribed the sentimental and affected style of some of their literature to the influence of the English literature of that century. A remarkable Anglomania prevailed in France for some time before the commencement of the Revolution. It arose out of political considerations and admiration of English free institutions, but extended to trifles even of fashions and manners, and often became very ridiculous. Since the garish court of the Third Napoleon has been replaced in France by the more sober régime of the Republic, Anglomania has replaced Gallomania with our fashionable set and has for some time been a fruitful theme of popular satire.

ANGLO-NORMAN LITERATURE, or **ANGLO-FRENCH LITERATURE.** Anglo-French is a dialect in which are mingled Old French, together with a blending of the Scandinavian language spoken by the followers of Hrolf, or Rollo (q.v.), who invaded the north of France and conquered it about 910. Anglo-Norman literature is that which was composed by the Normans in France or in England, and was equally admired by both. Many writers incorrectly say that it dates from the battle of Hastings (Senlac), but French had become well known to the courtiers of the Saxon court of Edward the Confessor, who preceded King Harold and who greatly favored the Norman-French scholars and poets whom he welcomed. French, indeed, was the language of love and poetry in England, as Latin was the language of scholarship, and it formed the reading of the aristocracy. It was not until the reign of Henry IV that an English language was definitely recognized, except among the peasants and such Saxons as held themselves aloof from Anglo-Norman influences.

Gaston Paris (q.v.) has given an interesting account of the French influence in England in

very early times (*La littérature française au moyen âge*). Certain it is that in the eleventh, and especially the twelfth, century Anglo-French was familiar to both the English and Normans and remained a spoken language until the seventeenth century, and even then it was still employed in legal documents.

How closely alike was the usage in both countries may be seen from the fact that some original manuscripts written in France are now to be found only in England, while many that were written in England are preserved only in France. The language, indeed, was expressive of the early English character—its gaiety, its daring, and its vivid imagination. The typical Englishman as we know him to-day did not come in before the Hanoverians. Prior to that time, as may be seen in Shakespeare and his contemporaries, the English were high-spirited, impulsive, rash, and full of vivid imagination. Only after the French element subsided, does one find the stolid, unemotional type that is choleric rather than full of passion. "Stodginess" was not an early English trait.

The different forms of composition in Anglo-Norman literature were highly varied, though many of the works themselves have not been preserved in the original, since they were transmitted orally. Among them we find historical documents, such as the *Roman de Rou et des ducs de Normandie* by Wace (q.v.), who also wrote a *Geste des Bretons* which is in the nature of history. This was imitated by Benoit de Sainte-More at the command of Henry II. Henry was a remarkable linguist. It was said of him that he knew something of every language spoken from the Bay of Biscay to the river Jordan. His patronage did much to cultivate literature in England and to encourage the development of learning. In his own day a swarm of unhistorical stories relating to the murder of Thomas à Becket sprang into existence and were widely circulated. A very great work of historical and social importance is the history of William the Marshal who was regent of England from 1216 to 1219.

In addition to histories (many of which were written in Latin) were the famous *chansons de geste* (q.v.) and *chansons d'aventure*, which also, like the *romans*, were sung and chanted rather than written down. It is a matter of record that the *Chanson de Roland* was chanted at the battle of Hastings. Among the most famous of love stories is that with which all the world is now familiar under the title of *Tristan and Yseult*, immortalized by Richard Wagner in what is probably the most famous of his operas, as it is one of the most famous romances of passionate love. In the Middle Ages, however, as told by Bérold and Thomas, it had less vogue than at the present time. A vast number of didactic compositions have been collected and edited, such as lives of saints, works on orthography, bestiaries, psalteries, and *contes moralistes* that were told in the churches and may now be found in the variegated *Gesta Romanorum* (q.v.), which still makes its appeal, and of which Mr. W. D. Howells has written appreciatively in *My Literary Passions*. Translation from the Latin is represented by versions of Eutropius and the pseudo-Dares in the thirteenth century.

Lyric poetry is less frequent than one might expect, and most of it had its origin in France. The same thing may be said of epic poetry, which was popular enough in England but usually originated in France. Some of the English epics have not even yet been printed and edited, as, for instance, the colossal work on Guy of Warwick. Gower (q.v.) wrote a number of ballads in Norman-French. The so-called *fabliau* is likewise more French than English. There is a volume of *fabliaux* compiled by Nicole Bozon about the year 1320. Much of the Alexander Saga, which at one time was widely read, is drawn from Anglo-Norman *fabliaux*. The French gift for neat and telling satire shows itself in the Anglo-Norman literature, the chief objects of attack being the clergy and women. As for the drama, no plays seem to have been acted in England prior to the fourteenth century; and the earlier English Moralities were drawn from French sources. In the thirteenth century there was written in Norman-French a mystery entitled *Adam*. For religious instruction there have been preserved 60 legends relating to the Virgin Mary, and also the famous *Poème de Marie et de Jésus*.

In the course of time the Anglo-Norman French of England naturally began to vary somewhat from the Norman-French of France. The Hundred Years' War did much to bring English to the front; yet even then a knowledge of French was esteemed the necessary accomplishment of a gentleman, and schools were founded in England for teaching the French language. Among these was Marlborough College, whose original purpose was the preservation and transmission of Anglo-Norman literature. Changes in pronunciation inevitably occurred, until at last Norman-French and Anglo-Saxon had blended into a new language which was thereafter to be known as English. The Reformation made a still deeper breach between France and England, though for a time the Catholic court of Scotland continued the Anglo-Norman tradition.

Bibliography. The present century is witnessing a very keen interest in the revival of Anglo-Norman literature, owing to the fact that the Romance languages are being studied so minutely. The French Société des Anciens Textes has made possible some very brilliant pieces of compilation and exegesis, especially in giving a free hand to Paul Meyer, an indefatigable worker in this fascinating field. He published and edited many texts of Anglo-Norman literature ranging from *lais* to *brutes*. His contributions to the periodical, *Romania*, are also notable. See also Brandin's *Introduction to Fulk Fitz Warine* (London, 1894). The collected papers of Meyer were published by the Société de l'Histoire de France (3 vols., Paris, 1891–1901). Note Schofield, *English History from the Norman Conquest to Chaucer* (London, 1906). Everything by G. Paris is memorable as giving brilliantly what may be called the environment of the Middle Ages in France and England. The work of Skeat, *Principles of English Etymology* (2d series, Oxford, 1891), which is valuable as well as popular; Behrens in Paul's *Grundriss der germanischen Philologie* (2d ed., 1897); L'Héricher, *Les Scandinaves en Normandie* (Paris, 1891); Groeber, *Grundriss der romanischen Philologie*, ii, iii (Strassburg, 1902); and Jusserand, *Histoire Littéraire du peuple anglais*, vol. i (2d ed., Paris, 1895), are indispensable. Compare the articles ENGLISH LITERATURE, FRENCH LANGUAGE, FRENCH LITERATURE, and NORMAN-FRENCH in the present work, with their appended bibliographies.

AN'GLO-SAX'ON ART. A term used to

describe whatever works of art were produced in England during the period of about six centuries between the time of the conquest by the Angles, Saxons, and other Germanic tribes and the time of the Norman conquest in the eleventh century. They found a combination of distinct Roman and Celtic art traditions, and were influenced by them, and subsequently by Christian art from Rome and Byzantium. Their originality was shown principally in their jewelry (especially the *cloisonné*) and arms, in which, however, they had borrowed what they knew from the Goths, whose works of the same kind were far more artistic. In architecture the Anglo-Saxons used principally wood, and relied entirely on foreign workmen for their rare buildings in stone, which were extremely plain, and this, which can hardly be called a "style," was influenced and partly superseded by the Norman style even before the Conquest. The Anglo-Saxons excelled in the illuminating of MSS., and in this they borrowed from the Irish Celts and in their turn assisted the Irish monks in teaching the Carlovingian artists; for the great Anglo-Saxon monasteries sent masters to those in Gaul before and after the time of Alcuin.

Architecture. Of the stone churches, hardly a single one survives intact, those of importance having been reconstructed during the Norman or Gothic epochs. The stone masons, who were brought from Gaul and Rome in the seventh century to build the first stone churches, erected for Benedict Biscop the famous monasteries of Wearmouth and Yarrow; small parts of them remain. The little hall church at Bradford, entirely without columns, is almost the only complete structure remaining (705 A.D.). To about the same time belong the crypts at Ripon and Hexham. After these early works, which retain something of a Continental and Roman style, the later monuments of the ninth, tenth, and early eleventh centuries show an increase of Celtic peculiarities. The church towers have sometimes survived where the churches themselves have been renovated, and they form the most interesting group of Anglo-Saxon monuments, from such simple ones as that of Barton-on-Humber, through the more architectural examples at Barnack and Sompting, to the richer towers of Earl's Barton and Deerhurst. They are built of crude, irregular masonry—a few large blocks set in the midst of a mass of small stones. The corners are formed of long-and-short work, the high and narrow stones alternating with the flat, long ones bonded into the wall. In the more elaborate examples the surface is decorated with a series of vertical lines of pilaster strips occasionally joined by arched or gabled connecting strips and the few windows are sometimes arched, sometimes topped with two slanting straight pieces forming gables; while their jambs, or divisions (in two-light windows), are either pilasters or the peculiar baluster colonnettes not found except in this style. There are very few moldings and very little sculpture, none of it being figured. In fact, the style is so rude as hardly to rise to the dignity of art.

Illuminated Manuscripts. The Saxons were entirely without monumental sculpture or painting of native growth, and only their industrial arts are important. Even here they are inferior to the Goths in their jewelry, enameling, and goldsmith work, and to the Irish in their illuminating of manuscripts. Comparison with the Book of Kells, the Gospels of MacKegol, and other Irish illuminations will prove this. It is true that the Gospels of Lindisfarne (British Museum) are equal to these works, but they were executed by Saxon pupils of the Irish monks. Another remarkably fine work is the Benedictional of St. Athelwold. In one particular the Saxon works are superior—in the treatment of the human figure, which in Irish works is a mere piece of decorative scroll-work without a trace of resemblance to the human form or real drapery. The influence of the pictures and illuminated MSS. brought to England from Rome and of the Byzantine MSS. gave the Saxons the advantage of good models for subjects of religious art, as is shown in such works as the Cuthbert Gospels (British Museum). There are three styles in Anglo-Saxon illuminations: (1) stage of Roman influence, seventh century, when the missionaries from Rome and Benedict Biscop gave Roman models (illustrated by the Golden Stockholm Gospels and the Psalter of St. Augustine, British Museum); (2) stage of Irish influence, with predominance of the geometric ornament of beautiful elaborate designs taken from textile fabrics, metal work, and conventionalized animal forms, seventh and eighth centuries (Durham Gospels, Gospels of St. Cuthbert, British Museum, Athelwold's Book of Prayers at Cambridge); (3) stage of reactive influence of Carlovingian (Frankish) and Byzantine art, with re-introduction of figured composition and the placing of ornament in the background. This late development was rapid under the direction of SS. Athelwold and Dunstan, in the ninth and tenth centuries (Psalters of King Athelstan, British Museum; Missal of Leofric, Oxford; Gospels and Psalter of Boulogne; Gospels called "Bib. Greg." in British Museum; Cædmon, Oxford; Cotton Psalter, etc.). Certainly the peculiar interest of all the Saxon illumination lies in its immense initial letters and full-page geometric ornamentation, in which the artists rivaled the Irish in a field where neither Italian nor Byzantine illuminations had preceded them. They blazed a way which was followed by all subsequent illuminators in varying degrees; and for delicacy and precision of touch, judicious treatment of surface, and balance of composition, their geometric work has never been surpassed. In their good though simple color scheme one point is remarkable—that they never used gold leaf. In this they influenced Carlovingian illuminators in direct opposition to the Byzantine style of profuse gold grounds and ornaments. In so far as similarities have been noticed in Scandinavian works, it is probable that they are due to influences from Great Britain rather than vice versa. When Charlemagne encouraged art, he found the British monasteries a great resource. The great Bible of St. Denis (British Museum) and the Leipzig Psalter are examples of this British influence on illumination among the Franks. During the last stage, when the geometric style was abandoned, extensive composition in pen-and-ink outline became a favorite method of illustration. Consult: Rickman, *An Attempt to Discriminate the Styles of Architecture in England* (London, 1848); De Baye, *The Industrial Arts of the Anglo-Saxons* (London, 1893); Akerman, *Remains of Saxon Saxondom* (London, 1853); Kemble, *Horæ Ferales* (London, 1863); Parker, *Introduction to the Study of Gothic Architecture* (London, 1847); Westwood, *Fac-*

similes of the Miniatures and Ornaments of Anglo-Saxon and Irish Manuscripts (London, 1868); also volumes of the *Archæologia* (London, 1770 ff.).

ANGLO-SAXON CHRONICLE. There are really Anglo-Saxon chronicles, growing out of a common stock but differing more or less widely from each other, especially in their later entries. Of this four-fold chronicle there are seven manuscripts in existence, four of which (A, C, D, and E) may well be considered independent records.

The common historical material out of which these four have grown is taken from Cæsar's invasion of Britain to the year 892. It seems likely that the idea of a national chronicle to embody existing oral and written records was suggested by King Alfred. The impulse thus given by Alfred was continued under Edward in the official record of the Danish wars which in C and D extends to 915, in A to 924.

From 925 to 975 all the chronicles are very fragmentary, A ending about 1001 with a few local entries. From 983 to 1018 C, D, and E are practically identical, this section, in all probability, having been composed at Canterbury. C extends to 1066, D to 1079, and the last part is mutilated. E is continued until 1154, the later parts showing unmistakable evidence of the harsh Norman rule in the querulous tone and the growing ignorance of the language. Nevertheless, "our debt to it is inestimable."

ANGLO-SAXON LAN'GUAGE AND LIT'ERATURE. The term "Anglo-Saxon" is employed, in popular speech and to some extent among scholars, to designate the language of the Germanic peoples in England before the coming of the Normans (1066). Such, however, was not the usage of those who wrote in the language. Alfred, Ælfric, and others repeatedly called it *Englisc*, i.e., English. True, the expressions *Angli Saxones* and *Saxones Angli*, i.e., English Saxons, occur in mediæval Latin literature, but they were used to distinguish the Saxons in England from those on the Continent. It was not until the revival of interest in England's earliest history and literature, which dates from Camden's *Britannia* (1586), that the compound "Anglo-Saxon" made its appearance, to denote, without any reference to their Continental kinsmen, the entire English people and their language. This designation was generally followed by historians and philologists down to 1875. Since then an increasing number of them have adopted the usage of King Alfred. To the earliest period in the history of the English language they have given the name "Old English." The term "Anglo-Saxon," it is argued, is misleading; for it seems to imply that our language before the Norman conquest was not English. It is, of course, admitted that the English language underwent great phonetic and inflectional changes in the twelfth and thirteenth centuries; and yet English has always remained English. On this continuity in the development of our speech, the proper emphasis is laid by the term "Old English." For this and other reasons, it has seemed best to treat the so-called Anglo-Saxon language and literature under ENGLISH LANGUAGE, ENGLISH LITERATURE, ANGLO-NORMAN LITERATURE AND NORMAN FRENCH.

ANGLO-SAXON LAW. The body of law of the Anglo-Saxons. It was not until the close of the nineteenth century that historical investigation made it possible to form even a tolerably clear conception of the legal system that prevailed in England prior to the Norman conquest. The earliest written records of that system are the Anglo-Saxon "dooms," or judgments, which go back to the sixth century of our era. From the time of Ethelbert of Kent to that of Edward the Confessor these records, though fragmentary, appear in an almost unbroken series, supplemented by land charters and wills, collected through the industry of modern scholars. These give us a far from complete, but yet a fairly consistent, idea of the principles and procedure of Anglo-Saxon law. This was, even at the time of the Conquest, a primitive law, concerning itself mostly with the personal relations of free and unfree men, liegemen and lordless men, or outlaws, with crimes of violence—homicide, wounding, and cattle-stealing—and with a simple and slowly developing law of real property. Contract law, as we understand the term, did not exist. There was no distinction between willful and accidental homicide or maiming, and all crimes were punished by the infliction of heavy fines, which were graduated, not according to the atrocity of the deed, but according to the personal status or dignity of the person injured. Indeed, the law of persons consisted almost entirely of a graded valuation of the individual's life or limb, and the terms "twelve-hundred-shilling man," "two-hundred-shilling man," were the well-understood equivalents of terms of rank or personal status.

Anglo-Saxon land law was a composite of Teutonic customary law and the rules growing out of the personal and property relations of lord and vassal, the former probably predominating. Folc-land (q.v.) was the name given to land the title to which rested on the common, customary, and unwritten law. Land derived by grant from the King was known as boc-land (q.v.), the title resting on the book, or written instrument, creating it. It is in the latter that the elements of a feudal form of tenure appear; but it is probable that all forms of tenure were more or less dependent; though of feudal tenure, in the strict sense of the term, there are only a few traces before the Conquest. The allodial ownership, referred to in the books, was not the "absolute and unqualified property" in land which Blackstone and other later writers had in mind when they used the term. Sometimes it is employed as the equivalent of boc-land, and more often merely as signifying an inheritable estate. See ALLODIUM; FEUDALISM; TENURE.

The Anglo-Saxon judicial system was of the loosest possible description. The public courts—the hundred court and the county court—were popular and local in character, and had no effective process for carrying their judgments into effect. There was no supreme judicial tribunal, no *curia regis*, such as developed in the Norman period; and when the king's justice was invoked to remedy an act of injustice committed by the regular tribunals, it was an irregular and extra-legal, or at least extra-judicial, power which he was called upon to exercise. Toward the close of the Saxon period a multiplicity of private courts sprang up, the predecessors of the courts-baron of a later date. See MANOR; COURT BARON; CURIA REGIS; KING'S BENCH. Consult: Pollock and Maitland, *History of English Law* (2d ed., Boston, 1899), for a brief but comprehensive description; Lee, *Historical Jurisprudence* (New York, 1900); Holmes, *The Common Law* (Boston, 1881); Chadwick, *Studies in*

Anglo-Saxon Institutions (Cambridge, Eng., 1905).

ANGLO-SAXONS. The collective name generally given by historians to the various Teutonic or German tribes which settled in England, chiefly in the fifth century, and founded the kingdoms which were ultimately combined into the English monarchy and nation. Various groups of them were known as Angles, Saxons, and Jutes. The traditional statement is, that the first of these invaders made their appearance in Britain in 449, having Hengist and Horsa as their leaders. But under the more searching scrutiny of later writers, these famous leaders have come to be looked upon as mythical heroes of romance, common to most of the Germanic nations; and though the fact of a great Germanic invasion in the middle of the fifth century is not doubted, it is believed that this was by no means the earliest period at which Germanic settlements were effected in England. Long previous to this period, a portion of the coast, extending from Portsmouth to Wells in Norfolk, was known as the Litus Saxonicum; but whether in reference to Saxons by whom it was settled, or to roving adventurers of that race by whom it was ravaged, is still a subject of dispute. Of the three tribes mentioned above, the Jutes are stated to have been the first comers. Their earliest home was in what is now Schleswig, North Germany, and the portions of England of which they possessed themselves were Kent, the Isle of Wight, and the opposite coast of Hampshire. The Saxons settled chiefly in the southern parts of England—in Sussex, Essex, Middlesex, the south of Hertford, Surrey, the part of Hampshire not possessed by the Jutes; also Berkshire, Wiltshire, Dorset, Somerset, Devon, and the portion of Cornwall which did not remain in the possession of its former Celtic inhabitants. The Saxons who invaded England probably belonged chiefly to the portion of that great nation, or confederacy of nations, whose territories lay on the shores of the Baltic and about the lower Elbe, occupying a region corresponding to Holstein, the north of Hanover, and the west of Mecklenburg. Of the settlements of the third tribe we have little knowledge, until we find them established along the eastern coast of Britain. Some recent historians maintain that they were Enger-Saxons, from the lower Weser; but they were probably Angles (q.v.) from Schleswig, a corner of which is at the present time called *Angeln;* it is certain that they made a succession of descents on the coasts of Suffolk and Norfolk, on the country to the north of the Humber, and on the southern part of Scotland between the Tweed and the Forth. From these coasts they made their way inland, and eventually obtained possession of the whole of England, except the portions already mentioned; that is to say, of all the part to the north of the Avon, on the one side, and the Thames on the other, Essex, Middlesex, and part of Hertford excepted. The union of different bands of these conquerors among themselves, with their countrymen who had preceded them, and with the Celtic population which, though conquered, there is no reason to suppose was exterminated, gave rise to the so-called Heptarchy, the kingdoms of Northumbria (originally Bernicia and Deira), Kent, Sussex, Wessex, Essex, East Anglia, and Mercia.

The various independent states into which England had till then been divided were united by Egbert, King of Wessex, in 827, into one kingdom. The royal family of Wessex, which was thus raised to the kingly dignity over the whole country, never again lost its supremacy till the Norman Conquest, except during the periods from 878 to 958, when the Danes ruled the kingdoms north of the Thames, and from 1016 to 1042, when Danish kings ruled over all of England. Indeed, all the later rulers of England, except the four kings of the Norman house, have been descended from the same line. Alfred the Great was the most famous king during the Saxon period. The whole ruling race eventually came to be known among themselves from the most numerous element in it, the English, and their land as Angle-land, or England. The Celtic races in Wales, Scotland, and Ireland, however, have always known them as Saxons.

Christianity was introduced among the newcomers in the latter part of the sixth century by missionaries from the Christian Scotch and Irish, to the northward, and at about the same time by St. Augustine, a missionary sent by Pope Gregory I, and by his companions and successors. Augustine became the first archbishop of Canterbury; the Roman missionary movement gradually superseded the Celtic, and before the close of the seventh century the whole of England was a Christian country under one metropolitan. Ethelbert, King of Kent, was the first sovereign who embraced the Christian religion. Bringing with them the traditions and feelings of the Empire, the whole influence of the clergy was thrown into the scale of monarchy and greatly tended to its consolidation. Their custom of holding councils of prelates from all over England, and of adopting regulations for the English church at large, also exercised a strong influence on the growth of a feeling of national unity. The English clergy in general were not very submissive to the authority of the popes, and the connection with Rome was a very tenuous one during the whole of the Anglo-Saxon period. St. Dustan was probably the most famous churchman of this period. The early English church was distinguished for the learning and laboriousness of its clergy. Bede is the most eminent author whom it produced. Between his time and that of Alfred, a very great degeneracy had taken place both in the learning and efficiency of the clergy which that active and enlightened sovereign labored to restore, but with only partial success. St. Boniface and many other English and Scottish missionaries labored with success in the propagation of Christianity in Germany.

The monastic system took strong hold on the Anglo-Saxons, and a number of Benedictine abbeys were founded and endowed with extensive landed possessions. Most of the bishoprics which were to remain the permanent administrative divisions of the English national Church were organized, and the primacy of the two metropolitan sees of Canterbury and York was acknowledged.

The political organization of the Anglo-Saxons before they were united under one government is almost unknown, and must have been exceedingly crude, probably being scarcely developed beyond tribal conditions. After the union under the West Saxon monarchy, however, they attained a considerable degree of constitutional development. The most marked characteristic was the large amount of power possessed by local assemblies, or *mōts.* The township existed

as an economic and administrative, but scarcely as a political, body. The political unit of the country was the *hundred*. It was a certain stretch of country or a certain body of the population whose members met from time to time for various public functions, principally judicial. The significance of the numerical expression applied to it is quite unknown. There was an official known as the *hundred's ealdor*, who seems to have presided at the hundred-mōt and exercised certain police functions. Just as a group of townships made up the hundred, so a group of hundreds made up a *shire*, the later *county*. The inhabitants of the shire also held a meeting, the shire-mōt, at which judicial cases were settled as well as at the hundred-mōt, but it seems to have existed more normally for fiscal and military purposes. The able-bodied men of the shire when called out for fighting purposes were known as the *fyrd*. The administrative and military head of the shire was the *ealdorman*, called later, in imitation of the Danish term *jarl*, the *earl*. An equally important if not so exalted official of the shire was the *shire-reeve* or *sheriff*, the representative of the king's power and interests in the shire, as the ealdorman was the representative of local independence and self-government.

At the head of the whole system of government was the king, although ordinarily he took no important political action except in conjunction with the *witan*, that is to say, the great men of the country—the prelates, the ealdormen, members of the royal family, and various royal officials. The gatherings of these magnates to determine, along with the king, on important affairs of the nation, was called the *witenagemot*, and was the direct predecessor of the royal council of the Norman period and of the House of Lords of later times. The authority of the kingship was increasing through the whole Anglo-Saxon period, and in the hands of a vigorous king overrode all limitations by the *witan;* although in case of inefficiency or doubtful succession, the latter body exercised a real power of deposition and selection. The form of election and popular acceptance was always carried out.

In early times a fundamental distinction of classes existed. The *ceorl* class were the great body of the people; the *eorl* class were the nobility by blood. The term *eorl* is not to be confused with *earl*, mentioned above, with which it has no historical connection. This distinction of classes was reflected in the amount of the money-fine imposed for murder or other violence, the payment to the injured person or to his relatives being greater in case he were of eorl rank than if he were ceorl. Members of the royal family were known as *æthelings*. Below all these classes were the *theows*, or slaves. Another distinction which seems to have grown up later and superseded the division into eorl and ceorl, was one dependent on military service or personal relationship to the king or other great man. A *gesith* or *thegn* was a personal follower of a powerful man, who usually obtained land and privileges as a result of service. Ultimately, *thegn* seems to have become a general expression for any member of the class of gentry who was not known by the higher title of earl, ealdorman, or æthelings. See WITENAGEMOT.

Bibliography. Green, *The Making of England* (London, 1883) and *The Conquest of England* (London, 1884); Ramsay, *The Foundations of England* (London, 1898); Stubbs, *Constitutional History of England*, vol. i (Oxford, 1903); Turner, *History of the Anglo-Saxons* (London, 1799–1805); Chadwick, *Studies in Anglo-Saxon Institutions* (New York, 1905), and *Origin of the English Nation* (Cambridge, 1907). For a fuller bibliography, see Gross, *Sources and Literature of English History* (London, 1900). See ENGLAND.

ANGOL, ân-gōl′. Capital of the department of Angol, and of the province of Malleco, Chile, 70 miles southeast of Concepcion (Map: Chile, C 11). It is on a branch railway extending 45 miles southward to Traiguen. In the sixteenth century it was sacked by the Indians and was rebuilt by Mendoza. Pop., 1885, 6331; 1895, 7056; 1903, 7896.

ANGOLA, ân-gō′lȧ (Portug. for the native name *Ngola*). A Portuguese colony in West Africa, extending from 6° to 17° S. lat. and from 12° to about 25° E. long. (Map: Africa, F 6). It is bounded by German Southwest Africa on the south, Northern Africa on the east, and Belgian Congo on the east and north. Its coast line on the Atlantic extends for about 1000 miles, and its entire area, including the small possession of Kabinda, north of the Congo, is 490,463 square miles. The surface is very mountainous in the west, where some of the peaks reach an altitude of about 8000 feet. In the interior there is an extended range of mountains. The coast line forms a great number of harbors, the most important of which are São Paulo de Loanda, Lobito, Benguela, and Mossamedes. The rivers are mostly short and usually dry up during the arid season. The most important and only navigable streams are the Kuanza and Kunene, both flowing into the Atlantic. Temperature varies considerably, owing to the uneven formation of the surface. Rainfall is heavier in the northern part and in the vicinity of the coast than in the south. The agricultural products of Angola consist of manioc, coffee, bananas, sugar-cane, tobacco, and cereals. The land is held mostly in very large plantations by the Portuguese, and the condition of the native farm laborers is very close to actual slavery.

The trade is principally with Portugal. The chief articles exported are coffee, rubber, ivory, wax, and fish. The imports consist mainly of food products and textiles. The value of the imports and exports in 1909 was $3,097,351 and $2,999,856 respectively. The principal port is São Paulo de Loanda, commonly called Loanda, the capital of the colony, with a very considerable shipping. There is a railway from Loanda to Ambaca (225 miles), and thence about 75 miles to Malanje. A line from Lobito Bay is under construction toward the Katanga copper mines near the Rhodesia frontier. The total length of railways, as reported in 1913, was 642 miles. The telegraph lines of Angola had a total length of 2688 miles, with 69 offices, in 1911. Post offices, 453. The finances of the colony are in a rather strained condition, in spite of heavy taxation. The budget for the year 1909–10 showed estimated revenue of $1,272,269 and estimated expenditure of $1,698,546. For administrative purposes the colony is divided into six districts, which are controlled by the Portuguese government, but the greater part of Angola is under the rule of native chiefs. At the head of the colony is

a governor, appointed by the Portuguese government. The population is estimated at 3,800,000, mostly of Bantu-Negro stock. The number of Europeans is comparatively small, only about 4000; but they have exercised a great modifying influence on the native population inhabiting the western part of the colony as regards their customs and economic condition. The aborigines in the interior have retained their ancient institutions intact. The authority of Portugal in the western part of Africa was first established by the Portuguese explorer, Diogo Cam (Cão), who visited the estuary of the Congo (c.1482). Very little, however, was done by the Portuguese government to extend its rule farther inland, and in the middle of the sixteenth century it was almost entirely superseded by the Dutch. Gradually, by definite treaties, the Portuguese possessions in West Africa were extended to their present proportions.

Consult: J. de Vasconcellos, *As Colonias Portuguezas* (Lisbon, 1897); Châtelaine, *Angola* (Washington, 1893); H. W. Nevinson, *A Modern Slavery* (London, 1906); Mary H. Kingsley, *West African Studies* (London, 1901).

ANGOLA. A city and the county-seat of Steuben County, Ind., 41 miles north by east of Fort Wayne, on a branch of the Lake Shore and Michigan Southern, and the St. Joseph Valley railroads (Map: Indiana, D 1). Angola is the seat of the Tri-State College. The town was settled about 1834, incorporated as a town about 1866, and as a city in 1906. Pop., 1890, 1840; 1900, 2141; 1910, 2640; 1913, 2800.

ANGO'RA (ancient Gk. Ἄγκυρα, *Ankyra;* Lat. *Ancyra;* Turk. *Enguri*). The capital of the Turkish vilayet of the same name, in the mountainous interior of Asia Minor, and distant from Constantinople about 220 miles. The city is fabled to have been built by Midas, the son of the Phrygian Gordius. It was a flourishing city under the Persians; became the capital city of the Gallic Tectosages, who settled in Asia Minor about 277 B.C.; was a principal seat of eastern trade under the Romans, and was made the capital of the Roman province of Galatia Prima. It was the seat of one of the early churches of Galatia, and the scene of two Christian councils, held in 314 and 358. A temple of white marble, of exquisite workmanship, was erected by the citizens and dedicated to Rome and Augustus who had greatly beautified the city. In 1553 a Dutch scholar, Busbecg (q.v.), found in this temple a most important inscription, in two versions, one Latin, the other Greek, recounting the deeds of Augustus. This inscription is to be connected with a statement made by Suetonius (q.v.), in "Vita Augusti," 101, that Augustus left behind three *volumina*, one of which gave "a list of his exploits which he wished to have cut on brazen tablets which should be set up before his Mausoleum." The Latin inscription is a copy, more or less mutilated now, of the record set up at Rome in accordance with the will of Augustus. It was found on the wall of the vestibule, in six parts or pages, three to the right, three to the left of the entrance; the whole inscription is about 26 feet long by 8 feet high. The Greek translation was on one of the outer walls of the temple, and is about 4 feet high by 65 feet long. This Greek version is of very great value, because in many cases it supplements the breaks in the Latin original. The inscription was first printed in Schott's edition of *Aurelius Victor* (Antwerp, 1579), and has been edited by Mommsen (Berlin, 1883), Willing (Halle, 1897), and Fairlie, as vol. v, no. 1, of *Translations and Reprints from the Original Sources of European History*, published by the Department of History of the University of Pennsylvania (Philadelphia, 1898). Fairlie's book contains both versions and a translation. The text may also be found in Schuckburgh's edition of Suetonius's "Vita Augusti" (Cambridge, 1896). At Apollonia, on the borders of Phrygia and Pisidia, part of the Greek version has been found; this corresponds very closely to the Greek version found at Angora. Casts of the versions at Angora have, since 1882, been in possession of the Royal Academy at Berlin. Angora contains more than 30,000 inhabitants, of whom about one-third are Armenians. The district is famous for its breed of goats, with beautiful long silky hair. Of this goat-hair a kind of yarn is made, known as Turkish yarn or camel yarn, used in the manufacture of camlets which is extensively carried on in Angora itself. Many animals in this region are remarkable for the length and softness of their hair, especially dogs, rabbits, goats, and cats. This characteristic seems to depend upon a peculiarity of the climate, since this distinction disappears when the animals are transported to Europe. Consult Wright, *Cities of Paul* (Boston, 1905).

ANGORA CAT, GOAT, etc. See CAT; GOAT, ETC.

ANGORNU, äṅ'gôr-nōō'. See NGORNU.

ANGOSTURA, äṅ'gŏs-tōō'rȧ. See CIUDAD BOLÍVAR.

ANGOSTURA BARK, or **ANGUSTURA BARK,** or CUSPARIA BARK. The aromatic bitter bark of certain trees of the natural order Rutaceæ and species Cusparidæ, natives of Venezuela and other countries of South America where it is used to combat periodic fevers. It derives its name from the town of Angostura, whence it is exported. It is said to have been used in Spain as early as 1759, as a remedy for weakness of digestion, diarrhœa, dysentery, and fevers. It is tonic and stimulant. The most important of the trees producing it, *Galipea officinalis*, grows upon the mountains of Colombia. It is a tree 12 to 20 feet high and 3 to 5 feet in diameter, having a gray bark, trifoliate leaves, with oblong leaflets about 10 inches long, and flowers about an inch long, in racemes, white, hairy, and fragrant. The bark contains a chemical substance called *angosturin*, *cusparin*, or *galipein*, to which its medicinal efficacy is ascribed. It is supposed that a variety of Angostura bark is produced by Galipea cusparia (called by some *Bonplandia trifolia*), a majestic tree of 60 to 80 feet in height, with fragrant trifoliate leaves more than 2 feet long. Angostura bark was formerly believed to be a valuable febrifuge; but it has been supplanted by quinine, and has, indeed, in some countries of Europe been prohibited, in consequence of its frequent adulteration with the poisonous bark of the Strychnos nux vomica (false Angostura bark), or the substitution of that bark for it.

ANGOT, äṅ'gōt', CHARLES ALFRED (1848—). A French meteorologist, born in Paris. After the completion of his scientific studies he was for a time professor at the Institute of Agronomy, serving also as secretary-general of the Meteorological Society of France, and for many years as director of the National Bureau of Meteorology. He wrote much on meteorology and kindred

subjects, among his most important works being: *Traités de physique et de piles électrique; Traité élémentaire de météorologie* (1899); *Abrégé des instructions météorologiques* (1902).

ANGOULÊME, äN'gōō'lâm'. The ancient capital of Angoumois, now of the department of Charente in France (Map: France, S., E 3). It is built upon a ridge, down the north slope of which straggle the quaint houses and crooked streets of the old town. The new town occupies the south slope. It is situated on an eminence between the Charente and the Anguienne, and among its industries are a number of paper mills and manufactures of machinery, wire, wine, brandy, woolen stuffs, linen, and earthenware. It possesses a royal college, a museum of natural history, a naval academy, a theological seminary, and a library. It is the seat of a bishop, and the cathedral of St. Peter dates from 1101. The founding of the see took place in 379, and Clovis built the earliest cathedral in 507. In the centre of the town stands the remnant of the ancient castle of Angoulême, in which was born Margaret of Navarre, the author of the *Heptameron* and other works. Pop., 1906, 37,507; 1911, 38,211. Consult: Castaigne, *La Cathédrale d'Angoulême* (Angoulême, 1834); Nanglard, *Fouille historique du diocèse d'Angoulême* (Angoulême, 1894–97); Babinet de Rencogne, *L'Histoire du commerce et de l'industrie en Angoumois* (Angoulême, 1878–79).

ANGOULÊME, Charles de Valois, Duc d' (1573–1650). The illegitimate son of Charles IX of France and Marie Touchet. Until 1619 he was known as Comte d'Auvergne. He was imprisoned in the Bastille from 1605 to 1616 for having plotted against Henry IV. He was then released by Louis XIII and restored to his rank in the army, which he commanded at the siege of La Rochelle in 1628. He left some memoirs of the reigns of Henry III and Henry IV.

ANGOULÊME, Louis Antoine de Bourbon, Duc d' (1775–1844). The eldest son of Charles X of France and Dauphin during his father's reign. He retired from France with his father (who was then the Comte d'Artois) at the beginning of the Revolution and spent some time in military studies at Turin. In August, 1792, he entered Germany at the head of a body of French *émigrés* and soon after retired to Edinburgh. In 1799 he married his cousin, Marie Thérèse Charlotte, daughter of Louis XVI, with whom until 1814 he lived in exile. On the recall of his uncle, Louis XVIII, he was appointed lieutenant-general of the kingdom; but he failed in his attempt to oppose Napoleon and was forced to capitulate. After the second restoration he was sent by Louis XVIII to the southern provinces to repress the political and religious outbreaks there, and in 1823 he led into Spain the French army, which put an end to the constitution and restored Ferdinand VII to absolute power. He was a man of phlegmatic disposition and mean abilities. When the Revolution took place in July, 1830, he signed, with his father, an abdication in favor of his nephew, the Duc de Bordeaux (Comte de Chambord); and when the Chambers declared the family of Charles X to have forfeited the throne, he accompanied him into exile to Holyrood, to Prague, and to Görz, where he died.

ANGOULÊME, Marie Thérèse Charlotte, Duchesse d' (1778–1851). The daughter of Louis XVI. She exerted great influence over Louis XVIII and Charles X. She was imprisoned in the Temple with her parents, but in 1795 was exchanged for some French prisoners in the hands of the Austrians, and lived at Vienna till her marriage in 1799, with her cousin, the Duc d'Angoulême. Her memoirs were published in London (1852) with the title *Filia Dolorosa*, the editor being Mrs. I. F. Romer. Consult A. F. Nettement, *Vie de Marie de France, fille de Louis XVI* (3d ed., Paris, 1872).

ANGRA DO HEROISMO, äṅ'grȧ dō ā'rō-ēs'mō (Portug. bay of heroism). The capital of the Azores, a seaport at the head of a deep bay on the south coast of the island of Terceira, lat. 38° 38′ N., long. 27° 12′ W. (Map: Portugal, B 5). It is a station for ships between Portugal and Brazil and the East Indies, but the harbor, the only available one on the island, is very much exposed. It is the seat of the Portuguese governor-general of the Azores and of the bishop; is well built, but dirty; strongly fortified, and protected by a citadel at the foot of the Monte de Brazil; contains a military college and arsenal, several scientific and literary societies, a cathedral, and numerous churches. There is a considerable export of wine, fruit, honey, grain, and flax. This city furnished an asylum for the Portuguese regency from 1830 till the taking of Oporto by Dom Pedro (1833). Pop., 1911, 10,057.

ANGRA PEQUENA, äṅ'grȧ pā-kā'nyȧ (Sp. *pequeña*, little, small; see Angra). A settlement and a bay in German Southwest Africa (q.v.). Though poor its harbor is the best sheltered in the German possessions in that part of the continent (Map: Africa, F 7). The commercial importance of the bay has almost entirely disappeared on account of the lack of fresh water and the general barrenness of the surrounding country, although the climate is pleasant. The settlement of Angra Pequeña was established by the Bremen merchant Luderitz in 1883, and it was the nucleus of the present German Southwest Africa. It was at Angra Pequeña that the German flag was first planted on African soil in 1884. In honor of its founder, Angra Pequeña is called by the Germans Luderitz Bay, and the surrounding country is known as Luderitzland.

ANGRI, äṅ'grē. A city in south Italy, 4 miles east of Pompeii (Map: Italy, F 11). It is situated in the mountains, has a castle and a park, and silk and cotton factories. South of the city, on the ancient Mons Lactarius, Teja, the last King of the Ostrogoths, was defeated by Narses in 553. Pop., 1881, 7700; 1901 (commune), 11,219; 1911, 11,574.

ÅNGSTRÖM, ōṅg'strēm, Anders Jönas (1814–74). A Swedish physicist. He entered the University of Upsala in 1833; became privatdocent in physics in 1839, keeper of the astronomical observatory in 1843, and professor of physics in 1858. From 1867 till his death he was secretary to the Royal Society of Sciences at Upsala. He wrote on heat, magnetism, and especially on optics. Among his works were *Recherches sur le spectre solaire* (1869), in which he published his determinations of the wave lengths of most of the dark lines of the solar spectrum known as the Fraunhofer lines; *Sur les spectres des gas simples* (1871), and

Mémoire sur la température de la terre (1871). His best-known work, *Optiska Undersökningar* (1853), treats of the principles of spectrum analysis.

ANGUIER, äṅ'gē'ā', François (1604–69), and Michel (1614–86). Brothers, prominent sculptors of the Baroque period. Both were born at Eu (Normandy); studied with Simon Guillain in Paris, and afterwards at Rome. The chief works of François are the mausoleum of Henri II, Duke of Montmorency, at Moulins (1651–58); figures from the mausoleums of Jacques Augustin de Thou and Jacques de Souvre, in the Louvre, and those of Gaspard de la Châtre and Henri Chabot, Duke de Rohan, in the Museum of Versailles. All of these works are in marble. At Moulins he was assisted by his brother Michel, who also carved many statues for the churches there. From 1654 to 1655 Michel was occupied with the plastic decoration of the apartments of Anne of Austria in the Louvre. His many sculptures include a bronze relief of the "Nativity," now in St. Roche, Paris, and a number of works in the Louvre, including a large terra cotta, "Hermes and Atlas." His masterpiece is the sculptures of Porte St. Denis, Paris, after the designs of Le Brun. The model of the grand staircase of the palace of Versailles is also attributed to him. One of the ablest sculptors of the seventeenth century in France, Michel Anguier united a fine sense of the antique with a strong decorative talent. Compared with his work, that of his brother François, although able technically, seems cold and labored. Consult the monographs on the brothers by Stein (Paris, 1899), the best upon the subject; others are by Sansom (Paris, 1889) and Duplais (Paris, 1890).

ANGUILLA, äṅ-gwĭl'lȧ, or Little Snake (Sp. *Anguila,* ȧn-gē'lȧ; dimin. of Lat. *anguis,* serpent, snake). One of the British West India Islands, about 150 miles east of Porto Rico (Map: West Indies, Q 5). It is about 17 miles long and 4 miles broad, with an area of 35 square miles and a population of (1911) 4075, mostly negroes. The industries are cattle-raising and the production of vegetables, cotton, and salt, the latter obtained from a lake in the centre of the island.

ANGUISCIO-LA, ȧn-gwē'shō-lȧ, or **ANGUSSOLA,** ȧn-gōō'sō-lȧ, Sophonisba (1527–c.1623). An Italian portrait painter. She was born at Cremona, of an ancient and noble family. Here she studied with Campi and Gatti, unimportant Eclectic painters, and imparted her own knowledge to five sisters, who also became painters. In later years she became blind, and it was then that Van Dyck visited her and professed himself enlightened by her conversations on art. Sophonisba's popularity was largely due to her personal charm and her wide culture. To modern ages her paintings seem mediocre. Of her portraits, which are to be found at Florence, Madrid, Genoa (Lomellini Palace), and in English private possession, the best known are the numerous portraits of herself, of which there are examples in the Uffizi and at Vienna. One of her best productions is her "Three Sisters Playing Chess" in the National Gallery, Berlin. Consult Fournier-Sarloveze, *Sophonisba Anguisciola et les sœurs* (Paris, 1900).

ANGUS, ăṅ'gŭs, Earls of. See Douglas, Family of.

ANGUS, Joseph, D.D. (1816–1902). A Baptist educator, born at Bolam, Northumberland, England. He was educated at the University of Edinburgh, and became president of the Baptist Regents' Park College, in London, in 1849. He was a member of the Bible Revision Committee, and is well known as the author of the *Bible Handbook* (London, 1854), *Handbook of the English Tongue* (1862), *Handbook of English Literature* (1868), *Handbook of Specimens of English Literature* (1866), and the commentary on Hebrews in Schaff's *International Commentary* (1883).

ANGUS, Richard Bladworth (1831–1922). A Canadian financier and capitalist. He was born at Bathgate, Scotland, and educated in the public schools. After being employed for several years in the Manchester and Liverpool Bank, he came to Canada in 1857, joined the staff of the Bank of Montreal, and became its general manager in 1869, holding that position for 10 years. He assisted Lord Mountstephen and Lord Strathcona in the reorganization of the St. Paul, Minneapolis, and Manitoba Railway, and, with them, was an influential member of the syndicate which completed the construction of the Canadian Pacific Railway in 1885. He became known as a munificent promoter of charitable institutions and of art.

ANGWANTIBO, äṅ'gwȧn-tē'bō. The slow lemur. See Lemur.

ANHALT, än'hȧlt. A duchy of the German Empire, inclosed within Prussian territory (provinces of Saxony and Brandenburg), with an area of 888 square miles (Map: Germany, E 3). The western part, adjacent to Brunswick, partakes of the mountainous character of the Harz region and inclines gradually toward the valley of the Elbe. The latter traverses in a westerly direction the main part of the duchy and receives the Saale, Mulde, and a few minor tributaries. Anhalt has a fertile soil and is well cultivated. Rye, wheat, potatoes, oats, and grasses are grown extensively. The forests occupy a considerable area and belong chiefly to the state. The chief mineral product of Anhalt is salts of different kinds, which are worked exclusively by the government. The output of ore is very limited, while the production of lignite amounted to 1,266,369 tons in 1910. The manufacturing and mineral industries give occupation to over 47 per cent of the population. The chief manufactured products are metal articles, sugar, cement, bricks, soap and other toilet articles, leather, woodenware, and spirits. Exports are chiefly sugar, spirits, grains, salt, carpets, and matches. The railways of Anhalt have a total length of about 180 miles, chiefly state-owned. The constitution of the duchy vests the executive power with the duke, who is assisted by the Diet. The latter is composed of 36 members, elected indirectly for a period of six years. The immediate executive authority is vested in the minister of state. Anhalt is represented by one member in the Bundesrat and two deputies in the Reichstag of the German Empire. For purposes of local administration it is divided into six circles. The budget for the year 1912–13 balanced at 32,275,825 marks. The revenue is derived from taxes, customs, and state domains, mostly salt works. The military organization of the duchy is under the control of Prussia. Education, elementary as well as secondary, is well provided for by the state. The state re-

ligion is Protestant, but the Catholic and Jewish religions are also subsidized to some extent. According to the census of 1910, the population of Anhalt was 331,128, showing an increase of less than 5 per cent for the decade. Over 96 per cent of the population is Protestant. Capital, Dessau (q.v.).

The reigning house of Anhalt traces its origin to Albert the Bear, Margrave of Brandenburg, upon the death of whose grandson, Henry I, in 1252, the Anhalt territories of the family were divided into three parts, which gave rise to the related families of Bernburg, Aschersleben, and Zerbst. The subsequent history of Anhalt is a monotonous succession of reunions and reparcelings. All the parts were united between 1570 and 1586, and were then broken up again into four parts, Dessau, Bernburg, Köthen, and Zerbst. By the successive extinction of the last three lines, Anhalt was definitely reunited in 1863.

ANHALT-BERNBURG, -bĕrn'bŭrk, CHRISTIAN, PRINCE OF (1568–1630). A German general, founder of the Anhalt-Bernburg branch of Anhalt. In 1608 he took a leading part in the formation of the so-called Union of the Protestant German Princes directed against the encroachments of the Catholics. After acting as second commander of the army of that league, he entered the service of King Frederick of Bohemia, and led the army which was defeated by Tilly at Prague (1620).

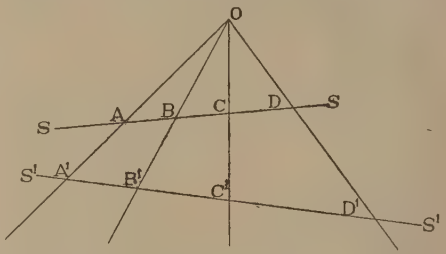
ANHALT-DESSAU, -dĕs'ou, LEOPOLD I, FOURTH PRINCE OF (1676–1747). A Prussian field-marshal. He entered the Prussian service at the age of 12, and succeeded his father five years later. He distinguished himself at Höchstädt or Blenheim (1704) and in Prince Eugene's brilliant campaigns in Italy. After serving as a volunteer at Malplaquet (1709), he received command of the Prussian forces in the Netherlands, and aided Marlborough in his operations against Villars. In 1712 he was made field-marshal and military counselor to King Frederick I. Under Frederick William I Marshal Dessau aided in the reorganization of the Prussian army. As one of Frederick the Great's generals, he distinguished himself in the War of the Austrian Succession, in which he gained a bloody victory over the Austrians at Kesseldorf in 1745. To his soldiers Leopold of Anhalt-Dessau was known as "Der Alte Dessauer" ('Old Dessau'). Carlyle, in his *Frederick the Great*, speaks of him as "a man of vast dumb faculty, dumb but fertile, deep—no end of imagination—no end of ingenuities—with as much mother wit as in whole talking parliaments." There are numerous lives of him in Germany; the best ones are those of Varnhagen von Ense (Leipzig, 1872) and Crousaz (Berlin, 1875). There is an incomplete autobiography, edited by Hosaus, *Selbstbiographie des Fürsten Leopold.* Consult also Carlyle, *Frederick the Great* (London, 1858).

AN'HARMON'IC RA'TIO (Gk. *ἀν, an,* priv. + *ἁρμονία, harmonia,* harmony, agreement). An important form of ratio introduced by Möbius under the name *Doppelverhältniss* (double ratio), but called by Chasles *rapport anharmonique.* If a pencil of four lines with vertex *O* are cut by any transversal *SS* in points *A, B, C, D,* the ratio $\frac{AB \cdot CD}{AD \cdot CB}$ is called the anharmonic ratio of the points and also of the pencil, and is symbolized by $\{O,\ ABCD\}$ or simply $\{ABCD\}$. Since $\frac{AB \cdot CD}{AD \cdot CB} = \frac{\sin AOB \cdot \sin COD}{\sin AOD \cdot \sin COB}$, the anharmonic ratio is the same for any transversal, such as *S'S'*, of given pencil, so that

$$\{ABCD\} = \{A'B'C'D'\}$$

This *invariance* with respect to projection and section is the fundamental property of the anharmonic ratio. All projective properties of geometric figures are expressible in terms of anharmonic ratios of their lines and points.

The anharmonic ratio $\{ABCD\}$ admits of certain interchanges of letters without altering



the value of the ratio. In fact, the 24 permutations of the letters give only six different anharmonic ratios, and these six are thus related: If $\{ABCD\} = \lambda$, then

$$\{ADCB\} = \frac{1}{\lambda}$$

$$\{ACBD\} = 1 - \lambda \quad \{ABDC\} = \frac{\lambda}{\lambda - 1}$$

$$\{ACDB\} = \frac{\lambda - 1}{\lambda} \quad \{ADBC\} = \frac{1}{1 - \lambda}$$

When the segments are so related that the value of the anharmonic ratio is -1, the ratio is called *harmonic.* The subject of anharmonic ratio, as indicated above, plays an important part in projective geometry. Consult Cremona, *Elements of Projective Geometry* (London, 1885). See GEOMETRY.

AN'HIDROT'ICS (Gk. *ἀν, an,* priv. + *ἱδρώς, hidrōs,* sweat). Drugs which check perspiration. They are chiefly used in the profuse night-sweats of phthisis. The most important are atropine, picrotoxin, agaricin, camphoric acid, sulphuric acid, and gallic acid (qq.v.).

ANHIMA, ăn'hĕ-mȧ (Brazilian name). The horned screamer, one of the curious South American birds of the order Palamedeiformes and the family Palamedeidæ. See SCREAMER.

ANHIN'GA. A generic and native name in South America of the snake-birds, or darters (family Anhingidæ). See DARTER, and illustrations on Plate of FISHING BIRDS (for similar species).

ANHOLT, ăn'hôlt. An island belonging to the district of Randers, Denmark, situated in the centre of the Kattegat, about 22 miles from the peninsula of Jutland and the mainland of Sweden (Map: Denmark, E 2). Anholt Island has an area of 8 square miles, and is nearly twice as long as it is broad. At the eastern end is a lighthouse to mark the dangerous shoals and reefs of the neighborhood. Pop., 1906, 342.

ANHY'DRIDE (Gk. waterless, from *ἀν, an,* priv. + *ὕδωρ, hydōr,* water). An oxide which

combines with water to form an acid, or an oxide which combines with a basic oxide to form a salt. Sulphuric oxide (SO_3), when added to water (H_2O), forms sulphuric acid (H_2SO_4); sulphuric oxide is, therefore, termed the anhydride of sulphuric acid. Again, chromic oxide (CrO_3) combines with barium oxide (BaO), yielding barium chromate ($BaCrO_4$); chromic oxide is, therefore, classed as an anhydride.

ANHY'DRITE (Gk. *ἀν, an,* priv. + *ὕδωρ, hydōr,* water). An anhydrous calcium sulphate that crystallizes in the orthorhombic system. It is found crystallized, fibrous, finely granular, or scaly granular. A scaly granular variety from Vulpino, in Lombardy, Italy, takes a fine polish and has been used for sculpture. In America it is found in Lockport, N. Y., near Nashville, Tenn., and extensively in Nova Scotia.

ANI, ä'nē (native Brazilian name). A bird of the genus *Crotophaga,* inhabiting the warmer parts of America and related to the cuckoo. Three species are known, the most common of which (*Crotophaga ani*) is found in Florida, the West Indies, and Yucatan and eastern South America, where it is known as the "black witch," "savannah blackbird," and "rain crow." The anis are birds of medium size, about one foot in length, and have a black, lustrous plumage with blue and violet reflections. The tail contains only eight feathers, the smallest number credited to any living bird. The bill is exceedingly compressed, the upper mandible forming a thin crest. The nests are built in bushes, and the eggs are greenish overlaid with a white chalky substance. One species is said to be communistic, several individuals uniting to form a large nest, which they use in common, and the practice may be common to the tribe. The groove-billed ani (*Crotophaga sulcirostris*) is found from Arizona south to Peru and is named "el garapatero" because it accompanies cattle in the fields, settles on their backs, and picks from their hides the ticks which are called *garapatos.* For illustration, see CUCKOO.

ANICET-BOURGEOIS, ä'nē'sā' bōōr'zhwä', AUGUSTE (1806–71). A French dramatist, born in Paris. The splendid success of a melodrama, *Gustave, ou le Napolitain* (Gaîté, 1825), which he wrote at the age of 19, induced him to follow a literary career. He soon became a collaborator with some of the leading authors of France, such as Lockroy, Decourcelle, Labiche, and Brisebarre. Among the vaudevilles and comedies produced in this way were: *Père et parrain* (1834), *Passé minuit* (1839), *Les trois épiciers* (1840), *Le premier coup de canif* (1848), *L'avare en gants jaunes* (1858), *Les mariages d'aujourd'hui* (1861). In conjunction with Barbier, Cornu, Lockroy, Masson, Féval and others he composed several melodramas, such as: *Le couvent de Tonnington* (1830), *Périnet Leclere* (1832), *La nonne sanglante* (1835), *Marceau, ou les enfants de la République* (1848), *La dame de la Halle* (1852), *L'aveugle* (1859), *Le bossu* (1862). His independent works include *La Vénitienne* (1834, one of his best efforts), *La pauvre fille* (1838), and *Stella* (1843). Anicet-Bourgeois was a master of dramatic technique and was unsurpassed in the field of the melodrama. He wrote in all nearly 200 pieces, many of which, however, were composed in collaboration with others, such as Dumas, for example, under whose name many of Anicet-Bourgeois's productions are still performed.

AN'ICE'TUS (?–168). A bishop of Rome from about 157 to 168 A.D. About 160 A.D. he conferred with Polycarp to determine the proper time for celebrating Easter, but they came to no agreement. Although it is not certain that he was a martyr, he is so called in the Roman and other martyrologies. He is commemorated as a saint by the Roman church on April 17.

AN'ILINE (from *anil,* Ar. *an-nīl,* for *al,* the + *nil,* from Skr. *nīlī,* indigo), AMIDO-BENZENE, or PHENYL-AMINE, $C_6H_5NH_2$. A liquid organic substance extensively used in the manufacture of dyes. Pure aniline is colorless, has a faint, somewhat disagreeable odor, and boils at 183° C. All aniline ordinarily met with contains a thiophene derivative as an impurity, and it is owing to this that aniline rapidly turns red on exposure to air and light. The impurity is extremely difficult to remove, and really pure aniline, which remains colorless indefinitely, is best prepared by starting with benzene thoroughly freed from thiophene. Aniline combines with acids to form salts, such as aniline hydrochloride, $C_6H_5NH_2.HCl$. It may be readily prepared by the reducing action of nascent hydrogen on nitrobenzene in acid solution, according to the following chemical equation:

$$\underset{\text{Nitrobenzene}}{C_6H_5NO_2} + 6H = \underset{\text{Aniline}}{C_6H_5NH_2} + 2H_2O$$

On a large industrial scale aniline is made as follows: A small quantity of ground scrapings of soft iron castings, technically called *swarf,* is introduced, together with some water, into a large cast-iron still furnished with powerful agitators. Crude hydrochloric acid is then added, and nitrobenzene is allowed slowly to flow into the still; at the same time, through another opening, the rest of the swarf to be employed in the operation is allowed to flow into the still in a steady stream. After the first energetic action has subsided, the reacting mixture is heated with a current of steam introduced into the apparatus through several pipes. Six to eight hours suffice to transform all the nitrobenzene employed in one operation. The process may be called continuous, since the acid employed serves merely to start the reaction, and might, theoretically, be used in reducing an indefinte quantity of nitrobenzene, the reduction being effected by the iron and water. In reality, however, a portion of the acid remains combined as ferrous chloride, while most of the iron is transformed into its magnetic oxide, Fe_3O_4, technically called *black stuff.* All the aniline brought into commerce is made in this manner.

Aniline was first discovered in 1826 by Unverdorben, among the products obtained in the destructive distillation of indigo. In 1834 Runge found it in coal-tar; in 1841 Zinin obtained it by reducing nitrobenzene with sulphuretted hydrogen, and in 1843 Hofmann effected the same reduction with nascent hydrogen, by the reaction of dilute acid and metals. The manufacture of aniline has been an important branch of industry since 1856, when the discovery of mauve was perfected by Perkin.

The qualities of commercial aniline adapted to certain purposes often contain, besides aniline, large quantities of other substances. Thus, crude "aniline for red" contains only about 25 per cent of aniline, the rest being ortho-toluidine and para-toluidine, compounds chemi-

cally allied to aniline. The presence of aniline in a substance submitted for analysis may be readily detected by dissolving some of the substance in water and adding a solution of bleaching-powder: in the presence of aniline an intense purple coloration is produced. Another test for aniline is afforded by the so-called carbylamine reaction: a drop of aniline added to a mixture of chloroform and a solution of caustic potash in ordinary alcohol produces an intensely nauseous smell, due to the formation of phenylcarbylamine (phenyl iso-cyanide), C_6H_5NC. For bibliography, see COAL-TAR COLORS.

ANILINE COL'ORS. See COAL-TAR COLORS.

ANILINE POISONING. Aniline is a derivative of coal tar, in which it exists in small quantities, and is chemically the starting point of a host innumerable of compounds used in the arts and medicine. Aniline itself is a colorless liquid, which becomes brown on exposure to the air, constituting the commercial aniline oil. It has an aromatic odor and an acrid, burning taste. When taken in the liquid form or by inhalation, aniline is a very active poison, producing symptoms of headache, dizziness, cardiac and respiratory paralysis, loss of muscular power, cyanosis, convulsions, and coma. The fatal dose is about 1½ drams. Externally aniline is irritating and gives rise to a troublesome form of eczema. Poisoning by this substance occurs, however, most frequently in the chronic form, among workers in aniline dyes (see COAL-TAR COLORS), either in their manufacture or in dyeing processes or in making inks. In medicine a great many aniline derivatives are used, notably the anilids, of which acetanilid, phenacetine, and antipyrine (qq.v.) are types. Several aniline dyes are also employed in medicine, among which may be mentioned methylene blue, an antiperiodic and urinary antiseptic; scarlet red, applied as an ointment to stimulate epithelial growth upon granulating surfaces; fluorsceïn, sometimes dropped in the eye for diagnostic purposes. Eosin and fuchsin are used in pathological laboratories to stain tissues and microorganisms. Aniline dyes are also largely employed to give an agreeable color to medicines. In whatever form these derivatives are absorbed their general effect is the same. They are cardiac poisons, and have a selective hemolytic action on the blood. The symptoms vary only in degree, according to whether they are slowly or rapidly taken into the body.

AN'IMAL (Lat. a living being, from *anima*, current of air, breath of life, soul, *animus*, soul, mind; from the Skr. root *an*, to breathe). A representative of one of the two great groups of organisms, the other including plants. The distinction between animal and plant is hard to draw sharply, although the usual differences between the higher representatives of the two groups are obvious enough. Most higher animals differ from most higher plants in that their food is chiefly solid and organic, in their capacity for locomotion, in their alimentary tube, muscles, nervous system, and sense organs, in their limited growth and greater specialization of parts. This list of differences is really less formidable than it appears; it resolves itself chiefly into a difference of food, which demands that the animal shall seek the food and be provided with organs for locomotion (muscles, nervous system, and sense organs) and digestion. The difference in general form of body is due to the different methods of getting the (dissimilar) food. This difference in food (solid and organic, as opposed to fluid and inorganic) serves in a general way to divide even the lower animals from the lower plants. But most animal and plant parasites are alike in requiring liquid, organic food; even green plants use organic food (some in large quantities, see SUNDEW), and all animals require inorganic food.

Locomotion is not a distinguishing characteristic of animals, first, because great groups of animals are permanently attached, viz., among protozoans, suctoria, sponges; among cœlenterates, most hydroids and corals; crinoids (sea-lilies); bryozoans, barnacles, and most ascidians. Single cases of attached animals are found in other groups. Secondly, bacteria, diatoms, oscillaria, certain unicellular green algæ, and many plant "swarm-spores" are more or less locomotive. In respect to irritability there is little fundamental difference even between the higher animals and plants, for plants respond to the same agents as do animals, but less perfectly. The reproductive process is fundamentally the same in the two kingdoms. In their chemical composition the higher animals differ from most plants; for the former contain no cellulose, whereas the latter are largely built up of it. But cellulose is found also among animals, especially in the test of the tunicates. In their cell structure and cell physiology animals are almost indistinguishable from plants. The fundamental living substance, called protoplasm, is substantially alike in the two kingdoms, and it is probable that future studies will make dimmer rather than clearer the line separating them.

The principal functions of animals are connected with nutrition, locomotion, sensation, and reaction, reproduction, and relation to other organisms. Nutrition involves first the acquisition of food. Food is (1) inorganic—water, oxygen, certain salts; or (2) organic—either vegetable or animal, either dead or living, passive or active. Attached animals depend mostly on dead or on passive living organisms, brought to them in currents of water. Those which live on active animals must have the most powerful organs of locomotion and sense. Solid food has to be triturated by teeth or crushing jaws and digested in a food canal. The fluids thus obtained pass through the wall of the food canal either into the general body spaces or into blood vessels, which carry them to the tissues, where they are assimilated or burned for heat and energy. When the food is exclusively fluid, it may soak through the body wall, as in tapeworms, which have no alimentary tract. The oxygen required passes through the wall of the body, is imbibed with water, or enters through special thin wall-tracts of the body surface known as gills or lungs. The body space or blood vessels carry the oxygen to the tissues, where it is used in combustion and in building up the organic compounds. The waste products of catabolism in the tissues are cast into the body spaces (or blood vessels) and eliminated, either directly or by special excretory organs. See ANATOMY; ALIMENTARY SYSTEM; RESPIRATORY SYSTEM; MUSCULAR SYSTEM, and similar articles.

Locomotion involves locomotive apparatus of divers kinds, jets of water, suckers and contractile tubes, lashes, tails, cilia, paddles, fins, wings,

and legs. It involves also muscles and a nervous system to control them.

All the protoplasm of the living body is irritable, but parts of the surface are told off as areas of special sense; for contact, hearing, taste, smell, sight, and temperature. To receive these impressions and to set in action appropriate movements, the central nervous system has become specialized. In the definite reactions which accompany particular situations to the world external to the animal lie the first evidences of a "psychic life." All sessile animals are characterized by lack of many sense-organs, reduction of muscular and nervous systems, and reduction of instincts.

Owing to accidents, the number of individuals tends constantly to diminish, yet it must be maintained. The single way that organisms have of making good losses or increasing their numbers is by dividing; this is the essence of reproduction (q.v.). Of especial significance is the fact that in all groups of animals the bits which have been constricted off (gametes) from time to time unite in pairs to form zygotes before going on with their development. In all reproduction the dividing individuals give rise to two incomplete individuals, except in the case where the division separates a "germ cell" from the body that carried it. The divided pieces or the germ cells are imperfect representatives of the species; they must "regenerate" or "develop" to produce the adult condition. See EMBRYOLOGY; REPRODUCTION.

The relations of animals to other organisms are varied. Many animals, especially in the higher groups, care for their young. Many protect themselves from their enemies by concealment or by flight; others are powerful for offense and defense. On account of the mating instincts, many higher animals have gained peculiar methods of appealing to the eye or ear or smell of other members of the species.

ANIMAL CHEM'ISTRY. See CHEMISTRY, PHYSIOLOGICAL.

ANIMAL COL'ORS. The chief animal colors now in use are cochineal, kermes, and lac dye (qq.v.). See also PURPLE.

AN'IMAL'CULE (dimin. of Lat. *animal*, living being). A popular name originally applied to any small animal, but later restricted to microscopic organisms, particularly such as are found in water. The term has no scientific standing and is now little used except in compound names, such as *bell-animalcule*, *wheel-animalcule*, *bear-animalcule*, very different sorts of animals elsewhere described.

ANIMAL FLOW'ER. A sea-anemone or similar polyp, whose expanded colored tentacles resemble the petals of a blossom. For illustration, see SEA-ANEMONE.

ANIMAL HEAT. Heat generated in the animal body by oxidation of its tissues. In order to understand heat production, distribution, and regulation it is necessary to consider the animal body as a machine for converting potential energy, which is food, into the actual energy of heat and physical work, heat being merely a form of energy. The source of animal energy lies in the oxidation of its waste products, or, more specifically, in the conversion of proteids, fats, and carbohydrates into urea, carbonic acid, and water; and the only two ways by which this energy is liberated are as heat and mechanical labor. In the building up and repairing of tissue (anabolism) heat is absorbed and converted into its latent form, while during the process of breaking down (katabolism) heat is set free. The muscular system, in which these processes are very active, is obviously, then, the chief source of heat, and next in importance are the large secreting glands, such as the liver. Comparing the temperature of the blood as it enters the liver through the portal vein, with that as it leaves this organ by way of the hepatic vein, we find an increase of about 2° C., showing that the liver has raised the temperature to this extent. The blood itself is not an appreciable source of heat, but acts as an oxygen carrier and a distributer of warmth, bearing heat to the two great regulators of the body temperature, the skin and lungs, where dissipation takes place by evaporation; in the case of the skin, through the medium of perspiration. In animals like the dog, which do not perspire freely, respiration is the chief mechanism of heat regulation, and active exercise is attended by a correspondingly increased respiratory activity (panting). In human beings the skin is the chief regulator of body heat. The process of heat regulation is further controlled by certain areas in the brain and spinal cord, similar to those governing the vaso-motor system, these heat centres in their turn being stimulated or inhibited by afferent impulses from the surface, transmitted through the sensory nerves.

In man the average temperature is about 98.6° F. (36.8° C.), varying with circumstances, being somewhat higher after exercise or a hearty meal and at noonday than at midnight. It differs slightly in various parts of the body, the interior being from ½° F. to 1½° F. higher than the surface. It also varies in diseased conditions of the body, rising to 106° F., or even 111° F. or 113° F. in sunstroke or heatstroke, and falling as low as 90° F. in cholera. A temperature of 108° F., if maintained for several hours, is almost inevitably fatal. In starvation a constant phenomenon is the marked fall of temperature, which becomes very rapid as death approaches. In most fish and reptiles, commonly termed "cold-blooded," the temperature differs but little from that of the water or air in which they live; the same is true in hibernating animals during the later part of their torpid condition.

Throughout the animal kingdom the power of generating heat bears a close relation to the activity or sluggishness of the animal. Many birds which are perpetually in action have the highest temperature (100° F. to 113° F.) and the swallow and quick-flighted birds higher than the fowls which keep to the ground. The higher the standard of animal heat, the less able is the animal to bear a reduction of its temperature; if that of a bird or animal be reduced 30° F. the vital changes become slower, and death finally ensues. Fish and frogs, on the other hand, may be enclosed in ice and still survive. Consult Kirkes, *Textbook of Physiology* (Philadelphia, 1907). See METABOLISM.

ANIMAL MAG'NETISM. See HYPNOTISM.

ANIMAL PSYCHOLOGY. That department of psychology (q.v.) which has for its subject matter the description of mind as it is found in animals below man. It is frequently called comparative psychology, although that term is more properly reserved for the comparative study of the mind of animals including man. In general, the method of animal psy-

chology consists in the observation of the behavior of animals under various conditions, in the examination of their nervous structure, and in the interpretation, as indicators of mind, of the facts of behavior or structure or both in their relation to human behavior and structure. At first sight the observations of animal psychology appear to differ widely from the detailed verbal reports given in laboratory experiments upon the human subject; the difference is, however, more one of degree of precision than of kind. The special method of normal psychology is the method of introspection (q.v.). Introspection implies, on the part of the subject, observation and a report, and, on the part of the psychologist, an interpretation of the report on the basis of analogy between the psychologist's own mind and the mind which he interprets. The analogy may always be assumed to exist because the psychologist and his fellow being, whose mind he infers, are similar creatures, that is to say, their individual behavior and physiological structure are similar. In much the same way that the human subject introspects, the animal may be said to "observe," in that it clearly experiences certain phenomena, and to "report upon" these phenomena, in that it exhibits gross bodily movements subsequent to the experience. The flight of the deer at the sound of the hunter's gun may be regarded as no less a report upon experience than are the more refined movements of writing or speaking which constitute description by the human being. The difference lies in the accuracy with which the two reports may be interpreted. Gross bodily movements are much less precise and admit of much less specificity of meaning than do the movements involved in language, and the reliability of accurate interpretation on the basis of analogy to the human mind is decreased when there is greater diversity of bodily structure and general behavior between the animal and the human subjects. In the flight of the deer from the hunter, since this diversity is not so great, we may assume something not wholly unlike the human emotion of fear; in the flight of the infusorian from the drop of acid the likeness of conscious experience is much less probable. We may say, then, that the method of animal psychology is, in principle, the same as that of human psychology, but that the interpretation of data is much less precise, and that the degree of precision is least when the diversity of structure and behavior between the animal and man is greatest.

A very frequent resource in animal psychology of an earlier date is the anecdote. In the writings of Darwin and Romanes it forms the principal basis for conclusions concerning the animal mind. The anecdotal method is, however, open to serious objection, in that it does not distinguish carefully between fact and interpretation of fact; moreover, personal bias is not excluded, and superficiality of observation is not condemned. Washburn objects to the method on five grounds: "The observer is not scientifically trained to distinguish what he sees from what he infers. He is not intimately acquainted with the habits of the species to which the animal belongs. He is not acquainted with the past experience of the individual mind concerned. He has a personal affection for the animal concerned, and a desire to show its superior intelligence. He has the desire, common to all humanity, to tell a good story." Wundt gives a specific instance of the error from Romanes's *Animal Intelligence*. "I have noticed," writes an English clergyman, "in one of my formicaria, a subterranean cemetery where I have seen ants burying their dead by placing earth above them. One ant was evidently much affected and tried to exhume the bodies; but the united exertions of the yellow sextons were more than sufficient to neutralize the effort of the disconsolate mourner." "How much," asks Wundt, "is fact, and how much imagination? It is a fact that ants carry out of their nest, deposit near by, and cover up dead bodies, just as they do anything else that is in their way. They can then pass to and fro over them without hindrance. In the observed case they were evidently interrupted in their occupation by another ant and resisted its interference. The cemetery, the sextons, the feelings of the disconsolate mourner, which impelled her to exhume the body of the departed—all this is a fiction of the sympathetic imagination of the observer."

The obvious deficiencies of this anecdotal method have led to its almost complete abandonment in favor of the method of experiment. In 1883 Lord Avebury (Sir John Lubbock) published his experimental work on "Ants, Bees, and Wasps," and two years later Romanes reported experiments on cœlenterates and echinoderms. Many German investigators followed in the same path. The publication, in 1898, of Thorndike's *Animal Intelligence*, a book containing the results of experiments made under rigidly controlled conditions upon cats, dogs, and chicks, initiated a period of rapid development in experimental animal psychology and has been followed by a great body of researches into the behavior of various forms from protozoa to vertebrates.

A number of special experimental methods have been developed, particularly in the work upon vertebrates. The observation of structure and behavior have been supplemented by the observation of the alteration in behavior that takes place upon the extirpation of certain parts of the central nervous system or of the peripheral sense-organs. Methods of training have also been worked out. Animals have been required to associate food-getting with special conditioning factors, as color, shape, place. (See LEARNING IN ANIMALS.) The "puzzle-box method," originated by Thorndike, and the "maze method" have been widely utilized. In the former, the animal is required to let itself either out of or into a cage by undoing, often in a given order, a more or less complicated series of fastenings; in the latter, it learns to find its way without mistakes through a labyrinth. In either case the incentive may be hunger, in which event the animal is fed after a successful trial, or it may be desire for freedom or for the nest. In one form of the maze method the creature is punished by an electric shock whenever the wrong path is taken. Sometimes the method of extirpation and of training are combined, and the animal, after learning a problem, is subjected to operation in order to see what the effect may be upon the special association. Thus rats, which had learned a maze, were found to run the course almost as well after their eyes had been removed. An experimental lesion in the frontal lobes of the brains of monkeys was found to result in the loss of recently formed associa-

tions but not of those of long standing. Another method of training (Pawlow) consists in the formation of an association between some irrelevant stimulus and food, and the subsequent measuring of the strength of the association by the amount of salivary secretion that occurs upon the presentation of the originally irrelevant stimulus.

The advantages of the experimental are clear. The conditions are strictly controlled, the observer is impartial and is ordinarily trained in scientific observation. The method, however, presents the danger that the animal will not behave naturally in the surroundings of the laboratory. Fear and loneliness, as well as the extreme hunger used as a motive in some experiments, are not the natural circumstances under which the animal is accustomed to act. With the lower animal forms natural conditions can be fairly well approximated. For the higher forms "the ideal method," Washburn maintains, "involves patient observation upon a specimen known from birth, watched in its ordinary behavior and environment, and occasionally experimented upon with proper control of conditions and without frightening it or otherwise rendering it abnormal."

The tendency, evident in Darwin, Romanes, and their contemporaries, toward the more extremely anthropomorphic interpretation of the facts of animal behavior was the direct result of the Darwinian theory. The Cartesian notion of animals as automata could no longer suffice. From the point of view of the theory of evolution, which regards not only the entire physical structure of the human body, including the nervous system, but also the entire mental structure, which stands in intimate relation to the nervous system, as the result of a long period of development in the animal world, the demonstration of the pre-human mind becomes a necessity. As long as there was opposition to the theory of evolution, its adherents sought for evidence of human intelligence in animals; and this effort, coupled with the inevitable leaning toward anthropomorphic interpretation, led to an undue ascription of human faculties to animals. When, however, the opposition to Darwin's theory had abated, interest centred less in bridging the gulf between the animal and the human mind than in establishing a definite mental scale from the lowest forms up to man,—such a scale as the doctrine of evolution would naturally imply. It now became possible to formulate a principle of parsimony for the interpretation of observed data. Thus Lloyd Morgan laid it down as fundamental that "in no case may we interpret an action as the outcome of the exercise of a higher psychical faculty, if it can be interpreted as the outcome of the exercise of one which stands lower in the psychological scale." It was, of course, the purpose of this principle, which has received quite general acceptation, to offset the obvious tendency to read human consciousness into the performances of animals. The chief argument against the principle seems to be that it is not necessarily implied in the method of animal psychology. "But what," says Lloyd Morgan, "it may be asked, is the logical basis upon which this principle is founded? If it be true that the animal mind can only be interpreted in the light of our knowledge of the human mind, why should we not use this method of interpretation freely, frankly, and fully? Is there not some contradiction in refusing to do so? For, first, it is contended that we must use the human mind as a key by which to read the brute mind, and then it is contended that this key must be applied with a difference." The justification, it appears, is found in the doctrine of evolution. "Here evolution is postulated. The problem is this: Given a number of ascending grades of organisms, with divergently increasing complexity of organic structure and correlated activities: granted that associated with increasing organic complexity there is increasing mental or psychical complexity: granted that in man the organic complexity, the complexity of correlated activities, and the associated mental or psychical complexity, has reached the maximum as yet attained: to gauge the psychical level to which any organism has been evolved." Thus we assume, on the evolutionary hypothesis, greater simplicity of mind in the lower animal forms, and then adopt the principle of interpretation which is capable of giving results consistent with that premise.

We have seen that the method of animal psychology aims at a description of mind in conscious, living individuals. It presupposes the existence of mind. The question, however, is often asked: What is the criterion of mind? Does all life imply consciousness, or are mental processes first found only at some definite point in the biological scale? Various answers have been given. Some critics have maintained that there is no reliable evidence of mind in any animal, that animal psychology should therefore be abandoned, and that the behavior of organisms below man should be regarded merely as a group of physiological manifestations. Bethe, who, in his study of ants and bees, is an often-quoted expositor of this position, would explain all their complex activities by references to physiological reflexes and even deny them consciousness. More recently there has developed a study of animal behavior for its own sake, without regard to the characteristics of consciousness that the behavior implies; and not infrequently a "behaviorist" suggests that the consideration of mind in connection with the data of behavior is secondary to the real interest of the animal psychologist. Most students of animal activities, however, continue to ascribe consciousness to at least some creatures below man.

These latter investigators form two groups. The first group holds that not all animals are conscious, but only those higher forms which exhibit certain evidences of consciousness. The criterion of mind most usually accepted is the modifiability of behavior by experience. Both Loeb and Morgan hold this view. The former ascribes modification to "associative memory," which is "the fundamental process which occurs in all psychic phenomena"; if the animal can learn, that is to say, it has associative memory and therefore mind. The chief objection to such a position is that all animals and many inanimate objects alter their performance after being repeatedly acted upon by an outside agent. Washburn mentions the wood of a violin, which "reacts differently to the strings after it has 'experienced' them for 10 years." The implication of mind is evidently greatest when the modification occurs upon the first repetition of the experience; hence we may say that, when an animal *rapidly* alters its behavior upon the

repetition of a given situation, the evidence for consciousness is very strong. Loeb fails to find that the lower organisms satisfy his criterion for psychical processes, and explains their activities by reference to a purely physiological reaction, the tropism (q.v.), which is a response "brought about automatically or mechanically" by an agent acting directly upon the organism.

Jennings, on the other hand, discovers evidence of modification of behavior among even the lowest animal forms, and, in contradistinction to the theory of tropisms, attributes certain kinds of organic response to a method of trial and error. He maintains, however,—and it seems correctly,—that there is no real difference between Loeb and himself. The former has assumed a physico-chemical principle, the tropism, and has sought synthetically to build up therewith the simpler forms of behavior. Such forms as could not be synthetized he has missed. Jennings, on the contrary, has worked analytically from behavior down toward an equally mechanistic explanation, although in many cases he has not been able to push his analysis to the limit. Thus Loeb, working from both ends of the biological scale, denies mind to the lower animals, while Jennings, who works continuously down from above, admits its possibility. Now a criterion of the kind put forward by Loeb is, in general, open to the objection that it implies the discontinuity of a series, into which mind is introduced at one particular stage; in particular, the indefiniteness of the criterion actually chosen makes it again unsatisfactory. Since modification of behavior may occur anywhere in the scale, it cannot itself alone serve as the index of mind. If, on the other hand, we accept only such rapid alteration in behavior as will insure the presence of mental process, we find that we cannot even be assured of the existence of consciousness in those animals whose similarity of nervous structure to that of man makes the denial of mind an absurdity. Structure alone, we may add, cannot serve as a criterion, for it is continuous in its forms throughout the scale and affords no opportunity for the elimination of consciousness at any special point. The alternative, at present, then, seems to be to assume consciousness at all points in the biological scale—a notion, which is not inconsistent with the theory that certain of the earliest organic movements were conscious. See ACTION.

The results of experimental work upon the protozoa have shown that the mind of these lowest forms of animals must be of the very simplest. Yerkes observes: "The mind of the one-celled animals consists of a certain limited number of sense qualities, together with the feelings of agreeableness and disagreeableness. There is no sufficient reason for assuming that the animals experience ideas, memories, emotions, sentiments, thoughts, or any of the psychic complexes which have been observed in man. Theirs must be lives of simple awareness of certain features of their surroundings, without even the consciousness of self as distinguished from environment." Amœba, for example, is capable of but three, or at most four, different reactions. A weak mechanical stimulus, such as would be encountered in the ordinary movement of the animal, brings out a positive reaction, that is to say, the amœba proceeds toward the stimulus; a particle of food elicits a food-taking reaction, in which two pseudopodia are advanced and the food is engulfed; any other stimulus—mechanical, chemical, thermal, photic, galvanic—causes the negative reaction, in which the animal moves away from the source of stimulation. When suspended in water, the amœba throws out pseudopodia until one of them comes in contact with a solid body. There is no reason to suppose that a single reaction is accompanied by more than one sensory process, unless the positive reactions are attended by a vague agreeableness, and the negative, by a dim disagreeableness. At most, however, the consciousness of the amœba can hardly involve more than three or four simple experiences. There can scarcely be any reference to objects, any imagery, any memorial revival, or any ideas. See CHEMICAL SENSE IN ANIMALS; MECHANICAL SENSE IN ANIMALS.

In the lower metozoa—sea anemones, jelly fish, worms, crabs, etc.—we find an increased complexity of both structure and behavior; specific organs, including sense organs, appear; and the forms of reaction are more numerous and more highly differentiated. Consequently we may assume the presence of many more sense qualities than we allowed to the protozoa and the arrangement of these qualities into simple conscious patterns. Some observers would interpret the modification of behavior by experience, in certain of these creatures, as indicating the presence of imagery. Such an interpretation seems, however, to be exceedingly problematical. See IMITATION IN ANIMALS; MEMORY IN ANIMALS.

Among the higher invertebrates—the ants, bees, wasps, and other social insects—we find an exceedingly complex behavior, which, as we have noted, has been interpreted by some to imply a consciousness comparable with that of man. Other investigators have emphasized the instinctive character of the activities of these animals and have been content to consider the higher insects as mere automata. Still others take intermediate ground. The truth is that the insects represent a line of development divergent from the course of evolution that has culminated in man, and it is therefore difficult to describe the insect mind from the analogy of human consciousness. Either we may, because of the fixed character of behavior, assume that the performances of bees and ants are largely reflex and only infrequently conscious, or, on the basis of the relation between emotion and instinct in the human subject, we may attribute a very complex affective consciousness to these creatures. See ANT; BEE; INSECT, *Social Insects;* INSTINCT.

In the vertebrates below the mammals behavior is not so complicated as in the insects, but it indicates a mind more nearly of the human type. The birds and reptiles show some evidence of imagery. Among the mammals vastly more complicated consciousnesses appear; and Yerkes has compared the mind of the cat or dog to that of the human infant in its first year, and the mind of the highest apes to that of the human child in its first three years. In general, we may conclude from the mass of experimental evidence that the vertebrate consciousness is not unlike the human, in that it is characterized by complex patterns of a great variety of sensory and imaginal processes, often

affectively toned. The principal difference between the mind of man and the mind of other vertebrates seems to be that in the latter there is a predominance of sensory experience. Indeed the question has been raised whether any animals possess free ideas, that is to say, ideas referring to absent objects and not grouped about an immediate sensory core; and it is generally admitted that, if such ideas occur, they must be very infrequent. See animal articles on CHEMICAL SENSE; HEARING; IMITATION; LEARNING; MECHANICAL SENSE; MEMORY; VISION.

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ANIMALS, CRUELTY TO. See CRUELTY TO ANIMALS.

ANIMAL WOR'SHIP. See RELIGION.

AN'IMA MUN'DI (Lat. the soul of the world). The view that all the changes in phenomena are due to the operation of conscious beings, conceived on the analogy of human consciousness, was the result of one of the most primitive and most naïve attempts to solve the problems presented to experience by change and chance. (See MYTHOLOGY.) When the early philosophers in any race advanced from a belief in a multiplicity of presiding genii to a belief in a single ordering consciousness, which stands in the same relation to the world as a whole as the human mind stands to the human body, the doctrine of the *anima mundi* was reached. It has been held in various forms and has survived to quite recent times. Anaxagoras, who believed in a universal reason that gave form to the universe, was one of the first Occidental philosophers who held this doctrine. Aristotle escaped animism (i.e., the doctrine of an *anima mundi*) by holding that although Nature is a being in itself alive, God is separated from nature as a transcendent spirit. In the system of the Stoics the *anima mundi* was conceived to be the sole vital force in the universe; it usurped the office of pure spirit, and the doctrine became indistinguishable from pantheism. In modern times Agrippa of Nettesheim (1486–1535) revived the doctrine with a changed terminology, substituting *spiritus mundi* for *anima mundi*. Bruno, Paracelsus, Sebastian Franck, Boehme, Van Helmont, More, and Cudworth (see articles under these titles) have advocated similar views with varying terminology. See PANTHEISM.

ANIMÉ, an'ī-mā or mē (of disputed origin). A variety of copal; a white, brittle mineral resin soluble in alcohol and used, to some extent, in the manufacture of sealing wax and of varnishes. See COPAL.

AN'IMISM (from Lat. *anima*, soul), the belief in spiritual beings. The classical expression of the doctrine of animism, with reference to primitive peoples, was given by E. B. Tylor in his *Primitive Culture*. The idea of a spiritual double, according to Tylor, is first suggested to the mind of the savage by his dream experiences. In his dream he visits his friends and performs various acts, whereas the assurances of his mates convince him that his body has all the while been quietly at rest. These impressions are verified by certain observations during waking hours. The reflection in the water, faithful to its original but possessed of a strange independence; the shadow, ever present but also exhibiting ways of behavior all its own; the echo—all bespeak the presence of a double, modeled after the individual but only in part dependent on it and of a more fleeting and evasive nature. The ideas thus suggested are presently applied by the savage to the interpretation of sickness, coma, death. The possible importance of apparitions and hallucinations, in this connection, has been emphasized by Andrew Lang (*The Making of Religion*). Analogous experiences are responsible for the doubles of animals, plants, inanimate objects. Animism thus becomes a general philosophy of nature utilized by the savage in his attempts to interpret the animate and inanimate world that surrounds him.

The explanation of animism given by Herbert Spencer (*Principles of Sociology*, vol. i) differs somewhat from that presented above. Spencer's primary concern was with the human double, the origin of which he explained by considerations practically identical with those advanced by Tylor; he did not, however, apply the same argument to the rest of animate and inanimate nature, but populated it with human spirits.

The idea of a spiritual entity, as held by the savage, must not be conceived of as utterly devoid of all properties of matter. While free from some of the gross characteristics of objective nature, the soul or spirit is possessed of a certain tenuous substantiality, which makes it possible to prevent its escape from a body by closing all the exits, and which necessitates the presence of a hole, however small, if the spirit is to enter an object or a being.

While no sharp line is drawn in primitive thought between good and evil spirits, spiritual agents are almost universally made use of in the interpretation of disease. The sick man is possessed by a foreign spirit that has entered the body, perhaps during the absence of the patient's own double; and, if health is to be restored, the intruder must be removed. To effect this is commonly the function of the medicine man who, by rubbing, sucking, or striking, induces the disease spirit to leave the body, and presently produces its material embodiment in the form of a small pebble or some other small object.

The doctrine of animism, as an interpretation of savage belief, held absolute sway during the last third of the nineteenth century. Barring the speculative considerations adduced by Spencer and Tylor, an insight into the nature of primitive animism may best be secured by the study of such works as Theodor Koch's "Zum Animismus der südamerikamschen Indianer" (*Internationales Archiv für Ethnographie*, vol. xiii, Supplement) or Waldemar Bogoras' "The Chukchee," part ii, "Religion" (*Publications of the Jesup North Pacific Expedition*, vol. vii).

Since Tylor first proclaimed his minimum defi-

nition of religion as the "belief in spiritual beings," the problem of animism has often been identified with that of religion. In recent years serious objections have been advanced against the legitimacy of such identification. While it is true that all peoples so far investigated were found to profess both animism and religion, a belief in spirits does not *per se* involve a religious attitude. On the other hand, religious emotion may well be aroused by agencies and situations lying outside the domain of animism. See RELIGION.

Others have criticised the conception of a double. Lévy-Bruhl, in particular, has attempted to show that the prevailing belief among primitive tribes is in a multiplicity of spiritual entities or souls, whereas the belief in a double seems to have a rather limited distribution (*Les fonctions mentales des sociétés inférieures;* compare also Wundt's discussion of the soul in his *Völkerpsychologie, Mythus und Religion*, part i).

It has also been claimed in various quarters that the belief in spirits cannot be conceived of as really primitive, that there must have been a "pre-animistic stage," which knew no spirits but endowed nature with vague and undifferentiated magical powers which, while efficient, were also elusive and did not assume the form of individualized entities (Marett, Preuss, Hubert and Mauss, Lévy-Bruhl, Durkheim). Such magical powers are often designated by the Polynesian term *mana*.

The last 25 years have seen much careful and systematic research of savage beliefs. Of these studies was born the conviction that primitive animism ought not to be conceived as a philosophy of nature. Deliberate systematization of his experiences is foreign to the mind of the savage. What animism thus comes to mean is not that the savage conceived of spiritual entities behind all phenomena of objective nature, but that whenever he thought or felt in terms of causes, these causes were for him spiritual entities. His thinking and feeling, moreover, in this as in other connections, were spontaneous, unsystematic, often self-contradictory.

However that may be, animism must be regarded as the most common form taken by primitive beliefs, which have survived in the innumerable animistic superstitions of modern European peasants and, having traveled along the highways and byways of mental progress, still blossom forth in the churches, parlors, and garrets of civilization.

ANIMUCCIA, ä′nê-mo͞o′chä, GIOVANNI (c. 1500–71). An Italian musician sometimes called the "Father of the Oratorio." He became maestro di capella of the Vatican in 1555. For the congregation of the Oratory, one of whose objects it was to render religious services attractive to young people, Animuccia composed the *Laudi*, which were to be sung at the conclusion of the regular office, and from which the oratorio is said to have developed. Several of his masses, magnificats, motets, madrigals, etc., have been published, and among these the following are a few of the most noteworthy: *Il primo libro di madrigali, etc.* (Rome, 1595); *Joannis Animucciæ Magistri Capellæ Sacrosanctæ Basilicæ Vaticanæ Missarum Libri* (Rome, 1567); *Magnificat ad Omnes Modos* (Rome, 1568); *Il secondo libro delle laudi ove si contengono motetti* (Rome, 1570). See ORATORIO.

ANIMUCCIA, PAOLO (?–1563). An Italian musician, brother of Giovanni Animuccia. He was one of the ablest contrapuntists of his time and occupied the position of maestro di capella at the church of San Giovanni in Laterano from 1550 to 1552. Many of his motets and madrigals were popular.

ANIO, ä′nê-ō, modern **ANIENE,** ä′nê-ā′nâ, or TEVERONE. A river in central Italy, 69 miles long, which rises 44 miles east of Rome in the Sabine Mountains, forms famous waterfalls at Tivoli (q.v.), and then flows freely through the Campagna into the Tiber 2 miles above Rome. An aqueduct was built in 265 B.C., with the proceeds of booty taken during the war with Pyrrhus to carry water from Tivoli to Rome. The water power of the Anio is now converted into electric energy, which is transmitted to Tivoli and Rome. See AQUEDUCT.

AN′IONS. See ANODE; ELECTRO-CHEMISTRY.

AN′ISE (Lat. *anisum*, anethum, Gk. *ἄν[ν]ηθον, an[n]ēthon*, anise, dill), (*Pimpinella anisum*). An annual plant of the family Umbelliferæ. The genus *Pimpinella*, which embraces about 75 species, natives of the Old World, has compound umbels usually without involucres. One European species, adventive in waste places in the eastern United States, *Pimpinella saxifraga*, is known as burnt saxifrage or pimpernel, and has no properties of importance. Anise is a native of Egypt and other Mediterranean regions. It is an annual plant; the stem is 1½ to 2 feet high, dividing into several slender branches; the lower leaves roundish, heart-shaped, divided into three lobes, and deeply cut; those of the stem pinnate, with wedge-shaped leaflets. The umbels are large and loose, with yellowish-white flowers. It is much cultivated in southern Europe, Germany, especially in the district around Erfurt, where a large quantity of the seed is annually produced, South America, India, etc. Attempts were made more than 200 years ago to cultivate it in England, but the summers are seldom warm enough to bring it to perfection. It is occasionally sown in gardens for a garnish or for seasoning. Aniseed is used as a condiment and in the preparation of liqueurs; also in medicine, as a stimulant stomachic, to relieve flatulence, etc., particularly in infants; and it has been used in pulmonary affections. It has an aromatic, agreeable smell and a warm, sweetish taste. It contains a volatile oil, called oil of anise, which is nearly colorless, has the odor and taste of the seed, and is employed for similar purposes. One hundredweight of seed yields about two pounds of oil, which is obtained by distillation; but at Erfurt the oil is made from the stems and leaves.

ANI′SOPHYL′LY (Gk. *ἀν, an*, neg. + *ἴσος, isos*, equal + *φῦλλον, phyllon*, leaf). This is the phenomenon of the production on the same shoot of two sorts of leaves, large and small. It is well illustrated by several species of *Selaginella*, which possesses four vertical rows of leaves, two large and two very much smaller. In this plant the cause of the unequal size of the leaves is not known, but in other cases it has been shown to be due to the unequal action of various factors, the most important of which are light and gravity. The influence of the latter is shown in the development of anisophyllous rosettes upon the oblique stems of *Sempervivum*, while vertical stems of the same plant produce symmetrical rosettes, since all sides of the stem are equally exposed to the action of gravity. Consult Figdor, W., *Die*

Erscheinung der Anisophillie (1909), Boshart, K., *Beiträge zur Kenntnis der Blattasymmetrie und Exotrophie*, and Flora 103: 91–124 (1911). See LEAF.

ANJER, ăn′yĕr, or **ANJIER,** ăn′yēr. A fortified seaport of Java, on the Straits of Sunda, 60 miles west of Batavia (Map: East India Islands, C 6). It is the landing place for passengers and mails for Batavia and is frequented by steamers for a supply of fresh water and food. In 1883 it was completely destroyed by a wave caused by the volcanic destruction of the neighboring island of Krakatoa, but it has been rebuilt since. Its population is estimated at 3000.

ANJOU, *Eng.* ăn′jōō; Fr. ĀN′zhōō′ (from *Andecavi, Andegavi*, a Gallic tribe). A former province of France, now forming the department of Maine-et-Loire, and small parts of the departments of Indre-et-Loire, Mayenne, and Sarthe. It was inhabited in ancient times by the Andecavi, whose ancient capital bears the modern name of Angers. Under Fulk III Nerra (987–1040) the county of Anjou became very powerful; through his victories and those of his son Geoffrey Martel (1040–60), the counties of Touraine and Maine became subject to Anjou, and the Count of Blois was humbled. From this time amid the alternating fortunes of war Anjou remained one of the great powers in France. The most celebrated of the counts of Anjou was Geoffrey IV (1129–51), called Plantagenet, whose son by Matilda, daughter of Henry I of England, ascended the English throne in 1154 as Henry II. Anjou remained in the possession of the English kings till 1203, when it was seized by Philip Augustus. Some 40 years later it was bestowed as a fief upon Charles, the son of Louis VIII, who became by conquest in 1266 the founder of the Angevin line of kings in Naples and Sicily. At this time for nearly half a century it was united with Provence. From 1328 to the year 1360, in which it was made a duchy, it was held by the French crown as a part of the dowry brought by Margaret of Anjou to Charles of Valois, father of Philip VI. It was reunited with Provence under the rule of the kings of Naples in 1382. In 1480, upon the death of René the Good, it was annexed to the royal dominions by Louis XI. The last who bore the title of Duke of Anjou was the grandson of Louis XIV, who became Philip V of Spain. Consult Marchegay and Salmon, *Chroniques des comtes d'Anjou* (Paris, 1856–71).

AN-JU, ăn′jōō′. A town of northwest Korea, 18 miles from the Gulf of Korea and 160 miles northwest of Seoul (Map: Korea, G 4). It became important during the Russo-Japanese War because of its nearness to the scene of operations.

ANKARSTRÖM, äŋ′kär-strēm, JOHAN JAKOB. See ANCKARSTRÖM.

AN′KERITE. A carbonate of calcium, magnesium, and iron isomorphous with dolomite and siderite (q.v.) and intermediate between them in composition. It crystallizes in brownish to grayish rhombohedra closely resembling those of dolomite. It occurs chiefly in deposits of iron ore and is found in the hematite mines of Antwerp, N. Y., near Londonderry, Nova Scotia, and in the Styrian and German iron mines. It is named after Professor Anker of Styria.

ANKLAM, äŋ′kläm. A town of Prussia in the province of Pomerania, 44 miles northwest of Stettin, on the right bank of the Peene, and 4 miles from its mouth in the Kleine Haff (Map: Prussia, E 2). The river is navigable to Anklam, which has long been commercially important. Many of its private houses are excellent samples of German mediæval architecture. It manufactures linens and woolens and sugar, and has breweries, soap works, tanneries, and ship yards. There is considerable trade in the products of its home industries. Anklam was settled by Germans in the twelfth century and joined the Hanseatic League in 1244. During the wars of the seventeenth and eighteenth centuries it was repeatedly sacked. In 1720 it was acquired by Prussia. Pop., 1890, 13,000; 1900, 14,600; 1905, 15,604; 1910, 15,282.

ANKOBAR, äŋ-kō′bēr, or **ANKOBER.** A town in eastern Africa, the former capital of the Abyssinian kingdom of Shoa, situated at an altitude of over 8000 feet, in lat. 90° 34′ N. and long. 39° 53′ E. (Map: Africa, H 4). The climate is healthful. Its population is estimated at 2000.

ANKO′RI or **ANKO′LE.** A plateau of the Uganda Protectorate, British East Africa, lying between lakes Albert Edward and Victoria.

ANKYLOSIS, ăŋ′kī-lō′sĭs (Gk. *ἀγκύλωσις, ankylōsis*, a stiffening of the joints, from *ἀγκύλη, ankylē*, the bend of an arm, a joint bent and stiffened by disease). A term used in surgery to denote joint fixation not dependent upon muscular rigidity. It results from injury or disease, causing the formation of fibrous adhesions or the deposit of new bone between the articular surfaces. Osseous union may render the joint perfectly rigid, while fibrous union permits a certain amount of motion. In surgery fibrous is also known as *false*, and bony as *true* ankylosis. The elbow is especially apt to become ankylosed. In the knee or hip-joints osseous ankylosis is the preferable form, as the limb can then afford a rigid support. Joints stiff through a membranous ankylosis may be forcibly bent, and the bond of union ruptured, so as to restore mobility or allow of their being placed in a convenient position. Ankylosis of the joints between the ribs and the vertebræ is common in advanced age; and there are some cases on record of universal ankylosis of all the joints. Ankylosis is caused by injury, tuberculosis, gout, rheumatism, and syphilis. Passive motion, friction, massage, douches, and forcible motion under an anæsthetic are methods of treatment.

ANKYLOSTOMIASIS, ăŋ′kī-lō-stō-mī′ă-sĭs (Gk. *ἀγκύλος*, hooked, and *στόμα*, mouth) or "Miners' Anæmia," is caused by the presence of an intestinal nematoid worm, the *Ankylostoma duodenale*, which acts like a bloodsucker. The disease was discovered by Dubini in 1838 and has been variously named brickmakers' anæmia, tunnel anæmia, Egyptian chlorosis, and Dochmiasis, the latter from the genus Dochmius, to which *A. duodenale* belongs. The worm is from 1-60 to 1-25 inch long and nearly cylindrical. Its head is provided with sucking discs and hooklets. The symptoms are those of simple anæmia, with or without bloody diarrhœa. It attacks principally miners. The disease was epidemic among coal-miners in Belgium in 1894, having been brought there by Italian laborers from the St. Gotthard tunnel. Access to the body is gained through the medium of food or soiled hands. Treatment consists of killing the parasites with anthelmintics after emptying the bowels with cathartics, and then relieving the anæmia with

arsenic, iron, or other tonics. As a prophylactic measure, all defecations should be disinfected and strict cleanliness be practiced. See HOOKWORM DISEASE.

AN'NA. A city in Union Co., Ill., 36 miles northwest of Cairo, on the Illinois Central Railroad (Map: Illinois, C 6). It is an almost purely agricultural community, producing wheat, corn, hay, fruit, and vegetables. Anna is the seat of the State hospital for the insane, and has a public library. The city owns its water works. Pop., 1890, 2295; 1910, 2809.

ANNA (Hind. *ānā*). An East Indian coin, a sixteenth of a *rupee* (about 33 cents), or about two cents of United States money. The anna is money of account only, though half and quarter annas are coined.

ANNA, SAINT, or **ANNE.** According to tradition, the wife of St. Joachim. After 21 years of barrenness, she is said to have given birth to the Virgin Mary, the mother of the Saviour. Nothing positive is known about her life; her name does not occur in the Scriptures. The first source for the tradition is the *Protoevangelium* of James. Her cult can be traced to the fourth century, but toward the eighth she was widely invoked. Her body was believed to have been transferred from Palestine to Constantinople in 710 A.D. Düren, in the Prussian Rhine Province, Ursitz, in the diocese of Würzburg, and other churches claim to possess remains. The Roman Catholic church has a festival in her honor on July 26, established in 1584; the Greek, on December 9. In Austria, Bavaria, and other Catholic countries, this festival is one of great importance. The Fraternity of St. Anna was instituted in the thirteenth century. After the Reformation it was organized anew by the Jesuits and in modern times has manifested some vitality in Bavaria and Catholic Switzerland. She is the patron saint of child-bearers and miners, and it was upon her that Luther called for protection when in the storm, and to her he vowed to become a monk if rescued (1505). The shrine of St. Anne de Beaupré near Quebec is the most famous centre of her cult in America.

ANNABERG, ăn'nȧ-bĕrK. A town of the kingdom of Saxony, in the district of Zwickau, on the right bank of the Selma, 18 miles south of Chemnitz (Map: Germany, E 3), situated 1970 feet above the level of the sea. Originally Annaberg was a mining town and gained her importance in that industry. Barbara Uttmann, in whose honor a statue has since been erected, introduced lace-making in 1550, and since then the town has been chiefly occupied in the manufacture of lace and ribbon, much of which is exported to the United States. Pop., 1890, about 15,000; 1905, 16,813; 1910, 17,025.

AN'NABERGITE. A hydrous nickel arsenate which frequently accompanies nickel and cobalt deposits. It occurs in bright, apple-green fibres and earthy crusts.

ANNA COMNE'NA (1083–1148?). Author of one of the most valuable works in the collection of the Byzantine Historians. She was the daughter of the Emperor Alexius I (Commenus) and was born on Dec. 1, 1083. She received the best education that Constantinople could give and was betrothed to the son of Michael VII. After the death of her fiancé she married Nicephorus Briennius. During the last illness of her father she entered into a scheme to induce him to disinherit his eldest surviving son, John, and to bestow the diadem on her husband. After her father's death she plotted against her brother, and as a punishment, Anna, with her mother, was shut up in a convent, where she remained until the death of her brother in 1143. The date of her death is unknown, but she was still at work on her history in 1148. She entitled this work the *Alexiad.* The first two books treat of the history of the Empire from the time of Isaac Comnenus; the remaining 13 books are devoted to the reign of Alexius. Chronologically Anna is frequently at fault, and she omits purposely many events; but as a whole her work is useful. The best editions are those of Schopen and Reifferscheid (2 vols., Bonn, 1839–78), and of Reifferscheid (Leipzig, 1884). Consult: Chalandon, *Règne d'Alexis I* (Paris, 1900); Oster, *Anna Komnena* (Rastatt, 1868–71); and Diehl, *Figures byzantines* (Paris, 1909).

ANNA IVANOVNA, ăn'nȧ ē-vä'nŏv-nȧ (1693–1740). Empress of Russia. She was the second daughter of Ivan, the elder brother of Peter the Great. She was married in 1710 to the Duke of Courland, the last of his race, who died in the following year. The throne of Russia was offered to her by the Supreme Council on the death of Peter II in 1730, on conditions which greatly limited the power of the monarchy, terms which she soon broke. Her elevation was greatly due to the intrigues of the Chancellor, Ostermann, who had had the charge of her education, but who was disappointed in finding her not so grateful and tractable as he had expected. For some years, however, her rule was tolerable. Abroad, Russia took part in the War of the Polish Succession and waged a successful contest against Turkey in the Crimean War (1736–39). Internally the army was reformed, greater liberty was allowed to the landed gentry, and government debts were paid, though to pay them the peasants were crushed down with taxes. The administration of the Empress was a cruel one, due in a large measure to the influence which her paramour Biron exerted over her. Twenty thousand souls, it is said, were banished to Siberia; numbers were knouted, had their tongues cut out, or were broken alive on the wheel. Eleven thousand perished in this way. Prince Basil Dolgoruki and others of his family suffered the ignominy of the scaffold. At length the health of the Empress gave way. She died on Oct. 28, 1740, and left the throne to her grand-nephew Ivan, with Biron as regent. See RUSSIA; BIRON.

ANNA KARÉNINA, ăn'nȧ kȧ-rā'nyē-nȧ. One of Count Tolstoy's novels, which first appeared serially in a Moscow publication, from 1875 to 1878. It is a powerful study of the effects of passion upon human life and is by many considered the author's greatest work.

ANNA KARLOVNA, ăn'nȧ kär'lŏv-nȧ, or frequently, ANNA LEOPOLDOVNA (1718–46). Regent of Russia during the minority of her son Ivan. She was the daughter of Charles Leopold, Duke of Mecklenburg, and of Catharine, sister of the Russian Empress, Anna Ivanovna (q.v.). In 1739 she married Anthony Ulric, Duke of Brunswick-Wolfenbüttel. Her son, Ivan, born Aug. 24, 1740, was appointed by the Empress Anna Ivanovna as her successor. The Empress died in October, 1740, and Biron, whom she had made regent, was overthrown within a month. Anna Karlovna now proclaimed herself Grand Duchess and Regent of Russia; but she showed no capacity for managing the affairs of a great country, spent her time in indolent enjoyments,

and resigned herself very much to the guidance of one of the ladies of her court, Julia Mengden. A conspiracy was formed by a party desirous of raising to the throne Elizabeth, daughter of Peter the Great and Catharine, and this was accomplished on Dec. 6, 1741. The infant Ivan was sent to the castle of Schlüsselburg, where he was afterward murdered; Anna and her husband were condemned to prison for life and conveyed to Kholmogory, on the White Sea, where she died in childbirth. Her husband remained a prisoner for 39 years and died in 1780.

ANNALES, or ANNALES MAXIMI. See ANNALS.

ANNALISTS. See ANNALS.

AN'NALS (Lat. *annales*, from *annus*, year). In the original sense, records of public events arranged year by year. In the early days of Rome such records were kept by the priests and were known as the *annales pontificum*, or *annales maximi*, because prepared by the *pontifex maximus*. In later times public men interested in history wrote crude chronicles of events, also known as *annales*, 'Year Books,' because they gave events year by year, with no attempt to trace the sequence of cause and effect; such annalists were Fabius Pictor, Cincius Alimentus, M. Porcius Cato (q.v.), L. Calpurnius Piso, Cælius Antipater, Valerius Antias, Claudius Quadrigarius, and many others. The annalistic method of writing appears even in the great work of Livy (q.v.). For Cicero's judgment of the *Annales* and of the Annalists see *De Oratore*, ii, 51–52, *De Legibus*, i, 6; see also W. W. Capes's edition of Livy, xxi, xxii, pp. xxxvii–xlii (London, 1883). When Ennius (q.v.), the "father of Roman poetry," wrote the deeds of Rome in heroic verse, he called his poem *Annales;* and finally Tacitus (q.v.) thus designated his story of Rome from Tiberius to Nero. See ACTA; ACTA DIURNA.

AN'NALS OF A QUI'ET NEIGH'BORHOOD. The title of a novel by George MacDonald (1866).

ANNALS OF A SPORTS'MAN. A series of 22 short sketches (some of them not more than six pages in length) by Ivan Turgeneff. It was published in book form in 1852, and not only established the author's reputation but helped to bring about the liberation of the serfs under Alexander II. The stories are of the Russian peasant, for the most part, with now and then a sketch of the overseer, the district doctor, or the landed proprietor.

ANNALS OF THE PAR'ISH. The title of a novel by the Scottish writer John Galt (1821).

ANNALS OF THE POOR. A collection of stories containing *The Dairyman's Daughter*, *The Negro Servant*, etc., written by the Rev. Legh Richmond in the Isle of Wight and published in 1814.

ANNAM, ăn-năm' (*Nhan-nam*, Peace of the South), sometimes spelled ANAM. The central division of French Indo-China and formerly the designation of an independent empire which included the provinces of Annam, Tongking, and Cochin China (Map: French Indo-China). It embraces the greater part of the east coast of Indo-China (washed by the South China Sea), and stretches from Cochin China on the south to Tongking on the north, its southernmost point being about lat. 10° 30′ N. and its northern extremity about lat. 20° 30′, at the delta of the Song-koi, or Red River. On the west it is bounded by the country of the Laos, Siam, and Cambodia. The area is about 52,110 square miles. The coast, about 750 miles long, is deeply indented and fringed with many islets.

Annam is traversed throughout its entire length from north to south by a mountain chain which slopes precipitously toward the sea, but declines gently toward the Mekong valley in the interior. It reaches in the peak of Pu-san an elevation of about 9000 feet. Pu-atuat is about 1000 feet lower. The country has two hydrographic zones. On the west is the basin of the Mekong; on the east are numerous coast rivers, shallow and nearly impracticable for navigation. The Mekong River rises in Tibet, flows through the extreme south of China, traverses the Indo-Chinese peninsula with a rapid current, gathering many tributaries on its way and forms the boundary between Annam and Siam. It is navigated by steamboats along the Annam frontier. The capital of Annam is Hué (population estimated at 61,600). The products of Annam include rice and other cereals, cinnamon, sugar-cane, coffee, tobacco, tea, and cotton. A considerable quantity of silk is produced, and the forests yield valuable woods. The buffalo is domesticated and used in tillage. The Chinese hog is reared in large numbers. The large game characteristic of the wilds of India abounds in Annam. One of the results following on French occupation of the Laos country was the diversion of trade from Bangkok in Siam to the Mekong valley and the seacoast. The first commercial caravan coming from Laos arrived at Hué in February, 1895. The principal imports are cotton goods, Chinese paper, machinery, metals, Chinese drugs, flour, petroleum, and tea. The exports consist of sugar, cinnamon, horn, ivory, skins, raw silk, tea, wood, etc. In 1897 the imports amounted to 4,719,349 francs and the exports to 2,552,919 francs. The principal ports of Annam are Tourane and Qui-nhon.

The government is in theory a monarchy. The king is assisted by a council of six members, though everything is in reality subject to the French resident superior at Hué, who has a staff of assistants and a military guard. The country is divided into 12 provinces, each of which is subdivided into fu ('departments') and huje ('districts'). Most of the actual administration of justice and tax collection is under the native officials. Service in the native army, of 10,000 men, who are under French officers, is compulsory. The population of Annam was estimated in 1911 at 5,542,822.

The Annamese comprise at least two different stocks—the rather primitive Mois of the mountainous interior, and the Annamese proper, both of whom exhibit quite uniform physical types, notwithstanding intermixture with other peoples (Khmers, Malays, Chinese, etc.) in prehistoric and in recent times. The foreign-born population, living chiefly in the towns, comprises about 4000 Chinese and 2000 Europeans. In appearance the Annamese proper are the least attractive of the Indo-Chinese races. They are short, rather slenderly built, and brachycephalic. They have a swaggering stride or gait, arising from a peculiar structure of the pelvis and femur and a notable separation of the big toe, or "foot-thumb," from the other toes. In race they are Mongolian. This speech is monosyllabic, belonging to the Mon-Khmer branch of Indo-Chinese languages. Like most of the peoples of this region, they possess strains of Aryan.

and, possibly, negroid blood. Annamese culture and folk-lore are largely reflections of Chinese. From China came also the written characters of their language, their literature, and the form of Buddhism and Confucianism professed by the more enlightened classes. The Annamese are essentially democratic in disposition and live in patriarchal style, the father having almost absolute authority in his family. About 420,000 of the inhabitants are Catholics. Among the principal towns are Hué, the capital, Bindinh (pop., 75,000), Than-hoa, and Tourane (pop., 6800).

Subjected to China, together with Tongking, in the third century B.C. by She Twang Ti, Annam became autonomous under Chinese suzerainty in 1428 A.D. after long and sanguinary wars. In 1789 the ruler of Annam was able, with French aid, to free himself from subjection to China and to join Tongking and Cochin China to his empire. This became a field of French influence. Under Napoleon III France began the establishment of her dominion in Indo-China by engaging in hostilities with Annam in 1858. In 1862 the King was compelled to cede the principal part of Cochin China to the French, and the rest of that territory was added in 1867. The French continued to encroach, entered in 1882 upon the conquest of Tongking (of which they became masters in 1885), and the treaty of June 6, 1884, ratified at Hué, Feb. 23, 1886, established a French protectorate over Annam. French troops occupy the citadel at Hué, and France controls the finances. Prince Bun-Lan, who was proclaimed King in 1889, under the name of Than-Thaï, attained his majority in 1897. On account of his vices and cruelties he was forced by the French to abdicate, Sept. 9, 1907, in favor of his son Duy-Tan (born 1899), who was placed under a council of regency.

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AN'NA MATIL'DA. A pseudonym under which Hannah Parkhouse Cowley maintained a poetical correspondence with Robert Merry ("Della Crusca"), the leader of the so-called English "Della Cruscans," in the *World*, ending about 1789, when the correspondents first met personally. Their interchange of verses gained an added notoriety from Gifford's satire *Baviad* and *Mœviad*, which held it up to ridicule. "Anna Matilda" has come to be used typically of a writer of tasteless sentimentalism.

AN'NAN. A seaport and parliamentary burgh in the county of Dumfries, Scotland, on the river of the same name, near its entrance into the Solway Firth, and 15 miles by rail from the city of Dumfries (Map: Scotland, E 5). It is neat and well built. Among its industries are shipbuilding, tanning, cotton-spinning, and rope-weaving. Sandstone, of which many of its buildings are constructed, is quarried near by. The river is navigable for large vessels half a mile below the town. There is regular communication by steamers with Liverpool and Whitehaven, and railways connect the town with Edinburgh, Glasgow, and Carlisle. The burgh unites with Dumfries, etc., in returning one member to Parliament. Pop., royal parliamentary and municipal burgh, 1901, 7073; 1911, 6892.

AN'NANDALE. The valley of the river Annan, in Dumfriesshire, Scotland.

ANNANDALE, CHARLES (1843–1915). An English author. He was born in Kincardineshire, and was educated at Aberdeen University. He edited such important works of reference as the *Imperial Dictionary* (1882); *Blackie's Modern Cyclopædia* (1890; new ed., 1907); *Student's Dictionary* (1895); *New Cabinet Encyclopedia and Treasury of Knowledge* (1895); *New and Universal Self-Pronouncing Encyclopedia.*

ANNANDALE, THOMAS (1838–1907). An English surgeon. He was born at Newcastle and was educated at Edinburgh University, where he subsequently was appointed assistant to Professor Syme. He was for some time demonstrator of anatomy under Professor Goodsir at the same university and in 1877 was made regius professor of clinical surgery there. He published *Diseases and Injuries of Fingers and Toes* (1865), *Abstracts of Surgical Principles* (1868–70), and other important works.

ANNAP'OLIS. The capital of Maryland and the county-seat of Anne Arundel County, on the Severn River, 2 miles from Chesapeake Bay, 26 miles by rail southeast of Baltimore, and 30 miles (direct) northeast of Washington, D. C. It is on the Maryland and the Annapolis, Washington, and Baltimore electric railroads, and has boat service to Baltimore and other cities on the bay (Map: Maryland, M 5). The city's most noteworthy feature is the United States Naval Academy (q.v.), with its beautiful buildings and grounds. Other points of interest are the marine barracks and naval experiment station, St. John's College, founded in 1789, the State government buildings, and the statues of Chief Justice Taney and General De Kalb. The city has a fine harbor and is the seat of an extensive oyster-canning industry, the product being largely exported. Pop., 1890, 7604; 1900, 8525; 1910, 8609; 1920, 11,214.

In 1608 Capt. John Smith visited the site of Annapolis, but no settlement was made until 1649, when a company of Puritans from Virginia established here the town of "Providence," which name was later changed successively to "Proctor's," "The Town," "Anne-Arundel Town," and, finally, to the "Town of Annapolis," in honor of Queen Anne. In 1694 the capital of the province was moved here from St. Mary's, and Annapolis was made a city in 1708 by a charter from Queen Anne. Early in the eighteenth century one of the first free schools on the continent was established here. From this St. John's College (q.v.) developed. On May 25, 1774, the citizens passed resolutions of sympathy for Boston, whose port had just been closed, and on October 18 the brig *Peggy Stewart*, laden with tea, was publicly burned. On Dec. 23, 1783, Washington surrendered his commission as Commander-in-Chief of the Continental Army to Congress, then sitting at Annapolis. Consult Ridgely, *Annals of Annapolis* (Baltimore, 1841), Riley's *"Ancient City,"* and a sketch in Powell's *Historic Towns of the Southern States* (New York, 1900).

ANNAPOLIS CONVEN'TION, THE. A convention held at Annapolis, Md., Sept. 11, 1786, to consider the question of intercolonial commerce and discuss some proposed alterations in

the Articles of Confederation. Commissioners from only five States, Virginia, Delaware, Pennsylvania, New Jersey, and New York, were present (though New Hampshire, Massachusetts, Rhode Island, and North Carolina had appointed delegates, who did not attend); and the Convention accordingly adjourned after recommending that a convention of all the States be called for the purpose of rendering the "Constitution of the Federal Government adequate to the exigencies of the Union." This led to the Constitutional Convention of 1787. Proceedings may be found in *United States Bureau of Rolls*, vol. i.

ANNAPOLIS ROYAL. Originally the Port Royal of the French occupation. A port of entry and summer resort in Nova Scotia, Canada, 130 miles west of Halifax, on the Dominion Atlantic Railroad, and at the mouth of the Annapolis River, an inlet of the Bay of Fundy (Map: Nova Scotia, D 5). It has an excellent harbor, which is accessible to ocean steamers, and exports lumber and apples, the latter especially, since it is the chief product of the entire district. The United States is represented by a consular agent. Annapolis Royal is the oldest European settlement in British North America. It was the scene of many conflicts between the French and English and was ceded by the former in 1713, when its name was changed in honor of Queen Anne. Old Fort Anne has been restored by the Dominion government and the citizens of the town, and within the fortifications a monument has been erected to the memory of De Monts, who landed here in 1604. Pop., 1901, 1019; 1911, 1019.

ANN ARBOR. A city and the county-seat of Washtenaw Co., Mich., 37 miles (direct) west of Detroit, on the Michigan Central, and the Ann Arbor and Toledo railroads, and the Huron River (Map: Michigan, F 6). It is the seat of the University of Michigan, and has a fine high school, two schools of music, two libraries, a court house, five hospitals, and a large auditorium. Ann Arbor is the centre of a fertile agricultural district and has important manufactures of pianos, flour, automobile accessories, laces and curtains, and steel ball-bearings. Water power producing a supply of electricity sufficient for an area of 60 square miles is obtained from the Barton Dam. Ann Arbor was settled in 1824 and was incorporated as a city in 1851. Pop., 1890, 9431; 1900, 14,509; 1910, 14,817; 1920, 19,516.

ANNARR', or **ONARR'**. In Norse mythology, the husband of Nött (night), and father of Jörd (the earth).

AN'NAS (Heb. merciful). A Jewish high priest, appointed by Quirinius in 6 A.D. and deposed by Valerius Gratus in 15 A.D. He, no doubt, continued to exercise great influence, as the office was held by five of his sons, Eleazar, Jonathan, Theophilus, Ananos, and Matthias, and by his son-in-law, Joseph, surnamed Caiaphas, between 18 A.D. and 36 A.D. The wealth of "the house of Annas" was to some extent derived from the booths, where they provided all kinds of materials for sacrifice. By this monopoly they made the temple "a den of robbers" and drew down upon themselves the curses of the Pharisees as well as the indignation of Jesus. The influential position of Annas may have led to the erroneous statement of Luke, that there were two high priests, Annas and Caiaphas (iii. 2), and the consequent Johannine account of a separate trial of Jesus, before Annas (xviii. 13–27). A son of Annas, by the same name, was appointed high priest by Agrippa II in 62 A.D. He is said to have put to death James, the brother of Jesus; but the passage of Josephus (*Ant.* xx, 9) which relates this is supposed by many scholars to be a Christian interpolation. Consult Schürer, *Geschichte des jüdischen Volkes*, pp. 270 ff. (4th ed., 1907).

ANNATES, ăn'nâts, or FIRST FRUITS. In ecclesiastical law, the value of every spiritual living for a whole year (hence the name, from the Lat. *annus*, a year), which the Pope, claiming the disposition of every spiritual benefice within Christendom, reserved out of every living. This impost was at first levied only from persons appointed to bishoprics; but it was afterward extended to the inferior clergy. The value of these annates was calculated according to a rate made under the direction of Pope Innocent IV (1253 A.D.), but afterward increased by Pope Nicholas III (1292 A.D.). The valuation of Pope Nicholas is still preserved in the exchequer. This papal exaction was abolished in England by the Act 25 Henry VIII, c. 20, and by an act passed in the following year of the same reign (26 Henry VIII, c. 3), the right to annates, or first fruits, was annexed to the crown. The various statutes subsequently passed on this subject have all been consolidated by an act (1 Vict., c. 20) regulating the collection of the moneys so levied. See FIRST FRUITS; QUEEN ANNE'S BOUNTY.

ANNATTO, ăn-nät'tō. See ARNOTTO.

ANNE (ăn) OF AUSTRIA (1601–66). The daughter of Philip III of Spain, who in 1615 became the wife of Louis XIII of France. The marriage was so far from being a happy one that the royal pair lived for 23 years in a state of virtual separation—a result due chiefly to the influence of Cardinal Richelieu, whose fixed determination to humble the house of Austria led him to spare no means for alienating the affection of Louis by representing her as ever involved in conspiracies against his authority. Her imprudence, however, lent much force to Richelieu's accusations, for she certainly was concerned to some degree in the conspiracies of Chalais (1628) and Cinq Mars (1642). On the death of the King, in 1643, Anne became Queen Regent for her son Louis XIV, and evinced her discernment by choosing as her minister Cardinal Mazarin, whom she is said to have married secretly, and by whose able management the young King (Louis XIV) came into possession of a throne firmly established on the ruins of contending parties. (See FRONDE.) Her character was marked by contradictions. Her stately coldness, which failed to attract her husband, often gave way to fits of reckless gayety which repelled him. Without being actually treasonable, she often engaged in intrigue. Proud of her royal state, she made an Italian *parvenu* her favorite and, as some say, her husband. There was in her a great conflict between the woman and the queen. Consult: Freer, *Married Life of Anne of Austria* (London, 1895, later ed., 1913); *Regency of Anne of Austria* (London, 1866); Matteville, *Memoirs of Anne of Austria and her Court* (New York, 1901).

ANNE OF BRITTANY (1476–1514). Queen of France. She was the daughter and heiress of Francis II, Duke of Brittany. By her marriage to Charles VIII, Dec. 6, 1491, Brittany became incorporated with France. Anne had been affianced to Maximilian of Austria, but the

French King took care not to let slip so rich a prize. During Charles VIII's campaigns in Italy she governed France well. After her husband's death she married his successor, Louis XII, over whom she had great influence. She was a woman of beauty and intelligence.

ANNE OF CLEVES, klēvz (1517–57). The daughter of John, Duke of Cleves, and fourth queen of Henry VIII of England, who reluctantly married her on Jan. 6, 1540, to conciliate the German Protestant princes, but divorced her on July 9 of the same year on the ostensible ground that he had never really given his inward consent to the marriage. Anne was a very homely woman. She died at Chelsea, July 16, 1557. Consult the *Gentleman's Magazine*, vol. ccxc (London, 1901), and Hume, *The Wives of Henry VIII* (London and New York, 1905).

ANNE OF DENMARK (1574–1619). The wife of James I of England (q.v.), born at Skanderborg, Jutland. Negotiations for her marriage to the young Scottish King were begun when she was only 11 years old, but because of the opposition of Queen Elizabeth the ceremony was delayed until after the execution of James's mother, Mary Stuart, Queen of Scots. The Scottish nobility then demanded that the royal match be concluded at once, but two years passed before Anne was married, in August, 1589, by proxy, and on November 23, in person, to James. Six months after the wedding at Opslo, Norway, the couple arrived in Scotland. Anne was crowned with James at Westminster (1603), when he ascended the English throne, and shortly afterward took up her residence in London. Exceedingly fond of display, she found that the active promotion of court entertainments, such as masks, and the furthering of "progresses" through the country, afforded her the best of opportunities for outshining the ladies of her court. She took part in numerous plays, including Ben Jonson's *Mask of Blackness* and *Mask of Queens*, and is reported to have danced in Shakespeare's *Twelfth Night* when she was 43 years old. Anne's "progress" to Bath in 1613 cost £30,000. Accustomed not only to lavish personal display, but to the satisfaction of an expensive taste in things artistic, her demands for funds outstripped a generous Parliament's grants. At the time of her death she had incurred such heavy debts that it was found impossible to get credit for the funeral expenses, and lack of ready money forced a delay. While Anne had inclined toward Catholicism at one time in her life, before its close she professed the Protestant faith. Consult A. Strickland, *Queens of England*, vol. vii (1844).

ANNE OF GEIERSTEIN, gī'ĕr-stīn. The title of a novel by Scott (1829), based upon events connected with the victory of the Swiss over Charles the Bold of Burgundy in the fifteenth century.

ANNE, ăn, QUEEN OF GREAT BRITAIN AND IRELAND (1665–1714). The last British sovereign of the house of Stuart. She was born at St. James's Palace, London, Feb. 6, 1665, and was the second daughter of the Duke of York, afterward James II, by his first wife, Anne Hyde, the daughter of the Earl of Clarendon. When she was about seven years of age, her mother died, and her father soon after professed himself a member of the Church of Rome; but he permitted his daughters to be educated in the principles of the Church of England, for which Anne always retained an ardent if not a very enlightened attachment. To advance his own popularity, her father gave her in marriage, in 1683, to Prince George of Denmark, brother of Christian V, an indolent and good-natured man, who concerned himself little about public affairs and was endowed with no capacity for taking part in them. Anne's own weakness of character and that of her husband gave opportunity to Lady Churchill, afterward Duchess of Marlborough, her early playfellow, to acquire an influence over her which during many years was almost supreme. During the reign of her father Anne lived in retirement, taking no part in politics. On the landing of the Prince of Orange she seems at first to have hesitated, and even to have been inclined to adhere to the cause of her father, whose favorite daughter she was; but Churchill had made up his mind to an opposite course, and his wife induced the Princess to adopt it. She consented to the act by which the throne was secured to the Prince of Orange in the event of his surviving her sister Mary; but quarreled with the King and Queen over money matters. Although she had borne 17 children, only one, the Duke of Gloucester, survived infancy, to die in 1700, in his eleventh year; and Anne was without a direct heir when she ascended the throne on March 19, 1702. The influence of Marlborough and his wife was powerfully felt in all public affairs during the greater part of her reign. The strife of parties was violent, and political complications were increased by the Queen's anxiety to secure the succession to her brother. In so far as she had any political principles, they were opposed to that constitutional liberty of which her own occupancy of the throne was a sort of symbol, and were favorable to absolute government and the assertion of royal prerogative according to the traditions of her family. These principles, and her family attachment, tended to alienate her from the Marlboroughs, whose policy, from the time of her accession, had become adverse to Jacobitism, and who now, along with Godolphin, were at the head of the Whig party. The Duchess also offended the Queen by presuming too boldly and haughtily upon the power which she had so long possessed.

Anne found a new favorite in Mrs. Masham, a relative of the Duchess, who had introduced her into the royal household. To Mrs. Masham's influence the change of government in 1710 was in a great measure owing, when the Whigs were cast out, and the Tories came into office, Harley (afterward Earl of Oxford) and St. John (Lord Bolingbroke) becoming the leaders of the ministry. But although they concurred more or less in the Queen's design to secure the succession of the throne to her brother, the new ministers had quarrels among themselves which prevented its successful prosecution; their plans and intrigues became sufficiently known to alarm the nation and to alienate many political supporters of the government party. A dispute between Oxford and Mrs. Masham, carried on for hours in the Queen's presence and terminating in her demand for his instant resignation, seems to have brought on the attack of apoplexy of which she died, Aug. 1, 1714. The Elector of Hanover succeeded her as George I. The principal event of her reign was the union of England and Scotland, in 1707, and she was the last sovereign who ruled over these as separate kingdoms, and the first sovereign styled "of Great Britain." Another important event was the War of the

Spanish Succession, in which the Duke of Marlborough won brilliant victories over the armies of Louis XIV of France. Queen Anne was of middle size and comely, though not beautiful. She was virtuous, conscientious, and affectionate, more worthy of esteem as a woman than of admiration as a queen. Her reign is often mentioned as a period rendered illustrious by some of the greatest names, both in literature and science, which her country has ever produced; but literature and science owed little to her active encouragement. Consult: Burton, *Reign of Queen Anne* (London, 1880); McCarthy, *The Reign of Queen Anne* (London, 1902); Paul, *Queen Anne* (London, 1907); Jonathan Swift, *Four Last Years of Queen Anne.*

ANNE, Sister. In the story of *Bluebeard* (q.v.), the sister of Fatima. While Fatima is awaiting the penalty of her disobedience, Anne, on the top of the tower, watches for the coming of their brothers to save them.

ANNEAL'ING (from ME. *anelen*, OF. *neeler*, Fr. *nieller*, to enamel, from Lat. *nigellus*, blackish). The process by which glass and certain metals are heated and then slowly cooled to make them more tenacious and less brittle. The rationale of annealing has been most studied, perhaps, in connection with steel manufacturing. Important steel castings are nearly always annealed, and it is a common requirement for steel forgings. In the working of metals, such as the drawing of rods, wire, and pipe, the rolling of plates, or hammering, the metal becomes brittle, and frequent annealing is necessary. It is a common practice to anneal steel plates for the best marine boiler work. The hardening and tempering of steel are analogous processes to annealing, there being a close interrelation between the three phenomena. Steel is hardened by sudden cooling from a high temperature, usually at or above red heat, by plunging it into oil, water, etc. To temper steel means, in its specific sense, to mitigate, or to moderate, the effects of previous hardening. It is usually performed by gently reheating the previously hardened steel to a much lower temperature than red heat and then cooling it, generally suddenly, but sometimes slowly. While tempering somewhat moderates the effects of previous hardening, annealing aims nearly completely to eliminate them. Annealing of steel is usually effected by slow cooling from a temperature at or above red heat. Thus steel is in its hardest and most brittle state when hardened, in its softest and toughest when annealed, and in an intermediate condition when tempered.

In hardening, the steel articles, if small, are heated in boxes or pans filled with charcoal dust and placed in reverberatory furnaces. Larger articles are heated in the furnace proper, which is often made of a special shape to fit the form of the article, such, for instance, as a long gun tube. In general, the more rapid the cooling, the harder and more brittle is the steel. The surface of steel or iron, when heated in contact with charcoal, absorbs a certain percentage of carbon, resulting in a higher carbon steel which increases the hardness when the metal is rapidly cooled. By this method a hard surface backed by comparatively soft tenacious iron can be produced, such as armor plate and rock-crushing machines. Mercury is the most rapid cooling agent, and water, rapeseed oil, tallow, and coal-tar follow next in the order named. Steel castings and forgings for guns, marine engine-shafts, and armor-plate, where strength is more important than hardness, are usually cooled in oil; while steel for cutting tools, where extreme hardness is the important thing, is ordinarily hardened in water.

In tempering hardened steel articles they are slowly heated by contact with hot iron bars, plates, or rings, on the surface of melted lead or other fusible metal, in hot sand, in burning charcoal, or in special furnaces, to a temperature of from 428° F. to 600° F. The temperature required for razors is from 446° F. to 469° F.; for shears and scissors, 491° F.; for woodworking tools, 531° F.; for swords and coiled springs, 550° F.; for handsaws, 600° F. The heated article is cooled by plunging it into a bath of water or oil.

In annealing, the article is heated uniformly in a furnace, without direct contact with the flames, to the temperature generally of bright cherry red. The common method of cooling is to withdraw the fire from the furnace and to close all apertures, allowing the furnace slowly to cool down. Cooling is sometimes accomplished by burying the heated article in ashes, lime, or other slow conductors of heat, and allowing it to become cool by the radiation of its heat. Boiler and ship plates are often cooled by simply withdrawing them from the furnace and throwing them on the mill floor to cool by radiation. When medals are repeatedly struck by the die-stamper, the gold or other metal, by the concussion, becomes brittle, and requires to be heated and annealed at intervals. Annealing is necessary in gold-beating and in rolling, hammering, and stamping sheet metals generally. Articles of tin, lead, and zinc, which are metals with a low melting temperature, are annealed in boiling water, which is allowed to cool with the article immersed. Malleable iron is cast-iron annealed by being covered with powdered hematite ore and heated and then slowly cooled.

In the making of glass vessels by the glass-blower (see Glass), they are of course quickly reduced in temperature while the fused glass is being molded into the desired shape. The atoms of the glass thus rapidly compelled to assume a permanent position do not seem to be properly and firmly arranged together, and the vessel is very liable to be broken, either by a slight but smart blow, or a sudden increase or decrease in temperature. This brittleness is very observable in the *lacrimæ vitreæ*, or glass tears, known as Prince Rupert's drops, obtained by allowing molten glass to fall into water, when the glass forms pear-shaped drops, which are so brittle that if they be scratched with a file or the end be broken off the whole bursts asunder and falls down into a fine powder of glass. The same brittleness is exhibited in Bologna jars, or vials, which are small and very thick, and yet, if a minute angular fragment of any hard substance be dropped into the jar, the latter flies to pieces.

In the annealing of glass vessels they are arranged in iron trays and placed in a long oven, where they are gradually raised in temperature to near their fusing point by the trays being drawn along to the hottest part of the oven; and thereafter the trays, with their contents, are very slowly drawn into a cooler and cooler part, till they become cold. The annealing operation generally takes 12 hours for small articles, such as wine glasses; but days, and even a week or two, are required completely to anneal large vessels. Many articles of glass, such as tubes for

steam gauges, lamp glasses, etc., are annealed by immersion in cold water, which is very gradually raised to its boiling point and then cooled.

The theory of annealing is one of considerable technical intricacy, and scientists are not altogether in agreement as regards many of its features. For the theory and practice of the hardening, tempering, and annealing of steel, consult Howe, *Metallurgy of Steel* (New York, 1892), and Woodworth, *Hardening, Tempering, Annealing and Forging of Steel* (New York, 1903).

ANNECY, ăn'sē'. The chief town of the department of Haute-Savoie, France (Map: France, S., L 3), in the midst of a fertile country at the northwestern extremity of the Lake of Annecy and 22 miles south of Geneva. The Lake of Annecy is 1470 feet above the sea and is surrounded by magnificent mountain scenery. It is about 9 miles long and 2 miles wide, its waters flowing by the Fieran to the Rhone. Annecy has manufactures of linens, cotton yarn, felt hats, paper, straw goods, iron, and steel wares. Its linen bleachfields have existed since 1650. Near Annecy is a famous bell foundry. The town is clean and has an air of respectable antiquity, the shops in many of the streets being under arcades. The most remarkable buildings are the château, once the residence of the family of Genevois-Nemours, the old and new bishops' palaces, the cathedral, and the modern church of St. Francis, the latter of which boasts of possessing the relics of St. Francis of Sales and St. Jane Frances Chantal. Annecy has a scientific and archæological museum. In the public gardens is a statue of Berthollet, a celebrated chemist who was born at Talloire, near by. Pop., 1901, 13,611; 1911, 15,622.

In the twelfth century Annecy was called *Anneciacum Novum*, to distinguish it from Old Annecy, *Anneciacum Vetus*, which occupied the slopes of a neighboring hill, and was a place of some consequence in the times of the Romans. In the earlier part of the Middle Ages Annecy belonged to the counts of Geneva, and on the extinction of that house it passed to the house of Savoy, in whose possession it remained, except for a brief period under the French Empire, until the transference of Savoy to France in 1860.

ANNEL'IDA. See ANNULATA.

ANNENKOFF, ä'nyĕn-kôf, MIKHAIL NIKOLAYEVITCH (1835–99). A Russian soldier and engineer, born in St. Petersburg. He was educated as a member of the corps of pages, took part in crushing the Polish insurrection of 1863, and was connected with the administration of affairs in Poland until 1866. He was promoted to be colonel, and during the Franco-Prussian War accompanied the German army. In 1867 he attracted considerable attention by his articles in the *Voyeni Sbornik* (a military journal) on utilizing the railroads in military activities. In the Russo-Turkish War of 1877–78 he directed the military transportation. He became a lieutenant-general in 1878 and served in the campaign against the Tekke-Turkomans in 1880–81. He directed the construction of the railway from the Caspian Sea to Samarkand (1881–89) and in 1892 began the construction of the line from Samarkand to Tashkent. He was also known as the chief promoter of the Trans-Siberian Railway. Besides the papers already mentioned, he published *Observations and Views of a Russian Officer* (1871) and *Siberia and its Railroads* (1888).

ANNENKOFF, NIKOLAI IVANOVITCH (1819–89). A Russian botanist. He studied at Moscow and in 1853 became a director of the School of Agriculture. In 1863 he was appointed director of the School of Horticulture at Uman. His works include a dictionary of botany, in which the names of plants are given in Russian, French, German, English, and other languages.

AN'NEXA'TION (Lat. *annexus*, a tying or binding to, from *ad*, to + *nectere*, to tie). The acquisition by a state of territory previously independent or in the possession of another power. Though strictly applicable, perhaps, only to the extension of a state's sovereignty over adjoining territory (as in the annexation of Alsace-Lorraine to Germany as the result of the Franco-Prussian War, and of California and adjacent territory to the United States as the result of the war with Mexico), the term is applied to any territorial acquisition, near or remote, as in the cession of Porto Rico and the Philippines to the United States, and the forcible annexation of the Boer republics in South Africa to the British Empire. Mere cession of a territory does not nullify the existing laws until otherwise ordained, and, until possession is taken, the prior authorities retain their police functions, although, technically speaking, sovereignty ceases upon completion of cession. Thereupon the inhabitants of the annexed territory are absolved from their allegiance to their former sovereign and their legal relation to him is dissolved, but not their relations to each other. Titles to property are not affected by cession, excepting in the substitution of the new sovereign for the old as lord paramount. See TENURE.

As annexation is a legal fact, resulting in the virtual incorporation of foreign territory in the annexing state, it does not proceed from such extra-legal or informal acts as discovery, occupation, or military conquest, but requires for its completion the official and legal action of the state, by treaty duly made and ratified, by proclamation of the sovereign, or by legislative act. Thus, it was decided by the Supreme Court of the United States, in the so-called Insular cases (1901), that Porto Rico remained foreign territory, notwithstanding the destruction of the Spanish sovereignty and government and the occupation of the island by the military forces of the United States until the ratification of the treaty of peace with Spain in 1898, and that it was this act which extended the sovereignty of the United States over that island. Where the transfer of title is not acquiesced in by the former sovereign, there must be an effective occupation and a virtually complete destruction of the previously existing authority. But the annexation may be complete notwithstanding the active or passive opposition of the inhabitants of the territory affected, as in the case, previously referred to, of the Boers in South Africa and the native population in the Philippine Islands. Consult Randolph, *The Law and Policy of Annexation* (New York, 1901). See ALLEGIANCE; COLONY; CONQUEST, and the authorities there referred to.

AN'NIE LAU'RIE. A Scottish song of the eighteenth century, by William Douglas, of Scotland, to Annie, daughter of Sir Robert Laurie, of the Maxwelton family. It was set to music by Lady Jane Scott.

ANNI'HILA'TIONISM (from Lat. *ad*, to + *nihil*, nothing). The theory of the utter extinction of man's being, both bodily and spiritual,

either at death or at some later period. Christian theology was for ages dominated by the Greek theory of the natural immortality of the soul. Modern philosophy began to question this theory. Spinoza (*Tractatus de Deo et Homine*), Hobbes, and Locke argue for possible annihilation. In theology little was heard of the doctrine until the eighteenth century, when Taylor, of Norwich, England, McKnight, and a few others wrote upon it. Among later supporters perhaps Archbishop Whately may be counted; for in his *View of the Scripture Revelations Concerning a Future State*, he says that in the passages in which "death," "destruction," "eternal death," are spoken of, the words may be taken as signifying literal death, real destruction, the utter end of things; that "unquenchable fire" may mean a fire that quite consumes what it feeds upon, and the "worm that dieth not" may be that which entirely devours its prey. In the United States the question was revived by *Six Sermons on the Question: Are the Wicked Immortal?* by George Storrs (Philadelphia, 1848). James H. McCulloh in his *Analytical Investigations Concerning the Scriptures* (Baltimore, 1852), maintained that after the final decisions at the judgment the wicked will be utterly destroyed by the visitation of God in wrath. C. F. Hudson, in *Debt and Grace, as Related to the Doctrine of a Future State* (Boston, 1857), denies that the natural immortality of the soul is even implied in the Bible; on the contrary, life and immortality are brought to the redeemed alone, all others being not only naturally mortal, soul and body, at death, but after that mortal suspension of positive existence, all are raised at the final resurrection and cast into the lake of fire at the second death. He denies that endless conscious suffering is ever affirmed to be the nature of future penalty, but affirms that the penalty consists in privation, and that in the perpetuity of this privation consists the eternity of future punishment. R. W. Landis replied to Hudson, in his treatise *On the Immortality of the Soul and the Final Condition of the Wicked* (New York, 1859), and many other writers discussed the subject, especially in religious reviews and magazines.

The discussion then broadened out and was participated in by members of all communions. The general purpose was to gain some relief from the thought of the eternal suffering of vast multitudes of human souls. It has accordingly been argued that sin is corrupting in its nature, that it leads necessarily to degeneration and decay, and that a sinning soul, embarked upon a course of rebellion against God, must finally wear its life-forces out and cease to be. It is argued, on the other hand, that this position has no support in the Bible, and that there is no evidence, from the experience of sinners in this world, that sin, however much it may otherwise affect the nature, substantially diminishes the power of life. The tendency among thinkers who have sought relief in this direction has therefore been rather to the doctrine of "conditional immortality," so called, that the soul of man is not by nature immortal, but becomes so by the special gift of Christ upon the exercise of a genuine faith in him, and that apart from this faith man would eventually, and probably at death, cease to be. Against the objection that thus multitudes of souls would seem to have been created to no purpose, the analogies of evolution are brought by some, by which multitudes of forms are everywhere produced that a few select ones may survive. The soul itself thus enters into the "struggle for existence," and the "fittest" souls survive; that is, those who have risen by Christian faith to the higher plane of life. The chief advocate of the view is Rev. Edward White, *Life in Christ* (London, 1846). A modification of this view is to be found in S. D. McConnell's *Evolution of Immortality* (New York, 1901).

AN'NISTON. A city and the county-seat of Calhoun Co., Ala., 63 miles east by north of Birmingham, on the Southern, and the Louisville and Nashville railroads (Map: Alabama, D 2). It has a fine location in the foothills of the Blue Ridge Mountains and contains a park, fair grounds, the beautiful churches of St. Michael and All Angels, the Alabama Presbyterian College for young men, the Noble Institute for young ladies, and the Barber Memorial Seminary, an industrial college for colored girls. The city is in a productive coal, iron, corn, grain, and cotton region and is the centre of an important cotton trade. Its chief industry, however, is the manufacture of cast-iron pipe. There are also extensive blast-furnace foundries and machine shops, rolling mills, freight-car, locomotive, and boiler works, cotton-goods manufactories, a carriage factory, and a yarn mill. Anniston was founded in 1873 by the Woodstock Iron Company, headed by Samuel Noble, but was not thrown open to the general public until 10 years later. In 1912 the National Guard of eight southern States held their field manœuvres here, under the direction of the United States War Department. Pop., 1890, 9998; 1900, 9695; 1910, 12,794; 1920, 17,734.

ANNOBON, ăn-nō-bŏn'. An island in the Gulf of Guinea, about 1° 30′ S. lat., belonging to Spain (Map: Africa, E 5). It has an area of a little over 6 square miles and is highly mountainous. The population in 1910 was 1313, mostly black, and some of them have been converted to Christianity. The island was discovered by the Portuguese in 1471 and ceded to Spain in 1778. The only town is San Antonio de Praga, in the northern part.

ANNONA. See CUSTARD-APPLE.

ANNONAY, ăn'nō'nâ' (anciently Lat. *Annoneum*). A picturesque town of France, in the department of Ardèche, situated at an altitude of over 1000 feet, where the valley of the Déome joins the valley of the Cance, 37 miles south of Lyons (Map: France, S., J 3). It has a rugged beauty of its own, the houses and jutting rocks interspersed along steep and narrow streets. The principal buildings are the Gothic church, built in 1614, the college, the museum, and library. It carries on an active trade and industry, the chief articles of manufacture being paper, of which nearly half a million reams are produced annually, glove leather from kid skins, silk and cotton twist, woolen cloth, and flour. A great quantity of silk is produced in the neighboring villages. The paper mills of Annonay were established by the father of the celebrated aëronauts Montgolfier, who were born here, and of whom there is a statue in the Grande Place. Pop., 1901, 17,490; 1906, 17,300; 1911, 16,661.

AN'NUALS. A class of handsomely illustrated collections of prose and verse, imitating the gift-books of the Germans and intended for Christmas, New Year's, and birthday presents. The first, the *Forget-me-not*, was published in London in 1823 and was followed by the *Liter-*

ary Souvenir; the *Keepsake,* edited by Lady Wortley and subsequently by the Countess of Blessington; the *Book of Beauty;* the *Musical Bijou;* the *Comic Annual,* begun by Thomas Hood and others, and in the United States by the *Gift* and the *Token,* to mention a few of the many. Large sums were spent on these publications, and large profits were realized; but while many authors of distinction, as Tennyson, Longfellow, and Bryant, were induced to contribute to them, the articles, as a rule, were of an inferior and highly sentimental nature, and after 1840 the demand for annuals declined. The *Forget-me-not* had an unparalleled life of 22 years; but the *Book of Beauty* and the *Keepsake* survived it, the last named ceasing to exist in 1856. The tradition of the old annuals survives in the special Christmas numbers of many magazines. See YEAR BOOK.

ANNUALS, or **MON'OCYC'LIC PLANTS.** Plants that live only during a single vegetative period. The aërial parts of many plants are annual, the subterranean parts being persistent, and these must not be confused with annuals.

ANNU'ITY (from Lat. *annus,* year). A sum of money paid annually. If perpetual, the right to receive the payment passes from the annuitant to his heirs. Such perpetual annuities are less frequent than life annuities, which may assume the most varied forms. In the simplest phase of the matter the annuitant receives a fixed annual payment during his life, the annuity being extinguished by his death. If upon the lives of several persons, the aggregate amount of the annuity only is fixed. On the death of one of the recipients, his share is distributed among the survivors, the last person receiving the whole amount which was formerly distributed. The annuity may begin immediately and stop upon the happening of some contingency, as marriage; or again, the annuity may not begin until a later date, in which case it is designated as deferred. Many other combinations can be and actually are devised. Such annuities arise either from testamentary dispositions or from contract. In the former case it is the desire of the testator to insure to the recipient an income fixed in amount either for life or for a lesser period. Thus, a father may provide an annuity for his daughter, to be terminated upon marriage. In case of an annuity resting upon contract, the annuitant, or some one for him, surrenders the use of a sum of money to another person who agrees to make fixed annual payments to the annuitant during the life of the latter. The annuity may be purchased by a single payment or a series of payments extending over a number of years. The latter is particularly applied to old age insurance, the object of which is to secure a fixed annual income after reaching a certain age. Such a contract between two individuals would be little more than a wager. No one can tell how long an individual may live, and one of the parties to the contract must gain at the expense of the other. When, however, the business is concentrated so that the party paying the annuities deals with a large number of persons, the same laws that make life insurance possible make this a calculable and legitimate enterprise. The relations of life insurance and annuities are obvious. They are reciprocals of one another. In life insurance a series of annual payments obtains for heirs of the insured certain capital at death of the insured, while in annuities the surrender of a certain capital insures a series of annual payments during life. Annuities are, in fact, older than life insurance, and the latter is an offshoot of the former.

The elements in the calculation of the rates of annuities are the same as in life insurance, though the calculation is a different one. The first element is the probability of human life, as determined by vital statistics. Upon the length of human life depends the number of payments, and for a given capital, therefore, the amount of such payments. It is obvious that the sum of $1000 would purchase a larger annuity for a man of 50 than for one of 25. It is equally clear that for a series of contracts once entered upon, a lengthening of the average period of human life would cause pecuniary loss to those paying the annuities, while a shortening of human life would cause a profit. Like results have frequently followed from undertaking annuity contracts upon an erroneous statistical basis. The second element in the case is the interest upon money. If the money surrendered at the outset were locked up in a strong box, the calculation of the payment for a fixed number of years would be simplicity itself. In that case an annuity of $1 for 10 years could not be purchased for less than $10. But the purchase money is, in fact, placed at interest, and under the terms of the contract above noted, the seller of the annuity would enjoy the interest on $10 for one year, on $9 for the second year, and so on. The purchaser, however, will not surrender his entire claim to interest, but will at least share it with the seller. Thus it follows that an annuity of $1 for 10 years should be purchased for something less than $10. How much less, will depend upon the rate of interest. If interest were 6 per cent, the annuity could be purchased more cheaply than if it were only 3 per cent. Changes in the rate of interest complicate the practical problem of executing annuity contracts.

Such contractual annuities as have been described are more frequent in Europe than in the United States. In Europe the earliest public debts were in the form of life annuities. The ill success of these ventures was one of the earliest stimulants to a scientific study of the laws of mortality. In European countries the issue of annuities is still carried on by the government as well as by private companies. The greater familiarity with annuities which prevails in England, for instance, explains the frequent allusions to the interest on the public debt as a multitude of perpetual annuities. The repayment of the principal not being contemplated, the investor in the funds acquires the right to receive a certain annual income, and this right is transferable to his heirs. Annuities are assuming new importance in the United States, owing to the fact that most life insurance companies are beginning to issue new and attractive forms of annuity policies.

The mathematical treatment of the subject is extensive, involving the preparation of mortality and investment tables. The formation of these tables is discussed in the *Assurance Magazine,* a journal of the Institute of Actuaries of Great Britain and Ireland.

The annuity may be chargeable only to the person of the grantor, or it may be a charge on specific personal or real estate. In either case, if given with words of inheritance, it will descend as real property, but for all other purposes it will be treated as personal property. In this

respect it differs from a rent charge (q.v.), with which it is often confused, but which is always charged on specific real estate and, whether inheritable or not, is always treated as real property. Annuities are classed by Blackstone (*Commentaries*, book ii, p. 40) with rents, franchises, etc., as incorporeal hereditaments (q.v.). Like other species of property, they are generally alienable, except in jurisdictions where by statute beneficiaries of trusts for the payment of annuities are not allowed to alienate their interests under the trust.

Consult Blackstone, *Commentaries on the Laws of England;* Kent, *Commentaries on American Law*, and the authorities referred to under the title INSURANCE.

AN'NULAR ECLIPSE. See ECLIPSE.

AN'NULA'RIA (Lat. *annulus*, a small ring). A genus of fossil plants found in rocks of Devonian, Carboniferous, and Permian ages, allied to the modern Equisetaceæ, or Scouring-Rushes, and consisting of fluted annulated stems bearing numerous narrow leaves arranged in whorls at the ring-like joints. *Annulariæ*, for so long a time considered to be plants of a distinct genus, are now known to be, together with the genera *Asterophyllites* and *Sphenophyllum*, merely heteromorphous leaves of the *Calamites*.

AN'NULA'TA, or **ANNEL'IDA** (Lat. *annulus*, a little ring). A phylum of animals, the annelids, comprising a large group of segmented, worm-like forms, mostly included by Linnæus in his class Vermes. They have a more or less elongated body, which is always composed of numerous segments. The first of these assumes, in many, the character of a head, but in some the head is not clearly set off from the trunk. They have no jointed appendages, but most of them are provided with bristles and hairs, called *setæ*, often in numerous bundles, which are of use to them in locomotion; some, which want these, are furnished with suckers at the extremities and employ them for this purpose; some remain fixed in one place. Their bodies are always soft and without external or internal skeleton; but some of them form for themselves a calcareous covering by exudation; others form coverings partly by exudation and partly by agglutination. Their blood is generally red, but not from red corpuscles, as in vertebrates; sometimes it is greenish or yellowish. The circulatory system is well developed in most annelids, though a few aberrant forms have it greatly reduced or even entirely wanting. It is generally what is called a closed system, i.e., the vessels of which it is composed are entirely shut off from communication with the body cavity. But in the leeches there is no sharp distinction between blood vessels and body cavity. There are always longitudinal vessels, usually two, sometimes four, the dorsal or lateral of which pulsate more or less. These longitudinal vessels are connected by a large number of transverse vessels. Some of these near the anterior end of the body are occasionally larger than the rest and are called "hearts," but there is no true heart. See ALIMENTARY SYSTEM; CIRCULATORY SYSTEM.

The nervous system consists of a pair of ganglia lying above the œsophagus, known as the brain, from which the nerve trunks arise. Usually there are two such trunks, which pass downward and backward around the œsophagus, meeting in the mid-ventral line and running backward to the rear of the body as a double cord. On this there are ganglia in each segment. The sense of touch is usually acute in annelids and is often localized in tentacles and papillæ. Many species have eyes more or less highly organized; some have sensory pits, supposed to be smelling organs; some have sensory papillæ, which from their occurrence around the mouth are supposed to be organs of taste; and a very few have otocysts, or positional organs. In all annelids, except a few aberrant forms, excretion takes place by means of nephridia, and these are usually arranged a pair in each segment. These nephridia are coiled tubes, one end widened to form a funnel and opening in the body cavity, and the other opening to the exterior. See NERVOUS SYSTEM.

Respiration is either by gills, which are of very various structure and appearance, or through the surface of the body or some part of the alimentary canal. The latter varies greatly with the habits of the worms, but the anal opening is always at the posterior end of the body. The muscular system is usually well developed, for many of these worms are very active animals. The sexes are generally separate, but many annelids are hermaphrodites. Nearly all lay eggs, and these are sometimes provided with a shell. See RESPIRATORY SYSTEM; GILLS; MUSCULAR SYSTEM.

Annelids are widely distributed over the world; while the majority are marine, a large number are found in fresh water or in the earth. Many are carnivorous, but some are almost wholly vegetable feeders. Some are sluggish, but the majority are active, and some move with remarkable rapidity. They vary greatly in size, some being almost microscopic, while others are several feet long. They are usually dull-colored, but some, especially tropical species, are gorgeously arrayed. Aside from the part they play in the economy of nature as soil producers and scavengers, they are of little use to man. Leeches were formerly (and are still sometimes) used in medicine for blood-letting, and a few species are used as food by savages, notably the palolo-worm.

The classification of the annelids has always been a matter of great difficulty, as there are several other groups to which they seem to be related or which they superficially resemble. The matter is not definitely settled, but it seems best now to regard them as a phylum, or type, coördinate with Mollusca, Arthropoda, etc., containing two well-marked classes, and two others whose relationships are very obscure. The largest and most important of these classes is that of the *Chætopoda*, in which the blood system is closed and the external rings of the body correspond to the internal segments. They have locomotive organs in the form of *setæ*, or appendages provided with them. The class includes a very great number of species of widely different structure and appearance, and the most convenient, though possibly not the most natural, way to divide it is into three groups, Polychæta, Oligochæta, and Myzostomida. The last named are a very small group of curious, degenerate annelids which live parasitically on crinoids. The body is flat and unsegmented and has neither circulatory nor excretory system. The second class is *Gephyrea*, containing marine Annulata "devoid of any trace of segmentation in the adult condition, without parapodia, and either without *setæ*, or with only a limited number." It includes Sipunculus, Echiurus, and a

few closely related forms. The third class is *Archi-annelida*, minute marine worms, faintly segmented, and represented by only two families —the Histriodrilidæ, parasitic on lobsters, and the Polygordiidæ; the larvæ of both are trochospheres. The fourth class is *Hirudinea*, the leeches, which have the blood system communicating with the body cavity, and the external rings are four or five times as numerous as the inner segments. They have no *setæ* and are provided with suckers. Consult Parker and Haswell, *Zoölogy* (New York, 1897). See Earthworm; Leech; Nereis; Serpula; Worms; Fossil.

AN'NULET (Lat. *annulus*, dimin. of *annus*, a ring). 1. A term in architecture for a small fillet or band in relief encircling a shaft or capital. The annulet is several times repeated under the echinus of the Doric capital. (See Orders of Architecture.) The shafts of Moorish columns are often banded with several annulets, and in English Gothic architecture the shafts of a pier-cluster are frequently divided into two or more lengths by molded annulets. 2. *Annulet*, a ring, a charge in heraldry of frequent occurrence.

ANNUNCIADE, ăn-nŭn'shĭ-ād, or **ANUNCIADA,** ä-nōōn'thē-ä'dä (Sp. *Anunciada*, annunciation). The name of several religious orders. 1. The religious Order of the Heavenly Annunciation, or of the Nuns of the Annunciation of Mary, was instituted by Maria Victoria Fornari at Genoa in 1604, after a very strict rule. The convents of the order at one time numbered 50 in France, Germany, and the Netherlands, but they have disappeared since the French Revolution, except the one in Genoa. 2. Another Order of the Annunciation, or of nuns of Mary's Annouucement, or the Ten Virtues, was organized by Joanna, the daughter of Louis XI, in 1501, after her separation from Louis XII. It extended to 50 convents for the reception of poor gentlewomen, but was broken up at the Revolution. Some convents still exist in Belgium. 3. The Order of Knights of the Annunciation in Savoy, *Ordine Supremo dell' Annunziata*, now the first Italian order, known originally as the Order of the Neck Chain or Collar, was instituted in 1360 by Amadeus VI, Duke of Savoy. It received statutes from Amadeus VIII, as Anti-Pope Felix V, in 1409, was renewed in 1518 under the name of the Holy Annunciation, and in 1720 was raised by Victor Amadeus to be the first order of the kingdom of Savoy. The King is always grand master. The knights, who since 1720 are not limited in number, must be of high rank, and already admitted to the orders of St. Mauritius and St. Lazarus. They compose only one class. The decoration is a gold medal, on which is represented the Annunciation, surrounded by love-knots. It is usually worn suspended by a simple gold chain, but the proper collar or chain of the order is composed alternately of love-knots and roses. On the roses are engraved the letters F. E. R. T., which some interpret *Fortitudo ejus Rhodum tenuit*, in allusion to the defense of Rhodes by Amadeus V, and which others hold to signify *Frappes, entres, rompes tout*. Since 1680 the knights wear on the left breast a star embroidered in gold. The four officers of the order—the chancellor (always a bishop or archbishop), the secretary (usually the minister of foreign affairs), the almoner (usually the king's first almoner), and the treasurer—wear the decoration round the neck, suspended by a sky-blue ribbon, accompanied by a star on the left breast. For details of costumes, etc., see Burke's *Book of Orders of Knighthood*, pp. 250 et seq. 4. A brotherhood of the Annunciation was established in Rome by Cardinal Turrecremata in 1460. Its primary object was to provide dowries for 12 poor girls, but it now supports 400 girls, to whom it gives 25 scudi ($25) apiece if they marry, or 50 scudi apiece if they enter a convent. Pope Urban VIII (died 1644) left his entire private fortune (30,000 scudi) to the brotherhood.

ANNUN'CIA'TION, The (Lat. *ad*, to + *nuntius*, messenger, newsbearer). The announcement by the angel to the Virgin Mary of the incarnation of Christ (Luke i. 26–38). The festival of the Annunciation is kept on March 25, which was for a long period the beginning of the legal year in England. The earliest authentic evidence of the celebration of this feast is in a canon of the Council of Toledo, held in 656.

ANNUNCIATION, The. A subject frequently treated by religious painters, especially the Italian. The Virgin is commonly represented with needlework or with a book, according to the legends, while the archangel usually appears bearing a lily or cluster of lilies. Among well-known pictures with this title are paintings by Andrea del Sarto, in the Pitti Gallery, Florence; Fra Angelico, a fresco, in the cloisters attached to the church of San Marco, at Florence, a particularly delicate and characteristic treatment of the theme; also by the same, panels in the Gesû, Cortona, and in the Museum of Madrid; Fra Bartolommeo in the Louvre; Luca Signorelli, at Volterra, Italy, in a chapel of the Duomo; Titian and also Tintoretto, in the Scuola di San Rocco and elsewhere at Venice. Among Spanish painters it was often represented by Murillo in a number of pictures in Seville and Madrid, and among moderns by D. G. Rossetti, in the National Gallery, London, a noteworthy example of the pre-Raphaelite school, in which the Virgin is a portrait of Christina Rossetti.

ANNUNZIO, ân-nōōn'dzê-ō, Gabriele d' (1864—). A leading Italian novelist and poet. He was born at Francavilla al Mare, near Pescara. In his fifteenth year, while a student at Prato, he published his first collection of verse, *Primo Vere* (1879), followed at intervals by *In Memoriam* (1880), *Canto novo* (1882), *Intermezzo de rime* (1884), *Isaotta Guttadauro* (1886), and *L'Isotteo e la Chimera* (1890). From the appearance of his first volume, in which he imitated Carducci, he was hailed as a poet of exceptional promise, although the naturalistic tone of many of his earlier poems, especially the *Canto novo*, provoked much censure. His first novel, *Il piacere* (translated under the title *The Child of Pleasure* (Boston, 1910), appeared in 1889 and was evidently written under the dominating influence of Maupassant and Bourget. In the main, it is a psychological study of a thorough-going egotist, whose affections are divided between two women and who in the end ruins the life of one of them as well as his own. His next volume, *L'innocente* ('The Intruder,' 1891), and *Giovanni Episcopo* (1892), are both powerful but gruesome stories, showing strongly the influence of the Russian school, and especially that of Tolstoy's *Kreutzer Sonata*. *Il trionfo della morte* ('The Triumph of Death'), the purpose of which was to establish in Italy "a modern narrative

and descriptive prose," appeared in 1894 and confirmed his reputation as a searching psychological writer, although its audacity has made it impossible to translate the volume in its entirety. About this time some of his volumes were translated into French by M. Herelle, and shortly after their appearance M. de Vogüé wrote a highly eulogistic appreciation of d'Annunzio for the *Revue des Deux Mondes* (1895), under the caption "La Renaissance latine," with the result that the young author suddenly awoke to an international reputation.

During the following years d'Annunzio's literary ideals seemed to undergo an interesting evolution. Grouping together his earlier novels, *Il piacere*, *L'innocente*, and *Il trionfo*, as the *Romances of the Rose*, he conceived the idea of a triple trilogy, the second and third groups to be respectively known as the *Romances of the Lily* and *Romances of the Pomegranate*. The first "Romance of the Lily," *Le vergini delle rocce* ('Virgins of the Rocks'), in which the influence of Nietzsche's doctrine of the Superman is pronounced, appeared in 1896. His long-promised *Fuoco* ('Flame of Life'), the first of the "Pomegranate" series, appeared in the autumn of 1900 and had a great "success of scandal." It is an apotheosis of poetry, physical beauty, and sensual love. It marks the beginning of a decline, more pronounced in his later novels, such as *Forse che sì forse che no* (1910). D'Annunzio also turned his attention to the drama, which it was his ambition to restore to the grandeur and unity of the classic Greek tragedy. In this he has been unsuccessful, for his dramas are usually devoid of action. His plays include *Il sogno d'un mattino di primavera* (1897), *Il sogno d'un tramonto d'autunno* (1898), *La città morta* (1898), *La Gioconda* (1898), *La Gloria* (1899), *Francesca da Rimini* (1901), *La figlia di Jorio* (1904), and *La fiaccola sotto il moggio* (1905), the last two dealing with the life of his native Abruzzi and revealing a marked advance in his dramatic art. The tragedies *La Nave* (1908) and *Fedra* (1909) were both failures. *Novelle della Pescara*, a collection of short tales modeled closely on Maupassant, appeared in 1902. His later lyrical work is contained in the *Laudi*, generally regarded as his finest achievement in poetry, a collection of songs to be completed in seven books dedicated to the pleiades and chanting the praises, as the full name tells, "of the heavens, the sea, the earth, and the souls of heroes." These later poems have been received with great enthusiasm in Italy, where d'Annunzio has been assigned a place in the front rank with Carducci. D'Annunzio is a firm believer in a new Renaissance—a Renaissance which will begin by "re-establishing the worship of Man," and which will "exalt and glorify above all things the beauty and power of man, the conqueror." His most recent works are *Il Martirio di San Sebastiano*, a mystery play originally composed in French and translated into Italian by Janni (1911), and *La Vita di Cola di Rienzo*, the first of a series entitled *vite di uomini illustri e di uomini oscuri* (1913). Though d'Annunzio is a very great artist, Borgese considers him the product of a materialistic age, incapable of a high ideal, which prevailed in Italy after the accomplishment of national unity. Consult: Borgese, *Gabriele d'Annunzio* (Naples, 1909); Collison-Morley, *Modern Italian Literature* (Boston, 1912); Gargiulo, *Gabriele d'Annunzio* (Naples, 1912); Croce, "*G. D'A.*," *Critica* (Bari, 1910).

AN'NUS MIRAB'ILIS (Lat. wonderful year; the year of wonders). The title of a poem by Dryden (1667) on England's naval successes in the war with Holland (1666) and on the great fire of London.

ANN'VILLE. An unincorporated town in Lebanon Co., Pa., 5 miles west of Lebanon, the county-seat; on the Philadelphia and Reading Railroad (Map: Pennsylvania, E 3). It is the seat of Lebanon Valley College (United Brethren in Christ), opened in 1866, and has manufactures of shoes, hosiery, etc. The town is governed by five commissioners elected by the people. Annville was laid out in 1762 and originally was called Millerstown, in honor of its founder. Pop., 1890, 1283; 1910, 2482.

ANO'A (native name). A genus of buffaloes, the smallest of all wild cattle, and represented by the sapi-utan of Celebes (*Anoa depressicornis*), having low straight horns, wide at the base. See Plate of BUFFALO.

AN'ODE (Gk. *ἄνοδος*, *anodos*, a way up, from *ἀνά*, *ana*, up + *ὁδός*, *hodos*, way). A term first used by Faraday to designate the positive terminal or conductor by which the current of a voltaic battery enters a substance, undergoing decomposition by electrolysis. The negative pole, or conductor, by which the current leaves the electrolyte, is called in the same nomenclature the *cathode* (*kata*, downward and *hodos*). *Electrode* is the general term applied to either of these. The products of electrolysis are called *ions* (*iōn*, going). Such as go to the anode receive the name of *anions*, and those passing to the cathode, *cations*. Thus, in the decomposition of water by the passage through it of an electric current between two platinum plates, the water is the electrolyte; the platinum plate connected with the copper or carbon of the battery is the anode; and the one connected with the zinc plate, the cathode. The oxygen and hydrogen which are disengaged are the ions, the oxygen separating at the anode forming the anions, and the hydrogen at the cathode the cations. See ELECTRICITY for a discussion of electrolysis; also ELECTRIC FURNACE and ELECTRO-CHEMISTRY.

AN'ODON'TA. A subdivision of fresh-water mussels of the family Unionidæ, characterized by having light, thin, smooth shells without hinge-teeth. They are abundant in both ponds and streams in America and most other countries. See Plate of ABALONE, ETC.

AN'ODYNE (Gk. *ἀν*, *an*, priv. + *ὀδύνη*, *odynē*, pain). A remedy given to assuage pain. Properly the term is applied to medicines, such as opium, which act on the nervous system so as to diminish pain. Anodynes may induce sleep. See HYPNOTIC; ANÆSTHETIC.

ANOINT'ING (Lat. *inunctio*, from *in*, in + *unguere*, to smear, anoint). The custom of pouring oil on the head or of applying unguents to one's body. Anointing was widespread in the ancient Orient for secular as well as for religious purposes. In the Old Testament, where the custom is frequently referred to, the unguent used was olive oil, to which frequently aromatic spices were added. As a part of the regular toilet, anointing was associated with washing (e.g., Ezek. xvi. 9), but in days of mourning, anointing, which was regarded as a symbol of joy and gladness (e.g., Ps. xxiii. 5), was omitted. Head, face, and feet were the parts of the body to which the unguents were applied. The Hebrews

in thus using aromatic unguents no doubt simply followed general customs, and similarly the religious and ceremonial use of unguents was common to the ancient Orient. It was general to anoint kings as a symbol of initiation, and likewise priests and sacred objects were anointed. An interesting development growing out of the custom among the Hebrews was the use of the word *meshiach*, which means 'anointed,' in regard to the kings and the high priests who were anointed with oil, when they assumed their office. In later times the Aramaic form *messicha*, whence the Greek Μεσσίας, *Messias*, Messiah, was applied to the King of David's line who was expected. The Greek translation ὁ χριστός, *ho Christos*, occurs in the Psalter of Solomon, with this significance, and becomes the title of Jesus in the New Testament.

As to the original significance of anointing as a religious rite, scholars hold different views. Some regard the oil as a substitute for blood; others look upon it as itself symbolizing life, fat being, according to ancient ideas, one of the seats of life. In either case the idea expressed by the religious and ceremonial anointing is that of establishing a covenant between the individual and the Deity, perhaps as the source of life of which the oil serves in some way or other as representative. It was the actual rubbing of the unguent over the head, face, or feet whereby direct communion between the individual and the unguent was brought about that constituted the essential part of the ceremony, and not the mere act of pouring it over the head of a person. In the course of time, however, as the custom became more and more merely a mark of honor, the pouring over the head became the customary form of anointing. In the New Testament anointing is merely referred to in the case of the sick; but the rite was adopted by the Roman Catholic and the various Oriental churches, and survives in the anointing of kings in England, Spain, and Russia. See also CHRISM; CORONATION; EXTREME UNCTION; and for anointing of the dead, see EMBALMING.

ANOKA, ȧ-nō′kȧ. A city, the county-seat of Anoka Co., Minn., 18 miles north-northwest of Minneapolis, on the Great Northern, Minneapolis Northern, and the Northern Pacific railroads, and on Rum River (Map: Minnesota, D 5). Anoka has a Carnegie library and is the seat of a State asylum. Its chief industries include a sash and door factory, a motor company, and a starch factory. The commission form of government adopted (1913) provides for election of mayor and four commissioners biannually. Both the water works and electric light plant are owned by the municipality. Pop., 1890, 4252; 1900, 3769; 1910, 3972.

ANO′LIS (in the Antilles, *anoli, anoalli*, a lizard). A genus (containing over 100 species) and family (Anolidæ) of small, fine-scaled, iguanid lizards, with considerable ability to change color, numerous in the warmer parts of America and represented in the United States by one species (*Anolis carolinensis*). See CHAMELEON. For illustration, see LIZARD.

ANOM′ALIS′TIC YEAR. The interval that elapses between two successive passages of the earth through its perihelion, or point of nearest approach to the sun. If the earth's orbit had a fixed position in space, this period would correspond with that of a sidereal revolution, or the time the earth would take after leaving any point of the heavens to return to it again, as seen from the sun; but the disturbing influence of the other planets causes the perihelion to advance slowly (about 11″.6 annually) in the direction of the earth's motion, so that the anomalistic year is longer than the sidereal. Owing to the fact that the advance of perihelion is not quite constant, the length of the anomalistic year varies slowly, increasing at the rate of about 2.6 seconds in 1000 years. According to Newcomb, the length in 1900 was 365 days, 6 hours, 13 minutes, 53 seconds, or 4 minutes, 43.5 seconds longer than the sidereal year. It receives its name from the anomaly (q.v.).

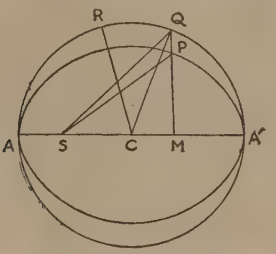
ANOM′ALISTS AND ANAL′OGISTS (for derivation, see below). Under this name were known in antiquity the representatives of the two opposing views of the origin of language. The science of grammar was developed among the Greeks in the Alexandrian Age (q.v.), although some beginning had been made in the earlier period, notably by Aristotle. (See GRAMMAR.) The Stoics concerned themselves with the origin of language and maintained that language was a natural growth, while the grammarians maintained that it was the product of convention. Chrysippus (q.v.) went further and taught that language was marked mainly by irregularities (ἀνωμαλία, *anōmalia*), and that not analogy, or law, but *consuetudo*, i.e., habit or usage, was the guiding principle of language; the Alexandrians, Aristophanes and Aristarchus, contended that regularity, analogy (ἀναλογία, *analogia*), was the rule, and that every departure from regularity is to be explained as an exception to the general law. (See ANALOGY.) The Pergamene school of grammarians, under the leadership of Crates (q.v.) of Mallos, adopted the anomalistic doctrine against the analogistic teaching of the Alexandrians. When Crates was sent on an embassy to Rome in the middle of the second century B.C., he transplanted his doctrine to that city; he accepted the phenomena of language as the arbitrary result of custom and usage. The Alexandrians' views, however, gained currency there somewhat later, and the contest between the two doctrines lasted a long time. Ælius Stilo, the teacher of Cicero and Varro, favored analogy; Cæsar wrote two books, *De Analogia*, now lost; and Varro (q.v.) devoted books viii–x, still extant, of his *De Lingua Latina* to a discussion of the two views. The analogistic view finally prevailed. Cicero was an analogist, but he gave great weight to *consuetudo*, going so far as to use forms which he knew to be wrong. As a matter of fact, neither the analogists nor the anomalists were wholly right; language is marked at once by analogy and by anomaly.

Consult: Wheeler, "Analogy and the Scope of its Application in Language," *Cornell Classical Studies* (Ithaca, 1887); Henry, *Etude sur l'analogie* (Paris, 1883); Paul, *Introduction to the Study of the History of Language*, translated and edited by Strong (London, 1888); Strong, Logeman, and Wheeler, *Introduction to the Study of the History of Language* (London, 1891), which is founded upon Paul's work; Sandys, *A History of Classical Scholarship*, especially vol. i, pp. 179–181 (Cambridge, 1906). See PHILOLOGY.

ANOM′ALOUS DISPER′SION. This phenomenon will be found discussed in the article LIGHT, particularly in the section dealing with ether and matter.

ANOM′ALU′RUS. See FLYING SQUIRREL.

ANOM'ALY (Gk. *ἀνωμαλία, anōmalia,* irregularity, from *ἀν, an,* negat. + *ὁμαλός, homalos,* even, equal). The angle measured at the sun's centre between a planet in any point of its orbit and the last perihelion. It is so called because it was in it that the first irregularities of planetary motion were discovered. In the ac-



companying diagram, let *P* be a planet, *APA'* its orbit, *C* the centre of the orbit, *S* the sun, and *A* the perihelion, then the angle *ASP* is called the true anomaly. Besides the true anomaly, there are two other anomalies—the eccentric and the mean—which are defined as follows: Let *AQA'* be the semicircle described on *AA'* as diameter, *Q* the point in which the line *PM* drawn at right angles to *AA'* meets the semicircle; then the angle *ACQ* is the eccentric anomaly. The mean anomaly is the angle *ACR*, *R* being the position of a hypothetical planet which moves along the circumference of the semicircle with uniform velocity in such a way that, starting from perihelion *A* at the same time as the true planet *P*, it reaches aphelion *A'* simultaneously with *P*. The difference between the true and the mean anomaly is termed the *equation of the centre* on account of its being the first equation or correction to be applied to the mean motion in the computation of the place of a planet. Kepler's Problem, the solution of which is of a mathematical nature and may be found in treatises on spherical astronomy, consists in the determination of the true anomaly in terms of the mean anomaly.

ANON'YMOUS (Gk. *ἀν, an,* negat. + *ὄνυμα, onyma,* Æol. and Dor. for *ὄνομα, onoma,* name). A term applied to a book the author of which does not give his name; when an assumed name is given, the term "pseudonymous" is used. Works of this class constitute one of the greatest difficulties of bibliography. French literature possesses an excellent *Dictionnaire des ouvrages anonymes et pseudonymes* (4 vols., 3d ed., Paris, 1872–79), by Barbier, embracing the titles of about 24,000 works. The best works in English are: Cushing, *Anonyms* (Cambridge, Mass., 1890), and *Initials and Pseudonyms* (1st series, New York, 1885; 2d series, New York, 1888); Halkett and Laing, *Dictionary of Anonymous and Pseudonymous Literature* (4 vols., New York, 1882–88); Olphar Hamst, *Handbook of Fictitious Names* (London, 1868).

In France and Germany literary criticism, when it extends beyond a brief notice, usually bears the author's name. In Great Britain and the United States there is no uniform practice, though reviews are more commonly unsigned.

ANON'YMUS CUS'PINIA'NI. The Latin designation of an important anonymous manuscript, so called from the name of Joseph Cuspinianus, the scholar who brought it to notice about the beginning of the sixteenth century. It is an historical account of the quarter-century preceding the fall of the Western Roman Empire. The manuscript is in the Imperial Library at Vienna.

ANOPHELES, ȧ-nŏf'ē-lēz (Gk. *ἀνωφελής, anōphelēs,* useless, harmful; from *ἀν, an,* priv. + *ὠφέλεια, ōpheleia,* help, use). A genus of mosquitoes which form the secondary hosts of malarial parasites and communicate disease. See MOSQUITO.

AN'OPLOTHE'RIUM (Gk. *ἄνοπλος, anoplos,* unarmed + *θηρίον, thērion,* wild beast). A genus containing several species of artiodactyl mammals that lived during late Eocene and early Oligocene time in France and the British Islands and that soon became extinct without leaving descendants. The remains of one species, *Anoplotherium commune,* of the size of a deer, occur in such abundance in the early Tertiary beds of the Paris Basin as to justify the conclusion that these animals ranged the forests of Tertiary time in immense herds in much the same manner as do the deer of the present day. The feet were provided with three digits, two of which were of equal size and of some length, while the third was in the form of a reduced dew-claw. Anoplotherium is by some authors placed in close relation to the Oreodonts, by others to the Hippopotami. See TERTIARY SYSTEM.

AN'OREX'IA. Loss of natural appetite for food. It is always a symptom of fevers and acute illness. Lack of appetite is a characteristic of many gastric disorders, chronic alcoholism, grief, anxiety, and certain nervous diseases. There may be merely an absence of the hunger sense, or there may be a positive aversion, to the extent of bringing on nausea at the sight of food. Anorexia is not seldom due simply to an excess of nourishment or to eating at too frequent intervals.

ANOR'THITE (Gk. *ἀν, an,* priv. + *ὀρθός, orthos,* straight; i.e., without right angles). An aluminum calcium silicate of the feldspar group of minerals. It crystallizes in the triclinic system and is found in prismatic crystals in many volcanic rocks; it has also been recognized as a constituent of certain meteorites.

ANOR'THOSITE (Fr. *anorthose,* triclinic feldspar; see ANORTHITE). An igneous rock related to the gabbro family, composed largely of that variety of feldspar, rich in lime, known as labradorite. Anorthosite has a granitoid but generally also a parallel structure, and in addition to labradorite feldspar contains often augite, hypersthene, hornblende, etc. It contains on an average about 55 per cent of silica, 28 of alumina, 10 of lime, 5 of soda, and 1 of potash. An obsolete name is labradorite rock. Anorthosite has been described from the Adirondack Mountains of New York, where it forms the central more mountainous part, including the Mount Marcy group, from Canada and Newfoundland, and from southwestern Norway. It occurs also about Lake Superior. See GABBRO; LABRADORITE.

ANOS'MIA (Gk. *ἀν, an,* priv. + *ὀσμή, osmē,* smell). A medical term, denoting a loss of the sense of smell. It may be due to causes acting either on the terminals of the olfactory nerve, peripheral, or on that part of the nerve which is within the brain, central.

ANQUETIL, äNk'tēl', LOUIS PIERRE (1723–1806). A French historian. At the age of 17 he joined the congregation of St. Geneviève;

was director of the Seminary of Rheims, and afterward director of the College of Senlis. In the Reign of Terror he was imprisoned in St. Lazare. He was an early member of the Institute and secured a place as archivist in the department of foreign affairs under Napoleon. His best work was his *Histoire de Reims* (1756–57). He also wrote several volumes of memoirs, such as *Louis XIV, sa cour et le régent* (1789; Eng. trans., Edinburgh, 1791); and an incomplete *Histoire de France depuis les Gaules jusqu'à la fin de la monarchie* (1805). His *Summary of Universal History* was published in English in Philadelphia (1805–09).

ANQUETIL-DUPERRON, dụ'pā'rôN', Abraham Hyacinthe (1731–1805). A French Orientalist, born in Paris. He studied theology and Oriental languages and in 1754 enlisted as a private soldier for India. There, after securing the support of the French government, he passed seven years in the collection and collation of manuscripts and studied the language and doctrines of the sacred books of the Parsees. He returned to France in 1762, was elected a member of the Academy of Inscriptions in 1763, and in 1771 published *Zend-Avesta, ouvrage de Zoroastre*, 3 vols., the first translation of Parsee religious works ever made into a European language, about the exactness of which a fierce polemic arose. His further publications include *Legislation orientale* (1778); *Recherches historiques et géographiques sur l'Inde* (1786) as part of Thieffenthaler's *Geography of India; L'Inde en rapport avec l'Europe* (1790); and *Oupnek'hat* (1801–02), a Latin translation of a Persian rendering of the Sanskrit *Upanishads*, noteworthy as the source of Schopenhauer's knowledge of the Indian philosophy by which his own system was not slightly influenced. Consult Sir T. E. Perry, *Bibliographical and Historical Miscellanies of the Philobiblon Society*, vol. iii (1856–57), and A. F. Weber, *Indische Studien* (1853).

ANSÆ (Lat. *ansa*, a handle). The two handle-like projections on the planet Saturn which are observed whenever the rings are tilted with reference to the earth. Galileo, writing to the Grand Duke of Tuscany, announced that the planet, as seen through the then newly invented telescope, appeared to be *tricorps*, and later observers likened the projections to two handles, until Huygens, in 1655, discovered their true nature.

ANSARIES. See Nosairians.

ANSBACH, äns'bäg, or **ANSPACH** (originally Onolzbach). A town of Bavaria, capital of the circle of Middle Franconia (*Mittelfranken*), on the Rezat, 25 miles southwest of Nuremberg (Map: Germany, D 4). Its only notable buildings are the churches of St. Gumbert and St. John, and the castle, once the residence of the margraves of Ansbach, containing a library and picture gallery. The town has several schools, a synagogue, a theatre, and a public slaughter house. It has iron foundries, breweries, dyeworks, and spinning mills; manufactures vehicles, paper, liquors, tobacco, earthenware, toys, and hardware, and has a considerable trade in wool, flax, and grain. Ansbach sprang up around a Benedictine monastery founded by St. Gumbert in the eighth century. It was the capital of the principality of Ansbach, which from the close of the Middle Ages was for three centuries ruled by margraves of the Franconian branch of the House of Hohenzollern (of Brandenburg, later of Prussia). After belonging for a short time to Prussia, Ansbach and its territory, together with the old principality of Bayreuth, which had also been ruled by margraves of the Hohenzollern line and had shared the fortunes of Ansbach, were transferred by Napoleon I to Bavaria in 1806. Pop., 1890, 14,200; 1900, 17,555; in 1905, 18,478; 1910, 19,995.

ANSCHÜTZ, än'shụts, Heinrich (1785–1865). A German actor. He was born at Luckau and studied at the University of Leipzig, in which city he saw the performances of Iffland, Esslair, and other distinguished actors who occasionally played there. He began his career as an actor at Nuremberg in 1807 and finally became a member of the Hofburgtheater in Vienna. He played both heroic and character parts and was for many years the central figure at the famous playhouse. An autobiography under the title, *Heinrich Anschütz, Erinnerungen aus dessen Leben und Wirken*, was published in Vienna (1866).

ANSCHÜTZ, Karl (1815–70). A German musician. He was born in Coblentz and in 1857 settled in New York, where he became well known chiefly as a conductor of opera and as a pioneer manager of German opera. He was also conductor of the Arion Society (1860–62). Consult F. L. Ritter, *Music in America* (New York, 1895).

ANSCHÜTZ, Ottomar (1846—). A German photographer, born at Lissa, in Posen. He devoted himself to instantaneous photography and to reproducing the movements of men and animals with the aid of a "tachyscope" of his own invention. (See Stroboscope.) Anschütz's invention has been applied to useful purposes in physiology.

ANS'DELL, Richard (1815–85). An English genre and animal painter, born at Liverpool. He studied art at the local academy, but acquired most of his training by independent sketching and study travels in the north of England and Scotland. In 1847 he removed to London and in 1856–57 visited Spain, which influenced both his subjects and technique. In 1870 he was elected to the Royal Academy. After Landseer, who greatly influenced him, he was the most popular animal painter of England, with a wide range of subjects, made interesting by a dash of human sentiment. He was good in composition, but his animals are not really true to nature. His historical subjects, which attracted much notice earlier in his career, were poor. Ansdell was also a skillful etcher, and examples of his art may be seen in the galleries of Manchester and Liverpool. His best painting is the "Combat of Red Stags."

ANSE D'ARLET, äNs' där'lā'. An attractive seaport town on the southwest coast of Martinique, in the canton of Diamaut, directly south of Trois Ilets. Near by is a hot spring, and there are many plantations on which are grown cotton, cacao, and coffee. Pop., about 3000.

ANSE DE PANIER, äNs de pà'nyâ' (Fr. handle of a basket). The equivalent of basket-handle arch. An architectural term for three-centred arches.

AN'SELL, Mary. An English actress, who after two years of theatrical experience made a success in 1893 as Nannie O'Brien in *Walker, London*. The next year she retired from the stage to marry the author of the play, J. M.

Barrie, the novelist, at Kerriemuir (July, 1894). In 1913 she published *Happy Houses.*

AN'SELM OF CAN'TERBURY, Saint (1033–1109). A scholastic philosopher, born at Aosta, in Piedmont. He led at first a dissipated life and, like Abélard, wandered through France, after the fashion of the scholars of those days, disputing wherever he could find an adversary. Attracted by the reputation of Lanfranc, he went, in 1060, to study at the monastery of Bec, in Normandy. Three years later he became prior, and, in 1078, abbot of this monastery, which under him became famous as a seat of learning. Lanfranc, who in the meantime had gone to England and become Archbishop of Canterbury, died in 1089; and the archdiocese remained four years without a successor, till, in 1093, Anselm was appointed. He was distinguished as both a churchman and philosopher. His numerous embroilments with William Rufus and Henry I, and the unbending spirit which he displayed in these, even when subjected to banishment, indicate the vigor and resoluteness of his character, as much as his writings exhibit the depth and acuteness of his intellect. In 1720 Clement XI expressly placed him in the list of Church authorities. Anselm was a second Augustine, superior to all his contemporaries in sagacity and dialectical skill and equal to the most eminent in virtue and piety. Embracing without question the doctrines of the Church, mostly as stated by Augustine, and holding that belief must precede knowledge and must be implicit and undoubting, he yet felt the necessity of a religious philosophy, urged the duty of proceeding from belief to knowledge, and sought to reduce the truths of religion into the form of a connected series of reasonings It was for this purpose he wrote his *Monologium sive Exemplum Meditandi de Ratione Fidei.* In his *Proslogium,* otherwise entitled *Fides Quærens Intellectum* ('Faith Seeking Intellect'), he strove to demonstrate the existence of God from the conception of a perfect being. This ontological proof, however, has never been held satisfactory. His writings, *Cur Deus Homo* and *De Concordia Præscientiæ et Prædestinationis,* made an epoch in Christian philosophy. Anselm may justly be reckoned the earliest of the schoolmen, although Alexander of Hales (q.v.) was the first who completely systematized in the scholastic manner the doctrines of the Catholic church. He died in Canterbury, April 21, 1109, and was buried there. The day of his death is observed in the Roman Catholic church. His works are in Migne, *P. L.,* 158, 159, and a few pieces since discovered in Mai, *Nov. Bibl. I.* For his life and teachings, consult: F. R. Hasse (Leipzig, 1843–52); De Rémusat (Paris, 1858); R. W. Church (London, 1870); M. Rule (London, 1883), who also edited two lives of Anselm by Eadmer for the Rolls Series (London, 1884); J. M. Rigg (London, 1896); A. C. Welch (London, 1900). In English are his *Book of Meditations and Prayers* (London, 1872); *Cur Deus Homo,* with selections from his letters and life (London, 1889); *Monologium, Proslogium,* and *Cur Deus Homo,* edited by S. N. Deane (Chicago, 1903).

ANSELM OF LUC'CA. See Alexander II (Pope).

ANSERES, ăn'sēr-ēz (Lat. nom. pl. of *anser,* goose). An order of birds, also called Anseriformes, including the ducks, geese, and swans (q.v.), and characterized mainly by the fact that the edges of both mandibles are provided with a series of tooth-like projections, those of the upper alternating with those of the lower mandible. The Anseres are found in all parts of the world, and about 200 species are known, mostly of large size. With few exceptions, they are essentially swimming birds and are never found far from water. They breed near the water, lay numerous eggs, and the young are able to care for themselves almost as soon as they are hatched.

ANSGAR, äns'gär (Anskar, or Anscharius) (801–865). A French prelate, styled "the Apostle of the North," on account of his labors to introduce Christianity into Denmark, Sweden, and northern Germany. He was born near the monastery of Corbie, in the vicinity of Amiens, France. In this monastery and that of Korvei, in Westphalia, an offshoot of the former, he was educated, and in the latter he subsequently became preacher. His family belonged to the Frankish nobility, and under the patronage of Louis de Débonnaire he went, with his colleague Autbert, to preach the doctrines of Christianity among the heathen Northmen of Schleswig, where he suffered many persecutions, but had, nevertheless, such success that in 831 the Pope established an archbishopric in Hamburg, and Ansgar was appointed the first archbishop. Here he passed through many difficulties, being compelled to save his life by flight in 845, when the Northmen and Danes under Eric I plundered Hamburg. He afterward made several missionary tours in Denmark and Sweden, and died Feb. 3, 865, at Bremen, where a church was named after him. The Roman Catholic church has canonized him. For his life, consult: G. H. Klippel (Bremen, 1845); Tappehorn (Münster, 1863); A. Butler, *Lives of the Saints,* under February 3 (London, 1847).

AN'SON, George, Lord (1697–1762). An English admiral and famous circumnavigator. He was born at Shugborough, Staffordshire, April 23, 1697. From an early period he manifested a predilection for a sea life, and entered the navy at the age of 15. In 1716 he served as second lieutenant under Norris; next under Byng in 1718, against the Spaniards; and was made a captain in 1723. In 1739, when war with Spain broke out, he was recalled from the Carolina station, on which he had been placed since 1724, and received the command of the fleet in the South Sea. He sailed from England in September, 1740, with instructions to inflict whatever injury he could on the Spanish commerce and colonies. The preparations for this cruise had been made in the most slovenly manner. Both vessels and stores were bad, and the sailors were old Chelsea pensioners; yet Anson, in spite of these disadvantages, achieved a brilliant reputation by the heroism, prudence, diligence, and humanity he displayed. After his little fleet of seven vessels had been scattered by a storm in doubling Cape Horn, he landed at Juan Fernandez, where he was soon joined by three of his ships, which arrived in a dismantled condition. Under great disadvantages he took several prizes, including a valuable Spanish galleon from Acapulco. Finally, with only one vessel left, he crossed the South Sea, doubled the Cape of Good Hope, and, favored by good fortune, was hidden by a thick fog as he passed through the French fleet and entered the English Channel. He arrived at Spithead, June 15, 1744, and his accumulated treasure, amounting to £500,000, was landed at Portsmouth, sent up to

London, and triumphantly paraded through the city in 32 wagons. He had circumnavigated the globe in three years and nine months, and his perilous cruise greatly extended the knowledge of navigation and geography. It has been described in his *Voyage Round the World* (editors Walter and Robins, 1748; new ed., 1853; in Everyman's Library, New York and London, 1911). As a reward for his services, Anson was made rear-admiral of the blue (1744), and in 1747, having defeated the French admiral Jonquière, at Cape Finisterre, he was created Baron Soberton, and four years later first lord of the admiralty. In 1761 he was made admiral of the fleet. Consult *Life*, by J. Barrow (London, 1839), and M. V. Anson (London, 1912).

ANSON, G. W. (1847—). An English actor, born at Montrose, N. B. He began his career at the Theatre Royal, Edinburgh, in 1865. After touring in the provincial towns and in America, he made in 1873 his London début, in *Sour Grapes*, at the Olympic Theatre, where he was engaged for several years. In 1880 he played Gaston Rieux, in *Heartsease*, with Madame Modjeska at the Court Theatre, and continued in London in various comedy parts till 1885, when he went to Australia for an extended stay. In 1892 he appeared in *The Lucky Dog* at Terry's Theatre, London. Among his subsequent rôles have been those of Schwartz, in *A Bunch of Violets*, at the Haymarket (1894); Hilarius, in *La Poupée*, with Anna Held, at the Lyric Theatre (1887), and Nero, in *Quo Vadis*, at the Adelphi (1900). During the years 1908, 1909, he appeared in the Shakespearean rôles of Old Gobbo in *The Merchant of Venice*, Sir Toby Belch in *Twelfth Night*, and Ligarius in *Julius Cæsar*.

ANSO'NIA. A city in New Haven Co., Conn., 12 miles west by north of New Haven, on the Naugatuck River, and on the Berkshire and Naugatuck divisions of the New York, New Haven, and Hartford Railroad (Map: Connecticut, C 4). Among the more prominent features of the city are the public library, built by Caroline Phelps Stokes as a memorial to her grandfather, Anson G. Phelps (q.v.), the founder of Ansonia, the Young Men's Christian Association Building, the Opera House, and the City Hall. A concrete bridge spanning the Naugatuck River has recently been completed at a cost of $175,000. Ansonia is noted as a manufacturing centre, the products including heavy machinery, rolls for paper making and wheat milling, rubber, sugar, copper, brass, and wire goods, electrical appliances, clocks, etc. The government, under a charter of 1901, is vested in a mayor elected every two years, a municipal council, and administrative officials, the majority of whom are appointed by the mayor with the consent of the council. Settled in 1840, Ansonia was set off from Derby in 1889 and was chartered as a city in 1893. Pop., 1890, 10,342; 1900, 12,681; 1910, 15,152; 1920, 17,643.

ANSPACH, ăn'spăg. See ANSBACH.

ANSPACH, or **ANSBACH,** ELIZABETH BERKELEY, MARGRAVINE OF (1750–1828). An English dramatic writer. She was a daughter of the Earl of Berkeley and was married in 1767 to Mr., afterward Lord, Craven, but separated from him 13 years later. In 1791 she became the wife of the Margrave of Anspach, with whom she had been some time intimately associated at his court. She and her husband were not received, when they came to England, either by her family or by royalty, even after she had been created a countess of the Empire by the German Emperor, Francis II. Her wanderings, after the Margrave's death, in 1806, finally ended at Naples, where she spent her last years. Her literary work included poetry, travels, and the plays: *Somnambule* (1778); *The Silver Tankard*, a musical farce (Haymarket, 1781); *The Princess of Georgia* (Covent Garden, 1799); and *Love in a Convent* (1805), in which she herself took part. She also wrote the curious *Memoirs of the Margravine of Anspach* (London, 1825).

AN'STED, DAVID THOMAS (1814–80). An English geologist and mining engineer. He was born in London and received his education at Jesus College, Cambridge. In 1840 he became professor of geology at King's College in London and afterward occupied a similar position at the Putney College of Civil Engineering. His works include: *Geology, Introductory, Descriptive, and Practical* (2 vols., 1844); *Goldseeker's Manual* (1849); *The Applications of Geology to the Arts and Manufactures* (1865); *The World We Live In* (1870); the fifth edition of his *Physical Geography* appeared in 1871, four years after its first publication.

AN'STER, JOHN (1793–1867). An Irish educator and poet. He was born in Cork Co., Ireland, and was educated at Trinity College, Dublin, where he was regius professor of civil law (1850–67). Besides making contributions to several literary periodicals, he published *Poems and Translations from the German* (1819); a translation of the first part of Goethe's *Faust* (1835); and *Faustus, the Second Part, from the German of Goethe* (1864).

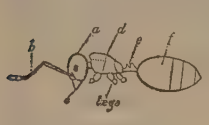
ANSTEY, ăn'stĭ, CHRISTOPHER (1724–1805). An English poet and humorist, who was educated at Eton and Cambridge. In his time the two great English universities were representative of a low order of scholarship, such as Gibbon and the poet Gray have vividly pictured in styling them "the home of bats and owls." Anstey, in his Latin oration for the degree of Master of Arts, boldly satirized the conditions which then existed, speaking of *doctores sine doctrina*. Because of his frankness the degree was refused him by the indignant dons. In 1776 he wrote a series of papers, collectedly called *The New Bath Guide, or The Members of The Broadhead Family at Bath.* The lively and piquant satire of this keen critic attracted a large body of readers, who were greatly amused by his observations on society and the manners of a certain class of English; and the book was popular for many years, though his other publications are now forgotten.

AN'STEY, F. See GUTHRIE, THOMAS ANSTEY.

AN'SWER (AS. *and-;* Ger. *ant-* in *Antwort*, answer, Gk. *ἀντί, anti*, against + *swerian*, to speak, swear). In law, technically the pleading interposed by the defendant to the plaintiff's bill in an action brought in a Court of Chancery. In his answer the defendant may set up any matter of defense to the plaintiff's claim, but in addition he is required to state fully under oath his knowledge, or, if he has no knowledge, his information and belief, as to all relevant matters alleged or inquired of in the plaintiff's bill. The method of pleading is technically known as giving discovery, and the information thus obtained may be used as evidence in the plaintiff's favor at the trial. It is subject, however, to the rule of chancery

practice, that, if unfavorable to the plaintiff, it is conclusive unless overcome by two witnesses or by one witness and corroborative circumstances. The plaintiff, however, may avoid this consequence by expressly waiving an answer under oath in his bill. At law, as distinguished from equity, the defendant's pleading is technically known as the *plea;* but under the modern statutory system of pleading, the term "answer" is applied indiscriminately to the defendant's plea in either law or equity. See PLEA; PLEADING, and the authorities there referred to.

ANT (AS. *æmete;* Ger. *Ameise;* from OHG. *meizan*, to cut, the original meaning thus being 'cut in'; as in Gk. ἔντομος, *entomos*, Lat. *insectum*). A small hymenopterous insect of the family Formicidæ, closely related to the wasps and bees, not only in structure, but in instincts and socialistic economy. "Emmet" is an older form of the word "ant" still in use, and "pismire" is another word occasionally heard. Ants are easily recognized by the well-known form of the body. The demarcation between head, thorax, and abdomen is very noticeable in these insects. From the termites and velvet ants, which most resemble them, true ants can readily be distinguished by the peculiar form of the abdomen, the first or first one or two segments of which are constricted off, to form separately jointed small knobs or scales, which greatly increase the flexibility of the body.



PARTS OF AN ANT.

a, head; *b*, antenna; *c*, jaws; *d*, thorax and legs; *e*, pedicel; *f*, gaster.

Classification. The ants, according to the best authorities, form a single family, Formicidæ, divided into five subfamilies. The subfamilies are founded mainly on the condition of the peduncle or part constricted off from the abdomen (whether composed of one or two portions), and on the presence or absence of a sting.

Polymorphism and Division of Labor. As in other social insects, there is, first of all, a dimorphism of the female sex. But among ants complexity of form goes further than this, on account of the complexity of the social organization. For the ant colony frequently contains enslaved individuals belonging to another species. The different forms of a species of ant are the results of division of labor among the members of the colony. Of the infertile females or workers, some are gatherers of food, some are nurses for the young, while others, of a larger size, act as soldiers to protect the ranks of foraging workers. In certain species certain workers serve as living storehouses. (See HONEY-MAKING ANTS.) Each of these differences in labor is associated with a difference in form. Even among individuals of the same sex and caste, considerable variability occurs. Although the workers are usually wingless, certain ones have been observed with short wings. A part or all of the fertile females may be wingless. Occasionally wingless males may exist together with the winged, while the wingless prevail in a few species.

The Origin and Maintenance of Colonies. Upon the appearance of the winged males and females in the ant colony, both are guarded by the workers until a suitable time for flight. Finally, they are let out on warm days in summer and autumn to appear in the air in myriads. Mating nearly always takes place while on the wing. Soon after mating, the males die, and those females that escape enemies and inclement weather settle down to the ground, tear off their wings, and make excavations in materials suitable for the construction of their nest. The eggs are then laid, and upon hatching, the larvæ are fed on some substance already stored up within the body of the queen, since she never goes out for food. When the workers of the first set, which are of small size, appear, the care of the larvæ and pupæ devolves upon them, and thereafter the queen devotes herself exclusively to egg-laying. Thus a new colony is established. Frequently one or more young queens are found by workers and conveyed to colonies already established, which they continue to maintain should the former queen be old. Thus more than one queen-ant may, without quarrels, live in a single colony. The workers feed the queen, and follow her on her wanderings throughout the passages and chambers. As she lets fall the eggs, the workers carry them to suitable locations. In the queen's presence they not infrequently perform those same peculiar antics and capers which they employ to express their emotions upon the return of a lost comrade. The legless larvæ and the pupæ are carried to the surface layers by day, for the sake of the sun's warmth, and at night, or during rain, to deeper and drier chambers. The larvæ are fed by the nurses on regurgitated liquid, or on a substance elaborated by them. They are carefully licked and rubbed by the nurses to keep them clean, and when the time arrives for the pupæ to emerge from their silken or naked sheaths, the workers are at hand to help them out and to unfold and dry their wings and legs.

Food. As is the case with all the other labors of the colony, getting the food devolves upon the workers. All sorts of available matter, of either animal or vegetable origin, both dead and freshly killed, serve them for food, and they are fond of sweets. The nectar of flowers and the sweet saps and juices of plants and fruits are sought. Sugar is ever a temptation to them. The honey-dew excreted by plant-lice, the "milch-cows" of ants, is especially prized. To secure it ants will climb even high trees. They follow the aphides about so as to catch the sweet excretion and even stroke them to hasten its expulsion. When the sap supply for the aphides fails, the ants carry their "cows" to new food-plants, and when winter comes on both the adult plant-lice and the eggs are carried out of reach of frost into the ant caverns and carefully attended until spring, when they are again placed on the swelling plant-buds. In warm lands several kinds of ants, such as the agricultural ant (q.v.) of Texas, are said to rear, harvest, and store grain, but there is every reason to believe that this statement is based on faulty observation. This habit has been ascribed to certain American ants of the genus *Pogonomyrmex*, especially to the Texan harvester (*P. barbatus*), but Wheeler has shown that the circle of tall grass, sometimes found around the nest of this species, is not sown by the ants, but springs up from the seeds that have accidentally germinated in the nest during moist weather and have been thrown out as refuse by the insects. Some ants,

studied by Belt in Nicaragua and by Bates in Brazil, accumulate bits of leaves within their caverns or line the walls with them. On the leaf-bits a fungus grows, or is planted, which serves the ants as food. While often very destructive to crops and stored supplies, ants such as the hunting-ants of South America, or the driver-ants of Africa, are useful scavengers; for not a bedbug, booklouse, moth, cockroach, mouse, or rat is overlooked by their myriad numbers. See DRIVER ANT; FORAGING ANT; LEAF-CUTTING ANT; SAUBA ANT.

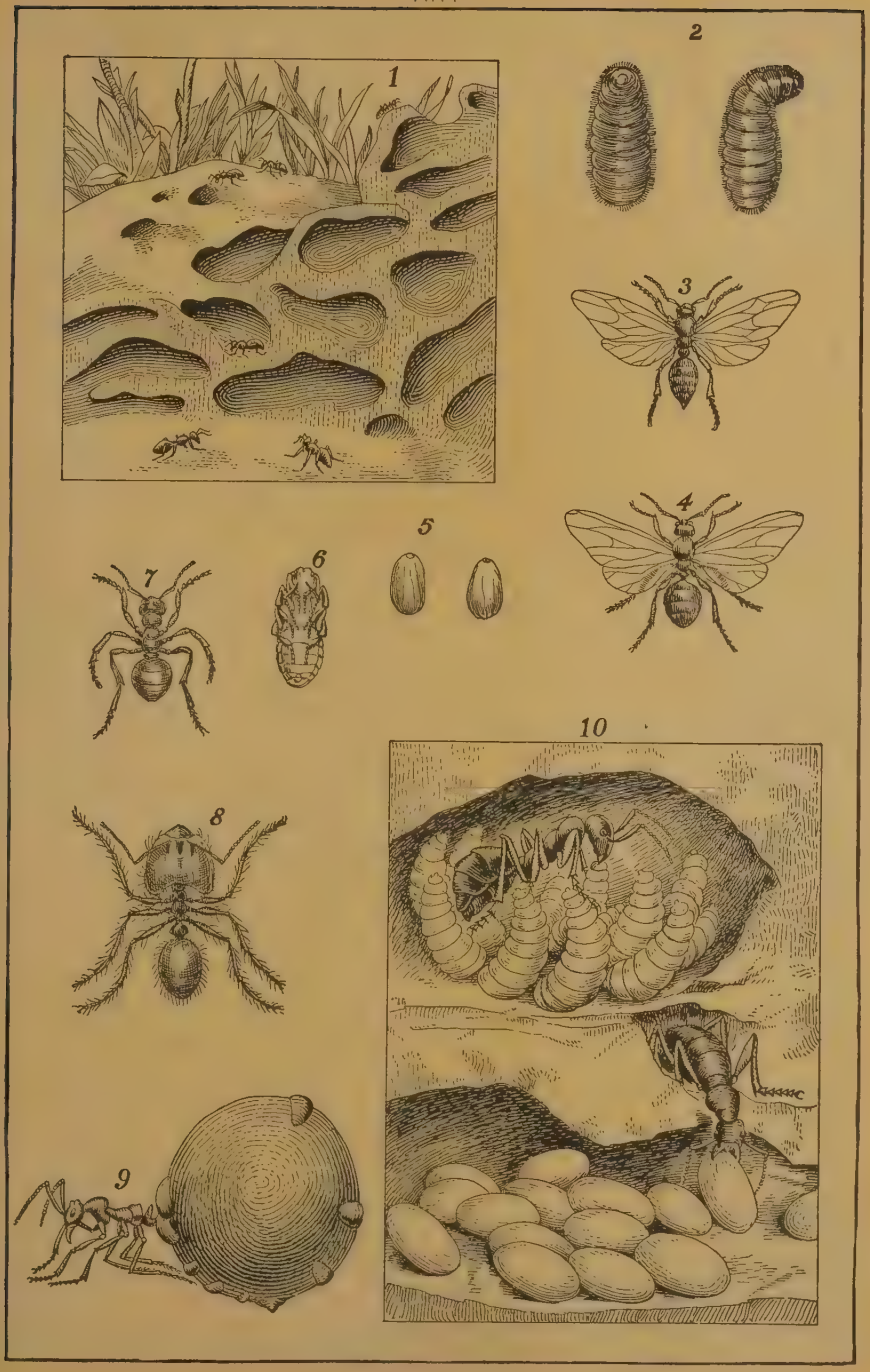
Nests and Nest Building. In their nest building ants differ from all other social Hymenoptera. The nests or combs of bees are divided into even compartments or cells, whose walls are made of wax, while those of social wasps are built of papery pulp, derived from masticated weather-worn wood. In each cell one egg is laid and one individual is reared. The young of ants, on the other hand, are kept in heaps and moved about from one part of the nest to the other as conditions of temperature and moisture demand. The nests are composed of a variable number of chambers, of irregular shape, connected by galleries. They are usually excavated in the ground, often under the shelter of a stone, or in rotting or living trees, shrubs, or herbs. The chambers and galleries which are excavated in the earth extend a considerable distance down to the region of constant moisture. Some of the sauba ants of South America are said to cross wide rivers by tunneling under the river-beds. Not infrequently the nests are carried above the level of the ground by means of earth heaped up and often cemented together. Some ant-hills are thatched by bits of herbage. In South America ant-hills often exceed the height of man. Some ants tunnel out homes in the trunks of trees, others burrow in the thorns or petioles of leaves. Certain ants make homes by bending leaves in circles. The adult ants cannot produce cement, so the larvæ nearly ready for the pupa stage are utilized. Some of the workers hold the bent edges of the leaves in place, while others bring up the larvæ, whose heads they dab back and forth over the edges of the leaves so as to bind them together with silk.

Symbiosis. Although certain ants are very destructive to vegetation, the relationship between ants and certain plants is sometimes one of mutual advantage, a symbiotic one. Thus, in South America, there is a small acacia known as the bull's-horn thorn, on account of the paired, horn-shaped thorns borne on the tree. While the thorns are still young the ant pierces a hole in the tip of one of them and then makes its way through the thorn to the base, where it tunnels into the other thorn. At the base of each young bipinnate leaflet on this same tree there is a honey-secreting gland, and at the tip a minute, pear-shaped fruit. The fruit does not all ripen at the same time; hence the ants (Pseudomyrma) are kept continually running over the tender foliage in search of edible stages. When the tree is disturbed, the ants swarm out of their nests in the thorns, and by their severe sting drive off intruders, such as caterpillars and even vertebrates. But they are most valuable to the tree in warding off the leaf-cutting ants that in a few hours can defoliate a tree. In the leaf petioles of another plant (*Melastoma*) there are two pouches. In these ants find homes, and, in return, they keep off the leaf-cutting ants and foliage-eating foes. The young, tender leaves of certain orchids and passion-flowers have honey-glands visited by ants to the exclusion of all marauders.

Relations of Different Species to One Another. Almost all kinds of ants carry off the larvæ and pupæ of other kinds of ants for food. At times, doubtless, more are taken than can be consumed; hence some of the captives come to maturity in the foreign nest. Perhaps in some such way as this, out of the instinct of the robber ant arose that of the slave-making ant. Slave-making ants, which are lighter in color than their captives, go forth in armies, attack the nests of the black ants, and carry away the larvæ and pupæ. These are brought up and act as servants or slaves. In some cases the warriors are structurally unable to take food, and hence are wholly dependent on their faithful domestics, who collect the food and actually put it in the mouths of their captors. Other small ants (*Solenopses*) live the lives of thieves, secreted in small chambers excavated in the interspaces between the chambers of large ants. The small entrances to the small chambers will not admit the large ants. Hence the small thieves retreat in safety to their homes with the young of the large ant, which they take for food. With the *Formica rufa* a smaller ant lives, apparently, in perfect harmony, perhaps as a domestic pet. When the *Formicae* are obliged to move, the small forms go too, tapping antennæ with them, or even riding on the backs of their hosts. Many species of beetles, and other little creatures, are usually present in ants' nests, and seemingly on terms of friendship.

Intelligence of Ants. Ants are sensitive to sound waves, even outside of human range; they are also keenly sensitive to changes in moisture and temperature. When a captive colony was placed by an experimenter near the fire, the heat was so grateful to its members, says he, that "they embraced each other, and skipped and danced like playful lambs or kittens." Many cases of ants indulging in what seems to us to be sportive exercise or play are recorded. Their care for the cleanliness of the growing young and the promptness with which they remove the dead from the nest, show a sanitary instinct. The complete and apparently willing suppression of the individual for the good of the colony almost surpasses man's comprehension of self-abnegation. The law of division of labor rules among ants. Certain groups of individuals perform only certain labors. Labor-saving devices are known to ants, for groups of workers will procure and drop food or building stuffs to waiting companions below and thus save much labor of transportation. They show ingenuity in building bridges, and may even span gaps by means of a rope made up of their own living bodies linked together. Moreover, information seems to be imparted by means of the antennæ, which they cross and rub together. Ants are able to recognize the myriads of members of their own colony, including their slaves, and even those that have been taken away in infancy. These facts and many others convince us that ants in some manner communicate with their companions. Otherwise, how are the discovery and the whereabouts of food too large for removal by one made known to the others; or how are cannibalistic and slave-making wars so managed that

ANT



1. COLONY-NEST OF THE BLACK ANT (Lasius niger).
2. LARVA OF BLACK ANT, front and rear view (enlarged).
3. WINGED MALE OF BLACK ANT.
4. FEMALE (QUEEN) OF BLACK ANT.
5-6. PUPÆ OF BLACK ANT.
7. WORKER OF THE SMALLER KIND.
8. LARGER WORKER OR "SOLDIER."
9. HONEY ANT, distended with stored honey.
10. CELLS OF BLACK ANT'S NEST, enlarged; feeding larvæ in upper cell.

the whole fighting community is ready to go out simultaneously?

Geological Antiquity. Geologically, ants are among the earliest Hymenoptera. In Tertiary times they were, perhaps, the most abundant of all the insects, and thousands of ancient forms have been found in amber.

Bibliography. Wheeler, *Ants: their Structure, Development, and Behavior* (New York, 1910); Mayr, "Die Formiciden der . . . Nordamerika," *Verhandlung der zoologischen-botanischen Gesellschaft*, pp. 419–464 (Vienna, 1886); Emery, "Nordamerikanische Aneisenfauna," *Zoologisches Jahrbuch*, vol. vii, pp. 633–682; vol. viii, pp. 257–360 (Jena, 1894–95); Lubbock, *Ants, Bees, and Wasps* (New York, 1894); White, *Ants and their Ways* (London, 1883). For ants of the tropics, Wallace, *Tropical Nature* (London, 1878); Bates, *A Naturalist on the Amazon* (New York, 1880); Belt, *A Naturalist in Nicaragua* (London, 1888). Consult also the works of Forel, Wheeler, Wasmann, and McCook. See INSECTS; APHIDES; INSTINCT; TERMITE; and the names of various ants.

ANTACIDS, ănt-ăs'ĭdz (*ant* or *anti* + *acid*), or **ALKALIES.** Drugs which diminish or correct abnormal acidity in the digestive tract or the various secretions of other organs. Those which unite directly with free acid in the stomach or intestines are known as direct antacids. Examples of this class are ammonia and its carbonate, magnesia, potassium bicarbonate, lime water, and chalk. Remote antacids, such as the acetates, citrates, and tartrates of the alkalies, act by being changed into carbonates, and thus increasing the alkalinity of the blood, which in turn diminishes the acidity of the urine. Some drugs, as the carbonates or bicarbonates of sodium, potassium, calcium, magnesium, and lithium, act as direct as well as remote antacids. The direct antacids are given after meals to neutralize an excess of the natural hydrochloric acid of the stomach and other acids resulting from fermentation of food. Given before meals, they cause an increase of the acidity of the stomach contents by increasing the secretion of gastric juice. The remote antacids are largely employed in the treatment of rheumatism and gout.

AN'TÆ. See PILASTER.

ANTÆOPOLIS. See ANTÆUS.

ANTÆ'US (Gk. *'Ανταῖος, Antaios*). A figure in legends of the Greek colonies in Africa, located at first near Cyrene, finally in Mauretania. His story is unknown to Greek epic poetry and is largely made up of borrowings from earlier legends. In the popular version he was a giant, son of Poseidon and Ge, who compelled all strangers to wrestle; he is thus the native opponent of the Greek colonists. When he was thrown, he received fresh strength from touching his mother, Earth. With the skulls of those he conquered, he built a temple to his father. He was invincible until Hercules discovered the source of his power and killed him by lifting him into the air away from the earth and strangling him; in this conquest the Greeks, as early as Pindar's time, saw the triumph of the intellectual, well-trained Greek athlete over the crude native might of the barbarians. Later Greek writers attempted to localize the myth in a city of Upper Egypt called Antæopolis (Egyptian name, *Du-kau;* Coptic, *Tkau*).

ANTAG'ONISM. The power of one solute to protect an organism against the toxic action of another solute. See NUTRITION.

ANTAKIYEH, ăn'tȧ-kē'yȧ. See ANTIOCH.

ANTAL'CIDAS (Gk. *'Ανταλκίδας, Antalkidas*). A Spartan statesman, son of Leon. Toward the end of the year 393 B.C. he was sent by his government to Tiribazus, the Persian satrap at Sardis, to break up the understanding which then existed between Athens and Persia. He succeeded with Tiribazus by agreeing to the Persian demand that Sparta should recognize the Persian supremacy over the Grecian cities in Asia Minor; Tiribazus gave him money to carry on war with Athens. This arrangement did not meet with the approval of King Artaxerxes, to whom the Athenians had sent a counter embassy, under Conon, and the satrap was recalled. However, in 388 B.C., the King restored Tiribazus and thereby gave evidence of his inclination toward the Spartans. Antalcidas was once more sent to Asia to treat with the Persians. He accompanied the satrap to the Persian court, was well received, and succeeded in coming to an understanding with the King on the basis of the terms previously agreed upon, and thus secured his aid against the Athenians. Antalcidas returned to the fleet, of which he was now made admiral, freed it from the blockade of the Athenians, and shut out the Athenians in their turn from the Ægean Sea. He was now in a position to compel the acceptance of terms. The peace that followed was called "The Peace of Antalcidas." In the winter of 387–386 B.C. representatives of the Greek states assembled at Sardis, where the terms of the peace were read. The final ratification took place at Sparta in 386 B.C. The terms of the peace were as follows: 1. That all the Greek towns on the mainland of Asia Minor, together with the islands Clazomenæ and Cyprus, should remain under the protection of the Persian King. 2. That all other Greek towns, large and small, should be independent; but that the islands of Lemnos, Imbros, and Scyros should, as of old, belong to Athens. 3. That war should be declared against any State that refused to accept these terms. In 372 B.C. Antalcidas went for the third time to treat with the Persians, but, after the battle of Leuctra (371 B.C.), he lost favor in that quarter. In 370–369 B.C. we find Antalcidas Ephor at Sparta. There is no truth in the story that he starved himself to death.

ANT'ANACLA'SIS (Gk. *ἀντί, anti,* against + *ἀνακλᾶν, anaklan,* to bend back). In rhetoric, a figure in which a word is repeated in a sense different from, if not contrary to, its first use, to give additional force to the expression; as the remark of Benjamin Franklin when he was about to sign the declaration of American independence: "We must all hang together or we shall assuredly all hang separately."

ANTANANARIVO, ăn'tȧ-nä'nȧ-rē'vō, or **TANANARIVO.** The capital of the island of Madagascar, favorably situated in the central part at an elevation of over 4000 feet (Map: Africa, J 6). It was originally built chiefly of wood, with irregular streets, but stone and brick buildings have superseded the old structures, and there are many excellent edifices, among which are a great number of churches, two cathedrals, a mosque, several colleges and hospitals, the most prominent building being the royal palace, situated on the summit of a hill. Its commerce, owing to its inland position and the inadequate transporta-

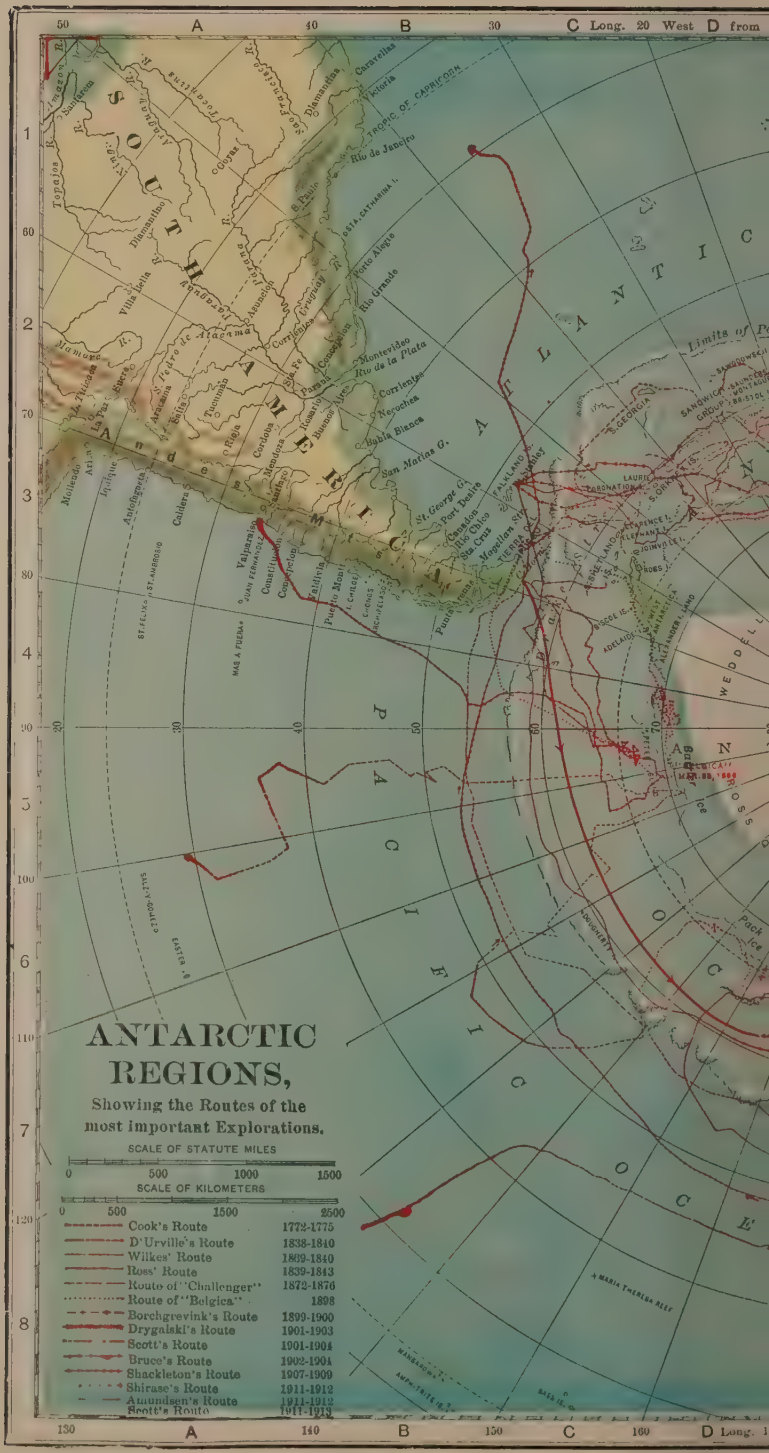
tion facilities, is not very extensive, but it has a considerable number of industrial establishments. The natives show in their manners, as well as in their mode of life, the influence of European civilization. Pop., 1904, 59,551; 1912, 94,813.

ANTAR, ăn'tär, or **ANTARA,** ăn'tâ-rä, IBN SHADDAD AL-ABSI. A celebrated Arabian hero living toward the end of the sixth century and one of the famous pre-Islamic poets of Arabia. His mother was a black slave, Seliba, and as the son of a slave he was obliged to render menial services to the members of his tribe. Through his warlike exploits, however, he secured not only his freedom, but a prominent position in his tribe. He died as a hero in battle. While neither the date of his birth nor of his death is known, he appears to have died shortly before the appearance of Mohammed. He gained equal fame among the Arabs as a poet and as a hero. Only one complete poem of Antar's has come down to us, which recounts his deeds and sings of his love for Abla, whom he married. This poem is generally included in the collection of the choicest seven Arabic poems, known as the *Moallakat*. A recent edition of the Arabic text is by L. Abel, *Wörterverzeichnisse zur altarabischen Poesie I* (Berlin, 1891); an English translation by Johnson in *Seven Arabic Poems* (London, 1897). Such was Antar's renown as a warrior that he becomes the prototype of the hero in the romantic literature of the Arabs. He is the central figure in the most famous of Arab romances, which bears the name *Antar* and is commonly ascribed to Al-Asma'i, who lived in the eighth century. The romance of *Antar*, however, as known to us, is a compilation which has passed through various hands and has gradually grown to huge proportions. It gives an attractive and faithful picture of Bedouin life and is rich in epic interest, although too monotonous to satisfy the taste of the European reader. A translation of a portion of it into English was made by Hamilton in 1820 (*Antar: A Bedouin Romance*, 4 vols., London). A *Diwân*, or collection of poems, is also attributed to him. They consist for the most part of fragments and have been published by Ahlwardt, *The Diwâns of the Six ancient Arabic poets*, 1870, having formed a part of the collection of Al-Alam. The memory of Antar is also preserved in various places of the East which bear his name. Consult Thorbecke, *Antarah, ein vorislamischer Dichter* (Leipzig, 1867); Ahlwardt, *Bemerkungen über die Aechtheit der alten arabischen Gedichte* (1872); Nöldeke, *Fünf Mo'allakat* (1900); Kennedy, *Pre-Islamic Poets* (London, 1908).

ANTARC'TIC CUR'RENT, LANDS; OCEAN. See ANTARCTIC REGION.

ANTARCTIC RE'GION (Gk. *ἀντί, anti*, against, opposite + *ἄρκτος, arktos*, bear, Ursa Major, the north). The name applied to that portion of our earth's surface which encircles the South Pole. Technically and astronomically it is bounded by the Antarctic Circle, and although the Antarctic land masses do not extend much farther equatorward than this, yet the Antarctic influences extend to very much lower latitudes, the solid ice fields drifting on nearly all sides below lat. 60° S., and between the southern extremities of Africa and South America even below lat. 50° S. The limit of this drift ice may be taken as the limit of the Antarctic region, although the drifting icebergs descend more than 10° of latitude lower. Thus, the Antarctic region is bounded by the Atlantic, Pacific, and Indian oceans. The Antarctic land mass lies, however, mainly within the Antarctic Circle. It is indicated, in the Eastern hemisphere, by a series of minor coast-lines which, roughly speaking, outline the circle between long. c.155° E. and long. c.50° E. Their names are, Adelie Land (c.140° E.), Clarie Land (c.134° E.), Sabrina Land (c.122° E.), Knox Land (c.105° E.), known collectively as Wilkes Land, Kaiser Wilhelm II Land (c.90° E.), Kemp Land (c.60° E.), Enderby Land (c.50° E.). In the Western hemisphere West Antarctica (Graham Land), a long spur, with numerous outlying islands, projects northeastward, from the 70th to 55th degrees of W. longitude, to beyond the 63d parallel of latitude; and near the 156th meridian, W., at the 77th parallel there is another land of unknown extent, called after King Edward VII. Since the recent expeditions of Amundsen and Scott it seems probable that this whole area is a continental land mass, restricted—possibly to separation—by the deep indentations of Ross and Weddell Seas. The former extends to at least 85° S. in 162° W.; the latter to at least 79° S. in 40° W. The remoteness of the Antarctic has prevented its exploration to the same extent as the north polar regions. Cooke (1773–76), Bellingshausen (1821), Weddell (1823), Ross (1842), Wilkes (1840), d'Urville (1840), the *Challenger* expedition (1874), de Gerlache (1897–98), Borchgrevinck (1899–1900), Nordenskjöld (1902–04), Drygalski (1902–03), Scott (1902–04), Charcot (1903–05), Shackleton (1909), Charcot (1910), Amundsen (1911), Scott (1912), Filchner (1912), Mawson (1912), have been the chief explorers of this region. Ross reached a latitude of about 78° 10′ S. in 1842, and Scott, in 1902, pushed on to 82° 16′ 33″ S. The pole itself was finally reached on Dec. 16, 1911, by Amundsen, succeeded within five weeks by Scott, who reached it on Jan. 18, 1912.

Antarctic Lands. The islands and the continent, or continental land-masses, surrounding the South Pole. Little is known of this territory. The continental land-mass where best known, from the northern edge of South Victoria Land in 70° S. to the South Pole, is an elevated ice mantle plateau of an average height of 7000 to 10,000 feet; the pole itself lying at an altitude of 10,200 feet. Superficially all the territories have features in common—more or less lofty coast-lines (with lower islands outlying) covered heavily with snow, often to the water's edge. In many regions barriers or "terraces" of ice, sometimes 200 feet and more above the sea level, border the land for many miles. Behind the sea cliffs, in all the regions that have been visited, there is a more or less level expanse of snow. The outlying islands are mainly of recent volcanic formation; but in those parts of the mainland which have been visited are found granites, fossiliferous sandstones, and other rocks that are characteristic of continental forms. Of the three regions which have been studied, the largest is South Victoria Land, the known coast of which extends between the 160th and 170th meridians E., from about lat. 70° to beyond lat. 83°. Its sea wall of sandstone and granite, containing also carboniferous deposits, is nowhere less than 4000 feet high, and behind it stretches a range of mountains, with peaks ris-


ANTARCTIC REGIONS,
Showing the Routes of the most important Explorations.
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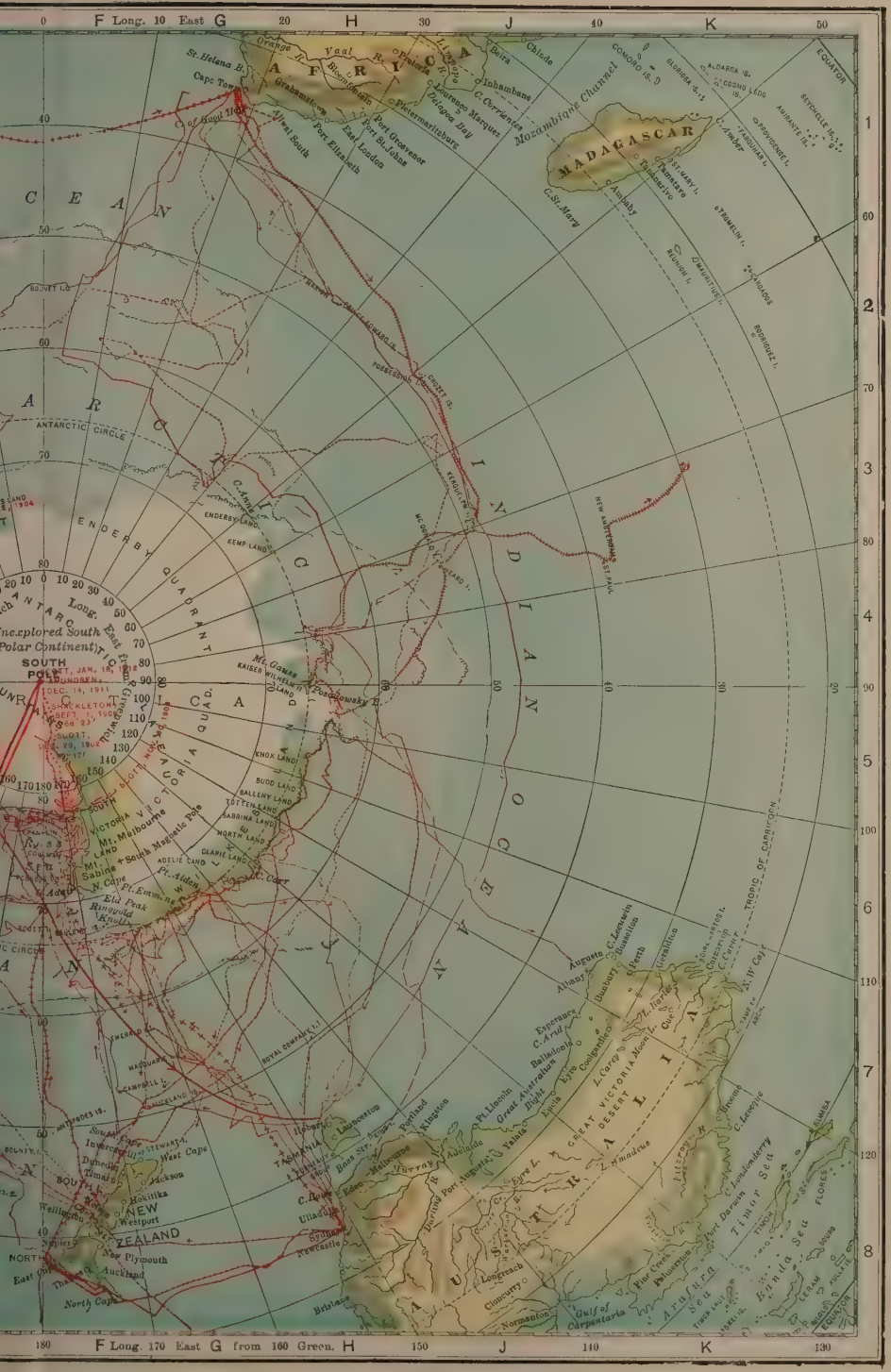
Cook's Route 1772-1775
D'Urville's Route 1838-1840
Wilkes' Route 1839-1840
Ross' Route 1839-1843
Route of "Challenger" 1872-1876
Route of "Belgica" 1898
Borchgrevink's Route 1899-1900
Drygalski's Route 1901-1903
Scott's Route 1901-1904
Bruce's Route 1902-1904
Shackleton's Route 1907-1909
Shirase's Route 1911-1912
Amundsen's Route 1911-1912
Scott's Route 1911-1913
SOUTH AMERICA
ATLANTIC
PACIFIC
OCEAN
Limits of Pack Ice
Rio de Janeiro
Montevideo
Buenos Aires
Valparaiso
Port Desire
Port Stanley
Falkland Is.
South Georgia
Sandwich Group
Tierra del Fuego
Magellan Str.
Cape Horn
Graham Land
Weddell Sea
Ross Sea
Ross Ice Barrier
Victoria Land
Adelaide I.
Alexander Land
Easter I.
Sala y Gomez
Juan Fernandez
St. Felix
St. Ambrosio
Mas a Fuera
Trinidad
Tropic of Capricorn
Coast Range
Andes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AFRICA
MADAGASCAR
INDIAN OCEAN
AUSTRALIA
NEW ZEALAND
ANTARCTIC CIRCLE
ENDERBY QUADRANT
Mozambique Channel
Cape Town
Port Elizabeth
East London
Durban
Lourenço Marques
Beira
Childe
Johannesburg
Pietermaritzburg
Port Shepstone
Port St. Johns
Port Grosvenor
Orange R.
Vaal R.
Limpopo R.
Zambesi R.
Comoro Is.
Diego Suarez
Tamatave
Tananarive
Majunga
Amboy
C. St. Mary
Reunion I.
Mauritius I.
Rodriguez I.
Seychelles Is.
Aldabra Is.
Farquhar Is.
Amirante Is.
Providence I.
Equator
Bouvet I.
Prince Edward I.
Crozet Is.
Kerguelen I.
Heard I.
McDonald Islands
New Amsterdam I.
St. Paul I.
Enderby Land
Kemp Land
Mac. Ra.
Mt. Gauss
Kaiser Wilhelm II Land
Posadowsky R.
Knox Land
Budd Land
Balleny Land
Sabrina Land
North Land
Adelie Land
Clarie Land
Victoria Land
Mt. Melbourne
Mt. Sabine
South Magnetic Pole
N. Cape
Pt. Emmanuel
Pt. Adare
C. Adare
Ross Sea
Ross I.
Mt. Erebus
Mt. Terror
Ice Barrier
Discovery Bay
Hut Point
Ferrar Glacier
Taylor Glacier
Victoria Quad.
Unexplored South East Polar Continent
SOUTH POLE
AMUNDSEN, DEC. 14, 1911
SCOTT, JAN. 18, 1912
SHACKLETON, JAN. 9, 1909
WILKES, 1840
Tropic of Capricorn
Augusta
C. Leeuwin
Albany
Perth
Geraldton
Dirk Hartog I.
Shark's Bay
Exmouth Gulf
N.W. Cape
Barrow I.
Nickol Bay
Roebuck Bay
Broome
Cossack
Onslow
Port Hedland
Eucla
Esperance
C. Arid
Balladonia
Eyre
Coolgardie
L. Lefroy
L. Cowan
L. Torrens
L. Gairdner
Great Australian Bight
Pt. Lincoln
Kingston
Portland
Adelaide
Hobart
Launceston
Tasmania
Melbourne
Sydney
Newcastle
Brisbane
Murray R.
Darling R.
Lachlan R.
Murrumbidgee R.
Port Augusta
Spencer G.
Gulf St. Vincent
Lake Eyre
Lake Torrens
Lake Frome
Lake Callabonna
Great Victoria Desert
Gibson Desert
Sturt Stony Desert
Simpson Desert
Tanami Desert
Barrier Ra.
Flinders Ra.
Grey Ra.
Macdonnell Ra.
Musgrave Ra.
Darling Ra.
Stirling Ra.
Hamersley Ra.
Fortescue R.
Ashburton R.
Gascoyne R.
Murchison R.
Yilgarn
Coolgardie
Kalgoorlie
Norseman
Eucla
Gulf of Carpentaria
Normanton
Cloncurry
Longreach
Thursday I.
Torres Str.
Timor Sea
Arafura Sea
Banda Sea
Timor
Flores
Celebes
Java
Sumba
Sumbawa
Lombok
Bali
Java Sea
Timor Sea
Arafura Sea
Banda Sea
Torres Str.
Thursday I.
Cape York
Cooktown
Townsville
Mackay
Rockhampton
Brisbane
Bundaberg
Maryborough
Gympie
Toowoomba
Ipswich
Darling Downs
Moreton Bay
Fraser I.
Sandy Cape
Hervey Bay
Gladstone
Port Curtis
Port Denison
Whitsunday I.
Broad Sound
Shoalwater Bay
Keppel Bay
Port Alma
Yeppoon
Great Barrier Reef
Coral Sea
Lord Howe I.
Norfolk I.
New Caledonia
Noumea
Loyalty Is.
Fiji Is.
Suva
Tonga Is.
Samoa Is.
Apia
Pago Pago
Tahiti
Society Is.
Marquesas Is.
Easter I.
Pitcairn I.
Tuamotu Archipelago
Cook Is.
Rarotonga
Auckland Is.
Campbell I.
Macquarie I.
Bounty Is.
Antipodes Is.
Chatham Is.
Kermadec Is.
Three Kings Is.
North Cape
Auckland
The Head
Bay of Islands
Whangarei
Kaipara Harbour
Manukau Harbour
Port Nicholson
Wellington
Cook Strait
Westport
Motuihka
Hokitika
Jackson
Dunedin
Invercargill
Foveaux Str.
Stewart I.
South Cape
West Cape
Banks Peninsula
Lyttelton
Timaru
Oamaru
Waitaki R.
Clutha R.
Molyneux R.
Waikato R.
Auckland
Hauraki Gulf
Bay of Plenty
Tauranga
Whakatane
Gisborne
Hawke Bay
Napier
Wairarapa
Wanganui
New Plymouth
Taranaki
Mt. Egmont
Waitara
Manawatu
Rangitikei
Hutt R.
Wairau R.
Clarence R.
Kaikoura
Cape Campbell
Cook Strait
Marlborough
Nelson
Golden Bay
Tasman Bay
Farewell Spit
Westland
Greymouth
Hokitika
Arthur's Pass
Canterbury
Otago
Southland
Stewart I.
Foveaux Str.
Bluff
Invercargill
Dunedin
Oamaru
Timaru
Lyttelton
Christchurch
Banks Peninsula
Kaikoura
Cape Campbell
Cook Strait
Wellington
Hutt R.
Wairarapa
Napier
Hawke Bay
Gisborne
Whakatane
Tauranga
Bay of Plenty
Hauraki Gulf
Auckland
Waikato R.
Kaipara Harbour
Whangarei
Bay of Islands
The Head
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North Cape
Three Kings Is.
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Chatham Is.
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Loyalty Is.
New Caledonia
Noumea
Coral Sea
Great Barrier Reef
Lord Howe I.
Norfolk I.
F Long. 170 East G from 160 Green. H
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ing to the height of 15,000 feet, and continuing southward in Queen Maud's Range, discovered by Amundsen, to at least 88° S. and 100° W. Several of these peaks are extinct volcanoes, and one, Mount Erebus (12,780 ft.), composing with Mount Terror, Ross Island (c. lat. 77° 30′), is still active. The persistence of the range, with its high altitudes (Mount Markham in South Victoria Land and Mount Fridtjof Nansen in the Queen Maud Range, both 15,000 feet) and its general trend, has suggested the possibility of its forming a part of the same mountain axis to which West Antarctica belongs. In Victoria Land lies the south magnetic pole.

From Ross Island to King Edward VII Land, 400 miles, extends the façade of a mass of ice, rising almost uniformly from 200 to 300 feet above the sea. It was discovered by Ross in 1842 and called the Great Ice Barrier. As shown by Amundsen it extends nearly to 86° S. at 160° W. Its eastern limit may lie in this longitude. It completely fills the head of the Ross Sea embayment as far north as the 79th parallel. It is probably the product of the great Antarctic ice sheet. A similar ice barrier exists at the head of the Weddell Sea. The coast of portions of West Antarctica (Graham Land) are also lofty, and here, too, are found ancient crystalline rocks and, on neighboring islands, sandstones rich in fossils. The interior, as seen from the sea, is apparently an "ice-cap" similar to that of Greenland. The third known territory, Kaiser Wilhelm II Land, consists of a completely snow-covered region, with one denuded peak, the Gaussberg (4000 feet). The structure of the land is of ancient crystalline rock. Behind the Gaussberg extends a relatively level ice-plain. In the vicinity of all these lands there is a sudden rise of the sea bottom to the "continental shelf." Upon this fact the advocates of the continent theory base an argument.

Ice. The pack ice is not so formidable as it is in the Arctic regions. The sea freezes over in winter; but ordinarily, in summer, the ice breaks away from the land, and the major part of it is borne away by the prevailing winds. An outlying pack borders all regions that have been reached by explorers; but not being confined by land, as is the ice of the Arctic basin, it becomes dissipated as the season wears on, and is at no time so heavy as the northern pack.

The icebergs are probably not directly formed from glaciers, as in Greenland; the Antarctic glaciers, although of great extent, are at best very sluggish, and the larger number are receding. The bergs undoubtedly are discharged from the great ice barriers or terraces; they are "tabular" in form and often many square miles in area.

Climate. The temperatures of the Antarctic are colder in summer, and perhaps warmer in winter, than those of the far north. The coldest temperature registered upon the *Discovery* expedition was –67° F. (May, 1903). In all regions, both winter and summer, sudden storms, accompanied by blinding snow, are frequent.

Flora. The vegetation is very sparse, consisting of tussock grass, mosses, and lichens. Of these, however, there are a number of species. Three kinds of hepaticæ have also been found.

Fauna. No land mammals exist. A variety of birds build their nests on the beaches. Among the birds are penguins, skua, petrel, fulmar, etc. There are five varieties of seal, and upon the northern coasts sea-elephants and sea-lions are sometimes found. There are six varieties of whales and dolphins. Sea life is exceedingly rich, including, among many other species, sponges, medusæ, echinoderms, crinoids, mollusks, nunatodes, amphipoda, cephalopods, etc. Fishes also are abundant.

Antarctic Ocean. The name Antarctic Ocean has been applied to the waters surrounding the Antarctic land-masses, but, according to modern oceanographical research, it is preferable to consider these waters as forming the southern ends of the Atlantic, Pacific, and Indian oceans, the dividing lines between which would respectively be the meridians of Cape Horn (68° W.), South Cape, Tasmania (146.5° E.), and Cape Agulhas (20° E.). Between the southern ends of the continent and the Antarctic lands the whole circumference of the globe presents an unbroken expanse of waters, save for a few islands here and there, being narrowest (600 miles) between South America and West Antarctica and broadest (at least 2400 miles) between Africa and whatever Antarctic land may lie in 20° E. The floor of Antarctic waters rises abruptly, as stated above, to the edge of the continental land-masses. The floor of the Antarctic gradually shoals from the middle latitude depths toward the South Pole. In general, at lat. 60° S., the waters of the Antarctic Ocean have an average annual temperature at the surface of 29.8° F., which is warmer than the average temperature of the air in the same latitude 28.7° F. At great depths and near the ocean floor the water temperature is between 32° F. and 35° F., but between these depths and the surface there is usually found a wedge-shaped layer of water with a temperature varying from 28° F. to 32° F.

The Antarctic drift is mainly from the west on the outer border and from the southwest and south at the interior of the Antarctic region. There are two great Antarctic currents: one crosses the Antarctic Circle toward the north, between long. 120° and long. 140° W., but swerves toward the east in lat. 50°, and near the South American continent separates, part going northward past Peru, and part preserving its eastward movement past Cape Horn, whence it returns to the Antarctic between long. 60° E. and 80° E.; the other current crosses the Antarctic Circle, going north between long. 80° and long. 100° E., and swerves to the eastward, forming the west Australian current.

The winds at the interior of the Antarctic region are probably directed spirally outward from the polar centre, so that they blow as southeast winds; but on the outer border winds are generally from the west, perhaps mostly from the northwest, rather than from the southwest. The annual precipitation immediately around the South Pole is probably less than 10 inches, but this increases to about 25 inches on the outer boundary of the Antarctic continental lands, from whence there is probably a poleward decrease.

Bibliography. Murray, "Antarctic Research," *Geographical Journal*, vol. iii (London, 1894), modified, however, by several articles in the *Geographical Journal* for 1904 and 1905; Cook, *Through the First Antarctic Night* (New York, 1900); Von Drygalski, *Zum Kontinent des eisigen Südens* (Berlin, 1904); Nordenskjöld

and Andersson, *Antarctica* (New York, 1905); Scott, *Voyage of the Discovery* (New York, 1906); Shackleton, *The Heart of the Antarctic* (2 vols., 1909); Charcot, *Le "Pourquoi Pas?" dans l'Antarctique* (Paris, 1910; Eng. ed., London and New York, 1911); Amundsen, *The South Pole* (1913); *Scott's Last Expedition*, edited by Leonard Huxley (2 vols., New York, 1913). See POLAR RESEARCH, paragraph on *Antarctic Explorations*.

ANTARES, ăn-tā′rēz (Gk. Ἀντάρης, *Antarēs*, like Ares, or Mars; from *ἀντί, anti*, against, opposite, compared with + Ἄρης, *Arēs*, Mars). A red star, thought by the ancients to resemble Mars (q.v.). It is a double star, the most conspicuous in the constellation Scorpio, and sometimes called, from its position, *Cor Scorpionis*, or the Scorpion's Heart. It gives its name to the third type in Secchi's classification of stars based on their spectroscopic behavior. The spectra of the stars of this type are characterized by heavy absorption bands or flutings which are quite sharply defined toward the violet and shade off gradually toward the red. It is supposed that the flutings are due in large measure to the presence of titanium. Other conspicuous Antarian stars are Betelgeux in the constellation of Orion, and Mira in the constellation of the Whale. Antares is often of use to navigators in determining longitude.

ANT′-BEAR′. The great ant-eater (q.v.).

ANT-BIRD, ANT-SHRIKE, ANT-THRUSH, and **ANT-WREN.** Names applied to groups within the large South American family of non-oscine Passeres named Formicariidæ, so called because they are supposed to subsist largely upon ants. More than 250 species are known. They are small or medium-sized, long-billed birds clad in soft grays and browns, inconspicuous in appearance and retiring in habit. Their notes are uttered at rare intervals and are ventriloquial in character although often loud and melodious in spite of their generalized oscine or "singing" organs. They creep silently among the lower branches or search on the ground for their insect food. They are almost always found in flocks attendant upon the swarms of hunting or army ants; yet in spite of the wide-spread belief which has given them their name, they seldom feed upon the ants themselves, but on other larger, more edible insects stirred up by the ferocious ants. The low twittering of ant-birds is always a warning of the approach of an army of ecitons or other ants. Like many other large families of tropical birds, ant-birds have been compelled by competition to specialize, and some have become shrike-like in habits as well as appearance; others resemble the long-legged pittas, while many others parallel wrens, warblers, and thrushes. The so-called ant-shrikes or bush-shrikes constitute in particular the sub-family Thamnophilinæ, which are found in the Antilles as well as in northern South America; ant-wrens are prettily marked, small, active, wren-like members of the sub-family Formicivorinæ; while the ant-thrushes belong to the typical sub-family Formicariinæ, to a Guiana species of which, the woodcock-colored ant-thrush (*Rhopoterpe torquata*), Buffon first gave the name *fourmilier* (ant-eater). The term "ant-thrush" is also improperly applied to the pittas, brilliantly colored, ground-haunting, insect-eating birds of eastern Asia and the Malay Archipelago. See PITTA.

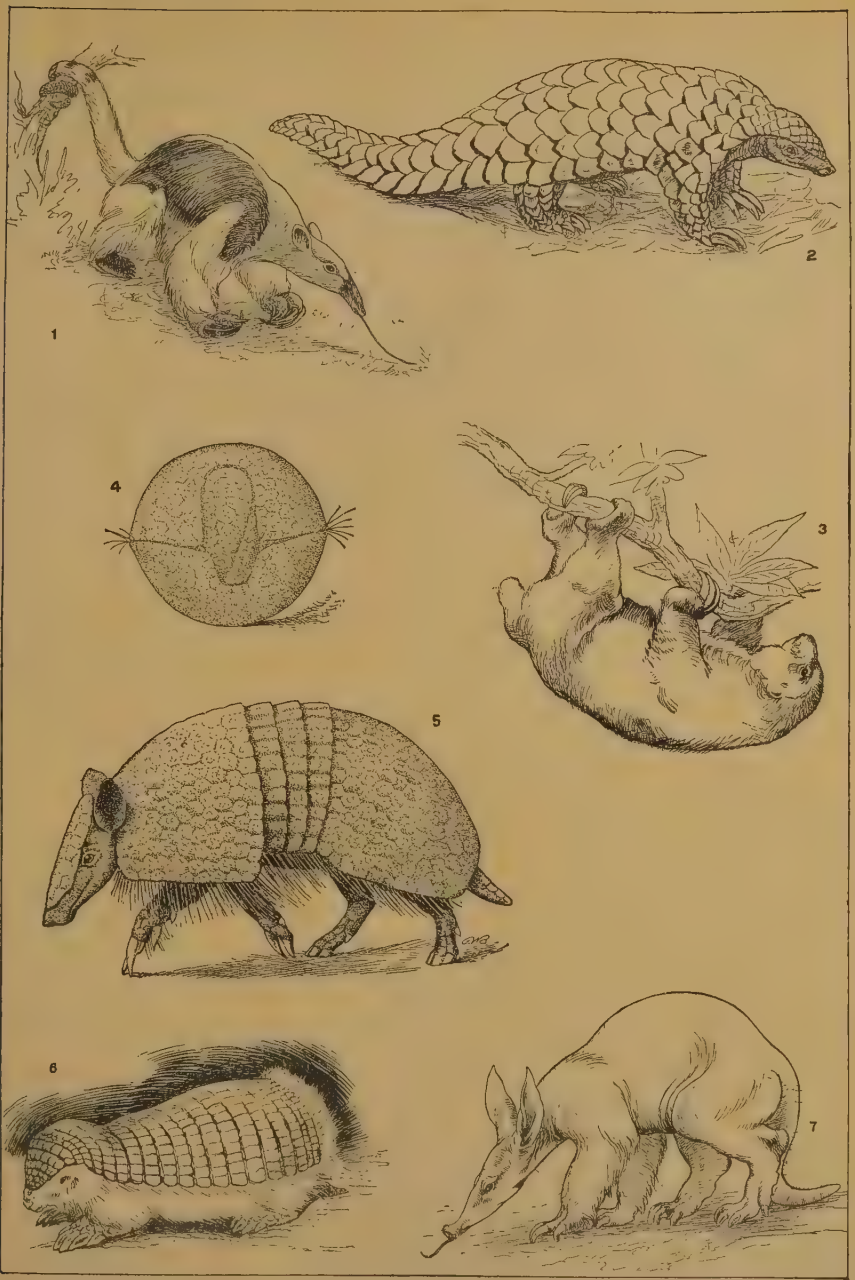
ANT′-EAT′ER. Any of various ant-eating mammals, especially those of the South American Edentate family Myrmecophagidæ. The head in this family is remarkably elongated, with a slender, tubular muzzle, and a small, toothless mouth, with a long, vermiform, protrusile tongue. The eyes and ears are very small. The legs are massive, and the toes united as far as the base of the claws, which are very large and strong and are turned under the fore-feet as the animal walks. The great ant-eater, tamanoir, or ant-bear (*Myrmecophaga jubata*), a native of the tropical forests of South America, is about 2 feet high and 4 feet long without the tail, which is 2½ feet long. The compressed body is covered with long hair, gray, strikingly marked by a black breast-band, which narrows back to the top of the shoulders, while the fore-legs and feet are white. The hair is especially long upon the back and tail, which can be curled over the back and is said to be held there as a shield during rain. The animal dwells in the dense forest, but is wholly terrestrial and does not burrow. It is timid, slow, and inoffensive, but at bay is able to defend itself effectively by means of its long fore-claws, with which it hugs and tears its enemy. These powerful claws are of service in tearing down the hills of the termites and ants, upon which it principally subsists. These are taken by means of the long tongue, which is covered with a sticky secretion from great salivary glands; this tongue is thrust among the disturbed ants or laid in their path and, when a number have adhered to it, is drawn into the mouth.

Only one young one is said to be produced annually, so that the creature is nowhere numerous; nor is this to be regretted, for it has few, if any, qualities to recommend it to man's attention. Another species, the tamandua (*Tamandua tetradactyla*), is much smaller, has a shorter head and short, bristly hair, and a slender, prehensile tail; its body is black, while the head, neck, fore-limbs, and hind-quarters are yellowish-white—a strange dress, varying a good deal among individuals. It also dwells in the equatorial forest of America, but is wholly arboreal, seeking its insect food and making its home in trees. A third species, the little, or two-toed, ant-eater (*Cycloturus didactylus*), is not larger than a rat, is clothed in silky fur, and dwells altogether in trees, for which its long, prehensile tail and curious feet have become especially modified; another species inhabits Costa Rica. For portraits of the three species mentioned above, see Plate of ANT-EATERS.

Other animals called ant-eaters are: 1. The manids, or scaly ant-eaters. (See MANIS.) 2. The aard-vark (q.v.). 3. The porcupine ant-eaters, or Echidnæ. (See ECHIDNA.) 4. The Australian insectivorous marsupials of the genus Myrmecobius, as *Myrmecobius fasciatus*, of West Australia, about as large as a squirrel, chestnut red, with white and dark stripes on the back. It has a long slender tongue, like a true ant-eater, but it has more than 50 teeth, a greater number than any other living mammal. It scratches open ant-hills for its food. (See Plate of PHALANGERS.) 5. Any of various ant-eating birds.

ANTECHAPEL. (Arch.) A chapel in front of a church, forming a part of the same structure. In some cases the antechapel serves both as a chapel and as a porch of entrance, as

ANT-EATERS AND ARMADILLOS



1. LESSER ANT-EATER (Tamandua tetradactyla).
2. SCALY ANT-EATER OR PANGOLIN (Manis javanicus).
3. THREE-TOED SLOTH (Bradypus tridactylus).
4-5. THREE-BANDED ARMADILLO (Tolypeutes tricinctus); rolled up and walking.
6. PICHICIAGO (Chlamydophorus truncatus).
7. AARD-VARK (Orycteropus capensis).

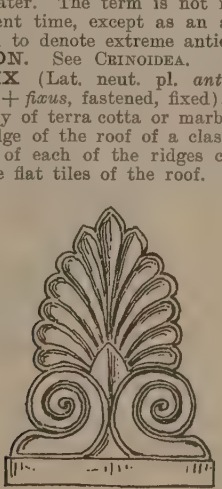
at the abbey of Vézelay in Burgundy and the church of St. Front at Périgueux (twelfth century); in some it takes the place, but not the function, of a porch, as the Galilee Chapel of Durham Cathedral, England; or again it may project from the West front of the church without interfering with the central door or porch, as in the Broadway Tabernacle, New York City.

ANTECHOIR. See CHOIR.

AN'TEDILU'VIAN (Lat. *ante*, before + *diluvium*, flood). A word used to denote whatever existed before the Flood. The antediluvian ages are those which elapsed before the Flood; and in theological language the antediluvian religion means the religion of the patriarchs from Adam to Noah. In geology the antediluvian period had no reference to the Deluge recorded in the Mosaic narrative, but signified only the final transformation of the earth by means of water. The term is not in good use at the present time, except as an adjective of exaggeration to denote extreme antiquity.

AN'TEDON. See CRINOIDEA.

AN'TEFIX (Lat. neut. pl. *antefixa*, from *ante*, before + *fixus*, fastened, fixed). An ornament, usually of terra cotta or marble, repeated along the edge of the roof of a classic building at the foot of each of the ridges covering the joints of the flat tiles of the roof. The antefix



ANTEFIX.

was commonly decorated with an anthemion, painted or carved; sometimes, however, especially in Etruscan examples in terra cotta, a head or even a whole figure in relief formed the chief decoration. The antefix was less used in Roman architecture than in the Greek and Etruscan, and wholly passed out of use with the decline of the Roman Empire.

ANTEIA. See BELLEROPHON.

ANTELAMI, ăn'tā-lä'mē, BENEDETTO (active 1177–1233). The most prominent sculptor of the Romanesque epoch in Italy. His sculpture is decorative in character and is conceived in the solemn and grandiose spirit of Lombard architecture. His earliest known work is a "Descent from the Cross" in the cathedral of Parma (1178). In the cathedral of Borgo San Donino (1178–96), the statues as well as the reliefs of the façade were executed under his supervision, and, in the interior, the imposing statue of "Christ Blessing" is by his own hand. His masterpiece was the cathedral of Parma, begun 1196, in which he served both as architect and master sculptor. The numerous sculptures of the façade, depicting the truths of the Christian faith, the fine lunettes of the interior, and the holy-water font were carved by him or under his direction. He also carved the bishop's chair of the cathedral of Parma and labored upon the portals of Sant' Andrea in Vercelli and also in Milan. Consult Venturi, *Storia dell' arte italiana* (1907).

AN'TELOPE (Gk. *ἀνθόλοψ, antholops*, a horned animal). Any of many hollow-horned ruminants forming a group (formerly esteemed the family Antilopidæ) within the family Bovidæ, and usually classified between the cattle and goats. The English word, in its widest popular use, often includes on the one hand a group represented by the chamois and the Rocky Mountain goat, preferably designated goat-antelopes; and on the other the American antelope or pronghorn (q.v.), which belongs to a quite different family. Scientifically, as now restricted by R. Lydekker and recent students, the term excludes these forms. The group cannot be demarked from other bovines by definite characters, yet as a whole it is easily recognized by the graceful build of its members (exhibited in the accompanying illustrations), their short hair, lively colors, manner of carrying the head uplifted, and the absence of a goat-like beard. "The horns, which may or may not be present in the females, are generally long, more or less cylindrical, and often lyrate in shape; while they are frequently marked with prominent rings and have an upright direction. Their bony internal cores, instead of being honeycombed, as in the oxen, sheep, and goats, are nearly solid throughout. These animals generally have a gland beneath the eye, by which they are distinguished from the oxen and goats" (Lydekker). In size they vary from a foot in height to the bigness of a large horse. Almost all are timid, peaceable animals, with small means of defense, and trusting for safety to the agility and fleetness in which they excel. Most of them inhabit plains, and these are highly gregarious; a few are found only in mountainous regions, while others dwell in pairs or small bands in jungles and deep forests. Palæontologists inform us that antelopes are the most generalized members of the Bovidæ now existing, and "since they are also its oldest known representatives, it is probable that from them have been derived the more specialized types,"—oxen, sheep, goats, etc.

Though now wholly restricted to Asia and Africa, the antelopes had formerly a wide distribution in Europe and Asia alone. Their disappearance from Europe and spread into Africa within recent times (geologically speaking), and their enormous multiplication there, form one of the most remarkable incidents in the history of the mammalia. When South Africa was first penetrated by Europeans, many species were found ranging its grassy plains in enormous herds, which formed the principal resource for animal food of the natives and a great number of carnivorous animals. This continued until the middle of the nineteenth century, when the rapid spread of English and Dutch colonization swept them away. Vast numbers were wasted by sportsmen and reckless colonists, or were killed for the sake of their flesh and hides, until now the great herds have disappeared from the remotest veldts, many species a few years ago numbered by tens of thousands are reduced to scattered bands, and others have become wholly extinct. The wide and rapid destruction of these abundant, valuable, and beautiful animals can be paralleled elsewhere only by the swift extermination of the American bison.

Several species are represented only by small bands preserved upon private estates.

Antelopes fall into certain groups having a common resemblance. These will be outlined here, leaving the reader to consult for details the separate articles upon individual species, the most important of which will be found described in their alphabetical places. One collocation is that of the *antelopine* gazelles, including a large number of species elegantly shaped and colored, as a rule not exceeding 30 inches in height, with hairy muzzles and teeth resembling those of goats, and with ringed and usually lyrate or spiral horns; they inhabit deserts from the Cape of Good Hope to India. Here, among less noteworthy kinds, fall the familiar ariel and other gazelles, the black-buck of India, the saiga, chiru, springbok, impalla, and the like. Another group (*cervicaprine*) is represented by the small African reed-bucks, the larger water-bucks, cobus, etc., the smaller rehboks and klipspringer, and the diminutive steinboks. A third (*cephalophine*) group is composed of the duikerboks and other forest-ranging species of Africa, among which are the smallest known ruminants, the least (see BLUE-BUCK) being only 13 inches tall. Only the males of these are provided with horns, and one species (see CHOUSINGHA) has four horns. These pygmies are connected with the cattle by the *alcephaline* antelopes, all large African species characterized by their much greater height at the withers than at the rump, and by having horns in both sexes, the cores of which are cellular as in oxen; prominent examples are the hartbeests, blesbok, bontebok, and gnus. Diverging oppositely from the typical gazelles toward the goats, the *hippotragine* section has been made to include very large African antelopes having long, stout, ringed horns in both sexes, such as the sable and roan antelopes, the extinct blaubok, addax, gemsbok and allied species. Another set of large species is the *tragelaphine*, represented in India by the nilgai, and in Africa by the bushbuck, koodoo, eland, etc. They are the largest, most valuable, and handsomest of all, their ground colors being bright and often ornamented or "harnessed" with conspicuous stripes, while their faces are beautifully marked. Consult: for former abundance in Africa, Harris, *Game Animals of Africa* (London, 1840), with colored folio plates; Lichtenstein, *Säugethiere und Vögel aus dem Kaffernlande* (Berlin, 1842); and the narratives of Livingstone, Gordon-Cumming, Andersson, Drummond, Baker, Schweinfurth, Selous, and similar explorers and sportsmen. For more modern conditions, Millais, *A Breath from the Veldt* (London, 1895); and Bryden, *Nature and Sport in South Africa* (London, 1897). For Asiatic species, Baker, *Wild Beasts and their Ways* (London, 1890); Blanford, *Fauna of British India: Mammals* (London, 1888). For zoölogy, Sclater and Thomas, *The Book of the Antelopes* (London, 1894–1900); Brooke, *Proceedings of the Zoölogical Society of London* (1871–73).

For the so-called antelope of western North America, see PRONGHORN.

AN'TENA'TI (Lat. nom. pl. of *antenatus*, from *ante*, before + *natus*, born). In law and history, persons born before a certain time or event, especially with reference to the existence of rights which are claimed. The term is specifically applied: (*a*) to children born before the marriage of their parents. By the common law of England such children are held to be bastards and do not become legitimate upon the subsequent marriage of their parents, whereas in the civil and canon law *antenati* are legitimate and capable of inheriting the real property of the father as if born after marriage. The common law rule prevails in the United States excepting where it has been changed by statute. (See BASTARD; HEIR; LEGITIMACY.) (*b*) In English history, to those natives of Scotland who were born before the accession of the Scotch King James VI to the throne of England as James I, and whose status as English citizens was therefore disputed. (*c*) In American history, to Americans born in this country before the Declaration of Independence; and, also, to those citizens of the colony of New York who were born during the period of Dutch sovereignty and who survived the transfer of the territory and government to the English crown. The property rights of the antenati, and, to a certain extent, the benefits of the Dutch law, were expressly preserved to them by the articles of capitulation, 1664. Consult the historical introduction to the Grolier Club's *Facsimile of Bradford's Laws of New York, 1694* (New York, 1894). See ALLEGIANCE; ANNEXATION.

ANTEN'NÆ. See INSECT.

AN'TENNA'TA (Lat. *antenna*, sail-yard, Neo-Lat. a feeler; horn of an insect). A class of Arthropoda characterized by the possession of one pair of preoral feelers, three parts of oral limbs and head distinctly marked off from the trunk; respiration by tubular tracheæ, opening externally by segmentally arranged openings called stigmata. The class is divided into two sub-classes: *Myriapoda*, or centipedes, etc., and *Hexapoda*, or insects (qq.v.).

ANTE'NOR (Gk. *'Αντήνωρ, Antēnōr*). The wise Trojan who advised his fellow-citizens to send Helen back to her husband. In return for his friendliness to the Greeks, his house was spared during the sack of Troy. A later version represents him as betraying the city. Legends differ about him: one is that he built a city on the site of Troy; others make him the founder of various cities in northern Italy (so Vergil, *Æneid*, i, 242–249, and Livy, i, 1) or of Cyrene.

ANTENOR (*'Αντήνωρ*). An Athenian sculptor of the sixth century B.C. He made the original statues of Harmodius and Aristogiton (q.v.), which were carried to Susa by Xerxes (480 B.C.). After the conquest of Persia they were restored by Alexander the Great, or one of his successors, and were set up again in the *Agora*, where they were placed originally; the original statues were seen at Athens by Pausanias (q.v.). In 478 B.C. the original statues were replaced by others executed by Critius and Nesiotes. The statues of Harmodius and Aristogiton, now in the Museo Nazionale at Naples, are regarded by good authorities as copies of those by Critius and Nesiotes.

AN'TEPEN'DIUM (Lat. *ante*, before + *pendere*, to hang). A hanging in front of the altar. As the earliest Christian altars were usually tables of wood or marble, it was customary during service to hang or set in front of them a richly decorated piece of stuff or metal relief. See ALTAR.

ANTEQUERA, än'tâ-kā'râ (anciently *Antiquaria*). An important manufacturing town in the province of Malaga, Spain, situated in a fertile plain at the foot of the Sierra de Antequera,

ANTELOPES

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1 DUIKERBOK – CEPHALOPHUS GRIMMI
2 BUSH BUCK – TRAGELAPHUS SCRIPTUS
3 PRONGHORN – ANTILOCAPRA AMERICANA
4 SAIGA – SAIGA TARTARICA

1/10 NATURAL SIZE

ANTELOPES

1. BUBALINE ANTELOPE (Bubalis coama); type of Hartebeests.
2. NILGAI (Bosephalus tragocamelus).
3. ROAN ANTELOPE (Hippotragus equinus).
4. BEISA (Oryx gazella); type of Gemsboks.
5. BRINDLED GNU OR BLUE WILDEBEEST (Connochaetes taurinus).
6. SING-SING (Cobus defassa); type of Waterbucks.
7. SABLE ANTELOPE (Hippotragus niger).
8. ELAND (Taurotragus oryx).

on the Guadalhorce, 45 miles west of Granada (Map: Spain, C 4). It has a Moorish castle and is the seat of a number of hidalgos. There are some stately houses, several palaces, and a fine church of the Virgin. It is active in the manufacture of woolen goods, paper, sugar, soap, and silk. There is considerable trade in fruit, oil, and wine. Pop., 1900, 31,665; 1910, 32,366.

AN'TEROS (Gk. *Ἀντέρως*, from *ἀντί*, *anti*, against + *ἔρως*, *erōs*, love). In the mythology of the Greeks, the brother of Eros, and god of unrequited love.

ANTEROS, or ANTERUS. Pope, or rather Bishop of Rome, from Nov. 21, 235, till his death, Jan. 3, 236. He comes in the list of popes between Pontianus and Fabianus.

ANTHE'DON (Gk. *Ἀνθηδών*). A small town on the north coast of Bœotia, situated at the foot of Mount Messapion, on the strait of Eubœa. It belonged to the Bœotian league; it was destroyed by Sulla, but was later restored. The site, near the modern Lukisi, was described by Leake, *Travels in Northern Greece*, ii. In 1889 excavations were conducted on its site by the American School of Classical Studies at Athens, which brought to light a complex of foundations near the harbor, and what seems to have been a small temple on a hill outside the city. The course of the walls was also traced, and a number of bronze implements and 64 inscriptions were found. The latter are chiefly gravestones, but give some idea of the local alphabet and dialect. Consult *American Journal of Archæology*, vi (1890).

ANTHE'LIA (Gk. *ἀντί*, *anti*, against + *ἥλιος*, *hēlios*, the sun). Luminous rings opposite to the sun, seen when the observer looks toward his own shadow cast upon a cloud or bank of fog or on the dewdrops on the grass. The shadow is seen to be encircled by a glory consisting of one or several concentric rings, having their common centre at the anti-solar point. The rings are usually colored, red inside and blue outside, but these are not pure colors, because formed by many overlappings of elementary rings. The outside rings have but little color and fade out into white. The radius of the rings increases with the smallness of the globules that make up the fog or cloud. The largest ring ever observed is the "white rainbow," which has an angular radius of about 40 degrees. It is almost pure white and is generally known by the name of the first observer, as Ulloa's ring. These rings are formed by the interference of rays of sunlight reflected from minute drops very much as in the case of the rings or glories seen close around the sun and moon. All these phenomena were imperfectly explained by Sir Isaac Newton as due to the dispersion of light refracted through drops of fog or rain; the only satisfactory explanation is that first given by Dr. Thomas Young, and more fully developed recently by Dr. Pernter, which attributes them to diffraction or interference. Consult Pernter, *Meteorologische Optik* (Vienna, 1901). See LIGHT.

AN'THELMIN'TIC (Gk. *ἀντί*, *anti*, against + *ἕλμινς*, *helmins*, a worm). Any medicine hostile to intestinal parasites. Anthelmintics which destroy are vermicides; those which expel, vermifuges. They act in one of three ways: (1) mechanically; (2) by some intoxicating influence; (3) by an actual poisonous effect. Among the remedies employed for the *Oxyuris vermicularis*, 'seat-worm,' or 'thread-worm,' are enemata of salt and water, lime water, or of infusion of quassia. For the *Ascaris lumbricoides*, or 'round worm,' santonin (q.v.) and spigelia, or pink-root, are most frequently used. The drugs given to expel tæniæ, or tape-worms, are aspidium, or male fern; pumpkin seeds, and bark of the pomegranate. Kamala (q.v.) is fairly efficient; cusso, or kousso, is of doubtful value. For hookworm (*Necatur americanus*, *Ankylostoma duodenale*) thymol is the most efficient remedy. Vermicides are given after a period of fasting, in order that the worms may not be protected by masses of food, and are followed in three or four hours by a brisk purgative to expel the dead or stupefied parasites. See ASCARIS; WORM.

AN'THEM (ME. *antempne*, earlier *antefne*, ML. *antiphona*, from Gk. *ἀντί*, *anti*, against + *φωνή*, *phōnē*, voice, sound). A piece sung in alternate parts. A species of musical composition introduced into the service of the English church after the Reformation, and appointed to be sung daily, at morning and evening service, after the third collect. The words of the anthem are taken from the Psalms, or other suitable parts of the Scriptures, and the music is either for solo or chorus, or a mixture of solo and chorus. It is rendered with or without instrumental accompaniment. In its origin, musical construction, and use the anthem is similar to the motet of the Roman church and the *Kantate* of the Lutheran church. See MOTET; also ANTIPHONY.

AN'THE'MION (Gk. *ἀνθέμιον*, blossom, flower). A decorative motive of radiating leaves in ancient, Oriental, Greek, and Roman art. Derived originally from the Egyptian

ANTHEMION.

lotus-palmette through Ægean and Assyrian art, it was the most characteristic motive of painted ornament on Greek vases and terra cotta mouldings and antefixæ, and was carved on bands and cymas of Ionic and Corinthian buildings and on the heads of funereal stelæ. It was further elaborated by the Romans, revived in the Renaissance, and has been the prolific parent of countless motives in modern art. Consult Owen Jones, *Grammar of Ornament* (London, 1856); Goodyear, *A Grammar of the Lotus* (New York, 1892).

AN'THEMIS. See CHAMOMILE.

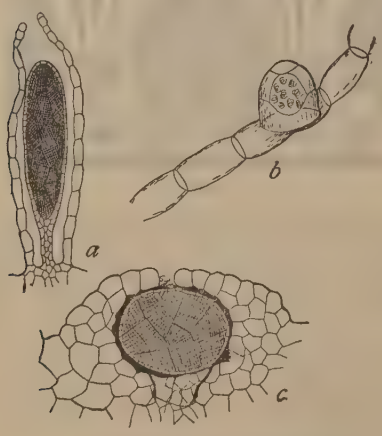
ANTHE'MIUS (Gk. *Ἀνθέμιος*, *Anthemios*) (sixth century A.D.). A Greek architect, mathematician, and engineer; born at Tralles, in Asia Minor. With the assistance of his colleague, Isidore of Miletus, he planned and built for the Emperor Justinian the church of St. Sophia in Constantinople (532–538), one of the greatest buildings in architectural history, and so may

be regarded as the founder of the developed Byzantine style. He wrote, among other mathematical treatises, a work on the subject of burning-glasses. Some fragments of his writings have been found. He continued the Greek tradition of uniting architecture and theoretical mathematics, which the Romans had discouraged, and he was one of the greatest architects of all ages.

ANTHEMIUS. An Emperor of the West (467–472), and son-in-law of the Eastern Emperor Marcian. He was appointed to the Western throne by the Emperor Leo, at the instance of Ricimer, who afterward married Anthemius's daughter. A quarrel arose between them, and Ricimer proclaimed Olybrius Emperor of the West in 472 and marched on Rome, which he took by assault. Anthemius perished in the battle. His character is highly praised in a panegyric of Apollinaris Sidonius (q.v.). Consult *The Cambridge Mediæval History*, vol. i (New York, 1911).

AN'THER (Gk. *ἀνθηρός, anthēros*, flowery, blooming). That part of a stamen which produces pollen. An anther usually consists of two small sacs, between which there occurs a certain amount of sterile tissue (the "connective"), which is often nothing more than the top of the axis of the stamen. See FLOWER.

AN'THERID'IUM (a diminutive after the GREEK fashion from *anther;* see ANTHER). The male organ of plants; that is, the organ in which the sperms are developed. Among the algæ and fungi an antheridium is usually a single cell, and in the simplest forms in which antheridia appear this single cell is merely a vegetative cell which under certain conditions produces sperms. In most algæ and fungi, however, the antheridium is a distinctly differentiated cell set apart from the very first for the production of sperms. Among the mosses and ferns the antheridium is a many-celled organ of



ANTHERIDIA OF A MOSS.

varying shape. The moss antheridium is a free organ and more or less club-shaped, a section showing that the wall consists of a single layer of sterile cells, and that the rest of the structure is a compact mass of very small cells, within each one of which a single sperm is organized. The antheridium springs open or bursts open in the presence of moisture and discharges its mass of cells and sperms, the latter of which free themselves by their movements and are ready to swim to the female organs. Among the ordinary ferns the antheridia are on the lower surface of the prothallium, being more or less imbedded in its tissue.

With the introduction of heterospory (q.v.), which involves certain of the fern-plants and all of the seed-plants, the male plant is very much reduced in size, being entirely contained within the spore that produces it, which in the seed-plants is called the pollen grain. This small male plant is in most cases a single antheridium, and in seed-plants the antheridium is represented chiefly by two sperms. In seed-plants, therefore, the antheridium is a concealed organ; while in the lower groups it is a conspicuous organ.

The name is an unfortunate one, since it means "anther-like," having been given under the impression that the anther of seed-plants is a male organ. It would be very desirable to change the name if such a thing were possible, and "spermary" has been proposed as a substitute.

AN'THESTE'RIA. See GREEK FESTIVALS.

ANTHEUNIS, ăn'tē'nē', GENTIL THEODOOR (1840—). A Flemish poet. He was born at Oudenarde, and removed to Brussels. He is considered one of the best lyric poets of Belgium. His verse is distinguished by depth of sentiment and euphony. Among his most popular songs are *Lentelied, Ih ken een Lied, Vergeefs,* and *Getroume liefde.* Collections of his poems have been published under the titles *Uit het Hart* (1875); *Leven, Lieven, Zingen* (1879).

AN'THOCY'AN, or **ANTHOCYANIN** (Gk. *ἄνθος, anthos,* flower + *κύανος, kyanos,* a dark-blue substance). The blue, purple, or red pigments found dissolved in the cell sap of flowers, fruits, young leaves and stems, roots, etc. The term "erythrophyll" is still sometimes used in this sense. The chemistry of the anthocyans is imperfectly known, but the term includes a number of individual compounds closely related to the tannins. There is evidence for the existence of two general groups of the bodies, with rather distinct chemical and physical characters: "beet red," found in all parts of the red beet and in the dark red varieties of Chenopodiaceæ and Amarantaceæ and other plants; the "vine red," found in wine, autumn leaves of *Ampelopsis, Rhus, Cornus,* and other plant organs. In an acid medium the anthocyans take on some shade of red, while in a basic medium they are blue or violet. For this reason the color of the anthocyan in a plant organ indicates whether the organ is acid or basic. When extracted, some of the anthocyans form excellent acid and base indicators. The function of anthocyan in the living plant is not positively known, although numerous attempts have been made to explain its presence and distribution. (See COLOR.) 1. It has been held to be a protection to the green coloring matter of young leaves against too much light, which promotes its decomposition (see CHLOROPHYLL), especially when it is formed slowly on account of low temperature. 2. It has been suggested that it protects the protoplasm against too great intensities of the injurious blue-violet and ultra-violet rays. The absorption spectrum of the anthocyans does not support either of these views. 3. It is alleged to be of advantage to young leaves and shoots

by increasing the absorption of the sun's energy, and thus raising their temperature. 4. Many hold that it is a by-product of metabolism that in some cases proves of advantage to the plant, as in the flowers and leaves, while in other cases it is indifferent, as in the roots. While in the main the amount and character of the anthocyan developed is determined by special and varietal qualities, still the amount is often affected by the conditions in which the organ develops. The amount of sugar present is one of the most important conditions. With high sugar content, at least in many plants, there is high tannin and anthocyan content. In turn, high sugar content often goes hand in hand with low temperature. This seems to account for the strong anthocyan development in spring and autumn foliage as well as in alpine and arctic plants.

ANTHOL'OGY (Gk. *ἀνθολογία, anthologia,* a flower-gathering, from *ἄνθος, anthos,* flower + *λέγειν, legein,* to pick out). The title usually given to a book consisting of an unconnected series of choice thoughts, usually of brief compass, whether in prose or in verse, but generally in the latter. In ancient times collections of this kind consisted largely of epigrams. (See EPIGRAM.) Even before Aristotle's day collections had been made of actual inscriptions graven on stone and on votive objects: thus Polemon gathered the Spartan, Philochorus the Attic, Aristodemus the Theban inscriptions. It was an easy step from this to the collection of epigrams that had been published in books: of these there were very many in widely scattered collections, for the most part small. 1. The earliest **Greek Anthology** based on literary pieces was compiled by Meleager, of Gadara, in Syria, about 80 B.C., and was the result of a renewed interest in the older Alexandrian poets. It was named *The Garland* (*Στέφανος, Stephanos*), and contained 130 of Meleager's own epigrams, and selections from 47 other poets, including Alcæus, Alexander Ætolus, Anacreon, Archilochus, Callimachus, Euphorion, Sappho, and Simonides. Something more than 100 years later, Philip of Thessalonica gathered the best epigrams of the preceding century into a collection, which he published in the reign of Caligula, and which at an early date seems to have been combined with Meleager's *Garland.* In both collections the epigrams were arranged according to the initial letters of the first verse. A third collection was made by Straton, of Sardis, in the second century A.D.; and a fourth by Diogenianus Heracleota. The latter seems to have been the first to adopt the name "anthology" (*ἀνθολόγιον ἐπιγραμμάτων, anthologion epigrammatōn*). The writing of epigrams then languished, but it was revived again during the sixth century in Constantinople; and the productions there of Julianus, Christodorus, Leontius, Paulus Silentiarius, and others gave occasion for a new anthology, made under Justinian by Agathias of Myrina and called by him *The Cycle* (*Κύκλος, Kyklos*). He was the first, it seems, to arrange his collection according to the themes of the poems. Thus, book vi contained poems of love, book vii poems on the joys of the table and of wine. Within the books the poems of a given author were separated by pieces from an array of other writers. Apparently the combined anthology of Meleager and Philip was current for a long time beside the *Cycle* of Agathias. In the tenth century small anthologies, the so-called *Sylloge Euphemiana* and the *Sylloge Parisina,* were made; in these two the arrangement was by subjects. Better known and more complete is the large compilation of Constantinus Cephalas in 15 books, which dates from the early part of the same century; here again the arrangement is by subjects, in chapters. Four centuries later, in Constantinople, the monk Maximus Planudes made a careless selection from Cephalas's compilation, in seven books, called *ἀνθολογία διαφόρων, ἐπιγραμμάτων, anthologia diaphorōn epigrammatōn, A Collection of Miscellaneous Epigrams,* arranged by subjects, in chapters. This latter was the only anthology known to western Europe until the seventeenth century. It is preserved at Venice in the single manuscript from which it was first published by Lascaris (Florence, 1494). It has been frequently reëdited, and was admirably translated into Latin, in part, by Grotius.

In 1607, however, Salmasius (q.v.) discovered and copied in the Palatine Library at Heidelberg the single manuscript of Cephalas's larger compilation, now known as the *Palatine Anthology.* Salmasius's copy was published first by Brunck in his *Analecta Veterum Poetarum Græcorum* (1776); this edition was superseded by Jacobs's *Anthologia Græca* in 13 volumes (1794–1803; improved edition, 1813–17), and was again reëdited with the addition of epigrams from inscriptions by Dübner, in his *Epigrammatum Anthologia Palatina* (2 vols., 1864, 1872; third volume by Cougny, 1890); Stadtmüller's critical edition of it is not yet completed (vol. i, 1894; ii, 1, 1899). In all, over 300 poets, some of them women, from preclassical to Byzantine times, are represented in this *Anthology;* the collection is invaluable as a mirror of Greek civilization and thought, and the epigrams express the entire range of human feeling with a brilliancy and cleverness that translation cannot reproduce. Translations have been made into English by Wrangham, John Sterling, Merivale, Garnett, Symonds, and others; into French by Dehesme, into German by Herder and Jacobs. Consult: Wellesley, *Anthologia Polyglotta* (1849); Symonds, *Studies of the Greek Poets* (London, 1893); Butler, *Amaranth and Asphodel* (London, 1881); Mackail, *Select Epigrams* (London, 1906). On the smaller collections, consult Dilthey, *De Epigrammatum Syllogis Quibusdam Minoribus* (1887).

2. **Latin Anthologies.** Among the Romans, the passion for making epitomes, selections, and *florilegia* of all kinds was strongly developed by the first century A.D. (See Nettleship, *Lectures and Essays: First Series,* Oxford, 1885, 248 ff.) Collections of *sententiæ,* or pithy sayings, were early made, for educational purposes. Collections of poems are mentioned in Catullus; book sellers also caused such collections to be made. In 1573 Scaliger published at Leyden, in imitation of the Greek anthology, a Latin anthology, under the title *Catalecta Veterum Poëtarum,* and Pithöus one at Paris, 1594. A larger collection was issued at Amsterdam (1759 and 1773) by Peter Burmann the younger, under the title *Anthologia Veterum Latinorum Epigrammatum et Poëmatum;* this comprised fugitive Latin verse from the time of Ennius to 100 A.D.; the arrangement was by subjects. In the nineteenth century a more careful anthology was undertaken by Riese (1869–70), a second edition of which has been published (Leipzig,

1906). The arrangement here is according to the sources of the epigrams. The Latin anthologies differ from the Greek in that they are the work of modern scholars who have patiently put together, by careful reading of Latin authors, and of inscriptions as well, the widely scattered remains of the minor poetry of the Romans.

3. **Asiatic Anthologies.** Asiatic literature is extremely rich in anthologies, which consist sometimes of extracts from the best poets, arranged according to the subject, and sometimes of "beauties" of their best poets, with biographical notices, which are placed either in chronological order or according to the countries in which the authors lived.

4. **Arabic Anthologies.** The oldest Arabic anthology is the Moallakat (q.v.; see also ANTAR), consisting of the seven most celebrated pre-Islamic poems. A much larger collection was made by Abu-Temâm (died 846), who published selections from the old Arabic songs composed previous to the time of Mohammed, arranged them in 10 books and named the entire collection after the first book, which consisted of war songs, *Al Hamâsa*. A German translation by Rückert was published in 1846, under the title *Hamasa*. Another famous anthology is the *Divan* of the Hudhailites (an Arabic tribe), a partial edition of which was published by Kosegarten, and a German translation by Abicht (1879). Wellhausen completed the edition (Arabic and German) in 1887, as part i of *Skizzen und Vorarbeiten*, published by him. Abu'l-Faradj of Ispahan (died 967) gathered together in his *Kitâb al-Aghâni* ('Book of Songs') all the ancient Arabic songs down to the first centuries of the caliphate. It was published by Kosegarten in 1840; but the complete work, in 20 volumes, was not issued till quite recently by the Arabic press of Bulak, to which Brünnow added the twenty-first volume in 1888. An Index to this anthology has been prepared by a group of scholars under the editorship of I. Guidi. Abu'l-Faradj accompanied this work with a minute commentary, which makes it one of the most interesting parts of the old Arabic literature. But the richest and most complete anthology of the later Arabic poetry is *Yatimat al-Dahr* ('The Pearl of the World'), by Taalabi, in which the writers are arranged according to the provinces in which they lived. It has been continued and enlarged since the period of the original compiler. Besides these and similar national anthologies, collections have been made in almost every province where the Arabic culture and speech prevailed. Such, for example, are the numerous Arabico-Spanish anthologies, though these are but little known.

5. **Turkish Anthologies.** The number of anthologies in the West Turkish, or, as it is generally called, the Turkish language, is very large. Most of the poems, however, show a tendency toward imitation of the Persian, which is natural when one recalls the fact that, under the old Ottoman dynasty, Persian was the official language of the court and was generally used by the aristocracy and the cultivated classes. (See below.) The most famous are: *Hesht Behesht* ('The Eight Paradises'), by Sehi of Adrianople (died 1548); *Taskarat ash-Shuara* ('Lives of the Poets'), by Latifi (died 1582), and, under the same title, a similar work of Ashik Chelebi (died 1571); and the great collection, *Subdat al-Ash'ar* ('The Blossoms of Poetry'), by Kassade (died 1621). The substance of these anthologies is to be found in Hammer Purgstall's *Geschichte der osmanischen Dichtkunst* (Pesth, 1836); and in Gibb's *History of Ottoman Poetry* in 5 vols. (1900–08).

6. **Persian Anthologies.** The Persian literature has many anthologies, which are called *safinah* (ship), *majmai* (collection), *bayâd* (album), *intikhâb* or *muntakhab* (selection), and the like. Among these are the *Muntakhab ul-ash'ar* ('Selection of Poems'), compiled in 1748; and the *Daqâ'iq ul-ash'ar* ('Subtleties of Poems'), compiled in the eighteenth century, which deals, as its name implies, especially with the more artificial styles of Persian poetry. The numerous biographical dictionaries of poets, called *Tadhkirat*, or memoirs, contain many verses from the poets whose lives are recorded. One of the most important of these is the *Tadhkirat ash-shu'ârâ*, written by Daulat-Shâh in 1487, and edited by E. G. Browne (London, 1902). The *Farhangi ash-shu'ârâ* ('Dictionary of Poets') contains an anthology of about 22,450 distichs in Persian, and was abridged and freely imitated by Hammer-Purgstall in his *Duftkörner aus persischen Dichtern gesammelt*, reëdited by Bodenstedt (Stuttgart, 1860). Persian minor poetry is the most perfect in the world and its forms and tone can be traced not only in the anthologies of the Eastern peoples—the Turks, the Hindus, the Arabs, and the Chinese—but even in modern Occidental writers such as Thomas Moore. Flügel has given an interesting bibliographical catalogue (Vienna, 1865); and some very graceful verse translations by Hermann Ethé can be found in Geiger and Kuhn's *Grundriss der iranischen Philologie*, especially vol. ii (Strassburg, 1906), and in Ethé's scattered contributions to the *Morgenländische Forchungen*. Consult also Meynard, *La Poésié en Perse* (Paris, 1887).

7. **Indian Anthologies.** The literature of the Mohammedan population of Hindustan, which is a mere copy of Persian literature, has also several anthologies. The most important are: *Gulzâri Ibrâhim* ('Rose Garden of Ibrâhim'), by 'Alî Ibrâhîm, containing biographical notices of 300 Hindustani poets with specimens of their writings; the collection called *Diwâni Jihân* ('Divân of the World'), by Bênî-Narâyan; *Gulshâni Hind* ('Garden of India'), by Mirzâ 'Alî Lutf; *Guldasta'i Nishât* ('Garland of Pleasure'), by Manû Lâl (Calcutta, 1836), and *Guldasta'i Naznindn* ('Garland of Delights'), by Karîm-ad-Dîn (Calcutta, 1845). The substance of these works is to be found in Garcin de Tassy's *Histoire de la littérature hindoue et hindoustanie* (2d ed., Paris, 1839–47), which, under the title of *Tabakâli Shurâi Hindi*, was translated into Hindustani by Karîm-ad-Dîn (Delhi, 1848). In the pure Hindu we have a rich collection of songs, the *Râgsâgar* ('Ocean of Musical Verse'), by Krishnânanda (Calcutta, 1845). The modern tendency of Hindu anthologies is wholly away from the Sanskrit, and the vernacular has been used especially, as by Râjâ Siva Prasâd, who died as recently as 1895. See Grierson, *Modern Vernacular Literature of Hindôstân* (1889).

8. **Sanskrit Anthologies.** The Sanskrit literature is not so rich in anthologies as are other Oriental literatures. But the collections, comprising a hundred strophes each (*Satakas*), and attributed to many poets, may almost be

termed anthologies. True Sanskrit anthologies are the *Saduktikarnāmṛta*, or 'Ear-nectar of Good Sayings,' by Sridharadasa (about 1205 A.D.), the *Sārngadharapaddhati*, or Anthology of *Sārngadhara*, and Vallabhadeva's *Subhāshitāvalī* ('Series of Good Words'). Böhtlingk, *Indische Sprüche* (3 vols., St. Petersburg, 1870–73), contains an anthology of 7613 Sanskrit strophes, with a literal German translation. Consult Frazer, *A Literary History of India* (1898).

9. **Chinese Anthologies.** The oldest anthology in the world is that which Confucius has handed down under the name of the *Shi-King*, or Book of Songs, forming one of the five great canonical books, or sacred classics of the Chinese. Chinese authors assert that about 3000 other poems were known in the time of Confucius. The *Shi-King* consists of 311 pieces, which picture vividly the manners and customs, the state of knowledge and art, and the aspects of nature in the states which afterward became China. It is, of course, written in the "book language" or classical Chinese of the literati, and time has made it almost unintelligible to those who speak only the vernacular dialects. But it is remarkable for the myriad allusions which it contains to the great body of Chinese literature and is extremely difficult because of the almost unlimited license of its word-order. The best translation with critical apparatus is by James Legge (London, 1876). There is also a version in Latin by Lacharme (Stuttgart, 1830) and one in German by Rückert (Altona, 1833). The poems of the Liang Dynasty (502–557 A.D.), and of the Tang Dynasty (618–905), have also been collected, but are only in part translated. Consult Giles, *A Chinese Biographical Dictionary* (1898); Giles, *Sun Tzu* (1910); and the article CHINESE LITERATURE.

10. **Japanese Anthologies.** The Japanese abound in anthologies, since they consider poetry more as the production of an epoch than of an individual. The oldest and largest anthology, compiled in the eighth century, is called *Manyoshu*, or *Collection of Ten Thousand Leaves*. It contains 4565 songs, mostly in 31-syllable poems. The *Kokinshu*, or *Songs Ancient and Modern*, numbering 1099, was finished about 922. Another anthology of the same century, *Gosen Wakashu*, contains 1356 short poems. Other collections were made by order of the Mikados in the succeeding centuries, ending with the fifteenth, and these, with *Songs Ancient and Modern*, are known under the general name of the *Anthologies of the One and Twenty Reigns*. All of these books have had abundant commentary, and are valuable to the student and historian. As is the case with almost everything in Japanese, the Chinese influence is apparent; but during the last 50 years, since Japan became Occidentalized, the vernacular has largely changed, and recent anthologies show a decided alteration in spirit, thought, and vocabulary, which bring the verse close to the manner of French and German lyrical writers. There are innumerable collections made by imperial or private order, besides many selections of 100 songs each, the most famous of the latter being the *Hiaku-nin-is-shiu* (100 poets, one verse), translated into English with notes by F. V. Dickens (London, 1866), and Clay MacCauley (Tokio, 1899). Consult, also: Leon de Rosny, *Anthologie japonnaise* (Paris, 1870); B. H. Chamberlain, *Classical Poetry of the Japanese* (London, 1880); Aston, *A History of Japanese Literature* (1899); and for a sympathetic interpretation, Hearn, *Japan* (1904).

ÂN'THON, CHARLES, LL.D. (1797–1867). An American classical scholar and teacher. He was born in New York City, graduated at Columbia College in 1815, studied law and was admitted to the bar in 1819, but never practiced. The next year he became adjunct professor of Greek and Latin at Columbia; after 15 years, he became full professor. From 1836 to 1867 he was also head master of the grammar school of Columbia College. He was exceedingly efficient as a teacher and won considerable reputation by his annotated editions of a large number of classical authors, prepared as school and college text-books. Besides nearly 50 such works, he published a new edition of Lemprière's *Classical Dictionary* (1825); a new Classical Dictionary (1841, 1855, 1874); manuals of Greek and Roman antiquities (1843, 1852, 1874); *A System of Greek Prosody and Metre* (1840, 1852); *Ancient and Mediæval Geography* (1855); and a number of other handbooks which were long and extensively used by classical students, both in this country and in England. The value of his editorial labors lay largely in the fact that by his books he directed the attention of American classical students to the valuable works produced by German scholarship; he thus gave a great impetus to the higher and more fruitful study of the classics in America. Consult Henry Drisler, *Commemorative Discourse* (New York, 1868).

ANTHONY, ăn'thō-ni. A city, and the county-seat of Harper Co., Kan., 57 miles southwest of Wichita, on the Missouri Pacific, the Atchison, Topeka, and Santa Fe, the Kansas Southwestern, the Kansas City, Mexico, and Orient, and the Chicago, Rock Island, and Pacific railroads (Map: Kansas, D 4). It controls a trade in the products of the surrounding agricultural and stock-raising region and has a salt plant, an ice plant, and a flour mill. Anthony has a large opera house, two hospitals, a Carnegie library, and seven churches. The city owns the water works and electric light plant. It has adopted the commission form of government. Pop., 1890, 1806; 1900, 1179; 1910, 2669.

ANTHONY, ăn'tō-nĭ, CLEMENS THEODOR (1755–1836). King of Saxony. Upon the death of his brother Frederick Augustus I, on May 5, 1827, he succeeded to the throne. After the disturbances of 1830 he appointed his nephew, Prince Friedrich August, co-regent, and on September 4 of the following year he gave his sanction to a constitutional government for the kingdom.

ANTHONY, HENRY BOWEN (1815–84). An American journalist and legislator. He was born at Coventry, R. I., and graduated at Brown University in 1833. He became editor of the Providence *Journal* in 1838 and continued as such for more than 20 years. In 1849, and again in 1850, he was elected Governor of Rhode Island, on the Whig ticket. He was a Republican member of the United States Senate from 1859 until his death, and served twice (1863 and 1871) as president *pro tem.* A collection of his historical and memorial addresses was printed for private circulation in 1875. He bequeathed to Brown University the Harris collection of American poetry, containing about 6000 volumes. Consult the *Anthony Memorial* (1886), a catalogue of the collection, with a sketch of the donor.

ANTHONY, JOHN GOULD (1804–77). An American conchologist. He was born at Providence, R. I., and for many years was in commerce, but his studies in natural history resulted in his being invited by Prof. Louis Agassiz, in 1863, to the directorship of the conchological department of the Museum of Comparative Zoölogy at Harvard University. In 1865 he accompanied Professor Agassiz on the Thayer expedition to Brazil. He was an acknowledged authority in his field of research, and published: *A New Trilobite: Ceratocephala Ceralepta* (1838); *Descriptions of Three New Species of Shells* (1839); *Descriptions of New Species of American Fluviate Gasteropods* (1861); *Descriptions of New American Fresh-Water Shells* (1866), and other works.

ANTHONY, SAINT. See ANTONY, SAINT.

ANTHONY, SAINT, CROSS OF, or the TAU CROSS. A cross, shaped like the letter T. In heraldry the name denotes an ordinary cross consisting of two stripes, one horizontal, the other vertical, crossing each other in the centre of the escutcheon.

ANTHONY, SAINT, FALLS OF. See MINNEAPOLIS.

ANTHONY, SAINT, FIRE OF. See ERYSIPELAS. The Rev. Alban Butler, in his *Lives of the Saints,* gives the following account of the origin of this name: "In 1089 a pestilential erysipelatous distemper, called the *sacred fire,* swept off great numbers in most provinces of France; public prayers and processions were ordered against this scourge. At length, it pleased God to grant many miraculous cures of the dreadful distemper to those who implored his mercy through the intercession of St. Anthony, especially before his relics; the church [of La Motte St. Didier, near Vienne, in Dauphiné] in which they were deposited was resorted to by great numbers of pilgrims, and his patronage was implored over the whole kingdom against this disease." The "Order of Canons Regular of St. Anthony," a religious fraternity, founded about 1090, for the relief of persons afflicted with the fire of St. Anthony, survived in France till 1790.

ANTHONY, SUSAN BROWNELL (1820–1906). An American reformer, born in South Adams, Mass., the daughter of a Quaker. She taught school for 15 years; was active in the total abstinence and anti-slavery movements; advanced a belief in the coeducation of the sexes; and from the Civil War devoted herself entirely to the woman suffrage movement. It was largely the result of her effort that married women in New York State were given the guardianship of their children and the control of their own earnings as early as 1860. She founded (1868) and for three years published *The Revolution,* a woman's rights paper. She was arrested, tried, and fined for voting at the election of 1872. An eloquent speaker, she lectured extensively in England and throughout the United States, and took part in many State campaigns and appeared before many Congressional committees. In 1899 Miss Anthony was a delegate to the International Council of Women, held in London. Two years later she retired from an office she had held for many years, the presidency of the National American Woman Suffrage Association. She contributed to leading magazines and (with Mrs. Elizabeth Cady Stanton and Mrs. Matilda Joslyn Gage) published an extensive *History of Woman Suffrage* (3 vols., New York, 1881–87). For her life, consult Harper, *Life and Work of Susan B. Anthony* (3 vols., Indianapolis, 1899); Alice Hubbard, *Susan B. Anthony* (East Aurora, 1909).

ANTHONY, WILLIAM ARNOLD (1835–1908). An American physicist. He was born at Coventry, R. I., graduated at the Sheffield Scientific School of Yale University, and was professor of physics and chemistry in Antioch College (Ohio) from 1967 to 1869. From 1869 to 1872 he was professor of physics at the Iowa Agricultural College, and from 1872 to 1887 professor of physics at Cornell University. In 1887 he became a consulting electrician. From 1893 to 1908 he was professor of physics in the Cooper Union School of Science. He contributed a chapter to E. A. Thompson's *Roentgen Rays and Phenomena of the Anode and Cathode* (1896); wrote (with C. F. Brackett) a *Manual of Physics,* and published in 1902 a *Theory of Electrical Measurements* (3d ed., 1908).

ANTHONY DE DOM'INIS. See DOMINIS.

ANTHONY OF BOUR'BON. See ANTOINE DE BOURBON.

ANTHONY'S NOSE. A projecting bluff on the Hudson south of West Point, said to have been named after a trumpeter of Governor Stuyvesant.

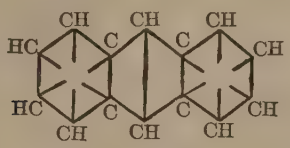
ANTHOPH'YLLITE. A name applied to an orthorhombic mineral of the amphibole group, containing the metals magnesium and iron and silic acid. It commonly occurs in lamellar or fibrous masses that have a vitreous lustre and vary in color from brown to green. A "hydrated anthophyllite" has been described in several instances, but in most cases the mineral has been shown to be really a hydrated monoclinic amphibole. Anthophyllite occurs in metamorphic rocks.

AN'THOXAN'THUM. See SWEET VERNAL GRASS.

AN'THOZO'A (Gk. *ἄνθος, anthos,* flower + *ζῷον, zōon,* animal), or ACTINOZOA. A class of cœlenterates, characterized by their polyp-like form. It contains the sea-anemones and all the corals except millepores. See CŒLENTERATA; CORALS; SEA-ANEMONES.

AN'THRACENE (Gk. *ἄνθραξ, anthrax,* coal) $C_{14}H_{10}$. An organic substance composed of carbon and hydrogen and obtained from coal-tar. The production of anthracene has been of great commercial importance since the discovery of the processes by which it is converted on a large scale into the valuable alizarin dyes. (See ALIZARIN.) The portion of coal-tar passing, during its distillation, above 270° C., contains a considerable amount of anthracene; when this portion is cooled, a mass of crystals is deposited, which is separated from the liquid oil by pressure and purified by digesting with the naphtha obtained from another fraction of the coal-tar, viz., the so-called light oil, which passes below 170° C. The product somewhat purified in this manner is brought into commerce under the name of "50 per cent anthracene" and is employed in the manufacture of alizarin. To isolate pure anthracene from this product, it is distilled with potash, and the distillate is treated with carbon disulphide, in which anthracene is nearly insoluble; the remaining traces of impurities may then be eliminated by recrystallization from hot benzene. Pure anthracene is a colorless crystalline substance melting at 213° C. and boiling at 360° C.; it is insoluble in water and but sparingly soluble in alcohol. Graebe and Liebermann obtained it from the coloring

matter of madder, and then, by reversing the process, artificially prepared that coloring matter (alizarin) from anthracene. All commercial anthracene contains more or less carbazol. The chemical constitution of anthracene is represented by the formula:



Consult Auerbach, *Das Anthracen und seine Derivate* (Brunswick, 1880), and Gnehm, *Die Anthracenfarbstoffe* (Brunswick, 1897).

AN'THRACITE (Gk. *ἀνθρακίτης, anthrakitēs*, from *ἄνθραξ, anthrax*, coal). A term used to designate the highest grade of coal, or that having the highest percentage of fixed carbon and lowest volatile contents of all the coals. It has been produced from bituminous coal by alteration through the action of pressure and heat. These conditions are produced when rock-masses are folded up into mountains, or when beds of bituminous coal are approached or penetrated by an intrusion of igneous rock. In passing from the horizontal coal measures of western Pennsylvania and Ohio to the greatly folded beds of eastern Pennsylvania, the coal changes from bituminous to anthracite. At Crested Butte, Colo., beds of bituminous coal are found to change to anthracite in those portions of the mass which are in close proximity to basaltic rocks that have been intruded into the beds underlying the coal in that region. The process involves distillation with evolution of gaseous compounds and is probably controlled to some extent by the relative porosity of the overlying rocks, as well as by the varying degree of heat to which the coal is subjected.

Anthracite has great heating power; it burns slowly, giving off but little smoke, and is consequently very clean. The average chemical composition of anthracite coal from different localities is as follows:

	Fixed carbon	Volatile matter	Water	Ash	Sulphur
Mammoth vein, Pa.	86.38	3.08	4.12	5.92	.50
Anthracite, Colo...	82.33	9.96	.81	6.90	1.06
Madrid, N. Mex. ..	93.02	1.04	.16	5.78	.117
Shan-si, China	82.74	5.55	1.55	10.15	.25

Anthracite is found at a number of widely separated localities; but the areas underlain by it are seldom large because its formation is dependent on local conditions. In the United States it is found in eastern Pennsylvania, where it forms several detached areas aggregating about 470 square miles. These fields are known as the Southern, or Schuylkill field (140 square miles); Western Middle field (90 square miles); Eastern Middle field (40 square miles); Northern, or Wyoming (200 square miles); Loyalsock, or Western Northern. The coals all belong to the Middle Carboniferous or Pennsylvania Series, at the base of which is a hard bed known as the Pottsville conglomerate. After beds of the Coal measures had been folded into basins, the presence of the outcropping ledges of conglomerate along the crests of the ridges protected the coal beds to a large extent and have kept them from being entirely worn away by weathering and erosion. The total number of workable anthracite seams is about 15, but several others are also known. The aggregate thickness of the beds increases from west to east; the best known is the Mammoth Bed, which in places may exceed 100 feet in thickness, while elsewhere it may split up into several beds separated by layers of shale. Wilkes-Barre, Scranton, Hazelton, and Pottsville are important mining towns in the region. At Crested Butte in Colorado, and near Madrid, N. Mex., anthracite is found in beds of Upper Cretaceous age, the formation of the anthracite in each case being due to igneous intrusions. Indeed, at the latter locality, the change from bituminous to anthracite coal takes place within a distance of 2000 feet. In Europe anthracite coal is found in the Carboniferous of South Wales. It is also known in France and Belgium. What are probably the largest deposits in the world are those around Tse-Chau in the province of Shan-si, China. Baron von Richthofen estimated that the unmined anthracite coal in Shan-si amounted to 630,000,000,000 tons, and that the area was greater than that of Pennsylvania.

Anthracite coal, after mining, goes through a crushing and sorting process in coal-breakers, in which the machinery consists of crushing rolls and screens. In this treatment the coal is separated into the different sizes given below, and particles of slate are eliminated. Much of the latter is separated by screens having the bars set at an angle, so that when a mixture of coal and slate passes over them the slate particles, owing to their thinness, slip through, while the coal passes by. Pieces of mixed coal and slate are known as *bone-coal*, and are picked out by boys when the smaller sizes of coal come down the shutes from the screens. Recently, wet methods of separation of slate and coal, by means of jigs (q.v.) have been adopted with great success. The capacity of some breakers is very large, being as much as 2000 to 3000 tons of marketable coal per day of 10 hours.

The following sizes are shipped from the breaker:

Broken, or grate coal, which passes through 4-inch mesh, but not through 2.5-inch mesh.

Egg coal, which passes through 2.5-inch mesh, but not through 1.75-inch mesh.

Stove coal, which passes through 1.75-inch mesh, but not through 1.25-inch mesh.

Chestnut coal, which passes through 1.25-inch mesh, but not through .75-inch mesh.

Pea coal, which passes through .75-inch mesh, but not through .50-inch mesh.

Buckwheat coal, which passes through .50-inch mesh, but not through .25-inch mesh.

Very coarse lumps are known as "steamboat coal," and the finer sizes are now separated into two kinds, which are known as rice and barley. The finest refuse from the breakers and mines is known as "culm" and has been a source of much concern, since, through being considered as waste, it has been allowed to collect in enormous heaps, forming a marked topographic feature of the anthracite regions. Owing to the fineness of this material, it was for some years found difficult to burn it in grates, as it packed and hindered the entrance of air. In recent years methods of utilization for culm have been found, and many of the banks have been worked over and the coarser particles washed out and sized. It can be burned in specially constructed

grates, or can be mixed with tar and pressed into briquettes for use with the ordinary grate. Another important use is for filling in abandoned or partially worked-out mines, which is done by washing the culm down through a pipe into the mine, where it settles into a compact mass.

In the trade anthracite is sometimes classed as follows: Free burning, white ash, hard white ash, Wyoming red ash, Lehigh red ash, Shamokin, Lykens Valley red ash, Schuylkill red ash, Trevorton, Lorberry red ash, and Bernice white ash. The hard white ash commands the best price.

The production of anthracite coal in Pennsylvania from 1907 to 1911 was as follows:

Year	Total product long tons	Value at mines	Average price per ton	No. employed	Average no. days worked
1907	76,432,421	$163,584,056	$2.14	167,234	220
1908	74,347,102	158,178,849	2.13	174,174	200
1909	72,384,249	149,181,587	2.06	166,801	205
1910	75,433,246	160,275,302	2.12	169,497	229
1911	80,771,488	174,952,415	2.17	172,585	246

It is also of interest to note the increase in shipments since the beginning of the industry:

ANTHRACITE COAL SHIPMENTS, 1825 TO 1911

1825	34,893 long tons	1870	16,182,191 long tons
1830	174,734 " "	1880	23,437,242 " "
1835	560,758 " "	1890	36,615,459 " "
1840	864,379 " "	1900	45,107,484 " "
1845	2,013,013 " "	1911	69,854,299 " "
1860	8,513,123 " "		

The exports of anthracite in 1911 were 3,553,999 long tons valued at $18,093,285, and the imports 2463 long tons valued at $12,550.

The production of anthracite in Colorado and New Mexico combined amounted to 98,561 short tons in 1911. Various estimates of the amounts of anthracite remaining in the Pennsylvania fields have been made, and all agree in the conclusion that the deposits will last at the present rate of production for more than 100 years. For illustration, see COAL.

Bibliography. For statistics of production, consult volumes on *Mineral Resources*, issued annually by the United States Geological Survey; various reports of the Second Geological Survey of Pennsylvania, and the Annual Reports of the Bureau of Mines, Pennsylvania. For description of occurrence, see *Coal Resources of the World*, an exhaustive work prepared by the XII session of the International Geological Congress, Toronto, 1913. Consult also: J. J. Stevenson, "Origin of Pennsylvania Anthracite," *Bulletin of the Geological Society of America*, vol. v, p. 39 (Rochester, 1894); M. R. Campbell, "Hypothesis to Account for the Transformation of Vegetable Matter into the Different Grades of Coal," *Economic Geology*, vol. i (Lancaster, Pa., 1905); N. F. Drake, "Coal Fields around Tse Chau, China," *Transactions of the American Institute of Mining Engineers*, vol. xxx (New York, 1898). See also COAL: PENNSYLVANIA.

ANTHRAC'NOSE (Gk. *ἄνθραξ, anthrax*, carbuncle + *νόσος, nosos*, disease). A group of fungus diseases of plants, in which the fruits, stems, and leaves suffer serious injury. Common forms are found upon beans, blackberries, raspberries, cucumbers, egg-plants, grapes, cotton, peppers, and spinach. Species of *Colletotrichum* and *Glœosporium* cause most of these diseases. About 500 species have been described under these genera, but it is now believed they may be reduced to a very few. The perfect forms of most of the species are now referred to the genus *Glomerella*. In the fruit attacked definite round discolored spots or pits appear, with a usually 'light-colored' centre, surrounded by darker zones. See GRAPE; BEAN, and the other plants mentioned above.

AN'THRACO'SIS. A disease peculiar to coal-miners, incident to long-continued inhalation of coal dust. The lungs are subjected to constant irritation, become black from deposited coal particles, fibrous tissue increases at the expense of the air spaces, and hard, nodular areas are formed, which tend to undergo ulceration. Such lungs are peculiarly liable to become tuberculous. See PNEUMOKONIOSIS.

AN'THRAPUR'PURIN. See PURPURIN.

AN'THRAX (Gk. *ἄνθραξ*, coal, carbuncle, malignant pustule; Fr. *charbon*). An acute, febrile, infectious disease produced by the *Bacillus anthracis*. The disease is known as charbon, splenic fever, milzbrand, carbonchio, mjeltbrant, and Siberian plague; in man as carbuncle or malignant pustule, wool-sorter's disease, and, incorrectly, malignant œdema.

Anthrax was the first disease traced to bacterial generation. It is most prevalent among herbivorous animals—cattle, horses, sheep, and goats—varying in relative frequency with the region. The camel and various members of the deer family are frequently affected. Anthrax is frequently transmitted to man, especially through abrasions of the hands of those who handle infected wools or hides. It may also be implanted in the lungs through inhalation of infected spores and, though rarely, in the intestines through swallowing food containing anthrax spores. The chief general anatomical changes are hemorrhages, by which all the organs are often permeated, serous, gelatinous, and hemorrhagic infiltrations of the subserous, submucous, and subcutaneous connective tissue, swelling of the spleen and parenchymatous inflammation of the liver and kidneys, and a tar-like condition of the blood. Œdema, fever, diarrhœa, delirium, and hemorrhages are followed speedily by death.

Enzoötic outbreaks of anthrax have been known from time immemorial and in all parts of the globe. In cattle veterinarians distinguish three forms of anthrax: per-acute or apoplectic, in which the animal suddenly drops to the ground and dies in convulsions after a few minutes or at most an hour; the acute form without external swellings, most frequent in cattle, in which the temperature is increased to from 40° to 42° C.; restlessness and excitement, or general prostration, and labored breathing appear, and death supervenes, with signs of asphyxia, in from 10 to 24 hours; the sub-acute form, which is rare, with symptoms the same as in the acute form, but less pronounced, death occurring in from one to seven days.

In both horses and cattle an external form of anthrax occurs, in which tumors or carbuncles develop under the skin. These tumors are distinguished from those of black-leg by the fact that they do not emit a crackling sound on being stroked. Before death the discharges of the body may become mucous or even bloody. In animals

which die of anthrax, blood-clots are found on nearly all the vital organs, and the spleen is enlarged to from two to five times its normal size. If needful, a definite diagnosis may always be made by an examination for the presence of the anthrax bacillus, which may be found in the blood within 16 to 18 hours before death.

In countries subject to the ravages of anthrax, the disease is usually restricted to well-defined areas, which seem to be permanently infected. Anthrax is most common in localities subject to inundation. Ponds of stagnant water and streams polluted with the waste from tanneries and morocco factories may serve as sources of infection. Perhaps the most common means for the spread of anthrax infection is found in the bodies of animals dead of the disease. The anthrax bacillus may gain entrance to the body of an animal in the inspired air, in food or water, or in wounds of the skin. The rapidity with which the different symptoms of anthrax develop depends largely upon the relative resisting power of the animal.

The bacillus in blood drawn from affected animals and dried may remain virulent for a month or longer. Anthrax spores may retain their vitality in the soil for an almost indefinite period, especially if situated at some depth, where they are protected from the action of light and oxygen. Putrefaction destroys the vegetative form of the bacillus, but does not affect the spores. In the filamentous form the bacillus is killed by exposure to a temperature of 55° to 58° C. for 10 to 15 minutes. The spores are very resistant to dry heat, a temperature of 120° to 140° C. for three hours being required to kill them.

Domestic animals may be immunized in practice by attenuated living cultures of the bacilli, by spore-containing cultures, by immune serum, and by immune serum and living cultures.

Active immunization by vaccination has been extensively practiced, as the organism may be attenuated in a variety of ways. The first developed and the one most commonly used is that established by Pasteur in 1881. He found that when grown at a temperature of 42° to 43° C. the pathogenicity of this bacillus gradually decreases until injections no longer cause the death of rabbits, and if continued even the mouse will not succumb, the bacilli in such cultures dying in about a month. Pasteur's method of protective vaccination consists in the injection subcutaneously of a culture attenuated by 24 days' growth at a temperature of 42.5° C., followed in 10 to 12 days by an injection of a stronger vaccine, i.e., one attenuated by a growth of but 12 days at the same temperature.

In 1911 Dawson prepared a single vaccine, which differs from the Pasteur vaccine only in the degree of attenuation and in that it is applied but once. This vaccine is recommended for use when animals are dying from the disease and an immediate protection is necessary. A passive immunity may be established within a few hours by the injection of an immune serum, but such immunity lasts for but one to two weeks.

In primary local affection of the skin, subcutaneous tissue, or the visible mucous membrane, deep incisions should be made, and after thorough scraping the wound should be repeatedly washed and cauterized. In cases of generalized disease which are not far advanced, the treatment with immune serum gives good results. In the prevention of anthrax the main reliance of the stockman is to be placed in vaccination. Anthrax vaccine may now be purchased of wholesale druggists and has proved very efficient in the prevention of the disease. The most important sanitary measure to be adopted in case of an outbreak of anthrax is the immediate and complete destruction of animal carcasses. This is best accomplished by burning. If anthrax carcasses are not destroyed, the contagion may be spread in the soil and water, and may also be carried by flies, buzzards, dogs, and other carnivorous animals. The thorough sterilization of hair, wool, and animal skins by steam, dry heat, or otherwise, will prevent the infection of man from handling these products.

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AN'THROPO- (from Gk. *ἄνθρωπος, anthrōpos*, man, human being). A combining form occurring at the beginning of many English words, especially scientific terms, and denoting that the word has something to do with *man* or *mankind;* e.g., *anthropo*-geography, the geographical distribution of mankind; *anthropo*logy, the science of man; *anthropo*phagy, man-eating, or cannibalism; etc.

AN'THROPO-GEOG'RAPHY (Gk. *ἄνθρωπος, anthrōpos*, man + *γεωγραφία, geōgraphia*, geography). A division of bio-geography which describes the distribution of the varieties of mankind and depends upon anthropology as the science from which it derives its facts regarding the types of men. Both in Germany and France the literature on the subject is assuming considerable dimensions. Prof. Friedrich Ratzel was appointed to the chair of anthropo-geography at Leipzig, in 1866. His *Anthropo-geographie* (Stuttgart, 1899) is a type of this division of geography. Anthropo-geography is treated in more or less detail in most recent works on ETHNOLOGY (q.v.). The most important American work in this field is Semple, E. C., *Influences of Geographic Environment* (New York, 1911). See also GEOGRAPHY, ECONOMIC; ANTHROPOLOGY.

AN'THROPOID APES. See APE.

AN'THROPOL'ATRY (Gk. *ἄνθρωπος, anthrōpos*, man + *λατρεία, latreia*, worship). A term signifying, according to its derivation, the worship of man, and always employed in reproach. Thus, the early Christians accused the heathen of anthropolatry because in their mythology men were represented as exalted among the gods, although an *apotheosis* (q.v.) was in these cases alleged by their worshipers; and the heathen retorted the charge of the worship of Christ, the reply to which was the assertion of his divinity. But the term is chiefly known in ecclesiastical history in connection with the employment of it by the Apollinarians against the orthodox Christians of the fourth and fifth centuries, who in worshiping Christ worshiped, as

was affirmed, only a man in whom God dwelt. See APOLLINARIS.

AN'THROPOL'OGY (Gk. *ἄνθρωπος, anthrōpos*, man + *λόγος, logos*, discourse, science). The science of man. Originally the term signified the zoölogy and comparative anatomy of man, but has long since come to have a much wider meaning. Like any other science it now has certain problems of its own according to which its province is determined rather than by the etymology of its name or even its historic development. The fundamental problems of anthropology are the relative antiquity of man's first appearance upon the earth, his subsequent distribution and career. To some extent these problems are shared by other sciences: thus the relative time of man's appearance upon the earth is largely a geological problem in that the ages of the various strata bearing traces of man must be determined entirely by geological methods. Again man's relation to mammals is in the main a zoölogical and palæontological problem for whose solution we must look to special students of those subjects. When, however, we come to man's distribution and career on the earth, we not only deal with the most distinctly human character in the world, but with a problem almost peculiar to anthropology. Anthropologists use the term "culture" to designate the results of man's activities or those characteristics not subject to inheritance. A human being comes into the world with certain instincts or tendencies to act, which may be designated as his biological equipment for life. With the nature of this equipment the zoölogist, physiologist, and psychologist are concerned. The anthropologist, on the other hand, is concerned with the functioning of this equipment, especially those instincts that lead to the production of culture. Though culture is not inherited, it is accumulative in that each group of people tends to preserve and conserve its experience.

It may be necessary to distinguish between the field of anthropology on the one hand and those of history and sociology on the other. While each deals with certain aspects of the cultural problem, they stand quite apart. History has to do with the culture of peoples having more or less definite records, or, at least, with such as have immediate connection with historic cultures. Anthropology takes up the prehistoric period of culture and the savage and primitive groups still living, but not constituting integral parts of the historic nations. The distinction is here fairly definite. Sociology concerns itself with the special social equipments of man and especially with the many practical problems that confront our own social life. To the social activities of non-historic peoples it seldom refers, except for illustrative data and suggestions as to theories for social origins.

It appears, then, that the peculiar and distinctive group of problems in anthropology are those that refer to culture. As we have noted, certain aspects of the antiquity of man are geological problems, but the presence of man in the past is usually determined by the remains or by-products of his cultural activities rather than by his own bones. When such objects are found in a given strata, such as broken flints, cracked animal bones, etc., it is for the anthropologist to say whether the objects in question were made by man and to determine from them what form of culture was practiced by their makers. The geologist is to be called upon to determine the age and conditions of the particular strata in which the objects were found, but with the cultural problem he has nothing to do, that being the peculiar province of the anthropologist.

There are several subheads under which the data of anthropology are grouped, viz., ethnography, ethnology, archæology, and physical anthropology. The first concerns itself chiefly with the classification and distribution of mankind. Ethnology gives its attention to the cultures of living people, their language, art, religion, social organization, industrial arts, etc. Archæology is the combined ethnography and ethnology of extinct peoples. Physical anthropology concerns itself with comparative studies of the anatomy and physiology of the different peoples, seeking to establish criteria by which the hereditary relationships of the different peoples of the earth may be determined.

The biological sciences have a fundamental conception in the doctrine of evolution which, once comprehended, gives one a general understanding of the whole. Some years ago anthropologists attempted to build their science upon the same conception, as the writings of the period attest, but it is now generally accepted that while the conception applies well enough to man's biological equipment, or to that part of him that is transmitted by heredity, it is not consistent with the facts of cultural development. When one recalls the fact that the biological theory of evolution is based upon descent, it is not strange that the conception should fail in its application to phenomena that are not hereditary but perpetuated by education and imitation. When this point became clear to anthropologists, they formulated what is known as the historical or cultural point of view as opposed to the biological or evolutionary.

The biological or evolutionary point of view was never very clearly formulated, but was an assumption that the law of progressive development held for all forms of culture. It was assumed that the transition of a people from a hunting to an agricultural mode of life, for example, was a normal or even a necessary course of development and a step almost certain to be taken sooner or later by every group of people. In conformity to this theory attempts were made to grade all the cultures found in the world into a progressive series of higher and lower, the most notable being the work of Sir John Lubbock. The difficulty in this case was that a genetic relationship had of necessity to be assumed between all the groups in the scheme ranging from the lowest savagery to the highest civilization, whereas data to support such assumptions were wanting. To prove definitely genetic relationship between types of culture we must know the cultural history of particular peoples. Direct data of this kind from non-historical peoples are scarcely to be had, but as the study of primitive cultures progressed anthropologists found a great deal of indirect data and noted conditions not consistent with the genetic view. During this period of development several important theories were developed; the animistic hypothesis of Tylor accounting for the origin and life history of religious and philosophical concepts; the social evolution of Morgan, Westermark, et al., accounting for the origins of marriage, exogamy, etc.; the totemic conception in whose development Frazer played the leading rôle; the theory of industrial evolution as developed by Tylor and Balfour, or the

notion that by arranging objects made by man in what seemed to be their most logical order, we can discover their genetic relationship; and, finally, the evolution of art as demonstrated by Haddon and others, the theory being that the origins of conventionalized designs and even simple geometric figures may be discerned by tracing them back to their realistic prototypes. (For similar attempts at the evolution of language, see ARYAN and LANGUAGE.) The chief leaders in this development were Englishmen, Morgan being the only American contributor. This development was certainly due to the influence of Darwin and his contemporaries.

All the preceding conceptions were worked out somewhat deductively and, with one or two exceptions, without resort to direct investigation. The method was to take extracts from the books of travelers or to select objects from museum collections in such a way as to illustrate the workings of each theory.

This period was followed by the one in which we now find anthropology, a period marked by intensive field-research among the peoples now living and highly developed techniques for the excavation and analysis of archæological remains. In this American anthropologists have played a leading part. The result has been the general abandonment of the preceding hypothesis as to the origin of culture and the formulation of several important principles of development.

Among these are the secondary association concept, the principles of convergent evolution, the tribal pattern theory, and independent development, all of which are in opposition to the fundamental concepts in the anthropology of the preceding period. Secondary association is conceived of as the bringing together of unrelated phenomena by historic contact or purely accidental means, such connection having neither functional nor genetic significance. Convergent evolution is the idea that two peoples may arrive at the same form of culture by entirely different steps and methods. The tribal pattern theory is that when once a people have developed definite ideas on religious, moral, or artistic subjects, they tend to recast all new ideas and practices and thus give them the same general pattern. All of these may be considered as definitely established, since authentic examples are available. The last, however, is less conclusive, for, though some examples of independent development are known, there are still able defenders of the theory that similarity of cultures means unity of origin. In the latter Graebner of Germany is the leader, in the former Boas of America. No one denies that both principles operate, but the partisans of one consider the other of minimum importance. All of these views are in one respect opposed to the hypothesis of the earlier period, for in any case the cultural history of a people cannot be reconstructed theoretically. One must know the history of a tribe before he can say which of these principles will account for its culture. This is an empirical point of view, and it is this generalized conception that is now known as the historical or cultural point of view in anthropology.

The practical problems now confronting anthropologists are the collection and recording of facts of human culture among the rapidly vanishing primitive peoples, and the systematic archæological survey of the earth's surface, both supplemented by anthropometric and anatomical studies of living races and skeleton material. Specimens of many kinds are gathered into museums where some kinds of investigations are made, but the real work is done in the field and not in the museum or laboratory. See MAN; ETHNOLOGY; ANTHROPOMETRY.

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ANTHROPOLOGY, CRIMINAL. See CRIMINOLOGY.

ANTHROPOLOGY, THEOLOGICAL. A theological system which considers man as being the subject of sin and grace. It consequently considers his natural powers, so far as these relate to moral action and states—the moral intuitions, conscience, the affections, the will, habit—the original sin of Adam and its effects upon himself and upon his posterity, the corruption of nature, technically called "original sin," and the fall, heredity, the bondage of the will, and imputation. To these topics certain others are often added, such as the origin and antiquity of man, the origin of the soul (whether by creationism or traducianism), and the unity of the human race. See SIN, GRACE, ETHICS, ORIGINAL SIN, FALL, IMPUTATION, SOUL, CREATIONISM, TRADUCIANISM.

AN'THROPOM'ETRY (Gk. *ἄνθρωπος, anthrōpos*, man + *μέτρον, metron*, measure). A method of measurement pursued in anthropology. The primary measurements are those of the normal body at rest, and include stature, weight, circumference of head, reach (or span of extended arms), circumference and expansion of chest, length of arm and leg, sitting height, circumference of waist, limbs, hips, and shoulders, length of forearm and thigh, size of foot, length of fingers, size and position of ear, facial angle (i.e., degree of prognathism), shape of head, size and form of nose, position and attitude of eyes, etc. Of these elements of the human body, only a few are commonly regarded as of ethnic significance, or of use in describing and comparing peoples or races considered collectively; the elements commonly so employed comprise stature, size and shape of head, facial angle, relative length of limb, attitude of eyes, etc. Some or all of the other elements receive special consideration in studies and comparisons of selected classes of population, e.g., school-children of various ages or grades; and certain of the elements are customarily recognized in the study of individuals, such as athletes, criminals, etc. With these definitely quantitative measurements, other individual or typical attributes of the human body are commonly correlated; chief among these are color (of skin, hair, eyes, mucous membrane, nails, etc.), character of pelage (scalp hair, beard, axillary and pubic hair, body hair), local and general texture of integument, form and mobility of features, etc. Other measurements of common use in anthropologic studies are those of the skeleton, particularly the skull, jaws, and long bones. Various anthropologists, like Manouvrier, Deniker, and Pearson, have devised formulas for determining stature from the length of femur, tibia, humerus, and other long bones; and the relative dimensions of the differ-

ent bones of the skeleton are commonly regarded as ethnic indications. The forms of certain bones are also deemed ethnic criteria; the flattening of the tibia (platycnemism) and the perforation of the humerus in the olecranon fossa have received especial consideration in this connection. The measurement of the skull has been developed into a system known as craniometry. A leading feature in this aspect of anthropometry is the cranial index, i.e., the breadth of the skull in proportion to its length as viewed from above (in the *norma verticalis*); and three types are commonly defined as dolichocephalic or long-head, mesocephalic or round-head, and brachycephalic or broad-head varieties of the genus Homo, the ratios of breadth to length being about 70: 100, 80: 100, and 85: 100, respectively.

Another important feature of the system is the capacity of the brain-case, measured by means of liquid or fragmental substances (water, glycerin, sand, fine shot, or small seeds), poured into the cavity and afterward weighed or gauged, or by aid of a thin, elastic, and impervious bag inserted through the foramen magnum and afterward filled with liquid; and connected with such determinations is the direct weighing or measurement of the brain itself. Still another feature is the facial angle, i.e., the angle subtended by the bones of the face and forehead with the base of the cranium, viewed from the side (*norma lateralis*), or in vertical antero-posterior section (*norma mediana*). There are several modes of defining this angle, those of Camper, Cloquet, Jacquart, and Cuvier being best known; and the progressively increasing angle from the lower animals to the anthropoids, and thence from the lowest races to the highest type of humanity, is among the striking facts brought out by scientific inquiry. The facial index is another feature of modern anthropometry and affords arbitrary but useful means of comparing crania of different types, while craniometric specialists have devised a series of points, lines, and angles serving to define cranial forms and types in great detail. Among the applications of anthropometry, in what may be called the static aspect, are those involved in the Bertillon system (q.v.) and related methods of bodily description for identification or other purposes, and among these that of identification by finger-prints (i.e., by the patterns of the papillaceous ridges which are peculiar to each individual), which was brought out some years ago in America by Gilbert Thompson and in England by Francis Galton, and has come into general use in the identification of criminals. (The United States Indian service now requires all signatures of Indians to be accompanied by the finger-print).

During recent decades what may be called the dynamic aspect of anthropometry has attained prominence, and the measurement of structures has been supplemented by measurement of functions, both periodic and special. Among the former are rates of respiration and pulsation, which vary with sex, age, and race as well as with individual characteristics and conditions; and various devices (including the plethysmograph, with its variants and improvements) have been devised to measure the interrelations between the periodic and special functions of the human body. The latter functions are too numerous and variable for ready treatment, though athletic records, the military step in various armies, the hours of labor in different countries and classes, and other relevant material are gradually assuming systematic form. Among the most fruitful lines of measurement of human function are those of experimental psychology, and education where, by use of the special statistical methods of Pearson, the functional relations between different kinds of activity may be discovered. The data obtained through anthropometry may be summarized under somatology (q.v.). See INDEX.

AN'THROPOMOR'PHISM (Gk. *ἄνθρωπος, anthrōpos*, man + *μορφή, morphē*, form). The application to God of terms which properly belong only to human beings. This may be done literally, teaching that God really has a body as some (see AUDÆUS) have been accused of doing, with doubtful truth. Some philosophers (Hobbes, Forster, Priestley) have ascribed to God a sort of subtle body. Figuratively, anthropomorphism is employed in the Scriptures, as when God is said to have eye or arm. Anthropopathism ascribes to God human affections and passions and is the more common form of anthropomorphism. The whole tendency arises from the difficulty of conceiving of God as he is in himself, and from the teachings of Christianity, which seeks to reveal God to men and employs terms which are capable of being understood. While it is susceptible of abuse, it has a fundamental justification in the fact that if there is to be any knowledge of God at all, man must be assumed to possess a like nature with God. We are made "in his image." All early religion was strongly anthropomorphic. As it advanced, the gods became less like men in form, but a certain kinship of spirit must always exist, so long as there is any conception which could be called God. The extreme of recoil from anthropomorphism is found in those philosophers (e.g., Fichte and his school) who reject the personality of God as anthropomorphic. Schleiermacher, following Spinoza, thought that there was something in God far higher than personality, which he regarded as a human limitation.

AN'THROPOPH'AGY (Gk. *ἄνθρωπος, anthrōpos*, man + *φαγεῖν, phagein*, to eat). Cannibalism; the eating of human flesh. See CANNIBALISM.

ANTHU'RIUM. See ARUM.

ANTHYL'LIS. See KIDNEY VETCH.

AN'TI, or **CAMPA.** An important and warlike tribe of Arawakan stock, occupying the forests at the head waters of the Ucayali River, the pampa of Sacramento, etc., on the eastern slope of the Andes, in southern Peru. The eastern division of the Inca Empire took its name of Antisuyu from them. They are of good physique and pleasant countenance and wear their hair long and flowing, with a poncho belted around the waist as their principal garment. The women are skillful weavers of wild cotton, and the men are good metal workers. They cultivate the ground to some extent and delight in taming animals from the forest. One of their important subtribes is the Machiganga, or Machiyenga, concerning which consult Farabee in *Proc. Amer. Antiq. Soc.*, vol. xx, N. S., pp. 127–131.

AN'TIA'RIA AND ANT'JAR. See UPAS.

ANTIBES, ăn'tēb'. A fortified seaport in the department of Alpes-Maritimes, in the southeastern part of Provence, France, and the general port of communication with Corsica. It is 11 miles southwest of Nice, situated on the east side of a small neck of land called La Garoupe, lying west of the mouth of the Var, in a fertile

district (Map: France, S., M 5). The harbor is serviceable only for small craft. It possesses a naval school, and has considerable trade in olives, dried fruits, salt fish, oil, perfumery, etc. The anchovies prepared at Antibes are held in high esteem. The environs of the town are bright with vineyards and orchards, while its gardens of roses and jasmine furnish material for the extensive perfume manufactories of the town. There are a number of tobacco factories. Pop., 1896, 4956; commune, 9329; 1901, 5512; commune, 10,947; 1911, 12,198; commune, 21,414.

Antibes is very old, having been founded under the name of Antipolis by a colony of Greeks from Massila (Marseilles), of which it became a dependency. In the time of Augustus it was elevated to the rank of a *municipium* and must have attained a high degree of prosperity if we are to judge from the ruins of theatres and aqueducts that still exist. After the disintegration of the Roman Empire Antibes shared the fate of all cities in that region, becoming subject to successive tribes of barbarians from the North. In the ninth century it was destroyed by Saracens; in the sixteenth century it was fortified by Francis I and Henry IV; during the War of the Austrian Succession it sustained a siege of three months (1746), and gained some celebrity from having closed its gates against Napoleon on his return from Elba. Consult Vinson, "Le port et le quartier maritime d'Antibes," in *Revue Maritime*, vol. cxlvi (Paris, 1900).

AN'TIBURGH'ER. See BURGHER.

AN'TICANT, DR. PESSIMIST. An appellation of Thomas Carlyle (q.v.).

AN'TICHLOR (*anti* + *chlorine*). Any one of several substances (e.g., sodium sulphite, sodium bi-sulphite, sodium hyposulphite, or calcium sulphide) used by manufacturers of linen and cotton fibre and paper pulp to remove the last traces of free chlorine that had been generated from the hypochlorite used in bleaching the materials mentioned. Free chlorine has a tendency slowly to disintegrate the material unless removed.

AN'TICHRIST (Gk. Ἀντίχριστος, *Antichristos;* from ἀντί, *anti*, against + Χριστός, *Christos*, Christ). A name which occurs only in the Epistles of John, but which, in all likelihood, designates the final New Testament form of a popular belief, whose rise is to be found in later Judaism and which was appropriated with various modifications by biblical writers.

Its source is a question of much debate. Most probably, however, it lay in the popular convictions aroused by the constant announcement of the divine purpose to punish Israel's sin by giving her into the hands of heathen nations, but to recover her by force from their power when her spiritual discipline had been accomplished. The repeated carrying out of this policy, even in earlier Jewish history, evidently impressed the popular mind with the idea of an essential opposition between the heathen nations and the people of God, the final outcome of which was yet in the future, but must be in favor of the chosen people. Such an impression may have been aided by the instinctive natural beliefs in the struggle of darkness with light and chaos with order (Bousset); but, in view of the above unique line of revelation and experience peculiar to the Jewish people, it is quite gratuitous to make such general beliefs the definite source of such a distinctive popular conviction.

As the later revelation emphasized the element of punishment to be administered to the heathen nations by announcing that God would not only recover his people when their discipline was finished, but would chastise the nations for any attempt on their part to overreach the disciplinary mission given them, the popular idea of the hostility of the nations to the people of God was naturally increased. The primary form of this popular conception is evidently used by Ezekiel as a basis for his prophecy concerning the consummation of Israel's restoration, in which he describes the nations of the world as assembled under the leadership of "Gog of the land of Magog," for final battle against Israel (Ezek. xxxviii., xxxix.; see also Zech. xii. to xiv. where the prophet foretells the gathering together of all the nations of the earth to fight against Jerusalem, and the Lord's going forth in turn to fight against them).

In the experience of the Jews under Antiochus Epiphanes, however, the popular conception of this struggle made a distinct advance, in which the opposition was concentrated in a single personage, and all idea of disciplinary mission toward Israel was lost sight of in the conviction of an inherent enmity against the people of God. This secondary form appears in the eschatological prophecies of the Maccabean Book of Daniel (Dan. vii. to ix., xi., xii., in which are given the vision of the beast with the ten horns, triumphed over by the "Ancient of Days," and the vision of the goat with the horn between the eyes who warred against the holy city but was finally himself destroyed).

Naturally, as the idea of a personal Messiah increased in definiteness, this popular belief in a personal adversary would grow stronger, especially when we consider the long-continued influence on Jewish thought of the Daniel prophecies. We can believe, therefore, though the Jewish apocryphal literature antedating the Christian era does not distinctly show it, that the conception of an Antimessiah was more or less current in Judaism before the rise of Christianity. This Antimessianic conception is appropriated by New Testament writers, with modifications due to the newer revelations of truth in the Gospel and apostolic times, particularly those which substituted the spiritual for the national idea of the kingdom of God, and so emphasized the significant distinction between righteousness and sin. So we see Paul's statement concerning the advent and mission of the Man of Sin and his final destruction by Christ (2 Thess. ii. 1–12: "For the day of the Lord will not come, except . . . the Man of Sin be revealed, . . . who opposeth and exalteth himself against all that is called God . . . whom the Lord Jesus shall slay with the breath of his mouth . . . whose coming is according to the working of Satan with all power and signs and lying wonders . . . and deceit of unrighteousness"), where, however, in the deceiving character of his mission, there is brought out a new idea—an idea which is frequently applied by Paul to those who opposed him and his gospel (Acts xx. 30; 2 Cor. xi. 13; 1 Tim. iv. 1, 2). So also we see the various forms of statement in the Book of Revelation regarding the Beast and the Dragon (compare Rev. xi. to xiii., xvi., xix., xx., in which we are told of "the beast that cometh up out of the abyss," who overcomes "the two witnesses," and of the "red dragon having seven heads and ten horns," warring

against the woman and her child and destroyed by Michael and his angels; also of the "beast coming up out of the sea, having ten horns and seven heads," ministered to by the "beast coming out of the earth," with "two horns like unto a lamb," and finding his identification in the mystical number "six hundred and sixty and six"). The idea of the deceiving mission of the adversary, however, is in this book specifically pictured in the separate figure of the False Prophet, "who wrought signs wherewith he deceived them that had received the mark of the beast" (Rev. xvi. 13, xix. 20, xx. 10, though compare also xii. 9 and xiii. 14 for the same characteristics in the Dragon and the Beast). In this figure there is a return to the earlier personal idea of the Antimessiah, and, at the same time, an advance to the final New Testament form found in the Johannine Epistles, where the teaching of false doctrines is personified in the term Antichrist (1 John ii. 18, 22; iv. 1–3: "Many false prophets are gone out into the world . . . Every spirit which confesseth not Jesus . . . this is the spirit of Antichrist"; 2 John 7: "This is the deceiver and the Antichrist").

This Antimessianic conception is clearly appropriated by Jesus as a form for his eschatological statements regarding those who shall appear in opposition to his cause (Mark xiii. 5, 6; "Many shall come in my name, saying, 'I am he': and shall lead many astray"; see also verses 21, 22: "There shall arise false Christs and false prophets, and shall shew signs and wonders, that they may lead astray, if possible, the elect"). In these statements Jesus seems, in the term "false," to have distinctly introduced a new idea, which does not appear to have been present in the popular beliefs. This would, however, have been quickly intelligible to those of his hearers who recalled the false prophets of Jewish history, whose ability to deceive the false Christs were to reproduce. From the tradition of Jesus' words may have come the idea of falseness in Paul's statement regarding the Man of Sin and his own gospel opponents; from its definite form in the written gospel is quite certain to have come John's statement regarding the false prophet, if not his use of the term itself.

The idea of Antichrist persisted into the post-apostolic times, in both Jewish and Christian circles. In the former it returned to its earlier national form; in the latter it carried forward the final New Testament form of the teaching. Consult: H. Gunkel, *Schöpfung und Chaos* (Göttingen, 1895); W. Bousset, *The Antichrist Legend* (Eng. trans., London, 1896); Wadstein, *Die Eschatalogische Ideengruppe-Antichrist-Weltsabbat-Weltende und Welgericht* (Leipzig, 1896); M. Friedländer, *Der Antichrist in den vorchristlichen jüdischen Quellen* (Göttingen, 1901). Consult also the Excursuses by Bornemann, Findlay, and Milligan, in their Commentaries on the Thessalonian Epistles; and the article on "Antichrist" in *Standard Bible Dictionary*.

ANTI-CIGARETTE LEAGUE. An organization founded in 1901 for combating by all legitimate means the use of cigarettes and other forms of tobacco by boys. It grew out of the work done along these lines for many years by Miss Lucy Page Gaston. The work of the league includes the introduction of anti-cigarette legislation in State legislatures and the circulation of pledges among boys. The stringent laws against the selling and smoking of cigarettes enacted in many States in recent years have been passed largely through the efforts of the league. Its organ, *The Boy Maguzine*, is edited by Miss Gaston.

ANTICIPATION. In music. See HARMONY.

AN'TICLI'MAX (Gk. *ἀντί, anti*, against + *κλῖμαξ, klimax*, a ladder, climax). In rhetoric, an abrupt declension by a writer or speaker from the dignity to which his idea has attained. Though the anticlimax is to be avoided in serious discourse, where it leads to bathos, it is employed with fine effect in ridicule and satire. Pope, Addison, and Fielding were masters in this art of unexpected descent. Pope, for example, thus writes of Queen Anne at Hampton Court:

> "Here thou, great Anna whom three realms obey,
> Dost sometimes counsel take—and sometimes tea."

AN'TICLI'NAL AX'IS. See ANTICLINE.

AN'TICLINE (Gk. *ἀντί, anti*, against, opposite + *κλίνειν, klinein*, to incline). In geology, a term applied to that form of rock-folding in which the opposite sides or limbs of the fold slope downward and away from the crest of the fold. Anticlinal axis is the axis or crest of such a fold. The anticline may be compared to the ordinary gable roof—the axis corresponding to the ridge of the roof, while the limbs of the anticline correspond to the slopes of the roof. When the anticlinal axis lies in a horizontal plane, which, however, is seldom the case, the layers composing the limbs of the fold are, after erosion, exposed in parallel rows on either side of the axis; those layers of earlier age, and consequently of lower stratigraphic position, occupying positions nearer to the axis, and vice versa. Thus, in an anticlinal ridge the crest of the ridge is occupied by rocks of a geologic age earlier than that of the rocks forming the flanks of the ridge. A special case of anticlinal structure is represented by the dome in which the strata slope away in all directions from a central point or summit.

The supplementary condition to that of the anticline or up-fold, is observed in the *syncline*, or down-fold, and indeed these two types of folds are usually found in close association; the features of anticlines being, however, reversed in synclines. When anticlinal and synclinal axes are tilted and eroded, the component layers outcrop in alternating convergent and divergent series to form zigzag ridges with intervening "canoe-valleys," a type of structure which is well developed in Pennsylvania. The term *anticlinorium* is applied to a compound anticline, and the term *synclinorium* to a compound syncline. Anticlines are sometimes associated with the occurrence of natural gas, it having been demonstrated that the gas occurs at those portions of the gas-bearing stratum that have been thrust upward to form an anticlinal axis or dome. See DIASTROPHISM; GEOLOGY; and for illustration, see Plate accompanying the latter title.

AN'TICOS'TI (N. Amer. Ind. *Naticotek*). A barren island in the province of Quebec, Canada, dividing the Gulf of St. Lawrence into two channels and situated between lat. 49° and 50° N. and long. 61° 40′ and 64° 30′ W., 40 miles north of Cape Gaspé (Map: Canada, S 7). It is 135 miles long, with a maximum width of 40 miles; has an area of 3147 square miles. It is almost destitute of harbors, the north shore being mountainous, and the south low and beset with shoals, while the neighbor-

ing currents are capricious. Ellis Bay, to the west, and Fox Bay, in the northwest, are the only possible harbors. The climate is severe, while the surface is an alternation of rocks and swamps. The principal inhabitants are the keepers of the lighthouses situated at different parts of the coast. Pop., about 250. There is little good timber, and agriculture cannot be carried on to any great extent because of prevalent summer frosts. Near the island there are considerable salmon, trout, cod, and herring fisheries. It is a favorite resort for seal and bear hunters. The most extensive peat deposits in the Dominion are found here. Marl exists in most of the small lakes and ponds along the coast. In 1873 the island was divided into 20 counties by a land company and was the scene of a disastrous colonization scheme. The colonists were attracted by specious promises, and had to be removed to the mainland after suffering severe privations. In 1895 Anticosti was acquired as a game preserve by M. Menier, a Parisian manufacturer. The rocks of Anticosti are of great interest to the geologist, as they comprise a series of shale and limestone beds that constitute an uninterrupted transition formation between the Ordovician and Silurian systems such as is known in few other localities. Consult: Logan, *Geological Survey of Canada, Report of Progress from its Commencement to 1863*, with atlas (Montreal, 1863–65); Billings, "Catalogue of the Silurian Fossils of Anticosti," *Geological Survey of Canada* (Montreal, 1866). See SILURIAN SYSTEM.

AN'TICY'CLONE. See STORM.

ANTICYRA, ăn-tĭs'ĭ-rȧ (Gk. *Ἀντίκυρα*). A city of Phocis (q.v.), on the Corinthian Gulf, with an excellent harbor. It was famous for the hellebore which grew in the neighborhood and so was much visited by the sick. The modern town is Aspra Spitia. There were two other towns called Anticyra, one in Locris and one in Malis.

AN'TIDOTE (Gk. *ἀντίδοτος, antidotos*, given against, from *ἀντί, anti*, against + *δίδόναι, didonai*, to give). A term applied in medicine to any substance capable of neutralizing the action of a poison. The action of antidotes may be due either to their chemical properties or to their having physiological effects that are the opposite of those which they are intended to counteract. Acids and alkalies are an example of chemical antidotes. Morphine and atropine are typical examples of physiological "antagonism." In cases of poisoning in which no true antidote is known, the treatment resorted to is necessarily of a mechanical nature. Such cases are in the majority; so that the stomach pump, emetics, and purgatives play an important rôle in the treatment of most cases of poisoning. The following is a list of the ordinary poisons, with their antidotes and other measures employed in counteracting them.

Acetanilid, Antipyrin, Phenacetin (ingredients of Headache Powders).—The patient should be kept warm, and heart stimulants, such as strychnine, digitalis, or whisky be administered.

Acids, Vegetable; Acetic, Oxalic, Tartaric Acids.—Give the patient water containing a suspension of such alkaline substances as chalk, whiting, or, in emergency, plaster scraped from the wall. Then give a dose of castor oil or of Epsom salts.

Acids, Mineral; Nitric, Sulphuric, Hydrochloric Acids.—Give chalk, magnesia, or soap, followed by demulcent drinks, such as the white of egg.

Alcohol.—The stomach may be emptied by an emetic or a stomach pump, and this followed by such stimulants as aromatic spirits of ammonia or hot coffee in repeated doses until the pulse has become strong. Then cold should be applied to the head and heat to the extremities.

Arsenic, Paris Green, "Rough-on-Rats."—A tablespoonful of "dialyzed iron" (sold in all drug stores) should be given to the patient every half-hour for four doses. This should be followed by a dose of castor oil.

Carbolic Acid.—A good chemical antidote for this is Epsom salts (magnesium sulphate) or any other soluble sulphate; for, on entering the blood, these form with carbolic acid harmless chemical compounds. Give the patient also large amounts of sweet oil, white of egg, and stimulants. Diluted alcohol is a valuable local antidote if given almost immediately after the poison is taken.

Carbonic Acid Gas, Carbonic Oxide, Coal Gas.—Fresh air should be supplied, artificial respiration employed, 30 drops of aromatic spirits of ammonia given every half-hour for three doses, and then one ounce of well-diluted whisky every three hours, for three doses.

Chloral, "Knock-out-drops."—Thirty grains of ipecac in water should be given to the patient as an emetic, followed by a hypodermatic injection of one-twentieth of a grain of strychnine. Friction of the surface, application of warmth, and artificial respiration are effective.

Corrosive Sublimate (Bichloride of Mercury), Bed Bug Poison, White Precipitate.—Thirty grains of powdered ipecac in warm water should be given to the patient as an emetic, then the whites of a dozen eggs, and a hypodermatic injection of morphine.

Iodine.—After evacuating the stomach administer starch suspended in water, followed by a dose of morphine hypodermatically, and inhalations of ammonia.

Nicotine, Tobacco.—The patient should be placed flat on the back, and emetics and stimulants should be administered. A hypodermatic injection of one-fortieth of a grain of nitrate of strychnine has a very good effect.

Opium, Morphine.—An emetic or the stomach pump should be employed first of all; then the patient should be made to inhale ammonia, and half a grain of permanganate of potash should be given every hour. Artificial respiration should be employed, two ounces of hot black coffee may be injected into the rectum, and rubbing and gentle shaking or brisk flagellation should be employed to keep the patient awake. A subcutaneous injection of atropine, or 30 drops of tincture belladonna given through the mouth, will have a powerful counteracting effect by stimulating the respiratory centre.

Prussic Acid.—Usually so rapidly fatal that nothing can be done, but when possible the stomach should be washed out, diluted ammonia given by the mouth with a dose of opium to relieve the pain. Then alternating hot and cold douches, atropine and heart stimulants by hypodermatic injection and artificial respiration.

Ptomaine Poisoning by putrefied meat or sausage (botulism).—Evacuate and wash out the stomach. Morphine is given to counteract the abdominal pain, and when there is prostration, stimulants.

Strychnine.—The stomach pump should be employed as early as possible, and 20 grains of zinc sulphate should be given, or 30 grains of powdered ipecac, in warm water, as an emetic. Then 20 grains of chloral and 30 grains of bromide of sodium, dissolved together in two ounces of hot water, may be injected into the rectum. In case convulsions occur, they may have to be controlled by the inhalation of chloroform. Chloral, which is in a sense antagonistic to strychnine, is considered a valuable antidote. In any case, 20 grains of sodium bromide should be given by the mouth every hour.

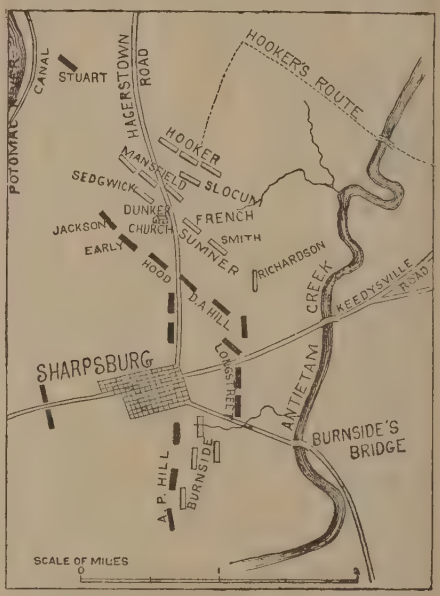
Tansy.—Thirty grains of powdered ipecac in warm water as an emetic, and a dose of castor oil, should be given to the patient.

Turpentine.—An emetic, mucilage of gum arabic, Epsom salts, and a hypodermatic injection of morphine, are indicated.

In the case of unknown poisons it is advisable to give two teaspoonfuls of chalk mixed with water, four eggs beaten up in a glass of milk, and some whisky. The stomach pump, too, may be useful, and in case these measures give no relief, artificial respiration should be employed. Of course, the physician should endeavor to ascertain the nature of the poison and direct the treatment accordingly.

AN'TI-EMET'IC (Gk. *ἀντί, anti,* against + *ἐμεῖν, emein,* to vomit). Any remedy which tends to arrest nausea and vomiting. No class of drugs is more unreliable in action, and rest and quiet are at times much more efficient than the administration of an anti-emetic. Drugs may act upon the vomiting centre, as morphine or hydrocyanic acid, or on the nervous system, or locally on the stomach. Of the local remedies, external applications of counter-irritants or of cold may succeed. Emetics act by removing the cause for continued vomiting; lavage, or washing the stomach, in the same way. Cold carbonated waters, alcohol, especially dry champagne, chloroform, opium, bromides, chloral hydrate, and arsenic are at times used successfully. Dilute hydrocyanic acid, small doses of calomel, cerium oxalate, cocaine, carbolic acid, nux vomica, and the alkalies are among the most reliable anti-emetics. In any case, it is necessary to determine the cause of vomiting before it is possible to select a proper anti-emetic. For example, the gastric disturbance may result from excessive acidity of the stomach contents, when an alkali or simple dilution with water may give relief; or it may be of cerebral origin, in which case such drugs as the bromides or opium may be required. If due to gastric irritation, a local anæsthetic may be efficacious; if to chronic alcoholism, some form of astringent, bitter, or stimulant, may relieve the vomiting. See EMETIC.

ANTIETAM, ăn-tē'tam, BATTLE OF, sometimes called THE BATTLE OF SHARPSBURG. A sanguinary conflict fought on Sept. 16 and 17, 1862, between a Federal force of about 75,000 under General McClellan and a Confederate force of about 40,000 under General Lee. After having driven McClellan from the Peninsula and Pope from the Rappahannock back upon Washington, Lee took the offensive and crossed the Potomac, with the intention of invading Pennsylvania, and with hopes of inducing Maryland to join the Confederate cause, and possibly of forcing a satisfactory peace upon the Federal government. Dividing his army, he sent Jackson against Harper's Ferry (q.v.), which surrendered with 12,500 men on September 15. Meanwhile, on McClellan's advance from Washington, Lee took up a strong position at Sharpsburg, on the west side of Antietam Creek and fortified the passes of South Mountain. These McClellan forced on the 14th (see SOUTH MOUNTAIN, BATTLE OF), and on the 15th the two armies stood facing each other across the Antietam. McClellan delayed his attack, and a part of Jackson's forces rejoined Lee; but on the afternoon of the 16th the Federal commander ordered Hooker across the creek, where the latter skirmished until dark. On the morning of the 17th



the Federal right and centre, under Generals Hooker, Mansfield, and Sumner, though their attacks were badly concerted, forced back the Confederate left under Jackson, who had arrived from Harper's Ferry during the night of the 16th; while the Federal left, under Burnside, which had been unable to cross the creek until 1 P.M. owing to the stubborn opposition of the Confederates at "Burnside's Bridge," attacked at 3 P.M. the Confederate right under Gen. A. P. Hill, and fought stubbornly until dark without obtaining any decisive advantage. McClellan decided not to renew the battle on the following day, though the Confederate right made several assaults upon Burnside's position, and during the night of the 18th General Lee retreated unmolested across the Potomac. The Federals lost in killed, wounded, and missing about 12,500, and the Confederates about 11,000. It was one of the bloodiest battles of the Civil War, more men being killed on September 17 than on any other one day between 1861 and 1865. Tactically, it was a drawn battle, though military critics are almost unanimous in the verdict, that McClellan, who brought only a part of his force into action, made many grave blunders, while the generalship of Lee, who utilized nearly every man, was almost faultless. Strategically, however, it was an important Federal victory, since it forced Lee to abandon his aggressive

campaign and retreat into Virginia. "Without McClellan's victory," says Rhodes, "the emancipation proclamation would have been postponed and might never have been issued." Consult: *Battles and Leaders of the Civil War* (4 vols., New York, 1887); Ropes, *Story of the Civil War* (2 vols., New York, 1894–98); *McClellan's Own Story* (New York, 1887); Michie, *General McClellan* (New York, 1901); Heysinger, *Antietam and the Maryland and Virginia Campaigns of 1862* (New York, 1912).

ANTIFEB'RIN. See ACETANILID.

AN'TI-FED'ERALISTS. A political party in the United States opposed to the so-called Federalists. As a matter of theory and analysis, the Federalists believed in a national system of government, while the Anti-Federalists believed in a decentralized and strictly federal system of government. The Federalists had the advantages of possessing a positive programme, and of gaining the first two points in the conflict when the national constitution was adopted and when they committed the national government to the exercise of such extensive powers as the creation of a national bank. The Anti-Federalists were thus merely a party of political opposition to the party in power. When, however, the Federalists, in the Alien and Sedition Acts (q.v.), seemed to encroach both upon the liberty of the individual and upon the jurisdiction of the States, the opposition of the Anti-Federalists became acute and their fundamental propositions were stated in the Virginia and Kentucky Resolutions (q.v.). This crisis resulted in the triumph of the Anti-Federalists under the leadership of Jefferson in the election of 1800; but soon thereafter the leaders of the party began to abandon its original creed of the strict interpretation of the Constitution and the narrow limitation of the powers of the national government. The first step in this direction was the purchase of Louisiana; and when finally the Federalist party was driven entirely out of existence, its characteristic principles remained effective as the chief principles of the Anti-Federalist party. The party was named the Republican party, then Democratic-Republican, and finally Democratic party. The name Anti-Federalist is commonly applied to the opponents of the party in power up to the end of the Adams administration. Strictly speaking, this is not correct, and the name should be limited to the campaign for the adoption of the Constitution. The Anti-Federalists opposed the adoption. Their objections were largely met by the first 10 amendments which were soon added to the Constitution. This was the party's chief contribution to American history. Consult Ostrogorski, *Democracy*, vol. ii (New York, 1902); and see DEMOCRATIC PARTY; FEDERALISTS; REPUBLICAN PARTY; UNITED STATES.

AN'TIGO. A city and the county-seat of Langlade Co., Wis., on the Spring Brook River, and on the Chicago and Northwestern Railroad, 207 miles by rail northwest of Milwaukee (Map: Wisconsin, D 3). The most noteworthy features are a teachers' training school, a school for the blind, a school of chiropractics, a business college, and a Carnegie library. It is in a productive agricultural and timber region, of which it is the commercial centre, and has extensive dairying interests and manufactures of various kinds of woodenware, besides flour mills, breweries, saw mills, cigar factories, wagon works, foundries, railroad shops, etc. Settled about 1878, Antigo was incorporated in 1884. The government is administered under a general State law, which provides for a mayor biennially elected, and a municipal council. Altitude, 900 feet. Pop., 1880, 4424; 1900, 5145; 1910, 7196.

ANTIGONE, ăn-tĭg'ō-nē (Gk. *Ἀντιγόνη*). 1. In the Theban legend, daughter of Œdipus (q.v.) by his mother, Jocasta, and sister of Eteocles, Polynices, and Ismene. Her story existed in various forms. The Athenian dramatists represented her as accompanying her blind father, Œdipus, in his exile, until his mysterious death or disappearance at Colonus in Attica. When her brother Polynices led the Seven against Thebes, she was in the city, and after the mortal duel between Eteocles (q.v.) and Polynices, she disregarded the decree of Creon, that the latter should be left unburied. Caught in the act of burying her brother by throwing the three handfuls of dust upon his body, she was condemned to be immured in a tomb, where she hanged herself. Her betrothed, Hæmon, son of Creon, committed suicide. Antigone's filial and sisterly devotion are depicted by Sophocles (q.v.) in the *Œdipus at Colonus* and in the *Antigone*. She appears in Æschylus's *Seven Against Thebes* and in Euripides's *Phœnissæ*. She was also the subject of a lost play of Euripides, which seemingly ended with her marriage to Hæmon. 2. ANTIGONE, daughter of Eurytius, and wife of Peleus, who hanged herself upon hearing a false report of her husband's marriage to Sterope, daughter of Acastus. 3. ANTIGONE, daughter of Laomedon, and sister of Priam, who offended Hera by comparing her own beauty to that of the goddess. Hera turned her hair into snakes, which so tormented her that the gods, in compassion, changed her into a stork.

ANTIG'ONUS (Gk. *Ἀντίγονος, Antigonos*), called Cyclops, or the 'One-Eyed' (c.380–301 B.C.). One of the generals of Alexander the Great, and a member of a distinguished Macedonian family. His father's name was Philip, though whether this was Philip of Elymiotis is uncertain. When Alexander died and his Empire was divided (323 B.C.), Antigonus received the provinces of Greater Phrygia, Lycia, and Pamphylia. Being accused of disobedience by Perdiccas, who was aiming at sole control of the lands left by Alexander, he entered into an alliance with Craterus, Antipater, and Ptolemy, and made war on Perdiccas. Perdiccas soon died, but the war was prosecuted against Eumenes and the party of Perdiccas. After the death of Antipater, in 319 B.C., Antigonus began to carry out his plans for obtaining sole sovereignty of Asia. The resultant war was continued with varying success, and many alliances were made and broken. At one time during the long struggle Antigonus was supreme in Asia and assumed the name of king. He himself invaded Egypt, and his son Demetrius Poliorcetes carried the war into Greece, but both were compelled to withdraw again to Asia. In 301 B.C. the forces of Antigonus and Demetrius Poliorcetes were overwhelmed by Lysimachus and Seleucus at Ipsus, in Phrygia, and Antigonus was killed.

ANTIGONUS (Gk. *Ἀντίγονος, Antigonos*). A Maccabee, King of the Jews, son of Aristobulus II, and the last of the Hasmonean dynasty. In 63 he was taken prisoner by Pompey and sent to Rome; later he escaped. In 56 he was again a prisoner in Rome, but was set free by

the Senate. After the death of the great Antipater, he sought to gain the throne, and about 40 B.C., with the help of the Parthians, who were then, under Pacorus, raiding Syria, he drove Herod from Jerusalem and assumed the royal power and became high priest. Herod fled to Rome, and was proclaimed there by the Senate King of the Jews; with the aid of Octavius and Antony, he returned in 37 B.C. to regain the throne. In the meantime the Parthians had been defeated by Ventidius and driven out of Syria. Antigonus surrendered to Sossius, representative of Antonius. He was taken to Antioch and, at the request of Herod, was there put to death in the same year. See MACCABEES.

ANTIGONUS DO'SON (?–220 B.C.). A king of Macedonia, from 229 to 220 B.C., called Doson (Gk. *Δώσων*, about to give), it is said, because he was "always about to give and never did." He was the grandson of Demetrius Poliorcetes, and on the death of Demetrius II of Macedonia became guardian of the latter's son Philip. He himself, however, married the widow of Demetrius and became king. He sided with the Achæan League against the Spartans, whom, under King Cleomenes, he defeated at Sellasia in 221.

ANTIGONUS GONA'TAS (319–239 B.C.). A son of King Demetrius Poliorcetes of Macedonia, and grandson of the great Antigonus. On his father's death, 283 B.C., he took the title of king, but, since there were various claimants to the throne, he did not secure the full power until 276 B.C. He was twice expelled from his dominions by a hostile force from Epirus, under Pyrrhus (before 277 and in 273). Consult W. W. Tarn, *Antigonus Gonatas* (Oxford, 1913).

ANTIGONUS OF CARYS'TOS. A Greek sculptor and author. He lived at Athens and Pergamum about the middle of the third century B.C. He worked at Pergamum on the group of bronze statues intended to picture the victory of the Pergamene kings over the Gauls. See PERGAMON.) Beside several biographies of celebrated contemporary philosophers, of which large fragments are preserved by Athenæus and Diogenes Laertius, he wrote treatises on painting and the plastic arts. Consult Westermann's *Scriptores Rerum Mirabilium Græci* (Brunswick, 1839), and the first volume of Keller's *Rerum Naturalium Scriptores Græci Minores* (Leipzig, 1877); Ulrich von Wilamowitz-Moellendorf, "Antigonus von Karystos," in his *Philologische Untersuchungen*, iv.

ANTIGONUS OF SO'KO. A Jewish teacher who, according to Pirke Aboth, iii, the only passage in the Mishna referring to him, handed down the tradition from Simon the Just, and expressed the following sentiment: "Be not like slaves who serve their master for their daily food; be like those who serve their master without considering the reward, and let the fear of God be with you." As to the time when he lived, the teachers of Simeon ben Shetach, a contemporary of Alexander Jannæus (102–76 B.C.) are said to have derived the tradition from his disciples, so that he probably appeared early in the second century B.C. Concerning Simeon the Just little is known with certainty (compare Schmidt, *Ecclesiasticus*, 1903, pp. xxiii ff.). Soko, the modern *el Suweke*, lies southwest of Jerusalem near Bet Jibrin, the old Eleutheropolis. A Greek name for a Jew is not strange at this time and in this environment, but the sentence quoted does not necessarily indicate the influence of Greek thought. It represents a legitimate development of the teaching of the prophets. There is no evidence that he was a member of the Pharisaic party or that this sect existed in his time. Consult Schürer, *Geschichte d. jüdischen Volkes*, 4th ed., vol. ii, p. 420.

ANTIGUA, ăn-tē'gà *or* -gwà. One of the British West Indian Islands, situated in lat. 17° 6′ N. and long. 61° 45′ W., forming with Barbuda and Redonda the most important of the five presidencies of the Leeward group (Map: West Indies, G 3). It covers an area of 108 square miles and had a population of 38,899 in 1911, chiefly negroes. The surface is rugged, and the coasts are highly indented and surrounded with rocks and shoals. The soil is very fertile, especially in the interior, but scarcity of water on the island necessitates the construction of reservoirs and irrigation works. The chief products are sugar, cotton, and pineapples. Commerce declined somewhat owing to the competition of countries paying a bounty on sugar, but latest figures show a new advance. Following is a table of exports and imports in pounds sterling:

Year	Exports	Imports
1898	79,178	105,103
1900	111,849	125,304
1903	110,036	136,147
1907–08	172,410	164,587
1908–09	179,106	175,587
1909–10	114,122	139,496
1910–11	196,184	170,033
1911–12	164,813	187,688

The island suffered severely from the hurricane of August, 1899. Antigua was discovered by Columbus in 1493 and was settled by the British in 1632. Slavery was abolished in 1834. It is the seat of the government of the colony, which consists of an executive council and a legislative council made up of eight official and eight unofficial members, both branches presided over by the Governor. The capital is St. John, with a population of 9262. It has a fine harbor, although English Harbor, on the south coast, is the best port. Consult V. L. Oliver, *History of Antigua* (London, 1894–99).

AN'TI-IMPE'RIALIST LEAGUE. An organization founded in 1898, after the conclusion of the Spanish-American War, to oppose the forcible extension of the authority of the United States over foreign peoples. Its work has been chiefly directed towards the immediate independence of the Philippine Islands. The propaganda of the league, carried on by the circulation of pamphlets and circulars, has been forcible and at times bitter. It has combated the American administration of the Philippines since their acquisition by the United States, and has criticised the methods of government with great freedom. The league has its chief membership in New England. Its work has undoubtedly done much to encourage among the Filipinos the idea of immediate independence.

AN'TI-JAC'OBIN, or WEEK'LY EXAM'INER, THE. An English paper published from Nov. 20, 1797, to July 9, 1798. It was founded by George Canning and his friends to express their opposition to the principles of the French Revolution. Its editor was William Gifford, who had already made a reputation as a political satirist. Among its contributors, besides Canning, were J. H. Frere and George Ellis.

ANTI-JACOBIN REVIEW', THE. An English periodical founded by John Gifford in 1798 after the discontinuance of the foregoing, i.e., *Anti-Jacobin, or Weekly Examiner*, with which, however, it had nothing to do. Its full title was *The Anti-Jacobin Review and Magazine, or Monthly Political and Literary Censor.* It ceased to appear in 1821.

ANTIKOKA'NIA. A fossil genus that includes the earliest representatives of life found anywhere up to the present time. The fossils were uncovered by A. C. Lawson in the vicinity of Steeprock Lake, west of Port Arthur, Canada, in strata of supposedly Lower Huronian age, and were described by Walcott in 1912, who placed them in this new genus. They are very primitive forms, built up of a number of tubes which in some instances are of hexagonal cross-section, and having a globose, radiating, or pear-shaped outline. They appear to be ancestral to the sponges, but also show relationship with the corals.

AN'TILEGOM'ENA (Gk. spoken against, from *ἀντί, anti*, against + *λέγειν, legein*, to speak). A term applied by Eusebius in his *Ecclesiastical History*, iii, 25, to certain New Testament books which were not, in his day, *homologoumena* (*ὁμολογούμενα*), i.e., everywhere acknowledged as authentic and authoritative. There were seven such books, viz., James, 2 Peter, Jude, 2 and 3 John, Hebrews, and the Revelation of John.

AN'TI-LIB'ANUS, or **AN'TI-LEB'ANON** (Gk. *Ἀντιλίβανος, Antilibanos*, Counter Lebanon). A mountain ridge in Palestine and Syria, about 90 miles long, separated from the Lebanon range on the west by the valley of Cœle-Syria (Map: Turkey in Asia, G 5). It is generally inferior to the Lebanon, its highest peak, Mount Hermon, on the southeast, being only a little over 9000 feet in height. This mountain is covered with perpetual snow and gives rise to the river Jordan. The Anti-Libanus is composed of Cretaceous strata and is almost devoid of cedars. Besides Mount Hermon the highest peaks are Tala-at-Musa (8721 feet), Halimat-Kabu (8257 feet), and Abul-Hin (8330 feet).

ANTILLES, *Eng.* ăn-tĭl'lēz; *Fr.* ăN'tēl'. A name applied to the West India Islands exclusive of the Bahamas. (See map.) The total area is about 90,000 square miles. The Antilles are generally divided into the Greater and Lesser Antilles. The former comprise the four largest islands, Cuba, Jamaica, Haiti, and Porto Rico, and a few small islands near their coasts. The Lesser Antilles are composed of a chain of small islands which, starting with St. Thomas, extends in the form of a crescent, and includes the Leeward and Windward groups, and all the small islands along the northern coast of Venezuela. Some authorities exclude the Virgin Islands from the Leeward group, thereby making four divisions instead of three. For detailed information, see articles on the groups and separate islands; also article on WEST INDIES.

AN'TILOCA'PRA AMERICANA (*Antilope* + Lat. *capra*, a she-goat). The type genus of the North American ruminant family Antilocapridæ, represented by the pronghorn, characterized by the absence of lateral hoofs, and especially by the fact that the horns, compressed at the base, are branched and deciduous. See PRONGHORN. See Colored Plate of ANTELOPES.

ANTIL'OCHUS (Gk. *Ἀντίλοχος*). Son of Nestor, who died young.

AN'TILOG'ARITHM. See LOGARITHM.

ANTI-MACHIAVEL, ăn'tĭ-măk'ĭ-ă-vĕl. A treatise written by Frederick the Great before he came to the throne; published by Voltaire in 1740. It is a reply to Machiavelli's *Prince* and sets forth the obligations of rulers.

ANTIMACHUS, ăn-tĭm'ă-kŭs (Gk. *Ἀντίμαχος, Antimachos*). A Greek poet and critic of Colophon, who lived about 410 B.C. He was a contemporary of Plato and a forerunner of the poets of the Alexandrine school. His works were more remarkable for learning than for genius. His chief productions were *Lyde*, a cycle of elegies, dealing with his lost love Lyde, which was imitated by Hermesianax, of Colophon, in his *Leontion;* an epic poem, *Thebaïs*, which the Alexandrine critics thought worthy to be compared with Homer's *Iliad*, but of which now only scanty fragments remain; and a recension of the text of the Homeric poems, from which readings are given in the Homeric Scholia. He was held in high esteem and exercised a great influence on later poets. In the few extant fragments of his works his style, though learned, is rigid and artificial. Consult Kinkel's edition of the *Thebaïs*, in the *Epicorum Græcorum Fragmenta*, vol. i (Leipzig, 1877), and Bergk's edition of *Lyde*, in *Poetæ Lyrici Græci* (4th ed., Leipzig, 1882).

AN'TI-MA'SONS. The name of a political party in New York and other states, organized in 1827–28, chiefly as the result of excitement over the fate of William Morgan, of Batavia, N. Y., who was said to be about to publish, or betray, the secrets of the Masonic order, of which he was a member. He disappeared suddenly in 1826, and his fate has never been satisfactorily determined. The opponents of Freemasonry declared that he had been murdered and his body sunk in the river or lake at Niagara. Legal inquiries followed, but proved nothing. At or about that time the Governor of the State was a Mason of the most advanced degrees, and probably a majority of all public officers were members of the order. Widespread excitement pervaded western New York, and the Anti-Masonic party was formed, casting in that State alone 33,000 votes in 1828, about 70,000 in 1829, and 120,000 in 1830, though many in the latter year were anti-Jackson men, without reference to Masonry. The party attempted to organize on national lines in 1830, and especially in connection with its National Convention of 1831; and in 1832 it supported William Wirt for President, but carried only one State, Vermont. The party was also able, through the disorganization of the Democrats, to control temporarily Pennsylvania, and it was strong in Ohio and Massachusetts; but after 1835 it disappeared as rapidly as it had arisen. Many who were conspicuous later in the two chief parties, such as Thurlow Weed, Seward, and Millard Fillmore, first entered politics in the ranks of the Anti-Masons. Upon the coalescence of each of the dominant parties, the life of a third national party became an impossibility, especially upon the subsidence of the excitement out of which it had arisen. That the opposition to Masonry simply served as an issue around which centred several discontented elements is shown by the fact that William Wirt was a Mason and defended the order before the convention which nominated him. Consult: Hammond, *Political History of New York State* (Cooperstown, 1846); Alexander, *Political History of the State of New York* (2 vols., New

York, 1906); McCarthy, "The Antimasonic Party," in the *Report of the American Historical Association* for 1902 (Washington, 1903).

ANTIMONAN, ăn'tē-mō-năn'. A seaport town of Luzon, Philippine Islands, in the province of Tayabas (Map: Luzon, J 11). It is situated on the eastern coast, 19 miles east of Tayabat, opposite Alabat Island, on which there are veins of excellent coral. Pop., 1903, 11,203.

AN'TIMO'NIAL WINE. See TARTAR EMETIC.

AN'TI-MONOP'OLY PAR'TY, THE. A political party organized at Chicago on May 14, 1884, when it nominated Benjamin F. Butler, of Massachusetts, for the presidency, on a platform which demanded an Inter-State Commerce law, a direct vote for United States Senators, a graduated income tax, the establishment of labor unions, the repeal of all tariffs, and the prohibition of grants of land to corporations. In the ensuing election the party united with the Greenback Labor party, the combined vote reaching 130,000 in the election of 1884.

AN'TIMONY (LL. *antimonium*, of disputed origin). One of the well-known metallic elements. It was known to the ancients, but first isolated in 1450. It occurs native in small quantities, occasionally with silver, iron, or arsenic. The chief commercial source is stibnite (gray antimony ore), containing 71.77 per cent of antimony and 28.23 per cent of sulphur, which is found in France, Spain, Germany, Italy, Austria, New South Wales, and Japan. The commercial production of stibnite ceased in the United States in 1907 owing to the low price of metal. The chief source of antimony in the United States, however, is a by-product obtained in smelting antimonial lead-ores, which yields a 'hard' or antimonial lead containing upward of 25 per cent of antimony. The production during 1911 consisted of 1543 tons from domestic and 711 tons from foreign antimonial lead ores. From alloys, scrap metal, and dross the production amounted to 2369 tons. The imports into the United States of type metal during the same period amounted to 4195 tons and contained 17.3 per cent of antimony. The metal is obtained from the ore in two ways: 1. Roasting the sulphide to form volatile oxide which is collected and subsequently reduced in furnaces or crucibles with carbon under a cover of fusible slag in order to prevent the oxidation of the molten reduced metal. 2. Precipitating molten antimony sulphide in a crucible by metallic iron and salt or sodium sulphate forming metallic antimony and a fusible iron-sodium sulphide; the product after refining contains between 98 and 99 per cent of antimony.

Antimony (symbol Sb., at. wgt. 120.43) is a brittle, hard, silver-white metal, easily crystallized, has a specific gravity of from 6.6 to 6.8, melts between 440° and 450° C., boils between 1090° and 1450° C. The chief commercial use of antimony is as a constituent of alloys. With acids antimony forms two classes of salts —antimonious and antimonic—in which the element is trivalent and quinquivalent respectively. The more important compounds of antimony are: the trisulphide, used in medicine and as a brilliant red pigment in oil painting, also in the manufacture of safety matches, percussion caps, fireworks, and yellow pigments; the pentasulphide, a red pigment used for coloring and vulcanizing rubber, or the trichloride, "butter of antimony," used as a bronzing solution for gun-barrels; the trioxide, used in the preparation of tartar emetic, and as a mordant.

ANTIN, MARY. See GRABAU, MARY ANTIN.

AN'TINO'MIANISM (Gk. *ἀντί, anti*, against + *νόμος, nomos*, law). The doctrine or opinion that Christians are freed from obligation to keep the law of God. It is generally regarded by the advocates of the doctrine of justification by faith as a monstrous abuse and perversion of that doctrine, upon which it usually professes to be based. From several passages of the New Testament, as Rom. vi. and 2 Peter ii. 18, 19, it would seem that a tendency to antinomianism had manifested itself even in the apostolic age; and many of the Gnostic sects were really antinomian, as were probably also some of the heretical sects of the Middle Ages; but the term was first used at the time of the Reformation, when it was applied by Luther to the opinions advocated by Johann Agricola (q.v.). Agricola had adopted the principles of the Reformation; but in 1527 he found fault with Melanchthon for recommending the use of the law, and particularly of the Ten Commandments, in order to produce conviction and repentance, which he deemed inconsistent with the Gospel. Ten years after, he maintained, in a disputation at Wittenberg, that as men are justified simply by the Gospel, the law is in no way necessary for justification nor for sanctification. The "Antinomian Controversy" of this time, in which Luther took a very active part, terminated in 1540 in a retractation by Agricola; but views more extreme than his were afterward advocated by some of the English sectaries of the period of the Commonwealth; and, without being formally professed by a distinct sect, antinomianism has been from time to time reproduced with various modifications. It ought, however, to be borne in mind that the term "antinomianism" has no reference to the conduct, but only to the opinions of men; so that men who practically disregard and violate the known law of God are not therefore antinomians; and it is certain enough that men really holding opinions more or less antinomian have in many cases been men of moral life. It is also to be observed that the term "antinomianism" has been applied to opinions differing very much from each other. In its most extreme sense it denotes the rejection of the moral law as no longer binding upon Christians, and a power or privilege is asserted for the saints to do what they please without prejudice to their sanctity, it being maintained that to them nothing is sinful; and this is represented as the perfection of Christian liberty. But besides this extreme antinomianism, than which nothing can be more repugnant to Christianity, there is also sometimes designated by this term the opinion of those who refuse to see in the Bible any positive laws binding upon Christians, and regard them as left to the guidance of Gospel principles and the constraint of Christian love; an opinion which, whatever may be thought of its tendency, is certainly not to be deemed of the same character with the other. Probably this kind of antinomianism usually originates in mistaken notions of Christian liberty, or in confusion of views as to the relation between the moral law and the Jewish law of ceremonial ordinances.

ANTIN'OMY (Gk. *ἀντινομία, antinomia*, opposition of laws; from *ἀντί, anti*, against + *νόμος, nomos*, law). A word used by Kant to mark the "conflict between two propositions, each of which

seems to be true, but neither of which has any more claim to our assent than the other." Kant uses the term "antithetic" in the same sense. Such a conflict arises when our reason "ventures to go beyond the limits of our experience." There are four of these antinomies; the first two being called mathematical, the last two dynamic. In each case the positive assertion is called the thesis, its negation is called the antithesis. Briefly, his theses are: The world (1) is limited in space and time, (2) consists of parts that are simple, (3) admits of causality through freedom, (4) implies the existence of an absolutely necessary being. Over against these stand the antitheses: The world (1) is without limits in space or time, (2) consists of parts always composite, (3) admits of no causality but that of natural law, (4) implies the existence of no absolutely necessary being. Kant overcomes these antinomies by showing that the contradiction is not real if critically considered with due discrimination between noumena and phenomena. See CATEGORY; KANT.

ANTINORI, ăn'tê-nō'rê, MARQUESE ORAZIO (1811–82). An Italian zoölogist and African explorer, born at Perugia. He went to Egypt in 1859 and with Carlo Poggia explored the Upper Nile country. In the *Bulletin* of the Italian Geographical Society, of which he became one of the founders in 1867, he gives an interesting account of his travels through Nubia. He made a tour through Bogoland, north of Abyssinia, after the opening of the Suez Canal, and in 1875 went to Tunis to investigate the practicability of Roudaire's plan for flooding a portion of the Sahara Desert in order to establish communication with the Mediterranean. He headed an important expedition to Shoa in 1876 and gave the first definite information concerning the zoology of that country.

ANTINOÜS, ăn-tĭn'ō-ŭs (Gk. *Ἀντίνοος, Antinoos*). A beautiful youth of Claudiopolis, in Bithynia. He was page to the Emperor Hadrian, and the object of his extravagant affection, accompanying him in all his travels. He was either drowned accidentally in the river Nile, or, as some suppose, committed suicide from a loathing of the life he led, in 122 A.D. His memory and the grief of the Emperor were perpetuated by many beautiful statues and bas-reliefs, of which several have been found in the villa of Hadrian near Tivoli (Tibur). There is a colossal bust of him now in the Vatican, a statue in the Capitoline Museum, a bust in the Louvre, etc., and his head appears on many medals. In the attempt of sculptors to produce idealized representations of Antinoüs art received a great stimulus; these attempts resulted in "the triumph of original thought over eclecticism of form." Though the elements in these portrayals are all Greek, "the whole remains one of the most powerful presentments invented by the sculptor's genius." Consult Mrs. Arthur Strong, *Roman Sculpture*, 249 ff. (London, 1907). "In all the figures of Antinoüs," says Winckelmann, "the face has a rather melancholy expression; the eyes are large, with fine outlines; the profile is gently sloped downward; and the mouth and chin are especially beautiful." The city of Besa, in the Thebaïs, near which Antinoüs was drowned, was also rebuilt by Hadrian, and the name of Antinoöpolis conferred upon it, in memory of his favorite. Important festivals in his honor were held at Athens and at Eleusis. Antinoüs was further enrolled among the gods, and temples were erected to him in Egypt and Greece. Antinoüs is a character in two historical romances, *Antinoüs*, by Taylor, translated from the German by Safford (New York, 1882), and *The Emperor* (*Der Kaiser*), by Ebers (Stuttgart, 1880), done into English by Clara Bell.

AN'TIOCH (Gk. *Ἀντιόχεια, Antiocheia;* Lat. *Antiochēa,* or *Antiochīa*). The ancient capital of the Hellenistic kings of Syria, on the Orontes, and the most magnificent of the 16 cities of that name built by Seleucus Nicator, and named for his father, Antiochus. Its site was admirably chosen. The river Orontes, issuing from the mountains of Lebanon, flows north as far as the thirty-sixth parallel of latitude and then southwest into the Mediterranean. On the left bank of the river, and at a distance of 20 miles from the sea, lay the famous city, in the midst of a fertile and beautiful plain, 10 miles long by 5 broad. By its harbor, Seleucia, it had communication with all the maritime cities of the West, while it became, on the other hand, an emporium for the merchandise of the East. Behind it lay the vast Syrian desert, across which traveled the caravans from Mesopotamia and Arabia. On the north, the plain of Antioch is bounded by the mountain chain of Amanus, connected with the southeastern extremity of Mount Taurus; and on the south, which is more rocky, by the broken declivities of Mount Casius, from which the ancient town was distant less than two miles. On this fair site, Greek colonies had been planted long before the time of Seleucus Nicator. In early times, a part of the city stood upon an island, which has now disappeared. The rest was built partly on the plain and partly on the rugged ascent toward Mount Casius. The slopes above the city were covered with vineyards, while the banks of the river displayed, as they do even at the present day, a gorgeous profusion of eastern fruit trees. The ancients called the city "Antioch the Great," "Antioch the Beautiful," and the "Crown of the East"; next to Rome and Alexandria it was the greatest city of the Roman Empire. It was a favorite residence of the Seleucid princes and of wealthy Romans and was famed throughout the world for its luxury. It received from Strabo the name of Tetrapolis, because four sites were successively built, each surrounded with a wall. Rebuilt by Seleucus Nicator about 300 B.C. to celebrate his victory at Ipsus, it received its first addition from him; its second from Seleucus Callinicus (246–226 B.C.); and its third from Antiochus Epiphanes (175–164 B.C.). From the first many Jews dwelt in the town, enjoying, by grant of Seleucus Nicator, equal rights with the Greeks. Its public edifices were magnificent. The principal were the palace, the senate house, the temple of Jupiter, burnished with gold, the theatre, amphitheatre, and Cæsarium. It had an aqueduct, a public promenade, and innumerable baths. Under the Romans it was the residence of the Governor of Syria, and the eastern headquarters of Cæsar, Agrippa, Augustus, Herod, Tiberius, and Antoninus Pius. After the founding of Constantinople it ceased to be the first city of the East, but it rose to new dignity as a Christian city, for Antioch was in fact the mother church of Gentile Christianity, the place where the Christians first received that name, the home of the first ministry of Paul, the spot from which he set out on his missionary journeys through Asia Minor and Greece, and

the scene of the first conflict between Jewish and Gentile Christianity, the result of which was the Apostolic Council in Jerusalem about 51 A.D. Ten Church councils were held at Antioch between 252 and 380. Churches sprang up, exhibiting a new style of architecture, which soon became prevalent; and even Constantine himself spent a considerable time here, adorning the town and strengthening its harbor, Seleucia.

The Antiochians themselves, however, brought about the ruin of their beautiful city. They were famous, above all other people in ancient times, for their biting and scurrilous wit and for their ingenuity in devising nicknames. When the Persians, under Chosroës, invaded Syria in 538 A.D., the inhabitants could not refrain from jesting at them. The Persians took ample revenge by the total destruction of the city, which, however, was rebuilt by Justinian. The next important event in its history was its conquest by the Saracens in the seventh century. In the ninth century it was recovered by the Greeks under Nicephorus Phocas, but in 1084 it again fell into the hands of the Mohammedans. The Crusaders besieged and took it in 1098, and it was held by the Christians until 1268. (See ANTIOCH, PRINCIPALITY OF.) Since then Antioch has undergone many vicissitudes. Its population at the height of its grandeur is estimated to have been 400,000. Probably no other great city in the world has suffered so frightfully from earthquakes as Antioch. It was destroyed by one in 526 A.D. A destructive visitation occurred in 1872.

The modern town of Antakiyeh, in the vilayet of Aleppo, is situated on the site of the ancient Antioch (Map: Turkey in Asia, G 4). It is poorly built, and presents a striking contrast to the magnificent walls of the old city, which are still partly preserved. It takes up only a small portion of the ancient city, the remainder being covered with olive trees and date palms. The inhabitants carry on some trade in olives, silk, and grain. The population is estimated at 30,000, of whom about half are Mohammedans, excluding some 8000 Ansarieh; Orthodox Greeks number about 4000, and there are other Christians and Jews. Antakiyeh is an important American mission station. Consult: K. O. Müller, *Antiquitates Antiochenæ* (Göttingen, 1839); Ritter, *Erdkunde*, vol. xvii, pp. 1147–1210; *Cambridge Medieval History* (New York, 1911). The city figures largely also in Lew Wallace's novel, "Ben Hur" (New York, 1880).

ANTIOCH, PRINCIPALITY OF. A principality founded by the Norman crusader Bohemund (q.v.) in 1098. For about 30 years it was the most important and wealthy portion of the Christian possessions in Syria. Gradually it declined in political importance; but the city remained a stronghold of Christendom in the East until 1268, when it was captured by Bibars, Sultan of Egypt and Syria. Consult Rey, "Résumé chronologique de l'histoire des princes d'Antioche," in the *Revue de l'Orient Latin*, vol. iv (Paris, 1896).

ANTIOCH COLLEGE. An unsectarian coeducational college at Yellow Springs, Ohio. It opened in 1853, with Horace Mann as its first president. It claims to have been the first college in the world to admit both sexes of all races to equal privileges. Endowment, 1913, over $100,000; value of buildings and grounds, $150,000; library, 12,000 volumes; faculty, 20; attendance, 230. President, A. D. Fess, LL.D.

ANTIOCHIAN, SCHOOL. The rival of the Alexandrian school. It held to the grammatical interpretation of Scripture, instead of to the allegorical or mystical. It dates from the martyr Lucian (died 311) and in its later form from Diodones of Tarsus (died 394). Its chief representatives are Chrysostom and Theodore of Mopsuestia. In theology, while in the main orthodox according to the Nicene type, it leaned toward asserting rather the conjunction than union of the two natures in Christ.

ANTIOCHUS, ăn-tī'ō-kŭs (Gk. *Ἀντίοχος, Antiochos*). A common Greek name, borne by 13 kings of Syria, four kings of Commagene (a small country between the Euphrates and Mount Taurus), and many other persons of note. See the following articles.

ANTIOCHUS I SOTER (Gk. *Ἀντίοχος Σωτήρ, Antiochos Sōtēr*, savior, deliverer). King of Syria, 281–261 B.C. The son of Seleucus I Nicator and Apama of Sogdiana. He was born in 324 B.C., fought at Ipsus in 301 against Antigonus and Demetrius Poliorcetes, was associated with his father as ruler from 293, and became his successor after the murder of Seleucus by Ptolemy Ceraunus in 281. Stratonice, his father's wife, became his own consort, Seleucus giving her to him in view of their mutual affection. She was still living in 268. In addition to her he seems to have had for wife also a sister by the same name, daughter of Seleucus and Stratonice. In 275 he gained a decisive victory over the Gauls, who had invaded Asia Minor. But Appian is wrong in maintaining that he was given the surname Soter on this occasion. This seems to have been done only after his death. A cuneiform inscription of the year 269 enumerates all his titles, but does not give this one. On March 21, 268, he laid the foundations of the new Nabu temple at Borsippa. At the instigation of Magas of Cyrene, Antiochus declared war against Ptolemy II Philadelphus. He found an ally in Antigonus Gonatas, King of Macedonia and Greece, but the war led to no decisive issue. He maintained with difficulty the integrity of the great empire his father had left him. Antioch, with its suburb Daphnæ, Seleucia with Ctesiphon, and Sardis were the three capitals of the kingdom. In the last years of his reign he endeavored in vain to prevent Eumenes of Pergamos from maintaining his independence. Antiochus fell upon the battle-field, slain, it is said, by a Gaul, though this statement may be due to a confusion with the end of Antiochus Hierax (q.v.). Consult: Norris, *Annus et epochæ Syromacedonum* (1689); Vaillant, *Seleucidarum imperium* (1732); Frölich, *Annales regum et rerum Syriæ* (1754); Thirlwall, *History of Greece* (1835–44); Droysen, *Geschichte des Hellenismus* (1836, 1877; Eng. trans., 1883–85); Th. Reinach, *Trois royaumes d'Asie Mineure* (1888); Babelon, *Les rois de Syrie* (1890); Wilcken, in Pauly Wissowa, *Realencyklopädie* (1899); Bevan, *The House of Seleucus* (1902); Niese, *Geschichte der makedonischen Staaten* (1893–1903); Bouché-Leclercq, *Histoire des Seleucides* (1913).

ANTIOCHUS II THE'OS (Gk. *θεός*, god). King of Syria, 261–246 B.C. Son of Antiochus I Soter and Stratonice; succeeded his father. His eight years' war with Ptolemy II Philadelphus cost him many provinces and cities in Phœnicia and Asia Minor. Only the expulsion of the tyrant Timarchus from Miletus in 250 B.C. can

be counted as a real success. He is said to have received the title "Theos" from the grateful Milesians; but this is doubtful. Theodotus seems to have established an independent kingdom in Bactria in 250 B.C., and the Parthian chief Arsaces, or his successor, Arsaces II Tiridates, took possession of Parthia and made himself practically independent in 247 B.C. Probably as early as 250 B.C. a reconciliation was effected between Antiochus and Ptolemy. The agreement was that the former should divorce his wife, Laodice, and marry the latter's daughter, Berenice. Upon the death of Ptolemy II in 247 B.C., Antiochus abandoned Berenice and her child, and went to Ephesus, where he took back Laodice and her sons. She, however, seems to have avenged herself by poisoning him in 246 B.C. Laodice then proclaimed her oldest son, Seleucus, king; and her servants by false promises lured Berenice and her son from Daphnæ, where they were strongly intrenched, and slew them both. Laodice's younger son was Antiochus Hierax. Consult: Niese, *Geschichte der makedonischen Staaten* (1893–1903); Reinach, *Trois royaumes d'Asie Mineure* (1888); Bevan, *The House of Seleucus* (1902); Bouché-Leclercq, *Histoire des Seleucides* (1913).

ANTIOCHUS III THE GREAT. King of Syria, 223–187 B.C. Son of Seleucus II Callinicus (246–226) and Laodice, a sister of Andromachus, ascended the throne at the age of 15, after the murder of his brother, Seleucus III Ceraunus (226–223). His first expedition was against Ptolemy IV Philopator (221–204), who had taken possession of Cœle-Syria and Phœnicia. But the revolts of Molon, Governor of Media, and his brother, Alexander, Governor of Persia, forced him to lead an army against them. He succeeded in defeating them, and also in subduing Artabazanes, King of Atropatene, 220 B.C. While he was occupied in these parts, however, Achæus, Governor of Asia Minor, assumed the royal diadem. Antiochus returned to Syria, suffered a severe defeat at the hands of Ptolemy IV at Raphia, 217 B.C., but still possessed sufficient strength to attack Achæus. After two years' siege Sardis was captured in 214 B.C., and this dangerous revolt was at an end. Soon after Antiochus marched against Xerxes of Armenia, besieged Arsamosata and received a tribute of 300 talents (212 B.C.). He then continued his march into Susiana and Media (210–209), and took 4000 talents of gold and silver from the temple of Anaïtis in Ecbatana. Arsaces III Artabanus was defeated, and the Parthian capital Hecatompylus captured. Finally, Arsaces III sued for peace and promised tribute, 209 B.C. In 208 Antiochus made an attack upon Euthydemus of Bactria, and in 206 this King indicated his willingness to recognize the suzerainty of Syria. He furnished elephants and provisions for the expedition against Sophagasenus of Kophen (Kabul). From here Antiochus returned through Arachosia, Drangiana, Carmania, and Babylonia to Syria in 204 B.C. He now united with Philip of Macedonia against Ptolemy V Epiphanes. The battle of Paneas, in 198 B.C., in which Antiochus defeated the Egyptian general, Scopas, determined the fate of Palestine. But the Romans were not willing to allow further encroachments. In 196 B.C. they ordered him to return all places taken from Egypt and deprived him of the Thracian Chersonese that had been given to Seleucus by Lysimachus. Against the counsels of Hannibal, who urged him to attack Italy itself, Antiochus went with his army to Greece, where he was defeated at Thermopylæ, 191 B.C. Still more crushing was his defeat at Magnesia in 190 B.C. In the treaty of 188 B.C. he was forced to abandon Asia Minor beyond the Taurus, to pay 15,000 talents, and to give hostages, among them his son. To raise the money he pillaged a temple of Bel in Elymais and was probably murdered by the outraged people in 187 B.C.

In addition to the works of Thirlwall, Reinach, Niese, Wilcken, Bevan, and Bouché-Leclercq, quoted under Antiochus I, consult Flathe, *Geschichte Macedonias* (1834); Heyden, *Beiträge zur Geschichte Antiochos des grossen* (1873); Stark, *Gaza und die philistäische Küste* (1848); Gutschmid, *Geschichte Irans* (1888); Holm, *Griechische Geschichte*, iv (1891); Eng. trans., 1901).

ANTIOCHUS IV EPIPH'ANES (Gk. Ἐπιφανής, *Epiphanēs*, manifest or, more fully, Θεὸς Ἐπιφανής, *Theos Epiphanēs*, manifest god). King of Syria, 175–164 B.C. Son of Antiochus III, succeeded his brother, Seleucus IV Philopator (187–175). In 189 he had been sent to Rome as hostage, and he had been educated there; in 176 Seleucus had sent his own son Demetrius to take his place. Antiochus was on his way home, when the news reached him that his brother had been murdered by Heliodorus. He took possession of the throne that by right of succession belonged to Demetrius. Suspicious of the young son of Seleucus, he seems to have used Andronicus to remove him, after which Andronicus himself was executed. In 173 Cleopatra died, and hostilities with Egypt began. His first Egyptian campaign, however, did not occur before 169, as Niese and Wellhausen have recognized. He captured Pelusium, entered Egypt, and led Ptolemy VII Philometor as king into Memphis, sought in vain to storm Alexandria, but defeated Ptolemy IX Physcon in a naval battle before he was obliged by troubles in Syria to return. In Judæa Onias III had been removed from the high-priesthood, and his brother, Jason, who was a mere tool of the ambitious family of the Tobiadæ, put into his place in 173. Immediately before the Egyptian expedition the Tobiad Menelaüs secured from Antiochus the high-priestly office. When a rumor spread in Jerusalem that Antiochus had perished, Jason returned, but his brother, Onias III, was preferred by the people. Jason fell, and Onias was made high priest. Menelaüs and other Tobiadæ fled to Antioch. On his way back Antiochus went to Jerusalem to reinstate Menelaüs. Onias III fled to Egypt, where he was granted the privilege of building a temple at Leontopolis by Ptolemy VII Philometor. (See ONIAS'S TEMPLE.) Antiochus entered the temple in Jerusalem and took many of its treasures, among them the golden altar, the candelabra, and the table of incense. He does not seem to have shed any blood. In 168 he undertook his second campaign against Egypt, where Philometor and Physcon were now united against him. His progress was checked by the Roman legate, Popilius Lænas, who demanded immediate obedience to the demands of the Senate. Returning to Syria, he found many of the Jews imbittered by the indignities heaped upon them, rebellious against the illegitimate high priest, and scarcely concealing their joy over his humiliation. He therefore ordered the

walls to be razed, fortified the Acra, put in a strong garrison, destroyed in part the temple, erected on the top of the old altar a new one to Zeus Olympius (*Shikkuz Shamen*, 'abomination of desolation'; for *Baal Shamem*, 'lord of heaven,' Dan. xi. 31), abolished the sacred seasons, forbade circumcision, and burned sacred books, 168 B.C. This course of action may, in part, have been due to a genuine zeal for the god of Hellas, for whom he must have longed during his Roman days, and on whose sanctuaries at Athens, Olympia, and elsewhere he later lavished his gifts. On the other hand, reasons of state may have led him to build a temple to Jupiter Capitolinus in Antioch. That he should have forsaken the gods of his fathers to worship this strange "god of fortresses," seemed to the author of Daniel a particular sign of his wickedness (xi. 38). His stringent measures for the Hellenization of Judæa caused the Maccabæan revolt. Mattathias began the rebellion. After his death in 166, his son, Judas, defeated Apollonius, Seron, Gorgias, and finally Lysias himself; took possession of Jerusalem, except the Acra, and restored and rededicated the temple in December, 165 B.C. Meanwhile Antiochus had gone with an army, first against Armenia and Sophene, 166 B.C., then against Messene on the Persian Gulf, 165 B.C., and finally into Susiana, gaining many victories everywhere. He attempted to plunder the temple of Nanæa in Elymais, but the people defended successfully their sanctuary, and he was forced to retire to Babylon. In Persis he received the sad news from Judæa, and died in Tabæ, 164 B.C., from an illness.

Consult the histories of Greece by Thirlwall and Holm; the histories of the Seleucidæ by Vaillant, Frölich, Babelon, Bevan, Niese, and Bouché-Leclercq; the article on Antiochus IV, by Wilcken in Pauly-Wissowa, *Realencyklopädie*, and Sharpe, *History of Egypt* (1862); Gutschmid, *Geschichte Irans* (1888); Schürer, *Geschichte des jüdischen Volkes*, vol. i, p. 166 (4th ed., 1901); Wellhausen, *Israelitische und jüdische Geschichte* (6th ed., 1907); Droysen, *Kleine Schriften II*, p. 405 (1894) Hofmann, *De bellis ab Antiocho Epiphane adversus Ptolemaeos gestis* (1899); Kaerst, *Geschichte des hellenistischen Zeitalters*, vol. ii (1909); Büchler, *Die Tobiaden und die Oniaden* (1899).

ANTIOCHUS V EUPATOR (Gk. Εὐπάτωρ, *Eupatōr*, born of a noble father). King of Syria, 164–162 B.C., son of Antiochus IV. He was only nine years old when his father died. Lysias became his guardian and regent of the Empire. Accompanied by the young King, Lysias marched against Judæa to quell the Maccabæan revolt. At Beth Zechariah Judas was defeated, Bethzur was taken, and the temple mountain was besieged. The Jews were obliged to negotiate for peace. They had to recognize the Seleucid authority, raze the fortifications of the temple, and accept the garrison in the Acra, but on the other hand were allowed religious freedom. During the absence of Lysias in Judæa a certain Philip, who had been with Antiochus IV Epiphanes when he died and was said to have received from him the diadem and seal that betokened supreme authority, took possession of Antioch. Lysias was quite able to cope with Philip, but the Romans sent an embassy demanding the destruction of the elephants in the army and the ships, and to this Lysias was obliged to agree in order to maintain his power. He was overthrown, and Antiochus was killed by the soldiers, when Demetrius, son of Seleucus IV, who had escaped from Rome, seated himself upon the throne in 162 B.C. Consult especially Bevan, *The House of Seleucus* (1902); Wellhausen, *Israelitische und jüdische Geschichte* (1907); and Bouché-Leclercq, *Histoire des Seleucides* (1913).

ANTIOCHUS VI THE'OS EPIPHANES DIONYSUS. King of Syria, 145–142 B.C. Son of Alexander Balas and Cleopatra, was proclaimed King while still a minor, living at the court of Imalcue, or Yamliku, King of Chalcis, by Diodotus, called Tryphon, one of Alexander's generals. Tryphon was supported by Jonathan in his struggle against Demetrius, but became apprehensive of the growing power of the Jewish high priest. He took possession of his person and 1000 of his followers. These he massacred, and demanded a ransom for Jonathan, but finally put him to death in Baskama, 143 B.C. In 142 Antiochus, who was a mere child, died, as it was said, from an operation and Tryphon ascended the throne. The Romans inscribed the name of Antiochus as donor upon the golden statue of victory which Tryphon sent as a bribe. Consult Bevan, *The House of Seleucus* (1902); Wellhausen, *Israelitische und jüdische Geschichte* (1907); Bouché-Leclercq, *Histoire des Seleucides* (1913).

ANTIOCHUS VII SIDE'TES (Gk. Σιδήτης, *Sidētēs*, native of Side). King of Syria, 137–128 B.C. Son of Demetrius I, born at Side in Pamphylia. He resided in Rhodes when he learned that Demetrius II Nicator had been taken prisoner by the Parthians. He went to Antioch and was recognized as King. One of his first acts was to write to Simon, the Jewish high priest, confirming him in his position and granting him the right of coining money. Having overthrown Diodotus, however, he demanded of Simon Joppa, Gazara, and the citadel of Jerusalem. This Simon refused to give, and when Antiochus sent his general, Cendebæus, against him, Simon's sons, Judas and John Hyrcanus, gained a victory, 137 B.C. In 131 B.C. Antiochus marched against Jerusalem, having devastated Judæa, captured the city after a long siege, and imposed very severe conditions upon the country. John Hyrcanus was forced to pay a tribute of 500 talents, to give hostages, and to send troops for the Parthian war. Having restored order in Syria, Antiochus attacked Phraates 130 B.C., defeated him in three battles, and secured the freedom of his brother. But his demands were so exorbitant that the negotiations led to no treaty of peace, and a reversal of fortunes caused Antiochus to lose all that he had gained. Not to fall into the hands of his enemies, he hurled himself from a rock near Ecbatana in Media 128 B.C. Consult: Niese, *Geschichte der Makedonischen Staaten*, vol. iii (1903); Schürer, *Geschichte des jüdischen Volkes*, vol. i (4th ed., (1901); Wellhausen, *Israelitische und jüdische Geschichte* (6th ed., 1907); Bevan, *The House of Seleucus* (1902); Bouché-Leclercq, *Histoire des Seleucides* (1913).

ANTIOCHUS VIII GRY'PUS (Gk. γρυπός, *grypos*, hook-nosed). King of Syria, 125–113 and 111–96 B.C. Son of Demetrius II Nicator and Cleopatra; succeeded his father in 125. He continued the struggle that Demetrius had had with Alexander, called Zabina, 'the purchased one,' and finally vanquished him in 121. Cleo-

patra, who found him too independent, wished to get rid of him, but he forced her to drink the poisoned cup she had prepared for him. For eight years he reigned peacefully, until in 113 Antiochus IX Cyzicenus aroused his suspicions. This son of Sidetes had just married Cleopatra, daughter of Ptolemy IX Physcon. With the aid of the Egyptian King he raised an army and captured Antioch. Antiochus Grypus recaptured the city, and his wife, Tryphæna, put her sister Cleopatra to death in a cruel manner. Soon after Cyzicenus defeated Grypus and avenged his wife on Tryphæna. A reconciliation was effected between the two brothers in 111, and they continued to reign over different parts of northern Syria. Antiochus VIII was slain by Heracleon in 96 B.C. Consult: Kuhn, *Beiträge zur Geschichte der Seleukiden vom Tode Antiochus*, vol. vii (1871); Wilcken, in *Hermes*, vol. xxix, and Pauly-Wissowa, *Realencyklopädie;* Schürer, *Geschichte des jüdischen Volkes*, vol. i, p. 175 (4th ed., 1901); Bevan, *The House of Seleucus* (1902); Bouché-Leclercq, *Histoire des Seleucides* (1913).

ANTIOCHUS IX CYZ'ICE'NUS (Gk. Κυζικηνός, *Kyzikēnos*, native of Cyzicus). King of Syria, 113–95 B.C. Son of Antiochus VII Sidetes and Cleopatra; was sole ruler of Syria between 113 and 111, and from that time to his death held a part of Syria, adjoining Palestine. He aided the Samaritans against John Hyrcanus (110–107 B.C.) without success, and a second attempt to subdue Judæa with the aid of Ptolemy XI Lathyrus likewise failed. Having been defeated in a decisive battle with Seleucus VI, he took his own life in 95 B.C. Consult Kuhn, *Beiträge zur Geschichte der Seleukiden* (1871); Schürer, *Geschichte des jüdischen Volkes*, vol. i, pp. 175 f. (4th ed., 1901); and the histories of Niese (1893–1903), Bevan (1902), and Bouché-Leclercq (1913).

ANTIOCHUS X EU'SEBES (Gk. Εὐσεβής, *Eusebēs*, pious), King of Syria, 95–92 B.C. Son of Antiochus IX Cyzicenus. He continued the war against Seleucus VI and forced him to retire to Mopsuestia, where he was murdered by the populace in 95 B.C. He also defeated Antiochus XI and Philip in 93 B.C., but was himself vanquished by Philip and Demetrius III in 92 B.C. and obliged to flee to the Parthians. He is supposed to have died in 75 B.C., leaving two sons, Antiochus XIII and Seleucus Cybiosactes. His widow, Selene, was given a few towns in Syria by Tigranes of Armenia, who in 92 B.C. took possession of Antioch. Consult histories of Niese (1893–1903), Bevan (1902), and Bouché-Leclercq (1913); Kuhn, *Beiträge zur Geschichte der Seleukiden* (1871), and Schürer's *Geschichte des jüdischen Volkes*, vol. i (4th ed., 1901).

ANTIOCHUS XI EPIPH'ANES PHILADELPHUS. King of Syria, 95–93 B.C., son of Antiochus VIII Grypus; upon the death of Seleucus VI in 95 B.C., he assumed the royal diadem; together with his brother Philip he took vengeance upon the people of Mopsuestia, who had murdered Seleucus VI. But on his return to Syria he was defeated by Antiochus X, and was drowned in the Orontes in 93 B.C. Consult Schürer, *Geschichte des jüdischen Volkes*, vol. i, p. 176 (1901); Bevan, *The House of Seleucus* (1902); Bouché-Leclercq, *Histoire des Seleucides* (1913).

ANTIOCHUS XII DIONY'SUS (Gk. Διόνυσος, *Dionysos*, Bacchus). King of Syria, 85 B.C., son of Antiochus VIII. He took the crown when he learned that his brother Demetrius III had been made a prisoner by the Parthians and intrenched himself in Demetrius's capital, Damascus. He was at first victorious in his campaign against the Nabatæans, but was defeated in a second battle, and lost his life in 85 B.C. Consult Bevan, *House of Seleucus* (1902); Schürer, *Geschichte des jüdischen Volkes* (1901); Th. Reinach, *Mithridate Eupator* (1890); Bouché-Leclercq, *Histoire des Seleucides* (1913).

ANTIOCHUS XIII A'SIAT'ICUS (Gk. Ἀσιατικός, *Asiatikos*, Asiatic). King of Syria, 69–64 B.C., son of Antiochus X. He was sent by his mother, Selene, to Rome, together with his brother Seleucus Cybiosactes, in 74 B.C., to present his claims to the throne of Egypt, but returned to Syria in 71, having been kept for a ransom by Verres in Sicily, as Cicero informs us. After his victory over Tigranes, in 69 B.C., Lucullus gave to Antiochus a large part of Syria, which he retained until Pompey made it a Roman province, in 64 B.C. Consult: Schürer, *Geschichte des jüdischen Volkes*, p. 178 (1901); Niese, *Geschichte der Makedonischen Staaten* (1903); Bevan, *The House of Seleucus* (1902); Bouché-Leclercq, *Histoire des Seleucides* (1913).

ANTIOCHUS HI'ERAX (Gk. Ἱέραξ, *hierax*, hawk). Son of Antiochus II and Laodice. He was made King of Cilicia by Ptolemy III Euergetes in 243 B.C. Ostensibly for the purpose of assisting Seleucus II Callinicus (246–226) to recover certain provinces that the Egyptian King had taken from him, but really to deprive him of all that he had left, Antiochus sent an army to Syria. Ptolemy came to an agreement with Seleucus, but the war between the two brothers continued. With the aid of the Gauls, Antiochus won a decided victory near Ancyra in 242. Seleucus was supposed to have been slain, and Antiochus mourned him. He then turned his arms against Demetrius of Macedonia and subsequently against Attalus of Pergamus. The war with Seleucus was renewed, and Eumenes used the opportunity to take possession of a large part of Asia Minor. After a signal defeat at the hands of Seleucus, Antiochus fled first to Cappadocia and then to Armenia. Suspecting foul play, he left for Egypt. Ptolemy III made him a prisoner. He escaped, however, and ended his stormy career at the hands of brigands in Thrace, 225 B.C. Consult Wilcken, in Pauly-Wissowa, *Realencyklopädie;* Holm, *Griechische Geschichte*, vol. iv (1891; Eng. trans., 1885); Bevan, *The House of Seleucus* (1902); Bouché-Leclercq, *Histoire des Seleucides* (1913).

ANTIOCHUS OF AS'KALON (?–c.68 B.C.). A Greek philosopher. He was a pupil of Philo and succeeded him as head of the celebrated Academy (see ACADEMUS) near Athens. He spent some time in Rome, and was on friendly terms with L. Lucullus. Cicero heard him in Athens in 79–78 B.C. Abandoning the more recent traditions of the Skeptic system in favor of a dogmatic eclecticism, seeking to combine Academic, Peripatetic, and Stoic doctrines into a new system, he introduced into the Academy the philosophy of Stoicism, the fundamental tenets of which he believed to have originated in the Old Academy of Plato. Consult R. Hoyer, *De Antiocho Ascalonita* (Bonn, 1883); Zeller, *Philosophie der Griechen*, 3d ed., vol. iv, pp. 598–610; and various notes, as well as the Introduction, in J. S. Reid's edition of the "Academica" of Cicero (London, 1885).

ANTIOPE, ăn-tī'ō-pē. See AMPHION.

ANTIOQUIA, än'tê-ō'kê-ȧ. A department of Colombia, South America, bounded by the departments of Bolivar on the north, Santander on the east, Tolima on the south, and Cauca on the west. Its area is 26,612 square miles. Situated in the region of the Cordilleras, Antioquia has valuable forests, but the soil is not suited to agricultural pursuits. The chief occupation is mining, for the mineral wealth of the department is considerable, especially in the north. Coal, iron, gold, and platinum are found. The region was first explored by Robledo about the middle of the sixteenth century. The population in 1912 was 740,937. Capital, Medellin.

AN'TIPÆ'DOBAP'TISTS. Those who oppose infant baptism. See BAPTISM, INFANT.

AN'TIPAR'ALLELS (*anti* + *parallel*). If a pencil of two lines, *O—XY*, is cut by two

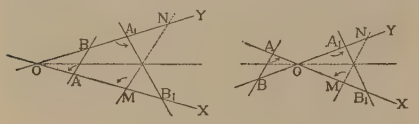


FIG. 1.

parallel lines, *AB*, *MN*, and if *MN* revolves through a straight angle about the bisector of $\angle XOY$ as an axis, falling in the position A_1B_1, then *AB* and A_1B_1 are said to be antiparallel to each other. *OA* and OA_1 are called corresponding segments of the pencil, as are also *OB* and OB_1. *A* and A_1 are called corresponding points, as are also *B* and B_1. The triangles *OAB* and OA_1B_1 are similar to each other. The concept of antiparallels materially simplifies the treatment of a number of propositions of elementary geometry; e.g., in the above figure it is easily seen that $OA:OM=OB:ON$, whence $OA\cdot OB_1=OB\cdot OA_1$. In the following figures, since *AB* and A_1B_1

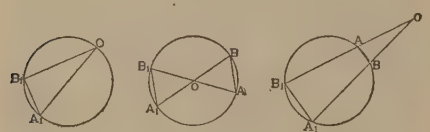


FIG. 2.

are antiparallels, we have at once the proof of the important proposition that wherever the point *O* be taken $OA\cdot OB_1=OB\cdot OA_1$.

ANTIP'AROS (Gk. *Ἀντίπαρος*, Opposite Paros). Anciently called Olearos or Oliaros. One of the Cyclades Islands, celebrated for a stalactitic cave, near the south coast (Map: Greece, G 4, 5). It is separated from Paros by a narrow strait. It contains about 600 inhabitants, and forms a part of the eparchy of Naxos. Antiparos is 7 miles long by about 3 wide; it is scantily supplied with water, but the flats in the north and the west are tolerably fertile. Grain and wine are cultivated, and there is pasturage for large flocks of goats. The principal occupation of the inhabitants is fishing. From Kastron, the only village on the island, the distance to the stalactitic cave is about an hour and a half's ride. This wonderful cave is not mentioned by any Greek or Roman writer whose works are extant, but must have been visited by the curiosity-hunters of antiquity, for the names of ancient tourists are inscribed about the entrance. It may well have been a place of worship. The entrance is near the top of a mountain on the southern coast. From a small chamber a long and somewhat dangerous descent leads to the great cavern, 80 feet high, more than 300 feet long, and 100 feet broad, which contains remarkable specimens of stalactitic formation. The cave was first made known to the modern world by M. de Nointel, French ambassador to the Porte, who, in 1673, spent three days in it and caused the Christmas mass to be celebrated on a natural altar. Views of the entrance and the exterior are published in the *Bulletin de géographie historique et descriptive* (Paris, 1887–97). Excavations by Messrs. Bent and Tsountas have brought to light a number of graves belonging to an early period in the "Island" civilization. Since 1872 profitable lead mines have been worked on the island. Consult Bent, *The Cyclades* (London, 1885).

AN'TIPAS. See HEROD.

ANTIP'ATER (Gk. *Ἀντίπατρος*, *Antipatros*). (c.400–319 B.C.). 1. The son of Iollas, and one of the most distinguished generals of Philip of Macedon and Alexander the Great. It was especially through the loyal services of Antipater and Parmenion (q.v.) that Alexander was enabled to establish his kingdom on a firm basis. When Alexander led his troops into Asia, he left Antipater in sole charge of affairs in Macedonia. The latter discharged the duties of his office with great ability, suppressing insurrections in Thrace and Sparta and supporting Alexander with fresh troops from home. But he was on the point of being superseded, at Alexander's orders, by Craterus, through the influence of Olympias, the mother of Alexander, when Alexander died. In the partition of Alexander's domain among his generals, the government of Macedonia was assigned to Antipater anew, and he was soon after called upon to defend himself against an alliance of the Grecian States, which, on Alexander's death, sought to regain their freedom. He at first met with reverses, but, with the assistance of Craterus, who was also his son-in-law, and Leonnatus, he finally brought the allies into subjection in 322 B.C. This war is usually called the Lamian War, from Lamia, where Antipater was besieged in 323 B.C. Everywhere oligarchies were established, and Athens was obliged to deliver up Demosthenes and Hyperides and to receive a garrison in Munychia. This war was followed by another with Perdiccas (q.v.), Antipater's son-in-law, and Antipater was again successful. After the murder of Perdiccas, in 321 B.C., Antipater was appointed to the supreme regency of Macedonia and the guardianship of Alexander's children. He made a new division of the kingdom, but died shortly after, in 318 B.C., leaving the regency to Polysperchon and a subordinate position only to his own son, Cassander. (See ANTIGONUS.) 2. Son of Cassander and King of Macedonia. His reign followed that of his brother Philip, who had followed Cassander in 297 B.C. He was killed, 287 B.C., by order of Demetrius Poliorcetes. 3. An Idumean, Father of Herod the Great. His first appearance is in the reign of Aristobulus II (69–63 B.C.), as a man of great wealth and important connections. He supported Hyrcanus II against Aristobulus, and after Hyrcanus, in 63 B.C., opened the gates of Jerusalem to Pompey, the influence of Antipater grew apace. In the struggle between Pompey and Cæsar he supported the former, but after the defeat of Pompey made his peace with Cæsar

and continued thereafter his firm adherent. Cæsar showed him many marks of favor. Antipater was poisoned in 43 B.C. 4. Son of Herod the Great by his first wife, Doris; a worthless prince, who was perpetually conspiring against the lives of his brothers. He was finally tried before Quintilius Varus, and executed in prison five days before Herod died.

ANTIP'ATHY (Gk. *ἀντί, anti*, against + *πάθος, pathos*, suffering, affection, emotion, feeling). By derivation, the opposite of *sympathy* (q.v.). It may be defined as a permanent aversion to, or settled incompatibility with, some object or some quality of an object. We may distinguish between formal or logical antipathy and concrete or actual antipathies. The choleric temperament is, formally, antipathetic to the phlegmatic, and the sanguine to the melancholy. (See TEMPERAMENT.) The term is, however, more usually restricted to such definite cases of individual aversion as the dislike shown by many persons to certain animals—snakes, mice, toads, cats. Some of these antipathies, doubtless, have their root in a cultivated affectation, or in the unconsidered encouragement of a prejudice imbibed in childhood; others date from a particular occasion of fright, or are due to the chance association of the object with an unpleasant incident. If, e.g., a house swarms with mice during a period of great mourning, it is probable that the mourners will henceforth show a marked antipathy to these animals. But there are cases which require a different principle of explanation. The aversion to snakes, e.g., which often prevails among those who have never come into contact with the reptiles and who have nothing to fear from those that they may happen to meet, is, perhaps, a phylogenetic symptom. The snake is the chief enemy of the monkeys, as readers of Kipling's *Jungle Book* will remember; and the liability to fear of snakes may be a heritage from our pre-human ancestry. Some persons, again, cannot enter a room which contains a cat. The explanation may be that the valerianic odor peculiar to the animal is automatically associated in certain constitutions with organic sensations of nausea or shuddering, just as there are persons who are subject to shivering and gooseflesh when a slate pencil squeaks upon a slate. At any rate, the mammals that excite antipathy (mouse, cat, fox, hare, pig) have one and all a marked and peculiar scent; and we know from animal psychology that a smell stimulus may set up a well-marked chemo-reflex. The aversion to mice may be derived in part from the uncanny and snake-like character of their locomotion and in part from the ubiquity which their small size makes possible. The aversion to toads (apart from superstitious belief in their poisonous properties) may be due to the clammy cold of their skin; we all know the horrible feeling that arises if, being in the pantry in the dark, the hand by chance is laid upon a piece of cold potato. Many historical cases of antipathy cannot now be explained, simply because there is only the record of the bare fact, with no mention of the conditions under which the antipathy took shape.

Bibliography. A. Mosso, *Fear* (New York, 1896); W. James, *Principles of Psychology* (New York, 1890). On reflex sensations, consult W. Wundt, *Grundzüge der physiologischen Psychologie* (Leipzig, 1910–11). See COMMON SENSATION.

ANTIP'ATRIS. A city of Palestine, built by Herod the Great (37–34 B.C.) in honor of his father, Antipater. It was situated on the river 'Aujeh, in the southeastern part of the Plain of Sharon, about 11 miles east-northeast of Joppa—probably the modern Ras el-'Ain. In Roman times it was of importance as the junction of several military roads leading from the south and east to Cæsarea, the Roman capital of Palestine. By the Jews it was considered the northwest limit of strictly Jewish territory, its location being within a few miles of the southern border of Samaria. Josephus often mentions it. Paul was escorted as far as Antipatris by Roman soldiers when he was taken from Jerusalem to Cæsarea (Acts xxiii. 31–32).

AN'TIPE'RIOD'ICS. Drugs given to arrest or alleviate the paroxysms of certain periodic fevers. The typical periodic fever is malaria, and the typical antiperiodic is its specific remedy, quinine. Other antiperiodic drugs in general use are cinchona, salicylic acid, eucalyptol, Warburg's tincture, and arsenic.

ANTIPHANES, ăn-tĭf'ā-nēz (Gk. *Ἀντιφάνης*). A Greek comic poet of the fourth century B.C. He was one of the chief representatives of the Middle Comedy. Many fragments of his works—which numbered, according to some estimates, 365, and to others 260—are preserved. He is praised by Athenæus for his polished diction. Consult Meineke, *Poetarum Comicorum Græcorum Fragmenta*, vol. iii (Berlin, 1839–57).

ANTIPH'ILUS (Gk. *Ἀντίφιλος, Antiphilos*). A Greek painter of Egyptian birth, who lived at the court of the first Ptolemy, about 330 B.C. Quintilian (xii, 16, 6), who rates him high among the painters of the age of Philip and Alexander, says he excelled in the graceful treatment of subjects of high art as well as of daily life.

AN'TIPHLOGIS'TIC. An agent supposed to combat or prevent inflammation, such as bloodletting, or the internal administration of aconite, veratrum, gelsemium, etc. A favorite local application consists of fuller's-earth and glycerine.

AN'TIPHON (Gk. *ἀντίφωνα*). A notable part of the breviary offices in all Western uses. The recitation of the Psalter forming the staple of the office, antiphons or short texts (generally from Holy Scripture), having special reference to the feast or season celebrated, were sung in connection with the psalms and evangelical canticles to give color and appropriateness to the invariable parts of the service. On the greater festivals (hence called "double feasts"), the antiphons are sung entire before and after the psalms; at other times only the first two or three words were sung before and the entire antiphon after. Pope Gregory I in 590 prepared the first regular *antiphonarium*, a service book containing the proper music for the antiphons.

ANTIPHON (Gk. *Ἀντιφῶν*) (480–411 B.C.). The earliest of the Ten Attic Orators in the Alexandrian Canon of Orators, and a teacher of oratory. He was the son of Sophilus the Sophist and was born at Rhamnus in Attica. Although Antiphon was undoubtedly influenced by the teachings of Gorgias, he never developed so rhetorical a style as some of the later orators. He labored to make his arguments clear, solid, and convincing, so that it might be impossible for the judges who listened to the speeches he wrote to refuse their assent to his propositions. His success was unmistakable. He first made oratory a matter of rules and principles and so was "the first contributor to the rules of eloquence." Although he never made a public appearance as a pleader in the courts of justice,

but contented himself with writing speeches for others to deliver, he acquired great influence, which he did not fail to exert for the furtherance of his political principles. He several times held commands in the Peloponnesian War. To him must be attributed the overthrow of the Athenian democracy (411 B.C.) and the establishment of the oligarchical government of the Four Hundred; for although Pisander (q.v.) figured prominently before the people in this revolution, the whole affair, according to Thucydides, was secretly planned by Antiphon. The oligarchical government fell within the year, and Antiphon was brought to trial for treason for having attempted to negotiate peace with Sparta. Thucydides affirms that an abler defense was never made by man in a similar position. Nevertheless he was convicted and put to death, his property confiscated, and his house razed to the ground; it was ordered that his remains should not be interred in Attica, and his children were forever declared incapable of enjoying civic privileges. Of the 60 orations which the ancients possessed, only 15 have come down to us. All deal with murder cases. Three were under Antiphon's name, written for others, and are admired for their clearness, purity, and vigor of expression; the remaining 12 appear to have been intended as specimens of school rhetoric for his pupils. The style is severe and archaic, lacking in ease. They have been edited by Blass (Leipzig, 1881). Consult also Blass, *Attische Beredsamkeit* (Leipzig, 1887–98), and Jebb, *Attic Orators* (London, 1876–80).

ANTIPHON (Gk. Ἀντιφῶν, *Antiphōn*) and **BRY'SON** (Gk. Βρύσων, *Brysōn*). Greek mathematicians of the fifth century B.C., who are credited with having introduced the process of exhaustion for the purposes of the quadrature problem. See QUADRATURE.

ANTIPH'ONY (Gk. *ἀντί, anti*, against + *φωνή, phōnē*, sound, voice). A name given by the ancient Greeks to a species of musical accompaniment in the octave, by instruments or voices, in opposition to that executed in unison, which they called *homophony*. Antiphony is also the name of a species of sacred song sung by two parties, each responding to the other, a practice which was cultivated in the early ages by the Hebrews, Greeks, and Romans. Many of the psalms of David show that antiphonal singing was then in use. Its introduction into the Greek church is ascribed either to Ignatius, Bishop of Antioch, in the second century, or to St. Chrysostom, about 400 A.D.; and Ambrosius, Bishop of Milan, is said to have introduced it into the Western church in the fourth century. The dividing of the antiphonies into verses, with rules regarding the same, is attributed to Pope Celestine in 432. The reformed Christian churches of Germany and England have still retained a certain degree of antiphonal singing, and there are several antiphonal choirs in America, notably that in the church of the Paulist Fathers in New York. The chanting of the psalms in the English cathedral service is an imitation of the ancient antiphony.

ANTIPH'RASIS (Gk. *ἀντίφρασις*, from *ἀντί, anti*, against, contrary + *φράζειν, phrazein*, to point out, declare, tell). A technical term used by the ancient rhetoricians and grammarians, signifying, etymologically, "contrary-speaking." Properly, it denoted the process of expressing an idea, generally an unpleasant idea, by using a word or expression of meaning opposite to the natural one. Thus, the Furies were called the *Eumenides* ('the kindly-minded ones'), and the Black Sea, though inhospitable *ἄξεινος, axeinos*), was named *Pontos Euxeinos* ('the Hospitable Sea'). In Greek and Roman comedy, too, the names of the personages often had a meaning diametrically opposed to the characters possessed by them. This use of antiphrasis is common in some modern writers, e.g., Thackeray and Sheridan. An example is Mrs. Candour in the *School for Scandal*. The word "antiphrasis" was used also in a broader sense of the process of expressing one idea by negativing the opposite; e.g., *not unmindful*, meaning emphatically *mindful*. This figure is, however, called distinctively Litotes.

ANTIPODES, ăn-tĭp'ō-dēz (Gk. pl. *ἀντίποδες*, from *ἀντί, anti*, against + *πούς, pous*, foot). Literally, those who have their feet over against each other. As used in geography, the term means the dwellers at the opposite extremities of any diameter of the earth. From this primary relation there necessarily arise many secondary relations. Antipodes must be on one and the same meridianal circle, separated from each other by half the circumference. They must therefore differ in longitude by exactly 180°, with the exception of the poles themselves, which have an indeterminate longitude; and being separated from each other by half the circumference, they must be equidistant from the equator in opposite directions. Take London as an example, in lat. 51° 30′ N. and long. 0° 5′ W. Its antipodes must be in lat. 51° 30′ S. and in long. 179° 55′ E., coinciding pretty nearly with a small island to the southeast of New Zealand. This small island, in honor rather of London than of itself, has appropriated the peculiar name of Antipodes Island.

With reference to the earth's daily rotation, noon of the one side must be midnight of the other; while with regard to its annual revolution, summer and autumn of the one side must be winter and spring of the other. With respect, however, to the former contrast, some explanation may be required. If this, for instance, is Wednesday in London, was last midnight in that city the noon of Tuesday or of Wednesday at Antipodes Island? The answer to this question depends upon a conventional usage, according to which (with a few exceptions, dictated by practical considerations) the time of all places east of Greenwich is said to be later than that at Greenwich, and the time of all places west of Greenwich is said to be earlier than that at Greenwich. To avoid confusion it has been agreed, further, to think of Antipodes Island as situated *east* of Greenwich. With this in view, it is clear that the midnight in question at London corresponded to Wednesday noon at Antipodes Island. See INTERNATIONAL DATE-LINE.

ANTIPODES IS'LAND. A small island southeast of New Zealand in 49° 42′ S. lat. and 178° 43′ E. long., so called because it is nearly the antipode of London (Map: World, Western Hemisphere, O 3). It is uninhabited and has an area of only about 20 square miles. See ANTIPODES.

AN'TIPOPE. A pontiff elected in opposition to one canonically chosen. The regular popes of Rome were occasionally out of favor with a faction which chose its own bishop (e.g., Hippolytus, 218–223; Felix II, 355–356), but the first Antipope is reputed to be Laurentius, elected

in 498, in opposition to Symmachus. Several emperors of Germany set up popes against those whom the Romans had elected without consulting them. Otho the Great displaced successively two popes of Rome; and when the Antipope Sylvester III had expelled Pope Benedict IX, Conrad II, Emperor of Germany, brought back this ecclesiastic, who transferred his dignity to Gregory VI (1044). There were now, consequently, three popes, and their number was increased to four by the election of Clement II in 1046. Shortly after, Alexander II found a rival in Honorius II (1061), and in 1080 the same unseemly spectacle was witnessed when Henry IV, Emperor of Germany, elevated to the papal chair Guibert of Ravenna, under the title of Clement III, in opposition to his implacable adversary, Gregory VII. But after the death of Gregory, Clement was himself opposed successively by Victor III and Urban II, and at last died at a distance from Rome, having just beheld the exaltation of Pascal II as the successor of Urban. During the twelfth century several antipopes flourished, such as Gregory VIII and Honorius III. On the death of the latter, France began to intermeddle in these disgraceful strifes and upheld the cause of Innocent II against Anacletus, while the kings of Sicily, on the other hand, more than once set up a pontiff of their own against the choice of the emperors. Between 1159 and 1378 there were four antipopes; but the most remarkable epoch is "the great schism of the West" produced by these unedifying rivalries in 1378—a schism which divided the Church for 50 years. It broke out after the death of Gregory XI at the election of Urban VI, whom the voice of the Roman people, demanding an Italian Pope and not one who should fix his pontificate, like several of his predecessors, at a distance from Rome, had elevated to the papal throne. The French cardinals objected, withdrew to Provence and elected a new Pope, under the name of Clement VII, who was recognized by France, Spain, Savoy, and Scotland, while Italy, Germany, England, and the whole north of Europe supported Urban VI. The schism continued after their death, when three popes were elected by different parties, all of whom were deposed by the Council of Constance, in 1415, and Cardinal Colonna elected in their place, under the title of Martin V. The last Antipope was Felix V (1439–49). These divisions are often alleged as an argument against the doctrine of papal infallibility; but Catholics consistently affirm that the privilege of infallibility is only claimed in matters of doctrine, and has no relation to questions of fact, such as disputed succession or canonicity of election.

AN'TIPYRET'IC (Gk. *ἀντί, anti*, against + *πυρετός, pyretos*, burning heat, fever). Any drug which lowers febrile temperature by action upon the blood, the circulation, or the secretion of sweat, or by changes in heat production and dissipation through the nervous system. The most important are antipyrine, acetanilid, phenacetine, quinine, salicylic acid (qq.v.) and its derivatives, and others of the benzene series. Less importance than formerly is attached to the action of such drugs in diminishing temperature, as fever is now regarded as a symptom of some disturbance, a symptom which is in many cases best relieved by removing its cause. If the temperature is so high as to appear to be injurious in itself, or if it causes discomfort, these remedies may be of value. Many of them are efficacious also in relieving pain; e.g., salicylic acid in acute rheumatism; antipyrine, antifebrine, or phenacetine in any painful febrile condition. Quinine is used in malarial fever, not only for its antipyretic effect, but to overcome the malarial organism. (See MALARIA.) Cold baths, sponges, packs, etc., are frequently employed to reduce temperature. The antipyretic action of drugs is usually accompanied by more or less depression of the heart. See CINCHONA; SALICYLIC ACID.

AN'TIPY'RINE (derivation same as of *antipyretics*). A synthetic drug, derived from phenyl hydrazin, having the chemical formula $C_{11}H_{22}N_2O$. It occurs in scaly crystals, colorless and odorless, has a bitter taste, and is freely soluble in water and alcohol. Antipyrine is chiefly used as an antipyretic, but it is also an efficient pain reliever, and nerve sedative, and possesses diaphoretic, mydriatic, and hypnotic properties. Locally it is antiseptic, hemostatic, and astringent. As an antipyretic it acts promptly, lowering the temperature and inducing perspiration. As an analgesic it is used in headache, neuralgia, and dysmenorrhœa; and in acute rheumatism, where it acts somewhat like salicylic acid. As a nerve sedative it is valuable in epilepsy and whooping cough, and to a less extent in chorea.

Like most coal-tar derivatives, antipyrine frequently produces untoward symptoms. Cyanosis, frequent and feeble heart action, dyspnœa, sometimes collapse, occur not uncommonly. Serious symptoms have been produced by 10 or 15 grains, and even death has been caused. This must be remembered especially in cases where the natural tendency of the disease is toward heart weakness. In these cases it should be given sparingly in conjunction with a stimulant. Individual susceptibility varies greatly. The drug sometimes produces rashes which resemble measles, scarlatina, urticaria, erythema, and purpura. These are unpleasant, but not serious. See ACETANILID; PHENACETIN.

AN'TIQUA'RIAN SOCI'ETIES. Organizations in Europe, England, and America for the promotion of the study of antiquities. The London Society of Antiquaries was antedated by a society established in 1572 and dissolved by James I about 1604. The present London society began to meet about 1707 and received its charter in 1751. The Scottish Society of Antiquaries was founded in 1780, the French society in 1814, and the American Antiquarian Society (see ANTIQUARIAN SOCIETY, AMERICAN) in 1812.

ANTIQUARIAN SOCIETY, AMERICAN. A society founded in 1812, which has its headquarters at Worcester, Mass. It owns a library of more than 100,000 volumes, which is especially rich in manuscripts, newspapers, political pamphlets, and early American publications. The *Transactions* have been published since 1820, and the *Proceedings* semi-annually since 1849. A new library for the society was completed and occupied in 1910. The society maintains a fund aggregating over $100,000 for the support of various departments of its work. See ANTIQUARIAN SOCIETIES.

AN'TIQUARY, THE. One of Scott's Waverley Novels (1816), and its chief character, Jonathan Oldbuck, laird of Monkbarns.

ANTIQUE, ăn-tēk' (Lat. *antiquus*, old). As the term "ancients" is commonly applied to the Greeks and Romans, the word "antique" is used

with reference to their works of art, especially their incomparable sculptures. The antique style in works of art is distinguished by critics from the romantic or mediæval, and also from the modern. But anything made to resemble the relics of classic art, however frankly or remotely, may be classed as antique. Moreover, the term has several special meanings. Thus, according to a ruling of the United States Treasury Department, anything made before 1700 A.D. is antique and hence exempt from tariff duty. In printing there is a certain form of type that is known as antique; while in bookbinding the term is applied to embossed, but not gilded, designs or lettering.

ANTIQUITIES. See ARCHÆOLOGY.

ANTIQUITY OF MAN. See MAN.

ANTI-RENTISM. A movement partly political, extending over the years 1839–47, among the leaseholders in Albany, Columbia, Delaware, Montgomery, Rensselaer, and other counties in New York State. These leaseholders held their land under a sort of feudal tenure, in spite of the virtual abolition in 1775 of many of the old manorial and patroonship rights (see PATROONS), the various farms being leased, for the most part, either in perpetuity or for a period of two or three lives, while the ground rents were generally paid in kind and certain feudal services were not infrequently exacted. As the population increased, such an arrangement grew exceedingly irksome to the tenants, who were nominal but not real owners, and who could not, as a rule, transfer their titles without paying to the landlords a portion (usually a quarter) of the amount received. The crisis came in 1839, when Stephen Van Rensselaer (q.v.), one of the largest landholders, died. He had been remiss in collecting his rents, and his heirs served writs of ejectment on tenants in Albany County. The tenants thereupon resisted, and on several occasions the resulting disturbances were so serious that the militia had to be called out. By 1842 the trouble had spread to other manors. Anti-rent associations were formed over most of the leasehold districts, rents were withheld, and evictions resisted, while the grievances of the tenants were aired in newspapers devoted to their interests and in memorials to the Legislature.

The question became political and was fomented by agitators for their own special purposes, the anti-rent party ultimately controlling the legislative delegations of 11 counties. Lawlessness became prevalent, and bands of men, absurdly disguised as "Indians," assaulted, tarred, and feathered, and, in several instances, murdered, deputy sheriffs and their assistants. A law passed by the Legislature against men appearing in public in disguise proved ineffectual, and on Aug. 7, 1845, O. N. Steele, a deputy sheriff of Delaware County, was surrounded and shot down by disguised men while serving a process. Governor Wright forthwith put the county under martial law, and arrested over 100 men, of whom 50 were convicted, 20 being sent to the State prison and 2 sentenced to death. The death penalty was commuted for life imprisonment, and eventually all of the prisoners were pardoned by Governor Young. The repressive measures broke up the unlawful resistance, though they caused the defeat of Governor Wright by John Young, the anti-rent candidate, at the next election. In 1846 an article was inserted in the State constitution abolishing all feudal tenures and forbidding future leases of agricultural land for more than 12 years. In order to settle the question of title the Attorney-General brought suit against Harmon Livingston. This suit resulted in Livingston's favor, but several out of the multitude of individual suits against the landlords went to the Court of Appeals, which decided in 1852 that without reference to the Constitution of 1846, agreements in restraint of alienation of titles in fee were void. Consult: Cheyney, *The Anti-Rent Agitation* (Philadelphia, 1887), and Murray, *The Anti-Rent Episode in New York*, in the "Report of the American Historical Association for 1896"; also Alexander, *Political History of the State of New York*, vol. ii (New York, 1906); Wright, *Life of Governor Silas Wright* (Auburn, 1847).

ANTIRRHINUM. See SNAPDRAGON.

ANTISABBATARIANS (*anti* + Gk. *σάββατον, Sabbaton*, Sabbath). Those who recognize no obligation to observe either the Jewish Sabbath or the Christian Lord's Day, deeming any one day as sacred as another.

ANTI-SALOON LEAGUE. An organization which was first founded in Ohio as a State body in 1893. The idea spread rapidly, and the league became national two years later. Its object is the radical repression and ultimate suppression of the liquor traffic. Its method includes the federation of existing agencies, especially the churches. There are departments of agitation, legislation, and law enforcement. The league is interdenominational and omnipartisan. It has branches in every State in the Union and publishes papers in nearly all the States. Practically every religious denomination in the United States has a vice president on the governing board of the league. The league has been most effective in the work which it has undertaken. Through its efforts large areas have been freed entirely from the sale of liquor and in other areas it has been greatly restricted. The work of passing restrictive measures through the State legislatures has been aggressively carried on, and where such measures have been passed agents of the league have worked with success for their proper enforcement. The remarkable wave of prohibition which swept over the Southern States in the first years of the twentieth century received its impetus largely from the work of the league. See PROHIBITION. The *Anti-Saloon Year Book* gives an annual summary of the work of the league.

ANTISANA, än'tē-sä'nä. A volcanic peak of the Andes in Ecuador, about 40 miles southeast of Quito, and over 19,000 feet high (Map: Ecuador, B 3). Signs of volcanic activity appeared in 1803 during the eruption of Cotopaxi. Tambo de Antisana, one of the highest settlements on the globe, is on a slope of the Antisana at an elevation of over 13,000 feet.

ANTISCORBUTICS. See SCURVY.

ANTI-SEMITISM (*anti* + *Semites*, i.e., Jews). A movement having for its object the exclusion of Jews from posts of political honor or of social prominence. In its extreme form Anti-Semitism seeks ultimately to expel the Jews from the nation, on the ground that they represent a non-assimilable element, exerting a pernicious influence upon the social order. In its inception modern Anti-Semitism was essentially social and economic, and questions of religion had little to do with it. With the progress of the Anti-Semitic agitation, however, the most effective popular attack on the Jew was based

upon his religion. In the Anti-Jewish riots that have occurred in Russia, Austria, Rumania, and Germany the religious element has been prominent, although social aversion and conflicting economic interests have also been in evidence. Anti-Semitism first assumed the proportions of a social movement in Germany about 1879. A political party organized in Berlin sought to place Jews under political disabilities. The leaders of the party were Stöcker, court preacher of Prussia and a Christian Socialist; Professor Treitschke, of the University of Berlin, an historian and deputy in the Reichstag; and Dr. Dühring, author of treatises on history and philosophy. Throughout 1879 and 1880 these men, through the press and in speeches, carried on an active Anti-Semitic propaganda based on social and economic grounds. The matter was brought to a vote in the Reichstag in 1880; but that body declared itself in favor of economic and religious liberty by a decisive vote. The Anti-Semitic Party became a strong one in the Reichstag, however, in the early nineties. Since that time its influence in German politics has been inconsiderable. In France the Anti-Semitic propaganda was begun by Edward Drumont, editor of *La Libre Parole*, about 1882, and reached a climax in the *affaire Dreyfus*. See DREYFUS.

Since its organization in Germany the Anti-Semitic Party has been organized in Russia, Austria, Greece, and Holland. As the Jews in Russia are to a great extent kept out of the ordinary trades, many of them have resorted to the business of money lending, and by means of mortgages placed to secure loans they have obtained control of small landed properties. This fact, coupled with religious prejudice, caused the Anti-Semitic movement in Russia, about 1881, to assume a most violent form. Laws preventing them from entering professions and from living in places other than towns and hamlets were vigorously enforced. In some cities, where a majority of the people were Jews, they were expelled without warning. The Anti-Semitic agitation led in April, 1903, to a terrible massacre of Jews at Kishinev in southern Russia; in 1905 and 1906 sporadic attacks upon the Jews, resulting in loss of life and destruction of property, occurred in various Russian cities. The persecution of the Jews in Russia and Rumania has caused an emigration on a vast scale, especially to the United States and South Africa. Consult Lazare, *Anti-Semitism* (New York, 1903). See JEWS.

AN'TISEP'TIC (*anti* + Gk. *σήπειν, sēpein*, to make rotten, to cause decay). In the arts, any substance which arrests fermentation and decay; in medicine, any agent which arrests the development and growth of micro-organisms. A *germicide* is a substance or agency which destroys these micro-organisms. A *disinfectant* destroys the organisms and at the same time removes the noxious products of fermentation and putrefaction. The conditions which favor putrefactive change are a moderate degree of warmth, air, and the presence of moisture and micro-organisms. Measures which tend to limit the action of any of these agencies are antiseptic in character. Cold acts as an antiseptic, by bringing the article to be preserved to a temperature at which the putrefactive bacteria can no longer act. In the preservation of canned goods another principle is employed, that of exclusion of air. The cans, with their contents, are heated, and when all air has been expelled the tops are soldered on. The principle of excluding moisture is employed in the processes of drying meats, fruits, and vegetables. The action of micro-organisms is often combated directly by the introduction into preserved foodstuffs of such antiseptic substances as boric and salicylic acids and formaldehyde. They are considered injurious, however, and their use is forbidden by law in many States. Besides the antiseptics proper, a number of the more common substances, such as common salt, sugar, alcohol, and saltpetre, are used in food preservation. Antiseptics are used for other purposes besides the preservation of foodstuffs. Thus the preservation of sizes used in paper-making is effected by the addition of sulphurous acid, and the preservation of the commercial gums and pastes by carbolic acid and oil of wintergreen. The preservation of wood from decay by impregnation with tar, creosote, and carbolic acid is also practiced to some extent.

In scientific laboratories antiseptics like alcohol and formaldehyde are largely employed in the preservation of anatomical and biological specimens. In surgery the application of antiseptics, first introduced by Sir Joseph Lister, is a matter of greatest moment. It is an understanding of the use of antiseptic and germicidal agencies that has brought about the remarkable advances made by this branch of the healing art since 1880. The condition that is sought for in every surgical operation to-day is *asepsis*, or surgical cleanliness. When a substance is *aseptic*, it is free from all septic micro-organisms. Instruments are rendered aseptic or sterile by boiling in water, by dry heat, by steam, by washing with the chemical antiseptics, or by exposing them to moist formaldehyde vapors; dressings, by dry heat or by steam at ordinary atmospheres or under pressure; ligatures, by prolonged immersion in alcohol or other antiseptic solutions; and the skin of the patient at the site of the operation, by application, after mechanical cleansing, of a solution of iodine or corrosive sublimate. The chemical substances most commonly employed as antiseptics in medicine are carbolic acid, the bichloride of mercury, peroxide of hydrogen, formaldehyde, free chlorine, iodine, potassium permanganate, iodoform, and boric acid, and to a lesser extent the vegetable substances thymol, menthol, and eucalyptol. See BACTERIA; MICROBE; KOCH, ROBERT; PASTEUR; WOUND.

AN'TISLAV'ERY SOCI'ETY, THE AMERICAN. An association organized in Philadelphia, December, 1833, by delegates from the few State or city societies in the United States. The first Antislavery Society was formally organized at Boston in January, 1832, William Lloyd Garrison being the leader of the movement. The American Antislavery Society took the boldest ground in favor of the immediate abolition of slavery, and its work was for many years looked upon as fanatical or at least hopelessly impracticable, its members were denounced, its meetings broken up, and rewards offered in the South for its leaders alive or dead. Divergence of opinion on the question of political action caused a split in the society in 1840. The non-voters under Garrison, although but a small portion of the Abolitionists, gained control of the old society. The others formed the American and Foreign Antislavery Society, but the movement had outgrown a society formation and found a better and more conservative expression in the

Liberty Party (q.v.) and its successors. Among the prominent Abolitionists were William Lloyd Garrison, Wendell Phillips, Samuel J. May, Lucretia Mott, Lydia Maria Child, Arthur Tappan, James G. Birney, John G. Whittier, William Goodell, Gerrit Smith, and William Jay. The parent society continued to exist, until after the adoption of the fifteenth amendment, in 1870, remaining small in numbers but largely influential in its propagandist work. For a partial bibliography of the movement, see the biographical sketches of the leaders here mentioned. See ABOLITIONISTS; SLAVERY.

AN'TISPASMOD'IC (*anti* + Gk. *σπασμός, spasmos*, convulsion, spasm). Any drug that has a sedative effect upon the nervous system, either by depressing the brain or spinal cord or by stimulating inhibitory centres, and so regulating the production of nerve force. The former class includes the bromides and chloral. The stimulating antispasmodics are asafetida, belladonna, camphor, Hoffman's anodyne, musk, and valerian. As a class, they are employed in conditions of nervous excitation, particularly of a hysterical nature, in asthma, alcoholism, and in convulsions from epilepsy or other causes.

ANTIS'THENES OF ATH'ENS (born about 450 B.C.). A rhetorician, but later a philosopher and the founder of the Cynic school of Greek philosophy. He was son of Antisthenes, an Athenian, and a Thracian slave-woman. He studied under the Sophist Gorgias, and was a disciple and ardent follower of Socrates; he plays a large rôle in the "Symposium" of Plato. He wrote a large number of philosophical works, in Greek much praised by ancient critics for its purity, and for many years taught elocution and philosophy, in the gymnasium outside Athens known as the Cynosarges; from the name of this gymnasium, perhaps, came the name Cynics (q.v.), which was given to his followers. Antisthenes regarded freedom and happiness as attainable only through virtue; but the meaning of his doctrine is ambiguous until the definition of virtue is given. In this Antisthenes followed Socrates's eudæmonistic principles. For Antisthenes, however, virtue was not in doing good for its own sake; the object of virtue was to render man as independent as possible of the events of life, and this freedom was attainable by reducing the wants of life to what is absolutely inevitable, viz., the wants of hunger and love. Customary morality and the demands of decency, as well as the pleasures of life, both material and intellectual, were ridiculed by Antisthenes and his followers and denounced as depriving man of his freedom, and, hence, as leading to nothing but unhappiness. Nevertheless, the Cynic was not inconsistent when he advocated a philosophic culture; but this culture was to be looked upon as a means, and not as an end; it was desirable not for its own sake, nor for the sake of the intellectual pleasure which it could afford, but as leading our intelligence to avoid consistently the artificial enjoyments of civilized life. Two declamations ascribed to Antisthenes were edited by Friedrich Blass in 1871, but most scholars decline to believe that they were written by Antisthenes. Consult T. Gomperz, *Greek Thinkers* (Eng. trans., vol. ii, 1905).

ANTISTROPHE, ăn-tĭs'trō-fē (*anti* + Gk. *στροφή, strophē*, a turning, strophe, stanza). A stanza or portion of a poem following the strophe, and responding to it. It results also when the same word or phrase is used at both the beginning and the end of a clause or sentence; as in

> "Fare thee well; and if forever,
> Still forever fare thee well."

ANTITH'ESIS. See RHETORIC, FIGURES OF.

AN'TITOX'IN (*anti* + *toxin;* Gk. *τοξικόν, toxikon*, poison for the arrow, from *τόξον, toxon*, bow). During the course of diseases caused by bacterial infection, certain poisons (toxins) are developed in the blood by the bacteria, or exist in the bodies of the bacteria. Nature, in combating the disease, produces certain principles in the serum of the blood of the patient, called antitoxins, which antagonize the action of the toxins. These principles have not been isolated, but they are used to combat disease artificially by injecting blood serum which contains them into the tissues of a person suffering with a bacterial disease, to aid him in neutralizing the toxins resulting from that disease. Antitoxins combating the poisons of tetanus, cerebro-spinal meningitis, snake-bite, pneumonia, tuberculosis, yellow fever, bubonic plague, cholera, and other ailments have been prepared and used. The one most often employed is diphtheria antitoxin, which is frequently called simply antitoxin. See ANAPHYLAXIS; BACTERIA; DIPHTHERIA; SERUM THERAPY.

AN'TI-TRADE' WINDS. See WINDS.

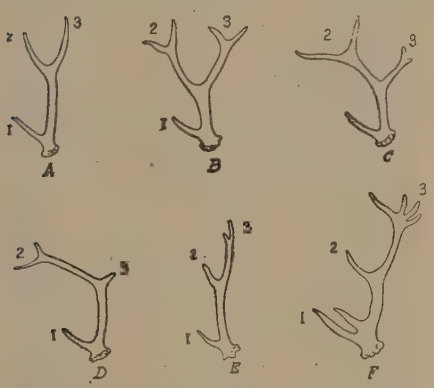
AN'TITRIN'ITA'RIAN (*anti* + *trinitarian*, from Lat. *trinitas*, triad, trinity). One who denies the doctrine of the Trinity. An Antitrinitarian differs from a Unitarian only in this respect, that his objection to the doctrine in question is made on philosophical, while that of the latter is made on theological, grounds.

AN'TITYPE (*anti* + *type;* Gk. *τύπος, typos*, an impression, model, pattern). The fulfillment of the type. Thus, David is often regarded as a type of Christ, who is, therefore, the antitype; the sacrificial offerings of the Old Testament types of Christ, and he is their antitype. See TYPE.

ANTIUM, ăn'shĭ-ŭm (now Anzio, formerly Porto d'Anzio). One of the most ancient cities of Latium. It stood on the coast, about 34 miles from Rome, and, being favorably situated for commerce and piracy, was, under the Volscians, into whose hands it had fallen, one of the most powerful enemies of rising Rome, until finally subdued (338 B.C.). All its ships were at this time taken from the town, and their beaks (*rostra*) were set up on the speaker's platform in the Forum, hence known as the Rostra. It became a favorite resort of the wealthy Romans, and some of the most famous remains of ancient art have been discovered among the ruins of their villas and palaces, such as, perhaps, the "Apollo Belvedere" (see APOLLO BELVEDERE) in the Vatican, and the "Borghese Gladiator" in the Louvre. (See AGASIAS.) In 1878 a statue, long known as the Maiden of Anzio, was discovered there, within the villa of Prince Ludovico Chigi; in December, 1909, the Italian government paid nearly $90,000 for this statue and set it up in the Museo delle Terme, in Rome. Since that time many have maintained that the statue was rather that of a youth: see *The Classical Weekly*, vol. iii, pp. 146–147 (New York, 1910), and for the opposite view, that it portrays a maiden, a prophetess, see the same periodical, vol. iii, pp. 180–181. It was the birthplace of the emperors Caligula

and Nero, and the latter constructed a splendid port by means of two moles inclosing a basin two miles in circumference. Remains of the moles still exist, although the basin is mostly filled up with sand. In the ninth and tenth centuries the town was made desolate by the raids of the Saracens. Its site is now occupied by Anzio, a favorite bathing resort for the inhabitants of Rome, with some charming villas.

ANT'LERS (OE. *auntlere*, OF. *antoiller*, from Lat. *ante*, before + *oculus*, eye). The horns of (male) deers. For their structure, etc., see DEER. In the language of British stag-hunting, each part of the horn and each stage of growth receives a name, and many of these names serve to designate a deer of a certain age or fitness. These names are derived from and



TYPES OF ANTLERS.

A, Rusine. *B*, Normal rucervine. *C*, Intermediate rucervine. *D*, Extreme rucervine. *E*, Sub-elaphine. *F*, Elaphine. 1, Brow-tyne. 2, Tres-tyne. 3, Royal-tynes.

specifically apply to the European red deer (*Cervus elephas*), now preserved in many parts of Europe for the sport of stag-hunting; and they have descended from ancient terms, mostly French, originating on the Continent in mediæval times. The following is a summary given by Prof. A. H. Garrod in *Cassell's Natural History*, vol. iii:

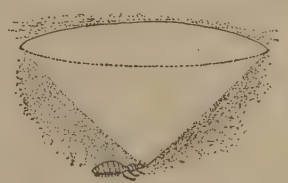
"In the common red deer, in the spring of the year following its birth, the antlers are nothing more than straight, conical, and unbranched 'beams,' the animal being then known as a 'brocket.' In the following spring the antler has, besides the 'beam,' a small branch from its base, directed forward, known as the 'brow antler'; it is then termed 'spayad.' In the third year an extra front branch is formed, known as the 'tres,' and the whole antler is larger. The tres is sometimes seen in the smaller antler of the spayad. In the fourth year the brow antler is doubled to form the 'brow' and 'bez-tyne,' at the same time that the top of the main beam divides into the 'sur-royals' of the 'staggard,' or four-year-old male. In the fifth year the sur-royals become more numerous, the whole antler of the 'stag' being heavier than previously, only to be exceeded in weight by those of the fully adult 'great hart' with ten or more 'points,' each being larger and longer than the year before."

In Scotland a deer with twelve points is known as a "royal stag"; but this number is sometimes exceeded. The finest heads are no longer seen in Great Britain, where the habit of shooting the best is leading to deterioration, and fossil antlers from British caves and peat-beds are larger than those of any living individuals, rivaling those of the wapiti in size. Great heads have been obtained within recent years on the vast wild estates of eastern Europe. In many of the old German castles superb heads of sixty or more points are preserved; and Lydekker mentions one shot in Transylvania which had forty-five points and weighed 74 pounds. It should be said, however, that this excessive number of points is the result of injury or disease when the horn was growing, so that a large, symmetric pair with more nearly the normal number of tines is a really better example.

The material of antlers is highly durable, and enters extensively into the arts for making handles of knives, umbrellas, etc., and various ornamental articles.

ANT'LIA PNEUMAT'ICA, or the **AIR-PUMP.** A southern constellation, defined by Lacaille in 1752 and situated between the constellations Argo and Hydra. It contains no large stars.

ANT'-LI'ON. The larva of any insect belonging to the neuropterous family Myrmeleonidæ. The kinds commonly referred to are only those which form pitfalls, and not the members of the family in general, all of which do not possess this habit. The conical pitfalls which



ANT-LION.

Showing the conical Pit with the Larva waiting for its Prey.

are used to aid in the capture of ants and other small ground insects are excavated in sand, dust, and the powdered remains of decayed logs. Their size varies with that of the ant-lion, but they are commonly about one and one-half inches across the top. There are two methods used in the formation of these traps. The simplest trap is excavated by powerful upward tossings of the head after the larva has buried itself below the surface; thus, a funnel-shaped pit is formed. The second method is by crawling backward in a spiral direction just beneath the surface, and by means of the head tossing the sand to the outside. In the bottom of these conical pits the larvæ bury their whole body except their mandibles, which are spread ready for their prey. An ant, for example, strolling about and stepping on the margin of the pit starts a miniature land-slide on account of the looseness of the material in which the pit is excavated. This arouses the ant-lion, which begins actively to throw material from the bottom of the pit, thus accelerating the landslide and bringing the ant within reach of the jaws, which seize it and relax only after extracting the juices from the body. The scissors-like jaws are grooved on their inner side, and thus by opposition a tube is formed through which the juices are sucked. The carcass, extracted of its

juices, is tossed outside of the pit. The posterior part of the intestine of the ant-lion is remarkable for being modified to form a spinning gland or organ. The adult ant-lion spins a cocoon by the aid of sand, etc., in which it transforms to the imago state. The "flies" have four expanded net-veined wings, which are folded over the abdomen when at rest. In most of the species the wings are transparent. About fifty species are found in the United States, most frequently in sandy or semi-arid regions.

ANTOFAGASTA, ăn'tō-fȧ-gäs'tȧ. A northern province of Chile, bounded on the north by the province of Tarapacá, on the east by the republic of Argentina, on the south by the province of Atacama, and on the west by the Pacific Ocean. It has an area of 46,609 square miles. Taking in a large part of the Atacama desert, the surface is mostly mountainous and barren and interspersed with salt lagoons and marshes. It contains a number of volcanoes and has large deposits of silver, lead, iron, manganese, borax, guano, and saltpetre, much of which is mined and exported. Notwithstanding the phenomenal increase in the population of the province between 1885 and 1910 (from 21,213 to 118,718) on account of new mineral discoveries, Antofagasta is still one of the most sparsely populated provinces of Chile, its density being 2.6 to the square mile. This territory was ceded to Chile by Bolivia as a result of the war ending in 1883. The capital and chief seaport is Antofagasta.

ANTOFAGASTA. A port and the capital of the Chilean province of the same name (Map: Chile, C 8). Founded in 1870, it increased rapidly in importance, owing to the saltpetre deposits in the neighborhood and to the rich silver mines of Caracoles and Huanchaca, with which it is connected by railway. Among the imports are hardware, machinery, drugs and medicines, and cotton fabrics. Antofagasta is about 3000 miles from Panama. Pop., 1885, 7600; 1907, 32,496; 1910, 36,000.

ANTOINE, ăn'twȧn', ANDRÉ (LÉONARD) (1851—). A French theatrical manager, born at Limoges. He was for several years a clerk with the Paris Gas Co., but his chief interest came to be in the stage. In 1887 he founded in Paris the Theatre Libre, known also as the Theatre Antoine, an enterprise in which he showed a remarkable skill in the production of plays. He became co-director of the Odéon Theatre in Paris in 1896, and director ten years later. Here he produced many successful plays by modern authors and revived many of the plays of French and foreign writers, including Shakespeare. He was made a Chevalier of the Legion of Honor and an officer of public instruction.

ANTOINE, JULES DOMINIQUE (1845—). One of the principal representatives of the opposition party in Lorraine. He was born at Metz and served in the Franco-German War as officer of the *Garde Mobile.* After the war he became prominent in Metz as an exponent of the Anti-German sentiment in the Municipal Council and the local diet. In 1882 he was elected representative to the Reichstag, but after a fruitless attempt to deliver an address in French before that body, abstained almost altogether from attending the sessions. He was reëlected by his constituents in 1884 and in 1887. He was tried for treason and sentenced to permanent exile (1889), whereupon he became a naturalized citizen of France, being made Paymaster-General in 1893.

ANTOINE DE BOURBON, ăn'twȧn'dẽ bōōr' bōN' (1518–62), King of Navarre. He was born in Picardy, the son of Charles of Bourbon. In 1548 Antoine, then Duke of Vendôme, married Jeanne d'Albret, the heiress of Navarre, and through her became King of Navarre and Lord of Béarn (1555). He was feeble and irresolute and fluctuated between the two religious parties in France. At the beginning he sided with his brother Louis, Prince of Condé, and was involved in the conspiracy of Amboise, but in 1561 he was made Lieutenant-General of France and, embracing Catholicism, soon formed a coalition with the Duke of Guise and the Constable of Montmorency. He received command of the royal army besieging Rouen and there met his death in an assault on the city (Nov. 17, 1562). Antoine de Bourbon is best known as the father of Henry of Navarre, who became Henry IV of France. See BOURBON, HOUSE OF.

ANTOKOLSKI, ăn'tō-kōl'skê, MARK MATVEYEVITCH (1843–1902). A Russian sculptor of Jewish parentage. He was born at Vilna and studied in St. Petersburg Academy of Fine Arts. His earliest successes were a wooden statue "The Jewish Tailor" (1864), "The Miser" (1865) in ivory, which obtained him an imperial pension, and the marble "Kiss of Judas" (1867). In 1868 he received a stipend for traveling, and while in Italy he completed his famous statue, "Ivan the Terrible," which made him an academician. The Emperor Alexander II bought the statue and ordered a bronze cast, now in Alexander III Museum; a marble copy is in the Hermitage at St. Petersburg. Among other sculptures of the artist are: "Peter the Great" (1872, a colossal marble figure); "Christ before the People" (bronze, 1874); "The Death of Socrates" (1876); "The Last Sigh" (1878); "Spinoza" (1882); "Yermak" (the Cossack conqueror of Siberia); "The Sleeping Beauty" (1900), and a portrait statue of the novelist, Turgenieff. Most of the above sculptures are in the new Alexander III Museum, St. Petersburg. Among his portraits of the imperial family are the bronze statue of Alexander II at Moscow and that of Alexander III in the Kremlin. At the Paris International Exposition of 1878 Antokolski was awarded the first prize for sculpture, and two years afterward he settled permanently in Paris. He was a Chevalier of the Legion of Honor, corresponding member of the Académie des Beaux-Arts, etc. His art is characterized by powerful realism and energy of expression.

ANTOMARCHI, ăn'tō-mär'kê, FRANCESCO (1780–1838). The physician of Napoleon at St. Helena. He was born in Corsica, studied medicine at Pisa, and afterward practiced in the Santa Maria Hospital at Florence. At the request of Napoleon's mother he was induced by Cardinal Fesch to succeed Dr. O'Meara as the attendant physician of the Emperor at St. Helena. At first there was little cordiality between the two; but subsequently Napoleon conceived a high regard for his countryman and at his death left him 100,000 francs. The physician afterward declared that the death of Napoleon had not been caused by cancer of the stomach, but by a malignant fever peculiar to the island, and he refused to sign the *post-mortem* certificate. In 1830 Antomarchi displayed what he represented to be a death mask of Napoleon. The likeness was considered ac-

curate by many, but the phrenologists found fault with the contour of the cranium, and doubt was cast upon the genuineness of the mask. Nevertheless, it forms the model from which many busts of Napoleon have been made. At the outbreak of the Polish revolution, in 1830, Antomarchi went to Warsaw and soon afterward returned to France, whence, in 1836, he proceeded to America. He died at Santiago, Cuba. He published *Les derniers moments de Napoléon* (Paris, 1823; London, 2d ed. of Eng. trans., 1826).

ANTONELLI, ăn'tô-nĕl'lê, GIACOMO (1806–76). An Italian Cardinal and statesman, born at Sonnino. At the Seminary in Rome he became conspicuous for intellectual capacity, and Pope Gregory, recognizing his ability, attached him to his suite. He became Under-Secretary in the Ministry of Interior in 1841, and in 1845 Minister of Finance. At the accession of Pius IX he joined the Pope's reformatory schemes and gained great influence, becoming Cardinal in 1847 and a member of the Ministerial Council through which Pius undertook to establish his reforms. In 1848, when the ministry of priests and laymen was established, Antonelli became Prime Minister. After the Pope's pronouncement against the war with Austria (1848), Antonelli resigned, but afterward, when he had perceived the Pope's motive, he abandoned his national policy and associated himself entirely with the conservative element. Upon the reëstablishment of the papal power through the intervention of France, Antonelli returned to Rome with the Pope (1850) and reorganized the administration along strictly absolutistic lines. He rejected all advances of the Powers recommending opportunistic reforms and would not yield to the nationalistic aspirations of the Italians. He raised vain protests against the aggrandizement of the royal territories at the expense of the Papal States. During the closing years of his life he lost his influence with the Pope, who yielded more and more to the Jesuit element. At his death he was Prime Minister to the Pope. A deficit of 45,000,000 lire was discovered in the Vatican finances at this time. He left his property, amounting to about $8,000,000, to his three brothers, and his alleged daughter, the Countess Lambertini, vainly sued for a share. Consult Pillon de Thury, *Biographies des cardinaux* (1862).

ANTONEL'LO DA MESSI'NA (c.1430–79). A Sicilian painter of the Renaissance, famed as the introducer of oil painting into Italy. On the basis of Vasari's assertions he was said to have studied in Flanders and to have brought the oil technique to Venice, with whose school he is generally classed. But documents recently discovered by Dei Marzo and La Corte-Cailler show that he was born 1430 (not 1447) in Messina. Here he lived and practiced certainly till 1465 and probably until 1474. In 1475–76 he was in Venice, where he painted the lost altar-piece of San Casciano, which exercised a profound influence upon Venetian art. During the latter year he was also in the service of the Duke of Milan, and in 1478 he again appears in Messina, where he died the middle of February, 1479. There is no reason to assume that he visited Flanders, for in Naples, where he probably studied, Flemish influence was predominate and the oil technique was practiced. To his earliest period belongs a "Salvator Mundi" (1465) in the National Gallery, London; to the second a triptych in the gallery of Messina (1473), representing the Madonna dell' Rosario with saints, a portrait of a young man in the Berlin Gallery, and an "Annunciation" in the Palazzo Acreide (Syracuse). To the Venetian period belong the remarkable portrait of a condottiere in the Louvre (1475), a "Crucifixion" in the Antwerp Gallery, the portraits of the young men in the Trivulzio Gallery, Milan, the Borghese Gallery, Rome, and National Gallery, London (1476). Among his undated pictures are a beautiful St. Sebastian in the Dresden Gallery and a St. Jerome in London, both probably belonging to his last period.

Antonello was the only great painter of the Renaissance in south Italy. His reputation was as great among his contemporaries as in modern times. The chief characteristics of his art are a trenchant realism, strong characterization, and wonderful color. Consult: Morelli, *Italian Painters* (London, 1892); Beltrami, *Archivio storico dell' arte*, vii; the monographs on Antonello by Di Marzo (Palermo, 1903), La Corte-Cailler (Messina, 1903), and D'Amico (Messina, 1904); L. Venturi, *Le origine della pittura veneziana* (Venice, 1907).

ANTO'NIA MA'JOR (39 B.C.–?). The elder of the two daughters of Mark Antony and Octavia, and grandmother of the Emperor Nero. Her son, C. Domitius, was Nero's father. Her husband was L. Domitius Ahenobarbus.

ANTO'NIA MI'NOR (c.36 B.C.–38 A.D.). Sister of Antonia Maior, mother of the Emperor Claudius and of Germanicus the great general, and grandmother of Caligula. Her husband was Drusus, brother of the Emperor Tiberius. Caligula at first treated her with respect, but afterward subjected her to indignities.

ANTONIDES, ăn-tō'nê-dăs, JOANNES (1647–84). A Dutch poet. He was born in Goes and was educated at the expense of one of the chiefs of the admiralty at Amsterdam. He was the foremost pupil of Vondel, whom he resembled in poetical ability, although his works are marred by turgidness and monotony. He is best known by his poems, and a tragedy written at the age of 19, called *Trazil of overrompelt Sina* ('The Conquest of China,' 1866). His fame was fully established by the publication, in 1671, of *Ystroom*, an epic on the river Y.

AN'TONI'NA (449–c.565). The wife of the Byzantine general Belisarius. Though the daughter of a circus-rider, she was a favorite of Theodora, the wife of Justinian, and through the influence of the Empress reduced Belisarius to a state of servile submissiveness and impelled him to many acts of injustice. In connection with his public career, however, she frequently showed great foresight and diplomacy. See BELISARIUS.

AN'TONINE COL'UMN. The column of Marcus Aurelius in Rome. It was erected in 176 A.D. to commemorate that Emperor's victories in his German and Sarmatian wars. The column stood in a square surrounded by a portico and was part of a superb group of monuments to commemorate the Antonine dynasty, similar to the column of Trajan, which it imitated, having the same height (100 feet), and reliefs similarly arranged in ascending spirals, giving the history of the campaigns. It now adorns the Piazza Colonna.

AN'TONINES, AGE OF THE. The period in Roman history marked by the reigns of Anto-

ninus Pius and Marcus Aurelius Antoninus (A.D. 138–180). It was noted for its peace and prosperity.

AN'TONI'NUS. The name of several Roman Emperors, who are to-day generally distinguished by their titles or nicknames. See ANTONINUS PIUS; AURELIUS; CARACALLA.

ANTONINUS, ITINERARY OF (Lat. *Antonini Itinerarium*). A valuable geographical work, containing the names of all the places and stations on the principal and cross-roads of the Roman Empire, with their distances from one another in Roman miles. It has been usually attributed to the Emperor M. Aurelius Antoninus (Caracalla), whence its name. The testimony, however, of the Greek geographer Æthicus, author of the *Cosmographia*, assures us that a general survey of the Roman Empire was commenced 44 B.C., in the consulship of Julius Cæsar and M. Antonius, and completed in the reign of Augustus, when the results of the survey received the sanction of the State. These results, it is with some probability inferred, are embodied in this *Itinerary*, which, it is further supposed, received additions and amendments in the time of the Antonines. Subsequent improvements went down to the reign of Diocletian. The best editions are those of Wesseling (Amsterdam, 1735) and Parthey (Berlin, 1848). Consult D'Urban, *Recueil des itinéraires anciens*, with 10 maps (Paris, 1845).

ANTONINUS, MARCUS AURELIUS. See AURELIUS, MARCUS ANTONINUS.

ANTONINUS, SAINT (1389–1459). An Archbishop of Florence. His real name was Antonio Pierozzi, and he is also known by the name of De' Forciglioni. At first prior to several monasteries, he was, in 1446, appointed to the archbishopric of Florence, where his noble efforts tended greatly to alleviate the sufferings attendant upon the pestilence, famine, and earthquake of the period 1448–53. He was canonized by Pope Adrian VI in 1523. The 2d of May is consecrated to his memory in the Roman Catholic church. The most important of his writings are: *Summa Theologica Moralis, Partibus IV Distincta* (1477), a compilation of ethical precepts after Thomas Aquinas, which went through 15 editions in the first 50 years; *Summa Confessionalis; Summa Historialis*, a chronicle; and *Lettere* (1859). A monument to him was erected in Florence, and his cell in the monastery of St. Mark's is still pointed out.

ANTONINUS, WALL OF (Lat. *Antonini vallum*). See ROMAN WALL.

ANTONINUS AND FAUSTI'NA, TEMPLE OF. A prostyle temple in Rome, facing the Sacred Way, on the north side of the Forum (q.v.), voted by the Senate in 141 A.D., in commemoration of the elder Faustina, wife of Antoninus Pius, who died in that year and was deified. (See APOTHEOSIS.) Antoninus's own name was added to that of his wife on his death in 161 A.D.; together they were the patron deities of the temple. The temple has six unfluted columns in front and three on the sides. The frieze is richly sculptured. Before the twelfth century the temple was dedicated to St. Laurence under the title of San Lorenzo in Miranda. Urban V used much of its material in the reconstruction of the Lateran. Consult Huelsen, *The Roman Forum* (Rome, 1906); Platner, *The Monuments and Topography of Ancient Rome* (New York, 1911).

ANTONINUS LIB'ERA'LIS. A Greek writer on mythology, who lived about 150 A.D. and is supposed to have been a freedman of Antoninus Pius. He wrote in prose Μεταμορφώσεων συναγωγή (*Metamorphōseōn Synagōgē*), a collection of 41 myths dealing with transformations. Most of these are derived from ancient sources, now lost, so that the work is valuable.

ANTONINUS PI'US, TITUS AURELIUS FULVUS BOIONIUS ARRIUS (86–161 A.D.). A Roman Emperor (138–161 A.D.) who was born at Lanuvium in the reign of Domitian. His family was originally from Nemausus, now Nîmes, in Gaul. He was brought up by his maternal grandfather, Arrius Antoninus, a righteous and cultured man. He inherited great wealth and early gave proof of excellent qualities. In 120 he was made consul; afterward he was sent by Hadrian as proconsul into Asia, where the wisdom and gentleness of his rule won him a higher reputation than had been enjoyed by any of his predecessors. By his wife, Faustina, he had four children, of whom three died, leaving a daughter, Faustina, afterward wife of Marcus Aurelius. In 138 he was adopted by the Emperor Hadrian, in consequence of merit alone, and came to the throne in the same year. The reign of Antoninus Pius was peaceful and happy. In his private character he was simple, temperate, and benevolent, while in public affairs he acted as the father of his people. The persecution of the Christians, which was continued during his reign, was partly stayed by his mild measures. He was little engaged in war, except in Britain, where he extended the power of Rome and built a wall between the Forth and the Clyde, as a defense against invasions by the predatory inhabitants of the north. (See ROMAN WALL.) The reign of Antoninus Pius illustrates the saying, "Happy the nation which has no history," for by the justice, wisdom, kindliness, and courtesy of the Emperor his vast Empire was preserved from the crimes, conspiracies, insurrections, and bloodshed, the recording of which formed the largest part of the historian's work in the dark centuries of the Roman Empire. It is said that only one Senator was impeached during the lifetime of Antoninus Pius. Literature received great encouragement; the laws were improved, commerce extended; the means of communication were facilitated by the repair of roads, bridges, etc.; new sanitary regulations were introduced, and a taste for architecture fostered in the citizens. The epithet Pius, 'dutiful,' was conferred on him on account of his conduct in defending the memory of his predecessor, Hadrian, against certain dishonoring charges brought forward by the Senate. The column raised to his memory by his adopted son and successor, Marcus Aurelius Antoninus (q.v.), was discovered in 1709, but exists only in fragments. For the column now in the Piazza Colonna at Rome see ANTONINE COLUMN. See also FAUSTINA.

ANTO'NIO. 1. The Changeling in Middleton's play of the same name. 2. The steward in Webster's *Duchess of Malfi*. 3. The Duke of Milan in Shakespeare's *Tempest*. 4. The Merchant of Venice in Shakespeare's play of the same name, who, unable to repay money borrowed of the Jew Shylock, becomes liable for the stipulated forfeit, a pound of flesh.

ANTONIO, ăn-tō'nē-ō, NICOLAS (1617–84). A Spanish bibliographer and critic. In 1654 Philip IV made him his general agent at the court of Rome for the kingdoms of Spain and

Two Sicilies and the Duchy of Milan. There he remained nearly 20 years and employed most of his time on his great work, which was a list, as nearly complete as possible, of Spanish authors and their writings, from the time of Augustus down to his own day. He published part of it at Rome in 1672, under the title, *Bibliotheca Hispana Nova*, in two volumes, treating authors from the year 1500 to 1670; and in 1696 there appeared, also at Rome and in two volumes, his *Bibliotheca Hispana Vetus*, which begins with the reign of Augustus and closes with the year 1500. About 1677 he was fiscal for the Royal Council in Madrid. His *Bibliotheca Hispana* is considered by some critics the most comprehensive work on Spanish literature. There was an edition of Madrid, 1783, annotated by Gregorio Mayáns y Siscar; but the most available edition is that of Madrid, 1788, in four volumes. He also wrote a critique on fabulous histories (Valencia, 1742). Consult Menéndez y Pelayo, *La Ciencia española* (Madrid, 1887); Haebler, *Biblioteca ibérica del siglo XV* (Paris, 1906).

ANTONIO DE SEDILLA, dā sā-dē'lyà (c.1730–1829). A Spanish missionary priest, better known as 'Père Antoine.' In 1779 he was sent to New Orleans to reinaugurate the Inquisition there, but was immediately sent back by Governor Miro, who felt that the enforcement of Spain's rigid laws against heretics would precipitate a revolution. Père Antoine returned to New Orleans in 1783 as priest of the St. Louis Cathedral and by his kindness and his numerous charities earned the love of the residents, especially of the French element. Until 1886 a palm tree planted by him was a landmark in New Orleans, and about it clustered many picturesque traditions, some of which are given in Gayarré, *History of Louisiana* (3 vols., New York, 1846–53). Consult T. B. Aldrich's story, *Père Antoine's Date Palm*, and Arthur Phelps, "Louisiana," in the *American Commonwealths series* (Boston, 1905).

ANTO'NIUS, Gaius, surnamed Hybrida. A Roman consul, son of Marcus Antonius the orator, and uncle of Mark Antony. He was Cicero's colleague in both the prætorship (65 B.C.) and the consulship (63). He was regarded at first as one of Catiline's conspirators, whether rightly or wrongly we cannot say. Cicero, to whom his attitude seems to have given some concern, secured for him the province of Macedonia and so won him completely to his own side. On his return to Rome (59), he was accused of having taken part in Catiline's conspiracy and of extortion in his province, and, though defended by Cicero, was condemned on both charges. He then retired to the island of Cephallenia, but was recalled, probably by Cæsar, and was in Rome at the beginning of 44 B.C.

ANTONIUS, Marcus (143–87 B.C.). One of the most eloquent of Roman lawyers and speakers, commonly called "the Orator." He was the grandfather of Mark Antony, the triumvir. He was prætor in 104 B.C., and the following year governor (*legatus pro prætore*) of Cilicia; in 99 he held the consulship. He favored the aristocratic party, and was an adherent of Sulla in the Civil War against Marius, by whose order he was assassinated. In the judgment of Cicero, Antonius and L. Crassus were the first Roman orators who equaled the great speakers of Greece. Both are interlocutors in Cicero's *De Oratore*. Consult the Introductions to editions of Cicero's *Orator* and *De Oratore*, by J. E. Sandys and A. S. Wilkins respectively (Cambridge, 1885; Oxford, 1888).

ANTONIUS, Marcus (83–30 B.C.). A famous Roman, commonly known as Mark Antony, a descendant of one of the oldest patrician families. He was grandson of the orator Antonius (q.v.), and the son of the prætor, M. Antonius Creticus; on the side of his mother, Julia, he was related to Julius Cæsar. He wasted his youth in dissipation and, finding himself pressed by numerous impatient creditors, escaped to Greece in 58 B.C., where for a short time he listened to the teaching of Athenian philosophers and orators. His studies here were soon interrupted by the pro-consul Gabinius (q.v.), who appointed him leader of his cavalry. In the campaign against Aristobulus II (q.v.) in Palestine and in Egypt, Antonius distinguished himself by his courage and activity and ingratiated himself with the soldiers. After assisting Cæsar in Gaul, he went to Rome, in 50 B.C., to advance the interests of the former, who stood in great danger from the hostility of the oligarchical party, and was appointed an augur and chosen one of the tribunes of the people. In the following year, on account of his adherence to the party of Cæsar, he was expelled from the curia and fled to Cæsar, who made use of this event as a pretext for his war against Pompey. At the outbreak of this war Antonius received the appointment of commander-in-chief in Italy. In the battle of Pharsalus he commanded the left wing of Cæsar's army. In 47 he was made master of the horse by Cæsar, who left him to govern Italy during his absence in Africa. Antony, as usual, disgraced himself; was perpetually drunk; divorced his wife and married an actress, with whom he paraded himself offensively through the chief towns of the peninsula. In 44 B.C. he married Fulvia, the widow of Clodius, was made consul, and vainly endeavored to prevail on the Romans to recognize Cæsar as Emperor. After the assassination of Cæsar he played the part so well described by Shakespeare, and by his funeral oration and the well-timed display of Cæsar's bloody robe so wrought upon the passions of the people that the conspirators were compelled to escape from Rome, leaving the successful orator for a while in possession of almost absolute power. A formidable rival to Antonius now appeared in the person of the young Octavianus (the future Augustus), whom Cæsar had designated as his heir, and a contest for the ascendency ensued. The eloquence of Cicero, who, in his *Orationes Philippicæ*, denounced Antonius as an enemy of the State, secured the triumph of Octavianus in the Senate. Antonius, who had been besieging Decimus Brutus in Mutina (Modena), in order to obtain possession of Cisalpine Gaul, which had been voted to him by the people as one of his provinces (Brutus claimed it because after Cæsar's death the Senate had assigned it to him, as part of its agreement with the Liberators, as the murderers of Cæsar called themselves) was finally overthrown by the forces of the Senate in 43 B.C. He escaped beyond the Alps, visited the camp of Lepidus, who commanded in Spain and Gaul against the Pompeians, and gained the favor of his army, of which he took command. Plancus and Pollio joined him with their troops, and Antonius, who so recently had escaped as a helpless fugitive from Italy, returned toward Rome at the head

of 17 legions and 10,000 cavalry. Octavianus, who had pretended to maintain republican principles, was ordered to oppose Antonius; refusing to do this, he now threw off the mask and held a consultation with Antonius and Lepidus near Bologna, at which it was determined that as triumvirs they should share the whole Roman world among themselves. To secure their spoil, they returned to Rome and began their course of murder and robbery throughout Italy. Among their first victims fell Cicero, the orator, whose eloquence they dreaded. According to Appian (see APPIANUS), 300 senators and 2000 knights were put to death in the proscriptions of the triumvirs.

After making Italy safe for themselves and raising an enormous sum of money to carry on their war abroad, Antonius and Octavianus led their troops into Macedonia against Brutus and Cassius, and defeated the republican forces at Philippi (42 B.C.). Antonius next paid a visit to Athens, and then went into Asia, to subdue the East and to punish Cleopatra, Queen of Egypt, whose conduct had offended the triumvirs. The Queen herself appeared to answer his challenge and captivated Antonius by her beauty and address. The general who had overcome Brutus and Cassius was now made a prisoner, though not of war. He followed Cleopatra into Egypt and lived with her in idleness and luxury, until he was aroused by tidings of the quarrel which had taken place in Italy between his own relatives and Octavianus. This dispute gave rise to a short war, which came to an end before Antonius arrived in Italy. A new division of the Roman world between the triumvirs was soon quietly arranged at Brundusium, 40 B.C.; Antonius took the East, from the Adriatic to the Euphrates, Octavianus took the West; the ambition of the feeble Lepidus was appeased by his having the whole of Africa for his portion. Even this shadow of dominion was taken from him in 36 B.C. Meanwhile Antonius had confirmed his renewal of friendly relations with Octavianus by a marriage with Octavia, his sister. He now returned to Cleopatra, resumed his former voluptuous mode of life, squandered the wealth of Rome in gifts to his royal mistress, and became guilty of gross acts of injustice. Octavianus made use of these facts to excite the indignation of the Roman people against Antonius, and a war between the rivals became unavoidable. Antonius, in his idleness, tried to postpone the trial of strength which he saw inevitably approaching. In 36 B.C. he met disaster in an expedition against the Parthians; this increased popular disquiet at his conduct with Cleopatra. Presently, at Rome, he was formally deprived of his power, and war became inevitable. This Octavianus skillfully caused to be proclaimed against Cleopatra, thus putting himself into the position of one defending his country against a foreign foe, and Antonius into that of one supporting a foreigner against his fatherland. In the naval engagement which took place (31 B.C.) near Actium (q.v.), Antonius and Cleopatra were utterly defeated. His subsequent hope of finding troops still faithful to him in Libya was disappointed. He returned to Egypt, where, with Cleopatra, he once more forgot political cares and vexations, until his amusements were suddenly interrupted by the arrival of Octavianus at Alexandria. Antonius now roused himself, made a charge with his cavalry, and repelled the enemy; but the advantage was only momentary. Deserted by the Egyptian fleet, as by his own army, and suspecting that even Cleopatra had conspired against him, he went to her palace, from which the Queen had escaped. Deceived by a false message informing him of the death of Cleopatra, Antonius committed suicide by falling upon his sword, in the year 30 B.C. He died in the arms of Cleopatra, who immediately after put an end to her life.

ANTONIUS, SAINT. See ANTONY OF PADUA.

ANTONOMASIA, ăn'tō-nō-mā'zhī-ă (Gk. *ἀντονομασία*, from *ἀντί*, *anti*, against + *ὀνομάζειν*, *onomazein*, to name). In rhetoric, the substitution of any epithet or phrase for a proper name; as "The Stagyrite" for Aristotle, "The Little Corporal" for Napoleon, "The Man on Horseback" for Grant, "The Man from Nowhere" for Kipling, etc. Sometimes the process is reversed; as, calling a good orator a "Cicero." In either case the figure is akin to metonymy.

ANTON ULRIC, ăn'tŏn ŭl'rĭk (1714–80). The second son of Duke Ferdinand Albert of Brunswick-Wolfenbüttel (till 1735 Brunswick-Bevern, the title by which the Prince was first known in Russia). He married Anna Karlovna (q.v.), niece of Anna Ivanovna, Empress of Russia, in 1739. In 1740 the Empress fell dangerously ill and appointed Ivan, the infant son of Anton, her successor, with Biron as regent. After her death Anton Ulric made some feeble attempts to reverse these appointments, which only led to the punishment of those supposed to have instigated them and to his own military degradation. Biron's conduct toward the parents of the infant Prince became unbearably insolent, and Anna appealed in despair to General Münnich, who put a sudden end to Biron's sway and declared the Grand Duchess and her husband regents. After a few months Anna ungratefully overthrew Münnich. After his fall, as little unity prevailed among the ministers as between herself and her husband, and the government was looked upon as both a foreign and a contemptible one. Then came the revolution of Dec. 5, 1741, which raised Elizabeth Petrovna (q.v.) to the throne. Anton Ulric and his consort were exiled, and lived long at Kholmogory, in the government of Archangel. Anna died in 1746. Catharine II offered Ulric his freedom, but he declined it. Ultimately he grew blind. Catharine gave his children comfortable homes in Jutland. Consult Brückner, *Die Familie Braunschweig in Russland* (St. Petersburg, 1876).

AN'TONY, SAINT, OF THEBES (c.251–356). The father of monastic asceticism, known as the Great. He was born at Koma, near Heraklea, in Upper Egypt. His parents were both wealthy and pious, and bestowed on him a religious education. Having, in obedience to what he believed to be a divine injunction, sold his possessions and distributed the proceeds among the poor, he withdrew into the wilderness, where he disciplined himself in all those austerities which have hallowed his memory in the Catholic church and formed the model of the monastic life. When 30 years of age, however, desirous of obtaining a deeper repose than his situation afforded, he penetrated farther into the desert and took up his abode in an old ruin on the top of a hill, where he spent 20 years in the most rigorous seclusion; but in 305 he was persuaded to leave this retreat by the prayers of numerous anchorites who wished to live under

his direction. He now founded the monastery of Fayum, which was at first only a group of separate and scattered cells, but which, nevertheless, may be considered the origin of cenobite life. He declined, however, to preside over a monastery. The persecution of the Christians by Maximian, in 311 A.D., induced St. Antony to leave his cell and proceed to Alexandria to comfort the martyrs; but in the course of a year he returned to his solitude, which he soon left and plunged yet deeper into the desert. At length he found a lodgment on a hill, about a day's journey from the Red Sea; but his disciples, discovering his retreat, so pressed him with their affectionate importunities that he ventured to accompany them back. After many pious exhortations he once more left them and soon became the mighty oracle of the whole valley of the Nile. In 335 the venerable hermit made a journey to Alexandria, at the request of Athanasius, to dispute with the Arians. He had interviews with Athanasius and other distinguished persons, but soon retired to his desert home, where he died, 356 A.D.

His whole conduct indicates the predominance of a glowing and yet gloomy fancy, and a disposition to lead a life of absolute solitude. Although the father of monachism, St. Antony is not the author of any monastic "rules"; those which the monks of the Eastern schismatic sects attribute to him are the production of St. Basil. He is, perhaps, the most popular saint in the Catholic church. The chief source of information is the *Life of St. Antony*, attributed to Athanasius. Accounts of his life and miracles are given in the *Acta Sanctorum* of the Bollandists, under the date of the 17th of January, on which day his festival was kept.

ANTONY, SAINT, OF PADUA (1195–1231). A famous saint. He was born at Lisbon, Portugal, Aug. 15, 1195, baptized as Ferdinand, but took the name Antony when he entered the order of St. Francis, in 1220, after being a canon of St. Vincent's in Lisbon, and already noted for biblical and patristic learning. In 1221 he attended a meeting of the order at Assisi and made a poor impression, but soon after produced great astonishment and delight at a meeting with the Dominicans, and was sent by St. Francis as revival preacher to northern Italy, where he met with tremendous success. In 1223, after studying at St. Francis's direction mystical theology for five months, he was appointed the first theological tutor in the order, and taught in northern Italy and France. In 1227 he became provincial of northern Italy; in November of that year he entered Padua for the first time. In 1230 he went to Rome as delegate to get the papal decision upon the binding nature of certain points in the Franciscan rule —not, as frequently asserted, to secure the deposition of the general of the order. He died at Padua, June 13, 1231. He was canonized by Pope Gregory IX in 1232. His great repute as a preacher gave rise to legends of miraculous powers. He is the patron saint of animals. Once he preached a sermon to the fishes, it is said, and they listened to him with rapt attention. Joseph Addison gave an abstract of it in his *Remarks on Italy*. For the classic biography of Antony, consult Emmanuel de Azevedo of Coimbra, *Vita del Taumaturgo . . . Sant' Antonio di Padova* (latest ed., Padua, 1829). Consult also: De Chérance, *Antony of Padua* (London, 1895); I. Beale (1897), Mrs. Arthur Bell (1901), in French by A. Lepître (Paris, 1901). His works were published by Horoy in his *Medii Ævi Bibliotheca Patristica* (Paris, 1885).

ANTONY AND CLE'OPA'TRA. A tragedy by Shakespeare (1607). It was based upon the life of Antony in North's *Plutarch* and is admired for the vigor with which the author deals with a difficult theme. The play is to some extent imitated in both Dryden's *All For Love* and Fletcher and Massinger's *The False One*.

ANT PLANTS. See MYRMECOPHYTES.

ANTRAIGUES, äN'trāg', EMANUEL LOUIS HENRI DE LAUNAY, COMTE D' (1755–1812). A French publicist and diplomat. He was born at Villeneuve, department of Ardèche. His talents were first displayed in his *Mémoires sur les Etats-généraux, leurs droits et la manière de les convoquer* (1788), in which he predicted the downfall of absolute monarchy realized in the French Revolution. In 1789, when he was chosen a deputy, he defended, however, the privileges of the hereditary aristocracy. In 1790 he was employed in a diplomatic mission at St. Petersburg and Vienna, where he upheld the cause of the Bourbons. He incurred the displeasure of Bonaparte, but fled from France in 1798. In 1803 Alexander of Russia sent him on an embassy to Dresden, where he wrote a brochure against Napoleon, entitled *Fragment du XVIII livre de Polybe trouvé sur le mont Athos*. He was murdered, with his wife, near London by an Italian servant. Consult L. Pingaud, *Un agent secret sous la révolution et l'empire le comte d'Antraiges* (Paris, 1893).

AN'TRIM. A maritime county in the northeast of Ireland, in the province of Ulster. It is bounded, north, by the Atlantic; west, by the north part of the river Bann, dividing it from Londonderry, and by Lough Neagh; south, by Lagan River, separating it from the county of Down; southeast, by Belfast Lough; and northeast, by the North Channel (Map: Ireland, E 2). Its greatest length is 56 miles, its greatest breadth, 20 miles; its extent of seacoast, 90 miles. Area, 1176 square miles. About two-thirds of this is arable, and there are few forests. Mines of fine salt occur at Carrickfergus, and small coal fields near Ballycastle and in the interior. Rich beds of a fine quality of iron ore are worked at Glenravel, and this is exported from Cushendall and Carnlough. The soil of Antrim is light, and the chief crop is oats. The land is much subdivided, and the raising of flax, and various branches of linen, cotton, and coarse woolen manufacture employ a great portion of the people, although grazing is becoming more and more important. There are salmon and other fisheries, which furnish employment for the inhabitants along the coast. The principal towns are Lisburn, Ballymena, Ballymoney, Carrickfergus, Larne, and Antrim. In 1898 Belfast, the former capital, was constituted into a county borough. Pop., 1911, 478,603. In 1891 the population embraced in the present county limits was 208,010, 196,090 in 1901, and 193,864 in 1911. This county is not seriously affected by emigration.

AN-TUNG, än'tōōng'. A town in southeastern Manchuria, on the Yalu, about 7 miles from its entrance into the Bay of Korea (Map: Korea, F 4). In 1911 its population was estimated to be over 160,000. It is the seat of a United States consul. It was the headquarters of General Kuroki during the battle of the Yalu in the Russo-Japanese War.

ANT'WERP (Fr. *Anvers*). A province of Belgium south of the Netherlands, with an area of 1093 square miles (Map: Belgium, C 3). The soil, in some places reclaimed heaths, is fertile and yields grain and vegetables. Cattle and other domestic animals are raised. The chief manufactures of the province are laces, sugar, wool, cotton fabrics, and liquors. Capital, Antwerp. Pop., 1900, 819,159; 1910, 968,677; 1911 (est.), 987,201.

ANTWERP (Fr. *Anvers*, anciently *Andoverpum*, from *Anc de Werp*, at the wharf, harbor). A city of Belgium, capital of the province of the same name, situated on the right bank of the Scheldt, in lat. 50° 13′ N., long. 4° 23′ E. (Map: Belgium, C 3). It ranks first in commercial importance and second in population among the cities of Belgium, and its harbor is considered one of the best in Europe. Antwerp is situated in a fruitful and well-cultivated region. The larger part of the city lies within the walls, which have been continually extended and improved and at present have a total length of 8 miles. In point of architectural beauty and artistic achievements, Antwerp has but few rivals among European cities.

The most noteworthy edifice is the cathedral of Notre Dame, the noblest and largest specimen of Gothic architecture in the Low Countries. It is 383 feet long, 213 feet wide, 131 feet high, and covers an area of 70,060 square feet. It was begun in 1352 and continued at various periods during the fifteenth and sixteenth centuries. The roof is supported by 125 pillars, and the tower (403 feet high), whose exquisite beauty Charles V was wont to compare to Mechlin lace, is a marvel of gracefulness. The highly ornamented portal and the fine tracery of the window above it are particularly worth seeing. The impressive interior, the unusual seven-aisled division of which is to be noted, contains three celebrated works by Rubens, "The Descent from the Cross," "The Elevation of the Cross," and, adorning the high altar in the choir, "The Assumption"; the first named being the most magnificent, and generally considered his masterpiece. The church of St. James, begun in the late Gothic style, in 1491, and completed in 1656, outranks the cathedral in the splendor of its decorations and monuments. It has many altars, private chapels, and burial vaults, belonging to the most distinguished families of Antwerp, and contains the tomb of Rubens, who devoted himself to its embellishment. Of the secular buildings, the Hôtel de Ville, in the Grande Place, a fine structure in the Renaissance style, dating from 1561 to 1565, and rising to a height of 180 feet, and the Bourse, a stately edifice in the late Gothic style, deserve especial attention. The museum, erected in 1879–90, from plans by Winders and Van Dyck, is an imposing rectangular structure, inclosing six inner courts. Its picture gallery boasts of an unusually fine collection of paintings by the old masters, including about 800 canvases, especially of the Flemish school, among which are rare specimens by Jan van Eyck, Memling, Massys, Rubens, Van Dyck, etc.; "The Entombment of Christ," the masterpiece of Quinten Massys, and the "Christ Crucified," by Rubens, a work of great dramatic effect, being the most remarkable. Worthy of mention are also the Musée Plantin-Moretus, famous for its collection of everything pertaining to the early history of printing, the Guild Hall of the Archers, the Vielle Boucherie, or old meat market, and the Steen, part of the old castle dating from the tenth century, once the seat of the Inquisition and now containing an archæological museum.

Antwerp is administered by a burgomaster, assisted by five assessors and a municipal council. The burgomaster is nominated by the king for a period of eight years. The assessors are chosen by the municipal council for the same period. The municipal council numbers 39 members, including 8 members from the labor council, who are elected by all voting citizens for 8 years. The city is divided into 9 districts, administered by commissioners. Water is supplied by private companies. With the exception of the railway stations and the harbor, which have electric lights, the city is lighted by gas. The municipal expenditure in 1910 was 49,440,011 francs.

The most noteworthy educational institutions are the commercial school, established in 1852, the Athénée Royal, the Royal Museum of Fine Arts, dating from 1665, and attended by over 160 students, and the Royal Conservatory of Music, with an attendance of about 1350. Some of the higher schools are managed by Jesuits, and the German School is supported by the German government. Besides numerous scientific associations, Antwerp has many societies for the advancement of art, and its triennial exhibition of paintings is regarded as an important event in the world of art. The city has 2 theatres and 2 municipal libraries. Of the 16 daily newspapers published in Antwerp 6 are in French and 10 in Flemish. Besides 2 hospitals with 900 beds, an insane asylum, and asylums for orphans and aged people, there is a considerable number of minor charitable institutions maintained by private societies. The industrial establishments of Antwerp include distilleries and breweries, textile mills, diamond-cutting works, sugar refineries, cigar factories, etc. Antwerp is inferior to few European cities in the volume of its commerce; it is one of the greatest centres of the grain import trade. Its commerce is chiefly with the Balkan countries, Russia, the United States, and South America. The total annual value of the commerce, of which a large portion is transit, exceeds $1,200,000,000. Antwerp has magnificent harbor advantages. The quays, built of granite, have a total length of 3½ miles and are provided with gigantic cranes for the loading and unloading of vessels. There are 8 large basins and a number of smaller ones connected by sluices with the Scheldt. Plans for enlarging the port were decided upon in 1905. Its area was to be tripled, giving it 37.3 miles of running quays, a canal was to be constructed 5 miles long and 815 feet wide, and also an artificial channel for the Scheldt, the sand banks of which are rather dangerous to navigation. The cost of the work was estimated at 250,000,000 francs ($48,250,000), and the time necessary for its completion no less than 10 years. In 1911, 6908 vessels of 13,330,699 tons entered at the port, and 6928 of 13,325,781 tons cleared. Antwerp is the chief arsenal of Belgium and is fortified by strong ramparts and numerous citadels and forts, which the government contemplates to extend so as to include a circumference of nearly 80 miles. It has also devices for the flooding of the surrounding country and contains a garrison of about 10,000 men. In 1800 the population was about 40,000; in 1830, 73,500; in 1880, 169,112; in 1900,

272,831; in 1910 (census of December 31), 301,766. With the communes of Berchem, Borgerhout, and Hoboken, which are practically part of the city, the 1910 population was 398,255. The average annual temperature of the city is about 50°, or nearly the same as that of New York.

Antwerp appears in history as early as the seventh century, is spoken of as a market town some hundred years later, and by the middle of the twelfth century seems to have attained considerable prosperity as a trading town. Steadily extending its commercial operations under the rule of the Dukes of Burgundy, it became in the second half of the fifteenth century the world-mart of Europe, supplanting the other great Flemish cities, Bruges and Ghent. It was the *entrepôt* for the trade between England and the Continent, and in its harbor vessels from the north and the south of Europe met to exchange their cargoes. In the first half of the sixteenth century, under the rule of Charles V, the city was at the height of its splendor and prosperity. It was the principal station of the Hanseatic League and the centre of the money exchanges of Europe, while its manufacturing industry was on a level with its vast shipping. Material prosperity was accompanied by intellectual progress, and the great schools of Flemish painters made Antwerp their principal home. The events of the Reformation brought about a sudden decline. The reign of terror instituted by the Duke of Alva; the massacre of 6000 citizens, and the burning of 800 houses during three days in 1576 ("the Spanish Fury"); and the siege of 14 months by the Duke of Parma (1584–85), to whom the city offered a heroic but ineffectual resistance, sapped the prosperity of Antwerp. Its population at the end of the sixteenth century had dwindled to 55,000, or less than half of what it had been at the beginning of the century. Its ruin was completed by the Peace of Westphalia (1648), which closed the navigation of the Scheldt. This impediment continued until 1863, except during the French occupation (1794–1814) and during the period when the city belonged to the kingdom of the Netherlands (1815–30). By 1800 the population had declined to less than 40,000. Napoleon then attempted to set it up as a rival port to London. During the Belgian Revolution of 1830 the Dutch general Chassé held the citadel for two years against the citizens, until he was forced to surrender by a French army under Gérard. After the revolution the growth of the city was rapid. Consult: J. P. Van Mol, *Guide to Antwerp* (Antwerp, 1886); E. Rowland, "Le Port d'Anvers," in *L'Economiste Français*, vol. ii (Paris, 1899); "The Great Fire at Antwerp, and its Effects," in *The Builder*, vol. lxxx (London, 1901).

ANTYL'LUS (Gk. Ἀντύλλος, *Antyllos*). A Greek physician and surgeon who is supposed to have lived in the third or fourth century A.D. He is said to have been a voluminous writer, but only the fragments of his works quoted by Oribasius are extant. Of these extracts, the most interesting describe his method of operating on aneurisms. This method is still used and known by his name. (See ANEURISM.) Antyllus is the earliest writer whose directions for performing tracheotomy are extant.

ANU, ä'nōō. The chief god of the Babylonian pantheon, the king and father of the gods. He seems to have been originally a Sumerian deity representing heaven (ana), and the Akkadians also conceived of him as seated at the north pole of the ecliptic. He was "the great god" of Der (Dur-ilu, southeast of Bagdad) and had a temple at Uruk (see ERECH) which he shared with his daughter Nanai (Ishtar), as well as one at Assur (q.v.) which he shared with Adad (q.v.). A recently discovered Sumerian inscription, giving an account of the deluge, shows that Anu originally was the local god of a city bearing his name. The city has not been identified. With Ellil (of Nippur) and Enki or Ea (of Eridu) he forms a triad frequently invoked. But, like other heaven gods, he is not prominent in the cult and has more relations with the gods who flee to him for refuge than with men. As the functions of the old god Anshar (Ashur) had been transferred to Anu, so the citizens of Babylon regarded Anu as having transferred the rule of the world to their local god Marduk. Consult Jensen, *Die Kosmologie der Babylonier*, pp. 18, 272 (1890); Zimmern, *Die Keilinschriften und das Alte Testament: Religion und Sprache* (1902); Jastrow, *Die Religion Babyloniens und Assyriens* (1902–12); Jeremias, *Das alte Testament im Lichte des Alten Orients*, p. 94 (1906).

ANU'BIS (Gk. Ἄνουβις, *Anoubis*, hieroglyphic *Anúpu*). An Egyptian deity. His original seat of worship is not known with certainty, but there is some reason to believe that it was near Memphis. As his sacred animal, the jackal, haunts the desert valleys used as burial places, Anubis became the god of the necropolis and was supposed to conduct the souls of the dead down to the lower world, Amenthes, like the Greek Hermes Psychopompos. Hence the late Greek combination Hermanubis. Anubis was also the assistant of Osiris at the final judgment, and weighed in the scales the heart of the deceased against the feather, symbolic of truth and right. As the balance was found level or the reverse, the fate of the deceased was determined. When a more elaborate mythological system was formed, Anubis was made the son of Osiris by his sister Nephthys. The god is usually represented in human form, with the head of a jackal, which the Greeks changed into that of a dog and called the cities sacred to Anubis, Kynospolis ('Dog City'). Of these cities, the best known is that in Middle Egypt. In Roman times, when the Egyptian worship had spread to Italy, Hermes, who was identified with Anubis, sometimes had the dog's head among his insignia. For illustration, see EGYPT. See BABOON.

ANU'KIS (Egyptian *A nūqet*). An Egyptian goddess worshiped in the district around the first cataract of the Nile. She usually accompanies the god Chnum and is represented in human form, with a red crown of feathers on her head. For some reason now unknown she was identified by the Greeks with Hestia (Lat. Vesta). For illustration, see EGYPT.

ANU'RA (Gk. *ἀν, an*, priv. + *οὐρά, oura*, tail), of SALIENTIA (Lat. from *salire*, to hop, jump). An order of Amphibia embracing about 900 forms, including those that have no tail when adult. It is subdivided by Cope into three sub-orders: Aglossa, African and tropical American (Pipa) toads, and fossil forms; Firmisternia, frogs; Arcifera, toads. The two latter are now included in the sub-order Phaneroglossa.

ANURADHAPURA, ä-nōō'rädd-hə-pōō'rä. A

ruined city in the northern part of Ceylon, 50 miles from Dambul. In ancient times it was the capital of the island and achieved considerable importance. In the last decade of the nineteenth century the surrounding jungle was thoroughly explored, and many new ruins were disclosed. Most of these have been set apart for conservation by the crown. The population in 1911 numbered about 3700.

A'NUS (Lat.). The external termination of the rectum. The anus is kept firmly closed by the *external* and *internal sphincter* muscles, the former of which contracts the integument around the opening and, by its attachment to the coccyx behind and to a tendinous centre in front, helps the *levator ani* muscle in supporting the aperture during the expulsive efforts that are made in the passage of the fæces or intestinal evacuations; while the latter, or *internal sphincter*, is an aggregation of the circular muscular fibres of the lowest part of the rectum and acts in contracting the extremity of the tube. The main function of the *levator ani* muscle is expressed in its name. It supports the rectum and pelvic structures and during the act of defecation lifts the lower end of the gut up from the mass of extruded fæces. The integument around the anus lies in radiating folds, which allow of its stretching without pain during the passage of the fæces; and the margin is provided with a number of sebaceous glands, which, in some of the lower animals, secrete strongly odorous matters. (See SCENT GLANDS.) Infants are occasionally born with an imperforate anus, or congenital closure of the rectum. In the simplest form of this affection the anus is merely closed by thin skin, which soon becomes distended with the meconium (q.v.). More complicated cases are those (1) in which the gut terminates some distance above the seat of the anus in a blind sac or pouch, (2) where the rectum terminates in the bladder, urethra, or vagina. Fortunately the closure by a layer of skin is far the most common form of imperforate anus, and the condition is readily relieved by a simple surgical operation. The complicated cases require opening of the abdominal cavity and creating an artificial anus in the lower part of the abdominal wall. If the condition of imperforate anus is neglected, the child dies in a few days as a result of intestinal obstruction.

Spasm of the sphincter ani is characterized by violent pain, with difficulty in passing fæces. On examination, the muscle feels hard, and resists the introduction of the finger. Spasm of the sphincter is a symptom of fissure, ulcer, or some other form of anal or rectal irritation. Suppositories containing opium or belladonna, introduced during the period of relaxation, are sometimes of use, and if there are ulcers or fissures they must be speedily treated. *Ulceration* around the anus, not extending within the orifice, is common in persons who are not cleanly, especially in women with vaginal discharges. The treatment consists in strict attention to cleanliness, and application of silver nitrate or carbolic acid. If the ulcer is seated partly *without* the anus and partly *within* the rectum, the distress is much more severe. *Fissure of the anus* is an affection consisting in one or more cracks, excoriations, or superficial ulcerations, situated between the folds of the skin and mucous membrane at the verge of the anus and only slightly involving the rectum. They give rise to intense pain during the passage of the evacuations, and for some hours afterward to great discomfort, smarting, and itching. The treatment to be adopted is to endeavor to procure regular and somewhat soft evacuations, and to sponge with warm water immediately afterward, the parts being dried with a soft cloth. One or two applications of solid nitrate of silver will sometimes cure the disease, and an ointment of oxide of zinc, or one containing cocaine, will serve to allay irritation and promote healing. If these measures do not afford relief, the sphincter muscle must be dilated, the base of the fissure incised and curetted. *Pruritus ani*, which simply means itching and irritation of this part, is a symptom of certain morbid changes rather than a special disorder; but it is a very common affection, and is productive of much suffering. It is often associated with an unhealthy state of the intestinal secretions or with simple constipation; with uterine and ovarian diseases; kidney disease; diabetes; neurasthenia; tea, alcohol, tobacco, and opium habits; the presence of threadworms in the rectum; eczema, or other skin diseases; and it is peculiarly common in persons whose occupations are sedentary. The affection is often aggravated by the patient's being unable to refrain from scratching, which tends to create excoriations, ulcerations, and thickening of the skin. The treatment must aim to remove the cause, whether general or local. If the affection arise from worms, or a loaded state of the large intestine, enemata and purgatives will give immediate relief. If unhealthy excretions exist, attention must be paid to the diet, the bowels must be kept freely open, and strict local cleanliness observed. If there are any cracks or ulcers, these must be treated. In all cases of pruritus which have persisted for any length of time, the skin is found thickened and the redundant layers of epidermis must be removed and kept from re-accumulating by the application of suitable ointments. The other principal affections of the anus are *fistula*, *piles*, and *prolapsus*, which are discussed in special articles.

AN'VARI. A Persian poet famed for his panegyrics and for his verse in satiric vein. His full name was Auad-uddin Ali Anvari. He was born in the first part of the twelfth century, in the province of Khorassan. He first wrote under the title of Khavaran, from his native district; but he afterward adopted Anvari as his poetic epithet, and by this he is known to fame. He was educated at the collegiate institute at Tus (see FIRDAUSI), and he devoted his attention especially to astronomy; but finding more opportunity for preferment at court in literature, he composed a panegyric in honor of Sanjar, the ruler of Khorassan. This by its artistic grace immediately won him the royal favor, and he continued to enjoy the patronage of Sanjar's two successors as well. But Anvari's latter days were attended by ill luck. Employing his astronomical knowledge, he prophesied that a certain conjunction of the stars in October, 1185, would be accompanied by a frightful storm and dire disasters. The utter failure of the evil portents which were predicted drove him practically into banishment, and he withdrew to Nishapur and later retired to Balkh, where he died about 1190. Anvari's verses, as shown by his *Divan*, or poetical collection, are masterpieces of artistic form. With the consummate skill of a romantic panegyrist he combined, in high degree, the

subtle force of a keen satirist of the foibles and follies of his time. His elegy on the captivity of Sanjan has been pronounced one of the most beautiful in Persian literature. There is a lithographed edition of the *Divan-* (Lucknow, 1880). Consult Ethé, in the *Grundriss der iranischen Philologie*, vol. ii (Strassburg, 1896–1904). See PERSIAN LITERATURE.

AN'VIL (ME. *anvelt*, AS. *anfilte*, of uncertain origin). An iron or steel block, with a smooth, flat face or top, on which malleable metals are hammered and shaped. Anvils vary in size from the tiny articles used by jewelers to the enormous anvil blocks of power hammers, which weigh several tons. (See HAMMERS.) Blacksmiths' anvils have a cone or horn at one end of the flat face and a socket for a chisel in the other end. They are commonly made of cast iron faced with steel, the steel face being placed at the bottom of the mold and the iron poured upon it.

ANVILLE, än'vêl', JEAN BAPTISTE BOURGUIGNON D' (1697–1782). A French geographer. He was born at Paris and devoted himself to geographical and mathematical studies with such success that at the age of 22 he became royal geographer. He read the Greek and Latin historians and philosophers, as well as poets, noting the names and positions of cities and nations. He advanced the science of geography, not only by the number of maps (211) which he published, but also by publication of 78 memoirs full of erudition and of historic and critical details. Most of these are included in the *Recueil des mémoires de l'Académie des Inscriptions et Belles-lettres*. His great map of Africa was the most complete yet published. Among the most important of his works are *Atlas général* (1737–80) and *Atlas Antiquus Major*, with the *Géographie ancienne abrégé* (3 vols., 1769). His *Compendium of Ancient Geography* was published in English in London (1791) and in New York (1814). Consult O. Hartig, *Aeltere Entdeckungsgeschichte und Kartographie Afrikas mit Bourguignon d'Anville als Schlusspunkt* (Vienna, 1905).

ANZAN, än-zän', or **ANSHAN,** än'shän'. The name of an important city and also a country in the Zagros Mountains. Gudea of Lagash declares that he captured the city of Anshan. In the Nabunaid-Cyrus Chronicle Cyrus calls himself "king of the city of Anshan," and in the Cylinder Inscription he gives the same title to his father Cambyses, his grandfather Cyrus, and his great-grandfather Teispes. On the other hand, Anshan is mentioned with Elam, Simash, and Barachsu as a country in the inscription of Anumutabil of Der; and the booty of Ecbatana is said to have been carried by Cyrus to the land of Anshan. The priestly rulers in Susa under Babylonian suzerainty call themselves patesis of Susa and governors of Elam and Simash, but do not mention Anshan, or Anzan. Later, however, the independent kings in Elam in the twelfth century give themselves uniformly the title "king of Anzan and Susa." Eduard Meyer identifies Anzan with Susa, and much may be said in favor of this view. The objection based on the juxtaposition of Anzan and Susa may perhaps be met by the not improbable assumption that there were two cities, possibly on either side of the Choaspes—one where the native element continued to dominate, called Anzan, and the other where the Semitic influence since the Akkadian conquest was more strongly felt, which was called Shushun-Susa. This would explain why Susa alone is mentioned by the patesis, and also by Asurbanipal; while the native kings put Anzan first, and the dynasty of Teispes used Anshan alone. It was in Anzan-Susa that the ancestors of Cyrus reigned for three generations, and the great conqueror himself from 559 to 550 B.C., when the capture of Ecbatana made him King of Media and Persia. Consult: Billerbeck, *Susa* (1893); Scheil, *Textes élamites-anzanites*, i, ii, iii (1901–07); Ed. Meyer, *Geschichte des Altertums*, i, 2, pp. 409 f. (1909). See SUSA; CYRUS.

ANZENGRUBER, än'tsen-grōō'bĕr, LUDWIG (1839–89). An Austrian dramatist and novelist, born at Vienna. He left school early, and after spending some time as bookseller's assistant, became a strolling actor at the age of 20. While leading this life (1860–67), he wrote a number of plays, none of which met with success, then returned to Vienna to try his hand at literature, and finally accepted a clerical position in the police department of his native city. While thus employed he produced, in 1870, his *Pfarrer von Kirchfeld*, an anti-clerical drama, which caused a sensation and made him famous. He now decided to devote himself exclusively to literature. In the following year was performed the *Meineidbauer*, a powerful tragedy of peasant-life, by many considered his masterpiece. Even more popular proved his comedy *Kreuzelschreiber* (1872). All these plays were performed in the popular Theater an der Wien. In his dramas of modern Viennese life Anzengruber was less successful, but when he returned to the scenes and characters of the peasant life he knew so well, he achieved uniform success, as with his *G'wissenswurm* (1874) and many other plays. He showed the same power of character-drawing in his novels *Der Schandfleck* (1876) and *Der Sternsteinhof* (1883–84). His pathos and humor are equally genuine. Although many of the characters in his plays and novels speak the dialect of Upper Austria and Styria, his works have won a conspicuous place in German literature, and several of his plays hold the German stage, at the present day. His *Gesammelten Werke* were published in 10 vols. (1890; 3d ed., 1897). Consult: A. Bettelheim, *Ludwig Anzengruber* (Dresden, 1891); R. Rosner, *Erinnerungen an Anzengruber* (Leipzig, 1891); S. Friedmann, *Ludwig Anzengruber* (Leipzig, 1902).

ANZIN, än'zăn'. A town in the department of Nord, France, on the Scheldt, near Valenciennes, in the centre of a most productive coal-mining district (Map: France, N., J 2). Anzin has metal foundries, machine shops, glass-works, breweries, sugar refineries, and distilleries. Pop., 1901, 14,444; 1906, 14,387; 1911, 14,439.

ANZIO, än'zē-ō, formerly PORTO D' ANZIO. A Mediterranean seaport in the province of Rome, Italy, 33 miles southeast of Rome by rail (Map: Italy, G 6). It has fishing industries and, with Nettuno (pop., 1900), 1½ miles eastward, is a favorite bathing resort of the Romans. It occupies the site of Antium (q.v.). Excavations have brought to light remains of an ancient wall, but the modern town dates from the restoration of the harbor in 1698 by Pope Innocent XII. There are several palatial villas in the suburbs. Pop., 1901, 3561; 1911, 4506. Consult Sofredini, *Storia di Anzio* (Rome, 1879).

AOKI, ä'ō-kē, SHUZO (1844–1914). A Japanese statesman, born in Choshu. He was appointed

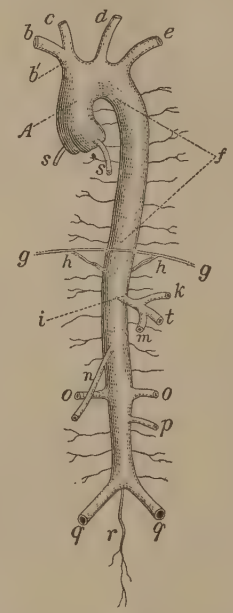
secretary of the Japanese legation at Berlin, in 1873, and afterward Minister there. He married the German Baroness von Rahden. In 1886–89 he was Vice-Minister of Foreign Affairs, in 1889–91, and in 1898–1900 Minister of Foreign Affairs. He became the first Japanese Ambassador to the United States in 1906, serving until December, 1907. Following his residence in Washington, he became a member of the Japanese Privy Council.

AOMORI, ä'ô-mō'rē, or **AWOMORI,** ä'wô-mō'rē. A seaport town of Japan, capital of the prefecture of the same name, situated at the northern end of Honshiu, on the Aomori Bay (Map: Japan, G 3). It is in the midst of the chief sphere of volcanic activity in the Empire. Pop., 1903, 34,857; 1908, 47,206.

AONIA, ā-ō'nĭ-ȧ (Gk. *Ἀονία*). A district of Bœotia in ancient Greece. The Muses, as dwelling on Mount Helicon, in Aonia, were called *Aonides*.

A'ORIST (Gk. *ἀόριστος, aoristos*, without boundaries, undefined, unqualified, from *ἀ, a*, priv. + *ὁρίζειν, horizein*, to divide, to bound). A form of the Greek verb which expresses the simple occurrence of an action in indefinite past time; it gets its name from the fact that it merely denotes "the occurrence of an action without any of the limitations as to *completion, continuance, repetition*, etc., which belong to other tenses." In distinction from the imperfect, the aorist expresses only the occurrence of an action or the entrance into a state or condition, while the imperfect represents an action or state as going on or as repeated in past time. Sometimes, too, in contrasts, the imperfect denotes attempted action, the aorist completed or successful action.

AOR'TA (Gk. *ἀορτή, aortē*, from *ἀείρειν, aeirein*, to lift, raise). The great arterial trunk which, rising from the left ventricle of the heart, sends its branches ramifying through the whole body. The aorta in man is subdivided by anatomists into the arch, the thoracic aorta, and the abdominal aorta. The *arch* is a loop with the convexity directed upward, forward, and to the right side, reaching at its highest part to a level with the second piece of the breastbone, and then descending to the left side of the fourth dorsal vertebra. Five arteries arise from the arch—viz., two coronaries, for the supply of the muscular tissue of the heart itself; the innominate, and the left carotid and left subclavian arteries. At the commencement of the arch are three small swellings or pouches, the aortic sinuses, below which are the three semilunar valves or folds of the lining membrane, which prevent regurgitation of the blood into the heart. The *thoracic aorta* extends from the fourth dorsal vertebra to the diaphragm, gradually occupying the mid line of the spine. The thoracic aorta gives off the bronchial arteries (two or three) to supply the tissue of the lungs; and some small branches (three or four) to the œsophagus, and intercostal arteries, to supply the walls of the chest (10 on left, and 9 on right side). The *abdominal aorta* extends from the diaphragm to the fourth lumbar vertebra, opposite the lower margin of which it divides into the two common iliac trunks. The abdominal aorta gives off the two phrenic arteries to the diaphragm; the cœliac axis, which divides into three large branches for the stomach, liver, and spleen; the superior mesenteric for the small, and part of the large intestine; the *renals* (two), one for each kidney; the *supra-renals* (two); the spermatic; the inferior mesenteric, for the lower part of the large intestine; and four or five lumbar arteries, which supply the lower part of the abdominal walls (the loins). Where the aorta bifurcates, a small artery, the sacra media, or caudal artery, arises, and passes along in the mid line; in fish and in animals with large tails, this branch is a continuation of the aorta.



AORTA.

A, ascending arch of aorta; *ss*, coronary arteries; *b'*, innominata artery; *b*, right subclavian; *c*, right carotid; *d*, left carotid; *e*, left subclavian; *f*, thoracic aorta; *gg*, diaphragm; *hh*, phrenic arteries; *i*, cœliac axis; *k*, coronary or gastric; *t*, splenic; *m*, hepatic; *n*, superior mesenteric; *oo*, renal arteries; *p*, spermatic; *q*, common iliac; *r*, middle sacral.

The above is the usual arrangement; but occasionally it varies, especially in the number of arteries springing from the arch. During fœtal life there is a communication between the arch of the aorta and the pulmonary artery called the *ductus arteriosus*, the canal of which becomes obliterated after birth. The velocity of the blood current in the carotid artery has been estimated at 300 to 500 millimeters per second. For diseases to which the aorta is subject, see ARTERY; ARTERIOSCLEROSIS.

AOSTA, ä-ôs'tȧ (anciently Lat. *Augusta*). A town in north Italy, on the left bank of the Dora Baltea, 49 miles northwest of Turin (Map: Italy, B 2), the site of the Roman Aosta, founded by Terentius Varro after he conquered the Salassi. There are many evidences of the Roman occupation still extant, their walls being especially well preserved. The Arch of Augustus, a cathedral said to have been founded by St. Eusebius, the Leper's Tower, celebrated in Xavier de Maistre's works, and the ruins of Bramafame Castle, belonging to the Counts of Challant, are all very noteworthy. The chief trade is in leather, cheese, and wine. The province is rich in iron, copper, and lead, in its pine forests, and in mineral springs, of which the most famous

are those of Courmayeur, Pré-Saint-Didier, and St. Vincent. Pop., 1881, 7437; 1901, 7875; 1911, 7008.

AOSTA, Duke of. A title of the House of Savoy, borne by Amadeus, a former King of Spain, and now by his son, Emmanuel Filibert.

AOUDAD, ä'o͞o-dăd (Moorish name). The wild sheep of the mountains of northern Africa (*Ovis tragelaphus*), usually known as Barbary sheep. It is somewhat goatlike in form, 3 feet in height, and light brown in color, with very long whitish hair growing from the throat, chest, and about the forelegs. Its horns resemble those of the bharal, and do not exceed 24 inches in length. This animal is common in the high Atlas ranges, where it wanders over the more precipitous regions of their arid southern slopes from the Atlantic to Tunis, keeping within sight of the Desert, and hiding among the fantastically decomposed and bushy rocks of those limestone mountains with singular skill. The animal has many names. In menageries, where it breeds and lives well, it is often labeled "ruffed mouflon" or "bearded argali"; the Moors of Algeria call it "aoudad," but the natives there know it as "arûi"; it is the "kebsh" of the Egyptians, and the "tidal" or "teybel" or "beyden" of Nubia. (See Plate of Wild Goats, etc.) For habits and methods of chase, consult E. N. Buxton, *Proceedings Zoölogical Society of London* (1890) and id., *Short Talks* (London, 1898); Lydekker, *Wild Oxen, Sheep and Goats* (London, 1898).

APACHE, ă-păch'ĕ. A general name applied to several divisions of Athapascan-speaking tribes in New Mexico and Arizona. These are now designated as Jicarillas (northern New Mexico), Mescaleros (southern New Mexico), Chiricahua (Fort Sill, Okla.), White Mountain, and San Carlos (both in eastern Arizona). They formerly roved in small bands over an extensive territory in southeastern Arizona and southwestern New Mexico and extended their forays far down into Mexico. Although essentially predatory in habit and carrying on constant raids against the Mexican settlements, they remained on friendly terms with the Americans until provoked by outrages about the time of the annexation of their country by the United States, after which their condition was one of chronic hostility toward the citizens of both governments until they were finally subdued and confined to their present reservations. Upon the surrender of the last hostile band, the Chiricahuas, in 1886, such energetic protest against their continued presence in the Territory was made by the people of Arizona that the whole Chiricahua band was deported to the East and, after some years of military confinement in Florida and Alabama, was settled at Fort Sill, Okla., on the Kiowa Reservation, where the few survivors and their descendants are still held as military prisoners. In 1900 the Apache tribe, including 300 Chiricahuas at Fort Sill, numbered 5200 souls. The Lipans, although spoken of as Apaches on account of their linguistic affinity, are a distinct tribe, and hostile to the Apaches.

APACHE CAÑON. See Glorietta.

APACHE TIM'OTHY. See Canary Grass.

APAFI, ŏ'pŏ-fĭ, or **ABAFI,** ŏ'bŏ-fĭ, Michael I (1632–90), Prince of Transylvania. He accompanied Prince George II in an expedition against the Poles in 1656, was taken prisoner by the Tatars, and after his release returned to his estate. In 1661 he was chosen Prince of Transylvania, through the support of Ali Pasha, generalissimo of the Turkish forces under Sultan Mohammed IV. During the peace concluded with Austria after the battle of St. Gotthard (1664), he reigned peaceably under the protection of the Porte. He remained faithful to the Ottoman power till after the siege of Vienna in 1683. Fortune then changed. The Imperial troops invaded the country; and in August, 1687, Apafi made a treaty with the Emperor by which Transylvania was declared to be freed from Turkish suzerainty and placed under Austrian protection. At Fogaras the Transylvanian deputies, assembled at the National Diet, took the oath of fealty to the Hapsburgs as legitimate monarchs of Hungary. Ever since the death of his wife, Anna Bornemitza, in 1688, Apafi had been sorely afflicted both in body and mind, and died (April 15, 1690) on the eve of a fierce retributive war, commenced by his old allies, the Turks, who considered themselves ill-used by his desertion of them. His son, Michael II (died 1713), succeeded to the throne and its perils. The Turks, under the vizier Kiuprili, overthrew the Imperial army, but the internal troubles of the Ottoman Empire hindered them, or rather Count Tökölyi (q.v.), whom they were supporting, from reaping the fruits of their successes. The Imperial troops subsequently regained everything. By the Treaty of Carlowitz, 1699, Transylvania was incorporated with Hungary, and the young Transylvanian prince was inveigled to Vienna and cajoled into giving up his dominions to Leopold I of Austria in lieu of a pension of some 15,000 florins.

APALACHEE, ă'pă-lă'chē, or **APALACHI,** ă'pă-lă'chĭ. A tribe of Muskhogean stock formerly occupying the country about Apalachee Bay, northwestern Florida. About the close of the sixteenth century Spanish Franciscan priests established missions among them, which continued in a prosperous condition for more than 100 years, until invaded in 1702–08 by the English from Carolina, accompanied by a large force of Indian auxiliaries. In three several expeditions the mission churches were burned, the missionaries slain, and the Apalachee tribe practically wiped out of existence, more than 1000 prisoners being brought back to be sold as slaves in Carolina or distributed by the English among their savage allies. A large number were thus incorporated among the Creeks, where for a time they preserved their name and language, but are now extinct. Consult Gatchet, *A Migration Legend of the Creek Indians*, pp. 74–76 (Philadelphia, 1884).

AP'ALACH'EE BAY. An arm of the Gulf of Mexico near the northwestern part of Florida, extending about 50 miles inland (Map: Florida, D 1). It receives the waters of St. Mark's River, at the mouth of which stands the town of the same name. Its average depth is 18 feet, and it affords a good harbor for small craft.

APALACHICOLA, ă'pă-lăch-ĭ-kō'lă. A city, port of entry, and the county-seat of Franklin Co., Fla., 85 miles southwest of Tallahassee, on St. George Sound (Gulf of Mexico) at the mouth of the Apalachicola River and the Apalachicola Northern Railroad (Map: Florida, C 2). The value of its foreign commerce amounted in 1912 to about $700,000, consisting almost entirely in the export of lumber, other commodities, with imports, forming a very insignificant share. Pop., 1900, 3077; 1910, 3065.

APALACHICOLA. A river formed by the junction of the Chattahoochee with the Flint, at

the southwest corner of the State of Georgia. Thence flowing southward through Florida, it empties into Apalachicola Bay, an arm of the Gulf of Mexico. It is navigable for steamboats through its entire course of 90 miles.

APALIT, ä'pä-lēt'. A town of Luzon, Philippines, in the province of Pampanga (Map: Luzon, E 7). It is situated 8 miles southeast of Bacolor, on the right bank of Rio Grande de la Pampanga, and had a population in 1903 of 12,206.

APAME'A ('Απάμεια). The name of several cities in western Asia. 1. A treasure city of the Seleucidæ (q.v.), in the valley of the Orontes, in Cœle-Syria. It was destroyed by Chosroes (q.v.), in the seventh century A.D., but was rebuilt. The Arabs called it Famia. It was still of consequence in the time of the crusades. 2. A city in Phrygia, founded by Antiochus Soter, near Celænæ, not far from the junction of the Marsyas and the Mæander. Here, in 188 B.C., was signed the treaty between the Romans and Antiochus the Great (q.v.). From Sulla's time it was an important centre of trade, thanks to its favorable position; many Italians and Jews resided there. From the third century A.D. it began to decline. Since the thirteenth century it has belonged to the Turks. Many important Greek and Roman inscriptions have been found on the site.

AP'ANAGE. See APPANAGE.

APAR, ä'pär. See ARMADILLO.

APAREJO, ä'pä-rā'hō (Sp. pack saddle). A leather bag about 2 feet wide, nearly encircling the mule or horse on which it is placed. The aparejo is used in the United States army as a substitute for the pack saddle (q.v.). Two round hand holes are placed in the middle of each side, the two side pouches of the bag being braced by small ash or other elastic wooden sticks and stuffed with hay or moss. The advantages claimed are that it distributes the load to greater advantage than any other system of pack transport and secures better results from the animal. In the United States mountain artillery and pack trains the aparejo is used to the exclusion of all other systems of pack transportation.

APARRI, à-pär'rē. A town of Luzon, Philippines, in the province of Cagayan, 54 miles north of Tuguegarao. It is situated on the northeastern coast, at the estuary of the river Cagayan, is the chief port for coasting and ocean trade on the north, and is the base for river navigation. Under Spanish domination it was the residence of a port captain. It is the northern terminus of a highway and telegraph line across the island to Manila. Pop., 1903, 18,252.

APARTMENT HOUSE. A building containing a number of distinct dwellings, or "apartments," of several rooms each. A tenement house conforms to this definition; and in New York and the United States generally, there is no legal distinction between tenements and apartment houses. In English and American usage, however, an apartment house differs from a tenement by superior design, finish, equipment, and cost; not by size, nor by number of rooms. The term "flats," sometimes applied in England to high-class apartments, is usually in the United States restricted to apartments in houses having no elevator or hall service. There are in American cities various classes of apartment houses, most of which have their analogues in at least the larger European cities. The chief are: (1) apartment hotels for either transient or permanent occupants, having suites of from two or three to six or even seven furnished rooms cared for by the hotel servants, a hotel office, and a public restaurant, with other conveniences for families or individuals desiring to escape the cares of housekeeping; (2) ordinary apartments, usually of from five or six to nine or more rooms, besides from one to three bath-toilet rooms to each suite, such apartments being let by the year unfurnished; (3) bachelor apartments of two or three rooms and bath, furnished or unfurnished; (4) small unfurnished flats of three, four, or five rooms, for families of moderate means; (5) "duplex" apartments, each suite having rooms on two different floors; (6) studio apartments, having studios occupying the height of two stories, with dwelling rooms, etc., on two floors adjacent thereto; (7) coöperative apartment houses owned jointly by the tenants or by some of them, in which case the rents paid by the others go to the joint account of the owners. Some houses combine the features of two or more of the above classes. All American apartment houses of more than four stories (except some of the earliest built, and the "flats") have elevators, hall attendance, heat, hot-water supply, and electric lighting, and in many flats all these are found except the first two. In Europe generally most of these features are lacking, except in the newest and most expensive buildings. The most recent German examples, however, at least in Berlin, are said to rival or surpass the best American practice in these respects.

Features common to American apartment houses generally may be enumerated as follows: 1. A public entrance leading to a hall which gives access to elevators and stairs, usually with an adjoining reception room (unless itself fitted up as a reception hall); in many cases a telephone exchange, served either by a special clerk or by the hall attendant, provides communication with every apartment. 2. A special entrance for servants and tradesmen, leading to a dumb-waiter or service elevator and service stairs in the rear. 3. Each apartment has its outer door from the public lobby or stair-landing, opening into its own corridor either directly or through a so-called "foyer" or private reception hall. 4. Each apartment comprises a parlor, dining room, pantry, kitchen, bath-and-toilet room, and from two to five or six bedrooms. Larger apartments may have library, music room, dressing rooms, several servants' rooms, refrigerated storeroom, and several bath-and-toilet rooms. 5. Hot and cold water supply in kitchen, pantry, bathrooms, and dressing rooms. 6. Steam or hot-water heating. 7. Electric lighting. In many modern apartments and flats the kitchen is equipped for cooking by gas only, and in the more elaborate and costly houses a vacuum-cleaning plant and artificial refrigeration for the pantry or storeroom, are provided. In the smaller apartments the laundry tubs are in the kitchen; in the larger ones usually on a top floor in a general laundry (or rarely in the basement), and steam drying-closets are provided in connection with them. Servants' rooms are either connected with each suite or grouped all on an upper floor. Storage rooms are provided in the basement. Many houses have a restaurant or common dining room for those averse to the cares of cooking and of the table. Some apartments have roof gardens. There is the greatest variety in the

number and size of rooms. In European apartment houses generally the rooms are larger than in most American examples and the bedrooms, at least, better lighted. The European street lay-out, resulting in a fundamentally different ground plan of the house, permits of greater street frontage than is practicable in New York or in many American cities, and of lighting more rooms from the street. Moreover, the European houses (of which the Parisian are typical) are usually built around spacious courts, giving abundant light and air to even the minor service rooms, which in American houses (especially the older New York houses) are too often lighted and ventilated from narrow courts or shafts. Since the enactment of the Tenement House Law (q.v.) in New York the practice there has greatly improved, owing to the legal regulation of the sizes of courts—many houses having large interior garden courts; others, courts open to the front on the street. The defective street layout and the tendency to congestion in American cities have combined to limit the size of the rooms in apartment houses. The economy of space has been carried so far that in some Western examples the beds are by day folded into the wall out of sight, so that the same room may serve both as a reception room or living room and as a chamber—a highly objectionable and unsanitary device for making two or three rooms serve the purposes of four or five. The rental of apartments in New York, where they average higher than in most cities, ranges from $30 to $1000 a month, or at the rate of from $6 to $60 a month per room. In Paris, while the upper limit of rentals is as high as in New York, one can obtain much more spacious and desirable accommodation at the lower rates, say from $40 to $120 a month: the same is true of Berlin and Vienna, except that the upper limit is not so high.

Historical Development. In some European cities, like Paris and Rome, individual or one-family houses have for at least two centuries been attainable only by the rich, people of moderate means occupying hired lodgings in large buildings, each family having one floor ("flat," in English parlance) or half or quarter of a floor; in many cases in a "palazzo" or mansion fallen from its former glory, whose large apartments have been cut up into smaller rooms for humbler tenants. In Paris great blocks of apartments were erected under the Second Empire (1852–70), designed with considerable architectural skill, though lacking many of what Americans call "modern conveniences." In the better class of these *maisons de rapport* the façade is of monumental design, with continuous balconies above the basement and at the top story; the entrance driveway (*porte cochère*) into the court, the entrance lobby, stairs and stair halls, and the *salon* of each apartment, being treated with elaborate architectural finish. The rooms are large, but the kitchen equipment and plumbing are primitive, there is no elevator, rarely a bathroom (in the English or American sense), and no hot-water supply. Sunlight and air, however, abound. In the more recent French apartments, built since 1900, modern conveniences are more generally to be found, though the elevator is usually a small "automatic" affair whose use for descending is forbidden! The absence of good elevator service is due to the fact that the height of buildings is limited by law, so that there are seldom more than five or six stories (*rez-de-chaussée, entresol, premier étage, deuxième étage*, etc., and *mansarde*). In Germany and Austria the apartment houses have generally followed French models. In London the apartment house has never been very popular, and there is no well-marked type of design. The too prevalent refusal to lease apartments for less than two or three years, and the conservatism with regard to elevators and other conveniences, partly explain this. In the United States the earliest apartments, built in New York between 1870 and 1875 to meet the changed conditions following recuperation from the Civil War were primitive affairs, both in design and construction. A rapid extension and improvement came with the improvement of the elevator, the development of fireproof building, and the introduction of electric lighting, about 1880. A further stimulus was given by the adoption of steel-frame construction in Chicago and New York, and later by the consolidation of Greater New York in 1898. The growth in number, size, and splendor of New York apartment houses since 1900 has been phenomenal. During the past 20 years other cities have built apartment houses in great number, even small cities and suburban towns yielding to the movement, as providing a relief from many cares incident to life in a private house. For the apartment house, with its janitor service, hall attendance, central heating and hot-water supply, elevators, and apartments each with rooms on one floor, makes possible housekeeping with one or two servants (or even none at all), where from three to six would be required in a private house. Indeed, the difficulty of securing good domestic service in America has been the strongest influence favoring the development and multiplying of apartment houses. The prevalence of the system in Paris, Berlin, Vienna, and Rome is due to other causes, largely local. The influence of apartment-house life upon the family and society is a serious problem not yet studied as it deserves to be.

For the legislation concerning apartment houses, see TENEMENT HOUSE LAWS. For the general literature of the subject, consult the files of English, American, and European architectural periodicals; also Daly, *L'Architecture privée au XIX^e siècle* (Paris, 1877); Guadet, *Théorie de l'architecture*, vol. iii (Paris, 1902); Perks, *Residential Flats of All Classes* (New York, 1905).

APASTAMBA, ŭ'pâ-stŭm'bâ. An ancient Sanskrit author, noted in connection with Vedic literature because of the *Śrauta-, Grhya-, Dharma-*, and *Kalpa-Sūtras*, which bear his name. See VEDA.

APATIN, ŏ'pŏ-tĭn. A town of the kingdom of Hungary, in the county of Bács-Bodrog, situated on the left bank of the Danube, about 45 miles southwest of Maria-Theresiopel (Map: Hungary, F 4). Its chief industry is the manufacture of rope made from the hemp raised in the vicinity. A Roman intrenchment, the Römerschanze, 13 feet high and 20 feet broad, is the greatest point of interest. Pop., 1900, 13,940; 1910, 16,798 (mostly Germans).

AP'ATITE (from Gk. *ἀπάτη, apatē*, deceit, as the mineral has often been mistaken for other minerals). A mineral consisting of phosphate with some chloride and fluoride of calcium, its composition being represented by the formula $3Ca_3(PO_4)_2 + Ca(ClF)_2$. It occurs both

in crystalline and amorphous form and is largely used in the manufacture of fertilizers, for which it is valuable on account of the contained phosphoric acid. It occurs in both stratified and crystalline (metamorphic and igneous) rocks, especially in the latter. It is thus found in the older crystalline rocks in Canada, New York, Maine, and New Jersey; in Europe it is known in England, France, Saxony, Tyrol, Bohemia, Spain, Norway, etc.; but the only deposits of economic importance are those of Canada, Norway, and Spain. Most of the Canadian material that has been shipped contains 85 per cent of the phosphate of lime. In recent years the enormous deposits of rock phosphate or amorphous phosphate of lime have seriously injured the Canadian trade.

Phosphate Rock. Amorphous phosphate, or phosphate rock, is a name given to noncrystalline deposits of phosphate of lime occurring in more or less abundance at certain localities and of importance as a source of fertilizer. In the United States the most important deposits under active exploitation are in South Carolina, Florida, and Tennessee, but small quantities are obtained in Arkansas and some of the Rocky Mountain States. The Florida deposits, which have been worked since 1888, are found near the western coast. They occur as lumps imbedded in clay, known as rock phosphate; in pebble agglomerations, known as land pebble; or as a mixture of small pebbles and sand in the river bottoms called river pebble. The latter mixture is obtained by dredging, the sand being eventually separated by screening. The South Carolina deposits are found in an area about 60 miles long, between Charleston and Beaufort. The phosphate occurs in nodules buried in sand and clay, the productive bed being one to two feet thick. An acre yields 400 to 1200 tons. The South Carolina district was opened up in 1867. Both the Florida and South Carolina deposits occur associated with rocks of Tertiary age, and many teeth of sharks, elephants, etc., together with bones, are found with the phosphate. The phosphoric acid of the mineral is supposed to owe its origin to the accumulation of excrement and decaying animal matter deposited along the shores or in pools during Tertiary times, and to subsequent local replacement of limestone, or to concretionary segregation of phosphate of lime. In south central Tennessee, the phosphate is associated with Ordovician, Devonian and Post-Tertiary rocks. Enormous beds of phosphate have been recently uncovered in the States of Idaho, Utah, and Wyoming, constituting altogether the largest resources of that material in the world. They consist of rock phosphate, phosphatic shales, and cherty layers, with a thickness up to 200 feet, inclosed in Carboniferous limestone. They appear to offer an almost inexhaustible source of supply that will be drawn upon extensively, no doubt, when the southern deposits become depleted. The phosphate industry of the United States has assumed great importance in recent years, and much of the material is shipped to foreign countries. The annual output greatly exceeds that of any other country; though Tunis and Algeria have recently come into prominence as producers of the material. Crude rock containing less than 50 per cent of calcic phosphate is unsalable. Siliceous impurities are inert, but alumina and ferric oxide are bad, because they tend to change the refined phosphate back to an insoluble condition. Lime, if present, neutralizes some of the sulphuric acid used in the manufacture of the fertilizer. The price of phosphate varies from year to year, and with its grade. The Florida hard rock averages the highest in phosphoric acid and commands extensive markets by reason of its accessibility to shipping points. The present output of phosphate rock in the United States exceeds 3,000,000 tons a year with a value, approximately, of $12,000,000.

For general information, the reader is referred to the paper by Adolphe Carnot: "Sur les variations observées dans la composition des apatites, . . . Remarques sur le gisement et le mode de formation de ces phosphates" in the *Annales des Mines*, vol. x (Paris, 1896). Papers descriptive of the phosphate deposits of particular regions are: Branner, "The Phosphates of Arkansas," in the *Transactions of the American Institute of Mining Engineers*, vol. xxvi (New York, 1896); Hayes, "The Tennessee Phosphates," in the *Sixteenth Annual Report of the United States Geological Survey*, part iv (Washington, 1895). For information on the western phosphate deposits, consult papers by Gale and Richards, and a separate paper by Blackwelder, *Bulletin No. 430, United States Geological Survey.*

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APATU'VIA. See FESTIVALS; GREEK FESTIVALS.

APAYAO, ä-pī'you. A head-hunting people living in Apayao sub-province and Ilocos Norte, Luzon. They are a dialect group of the Tinguian. See PHILIPPINES.

APE (AS. *apa*, Ger. *Affe*). A monkey; any quadrumanous animal, especially one of large size, and belonging to the Old World. (See below.) Thus, the "apes of Gibraltar," or "Barbary apes," are macaques (q.v.), and some "sacred apes" are baboons. (See BABOON: MACAQUE; MONKEY.) More particularly the word nowadays applies to simians (family Simiidæ), called "anthropoid apes," because they most resemble mankind.

The Anthropoid Apes consist of the chimpanzees, gorilla, and orang, the gibbons, together with several extinct and fossil species; but the three forms first mentioned are those usually in the mind of those who use the term in its popular sense. All approach, and some may exceed, man in size, frequently assume an erect attitude (though none are so much at ease in this position as are some gibbons), and resemble him in

ANTHROPOID APES

BY PERMISSION OF THE NEW YORK ZOOLOGICAL SOCIETY

1. ORANG UTAN (Pongo pygmaeus).
2. (Left) SCHWEINFURTH'S CHIMPANZEE (Pan schweinfurthi). (Right) GAMBIAN CHIMPANZEE (Pan chimpanse).
3. GORILLA (Gorilla gorilla).
4. SIAMANG GIBBON (Symphalangus syndactylus).

structure more closely than they do the apes and monkeys of other families. This is much more marked in young examples, however, than in the adults, which in advanced age become more and more brutish. This is particularly true of the characteristics of the skull, where huge, bony "crests" and super-orbital ridges develop, the canine teeth become greatly enlarged, and a revolting expression of face reveals the essentially savage and intractable nature of the animal, which, enforced by gigantic strength, renders these apes among the most formidable and ugly of wild beasts. The skeleton is substantially similar to the human skeleton, differing from it in greater size and weight and in certain proportions; the arms also are relatively much longer, and the legs shorter, and the great toe is longer and opposable only to a very limited degree. The spine lacks those curvatures in its lower part which enable man to stand erect with ease. In the flatness of the sternum and the absence of a certain small bone in the wrist these apes agree with man and differ from the monkeys. The skull is thicker, has in age great bony ridges, and projects at the muzzle; the teeth are of the same number and character as man's, but they are not set in a horseshoe form, but more nearly on three sides of a square, the front teeth making a decided angle with the cheek teeth, where the canines are developed into great tusks. The brain-case is smaller, and the bulk of the brain far less than that of man. Thus, according to Mivart, a normal human brain never measures less than 55 cubic inches, while that of the chimpanzee (the nearest) measures only 27½ cubic inches; the cerebrum is also relatively shorter. In its general form and structure, however, the brain of these apes is like that of man and is richly convoluted. There are no important differences in the soft parts of the body or their functions.

Externally, all the anthropoid apes are covered with black, brown, or reddish coarse hair, on all parts of the body except the face and palms, where the skin is dark, leathery, and wrinkled; the naked patches and callosities so frequently found upon the buttocks of the lower apes are absent or very small; nor are there any cheek pouches. There is no trace of a tail. The chimpanzee and gorilla are closely related to one another, but the orang is as distinct in structure from them as it is widely removed in habitat. All are inhabitants of the equatorial regions of the Old World, and restricted to forests, where they live in the trees, building rude sleeping platforms and shelters, and feeding wholly upon vegetable food—chiefly fruits. See CHIMPANZEE; GIBBON; GORILLA; ORANG-UTAN; MONKEY; and Plate of ANTHROPOID APES.

Consult: R. Hartmann, *The Anthropoid Apes*, illustrated (New York, 1886); Huxley, *Man's Place in Nature* (New York, 1898); and especially Elliot, *A Review of the Primates* (New York, 1913).

APEAK'. See ANCHOR.

APEL, ä'pel, JOHANN AUGUST (1771–1816). A German scholar and author. He was born at Leipzig, studied there and at Wittenberg from 1789 to 1793, and in 1801 was an alderman at Leipzig. He wrote several dramas, drawn largely from antiquity and slightly esteemed, a *Gespensterbuch*, collections of short stories (4 vols., 1810–14), and a *Wunderbuch* (3 vols., 1815–17) both popular. The first of them contained the story of *Der Freischütz*, which formed the basis for the text of Weber's opera of that name. He is perhaps best known for his *Metrik* (2 vols., 1814–16), which was a step forward in the understanding of ancient prosody.

APELDORN, ä'pel-dôrn, or **APELDOORN.** A beautiful town in the Netherlands, province of Gelderland (Map: Netherlands, D 2). It is situated about 17 miles north of Arnhem, on a canal which joins the river Grift, a branch of the Yssel. Near Apeldorn is the royal château Het Loo, originally a hunting lodge of the Duke of Gelderland and a favorite palace of William III of England when Stadtholder. It is now the summer residence of Queen Wilhelmina. The principal industry is paper making, the produce of the numerous mills being in large part exported to the East Indies. Pop., 1890, 19,190; 1900, 25,761; 1910, 35,838; 1911 (est.), 37,517.

APELLES, ȧ-pĕl'ēz (Gk. Ἀπελλῆς). The most celebrated painter in ancient times, the son of Pytheas, and probably a native of Colophon, on the Ionian coast of Asia Minor. The statements that he was a native of Cos or of Ephesus seem due to his long residence in those places. He was probably made a citizen of Ephesus, and may have died at Cos, which afterward possessed an unfinished painting by him. He lived during the latter part of the fourth century B.C. He first studied at Ephesus, under Ephoros, and afterward at Sicyon under the celebrated teacher Pamphilus of Amphipolis, where he may have learned the fine drawing in which he excelled. From Sicyon he seems to have gone to Pella in Macedonia, where he painted portraits of Philip and became the friend of Alexander, who sat to no other painter, though frequently to him, and permitted him much freedom of speech. His most celebrated portrait represented Alexander wielding the thunderbolt, of which it was said "of the two Alexanders, Philip's is invincible, Apelles's inimitable." He also painted portraits of some of the generals of Alexander. His most celebrated works were mythological or allegorical. Very famous were his "Anadyomene" (q.v.) and his "Artemis Surrounded by Maidens." Of his painting of "Slander," in which also appeared Ignorance, Suspicion, Envy, Deceit, Remorse, and other personifications, Lucian gives a detailed description which has inspired Botticelli, Dürer, and other artists. He seems to have returned to Asia after Alexander's conquests, and most of his celebrated works were found in Asiatic cities. At Rhodes he visited the painter Protogenes, and is said to have contributed to his reputation by offering a high price for one of his pictures. He was generous in his appreciation of his rivals, though fully aware of his own merits. He admitted that Melanthius surpassed him in grouping, and Asclepiodorus in symmetry, and that Protogenes was inferior only in never knowing when to stop, which deprived his pictures of the grace that Apelles claimed as his own. He seems to have been remarkable for his accuracy of drawing and fine coloring, probably due to a thorough theoretical and practical training. The industry with which he practiced drawing was so great as to give rise to the proverb which, in the Latin version, is *Nulla dies sine linea*. Many anecdotes are related of Apelles. When his works were exposed to public view, he used to place himself behind a picture, to listen to the criticisms of the common people. A cobbler having detected a fault in the shoe of one of his figures, it is stated that Apelles instantly

rectified it; but when the cobbler, on the following day, extended his criticism to the legs, the painter rushed from his hiding-place and told the cobbler to stick to the shoes, or, in the Latin version, which has become proverbial, *Ne supra crepidam sutor judicaret.* Consult: Pliny the Elder, *Historia Naturalis,* xxxv, 91 ff.; Woltmann and Woermann, *History of Painting,* vol. i (Eng. trans., New York, 1886); Houssaye, *Histoire d'Apelles* (Paris, 1867); Wustmann, *Apelles' Leben und Werke* (Leipzig, 1870).

APEL'LICON OF TEOS (died 84 B.C.). A wealthy bibliophile, born at Teos, but later a citizen of Athens. He gathered a great library, in part by purchase, in part by theft of original documents from the archives of Athens and other Greek cities. He is known now chiefly for the part he played in preserving the writings of Aristotle.

APELT, ä'pelt, Ernst Friedrich (1812–59). A German philosophical writer, born at Reichenau. He studied at Jena and Leipzig and was made professor of philosophy at Jena in 1840. His works include: *Die Reformation der Sternkunde* (1852); *Die Theorie der Induktion* (1854); *Metaphysik* (1857); *Parmenidis et Empedoclis Doctrina de Mundi Structura* (1857); *Religionsphilosophie* (1860).

AP'EMAN'TUS. A churlish cynic in Shakespeare's *Timon of Athens,* supposed to have been modeled after the sketch of a similar character given in Lucian's *Public Sale of Philosophers,* a work with which Shakespeare might easily have been acquainted.

APENNINES, ăp'e-nīnz (It. *Appennino;* Lat. *Mons Apenninus,* Apennine Mount, from Cym. Celt. *pen,* hill, summit, promontory). A mountain chain belonging to the system of the Alps and extending uninterruptedly throughout the whole length of the Italian peninsula. Its separation from the Maritime Alps is purely conventional, there being no change of structure, and the beginning is usually taken to be about at longitude 8° E., the actual division being one of the passes there, generally that called Bocchetta dell' Altare, a few miles from Savona. From this point the chain, under the name of the Ligurian Apennines, girdles the Gulf of Genoa in the immediate vicinity of the sea, and then runs slightly south of east inland almost across the peninsula at lat. 44°, and then southeastward, forming the watershed between the Adriatic and the Mediterranean, but gradually approaching the eastern coast, till, in the highlands of the Abruzzi, it borders close upon it; after which it takes a more southerly direction, traversing Calabria. The formation of the uplift on the north coast of Sicily being the same as that in Calabria, the Apennines may be considered to continue and terminate in that island. The total length is about 800 miles, and the breadth varies from 25 to 85 miles.

Geographers divide the Apennines as follows: 1. The North Apennines, from the Col di Tenda, or the Bocchetta dell' Altare, in the Maritime Alps, to the pass of Borgo San Sepolcro, in the neighborhood of Arezzo, on the eastern border of Tuscany. 2. The Central Apennines, from Arezzo to the valley of the Sangro. 3. The South Appennines, from the valley of the Sangro to Cape Spartivento, terminating in the height called Aspromonte (6420 feet). To these may be added, as a fourth division, the Insular Apennines, or Sicilian Range. The first division is generally subdivided into (*a*) Ligurian, (*b*) Tuscan, (*c*) Umbrian. The leading feature of the Apennines, wherever they approach the coast, is their extraordinarily steep declivities; while in Middle Italy and the adjoining portions of Upper and Lower Italy, long, terraced plateaus, lower ranges, and finally, relatively extensive coast plains mark their gradual descent on the west. The general name for these lower ranges is Sub-Apennine; but they have a variety of specific designations, such as the mountains of Carrara and Seravezza, Protomagno and Monte Amiata, in Tuscany; the Sabine, Alban, and Volscian mountains in the former Papal States; Monte Gargano on the southeastern coast, north of Manfredonia, etc. The main chain of the Apennines does not send off spurs into the Apulian Peninsula or heel of Italy, which in the main is rather level, or only interspersed with detached groups of hills. The principal chain exhibits for the most part a dreary and barren appearance, somewhat like a vast wall, with very few projecting peaks to break the dull monotony of the scene, and therefore seldom furnishes any salient points on which the eye of the spectator can rest with pleasure. Naked, riven, covered with thick débris, the declivities seem as if scorched by the southern sun. Only in the Abruzzi, in the Sub-Apennines, and especially in the marble-bearing mountains of Carrara and Seravezza do the bold and magnificent forms of the Alps reappear.

The average height of the entire chain of the Apennines is about 4000 feet, which, however, in the north sinks down to little more than 3500 feet, and in the mountains of the Abruzzi rises to 7000 feet. Here, in Monte Corno, the highest peak of the range, forming part of the Gran Sasso d'Italia, they reach an elevation of 9560 feet. The North Apennines attain in Monte Cimone, situated in the province of Modena, a height of 7103 feet. The highest peak of the South Appennines is Monte Polino, with an elevation of 7325 feet. On the highest peaks snow may be found at all seasons.

The Apennines are pierced by 13 principal passes. These are, proceeding from north to south: (1) the pass of Tenda; (2) of Bocchetta; (3) of Cisa; (4) of Monte Cimone; (5) of Poretta; (6) of Pietramala; (7) of Borgo San Sepolcro; (8) of Furlo; (9) of Serravalle; (10) of Aquila; (11) of Isernia; (12) of Arcano and Troa; (13) of Potenza.

Geology. The prevalent rock is a species of compact limestone, of a whitish-gray color, belonging to the Jura formation. Resting on the limestone is found a more recent formation of sandstone and marl, which is especially abundant in the middle region of the Sub-Apennines and contains an extraordinary number of fossils of the Tertiary Age. In the Apuan Alps and at several coast points remnants of older formations occur, but except these, and the rocks of the Calabrian portion where the prevailing limestone changes to crystalline and schistose rocks, the basic structure is Mesozoic and Tertiary. On the watershed of the north and central Apennines there are found Paleozoic clay-slate, graywacke-slate, etc. The Apennines, especially the Roman and Neapolitan, are distinguished from all other mountain chains by the rich variety of marbles which they contain. In some places the quarries seem inexhaustible. Igneous rocks are numerous in the middle and southern regions, where volcanic disturbances have produced many wonderful formations—as,

for instance, the crater lakes of Albano, Nemi, Vesuvius, Solfatara.

The direction of the great chain is favorable to the formation on the western side of important river basins, such as those of the Arno, the Tiber, the Garigliano, and the Volturno; while on the eastern side we find nothing but small streams, in most cases destitute of affluents, hurrying down to the sea through wild, precipitous valleys. In northern Italy the Ligurian Apennines, almost overhanging the Gulf of Genoa, develop on the southern slopes only puny streams, while their northern slopes send down, through the plains of Piedmont, large tributaries to the Po.

Flora. Where the Apennines, in general so poorly supplied with permanent streams, exhibit a trace of Alpine abundance of water, there is no lack of rich pastures and dense forests; but usually only thin grass and wild, scrubby bushes cover the stony slopes. The greater number of the roaring forest brooks in the deep, rocky ravines display during the summer only dry beds. Where the mountains dip down to the sea, as at the Riviera of Genoa and the Gulf of Naples, a rich, distinctively southern vegetation clothes the declivities. Gigantic agaves, Indian figs, myrtle bushes, orange groves, suggest in these northern lands the splendors of the tropics. The altitudinal vegetation zones are characterized as follows: Vine and olive up to 1300 feet; chestnut and oaks from 1300 to 3300 feet; pines from 3300 to 5200 feet; shrubs and grasses above 5200 feet, succeeded above by naked rocks.

APENRADE, ä'pĕn-räde. A town in the Prussian province of Schleswig-Holstein, situated at the head of a bay of the same name, opening into the Baltic Sea (Map: Prussia, C 1). It has an excellent harbor and considerable shipping trade. Pop., 1895, 5564; 1905, 7023; 1910, 7800. The town dates from the thirteenth century. It was destroyed by fire three times and in 1864 was captured by the Prussians. In the neighborhood is the Castle of Brundlund, built by Queen Margaret in 1411.

APE'PI, or APO'PHIS. The name of two Egyptian kings of the Hyksos Dynasty. (See HYKSOS.) Little is known of either, and only a few scanty memorials of them have been found. Under APEPI I, whose date is very uncertain, science and letters seem to have flourished. The celebrated *Rhind Mathematical Papyrus*, a sort of practical handbook for the solution of arithmetical and geometrical problems, bears a colophon stating that the manuscript was copied, in the thirty-third year of this King, from an original written in the reign of Amenemhat III. APEPI II flourished about 1650 B.C., and several monuments exist bearing his name. A papyrus in the British Museum (Sallier I) contains a legendary account of the breaking out of a war about religious matters between Apepi and Sequenen-ree, Prince of Thebes. It would seem, therefore, that Egyptian tradition regarded Apepi II as the Hyksos ruler in whose reign began the long war for the independence of Egypt.

APEREA, ä-pā'rē-ä. See CAVY; GUINEA-PIG.

APE'RIENTS. See LAXATIVE; PURGATIVE.

APET'ALOUS. See FLOWER.

A'PEX (Lat. the extreme end of a thing; point, summit). A term used in mining to designate the outcropping edge of a mineral vein or lode. As interpreted legally, it is not necessary that the edge of the vein should project above the surface of the ground, but simply above the surface of the inclosing bedrock, and both vein and bedrock may therefore be covered by soil or drift. The term "outcrop" in the legal sense, as used above, does not agree with the geological application of the term in all cases; for if a vein dips nearly parallel with a sloping surface, and may be exposed at a point below the apex, due to an irregularity in its dip, this second exposure, while constituting an outcrop in the geological sense, would not be one legally. According to the Revised Statutes of 1872, a miner having the apex of a vein within the boundaries of his claim is allowed to follow it along the strike until it intersects the end lines of his claim extended vertically downward. On the dip, however, he is at liberty to follow it indefinitely, even if it extends outside the vertical side lines of his surface location. This prohibits another person from sinking to the first party's vein from a point outside the latter's surface claim. This apex rule has led to many lawsuits, some of which were costly, involving property worth several million dollars. Thus, where two veins join below the surface and each is worked by a different party, both may endeavor to claim possession of the true apex, but under the apex law slighter pretenses are sometimes used by one person to gain ownership of another's vein. See LODE; MINING CLAIMS; OUTCROP; DIP; STRIKE; ORE DEPOSITS; and consult Barringer and Adams, *The Law of Mines and Mining in the United States* (Boston, 1897: 1911).

APEX OF THE SUN'S WAY. A term used to denote that point of the heavens toward which the sun's motion in space is at present directed. Tobias Mayer of Göttingen was the first to speculate on the effect that the motion of the solar system as a whole would have on the relative positions of the fixed stars, in causing those ahead to open out and those behind to close in upon the line of motion. Sir William Herschel, by considering the motions of a comparatively small number of the brighter stars of the northern hemisphere, fixed on a point in the constellation Hercules as the solar apex. More recent investigations, involving a larger number of stars and carried on with all the modern refinements of astronomical measurement, have led to various estimates of the position of the apex, but it appears to be the general consensus of opinion that it lies in the neighboring constellation of the Lyre, a few degrees from the place indicated by Herschel. See STARS.

APHANIP'TERA. An order of insects, which includes the fleas, distinguished from the Diptera by having the three segments of the thorax "distinct and nearly equal, the two last rings (mesothorax and metathorax) bearing short, leaf-like appendages; and mouth-parts adapted for piercing."

APHASIA, ä-fā'zhĭ-ä, *or* -zĭ-ä (Gk. *'Αφασία, speechlessness, from ἀ, a,* priv. + *φάναι, phanai,* to speak). Complete or partial loss of the power to express or understand the conventional symbols of language, resulting from disease of the brain centres involved. Aphasia may be classified as either motor or sensory, but the two forms may coexist. Motor aphasia results from inability to convey the necessary nerve impulses to the organs of speech. The motor speech area is in the third frontal convolution (Broca's convolution), and injury to this part of the brain or of the nerve tracts leading from it to

control the motions of the tongue and lips produce motor aphasia. With this affection the person may know what he wishes to say, but is unable to say it; he may be able to talk, but not say the words he wishes. All gradations of this affection, from slight to severe forms, exist, and it is one of the commonest forms of aphasia. There are several types of motor aphasia. When the patient is unable to write, he is said to have agraphia. Some victims of aphasia are able to write, but cannot enunciate words or sentences. The various degrees of this form of aphasia are severally termed aphemia, alalia, or anarthria, depending on the amount of impairment. Sensory aphasia, or amnesia, is a loss of memory for words. Three distinct types are recognized. 1. A simple loss of memory for words. 2. Word deafness or inability to comprehend spoken language. The auditory centre, or centre for auditory memories, that portion of the brain which hears and understands spoken speech, is in the first temporal convolution. Any defect of this centre, or of the fibres which go from it to the motor speech centre, produces what is known as word deafness. In this form the person may hear perfectly well, may read and speak, but does not understand spoken language. 3. Word blindness, or lack of power to understand written or printed words. The optical centre is located in the occipital lobes, and disease or injury of its cells, or of the fibres which lead from it to the motor speech centre, produces word blindness. In this form of aphasia the person, although capable of seeing, does not comprehend what he sees. He can talk and repeat aloud what is said to him, or write what may be said or what he reads. Several other sub-varieties of aphasia may be merely mentioned. Paraphasia denotes inability to connect ideas with the words proper to their expression; agrammatism, ataxaphasia, loss of the grammatical sense. Bradyphasia is abnormal slowness of speech. Aphasia is a symptom of many brain troubles. The most important cause is hemorrhage into the brain substance, involving the areas above described. Tumors, brain abscess, injuries of the brain, exhaustion, and some of the insanities may be accompanied by aphasia. The treatment is that of the underlying disease. Consult Gould and Pyle, *Cyclopedia of Medicine and Surgery* (Philadelphia, 1912).

A'PHEK. 1. A place north of Beirut (Josh. xiii. 4), having a temple to Ashtoreth, which was destroyed by Constantine on account of the impurity of the rites celebrated in it; probably the modern Khirbet Aphka at the source of Nahr Ibrahim. 2. One of the "twenty and two cities with their villages" belonging by inheritance to the tribe of Asher (Josh. xix. 30; Judg. i. 31). 3. A stronghold near Megiddo, where the Philistines assembled their army for the battles of Gilboa (1 Sam. xxix. 1) and Ebenezer (1 Sam. iv. 1), and from which Benhadad and Hazael (1 Kings xx. 26; 2 Kings xiii. 17) made their attacks upon Samaria. Over 100,000 of the Syrians are said to have been slain in one day's battle; the rest fled into Aphek, where 27,000 more were killed by a falling wall (1 Kings xx. 29, 30). It is probably identical with Apukn in the annals of Thothmes III (1501–1447), but this place has not yet been identified.

APHE'LION (Gk. *ἀπό, apo*, away + *ἥλιος, hēlios*, the sun). That point in the elliptical orbit of a planet which is most remote from the sun. The opposite point, or that nearest to the sun, is styled the perihelion. At the former point the swiftness of the planet's motion is least and begins to increase; at the latter it is greatest and begins to decrease. This irregularity of motion is most remarkable in comets, since their orbits deviate most from the circle. See APSIDES.

APH'ELIOT'ROPISM, or NEGATIVE HELIOTROPISM. That form of sensitiveness by virtue of which plant organs direct their axes away from the source of incident light. Certain roots show this reaction to light; e.g., those of mustard seedlings. It is seen also in the tendrils of *Bignonia capreolata*. See HELIOTROPISM.

APHE'MIA. A form of aphasia in which the ability to write is retained. See APHASIA.

A'PHID (probably from Gk. *ἀφειδής, apheidēs*, unsparing, from *ἀ, a*, priv. + *φείδεσθαι, pheidesthai*, to spare). An insect of the family Aphididæ, commonly known as plant-lice, which live either free on the foliage, bark, or roots of plants, or inclosed in galls. They nourish themselves on the sap of their plant hosts, which they suck up through a long slender haustellum. They are minute, the largest being only one-fourth of an inch long. They are usually green or brown and somewhat pyriform in shape. Most of the forms that live on roots underground have neither compound nor simple eyes. Many species secrete a cottony, protective coat. At the posterior end of the abdomen most aphids have a pair of tubes from which they discharge a liquid for defense against their enemies, and also excrete from the anus a sweet liquid which is eagerly collected by ants and some other insects. This latter liquid is called "honey-dew" and often falls upon and varnishes the leaves of plants. When the wind is blowing it may fall to the ground as a fine spray. Although ants are indirectly injurious to plants by protecting or even cherishing the aphides, they may be said to be beneficial in collecting the honey-dew, since its presence on the leaves or stems is apt to form a favorable substratum for the growth of parasitic fungi which are injurious to the plants.

Dimorphism, or even polymorphism is very common among aphides. Thus the cospecific forms which live on the roots of plants and those that live on the foliage may exhibit certain structural differences. The sexes may be winged or wingless, and the females may lay eggs or bring forth their young alive. In the spring the fertilized eggs give rise to females, and these may produce females parthenogenetically for several generations, till later in the season, either at times of drought or on the approach of winter, both males and females make their appearance and become the parents of fertilized eggs. These eggs hatch the following spring as the "stem mothers," and the cycle is repeated.

Aphides stunt or kill growing tips, weaken entire trees by impoverishing their sap, and some species produce galls or other abnormal growths They may destroy entire crops of cereals. Nearly all garden vegetables suffer from their ravages, and hot-house plants are particularly infested by them. The price of hops from year to year varies largely according to the abundance of the hop aphis. See HOP-LOUSE.

To the same group belongs the grape-vine phylloxera of Europe and America. Inundation of the ground during cold weather is fatal to

this pest. Carbon bisulphid and fumigation with tobacco, and spraying with neutral soaps are effective checks. Young fruit and shade trees may also be treated with soap washes, as well as with hydrocyanic-acid gas applied under closed tents. Birds, spiders, syrphus-fly larvæ, and ladybird beetles destroy great numbers of aphides and they are persecuted by deadly parasites. Indeed were it not for the many insect foes of aphides there would be little or no vegetation. The winter eggs of these insects may endure any amount of cold, but a cold, wet spell in the spring is often fatal to the newly hatched aphides. Among the most important species of this group are the "grain-lice," melon or cotton aphis, various peach and apple aphides, pea "louse," etc.

Bibliography. Thomas, *Eighth Report State Entomologist of Illinois* (Springfield, 1879); for Europe, Buckton, "Monograph of British Aphides," Ray Society (London, 1879–83). For bibliography of principal works on these insects see W. D. Hunter, *Bulletin 60, Iowa Agricultural Experiment Station* (Ames, Iowa, 1901).

A'PHIS-LI'ON. The larva of a lace-winged fly, especially of the family Hemerobiidæ, which feeds on plant lice. It is closely related to the ant-lions and golden-eyed flies. See LACEWING.

APHO'NIA (Gk. *ἀφωνία*, from *ἀ, a*, priv. + *φωνή, phōnē*, voice, sound). The term used in medicine to signify a more or less complete loss of voice. It is distinct from mutism, in which it is impossible to form articulate sounds, and in most cases the voice is not entirely lost. The voice is essentially produced by three distinct agents, viz., (1) the expiration of air, (2) the opening of the glottis, and (3) the tension of the vocal cords; and hence anything interfering with expiration, or with the functions of the glottis and vocal cords, may cause aphonia. Thus, it may result from paralysis of the respiratory muscles, from pulmonary emphysema, or pneumonia; or it may be caused by diseases of the larnyx, as chronic laryngitis, œdema of the glottis, polypus, etc.; or by pressure on the larnyx caused by abscesses, vegetations, and any kind of morbid growth; or it may be traced to some functional or organic disturbance of the vocal cords. The muscular fibres which act on these cords may become affected in acute laryngitis by extension of the inflammation, or their action may be impeded by the pressure of false membrane in croup. Aphonia may often be traced to compression of the recurrent or inferior laryngeal nerve, which is the nerve supplying motor power to all the muscles of the larnyx except one. Such pressure is not infrequently caused by aneurism, abscess, or tumor. A wound or contusion of the pneumogastric nerve, or one of the recurrent branches, will cause aphonia or, more commonly, extreme hoarseness from paralysis of the laryngeal muscles on one side. Aphonia is, moreover, very commonly associated with hysteria.

APH'ORISM (Gk. *ἀφορισμός, aphorismos*, a limitation, definition, from *ἀπό, apo*, away + *ὁρίζειν, horizein*, to bound, divide). A maxim or any short and significant saying; such as "Habit is a second nature." Sometimes a complete work is written in the form of a series of aphorisms, arranged in due order, and leaving their connection to be traced by the reader's reflection.

APHRAATES, ā-frā'tēz. A Persian Christian of the fourth century, who, after his conversion from heathenism, took the name of Jacob and was known as the "Persian Sage." He is said to have been an opponent of Arianism, and after his conversion lived at Edessa and later at Antioch. According to Prof. William Wright, he was bishop of the convent of Mar Matthew near Mosul and composed his works in 344, 345, and 377. His writings consist of 22 alphabetical homilies (ed. W. Wright, London, 1869; Graffin, Paris, 1894), and the separate homily *On the Cluster*, the text of which has been recovered lately. In the *De Viris Illustribus* (written before 496) of Gennadius of Marseilles, and in the ancient Armenian version, published by N. Antonelli (Rome, 1756), the homilies were ascribed to Jacob of Nisibis, who died in 338. The real author, however, is cited by name by Abhdisho, and by Elias of Nisibis (eleventh century), in his *Chronicle*. Consult: W. Wright, *Syriac Literature* (London, 1894); Duval, *Littérature Syriaque* (Paris, 1899); J. Forget, *De Vita et Scriptis Aphraatis* (Louvain, 1882); and Thalhofer, *Bibliothek der Kirchenväter* (Kempen, 1869–86), where eight of the homilies are translated. Ger. trans. by Bert in Von Gebhardt and Harnack, *Texte und Untersuchungen* (Leipzig, 1888); French by Parisot in *Edition Graffin;* English by John Gwynn in Schaff and Wace, *Select Library of Nicene and Post-Nicene Fathers*, vol. xiii (2d series, 1898).

APHRODISIA, ăf'rō-dĭz'ĭ-ȧ. The name given to the festival celebrated in honor of Venus. See GREEK FESTIVALS; VENUS.

APHRODISIAC, ăf'rō-dĭz'ĭ-ăk (Gk. *ἀφροδισιακός, aphrodisiakos*, pertaining to Aphrodite, or Venus, goddess of love). A name applied to drugs that excite erotic desire, though the term may also include any physical or mechanical means employed for the same purpose. All drugs that are tonic in their effects and which promote the health of the body are indirectly aphrodisiac in their tendency. Such are strychnine, iron, quinine, etc. True aphrodisiacs are very rare, and it is doubtful if there be any whose use is not injurious if given in effective doses. Such are hashish (*Cannabis indica*), cantharides, a violent and dangerous irritant, *Blatta orientalis*, and *Damiana*, a preparation made from a species of *Turnera* found in Mexico. Drugs having the contrary effect are called anaphrodisiacs (q.v.).

APHRODITE, ăf'rō-dī'tē. See ANADYOMENE; VENUS.

APH'THÆ (Gk. *ἄφθα, aphtha*, eruption, ulceration). Small round or oval whitish patches, placques or ulcers surrounded by a red border and very painful, which appear on the mucous membrane of the mouth, in the affection known as aphthous stomatitis. The favorite sites of these patches are the sides of the tongue, or its under surface, or in the fold between gums and lips. It is a disease of the dentition period of children, although adults are sometimes attacked. The irritation of dentition and general lowered vitality are predisposing causes, while faulty oral hygiene, unclean nursing bottles, decomposing particles of food and the like are the exciting factors. No specific germ has been definitely associated with aphthæ, nor has the affection been proved to be contagious. The treatment consists in cleansing the mouth with mild antiseptic washes, touching the ulcers with nitrate of silver or other caustics, and paying strict attention to oral cleanliness. This affection is not to be confused with Thrush (q.v.).

APH'THOUS FE'VER. See FOOT AND MOUTH DISEASE.

APH'YDROT'ROPISM, or NEGATIVE HYDROTROPISM. That form of sensitiveness by virtue of which a plant organ turns its axis away from the source of diffusing moisture. The phenomenon is seen in the fruiting bodies of many fungi. The vegetative filaments remain in the moist substratum (being positively hydrotropic), but the reproductive filaments, which bear the spores, grow out into the much drier air. See HYDROTROPISM.

APIA, ä'pē-ä. The principal town in the Samoan Islands, South Pacific Ocean. It is situated on the northern coast of the German island of Upola, in lat. 13° 49′ S., long. 171° 48′ W. It has an open harbor and is the chief commercial centre of the Samoan group. Most of the trade is British, and cocoa and copra are the principal exports. The town consists chiefly of one long street running along the harbor. There is a Roman Catholic church, several schools, and a district court. On March 15, 1889, Apia was visited by a disastrous hurricane, in which several vessels, including one American and two German warships, were destroyed, and 146 lives lost. Apia was constituted a municipality in 1899 and was for a time under the joint supervision of the British, American, and German consuls. Its population in 1910 was about 1450, of whom about 400 were Europeans. Apia is the seat of a United States consulate. See SAMOAN ISLANDS.

A'PIA'CEÆ. See UMBELLIFERÆ.

A'PIA'NUS, PETRUS (1501–52). A German astronomer and geographer, born at Leisnig, Saxony. His name was Peter Bennewitz, or Bienewitz (*Biene* is German for bee, which in Latin is *apis*—whence his adopted name). He was, from 1527, professor of mathematics at Ingolstadt and was celebrated as a mathematician, astronomer, and general savant, and especially as a cosmographer. He was the inventor of a number of philosophical instruments, and some of the earliest maps of America were printed by him. The best known among his writings is the *Cosmographia* (Landshut, 1524; Antwerp, 1529).

APICES, ăp'ĭ-sēz. See NUMERAL.

APICIUS, ă-pĭsh'ĭ-ŭs, MARCUS GABIUS. A Roman epicure, who lived in the time of Augustus and Tiberius and was celebrated for his luxurious table and his acquirements in the art of cookery. When, by the gratification of his favorite indulgence, he had consumed the greater part of his fortune, and had only some $400,000 left, he poisoned himself, in order to avoid the misery of plain diet. Two other gourmands—one in the time of Pompey, the other in the reign of Trajan—are mentioned under the name Apicius. The Roman cookery-book, *Cœlii Apicii de Re Coquinaria*, ascribed to Apicius, belongs to a much later time, as it abounds in inaccuracies and solecisms. It is edited by Schuch (Heidelberg, 1867).

AP'ICUL'TURE. See BEE-KEEPING.

APINUS, ä-pē'nus, FRANZ MARIA ULRICH THEODOR (1724–1802). A German physicist, born at Rostock. He devoted himself to the study of medicine and the exact sciences, and in 1757 he was appointed professor of physics at St. Petersburg. He is chiefly remembered for his extension of Franklin's electrical theory, but also published valuable works on various other branches of the physical sciences, including a work *On the Distribution of Heat at the Surface of the Earth* (1762).

A'PION (Gk. Ἀπίων). An Alexandrian grammarian of the first century A.D. He was born in the Oasis in the Libyan Desert, but came early to Alexandria, where Didymus (q.v.) received him into his house. He became a pupil of the grammarian Apollonius and Euphranor and eventually succeeded Theon as head of the Alexandrian school. (See ALEXANDRIAN AGE.) He traveled much in the cities of Greece, lecturing on Homer, whereby he gained great renown, but more from the brilliancy of his manner than from the value of the matter presented. His journeys extended to Rome, where his boastful nature won him from the Emperor Tiberius the nickname *cymbalum mundi* ('the cymbal of the universe'). The Alexandrians gave him citizenship; later, as leader of the anti-Jewish party, he was sent during the reign of Caligula at the head of an embassy to Rome to oppose the Jewish delegation led by the philosopher Philo. Josephus's tract, *Against Apion*, answering charges made on this occasion, is one of our chief sources of knowledge in regard to him. In the reign of Claudius Apion lived and taught at Rome. His chief writings were a comprehensive work, in five books, on the history and civilization of Egypt, which contained the famous story of Androcles (q.v.) and the Lion, preserved by Aulus Gellius (v, 14), and the tale of the love of a dolphin for a beautiful boy, also preserved by Gellius (vi, 8); and a Homeric glossary, which has been thought to be identical with that in the appendix to the *Etymologicum Gudianum*, p. 601, ed. Sturz (Leipzig, 1818), though probably without good reason. The scanty fragments of his historical works are collected by K. and Th. Müller, *Fragmenta Historicorum Græcorum*, vol. iii, pp. 506–516 (Paris, 1868–74).

A'PIOS TU'BERO'SA. See GROUND-NUT.

A'PIS (Gk. Ἄπις). A sacred bull worshiped at Memphis by the ancient Egyptians. His Egyptian name, *Hap*, is of uncertain etymology. Originally he may have been an independent local divinity, but in historical times he appears as the sacred animal of the god Ptah of Memphis. Later he was considered as an incarnation of Osiris, of Sokaris, or even of the sun; but usually he was, through a false etymology, associated with the Nile (*Ha'pi*). According to Greek accounts, he was not allowed to live longer than 25 years, and if he survived his allotted time was secretly drowned in a well. The bodies of the Apis bulls were carefully embalmed and were buried in subterranean rock-hewn tombs, in the Serapeum at Memphis (not to be confounded with the famous Serapeum of Alexandria), where Apis, under the name Serapis (a combination of Osiris and Apis), was worshiped as the patron of the dead. Three tombs, with numerous Apis mummies, were discovered by Mariette in 1851. After the death of an Apis bull, the country was searched, sometimes for years, until another was found bearing the sacred marks. As to the precise nature of these marks, traditions vary widely. The animal, however, must be black, with certain white spots, and a peculiar knot under the tongue. When found, he was solemnly conducted to Memphis and installed in the temple with great festivities. The day of his installation and that of his birth were celebrated annually, and oracles were derived from his movements and from the

nature of his appetite. Even the cow which had become the mother of an Apis bull received divine honors. The sumptuous worship of this animal seems to have impressed the Greeks as more remarkable than that of any other sacred animal. For illustration, see EGYPT.

AP'LACOPH'ORA. See AMPHINEURA.

AP'LANAT'IC LENS (not wandering, from Gk. ἀ, *a*, priv. + πλανᾶσθαι, *planasthai*, to wander). An achromatic lens corrected for spherical aberration (q.v.), so that all rays of light which emanate from one point and pass through the lens are focused at a point. The construction and correction of photographic lenses are fully described, from the technical standpoint, in Otto Lummer's *Photographic Optics*, translated by Silvanus P. Thompson (New York, 1900). See LIGHT; LENS.

APLITE. See GRANITE; ALASKITE.

APNŒA (Gk. ἄπνοια, from ἀ, *a*, priv. + πνεῖν, *pnein*, to breathe). Partial or complete suspension of respiration. It takes place when the blood is too highly oxygenized and fails properly to stimulate the respiratory centres. See also ASPHYXIA; DYSPNŒA.

APOC'ALYPSE. See REVELATION.

APOC'ALYP'TIC LIT'ERATURE' (Gk. ἀποκαλύπτειν, *apokalyptein*, to uncover, reveal). The designation of certain prophecies and revelations of Jewish and Christian authorship dating from about 200 B.C. to about 150 A.D. Their general subject is the problem of the final triumph of the Kingdom of God. The Jewish apocalypses profess to reveal the future glory of Israel, i.e., the divine vengeance on her enemies and oppressors and her enjoyment of an era of wonderful happiness. In the earlier apocalypses the new age is to be realized on earth and by the righteous only. The judgment on the wicked will be a physical one, by war, pestilence, and death, and the holy land and city will be the special objects of divine favor. In the later works more interest is taken in the transcendental world of spirits, angels, heaven, and hell. In some apocalypses a personal Messiah as the central figure of the new age is very prominent; in others he holds a secondary place or is not considered at all. Alterations and interpolations by Christian hands, making the alleged predictions point more definitely to Jesus, gave certain of these Jewish works a very wide circulation in the early Church.

The purpose of these works, all written in times of trial and disaster, was to vindicate God's ways to the faithful, who were sorely tried by the apparent triumph of the wicked, i.e., the heathen nations without and the irreligious within Israel. The fundamental ideas represented are those of the Pharisaic Judaism of the more popular, non-scholastic type—legalistic indeed, but full of passionate earnestness. This literature is mostly pseudepigraphic. The revelations and predictions are set forth as though actually received and written or spoken by ancient worthies, as Enoch, Moses, etc. But it is not difficult, in many cases, to see that the pretended prediction is but the résumé of past history. Where the pseudo-prophecy ends and the attempt at prediction really begins, the author is seen to be dealing with his own times, and the date of the work is thus betrayed.

The tone of these works is one of such assurance that they were once widely accepted as genuine prophecies, and found a warm reception in Jewish and early Christian circles. In time most of these works came to be looked upon with disfavor, except in the less enlightened circles of the Christian Church. Though all were originally written in Hebrew, Aramaic, or Greek and all once circulated in a Greek form in the early Church, several of the most important are known to-day only in such translations as the Ethiopic or Syriac, and many others have utterly perished. This literature is of the highest value to-day because of the light it throws on the growth of eschatological and Messianic doctrines among the Jewish people just previous to the rise of Christianity, especially since these doctrines have, in a purified form, found a permanent place in the Christian system.

The extant Jewish apocalypses are the following: 1. *The Book of Daniel*, composed about 165 B.C. (See DANIEL, BOOK OF.) 2. *The Book of Enoch.* A compilation from at least five different Enoch books. The earliest of these goes back to the Hasmonæan period. Of greatest importance for the history of the Messianic hope is the book called "The Parables of Enoch" (chaps. xxxii–lxxii of the whole collection). Concerning the date of this book there is as yet no consensus of opinion among scholars. It also contains extensive interpolations from an apocalypse of Noah. (See ENOCH, BOOK OF.) It contains much about angels and supramundane matters. The book is quoted in Jude 14. 3. Another Enoch book, *The Secrets of Enoch*, composed c.50 A.D., is now extant only in a Slavonic translation. 4. *The Sibylline Oracles.* Jewish imitations of the utterances of the heathen Sibyls. The present collection in 14 books represents the growth from beginnings made by Hellenistic Jews in the second century B.C. The later portions are by Christian hands. The oldest and most important parts are in book iii, lines 97–828. These oracles were highly esteemed and frequently quoted by the early Church Fathers. 5. *The Psalms of Solomon.* A collection of 18 patriotic and religious psalms, written originally in Hebrew some time after Pompey had made Judæa subject to Rome (63 B.C.). Until recently these were known only in a Greek translation, but in 1909 Rendel Harris published a Syriac translation of Psalms i–xvii. The apocalyptic element in these is very small. Psalm xvii contains strong Messianic hopes. These psalms are interesting for comparison with the early Christian hymns in Luke i and ii. 6. *The Book of Jubilees.* A revelation made to Moses of the course of events from Adam to Moses's own day. The history is divided into 50 periods of 49 years each; hence the name of the book. The outline is that of Genesis, but great liberties are taken with the text. The patriarchs are made the exponents of the writer's strict Pharisaic views and hopes. The book was written probably between 135 and 105 B.C. 7. *The Testaments of the Twelve Patriarchs.* The dying exhortations of the twelve sons of Jacob to their children. Each testament deals with some virtue or fault which the patriarch exemplified in his life and also contains predictions relating to the future of his descendants. These predictive portions have been largely worked over by Christian hands. The original Jewish work was composed about 109 B.C. by an ardent partisan of the rule of the Maccabæan priest-princes. It was later revised by an opponent of these princes about 70–40 B.C. 8. *The Assumption of Moses*, or *Testament of Moses*,

was written shortly after the death of Herod (4 B.C.). It gives the parting communications of Moses to his successor, Joshua, in which he unfolds the course of Israel's history down to the time of the successors of Herod, after which the writer claims that the Messianic age will come. 9. *The Apocalypse of Baruch.* One of several *Baruch* books once current in Jewish circles. It contains material of different dates from 50 to 90 A.D., and illustrates the Messianic hopes of Pharisaic Judaism just before and after the fall of Jerusalem, 70 A.D. On this account it is one of the most important of apocalyptic works. 10. *Fourth Esdras* (*Second Esdras* in the English Apocrypha of the Old Testament) contains seven alleged visions of Ezra, the famous scribe. His grief over the hard fate of Zion is relieved by the revelation of the coming Messianic era and punishment of the wicked. The book was written by a Jew, probably about 81–96 A.D., but has been slightly revised and added to by Christian hands. The work is also important because of its profoundly theological character in its serious and almost despairing grapple with the problems of sin and its consequences. For a complete list of Jewish Apocalypses, of which the titles alone remain, see Schürer, *History of the Jewish People in the Times of Jesus Christ*, §§ 32–33.

Of the Christian Apocalypses the most important is the canonical *Book of Revelation* (q.v.). Other less important ones are: *The Apocalypse of Peter*, of which a small fragment has recently been discovered treating of the place of eternal punishment. *The Apocalypse of Isaiah*, which treats of the history of the Church to the Neronian persecution, after which the final age is to appear. *The Shepherd of Hermas*, composed by Hermas, brother of Pius, Bishop of Rome c.150.

In the foregoing article no mention has been made of the very large number of apocalyptic writings of distinctly Christian origin which were produced from the second century onward, to satisfy an unhealthy craving for the occult and marvelous or to embellish the stories of the saints.

Bibliography. Deane, *Pseudepigrapha* (New York, 1891); Schürer, *History of the Jewish People in the Times of Jesus Christ*, §§ 32–33 (trans., New York, 1885–91); article "Apocalyptic Literature" in the *Encyclopædia Biblica* (New York, 1899). For English readers the most valuable editions of the Jewish Apocalypses are those by R. H. Charles (of all but Nos. 4, 5, and 10), and *The Apocrypha and Pseudepigrapha of the Old Testament* (ed. by Charles, Oxford, 1913).

APOCALYPTIC NUMBER, THE. The mystical number which is given in Rev. xiii. 18 as the designation of the beast of the ten horns and seven heads (v. 1), and which, in the accepted text, reads "six hundred and sixty and six."

Many interpretations of this number have been given by *Gematria* (q.v.). In view of the fact, however, that the author of the book, as is evident from the context, intended to represent some powerful and hostile personality in his own time whose identity was to be recognized by the circle of readers to whom he was writing, but hidden to all others, the interpretations can be largely reduced. The one most generally accepted and perhaps most probable is that—on the basis of the Hebrew numerical alphabet, which contains no characters for *e* or *a*—the author intended to represent Nero—

N (e)	R	O	N	K (e)	S (a)	R	
50	200	6	50	100	60	200	666

It is claimed, however, that there is variant reading for the text that gives the number "six hundred and sixteen," which, on the basis of the Greek numerical alphabet, would represent Gaius (Caligula)—

G	A	I	O	S	K	A	I	S	A	R	
3	1	10	70	200	20	1	10	200	1	100	616

In confirmation of this second reading, it is urged that an author writing for Greek readers would be more likely to use the Greek alphabet, with which they were familiar, than the Hebrew, with which they were unacquainted. But it is to be noticed that in ix. 11, a Hebrew as well as a Greek word is used for the mystical idea the author has in mind (" . . . the angel of the abyss, in Hebrew called Abaddon, and Greek Apollyon"), and xvi. 16, a Hebrew word alone, (". . . the place which is called in Hebrew, Har-Magedon"). It is not impossible, therefore, that Hebrew letters were intended to be represented by the number here given. In fact, the variant reading may have quite naturally come from the voluntary omission by copyists of the second *n* of *Neron* in the first reading, Nero being the more familiar form. See ANTI-CHRIST; REVELATION OF SAINT JOHN.

APOCALYPTIC WRITINGS. See APOCALYPTIC LITERATURE; APOCRYPHA.

AP'OCATAS'TASIS (Gk. ἀποκατάστασις, *apokatastasis*, restoration). A word found in Acts iii. 21 (compare Rom. viii. 21, Eph. i. 9, 10, Col. i. 19). It has been interpreted by some as pointing to the final salvation of all men and has been employed as a technical term with this signification. See UNIVERSALISM.

AP'OCHROMAT'IC LENS. See MICROSCOPE.

APOC'RYPHA (Gk. ἀπόκρυφος, *apokryphos*, hidden, concealed, from ἀπό, *apo*, away + κρύπτειν, *kryptein*, to hide). A term used to designate books that are not regarded as canonical, though they have been read, cherished, and often quoted as Scripture in synagogue and church. As to the origin of this term, it is not certain whether it is a translation of the Hebrew word *genuzim* or came into vogue because it had already in Greek been used for "secret" books. The verb *ganaz* means 'to store away,' 'to withdraw from use,' and the root idea suggests that it is something precious that is hidden. Worn-out scrolls of the law were removed to the Genizah. But books that were not considered to possess such a sanctity that they required a ceremonial washing after contact with them were also stowed away, removed from public use. Thus the term is used in connection with the process by which the canon was reduced to its final form; the sages intended to "withdraw" Ecclesiastes, they actually decided to "withdraw" Ecclesiasticus. Many books that were in this manner withdrawn were particularly cherished in some circles, because they were regarded as containing the secrets of the universe and of the future. Fourth Esdras makes a distinction among the books given by divine inspiration; 24 are intended for the wise and the foolish, the rest are secretly handed over to the wise (xiv. 26, 46). But these treasures, so dangerous to the peaceful

development of the people, were withdrawn by the sages; even Daniel was relegated from "the prophets" to the third group, "the writing." It seems probable that 'to remove,' 'to withdraw,' is a secondary meaning, and that the original meaning was 'to treat as a treasure,' 'to cherish,' 'to hold as a precious secret.' This then approaches the significance of the word in the title of a Leyden magical papyrus "The Sacred Apocryphal Book of Moses Called the Eighth or Holy Book," "The Apocryphal Books of the Phœnicians" from which Pherecydes of Syros is said by Suidas to have learned his wisdom, and "The Apocryphal Books of Zoroaster," of which, according to Clement of Alexandria, the Gnostic Prodicus had a copy. Unfortunately, we do not know whether any of these titles is earlier than the appearance of the term *ganaz* in Hebrew writings, or what expressions were used by the Essenes and the Therapeutæ to designate their hidden books. After the final establishment of the Hebrew canon, many works that had been secluded, or otherwise were not approved, were simply referred to as "the outside books." To some such writings, found in the Greek Bible, but not in the Hebrew, Jerome applied the term "apocrypha," and the same designation actually came to be used of books that in the formation of the New Testament canon were left outside.

From the standpoint of ecclesiastical usage there is a number of books that forms a distinct group and has held a peculiar position. It is composed of (1) *Ecclesiasticus*, or the Wisdom of Jesus, son of Sirach, (2) *Wisdom of Solomon*, (3) *Baruch* with the *Epistle of Jeremiah*, (4) *Tobit*, (5) *Judith*, (6) *1 Maccabees*, (7) *2 Maccabees*, and (8) some sections of *Esther* and *Daniel* found in the Greek text, but not in the Hebrew or Aramaic. These had a place in the Greek Bible and all its daughter versions as well as in the Latin Vulgate, were read as Scripture in the early Christian Church and throughout the Middle Ages, were declared by the Council of Trent, at its fourth session, in 1546, to be "inspired and canonical," and are so held by the Roman Catholic church and some of the Greek and Oriental churches. A certain distinction is recognized between them and the books in the Hebrew Bible, but only in time, not in degree of inspiration or canonical authority; and they are now, as in the past, often referred to by Roman Catholic scholars as "deuterocanonical." On the other hand, the Protestant churches since the Reformation, the Greek Orthodox church of Russia, at least since the latter part of the eighteenth century, and some other churches under Protestant influence have declared them to be "apocrypha" and denied their inspired and authoritative character. The reformers kept them in their Bibles and recommended them for purposes of edification, though not for "the establishment of doctrine," and until the eighteenth century it was customary to give them a place between the Old and New Testaments. But the struggle concerning the canonicity of these books led to their rejection, so that the great Protestant Bible Societies no longer publish Bibles containing them. The Church of England is alone in not rejecting their use in worship. At the present time, however, there is a revived interest in them, and they are being made more accessible to Christians in Protestant countries. Each of these books is discussed in a separate article, and for the question as a whole see Deuterocanonical Books. Aside from the books whose canonicity was decided by the Council of Trent there are some found in the Greek or Latin Bibles which are often included by Protestants with what they call Apocrypha. Such are *1 Esdras*, also called *3 Esdras*, which appears to be only another and possibly an earlier Greek translation of our Hebrew Ezra, (2) *2 Esdras*, also called *4 Esdras*, an apocalypse found in Latin and various other versions, originally written in Aramaic, and (3) *The Prayer of Manasses*, originally an addition to 2 Chronicles. Except in some of the Oriental churches, these are not now regarded as canonical, and fall under the head of apocrypha. If the term "deuterocanonical" is used, as seems proper, for the books so designated by Roman Catholic scholars, there is no need of employing the term "pseudepigrapha" for what they call "apocrypha." Pseudepigraphy, a wrong claim or tradition in regard to authorship, is not a distinguishing characteristic of this literature. The apocrypha are divided into two classes according to their Jewish or Christian origin.

I. Old Testament Apocrypha. We possess several lists of apocrypha drawn up in the ancient Church, such as the Stichometry of Nicephorus, the Athanasian Synopsis, a catalogue published by Montfaucon, an enumeration in the Apostolical Constitutions, and the Gelasian Decree; and many works are referred to by patristic writers. Of these some have come down to us, in whole or in part, while others have not yet been recovered. They may be divided into historical legends, testaments, apocalypses, philosophy, and poetry. Among the legends mention should be made of *The Life of Adam and Eve* (see Adam, Books of); *The Book of Jubilees* (q.v.); *The Martyrdom of Isaiah*, which has been preserved in the first part of the Ethiopic book *The Ascension of Isaiah;* the Story of the Three Pages in *1 Esdras; The Prayer of Manasses; The Letter of Aristeas to Philocrates* (see Aristeas); the stories told in the fragments of *Artapanus* (q.v.) and *Eupolemus* (q.v.); *3 Maccabees*, a story of the wonderful deliverance of the Jews in Alexandria in the time of Ptolemy IV Philopator (221–205 B.C.); *The Story of Aseneth*, the wife of Joseph; and such later works as *The Book of Jasher* (q.v.), *Josippon* (q.v.), *The Contradictio Salomonis*, a contest in wisdom between Solomon and Hiram; the *Liber Antiquitatum Bibliarum*, ascribed to Philo; *The Chronicles of Jerahmeel* (q.v.). Among the testaments the most important are: *The Testament of Abraham*, preserved in Greek and Slavonic; *The Testaments of Isaac and Jacob*, preserved in Arabic and Ethiopic; *The Testaments of the Twelve Patriarchs*, preserved in Greek, Armenian, and Slavonic, probably dating from the second century B.C.; *The Testament of Naphtali*, preserved in a later Hebrew translation; *The Testament of Job*, preserved in Greek (see Job, Testament of); *The Testament of Moses*, probably preserved, as Moore has suggested, in the part of *The Assumption of Moses* now extant in a Latin translation; *The Testament of Solomon*, translated by Conybeare in *Jewish Quarterly Review* (1899); and *The Rest of the Words of Baruch* or the *Paralipomena Jeremiæ*, preserved in Greek and Ethiopic. Among the apocalypses there are: *The Book of Enoch* (q.v.), preserved in Ethiopic and partly in Greek; *The Sibylline Oracles*, in Greek; *The Assumption of Moses*, preserved in

part in Latin; the *Syriac Apocalypse of Baruch* (see BARUCH); *The Greek Apocalypse of Baruch* (see BARUCH); *The Secrets of Enoch*, preserved in Slavonic; *4 Esdras*, or *The Apocalypse of Ezra*, preserved in Latin, Syriac, Ethiopic, Arabic, and Armenian (see EZRA, APOCALYPSE OF); *The Apocalypse of Elijah*, preserved in the Coptic and published by Steindorff in 1899; *The Apocalypse of Zephaniah*, preserved in Coptic and published by Steindorff in 1899; *The Prophecy of Eldad and Modad*, quoted by Hermas (ii, 34); and *The Book of Og the Great* and *The Penitence of Jannes and Jambres*, referred to in the Gelasian Decree. As late as in the twelfth century an *Apocalypse of Daniel* appeared, in which there is a distinction between the Messiah, son of David, and the Messiah, son of Joseph, which is discussed by Darmesteter in *Mélanges Rénier* (1887). *Fourth Maccabees* is a philosophical treatise on "The Supremacy of Reason." It is in Greek and has been wrongly ascribed to Josephus. The most important collection of apocryphal hymns of Jewish origin are those found in *The Psalter of Solomon*. These hymns, 18 in number, were originally written in Hebrew. They were composed about the middle of the first century B.C. and have been preserved in Greek and, except the last, in Syriac. Five other psalms preserved in Syriac have been published by Wright in *Proceedings of the Society of Biblical Archæology* (1887). One of them is identical with the additional Psalm cli in our Greek Bibles. Since most of this literature has passed through Christian hands, there are, especially in the apocalypses, occasional Christian interpolations. See also APOCALYPTIC LITERATURE.

II. New Testament. The New Testament apocrypha include numerous works purporting to have been written by apostles or their associates, but not able to secure a general or permanent recognition. These may be classified thus: (*a*) Gospels; (*b*) Acts of Apostles; (*c*) Epistles; (*d*) Apocalypses; (*e*) Didactic Works; (*f*) Hymns.

(*a*) Apocryphal gospels may be divided into several groups. 1. Those dealing with the nativity and childhood of the Virgin Mary, and the birth, infancy, and childhood of Jesus. Probably the earliest of these is the *Protevangelium of James*. It is but an enlargement of the nativity narratives in the canonical Matthew and Luke, and may have been written in the second century. Closely connected with the *Protevangelium* is the *Gospel of Thomas*, which treats of the childhood of Jesus. He is represented as even then working miracles and as fully conscious of his divine mission. This work was much used by Gnostics. It is to be dated not later than 150 A.D. The matter contained in these two works was combined with additions and variations in the later *Nativity of the Virgin Mary*, ascribed to Matthew. A still later form of the same material is found in the so-called *Arabic Gospel of the Infancy*, which devotes much space to the experiences of the Holy Family in Egypt. In *The History of Joseph the Carpenter* Jesus is represented as telling his apostles of his mother's betrothal, of his own birth, and, more particularly, of the last sickness and death of Joseph. 2. There is a second group of writings treating of the passion and post-mortem experiences of Jesus. *The Gospel of Nicodemus* is a late compilation of two earlier and altogether separate works, *The Acts of Pilate* and *The Descent of Christ into Hades*. *The Acts of Pilate* is probably the older, but in its present form an enlargement of the reputed official acts or reports of Pilate, to which reference is made by Justin Martyr (c.150 A.D.). The second work is mainly an imaginary narrative represented as having been told by two men raised from the dead at the time of the crucifixion (compare Matt. xxvii. 52–53). 3. More important than these are the gospels of the same type as those in the New Testament canon. *The Gospel according to the Hebrews*, probably the same as the *Gospel of the Nazarenes*, was one of the earliest gospel-books. It was probably a secondary form of the Aramaic original of our canonical Greek Matthew, written perhaps as early as 100 A.D. for the use of the Aramaic-speaking Christians of Palestine and Syria. The later Jewish-Christian sect of the Ebionites had a gospel called *The Gospel of the Twelve*, written in Greek, probably not earlier than 200 A.D. *A Gospel of the Egyptians* was in existence in the latter half of the second century. It was probably used in the country districts of Egypt. 4. Other gospels claimed apostolic authorship. The most important of these is the *Gospel of Peter*. Serapion, Bishop of Antioch, 190–211 A.D., discovered that this work was in use among the Christians of his diocese. Its use was neither approved nor severely condemned by the orthodox Bishop. A large fragment of this gospel was discovered in Egypt in 1885 and published in 1892. Though written early, certainly in the second century, it seems never to have been used as an authoritative gospel in the regular Church service. *A Gospel* or *Traditions of Matthias* (another name for Zacchæus, the publican), was known to Origen. This, with a *Gospel of Philip*, was used by Egyptian Gnostics. Other gospels of similar character were circulated under the names of Andrew, Barnabas, and Bartholomew. 5. Other forms of gospel material were in circulation in early times. Sayings of Jesus not contained in any known treatise are met with occasionally, such as the very interesting collections of Logia discovered at Oxyrrhyncus in Egypt. (See AGRAPHA.) 6. In addition to the above there were gospels of an avowedly heretical type. Of these, the *Gospel of Basilides*, written by the famous Gnostic for the use of his disciples, and *Marcion's* Gospel, which appears to have been a form of our Gospel of Luke, were the most important.

(*b*) Apocryphal acts of apostles. The beginning of this literature is traditionally connected with the name of Leucius Charinus. Whether he is an historic personage is gravely doubted by many scholars. He is accredited with having composed the *Acts* or *Travels* (Περίοδοι) of the Apostles *Peter*, *John*, *Thomas*, *Andrew*, and *Paul* (each apostle treated separately). In these *Acts* certain Gnostic tendencies were manifest, such as a mystic doctrine of the Cross and those ascetic teachings that exalt celibacy as a form of higher life. Later works of like character were the *Acts of Matthew*, *of Bartholomew*, and *of Philip*. On this originally Gnostic basis, by expurgation or abbreviation of objectionable material, or by rewriting, yet using the same outlines, a series of Catholic Acts was produced, written from a more orthodox standpoint. A secondary form of the same literature is the so-called Abdias collection of *Martyrdoms* (*Passiones* and *Virtutes*) of the several apostles

and their companions (sixth century). The most important and extensive of these *Acts* are *The Acts of John* and *The Acts of Judas Thomas*, the Apostle to the Indians.

(*c*) Of apocryphal epistles, the most famous is the *Correspondence between Abgar, King of Edessa, and Jesus*. Apocryphal Pauline epistles were: 1. An *Epistle to the Laodiceans*, on the basis of the hint in Col. iv. 16. 2. An *Epistle to the Alexandrians* mentioned as early as c.170 A.D. 3. A *Third Epistle to the Corinthians*. These are imitations of the Pauline letters in the New Testament. 4. *Correspondence between Seneca and Paul* in 14 letters (at least as early as the fourth century).

(*d*) Apocryphal apocalypses. Of these *The Apocalypse of Peter* is the most important, a small fragment of which was discovered with the fragment of the *Gospel of Peter*. The work was in existence as early as 175 A.D. and highly esteemed in some quarters. To this class belong also the *Vision of Hermas* and the Christian *Sibylline Oracles* (q.v.). *The Apocalypse of Paul, The Vision of Paul, The Apocalypse of the Virgin Mary* and other like works are late and less important.

(*e*) Didactic works. *The Preaching* (*κήρυγμα*) *of Peter* was written very early, possibly before 100 A.D. It was perhaps also known as the *Didascalia* or *Doctrine of Peter*.

(*f*) Hymns. The discovery in 1909 by J. Rendel Harris of the *Odes of Solomon* has given us the only large collection of early Christian hymns. In the Syriac text Odes iii–xlii have been preserved. They were probably written in Greek, somewhere in northern Syria, in the second century A.D. (See SOLOMON, ODES OF.) For other works sometimes classed as New Testament apocrypha, see APOSTOLIC FATHERS; CLEMENTINA; BARNABAS, ACTS AND EPISTLE OF; HERMAS, SHEPHERD OF; TEACHING OF THE TWELVE APOSTLES.

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AP'OCYNA'CEÆ (Gk. *ἀπό, apo*, away from + *κύων, kyōn*, dog). The DOGBANE FAMILY. A family of dicotyledonous plants, the species of which are herbs, shrubs, vines, and trees, mostly with a copious, milky juice. The leaves are mostly opposite, entire, and without stipules. The flowers are five-parted; ovary single. Fruit, a follicle or drupe; seed often covered with a thistle-like down. There are about 130 genera and more than 1000 species in this family, the principal subdivisions of which are: ARDUINEÆ, represented by *Arduina* and *Landolphia;* PLUMERIEÆ, containing the tropical genus *Tubernæmontana*, and *Aspidiosperma, Vinca*, and *Alstonia;* and ECHITIDEÆ, which embraces *Kickxia, Apocynum, Nerium*, and *Strophanthus*. The properties of plants of this family vary greatly, but many are exceedingly poisonous. Some, like *Kickxia* and *Landolphia*, are rich in caoutchouc; *Apocynum* yields valuable bast fibre, and its rhizomes are used in medicine; *Strophanthus* contains in its seed a powerful poisonous alkaloid; while others have varied economic uses. See PERIWINKLE; OLEANDER; INDIAN HEMP; RUBBER; STROPHANTHUS; DOGBANE; WRIGHTIA; POISONOUS PLANTS; ETC.

APOCYNUM, ă-pŏs'ĭ-nŭm. A genus of plants. See DOGBANE.

APOCYNUM, ă-pŏs'ĭ-nŭm. A drug composed of the powdered root of *Apocynum cannabinum*, Canadian hemp. Its taste is acrid and bitter. It contains a bitter principle, apocynine, gallic and tannic acids, etc. Its active ingredients are soluble in water and alcohol. Moderate doses increase the secretions of the skin, bronchi, and kidneys. Large doses cause vomiting and purging. The chief use of apocynum is as a diuretic, especially in dropsy. See APOCYNACEÆ; DOGBANE.

APODES, ăp'ō-dēz (Gk. *ἀ, a*, priv. + *πούς, pous*, foot). An order of teleost fishes, variously limited, including the eels (not the electric eel), murænas, and allied serpentiform species. Consult T. Gill, *Standard Natural History*, vol. iii, p. 100 (Boston, 1885) and Jordan, *Fishes*, p. 364 (New York, 1907). See EEL.

AP'ODIC'TIC (Gk. *ἀποδεικτικός, apodeiktikos*, demonstrating, -ive). A logical term signifying necessary, and applied to judgments, which admit of no contradiction. It is used largely by Kant. See A PRIORI.

APOG'AMY (Gk. *ἀπό, apo*, away from + *γάμος, gamos*, a wedding). A name which refers to the fact that a plant which ordinarily comes from a fertilized egg may, under certain conditions, develop in some other way. In all plants, except the very lowest, there are two plants in each life-cycle: a sexual plant and a sexless one, each producing the other. (See ALTERNATION OF GENERATIONS.) Apogamy is a general term, used to cover all cases in which the sexless plant does not come from a fertilized egg, without reference to the method of its origin. "Parthenogenesis" is that form of apogamy in which a plant is developed from an egg that has not been fertilized. In other cases of apogamy the new plant is developed in a vegetative way from various other tissues, such an origin being distinguished as "vegetative

apogamy." The phenomenon of apogamy has been observed chiefly among the ferns, which seem to respond most readily to the conditions which favor it. Numerous cases have now been observed (both among native and cultivated forms), in which the leafy plant (sexless) arises in various ways directly from the prothallium (sexual), without the fertilization or even the production of an egg. Among the mosses apogamy has never been observed; that is, there is no reason to believe that the spore-bearing structure (sexless plant) ever has any other origin than a fertilized egg. Among the seed-plants the phenomenon has been recorded in a number of cases, and has often been wrongly referred to parthenogenesis. So far as the records go, parthenogenesis has been established in comparatively few seed-plants. In various other cases, however, in which embryos are known to arise in seeds which have received nothing from the pollen, it is discovered that the embryo is not developed by the unfertilized egg, but arises vegetatively from various tissues of the ovule, just as a bud may develop almost anywhere upon a plant. The fact that a seed contains an embryo is no sure indication that this embryo has developed from the egg.

AP'OGEE (Gk. *ἀπό, apo,* from + *γῆ, gē,* earth). When the earth and some other planet reach such positions in their respective orbits that the distance between them is a maximum, then that planet is said to be in its apogee. The use of the word "apogee" is usually restricted to the sun and moon, the sun's apogee corresponding to the earth's aphelion, and the moon's apogee being the point of its orbit most remote from the earth. Apogee is opposed to perigee.

AP'OGEOT'ROPISM, or NEGATIVE GEOTROPISM. That form of sensitiveness to gravity in plants by virtue of which organs tend to grow vertically upward—that is, in a direction opposite to that of the earth's attraction. The best example of this phenomenon is found in the main shoots of most plants. When "centrifugal force" is brought to bear upon the plant in place of gravity, the stems of seedlings grow toward the centre of revolution, while the roots being positively geotropic, grow in the opposite direction. See GEOTROPISM IN PLANTS.

APOLDA, ä-pōl'dä. A town of the grand duchy of Saxe-Weimar, Germany, near the Ilm, a feeder of the Saale, 8 miles northeast of Weimar (Map: Germany, D 3). It is a station on the Thuringian Railway, between Weimar and Weissenfels, and a place of much industrial activity, having extensive manufactures of hosiery and woven goods, boilers and engines, and bell foundries. Pop., 1895, 20,798; 1900, 20,352; 1905, 21.262; 1910, 22,592.

AP'OLIS'TA. A small tribe of Indians, whose language constitutes them a distinct linguistic stock, originally inhabiting the valley of the Apolo (whence the name), an affluent of the Rio Beni, in northern Bolivia, northeast of Lake Titicaca. They now live just north of the Lecos. Consult the writings of Armentia, Ballivian, Cardûs, etc. De Créqui Montfort and Rinet, in a monograph on the Apolista or Lapaču language in *Zeitschrift für Ethnologie,* vol. xlv, pp. 512–531 (1913) seek to prove it "a moribund Arawak dialect."

APOL'LINA'RIS (?–392). The younger, Bishop of Laodicea in Syria, and one of the warmest opponents of Arianism. Both as a man and a scholar he was held in the greatest reverence, and his writings were extensively read in his own day. His father, Apollinaris the elder, who was Bishop of Laodicea, was born at Alexandria, and taught grammar, first at Berytus, and afterward at Laodicea. When Julian prohibited the Christians from teaching the classics, the father and son endeavored to supply the loss by converting the Scriptures into a body of poetry, rhetoric, and philosophy. The Old Testament was selected as the subject for poetical compositions after the manner of Homer, Pindar, and the tragedians; while the New Testament formed the groundwork of dialogues in imitation of Plato. But it was chiefly as a controversial theologian, and as the founder of a sect, that Apollinaris is celebrated. He maintained that the *logos,* or divine nature in Christ, took the place of the rational human soul or mind, and that the body of Christ was a spiritualized and glorified form of humanity. This doctrine was condemned by several synods, especially by the Council of Constantinople (381), on the ground that it denied the true human nature of Christ. The heresy styled Apollinarianism spread rapidly through Syria and neighboring countries, and, after the death of Apollinaris, its adherents formed two sects—the Vitalians, named after Vitalis, Bishop of Antioch, and the Polemeans, after Polemo, who added to the doctrine of Apollinaris the assertion that the divine and human natures were so blended as one substance in Christ that his body was a proper object of adoration. On this account they were accused of *sarcolatria* (worship of the flesh) and *anthropolatria* (worship of man) and also were styled *synousiastoi* (*σύν, syn,* together, *οὐσία, ousia,* substance), because they confused the two distinct substances. Other leaders were Valentinus and Timothy. Consult Harnack, *History of Dogma,* vols. iii, iv.

APOLLINARIS, SAINT. A citizen of Antioch, founder and bishop of the church of Ravenna. He was said to have followed St. Peter to Rome, where he was ordained. Tradition says he was martyred in Ravenna, after being bishop of that place for 26 years.

APOLLINARIS, SULPICIUS. See SULPICIUS APOLLINARIS.

APOLLINARIS SIDO'NIUS, CAIUS SOLLIUS (c.430–487 or 488). A Roman author, political leader, and Bishop of Arverna (Clermont-Ferrand), born at Lyons. He married in about 452 the daughter of Avitus, who was Emperor from 455 to 456. He was Prefect of Rome in 467, bishop in 472, and headed the national party against the Goths. In 474 he was imprisoned, but was later released and ruled his bishopric until his death. After his death he was canonized. He wrote nine books of letters of great historical value, and 24 poems, mainly panegyrical. The best edition of his work is in the *Auctorum Antiquissimorum,* vol. viii, in the *Monumenta Germaniæ Historica* (Berlin, 1887). Consult Hodgkin, *Italy and her Invaders,* vol. ii (Oxford, 1892), and Dill, *Roman Society in the Last Century of the Empire* (London, 1898).

APOLLINARIS WA'TER. An alkaline mineral water obtained from a spring in the valley of the Ahr, in Rhenish Prussia, which was discovered in 1851. Its pleasant taste and richness in carbon dioxide gas make it a valuable table water, recommended for dyspepsia and loss of appetite.

Its composition is:

Sodium carbonate	6.964	grains	in a pint
Magnesium "	2.751	"	"
Calcium "	1.900	"	"
Sodium chloride	2.743	"	"
Sodium sulphate	1.548	"	"
Sodium phosphate } Potassium salts }	Traces.		
Iron oxide with alumina	0.049	"	"
Silicic acid	0.099	"	"
Carbonic acid (free and semi-combined)	42.81	cub. in.	in a pint
Carbonic acid (combined)	12.44	"	"

APOL'LO. A borough in Armstrong Co., Pa., 25 miles (direct) northeast of Pittsburgh, on the Pennsylvania Railroad and on the Kiskiminetas River (Map: Pennsylvania, B 6). It is the centre of a coal-mining region and manufactures steel, lime, and woolen goods. Apollo was settled in 1790, laid out in 1816, and incorporated as a borough in 1848. Pop., 1890, 2156; 1900, 2924; 1910, 3006.

APOLLO (Gk. *Ἀπόλλων, Apollōn*, Doric for *Ἀπέλλων, Apellōn*). Next to Zeus, the most important and most widely worshiped divinity of Greece. Later antiquity identified Apollo with the sun, but in Homer the two are entirely distinct. As to the origin and the meaning of the name Apollo, there is no general agreement among scholars, though the weight of argument is slightly in favor of those who interpret it as 'he who wards off,' 'he who drives away' evil, from which conception it is easy to explain many of the varied forms of the Apollo cult. Thus Apollo is a god who heals diseases and purifies from moral defilement. So he was said to have purified Orestes (q.v.) for the murder of his mother, and so he was invoked to purify and cleanse entire communities afflicted by pestilence. In the same way his protection was extended to flocks and herds, as is shown by his epithet *Nomios*, and by the story of his serving as the shepherd of Admetus (q.v.), to the great increase of the flocks of that king. He also appears as protecting the grain from mildew, and as driving away field-mice, whence his surname *Smintheus;* as Apollo *Parnopios* he kept off the locusts (*πάρνοπες*). There are also traces of Apollo as a war god, who can drive away the enemy and who mingles actively in the fray; at the shrine in Amyclæ (q.v.), near Sparta, he appeared with a helmet and a lance. Nor is this view of the original conception of Apollo in any way inconsistent with his very obvious connection with the light. For that he was early connected with the sun is clear, from the celebration of his departure in the autumn to a distant land, and his return in the spring. Light is regarded as a healer and protector, the bane of evil spirits who love darkness. The light and heat, however, are not always beneficent, and Apollo thus appears as the sender of pestilence and as bringing sudden death with his unerring arrows. As a light-god, also, he is called Lycean and Lycian; these terms may be connected with the Latin *lux*, 'light.' The ancients connected them with the Greek word for 'wolf' (*λύκος, lykos*), and some good modern authorities consider Apollo as originally a herdsman's divinity in the form of a wolf. In a kindred view "Apollo was one outgrowth of the shepherd-god existing in each community, himself once a shepherd, protecting the sheep from wolves, patron of the music and the games that shepherds love." He is also styled Phœbus (*Φοῖβος*), the 'bright one,' the 'brilliant one.' Whatever may have been his early nature, the prominent conception of Apollo in historic times was as a god of prophecy and so of music and song. His most famous oracle was at Delphi (q.v.), but there were others at Delos; at the Ismenian sanctuary near Thebes; at Abæ, on the border of Phocis; at Patara, in Lycia; and at Claros, in Ionia, near Colophon. Apollo was also a god of colonization, and many Greek cities believed that their founders had been guided by Apollo in the form of an animal or bird.

As is natural in the case of a god so widely worshiped, the legends of Apollo are highly diversified, though the main features show considerable unity, due to the overpowering influence of the cults at Delphi and Delos, which made their versions canonical. He was the son of Zeus and Leto (Latona), born with his twin sister Artemis (see DIANA) on the island of Delos, which had hitherto floated on the sea, but now became fixed, and afforded a refuge for Leto, who had been driven from all other places by the wrath of Hera (see JUNO). After his birth the god hastened to Delphi and slew the dragon Python, who had pursued his mother during her sorrow. For other legends see ADMETUS; HYPERBOREANS; LAOMEDON; NIOBE. In Greece Apollo was not the god of any single race. The Ionians worshiped him as the ancestral god, Patroös; the great Dorian festival, Carneia (see GREEK FESTIVALS), was held in his honor. At Athens, at the Thargelia, in May, first fruits were offered to him, there were musical contests in his honor, and the city was purified by special rites that the ripened grain might escape his wrath. In Rome his worship was introduced from Greece at a comparatively late date. The earliest mention of a place of worship for Apollo is in 443 B.C., and it was not till 212 B.C. that the *Ludi Apollinares* were celebrated. Augustus greatly increased the honor of the god in gratitude for the victory of Actium (q.v.) (for Apollo's help of Augustus at Actium see Vergil, *Æneid*, viii, 704 ff.), and built him a splendid temple on the Palatine, with which a library was connected. The temple contained the celebrated statue of the god by Scopas.

The representations of Apollo in ancient art are almost innumerable. As Apollo Agyieus, or Apollo of the Streets, he was worshiped in the form of a conical stone. In general, two chief types can be distinguished. In the one Apollo appears as a nude youth, the ideal of youthful strength and beauty. This can be traced from the rude statues of archaic art, of Melos, Thera, and Orchomenus, through the Payne-Knight bronze, and the Choiseul-Gouffier marble in the British Museum, to the almost effeminate type of the Apollo Sauroctonos (the lizard-slayer) of Praxiteles, or the glorious divinity of the Apollo of the altar frieze from Pergamon (q.v.). The other type represents the god as clad in the long robe of the musician playing on the lyre, as he appears in the statue in the Vatican (see APOLLO BELVEDERE), which is probably a copy of the work of Scopas. The special attributes of Apollo are the bow and the quiver, the laurel and the lyre. Consult: Overbeck, *Griechische Kunstmythologie* (Leipzig, 1871–89); Wernicke in the Pauly-Wissowa *Realencyklopädie der klassischen Altertumswissenschaft* (Stuttgart, 1900); Farnell, *The Cults of the Greek States* (Oxford, 1896–1907).

APOLLO BELVEDERE, bĕl'vâ-dā'râ. A celebrated statue of antiquity, probably found

at Grotto Ferrata (less probably at Porto d'Anzio: see ANTIUM), and in 1503 placed in the Belvedere of the Vatican by Pope Julius II. The left hand and right forearm were restored by Montorsoli, a pupil of Michelangelo. The ægis (q.v.), which has been restored in the left hand, on the evidence of a bronze statuette, supposed to have been found in 1792, and now in St. Petersburg, is not known as an attribute of Apollo, nor is its presence in the statuette proved; further, the statuette has been pronounced by Furtwaengler (q.v.) a modern forgery. The significance of the statue cannot be surely determined. In one view the beautiful face expresses divine wrath and contempt. The god, clad only in the chlamys (q.v.), is moving forward against the powers of evil to rescue the distressed. Furtwaengler rejected this view and maintained that the right hand originally held a laurel branch wound with fillets, and that the presence of the quiver shows that the left raised the bow. The bow, he continued, marked Apollo as the "Far-Darter"; the laurel and the fillets referred to the propitiatory and cleansing power of Apollo. Thus the statue emphasizes two views of Apollo. This statue was once regarded as the highest type of Greek art, but it has long been known to be only a careful Roman copy, made about the beginning of the Empire, of a Greek original, which cannot well be earlier than the latter part of the fourth century B.C. (possibly by Leochares), while many good authorities regard it as belonging to the third, or even second century. Consult W. Helbig, *Guide to the Public Collections of Classical Antiquities in Rome* (a translation of a German work, by J. F. and Finlay Muirhead, Leipzig, 1895); A. Furtwaengler, *Masterpieces of Greek Sculpture*, a translation by Eugenie Sellers (London, 1895).

APOLLO CITH'ARŒ'DUS (Gk. *κιθαρῳδός, kitharōdos*, harper, from *κιθάρα, kithara*, lyre + *ἀοιδός, aoidos*, singer). Apollo, in his function of God of Music. Two famous statues of him in this capacity are in existence: one at the Vatican, the other at the Glyptothek in Munich, both of uncertain date and origin.

APOLLO CLUB. A seventeenth-century literary *coterie*, resembling the Elizabethans' "Areopagus," or that still more famous gathering which, in the eighteenth century, surrounded Dr. Johnson. Among its members were Ben Jonson, Robert Herrick, Randolph, and other poets and pamphleteers. Its meeting place was the Devil Tavern at Temple Bar.

AP'OLLODO'RUS (Gk. *Ἀπολλόδωρος, Apollodōros*). 1. An Athenian painter of the fifth century B.C., an elder contemporary of Zeuxis. He is said to have introduced the rendering of light and shade in place of the flat coloring of his predecessors. 2. A celebrated architect of the early part of the second century A.D., employed by the Emperor Trajan in the construction of his splendid stone bridge over the Danube, in the building of the Forum called the Forum of Trajan, and other works in Rome. His severe censure of Emperor Hadrian's architectural plans is said to have caused Apollodorus's banishment and death. 3. A Greek grammarian of the second century B.C. He studied philosophy in his native Athens and then joined the Alexandrian scholars about Aristarchus; he wrote a chronicle in iambic verse and several grammatical works. His greatest work was *On the Gods*, apparently a history of the Greek religion, though its exact nature can only be conjectured from scattered notices. The extant mythographical handbook which begins with the origin of the gods, and ends with the story of Troy, and which is of great value, is certainly, though it bears the name of Apollodorus, a compilation of a later date.

AP'OLLO'NIA (Gk. *Ἀπολλωνία*). The name of more than 30 ancient cities. 1. In Illyria, on the Aoüs, founded by emigrants from Corinth and Corcyra, commercially prosperous, and toward the end of the Roman Empire a seat of literature and philosophy. 2. In Thracia (afterward Sozopolis, and now Sizeboli), colonized by Milesians, and famous for a colossal statue of Apollo, by Calamis, which was removed to Rome by Lucullus (q.v.). 3. The port of Cyrene (afterward Sozusa, and now Marsa Suza), which outgrew Cyrene itself and left evidences of its magnificence in the ruins of its public buildings. Eratosthenes (q.v.) was born there. 4. A city of Macedonia, referred to in Acts xvii. 1, as one of the stations on the road from Amphipolis to Thessalonica. Its exact position is not known. It was, doubtless, on the celebrated Via Egnatia, probably near the present Gol (Lake) Beshik, to the south. Little is known of its history.

AP'OLLO'NIUS (Gk. *Ἀπολλώνιος, Apollōnios*). An Alexandrian scholar, son of Archibius. He lived toward the end of the first century A.D. and compiled a lexicon of Homeric words, the main sources of which were Apion's *Glossary* (see APION), and the commentaries of Aristarchus and Heliodorus. Though it has come down to us in abridged and otherwise imperfect form, this work is valuable for the exegetical study of Homer.

APOLLONIUS, OF PERGA. A mathematician, younger contemporary of Archimedes and Eratosthenes. Born at Perga, in Pamphylia, he lived, during the years of his activity as a scholar, which were approximately from 247 to 205 B.C., at Alexandria and Pergamum. His principal work was a treatise on Conic Sections, in eight books, the first four of which, accompanied by a sixth-century commentary on them by Eutocius, have come down to us in the original Greek. The extant books give the elements of the subject as an introduction to the more advanced theory. Apollonius clearly indicates his indebtedness to earlier scholars: at the same time it is plain that much of his work was original. Books i–vii were twice translated into Arabic in the ninth and tenth centuries; copies of these translations have been known in Europe since the seventeenth century; from one of these Arabic translations a Latin translation of books v–vii was made by Abraham von Echelles and Alfonso Borelli, and published at Florence in 1661. Of book viii there exist only certain *lemmata* of Pappus (q.v.) dating from the third and fourth centuries A.D. Apollonius's work, containing 400 problems, was so complete that it left little for his successors to improve. He wrote on the methods of arithmetical calculation, on statics, the stations and regressions of the planets (a work upon which Ptolemy drew in writing the *Almagest*), and on transversals of conics, which laid the foundation for the geometry of position. Among his other works deserving mention are: *De Sectione Spatrii, De Sectione Determinata*, and *De Tractionibus*. Apollonius's problem, "To draw a circle tangent to three given circles in a plane," found in his

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treatise on *Contact*, has been solved by Newton, Vieta, and others. Consult: Halley, *Opera et Studia* (Oxford, 1710), which is the best edition of the extant works of Apollonius; Heiberg, *Apollonii Pergæi quæ Græce Exstant Opera* (Leipzig, 1891–93); H. G. Zeuthen, *Die Lehre von den Kegelschnitten im Altertum* (Copenhagen, 1886). T. L. Heath's Cambridge edition also deserves mention.

APOLLONIUS, OF TRALLES. See AMPHION.

APOLLONIUS, OF TYANA. A native of Tyana, in Cappadocia, who lived in the time of Christ. He was a zealous follower of the doctrines of Pythagoras. He traveled through Asia to Nineveh and Babylon, thence to India, where, at the court of King Phraortes, he met Jarchas, the principal Brahmin. When Apollonius returned from this pilgrimage, his fame as a wise man was greatly increased; the people regarded him as a worker of miracles and a divine being, and princes were glad to entertain him at their courts. He himself seems to have claimed insight into futurity rather than the power of working miracles. Yet in Rome it was claimed that he raised a young woman from the dead. He was acquitted of treason by Nero, because the indictment had vanished from the paper. After extensive travels in Spain, Italy, Greece, and Ethiopia, he was accused of having taken part in an insurrection against Domitian. He appeared before the tribunal, but soon miraculously vanished. Ultimately he appears to have settled in Ephesus, where he opened a Pythagorean school and continued his teaching until he died, nearly 100 years old. His history was written by Philostratus (q.v.), but is plainly a religious novel intended for the entertainment of Julia, wife of the Emperor Severus. The travels of the apostle Paul are a more likely inspiration to this work than the Gospel narrative of Christ. It contains a mass of absurdities and fables through which an outline of historical facts and the real character of the man are sufficiently discernible. Hierocles, a heathen statesman and opponent of Christianity, wrote, in the third century, a work on the life and doctrines of Apollonius, with a view to prove their superiority to the doctrine of Christ. In modern times Blount in England and Voltaire in France have renewed the attempt. Consult: B. L. Gildersleeve, *Essays and Studies* (New York, 1890), and L. Dyer, *Studies of the Gods in Greece* (New York, 1894); and for his life, Philostratus in the Teubner series, vol. i (Leipzig, 1870–71); Eng. trans., Guthrie (New York, 1905); Fr. trans., A. Chassang (Paris, 1862); Ger. trans., E. Baltzer (Rudolstadt, 1883); also the essay of F. C. Baur, "Apollonius von Tyana und Christus," in *Drei Abhandlungen* (ed. Zeller, Leipzig, 1876); O. de B. Priaulx, *The Indian Travels of Apollonius of Tyana* (London, 1873); D. M. Tredwell, *A Sketch of the Life of Apollonius of Tyana* (New York, 1886); G. R. S. Mead, *Apollonius of Tyana* (London, 1901); Campbell, *Apollonius of Tyana* (New York, 1909).

APOLLONIUS, OF TYRE. The hero of a Greek romance now lost, which in a Latin version enjoyed great popularity in the Middle Ages and was translated into almost all the languages of western Europe (the earliest translation seems to have been one into Anglo-Saxon, in the ninth or the tenth century). In it are related the romantic adventures which befell Apollonius, a Syrian prince, previous to his marriage with the daughter of King Alcistrates, of Cyrene. To these are added the adventures of his wife, who was parted from him by apparent death, as well as those of his daughter, Tarsia, who was carried off by pirates and sold in Mytilene. The work closes with the reunion of the whole family. The original Greek work, which was soon lost, belonged to the third century A.D. and showed close relations with the *Ephesiaca* of Xenophon of Ephesus. The Latin version was made by a Christian, not earlier than the fifth century. The account given in the *Gesta Romanorum* and the part contained in the *Pantheon* of Godfrey of Viterbo (c.1185) are drawn from this early translation. The earliest translation from the Latin was into Anglo-Saxon in the ninth or the tenth century; an early English rhymed version of the end of the fourteenth century is to be found in Gower's *Confessio Amantis;* and the materials are employed in Shakespeare's *Pericles, Prince of Tyre.* About 1300 Heinrich von der Neuenstadt produced a poetical version in over 20,000 verses, based probably on the account in the *Gesta Romanorum.* The *Histori des Küniges Apollonii,* published 1476, is translated from Godfrey of Viterbo, as is the Spanish version of the thirteenth century, printed in Sanchez's *Colección de Poesias Castellanas* (Paris, 1842). Several French and Italian versions have been made from the same source. There are also middle and modern Greek versions extant. The Latin translation, which survives in about 100 manuscripts, from the Greek original, has been edited by Riese, *Historia Apollonii Regis Tyri* (2d ed., Leipzig, 1893). Consult in general: the preface to Riese's edition; Rohde, *Der griechische Roman und seine Vorläufer* (Leipzig, 1900); Hagen, *Der Roman vom König Apollonius in seinen verschiedenen Bearbeitungen* (Berlin, 1878); Krumbacher, *Byzantinischer Litteraturgeschichte,* p. 434; M. Haupt, *Opuscula,* vol. iii; Simrock, *Quellen des Shakespeare* (Bonn, 1872).

APOLLONIUS DYS'COLUS (Gk. *Ἀπολλώνιος Δύσκολος, Apollōnios Dyskolos*). An Alexandrian scholar who lived in the first half of the second century A.D. He and his son, Herodian, were the greatest Greek grammarians. Apollonius reduced grammar to a system and made a science of syntax. He wrote a large number of works, but the greater portion of them perished early. Four are extant: those on *Pronouns,* on *Conjunctions,* on *Adverbs,* and on the *Syntax of the Parts of Speech.* It is not clear whether the surname *Dyscolus* ('crabbed') had reference to his literary style or to his disposition of mind. Priscian (q.v.) founded his great work on Latin grammar on the work of Apollonius. Consult J. E. Sandys, *A History of Classical Scholarship,* vol. i, pp. 319 ff. (Cambridge, 1906).

APOLLONIUS MO'LON. A Greek rhetorician, born at Alabanda, in Caria. He taught rhetoric at Rhodes and was a distinguished pleader in the courts. In 81 B.C., having been sent to Rome as an ambassador by the Rhodians, he addressed the Roman Senate in Greek. He stayed some time at Rome and was there heard by Cicero, who afterward (78 B.C.) studied under him at Rhodes. Other distinguished Romans, among them Cæsar, also attended his lectures.

APOLLONIUS RHO'DIUS (c.295–c.215 B.C.).

An epic poet, son of Silleus (or Illeus), born at Alexandria. As a youth he was the pupil of Callimachus (q.v.), but afterward entered into a bitter strife with his former teacher, on literary grounds. Callimachus was the champion of the short poem in the artificial and learned style, while Apollonius preferred the lengthy poem in the simple style of Homer. The *Argonautica*, the most important and only extant poem of Apollonius, was in part written while the author was at Alexandria and was received with scorn by the audience there. Apollonius then withdrew to Rhodes, revised his poem, and produced it with great acclaim. He received citizenship at Rhodes, set up a school of rhetoric there, and styled himself the *Rhodian*. Later in life he is said to have returned to Alexandria and to have succeeded Eratosthenes as librarian —an office which he held till his death. The *Argonautica* is an epic poem in four books, containing an account of the expedition of the Argonauts in quest of the Golden Fleece. The first two books describe the departure of the expedition and the adventures on the way; the third book tells of the passion of Medea for Jason; the fourth book gives an account of the return home. The poem imitates the language and style of Homer, but it is labored and lacks spirit and movement, except in the third book, on which Vergil drew largely in writing the fourth book of the *Æneid;* in this book Apollonius shows himself master of the psychological analysis of human passion. The *Argonautica* was much admired by the Romans, being translated at least once, by Varro, of Atax, in Gaul, a contemporary of Horace, and often imitated by them. (See VALERIUS FLACCUS.) Apollonius wrote other works in verse and in prose. There are critical editions by Merkel (1854) and R. C. Seaton (Oxford); translations by A. S. Way (London) and Seaton (New York, 1912). There is an annotated edition in English, unfortunately not critical or accurate, by G. W. Mooney (London, 1912).

APOL'LOS (Gk. *Ἀπολλώς*, an abbreviation of *Ἀπολλώνιος, Apollōnios*). An early Christian missionary and companion of St. Paul. He was an Alexandrian, converted probably in Alexandria by followers of John the Baptist, and at once threw himself with enthusiasm into the work of propagating the new faith. He came to Ephesus and there gladly accepted the fuller instruction which he received from Priscilla and Aquila. Thus equipped, he passed on to Corinth, where he labored with great success (Acts xviii. 24–28). But unhappily there were those there who made a party called by his name and so contributed to the factional troubles in the Corinthian church. From Corinth he went to Ephesus. But his Corinthian admirers, who preferred his more rhetorical manner of preaching to the simpler manner of Paul, desired his return, and he promised to come a little later (1 Cor. i. 10–12; iii. 4–6; xvi. 12). The last mention of him in the New Testament (Titus iii. 13) shows him about to undertake a journey to Crete. According to tradition he became the first Bishop of Crete.

APOLLO SAUROC'TONOS (Gk. *Σαυρόκτονος, Sauroktonos, Lizard-Killer,* from *σαύρα, lizard* + *κτείνω, to kill*). A statue of the youthful Apollo in the Vatican—a copy of a bronze of Praxiteles, which Pliny calls "the most beautiful bronze statue left in the world." It represents the god leaning against a tree, dart in hand, ready to slay a lizard as it runs up the trunk. In the Roman Campagna men and boys still amuse themselves throwing knives at lizards. The statue was found in 1777 in the Villa Magnani, on the Palatine. Consult Helbig, *Guide to the Public Collections of Classical Antiquities in Rome*, translated by James F. and Findlay Muirhead (Leipzig, 1895–96).

APOLLYON, ȧ-pŏl'lĭ-on, *or* ȧ-pŏl'yŭn (Gk. *Ἀπολλύων*, from *ἀπολλύναι, apollynai*, to destroy). A designation used (Rev. ix. 3–11) to translate the Hebrew *Abaddon*, which means 'destruction,' and which was one of the names given to the great gathering place of the dead, more commonly known as Sheol. Apollyon is personified as the angel having dominion over the locusts coming up out of the "bottomless pit" at the sound of the fifth trumpet on the day of judgment. In Talmudic literature (*Shabbath* 55a) Abaddon is the name given to the angel who with Maweth, i.e., 'death,' stands over the six angels of destruction, who aid God in the punishment of the wicked.

AP'OLO'GIA PRO VI'TA SU'A (Lat. defense of his life). John Henry (afterward Cardinal) Newman's defense of his position in the "Oxford Movement." Its immediate cause was an accusation made by Charles Kingsley, that "Truth for its own sake has never been a virtue with the Roman clergy. Father Newman informs us that it need not and, on the whole, ought not to be." Newman first demanded a substantiation or a retraction of this charge; and unable to obtain either, published the *Apologia*.

APOL'OGIE FOR PO'ETRY. A famous work written by Sir Philip Sidney in 1580, and published in 1595, in answer to an attack on the playhouses entitled *The School of Abuse*, dedicated to him without his consent, by Stephen Gosson. It is a defense and eulogy of the art of poetry, closely modeled after Aristotle's *Poetics* and couched in the exaggerated Elizabethan style.

AP'OLOGUE (Gk. *ἀπόλογος, apologos*). A fable or short story, with animals or inanimate objects as actors or speakers, intended to convey some moral. The true apologue differs, however, from both the fable and the parable —from the former in that it always carries a moral, and from the latter in not being realistic. The apologue, though dramatic, cannot reach such artistic heights as the parable, since the points of resemblance between the animal and the man are too few and the analogies too crude. Unlike the parable, which aims to bring out man's relations to God, the apologue falls far short of portraying human character; it parodies rather than depicts human nature. Its origin is very ancient and its historical development very uncertain. It was first conceived in the East, where this form of tale served the purpose of voicing the slaves' protest against oppression. Both Æsop and Phædrus, the accredited fathers of the apologue, were slaves. Others after them have so much translated, amended, and edited their fables that it baffles the specialist to trace their history. Some of those who have imitated these earlier fables most successfully were La Fontaine in France, Lessing in Germany, and Krylóv in Russia. That collection, however, which is known as *Æsop's Fables* still enjoys the greatest reputation throughout the world. For an account of

the fable, consult Jacobs, Introduction to *The Fables of Æsop* (New York, 1896).

APOL'OGY (Gk. *ἀπολογία, apologia*, a speech in defense, defense). A term now commonly understood as synonymous with an excuse for breach of an engagement, etc., but originally used as the title of any work written in defense of certain doctrines, as in the *Apology of Socrates*, ascribed to Plato and Xenophon; the *Apology for the Christians*, by Tertullian, and in many other defenses of the Christians, written by Justin Martyr, Aristides, Athenagoras, Tatian, Theophilus, Origen, Eusebius, Minucius Felix, Arnobius, Lactantius, Augustine, Orosius, and others. After the fourth century, when the Church was made dominant under the Roman emperors, apologetical writings were less called for; but Bartholus Edessenus and Raymundus Martinus wrote against the Jews and the Mohammedans. In the fifteenth century, when the revival of learning placed Christianity in apparent opposition to the Platonic philosophy, Marsilius Ficinus wrote in defense of revelation; and, some time after the Reformation, the spread of free-thinking and skepticism in England was opposed by a variety of apologetical works, chiefly maintaining the points that Christianity is a divine revelation, Christ a divine Messenger, and His Church a divine institution. The defense of Christianity on grounds of reason came now to be treated as a distinct branch of theology, under the name of *Apologetics*. Among the numerous apologetic works by Protestants may be mentioned those by Grotius (*De Veritate*, etc.), Butler (*Analogy of Religion, Natural and Revealed*), Lardner (*Credibility of the Gospel History*), Leland, Addison, Soame Jenyns (*Internal Evidences of the Christian Religion*), Hugh Farmer, Bishop Watson (*Apology for Christianity*), Paley (*Evidences of Christianity* and *Horæ Paulinæ*). Among Roman Catholic apologetic writers the most eminent are Pascal, Hauteville, Guenée, Bergier, Mayr, and Chateaubriand.

In the nineteenth century a great number of apologetic works by Neander, Tholuck, and others were called forth in reply to Strauss's *Das Leben Jesu* and the *Vie de Jésus* by Renan. Later came the attacks from agnostic, materialistic, and other philosopho-scientific sources, and these have been replied to by Christian scholars, as A. Ebraid, *Apologetics* (2d ed., Gütersloh, 1878–80; Eng. trans., 3 vols., Edinburgh, 1886–87); P. Schanz (Catholic) (Freiburg, 1895–98; Eng. trans., 3 vols., Dublin, 1897); A. B. Bruce, *Apologetics* (New York, 1892). Manifestly these works are written to meet a passing need, and few of them retain much value after a few years.

AP'OMOR'PHINE (Gk. *ἀπό, apo*, away from + *morphine*). An artificial alkaloid made by heating morphine with hydrochloric acid under pressure. The salt of apomorphine employed in medicine is the hydrochloride, which occurs in minute, colorless crystals that acquire a greenish tint on exposure to light and air. It is the best known of the so-called systemic emetics (see EMETIC) and causes vomiting within 5 to 20 minutes, whether given by mouth or hypodermatically. This emesis is due to direct action on the vomiting centre in the medulla. It is repeated frequently, with little nausea, after the stomach has been emptied, and is accompanied by marked muscular relaxation. The respiration and circulation are also depressed, and large doses may cause convulsions, followed by paralysis. As an emetic it is used when prompt action is desired or when swallowing is difficult or impossible. It is used also in small doses as a sedative expectorant. Furthermore, apomorphine has been recommended as a hypnotic and is said to act usually within 10 or 15 minutes. For this purpose a small dose is given hypodermatically after lying down.

AP'ONEURO'SIS (Gk. *ἀπονεύρωσις*, end of a muscle where it becomes tendon, from *ἀπό, apo*, away + *νεῦρον, neuron*, sinew, tendon). An anatomical term for a sheet-like expansion of strong fibrous tissue, of which there are many examples in the human body. For the sake of convenience, it is generally confined to expansions from the tendons of muscles, as the lumbar aponeurosis. If a tendon is very broad and expanded, as that of the external oblique muscle of the abdomen, it is said to be aponeurotic. Some muscles, as those on the shoulder-blade, are partially covered with a tendinous expansion, to which some of their fibres are attached; this is termed the aponeurotic origin of the muscle; it gives the muscle a more extensive attachment, without adding materially to its weight.

APOPHYGE, ā-pŏf'ĭ-jē (Gk. *ἀπό, apo*, from + *φεύγειν*, to flee). In architecture, (1) a molding of concave, approximately quarter-round section, like an inverted cavetto, by which the shaft of a column or pilaster flares out to form the cincture at the top of the base. (See COLUMN; ORDERS OF ARCHITECTURE.) This flare is very pronounced in some early Greek Ionic orders, as in that of the temple of Apollo Epikourios at Bassæ. (2) The hollow molding or profile, almost a scotia, under the echinus of some early Greek Doric capitals in Magna Græcia (at Pæstum, the Basilica and temple of Demeter, and a temple at Metapontium). It is loosely used also of the transition from shaft to echinus of any Greek Doric capital and of the slight flare under the astragal at the top of the shaft in all the Roman orders. The French word *congé* (= leave-taking, dismissal) is used by many in the same sense.

APOPH'YLLITE (Gk. *ἀπό, apo*, away + *φύλλον, phyllon*, leaf). A common mineral of the zeolite group. It is a hydrated potassium-calcium silicate crystallizing in tetragonal forms. The lustre is vitreous except on cleavages parallel to the basal pinacoid, which show a pearly lustre. It is colorless, white, pink, or greenish. Apophyllite occurs as a secondary mineral in basalt and other volcanic rocks. Excellent specimens are found in the United States at Bergen Hill, N. J., and throughout the Lake Superior region, as well as in Greenland, Mexico, the Harz region, and Nova Scotia. It is named from its tendency to exfoliate under the blowpipe.

AP'OPLEXY (Gk. *ἀποπληξία, apoplēxia*, from *ἀπό, apo*, away + *πλήσσειν, plēssein*, to strike). A term applied to an engorgement of blood, with or without extravasation, in the brain, producing coma. In medicine three distinct affections of the brain circulation are understood: cerebral *embolism*, cerebral *thrombosis*, and cerebral *hemorrhage*. These differ in their cause and somewhat in their symptoms. In cerebral *embolism* there is a sudden blocking up of one of the blood vessels of the brain by some foreign body in the circulating blood. Such foreign bodies usually come from the valves of the heart,

which in a number of septic diseases, as rheumatism, typhoid fever, gonorrhea, etc., have minute growths upon them. These become detached and are swept into the circulation and may block up a brain artery. The symptoms come on acutely, may occur in the young or old, and may be slight, if a small vessel is blocked, or severe if the vessel is large. There may be sudden dizziness and weakness, going on to slight convulsive movements of one side of the body and loss of consciousness. This is accompanied by deep, noisy breathing, a slowing of the pulse, and perhaps a slight rise in temperature. The person may soon recover, usually with some weakness in some part of the body, or with a slight paralysis of some of the muscles of the leg, arm, or face. At times the whole of one side of the body may remain paralyzed.

Cerebral thrombosis is due to a disease of the blood vessels themselves, during which blood clots may form in them and thus cut off a portion of the brain substance from its normal supply of blood. Syphilis is the chief cause, especially in individuals under 40 years of age. The symptoms are apt to come on gradually. Following a period of headache, dizziness, and nausea, may occur sensations of prickling in the fingers; convulsive movements in some of the muscles, twitchings, or loss of muscular strength. At the time of attack the symptoms resemble those of embolism.

Cerebral hemorrhage is the most important cause of apoplexy. It occurs from the rupture of a blood vessel into the brain substance, and the severity of the symptoms depends partly on the amount of the hemorrhage, largely on the part of the brain involved. Hemorrhage is more apt to occur in the aged, and it is a frequent cause of death in those over 60 years of age. The symptoms may be sudden and terminate in death, or there may be several attacks of giddiness or collapse, with tingling or numbness of the extremities, or loss of speech. Patients may have several attacks and yet recover, with some persisting paralysis of one side of the body or of one arm or one leg. Little can be done before a physician comes. Mustard baths to the feet and the application of ice to the head may help in some cases. Persons with the "apoplectic habit" should take special care not to become mentally disturbed.

APOPLEXY, PARTURIENT. See MILK FEVER.

APORT'. See HELM.

APOS'PORY (Gk. *ἀπό, apo,* away from + *σπόρος, sporos,* seed). A name which literally means "without spore reproduction" and which refers to the fact that in some cases the sexual plant develops directly from the sexless one without the intervention of a spore. This phenomenon, like its correlative, *apogamy* (q.v.), has been especially observed among ferns, and the list of known forms which show it is increasing rapidly. Under certain conditions, which are not clear, a prothallium (the sexual plant) buds directly from various regions of the fern leaf, common among which are abortive sporangia and leaf teeth. Among mosses cases of apospory have been observed, and have also been induced artificially. In these cases a sexual plant is developed directly from the spore-bearing structure (the sexless plant). Among seed-plants apospory has not been observed and in the very nature of things is not likely to be found, one reason for this being that the sexual plant is so very much reduced that it would hardly be observable, even if it were to appear vegetatively.

APOS'TATE (Gk. *ἀποστάτης, apostatēs,* deserter, renegade, from *ἀπό, apo,* away + *ἱστάναι, histanai,* to place, to stand). Literally, any one who changes his religion, whatever may be his motive; but, by custom, a word always used in an opprobrious sense, as equivalent to renegade, or one who, in changing his creed, is actuated by unworthy motives. In early Christian times the word was applied to those who abandoned their faith in order to escape from persecution (see LAPSED); but it was also applied to such as rejected Christianity on speculative grounds, as, for instance (though in his case there had been no intelligent reception of Christianity), the Emperor Julian was supposed to have done. After the fifth century, when heathenism was declining, many who had no sincere belief in Christianity, yet made profession of it and were baptized; these also were styled apostates. The Roman Catholic church at one period imposed severe penalties on apostasy. The apostate was, of course, excommunicated, but sometimes, also, his property was confiscated, and he himself banished or even put to death. Those who embrace a religious faith are called "converts" by those they join and "perverts" by those they leave. The term "apostasy" is now employed commonly, and often abusively, as a reproach for great or sudden changes in political opinions.

A POSTE'RIO'RI. See A PRIORI.

APOSTLE (Gk. *ἀπόστολος, apostolos,* one sent forth as delegate, from *ἀπό, apo* + *στέλλειν, stellein,* to send). The name used in the New Testament to designate primarily that group of Christ's disciples who were called by Him to be His more intimate companions during His ministry, and to proclaim, as His representatives, the gospel to men. They were 12 in number: Simon Peter (surnamed Cephas, the Greek transliteration of the Aramaic *Kēphā,* 'rock,' of which the Greek *petros* is the translation, John i. 35–42), James (the son of Zebedee, Mark iii. 17), John (brother of James, Mark iii. 17; the two latter being surnamed Boanerges, Mark iii. 17), Andrew, Philip, Bartholomew, Matthew (the son of Alphæus, Hebrew name, Levi, Matt. ix. 9), Thomas (also called Didymus, John xx. 24), James (the son of Alphæus, Mark iii. 18), Thaddæus (called in Luke vi. 16 and Acts i. 13 Judas, the son of James, doubtless to distinguish him from Judas Iscariot, cf. John xiv. 22), Simon (the Canaanite, Mark iii. 18, of which the Greek equivalent is Zēlotes, 'Zealot,' the surname given him in Luke vi. 15 and Acts i. 13), and Judas Iscariot.

Their qualifications, as understood by the early Church, were evidently that they should have been with Jesus during His ministry and have seen Him after His resurrection (Acts i. 21, 22). As a result, however, of exercising its rights in the election of a substitute for Judas Iscariot, in order to maintain the original number, and as a result, further, of admitting into this number an extra apostle in the person of the divinely appointed Paul, the Church evidently considered itself justified in modifying these qualifications so as to adapt the office to the needs of its developing mission. As a result, others prominent in this work received the name of apostle besides the Twelve and Paul. So James, the Lord's brother, though apparently not commissioned to any specific work, is hon-

ored with this title, in view, doubtless, of his special relationship to the Lord (Gal. i. 19) and his special witness to the Resurrection (1 Cor. xv. 7). So Barnabas, though lacking any relationship to the Lord and not having been a witness of the Resurrection, was given this title, because of his special appointment by the Church to the mission work with Paul (Acts xiii. 1–3; xiv. 4, 14). So, doubtless, the title came to be extended to those who, though not outwardly appointed to any specific work, gave evidence of their divine choice to it by the signal way in which they accomplished it, e.g., Andronicus and Junia (Rom. xvi. 7), Apollos (1 Cor. iv. 6, with 9), Silvanus and Timothy (1 Thess. i. 1, with ii. 6), and the body of apostles, which Paul seems to have in mind as extending beyond the twelve (1 Cor. ix. 5; xv. 5–7). This enlarged application of the term is recognized by patristic writers, such as the author of the *Didaché* and of the *Shepherd of Hermas*.

Among the credentials of the apostolic office were apparently the ability to work miracles (e.g., 2 Cor. xii. 12), and the conversion to God of those to whom they brought the gospel (e.g., 1 Cor. ix. 2). If the office possessed peculiar rights, among them doubtless were the appointment of the original officers of the local churches (e.g., Acts xiv. 23), as well as the regulation of the teaching and morals within the churches' organized limits (e.g., 2 Thess. iii. 6). The characteristic duty of the office consisted, most likely, in the preaching and missioning of the gospel (e.g., Acts vi. 2–4). At the same time, however, as to how far the apostolate was considered by the early Church as an office at all is a question of large debate.

There is no evidence of any division of territory among the twelve. The nearest approach to this is in the mutual understanding referred to in Gal. ii. 9, by which Peter was recognized as the leader of the mission to the circumcision, which would naturally mean, in general terms, the Palestinian Jews; and Paul and Barnabas were recognized as the leaders to the uncircumcision, which would as naturally indicate, generally, the Gentiles outside of Palestine; but even this was not strictly carried out, since Paul began his work in most places to which he went by preaching in the synagogue, while the epistolary address in 1 Peter would imply that Peter had a considerable parish of Gentile Christians in Asia Minor.

In 2 Cor. viii. 23 and Phil. ii. 25, in which passages Paul speaks of the messengers of the churches, the word ἀπόστολος is used in its common classical meaning of 'commissioned messenger,' and in Heb. iii. 1, where Christ is referred to as "the Apostle and High Priest of our confession," the word is applied in the same sense, from the point of view of Christ's divinely appointed mission into the world (cf. John xvii. 18). For details of apostolic life and work, see under individual apostles.

Bibliography. In general, see Lightfoot, "Excursus on Name and Office of an Apostle," in *Commentary on Galatians* (London, 1877); Weizsäcker, *The Apostolic Age* (Eng. trans., Edinburgh, 1894); Harnack, *Die Apostellehre* (2d ed., Leipzig, 1896); E. Haupt, *Zum Verständnis des Apostolats im Neuen Testament* (Halle, 1896); Allen, *Christian Institutions* (New York, 1897); Hort, *Ecclesia* (New York, 1898); Falconer, *From Apostle to Priest* (New York, 1900); T. M. Lindsay, *The Church and the Ministry* (New York, 1903).

APOSTLE OF FREE TRADE. A title frequently applied to Richard Cobden (q.v.), author of *The Exponent of the Principles of Free Trade*, for his persistent advocacy of the repeal of the high-tariff policy which England practiced from 1830 to 1846. He gave utterance to the strikingly accurate prophecy that America must at no distant date enter into serious competition with English products; that, in this competition, England would be heavily handicapped by protection, and that the soundest policy for her lay in the direction of free trade. A fluent speaker, he carried these theories into Parliament and was directly responsible for the repeal of the obnoxious duties on corn.

APOSTLE OF IN'FIDEL'ITY. A term applied to Voltaire on account of his persistent attacks upon the Church, and his unfailing protection of those whom he believed to be persecuted by her. See VOLTAIRE.

APOSTLE OF IRELAND. A title given to Patrick, Bishop and saint, who, early in the fifth century, felt himself divinely inspired to attempt the conversion of Ireland, which was at that time a heathen country. See PATRICK, SAINT.

APOSTLE OF TEM'PERANCE. Theobald Mathew, so designated through his great labors during the first half of the nineteenth century to further the cause of temperance in the United Kingdom and especially in Ireland, the country of his birth.

APOSTLE OF THE ARDENNES, är'dĕn'. An appellation given to St. Hubert, the son of the Duke of Aquitaine, in the reign of Theodoric, King of the Franks. He was converted from a gay life by the vision of a stag bearing a shining cross between its antlers. He was made Bishop of Liége in 708 and died in 728. A century after his body was transferred to the Benedictine convent of Andoin, in the Ardennes, which thence received the name of St. Hubertus. He was held to be the patron of hunting and the chase.

APOSTLE OF THE HIGH'LANDERS. A Celtic missionary to the Caledonians, otherwise known as St. Columba; the founder of the monastery of Iona in or about the year 565.

APOSTLES, ACTS OF THE, APOCRYPHAL. See APOCRYPHA, *New Testament*.

APOSTLES, TEACHING OF THE TWELVE. See TEACHING OF THE TWELVE APOSTLES.

APOSTLES' CREED. See CREEDS.

APOSTLESHIP OF PRAYER. A Catholic association of prayer, founded at Vals, France, in 1844. In 1861 a priest, Rev. Henry Ramière, adapted its organization to general use and published a description of it in "The Apostleship of Prayer." It has had a rapid growth, its membership now numbering over 25,000,000, of which about 4,000,000 are in the United States. It is under the care of the Jesuit order and is directed by means of a journal, the "Messenger of the Sacred Heart." Consult *Handbook of the Apostleship of Prayer* (New York).

APOSTLES' IS'LANDS, or THE TWELVE APOSTLES. A group of islands in Lake Superior, near the western end, belonging to Wisconsin (Map: Wisconsin, C 1). They number in all 27, with an area of 125,000 acres. The largest is Madeline Island, on which are La Pointe, a thriving town, and the La Pointe Indian Reservation. Others are Oak, Presque, and Outer

islands. This group was settled by French missionaries as early as 1680.

APOSTLE SPOONS. The name given to spoons, usually in sets of 13, the handles of which are formed by images of the twelve apostles and of the Virgin Mary. Up to the seventeenth century such sets were favorite christening gifts. Complete sets are quite rare. In 1904 such a set was sold in London for £4900.

APOSTLE TO GERMANY. A title given to St. Boniface, an English missionary (died 755), for his lifelong labors among the Frisian and German tribes.

APOSTLE TO THE ENGLISH. An appellation given to St. Augustine, who led the body of monks sent to England by Gregory I to "convert the Angles into angels."

APOSTLE TO THE FRENCH. An appellation of St. Denis (q.v.), the patron saint of France, who is said to have been beheaded about 272 A.D. at Paris.

APOSTLE TO THE GENTILES. A name applied to St. Paul because of his life-work—"to preach the gospel to all mankind."

APOSTLE TO THE INDIANS, THE. John Eliot, thus styled because of his efforts to convert the Indian tribes of New England in the middle of the seventeenth century. See ELIOT, JOHN.

APOSTLE TO THE SCOTS, THE. A term applied to the Scottish reformer and historian, John Knox (q.v.), because of his untiring exertions to spread the Calvinistic doctrines in Scotland at the expense of those of the English and Roman Catholic churches. Also called the Apostle of the Scottish Reformation.

AP'OSTOL'IC, or AP'OSTOL'ICAL. An adjective used in various connections to denote something that is supposed to date from the age of the first apostles of the Christian Church, or to have received their sanction, or to rest upon their authority. As applied to a church, it means that the twelve apostles, or at least one of them, taught the truths it stands for. As applied to a doctrine or practice, it means that either it is taught in the New Testament or that traditionally it has been handed down from apostolic days. The claim to such origin, in particular cases, is much disputed by Protestants among themselves in regard to such points as infant baptism, immersion, and church government; and by Protestants over against Roman Catholics as to the priority of the Church of Rome and papal claims generally.

APOSTOLIC BRETH'REN, or APOSTOLICI. The name given in Italy, toward the end of the thirteenth century, to one of those sects which, animated by the spirit of an Arnold of Brescia, felt constrained to oppose the worldly tendencies of the Church. Its founder was Gherardo Segarelli, a weaver in Parma. Rejected, from some cause or other, by the Franciscan Order; his long-continued and enthusiastic meditations led him to the profound conviction that it was above all things necessary to return to the simple forms of apostolic life. Accordingly, he went about (1260) in the garb of the apostles, as a preacher of repentance, and by his practical discourses gathered many adherents into a kind of free society, bound by no oaths. At first he managed to avoid any direct collision with the dogmas of the Church; but after 20 years of undisturbed activity and growing influence, Segarelli was arrested by the Bishop of Parma, who, however, soon after released him and kept him in his palace as his fool and in 1286 banished him from his diocese. Upon the occasion of his release, Pope Honorius IV renewed a decree of the Council of Lyons (1274) against all religious communities not directly sanctioned by the papal chair. In 1290, Nicholas IV setting himself to expose and persecute the Apostolic Brethren, they, on their side, began to denounce the papacy as the Babylon of the Apocalypse. Many, both men and women, perished at the stake, among them Segarelli (July 18, 1300). But his cause survived him. Dolcino, a more energetic and cultivated man, brought up as a priest, who had previously taken an active part in Tyrol against the alleged corruptions of the Church, now headed the sect in Italy. He taught the duty of a complete renunciation of all worldly ties, of property, settled abode, etc. Having retreated into Dalmatia, he announced from thence the dawning of the new era and in 1304 reappeared in upper Italy, with thousands of adherents, as the enemy of the papacy, at that time humbled and impoverished by France. In 1305 a crusade was preached against him. He fortified the mountain Zebello, in the diocese of Vercelli, but was, after a gallant defense, compelled by famine to submit. After horrible tortures, which he bore with the utmost fortitude, he was burned at Vercelli, June 1, 1307. In Lombardy and the south of France brethren lingered till 1368.

APOSTOLIC CON'STITU'TIONS AND CAN'ONS. The Constitutions are a collection of ecclesiastical ordinances, in eight books, erroneously supposed to have been the work of the apostles, and to have been written down by St. Clement. In the last chapter of the eighth book the so-called Apostolic Canons, 85 in number, are given. It is now recognized that both works are compositions of the fourth or the beginning of the fifth century. The theory most generally held is that the first six books of the Constitutions are based upon the *Didascalia*, a work of the last third of the third century; that the seventh book is a reworking of the *Didache*, a second-century work; and that the eighth book rests probably upon a collection based upon the Canons of Hippolytus (q.v.). The Canons were probably composed in Syria. The authority of the Constitutions was never accepted in the Western church, and was rejected by the Eastern at the Council of Constantinople in 692. The Canons were accepted by the Eastern church at that council. In the West the first 50 were translated by Dionysius Exiguus (q.v.), were incorporated in the *Decretum* of Gratian (q.v.), and, although held to be apocryphal, are considered an important source for the rules of the primitive Church. A translation of both may be found in the *Ante-Nicene Fathers*, vol. vii (Buffalo, 1886), and a bibliography in vol. ix (Buffalo, 1887). The original text was edited by P. Lagarde (Leipzig, 1862). For the Canons, consult especially Lauchert, *Kanones* (Freiburg and Leipzig, 1896); for the Constitutions, Funk, *Die apostolischen Konstitutionen* (Rothenburg, 1891).

APOSTOLIC DELEGATE. A permanent representative of the Pope in a foreign country. In countries having diplomatic relations with the papal court, he is a government official; elsewhere he is purely an ecclesiastical official. The Delegation to the United States was established in 1893. It has been held by Monsignors Satolli (1893–96), Martinelli (1896–1902), Fal-

conio (1902–11), and Bonzano (1911—). The ecclesiastical power of the Delegate in the United States is very great, his decision being final in all cases laid before him from the church courts.

APOSTOLIC FA'THERS. The name given to the disciples and immediate followers of the apostles, especially to those among them who have left real or so-considered writings behind them. These writings, in Lightfoot's edition, comprise the Epistle of Clement of Rome, and the so-called Second Epistle, which is not his; the seven Epistles of Ignatius of Antioch; the Epistle of Polycarp of Smyrna; the Martyrdom of Polycarp; the Teachings of the Apostles (the Didachè); the Epistle of Barnabas; the Shepherd of Hermas; the Epistle of Diognetus; the fragments of Papias; and the Reliques of the Elders, preserved in Irenæus. The writings of the Apostolic Fathers, as to their form and subject, may be looked upon as a continuation of the apostolic epistles, though far inferior to them. They are very valuable as showing the beliefs and practices of the early Church. Editions of the Apostolic Fathers were published by J. B. Cotelerius (Paris, 1672); W. Jacobson (Oxford, 1838); C. J. Hefele (Tübingen, 1839); A. R. M. Dressel (Leipzig, 1857); Gebhardt, Zahn, and Harnack (Leipzig, 1876–78; text ed., 1877; 3d ed., 1900); J. B. Lightfoot (texts and Eng. trans., London, 1891; 2d ed., 1893). There is a separate English translation in *Ante-Nicene Library* (Edinburgh), vol. i (1867); *Christian Literature* editions (New York), vols. vii, ix. See the separate articles on the Apostolic Fathers mentioned above.

AP'OSTOL'ICI, or **AP'OTAC'TICI** (i.e., renunciants). A sect of heretics in Phrygia, Cilicia, and Pamphylia, in the third and fourth centuries, who renounced all their possessions, forbade marriage, and adopted an ascetic mode of life.

APOSTOLIC MAJ'ESTY. A title held by the kings of Hungary, conferred in 1000 by Pope Sylvester II along with the regal crown upon St. Stephen, ruler of Hungary, who had not only greatly encouraged the progress of Christianity but actually preached himself. In 1758 the title was renewed by Pope Clement XIII, in favor of Maria Theresa as Queen of Hungary, and it continues to be used by the Emperor of Austria as King of Hungary.

APOSTOLIC MENNONITE CHURCH. See MENNONITES.

APOSTOLIC PAR'TY. The name given in Spain early in the nineteenth century to a faction of fanatical Catholics who demanded the restoration of the Inquisition and the reëstablishment of the unlimited power of the King. They formed themselves (soon after the revolution of 1820) into an Apostolic Party, whose leaders were fugitive priests and whose troops were smugglers and robbers. They were popularly supposed to be ruled by a committee known as the Apostolic Junta. After taking an active part in all the subsequent agitations, they finally merged (1830) in the Carlist Party.

APOSTOLIC SUCCESSION. The doctrine that the powers of the Christian ministry are transmitted from Christ to those called to that ministry through those themselves consecrated to episcopal authority and office who trace their authority back by successive ascent to the Apostles; the system by which the Church, as an organic body, is made self-perpetuating, and by which the fullness of corporate life, the integrity of essential truth divinely revealed and committed to the Church, and the validity of Sacraments are maintained unimpaired. The ground for establishing this doctrine is held to be the continuous teaching and practice of the Church from and including the Apostles' times, witnessed to by the New Testament, especially the teaching of Christ and that of the epistles of St. Paul to Timothy and Titus, and further evidenced by writers of the Apostolic age and documents preserved in the works of later writers. The most important of this class of authorities outside the New Testament are the Epistles of Ignatius, the Teaching of the Twelve Apostles, the Epistle of St. Clement to the Corinthians, and the earliest ecclesiastical canons, which order that the consecrators to the episcopate shall be not fewer than three, the purpose being primarily to secure the transmission through a network of lines rather than a chain of single links, and secondarily to insure the public consent of the Church. It is strictly insisted upon by Eastern, Roman Catholic, and Anglican churches, none of which recognizes as valid the acts of those who have not received ordination from a bishop in the succession. In recent times controversy has arisen as to the maintenance of the succession in the Anglican church during the sixteenth century. The Bull of Leo XIII, set forth on the Roman Catholic side, lays stress on the question of sufficient intention in consecrations during the sixteenth century. A few minor bodies, like the Vaudois, the Moravians, and the Swedish church, assert that they can trace some kind of succession in a direct line to the Apostles. See BISHOP; ROMAN CATHOLIC CHURCH; PARKER, MATTHEW. Consult Haddan, *Apostolic Succession in the Church of England* (London, 1869); Gore, *Church and Ministry*, and *Roman Catholic Claims* (1894); Moberly, *Ministerial Priesthood* (1898); Denny, *Anglican Orders and Jurisdiction* (1893); Brightman, *What Objections have been made to English Orders* (1896); the *Catholic Cyclopædia* (1909).

APOS'TROPHE. See CHLOROPLAST.

APOTH'ECARY. See CHEMISTS AND DRUGGISTS.

APOTHEGM, ăp'ō-thĕm (Gk. *ἀπόφθεγμα, apophthegma*, an utterance). A term used to designate any truth or maxim sententiously expressed. The oracles of the heathen gods often took this form, as also the proverbs, memorable sayings, etc., of the sages of antiquity. In modern times Lord Bacon has made a charming collection of apothegms.

AP'OTHE'OSIS (Gk. *ἀποθέωσις*, deification, from *ἀπό, apo*, away + *θεός, theos*, god, deity). The raising of a mortal to the rank of a god. From the polytheistic point of view, there is nothing monstrous in this idea; on the contrary, it is quite natural, and a necessary part of the system. Among pagans generally, and especially among the Romans, every departed spirit became a deity (see LARES; MANES); "and as it was common for children to worship (privately) the *manes* of their fathers, so was it natural for divine honors to be paid publicly to a deceased emperor, who was regarded as the parent of his country." The deification was accomplished by a formal decree of the Senate; henceforth the emperor so deified was called *Divus*. At the *Consecratio*, as it was called, of a Roman emperor, the body was burned on a funeral pile, and, as

the fire ascended, an eagle was let loose to mount into the sky, carrying, it was believed, the soul of the emperor from earth to heaven. Many coins of deified Roman emperors are found with the word *consecratio* surrounding an altar, with fire on it. Other members of the imperial family, including women, were deified. Divine honors were also paid to living persons, as to Julius Cæsar and Augustus. This latter practice originated in the Orient, and was adopted, at a late date, by the Greeks; Lysander, Philip of Macedon, and Alexander the Great were so worshiped.

APOTOME. In Greek music. See LIMMA.

APOX'YOM'ENOS (Gk. *ἀποξυόμενος*, scraping one's self, from *ἀπό*, *apo*, away + *ξύειν*, *xyein*, to scrape). A well-preserved marble copy in the Vatican of a statue by Lysippus, representing an athlete scraping himself with the strigil. It was found in Trastavere, at Rome, in 1849. The original was in bronze, and stood in front of the baths of Agrippa.

AP'PALACH'IAN MOUNTAIN CLUB. A society of persons interested in the mountains of New England and adjacent regions. It was organized in 1876, incorporated in 1878, and authorized by legislative act of 1894 to hold mountain and forest lands and historic sites. In addition to fostering the love of nature, it aims to preserve the beauty of mountain forests and resorts, to render them attractive to visitors, to publish accurate maps, and to collect scientific data concerning the mountains. In 1893 it took the initiative in the creation of the Metropolitan Park system of Greater Boston. *Appalachia*, the club journal and its principal literary expression, has (1913) reached 48 numbers, constituting 12 complete volumes; an annual *Register* has been published since 1879, and a *Bulletin* which presents the current affairs of the society, monthly since 1907. Several books relating to mountaineering, etc., have also been published under its auspices. Its library consists of over 2500 volumes, 1000 pamphlets, 2000 maps or sets of maps. The notable Sella Collection, containing some 600 photographic views from the principal mountain ranges of the world, is one of its most valuable assets. Frequent meetings are held in Boston from October to May, at which lectures of geographic interest are presented, to many of which the public are invited. The membership in March, 1913, numbered 1744.

APPALACHIANS. The general name for the extensive mountain system in eastern North America, extending in a northeast-southwest direction from Newfoundland to central Alabama, consisting largely of parallel chains separated by deep valleys. It is narrowest in New York and is sharply broken by the Hudson River, and again by the valley of New River, into three divisions. At its southern end the system curves slightly to the westward, and beyond the Mississippi valley is resumed as the Onachita uplift of southern Arkansas and Indian Territory.

General Character. The uplift may be described as a long, narrow tableland, from 100 to 300 miles in width, with an altitude of 1500 to more than 6000 feet. In the United States it is bordered on the east by the well-defined Blue Ridge, and on the west by the Alleghany Plateau escarpment, which two ridges lie approximately parallel, and 75 to 100 miles apart, throughout their lengths. Between these outer ranges lie a great number of smaller disconnected mountain ridges, chiefly parallel to the main axis of the system in the central and northern part, but much broken in the southern and southeastern Appalachians. These mountain ridges maintain a remarkably uniform altitude, gradually increasing from both directions toward the central mass in western North Carolina. Lying between the comparatively narrow and regular wall of the Blue Ridge and Alleghanian ranges, west of it, is the great Appalachian valley, which is a characteristic feature of the topography, for it extends the entire length of the mountain system. Here and there it is broken by minor ridges into two or three parallel valleys, but the general nature of a trough between mountain ranges is maintained throughout. In New York it is known as the Wallkill valley; in Pennsylvania, the Lebanon, Lancaster, and Cumberland valleys; in Virginia it is the historic Shenandoah valley, or "Great Valley of Virginia"; and still farther south it is the Tennessee valley, extending into Alabama and Georgia.

Divisions. The Appalachian system has not a uniform conformation throughout its extent, but is divided into three sections, the Northern, the Central, and the Southern Appalachians, with the lines of separation as stated above. This division is not merely of an arbitrary nature, but is founded on well-marked differences in the structural and physiographic features of the three regions. The Northern division includes the Green Mountains, the White Mountains, the highlands of Maine, the Shickshock Mountains, the Notre Dame Range of Quebec, and terminates in the hills of Newfoundland. In the central division the Blue Ridge Range has gentle slopes, rising usually to rounded crests, which show a gently undulating sky line, with here and there a peak rising a little higher than the usual level. (See BLUE RIDGE.) To the west of this ridge is a more or less elevated northerly extension of the great Appalachian valley, which in general presents a succession of depressions and heights, the former worn by streams to a depth, in some cases, of 200 feet, while the latter rises to a height of usually less than 1000 feet above the depressions. The Alleghany Mountains rise west of the valley in bolder sculpturing than that of the Blue Ridge, the side toward the great interior valley, the "Alleghany front," or escarpment of the Alleghany Plateau, being steep and rugged; but on the side of the Mississippi valley the slope is gradual, descending westward in lessening ridges from the crest which marks the summit region; this configuration is due to the fact that the stratified rocks (see below) incline westward, exhibiting their upturned edges in precipices toward the east. Beginning with the Catskills, the line is broken by the broad valley of the Delaware, but reappears in several prominent ranges in Pennsylvania. The westernmost, or "front," range, is confusingly called First, or Blue, Mountain, with Peter's, or Second, Mountain, behind it, east of the Susquehanna. East of the Susquehanna, the Tuscarora, Blacklog, Jack's, Standing Stone, and Tussey's are well-defined ranges westward, filling the whole region with crowded heights to the long range distinctively termed Alleghany, which stretches from the border of New York down into West Virginia. In the Virginias both the Blue Ridge and the western ranges become loftier and better defined. The front range is here called the Great North Mountain, and west of it lie successively the Shenandoah and several broken ranges, ris-

ing to the continuation of the Alleghanies proper. These draw together at the southwest extremity of Virginia, where a new uplift, the Cumberland Mountains (q.v.), rises west of them and terminates in the Clinch Mountains. The Southern Division extends from the valley of New River, in Virginia and West Virginia, southward. The valley of the Tennessee makes a break, south of which the range reappears in the prolongations of the Cumberland Mountains in northern Alabama. In New Jersey the "Highlands" of the Blue Ridge rise to heights of 1000 to 1500 feet; in Pennsylvania to 2000 feet; in Virginia from 2000 to 4000 feet (Hawk's Bill, 4066 feet), and with a breadth of 16 miles. In North Carolina, near the Virginia line, the Blue Ridge forks, the Unaka Mountains, of somewhat greater altitude but of lesser continuity, branching off toward the southwest, while the Blue Ridge proper takes a more southerly course. The Alleghanies, which really begin with the Catskills, in New York State (highest 4200 feet), have in the northern part a general elevation of about 2000 feet, which increases to 4400 feet in Virginia and Kentucky, and still farther south decreases from 200 to 2500 feet. The absence of any isolated peaks is highly characteristic of the whole Alleghanian region; the mountains everywhere present the appearance of long, evenly topped ridges, and the name applies to the whole ridge.

The prominence of the Blue Ridge is the characteristic feature of the central division of the Appalachians. This rises suddenly from the Piedmont Plateau, east and south of it, to heights far greater than the Alleghanies attain. Beginning prominently in South Mountain, in southern Pennsylvania, it stretches southwestward in greater and greater heights, through Virginia and western North Carolina, where it divides, the northern branch continuing westward to Georgia as the Unaka, or Great Smoky Mountains. These form a broad mass of mountains on the border between North Carolina and Tennessee, containing peaks exceeding those of the White Mountains of New Hampshire, and consequently the highest east of the Rocky Mountains. The culminating group, reaching in Mount Mitchell 6710 feet, is known as the Black Mountains (q.v.), and contains many peaks above 6000 feet in height. The Unaka Mountains are characterized by the great sharp-ridged spurs which leave the main chain and preserve its height for a distance of several miles; between these spurs are deep valleys only wide enough at the bottom for the creek-beds which are invariably found there. The altitudes of the extended valleys in this great highland region are from 2000 to 3000 feet. To the west of the steep-sided Unaka ridge lies a valley, about 50 or 60 miles wide, in Tennessee, which contains the Tennessee River and its tributaries, the Clinch, Holston, and French Broad.

Geology. The Appalachian Mountains are folded mountains; i.e., they have been formed by plications or folds of the rock layers that make up the crust of the earth in this region, and the particular type of plication is so well developed in this region that it has received the name of the "Appalachian type" of folding. The Blue Ridge, along the eastern side, consists of layers of crystalline rocks, the oldest known in the Appalachians, that have suffered so great an amount of metamorphism as to render the determination of their exact age a matter of considerable difficulty. They are grouped under the term "fundamental complex," and it is certain that they are in large part pre-Cambrian; and some are even Archæan on the eastern edge of the Blue Ridge. On the western edge isolated masses of Cambrian rocks are found. All these rocks of the Blue Ridge have been much folded and compressed, so that the layers now stand almost on end and are even overturned. Great faults and overthrusts are common, and add to the difficulty of unraveling the structure of the district. In the Appalachian valley the geological structure is also quite complex, though the strata are not so intensely metamorphosed. The rocks are limestones, shales, and sandstones, and they lie in closed folds that become more open toward the western side of the valley. These folds are peculiar in that their eastward slopes are always steeper than the westward. When the folds are overturned, the inversion is toward the east; and overthrusts are also toward the east and often of considerable extent. This valley is largely the result of the erosion of a great limestone formation, of Cambro-Silurian age, that extends its entire length. The Alleghany Mountains consist of rocks of Paleozoic age, Cambrian to Carboniferous, inclusive, that have been elevated into folded ridges and then eroded to their present topography. The softer beds have been worn into valleys, and the harder beds, having resisted erosion, have been left to form the ridges and benches. In this limestone also have been eroded the wonderful series of caves of the Shenandoah valley and elsewhere, of which that at Luray, Va., is a striking example. (See CAVES.) Anticlinal and synclinal folds alternate in diminishing intensity toward the west, where they disappear in the nearly horizontal beds of the Cumberland Plateau, which is made up of Carboniferous rocks.

Drainage Development. The region now occupied by the Appalachian Mountains has been the scene of many physiographical changes too complex to explain here. At a comparatively recent time, however, the whole of the Appalachian system consisted of a great rounded plateau with an elevation of perhaps 4000 feet, the surface of which is called by geologists the Kittatinny Plain. Above this plain arose to a moderate height the now high mountains of western North Carolina. Along a central zone the land increased in altitude to a region in Virginia which thus became the watershed. The rain now did its work, and the great rivers—the New, the Roanoke, James, Potomac, and Susquehanna—cut out their paths through the then nearly level region, and a well-developed system of highlands and drainage was established. However, the subsequent elevation of land in this region by amounts ranging from 200 feet in the north to 1700 feet in Virginia, once more disturbed the adjustment of the water systems and gave a new impetus to the work of the flowing waters.

While the Appalachian Mountains form the watershed between the Atlantic slope and the Mississippi valley, yet throughout there is no definite watershed line on one side of which the rivers flow to the west and on the other toward the east. In the northern part the streams chiefly break through the mountains from the western side to the east. In the middle part some escape toward the east and some toward the west; while at the south the eastern mountain range of the Blue Ridge forms the watershed. The water-courses appear to be independ-

ent of the direction of the mountain ranges, and instead of pursuing what appear to be the natural directions along the present great valleys, they flow across the ridges through deep gaps in them. This peculiar circumstance is due to the fact that these gaps were cut by the streams before the intervening ridges were upheaved.

The chief streams draining the eastern slopes of the central and southern divisions of the Appalachians into the Atlantic are the Hudson and its branches on the west; the Delaware, Schuylkill, Susquehanna, Potomac, and the James, which cut their way eastward through the mountain ranges; and the Rappahannock, Dan, Yadkin (Pedee), Catawba, Broad, Saluda (branches of the Santee), and the Savannah, which rise from the eastern slope of the Blue Ridge, whose western slopes drain into the Susquehanna, Shenandoah (Potomac), James, or Tennessee. On the south are the Chattahoochee (head stream of the Apalachicola) and the Coosa (head stream of the Alabama), flowing into the Gulf of Mexico. The streams draining the Appalachian region on the west are tributary to the Ohio River. They are the Hiwassee, the Little Tennessee, and the French Broad, which flow from the Blue Ridge through a network of high mountains and break through the great Unaka range to the Tennessee; the Holston and Clinch rivers, also tributaries of the Tennessee; the Cumberland, the New (head of the Kanawha), the Little Kanawha, Allegheny, and Monongahela. The last two join to form the Ohio. The rivers draining the northern section are the St. John, Penobscot, Kennebec, and Connecticut.

Climate. The climate of the Appalachian Mountains must be characterized as temperate, as they extend from a region in which the average annual temperature is 46° F. southward to a region of 61° F. The region, therefore, partakes of the general climatic conditions of its latitude, modified by its altitude. As the prevailing winds come from the southwest, they do not bring much moisture, and the rainfall and snowfall are not excessive, though greater upon the heights of the central ranges than in the lower areas outside. The rainfall for the year averages about 40 inches throughout most of the Appalachian region, but in the southern section increases to 60 or 70 inches. Droughts frequently occur at the north, but seldom at the south. On the whole, the summer climate of the Appalachian region is delightful, and its charms are becoming more and more appreciated by summer visitors. This attractiveness is increased by the abundance of vegetation, the beautiful scenery, in which grandeur may often be found, and particularly by the presence in many parts of the mountains of springs of saline, chalybeate, and other mineral-bearing waters, both hot and cold. These medicinal waters, together with the purity and energizing character of the air, have long given the mountains, especially in North Carolina and Virginia, a high repute as a health resort.

Vegetation and Fauna. The Appalachian region is principally covered with the climax deciduous forest of eastern North America, viz., that known as the beech-maple-hemlock forest. It differs from the same forest in more northern areas by the presence of such trees as the chestnut, many species of oak, tulip, and magnolia, but such northern forms as the black and yellow birch, the white ash, and the hickories still persist. This forest is marked by great luxuriance and by the large size of many of the trees composing it. In the undergrowth laurel (*Kalmia*) and rhododendron are abundant, especially towards the south. Upon the higher slopes of the mountains the more xerophytic oaks and conifers are abundant. Among the latter are such northern species as the white pine, the balsam fir, and the black spruce, and the more southern *Pinus rigida*, *P. pungens*, and *P. mitis*. Such northern shrubs as *Acer spicatum*, *A. pennsylvanicum*, and *Sorbus americana*, together with several species of *Vaccinium*, are prominent in the undergrowth. The she-balsam, *Abies fraseri*, the Carolina hemlock, *Tsuga caroliniana*, and the mountain-rose bay, *Rhododendron catawbiense*, are found only above 2000 feet from Virginia to Georgia, and a vast array of northern shrubs and herbs reach their southern limit along the same elevations. Of the larger mammalia bears, deer, wildcats, are still common, but by no means plentiful. Wolves and panthers have practically disappeared. Small game birds and foxes are plentiful. At the South wild turkeys are still found. Unfortunately rattlesnakes and copperheads are to be found all over the mountains, yet rarely in dangerous numbers. The woods and streams abound, beyond almost any other part of the Temperate Zone, in fresh-water mollusks.

Mineral Resources. Economic products of considerable importance are found in the Appalachian system. Coal (q.v.) is far the most important; the entire anthracite field and part of the bituminous field of Pennsylvania and other states lie in the Alleghany Mountains and the Cumberland Plateau or its northern extension. The petroleum and oil fields of New York, western Pennsylvania, and southward, barely touch the edge of the Appalachian region. Of the metals, iron occurs as hematite, limonite, and magnetite at many localities; zinc is found in association with magnetite at the well-known localities of Franklin Furnace and Ogdensburg, N. J., and as blende, calamine, etc., associated with lead, at the Bertha Mines in Wythe County, Va. Lead has been found in small amounts at many points, but does not occur in sufficient quantity to constitute an independent industry. Copper is found native in the crystalline rocks of Virginia, and as chalcopyrite often in large masses, as at Ducktown, eastern Tennessee. Gold and silver occur in small amounts chiefly in Georgia and North Carolina; nickel and cobalt are also found sparingly. Bauxite, one of the ores of aluminum, has assumed great importance in Alabama, and manganese has been mined in large quantities in Tennessee and Virginia. Natural cement, of such high grade as to make it a rival of Portland cement, is found at many outcrops of the Upper Silurian formations in New York, New Jersey, Pennsylvania, and Maryland, and lime is burned throughout the region. Building stone of good quality is abundant, and slate of excellent grade is quarried in New Jersey and Pennsylvania. Asbestos, mica, garnet, and emery are mined in Virginia, the Carolinas, and Georgia, and gems of many kinds are found in the Blue Ridge. The entire Appalachian system had a distinct influence on the early history of North America and the United States. It formed a great barrier to western settlement that was only permanently overcome when the pioneers of Daniel Boone's time, 1775, broke through the passes and secured a footing

in the Kentucky and Ohio valleys. Previously the Hudson and the Mohawk valleys offered the only practicable highway into the interior of the continent, and the indomitable warriors of the Iroquois effectually blocked that path, their settlements being distributed from Albany to Buffalo and their several political divisions lying transversely across the State of New York.

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AP'PANAGE, or **APANAGE.** A French word which originally meant a provision for younger children when the main inheritance descended by primogeniture. Then it came to be the name applied in feudal law to contributions from the exchequer granted for the maintenance of princes of the royal house, or to lands and the revenues of lands set apart for the same purpose. Territorial appanages were bestowed either for life or upon a man and his direct heirs forever. It is of importance historically only in French history. Under the kings of the Capetian line it became the custom to set apart a valuable territory as the provision for the maintenance of each one of the younger sons and sometimes of the daughters. This custom was a constant source of danger to the policy of consolidation which had made the Capetian line strong, but it was persisted in until the end of the monarchy, in spite of attempts by statute to limit appanages to money or property other than land. In 1810 appanages were established by law for the descendants of Napoleon. By the Restoration their appanage was restored to the Orléans family, and this, which was united to the crown in 1832, was the last appanage in France. In England the Duchy of Cornwall is in form an appanage of the Prince of Wales; but other members of the royal family in Great Britain, as well as in most of the continental monarchies, are now provided for by annual grants from the Civil List. A survival of the appanage in Germany and Austria is the permanent endowment sometimes granted by the state to the princes of mediatized houses.

AP'PARA'TUS (Lat. from *ad*, to + *parare*, to make ready, prepare). In the sciences, a collection of tools or instruments for experimenting or working. In physiology, a group or collection of organs associated in a single function; as, the heart, veins, and arteries are the circulatory apparatus; the legs are the apparatus of locomotion, etc. The term is applied also to any materials used in the comparative critical study of a document.

APPARATUS, PSYCHOLOGICAL. See PSYCHOLOGICAL APPARATUS.

APPAR'ENT (Lat. *ad*, to + *parere*, to come forth, be visible). A term used to express a number of important distinctions, especially in astronomy. The *apparent diameter* of a heavenly body is the angle formed by two lines drawn from the opposite ends of a diameter to the spectator's eye; this obviously depends upon the distance of the body as well as upon its real magnitude; it is also called the angular diameter. A planet seen from the surface of the earth seems nearer the horizon than if seen from the centre of the earth: what is seen from the surface of the earth is the *apparent altitude* of the planet; its real altitude would be seen if an observation could be made from the centre of the earth. The apparent altitude differs from the true on account of parallax and refraction (qq.v.). *Apparent noon* (called also *true noon*) is the time when the visible sun is on the meridian; mean noon is the time when the sun would be on the meridian if his motion in the heavens were uniform and parallel to the equator. (See EQUATION OF TIME.) The daily and annual motions of the sun in the heavens are both *apparent motions*, caused by two real motions of the earth. In general, apparent phenomena are the phenomena of the actual visible heavenly bodies, while the corresponding true phenomena are what the former would be if certain disturbing causes were eliminated.

AP'PARI'TION (Lat. *apparitio*, an appearance, from *ad*, to + *parere*, to come forth, be visible). An illusion or hallucination in which objects, commonly human beings, are seen with such vividness as to be regarded as real. The hallucinations of delirium or insanity are not included under this term. Before the diffusion of modern science, there existed a well-nigh universal belief in the reality of apparitions. Greek and Roman poetry abounds with instances; folklore owes much of its attractiveness to its wealth of spectres and phantoms, fairies and brownies, and its witches and ghost-haunted houses. Dr. Johnson voices the universality of this belief, and, incidentally, gives us a glimpse of a vein of superstition and credulity in his nature when, in his *Rasselas*, he causes Imlac to say: "That the dead are seen no more I will not undertake to maintain against the concurrent testimony of all ages and all nations. There is no people, rude and unlearned, among whom apparitions of the dead are not related and believed." It is not difficult to understand how the untutored savage, encouraged by the events of his dream consciousness which led him to believe in a spirit-self existing apart from its body-self, should come to have an equally strong belief in the externality of the apparitions which he saw in his waking consciousness. Indeed, authorities are not wanting who see in the attitude of early man to apparitions the most important, if not the unique, origin of religion. Whether this be true or not,

we know that many social phenomena which present religious phases (e.g., witchcraft) have owed the possibility of their existence largely to a widespread belief in apparitions.

The reign of universal superstition has, it is true, given way before the onward progress of the scientific spirit; but the more subtle variations of the belief in apparitions have not as yet entirely disappeared. There still prevails a belief in the supernormal nature of apparitions as manifested in clairvoyance (q.v.), telepathy (q.v.), and spiritualism. We need refer, for example, only to the birth in 1847 of modern spiritualism, as a direct descendant of the belief in "haunted houses." In 1882 the Society for Psychical Research was instituted in England. One of its express purposes was to collect data upon the subject of apparitions. Much material has been published in the "Proceedings" of the Society, and in book form by Gurney, Myers, and Podmore. These authors express the relation of apparitions to telepathy in the following passage: "This book, then, claims to show (1) that experimental telepathy exists, and (2) that apparitions at death, etc., are a result of something beyond chance, whence it follows (3) that these experimental and these spontaneous cases of the action of mind on mind are in some way allied." The opposing position is that of Buckley, who asserts that "before endeavoring to explain how phenomena exist, it is necessary to determine precisely what exists; and so long as it is possible to find a rational explanation of what unquestionably is, there is no reason to suspect, and it is superstition to assume, the operation of supernatural causes." If we apply this criterion to the lately collected evidence for apparitions, we must discount for errors of observation, for errors of memory, and for the strong influence of autosuggestion (q.v.). We shall then find that we have left certain unexplained phenomena. Those who do not believe in apparitions account for these as illusions or hallucinations (q.v.).

Bibliography. Buckley, *Faith Healing, Christian Science, and Kindred Phenomena* (New York, 1892); Hibbert, *Sketches of the Philosophy of Apparitions* (London, 1824); Gurney, Myers, and Podmore, *Phantasms of the Living* (London, 1886); Podmore, *Apparitions and Thought-Transference* (London, 1895); Tylor, *Primitive Culture* (New York, 1891).

APPEAL' (from Lat. *appellare*, to address, appeal to, call, summon). In English legal procedure, a term that has two distinct meanings.

1. It denotes an accusation by a private person against another for some heinous crime, demanding punishment on account of the injury to the appellor, or a member of his family, or, in case of treason, against the king. The person appealed, known as the appellor, was entitled to trial by battle (q.v.) if he demanded it. This method of prosecution remained in force until abolished by Act of Parliament in 1819 (59 Geo. III, c. 46), although it had been used but rarely for a century prior thereto. The last appeal of murder brought in England (which led to the enactment of the statute above referred to) was that of Ashford *vs.* Thornton, instituted in 1818, and reported in 1 Barnwell and Alderson, 405. Consult Blackstone, *Commentaries*.

2. The other signification of the term is that of a complaint to a superior court of an unjust judgment rendered by an inferior tribunal. The object of the appeal is to secure the reversal or modification of the judgment or decree of the inferior court through the intervention of the superior tribunal. Originally the word was confined to a proceeding for the review of a decision in an equity, an admiralty, or an ecclesiastical cause. Common-law judgments were reviewed by a writ of error. The chief distinction, between a writ of error and an appeal was that the former brought before the higher court only errors of law committed in the court below, while the latter brought up for review findings of fact as well as of law. The tendency of modern legislation is toward the abolition of forms of action, and as a consequence the method of appeal has generally come to supersede the writ of error, both in England and the United States. (See ERROR, WRIT OF.) The grounds of appeal, the courts to which an appeal may be taken, and the methods of prosecuting appeals are regulated in the various jurisdictions by statutes and court rules. These are so diverse that no attempt will be made here to state their provisions. See COURT; PLEADING.

In parliamentary law, appeal denotes the proceeding by which a member tests the correctness of a ruling of the presiding officer by calling for a vote of the meeting thereon. See PARLIAMENTARY LAW.

APPEAR'ANCE (for derivation, see APPARENT). A term used in its most general meaning to signify what is presented in consciousness. It is that of which consciousness is cognizant as an object distinct from itself. For instance, in a perception I may have of a piece of money, its yellowness, its weight, its hardness, are all appearances to me. Now, the fact that appearance is always related to consciousness raises a metaphysical problem; viz., Is there anything more ultimate, more real, than appearance? And, if so, are the yellowness, the weight, the hardness, and other appearances of the coin really a revelation of what the coin is in its deepest nature, or are they merely the form in which that ultimate nature, whatever it may be, is disguised when it comes into my consciousness? Different schools of philosophy have given different answers to these questions, but a careful examination of the answers shows that they are all determined by the view taken of the nature of reality.

1. Assume that there is a reality different from appearance, that what a thing really is is what it is in absolute independence of all its relations; assume that "we must everywhere distinguish between the intrinsic being of a thing and its relations," adding that knowledge is always a relation, and it becomes clear that the reality of the thing, its intrinsic being, need not be revealed in the appearance it presents to consciousness. In fact, the question arises whether appearances must not be always deceptive. An affirmative answer to this question is the fundamental tenet of dogmatic skepticism (q.v.) and of critical philosophy. (See KANT.) A suspense of judgment on the problem is the attitude of the ancient Skeptics. A negative answer given without giving a reason for it is the attitude of dogmatism. A negative answer can be justified only by showing the nature of consciousness to be such that the presence of a reality in it does not necessarily transform it from what it is in its ultimate character. This is what some conceive to be the problem set by the science of epistemology, or theory of knowl-

edge. See KNOWLEDGE, THEORY OF. Recent realists have developed a theory of consciousness which, they believe, solves the problem. See REALISM and NEW REALISM.

2. Assume we do not and cannot know whether there is a reality distinct from appearance, but that at least we have the conception of its possibility, and the result of this confession is a critical skepticism.

3. Assume that there is no reality *apart* from appearance, and we have on the one hand Positivism (q.v.), and on the other the idealistic systems of philosophy.

Thus the attitude taken toward appearance may form the basis for one of the most convenient classifications of the different systems of philosophy.

Consult: Bradley, *Appearance and Reality* (London, 1897); Royce, *Conception of God* (New York, 1898) and *The World and the Individual* (New York, 1900); Lotz, *System der Philosophie* (Leipzig, 1884; trans. by Bosanquet, 2 vols., Oxford, 1888); Hegel, *Encyclopädie der philosophischen Wissenschaften im Grundrisse* (Heidelberg, 1830), in part translated into English by Wallace, under the titles *Hegel's Logic* (Oxford, 1892–94) and *Hegel's Philosophy of Mind* (Oxford, 1894); Fullerton, *The World We Live In* (New York, 1912); James, *Essays in Radical Empiricism* (New York, 1912).

APPEARANCE. The legal proceeding by which a defendant brings himself, or is brought, into court and made subject to its jurisdiction. In modern judicial procedure the actual presence of the defendant is, in civil cases, dispensed with, a written "appearance" being entered in lieu thereof, though in criminal proceedings, especially in cases of felony, actual presence is still generally necessary in order to give the proceedings regularity. In neither case, however, is appearance necessary to give the court jurisdiction of the person of the defendant, that being effected by the service of the process whereby the action is instituted. The usual method of making appearance is for the party to plead, i.e., put in his answer or defense, though it may be done formally, by serving upon the opposing party a regular notice of appearance, or, informally, by any act whereby the jurisdiction of the court is recognized, as by demanding or submitting to a preliminary examination. In civil cases appearance is usually by attorney. See ACTION; ANSWER; PLEADING; PROCEDURE.

APPEND'ANT RIGHTS (Lat. *ad*, to + *pendere*, to hang). In English law, certain common rights in the land of another (such as common of pasture) which have existed from time immemorial, and which are historically appurtenant to the land of the person claiming the right. They differ from *appurtenant rights* in that the latter, though also connected with the land of the claimant, may be of modern origin and may be acquired by ordinary prescription (q.v.) or by grant; whereas appendant rights are invariably ancient and cannot be created at the pleasure of the parties. For this reason the number of such rights is limited and cannot be enlarged. They are probably survivals of community rights in common lands, which have persisted notwithstanding the inclosure of such lands and their appropriation by private owners. See APPURTENANCE; EASEMENT; PROFIT À PRENDRE; REAL PROPERTY.

APPEN'DICI'TIS. See VERMIFORM APPENDIX.

APPEN'DIX VER'MIFOR'MIS. See VERMIFORM APPENDIX.

APPENZELL, ä'pen-tsĕl' (anciently, Lat. *Abbatis Cella*, abbot's cell). A canton in the northeastern part of Switzerland (Map: Switzerland, D 1), encircled by the canton of St. Gall. It is situated in the heart of the Alps and is noted for its scenic beauty. Altitudes range from 1300 feet, the lowest elevation, to 8215 feet in Sentis. Other prominent points are Jeiden, Wildkirchili, St. Anthony's Chapel, Ebenalp, and the Hone Kasten. The Sitter, a tributary of the Thur, is the chief river. The lofty mountains preclude agriculture on a large scale, but the pasture land is the richest in Switzerland. After the religious wars of 1597 a change was effected in the government of the canton along religious lines, whereby were formed two half-cantons, Ausserrhoden and Innerrhoden, each having an independent local government with representation in the Federal Parliament. Innerrhoden, almost entirely Roman Catholic, is 63 square miles in area and had in 1910 a population of 14,631, engaged principally in cattle raising. The women make beautiful hand embroidery. Trogen, the capital, which had in 1910 a population of 2347, is pleasantly located and is a summer resort. Ausserrhoden, the seat of the Reformed church, 96 square miles in area, had in the same year a population of 57,723, mostly employed in cotton and silk manufacture, chiefly for firms in St. Gall. The capital, Appenzell, had, in 1910, a population of 5126. It was at one time the country-seat of the abbots of St. Gall and is very interesting to-day.

AP'PERCEP'TION (Lat. *ad*, in addition to + *percipere*, to seize entirely, observe, perceive). A term first employed by Leibnitz (1646–1716), for whom it signified a spontaneous activity of the ego which exercised such a modifying influence upon the crude "perceptions" of sense that they became transformed into clear and ordered elements of knowledge. This metaphysical concept was used by Kant (1724–1804) in his epistemology, with sharp emphasis upon the spontaneity of the activity. On the other hand, the term was taken over into psychology by Herbart (1776–1841) and his followers, has been reformed and exhaustively treated by Wundt, and more recently has received extended discussion at the hands of the English psychologist Stout.

Herbart and his school, especially Lazarus (1824–1903) and Steinthal (1823–99), lay stress upon the practical significance of apperception. This principle forms, indeed, the corner-stone both of their psychology and of all modern theories of education based upon it. Apperception is "that psychical activity by which individual perceptions, ideas, or ideational complexes are brought into relation with our previous intellectual and emotional life, associated to it, and thus raised to greater clearness, activity, and significance." The mental resultant of previous experience wherewith we meet and receive a new experience is termed an "apperception mass." There will, of course, be individual variations in the nature of this mass; different minds are unequally prepared for a particular experience. One child will call butterflies "flying pansies"; another knows them to be insects. Thus, from the Herbartian standpoint,

it is of extreme importance for the teacher to acquaint himself with the existing store of ideas in the minds of the children under his charge, in order that the new matter which he presents may be received by appropriate thought-attitudes.

Wundt's treatment combines the psychological acumen of Herbart with the Kantian emphasis upon spontaneity as the characteristic feature of apperception. It includes a careful analysis of the experience of spontaneity into its ultimate psychical and physiological conditions. The salient points of Wundt's doctrine are as follows: Apperception designates (1) either certain phenomena actually given in consciousness, or (2) a certain activity which we infer from these conscious data—i.e., a concept or category under which the phenomena are grouped. As regards the phenomena themselves, we have to note first that the different components of a given consciousness vary in prominence. Some ideas are clear, standing in the focus of attention (q.v.); others are obscure. Ideas may, then, be in consciousness and yet not be "apperceived." Furthermore, the relation is not fixed. An idea may disappear from the focus of attention and another, previously obscure, take its place. Clearness is not, like quality or extent of sensation, dependent merely upon the character of the stimulus. It is not, like intensity, which it most resembles, a function of a single idea, but attaches to a number of ideas. Now the entrance of an idea into the focus of attention is by no means a simple matter. Analysis discloses, besides the increase of the given idea in clearness, (1) a feeling of activity, (2) inhibition of other ideas, (3) strain sensations and concomitant feelings which intensify the feeling of activity, and (4) the reflex effect of (3), which intensifies the given idea. A careful examination of Wundt's writings shows that the "feeling of activity" is not ultimate and unanalyzable, distinct from either sensation or affection (q.v.), but rather a conventional term representing a complex of sensation and affection from the presence of which in consciousness we infer an activity or spontaneity. Wundt distinguishes between "active" apperception, marked by the feeling of activity, and "passive" apperception, marked by a feeling of passivity, a lessening of the intensity of the concomitant phenomena, and less clearness of the focal idea. In typical passive apperception the clarifying of the idea is determined unequivocally and immediately. In active apperception there are several rival ideas; the result is equivocal and frequently delayed. The conditions of apperception are either (1) objective, viz., (*a*) the intensity, and (*b*) the frequency of the presented occurrence; or (2) subjective, viz., (*a*) the nature of the immediately preceding consciousness, and (*b*) the individual disposition of the mind, as determined by its entire previous history.

Apperception is closely related to association. Association, according to Wundt, furnishes all the possible connections of ideas; apperception decides which of the possibilities shall be realized. Thus the idea x may be associatively connected with a, b, c, and d, but apperception may bring it about that, in a given case of the arousal of x, only b appears in attention. This process of choice, of the enhancement of one out of several ideas, together with the feeling of activity, differentiates apperception from association. Apperceptive connections themselves may be either simultaneous or successive. The former are subdivided into (*a*) agglutinations, (*b*) apperceptive fusions, and (*c*) concepts. (See Abstraction.) The judgment is typical of the successive form of apperceptive connections.

Stout defines apperception as the "process by which a mental system appropriates a new element, or otherwise receives fresh determination." Great stress is laid upon the "preformed mental system," which is regarded as an organic whole, not (as by Herbart) a mere apperception-mass of presentations. By its reaction upon the further processes of attention, it gives us the clew to the problems of mental growth and mental organization. Stout further introduces the ideas of "negative" and "destructive" apperception. Negative apperception is a form in which the effort to appropriate a new element is unsuccessful; destructive apperception is a form in which "one system by appropriating a new element wrests it from its preformed connection with another system." In each case there results some positive effect; former systems become modified or new systems are developed.

The early experimental investigations of apperception deal for the most part with the time relations of the various factors involved; the later investigations have analyzed the conditions under which apperception occurs. Valuable results have been gained by a study of the apperception of ideas as conveyed by language (q.v.), both spoken and written.

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APPERT, à'pâr', Benjamin Nicolas Marie (1797–c.1847). A French philanthropist and educator, born in Paris. He introduced into several military schools a system of mutual instruction, and in 1820 founded and conducted gratuitously a school for prisoners at Montaigu. He was suspected of having aided the escape of two prisoners and was himself confined in the military prison. Here he made a study of the moral and physical circumstances of the prisoners, and after his liberation he devoted much time to the study of schools, prisons, and hospitals and published his researches in his *Journal des Prisons* (1825–30) and in a four-volume work called *Bagnes, prisons, et criminels* (1836). After the Revolution of 1830 he was employed by Louis Philippe to superintend the measures taken for the relief of the indigent classes. He also wrote a work entitled *Dix ans à la cour du roi Louis-Philippe* (1846). In his *Conférences contre le système cellulaire* he strongly opposed the system of solitary confinement. It is said that he taught at least 100,000 soldiers to read and write. He has been criticised for one-sidedness, but seems to have been a sincere and warm-hearted philanthropist.

APPERT, François (?–1840). A French technologist, the brother of Benjamin Appert.

He invented (1804) a method of preserving food without the use of chemicals. His method is fully described in his work on the *Art of Preserving Animal and Vegetable Substances* (5th ed., 1834; Eng. trans., London, 1811). It is the well-known method of placing the article of food to be preserved in a can, after heating it, and then sealing the can hermetically. The publication of his method brought Appert a prize of 12,000 francs from the French government.

AP'PETITE. See DIGESTION, ORGANS AND PROCESS OF, IN MAN.

AP'PIAN. See APPIANUS.

APPIANI, ä'pē-ä'nē, ANDREA (1754–1817). An Italian painter, born at Milan. His artistic training consisted in extensive studies of antique sculpture and of the Renaissance masters, and he is the chief master of the classicists in Italy. He first acquired fame by the frescoes of the palace of Monza and of the cupola of Santa Maria presso San Celso (Milan) and was appointed first painter of the court of Italy by Napoleon. He portrayed the Emperor, the Viceroy of Italy and his family, and frescoed several rooms of the royal palace at Milan. After his patron's fall he was afflicted by poverty and illness and died of apoplexy. By reason of the charm of his style he was called the "Painter of the Graces." He excelled all painters of his day in fresco; his oil paintings, to which an entire room of the Brera Gallery is devoted, are mediocre.

AP'PIA'NUS (Gk. *Ἀππιανός, Appianos*). A native of Alexandria, who lived during the reigns of Trajan, Hadrian, and Antoninus Pius. He was the author of a Roman history in Greek, entitled *Ῥωμαϊκά* (*Rōmaïka*), in 24 books, of which only 11 are extant in complete or fairly complete form. It was not remarkable for anything except the plan on which it was written. Instead of proceeding to exhibit chronologically the growth of the Empire, from its rude beginning on the Palatine Hill to the period when its power held the whole world in awe, which is at once the popular and the philosophical method, he divided his work into ethnographic sections, recording separately the history of each nation up to the time of its conquest by the Romans. First in order were the books devoted to the old Italian tribes; then came the history of Sicily, Spain, Hannibal's wars, Libya, Carthage, and Numidia, Macedonia, Greece proper and its colonies, Syria, Parthia, the Mithridatic wars, the Roman civil wars, wars in Egypt, and the imperial wars in Illyria and Arabia. The more complete extant portions deal with Spain, Hannibal, Carthage, Syria, Mithridates, the Roman civil wars, and Illyria. As an historian, Appianus is a mere compiler and not very accurate in his compilation. His geographical knowledge in particular is singularly deficient, considering the age in which he lived. The best edition is that of L. Mendelssohn (Leipzig, 1879–81), resting in large part on the great edition of Schweighäuser (q.v.) in three volumes (1785); translated by H. White (New York, 1899): the translator's preface contains much valuable matter, especially on the manuscripts of Appian.

AP'PIAN WAY (Lat. *Via Appia*). A Roman road, well named by the poet Statius *regina viarum* ('the queen of roads'), the oldest and most celebrated of the Roman roads. It was begun by Appius Claudius Cæcus while censor (312 B.C.). It led from the Porta Capena in the Servian wall at Rome in a southerly direction to Capua, passing through Tres Tabernæ, Appii Forum, Terracina, etc. Subsequently it was carried on to Beneventum, Tarentum, and thence to Brundusium. It was carefully built, though the pavement of large hexagonal blocks, principally lava, on a firm foundation and strengthened by cement, is probably not the original bed. From Rome Terracina the course is nearly straight, in spite of the steep grades in crossing the Alban Mountains and the difficulties of the Pontine marshes. Near Rome the road was lined with tombs, of which many remains can still be seen. The most remarkable of these tombs are those of the Scipios and of Cæcilia Metella. The ancient pavement, in good repair, is still in use in places.

AP'PIA VIA. See APPIAN WAY.

AP'PIUS, MARKET OF. See FORUM APPII.

AP'PIUS AND VIRGIN'IA. A Roman legend of an attempted corruption of maidenly virtue, which has since proved a fertile subject for romancers. The story was originally told by Livy. It is repeated in the *Pecorone di Giovanni Fiorentino*, published in 1378, and again in Painter's *Palace of Pleasure*, in 1566. Modifications of it occur in the *Roman de la Rose* and in Gower's *Confessio Amantis*. "The Doctor" of the *Canterbury Tales* also repeats it in substance. The title has headed no less than three English plays: an early tragical comedy, by an unknown author signing himself R. R., a tragedy by Webster, printed in 1654, and a tragedy by Dennis, in 1709. It is also the subject of a poem, "Virginia," by Macaulay. For other plays on the same subject, see VIRGINIUS.

APPIUS CLAU'DIUS CRAS'SUS. A Roman decemvir (451–449 B.C.). While the other decemviri (q.v.) were engaged in repelling an incursion made by the Sabines, Appius Claudius and his colleague Oppius remained in Rome, with two legions to maintain their authority. Meanwhile Appius Claudius had been smitten by the beauty of Virginia, daughter of a respected plebeian named Lucius Virginius, who was abroad with the army. By force and stratagem, representing that she was the born slave of Marcus Claudius, one of his clients, Appius Claudius gained possession of the girl. Lucius Icilius, who was betrothed to Virginia, and Numitorius, her uncle, threatened to raise an insurrection against the decemviri. Virginius, hurriedly recalled from the army by his friends, appeared and claimed his daughter; but, after another mock trial, she was again adjudged to be the property of Marcus Claudius. To save his daughter from dishonor, the unhappy father seized a knife and slew her. The popular indignation excited by the case was headed by the senators Valerius and Horatius, who hated the decemvirate. The army returned to Rome with Virginius, who had carried the news to them, and the decemviri were deposed. Appius Claudius died in prison by his own hand (so Livy states), or was strangled by order of the tribunes. His colleague, Oppius, committed suicide, and Marcus Claudius was banished.

AP'PLE. The name applied to a tree belonging to the rose family of plants, as well as to its fruit. The common apple is known botanically as *Pyrus malus;* the crab apples belonging to *Pyrus baccata.* All the cultivated

apples of the world have come from these two forms. The fruit of the apple is a *pome*, consisting of a thickened fleshy portion, resulting from the development of the calyx, inclosing the horny cells forming the core and covering the true seeds.

The common apple, *Pyrus malus*, has been in cultivation since prehistoric times. Charred remains of the fruit have been found in the mud of the lakes inhabited by the Lake Dwellers, and according to De Candolle, the tree was probably indigenous to Anatolia, the south of the Caucasus, and northern Russia, and its cultivation began at a very early date. The Siberian Crab, *Pyrus baccata*, is a native of the north, and is of great importance to fruit-growers not only on account of its own hardy and resistant character, but also because it transmits much of its hardiness to its crosses with *Pyrus malus*, thus producing a fruit of good quality that can endure northern climates. Besides these European apples, North America has several wild species. Among these, the prairie apple, *Pyrus ioensis*, is perhaps the most promising from a horticultural standpoint, because crosses between it and *Pyrus malus* (to which class the so-called *Pyrus soulardii* undoubtedly belongs) are already valuable. The eastern wild apple, *Pyrus coronaria*, is of little value for its fruit, but its bloom is beautiful. China and Japan have native apples which are of little economic importance, but are interesting in that they carry the genus through the north temperate zone around the world.

Economically the apple is the most important fruit of temperate regions. It is grown over a wide area, prospering as far north as Scandinavia and as far south as the southern mountain districts of the United States. It has, moreover, been carried into the southern hemisphere, and now, with rapid ocean transit, New Zealand and Tasmanian apples are annually offered during April and May in the markets of London and San Francisco.

North America is the leading apple-growing region of the world. Apples are raised on a commercial scale east of the Rocky Mountains from Nova Scotia south to northern Georgia and west to Wisconsin, Iowa, Nebraska, Kansas, and Oklahoma. In recent years the industry has developed rapidly in Colorado, Utah, Idaho, Montana, British Columbia, Washington, Oregon, and California. These several regions produce an annual aggregate product of 50,000,000 barrels. The greater portion of this yield finds a ready market within the domain of North America; but an increasing share of the crop is being annually exported, mainly to Liverpool, London, and Glasgow. Germany and the Mediterranean countries may be counted upon as a future market for American apples.

The apple is propagated both by budding and by grafting the desired sort on young seedling trees, which are usually grown from seeds obtained from apple pomace at the cider mills. (See Budding; Grafting.) Such seeds give a progeny variable both in hardiness and in habit of growth, and are therefore less desirable for stocks than seedlings grown from seeds of the wild *Pyrus malus* of Europe. Budded trees are preferred by most growers and nurserymen in the eastern parts of the United States; largely because of their quick growth, which shortens the time during which money invested is non-productive. The root-grafted tree is preferred by planters in the northwest; such trees form roots from the scion, if a short piece-root is used. This, sooner or later, produces a tree on its own root, which in turn eliminates the uncertainty of the seedling root and, when "iron-clad" scions are used, gives a perfectly hardy tree. Grafting is again important for the purpose of converting bearing trees, of several years' standing, from one variety to another.

Dwarf apples are grown as espaliers in parts of England. The dwarf trees are obtained by grafting the desired variety on Paradise or Doucin stocks. These are dwarf forms of *Pyrus malus*. New varieties of apples are obtained by sowing the seeds of cultivated sorts. Seeds from such fruits are more likely to give variable offspring than those from wild trees. Frequently thousands of seedlings are grown without producing one valuable tree. Apple trees grow large and endure many years. In planting an orchard, therefore, the trees should be given ample room; 40 feet each way is close enough in New York and the New England States, where the trees grow largest. Farther south, where the trees do not attain great size and are shorter-lived, 33 to 35 feet apart each way is not too close. In the Northwest trees should be planted even closer than this, for there they are liable to injury from sun-scald and wind. Closely planted and low-headed trees serve as a mutual protection. Soils for the apple which have given the best crops and have produced longest-lived trees are chiefly composed of clay or clay-loam impregnated with gravel. Such land, situated so as to afford good air as well as land drainage, produces more regular crops of highly colored and highly flavored fruits than lower and heavier lands. Atmospheric drainage is one of the best material safeguards against late spring frosts, and good land drainage assures a congenial soil for the plant.

The greatest demand in the ripening of the fruit and seed is made upon potash and phosphoric acid. These are the two ingredients most frequently needed by the orchard. If nitrogen be lacking, it can be made up by growing a leguminous crop, s ch as Canada peas, cow-peas, or beans, upon the soil and turning it under.

Cultivation. Good cultivation is an important part of orchard management. In favorable localities, cultivated and fertilized, shallow-rooted crops may be grown between the rows of trees for a few years without detriment to the orchard, but the orchard should not be used as a pasture lot or as regular farm land. Cultivation should be done early in the season to stimulate early growth, but discontinued by July 15 in the United States in order that growth may be checked and the wood mature properly to insure hardiness during the winter and a crop the following season. Sowing a leguminous cover crop at this time, to be turned under in the spring will facilitate the maturing process, add to the supply of nitrogen, and keep the soil in good physical condition. Another essential is proper pruning. This must be modified to suit the variety, locality, and purpose for which the tree is grown. In general, a low head, wide-spreading branches evenly disposed about the trunk and at different heights, are desirable ends. Thinning the fruit shortly after the June drop materially increases the number of fancy apples, reduces the culls, and increases the resistance of the remaining crop to windfall.

APPLES

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1 HYSLOP CRAB	NATURAL SIZE	4 BEN DAVIS	¾ NATURAL SIZE
2 RED ASTRACHAN	¾ NATURAL SIZE	5 NORTHERN SPY	⅔ "
3 YELLOW BELLFLOWER	⅔ "	6 HUBBARDSTON	¾ "

Harvesting and Storage. The work of Powell, Fulton, and others has shown that apples should be fully grown and highly colored to give them the best commercial and keeping quality. When harvested in that condition, they are less likely to scald in storage and are worth more money than when picked in a greener condition. Overgrown apples, such as those produced on young trees, are an exception and require earlier picking. After the fruit is picked, the ripening processes continue much more rapidly at the same temperature than when the fruit is left on the tree. Therefore after picking, the fruit should be taken at once to the storage room. Any bruising or rough handling hastens decay. The fruit keeps best and longest if stored at a temperature of 31° to 32° F. Early apples keep best in small packages which cool down rapidly in storage. Wrapping each fruit with unprinted newspaper prolongs the keeping quality and reduces the amount of decay. Wrapping is commercially profitable only with the highest dessert quality of fruit or for home use. Winter apples keep satisfactorily in barrels.

Varieties. Each section of the world possesses a certain number of varieties which are peculiarly suited to its soil and climate. When apple culture is to be extended to a new region, the problem to be solved is to ascertain which varieties are best adapted to the conditions prevailing in that region. In the United States the varieties held in highest favor by the inhabitants of any given locality have usually proved safest to plant for commercial purposes.

Uses. The apple is used most extensively for cooking and for eating out of hand. It is also employed for cider making and vinegar making. For these purposes smaller or inferior fruits are usually taken. Brandy and other beverages are made from the juice also. Large quantities of the fruit are now dried in evaporators, the product being quite extensively exported to European countries.

Apple Diseases. The apple is subject to a number of fungous diseases, the more important of which are rust, scab, bitter or ripe rot, canker, and crown gall. The rust is due to the heterœcious fungus *Gymnosporangium macropus*, the cause of the well-known galls on cedar or juniper trees. These gall-like growths ripen in the spring of the year and present horn-shaped orange-colored masses filled with spores. The spores are blown to apple trees and cause the rust of the leaves. This generation of the fungus has been given the name *Rœstelia pyrata*. In addition to the leaves the fruits are attacked, often severe losses occurring. There is some evidence that the mycelium of the fungus may find its way into the leaf buds of the apple and infect the next crop without having to depend on the alternate generation. Destroying all cedar trees and thoroughly spraying the apple trees with Bordeaux mixture (see FUNGICIDE) will hold the disease in check. Some other species of Gymnosporangium are associated with apple rust, and a similar disease of pears is common. The apple scab is caused by the fungus *Venturia pomi*, formerly known as *Fusicladium dendriticum*, its conidial stage. Leaves and fruit of both the apple and pear are subject to attack of this fungus. Upon the fruit dark circular spots are formed, and often a number of spots run together and the fruit cracks, exposing the hard brown tissue beneath. Upon the leaves the spots are somewhat similar to those on the fruit, but they are lighter in color. The affected leaves are crumpled, ragged, and finally fall off. This is one of the most serious fungous diseases to which the apple and pear are subject. Varietal differences in susceptibility to scab have been noted in some localities. Spitzenberg, Fameuse, Fall Pippin, and Harvest apples are especially subject to disease, while Ben Davis, King, Fallawater, and many others are less seriously affected. This disease and the losses occasioned by it may to a large degree be prevented by thorough spraying with Bordeaux mixture, lime-sulphur, or other fungicide, three to five applications being given the trees at intervals of about 10 days, beginning at the time of the swelling of the buds. The bitter or ripe rot is due to the fungus *Glomerella rufomaculans*, formerly known as *Glœosporium fructigenum*. This fungus is widely distributed and often causes great loss to fruit-growers. Upon the fruit it produces a soft rot, in later stages often becoming corky, dry, and dark. In advanced stages the fruit is shriveled and dried up. The name "bitter rot" is derived from the bitter flavor of the fruit often associated with this disease. The fungus also produces cankers on the limbs of the trees, from which spores spread to the succeeding crop of apples. All cankered limbs should be cut out, mummied fruit gathered and destroyed, and the trees sprayed as above. There are a number of diseases of apple trees called canker. One common in Europe, due to *Nectria ditissima*, has recently been found in the United States. The pear blight organism, *Bacillus amylovorus*, has lately been found to cause cankers on limbs and trunks of pear and apple. *Nummularia discreta* causes what is known as Illinois canker. The so-called New York apple tree canker is due to *Sphæropsis malorum*, a fungus that also causes a black rot of the fruit. The Oregon canker is due to *Neofabræa malicorticis*. These fungi gain entrance through wounds, destroying the bark and later the underlying wood. Where the attack is slight, cutting out the affected areas, the wound to be disinfected, may be followed, but where severe the trees should be cut and burned, as they are a menace to other trees. Spraying may be beneficially employed in connection with the pruning. The crown-gall of apples, due to *Bacterium tumefaciens*, is found upon the trunk or larger roots just below the surface of the ground. Galls are found elsewhere, but they usually are much smaller. Hard and soft galls are met with, and a disease known as hairy root is believed by some to be a form of crown-gall.

Insect Pests. A large number of insects injuriously affect apple trees and fruit, among which certain scales, beetles, and moths are prœminent. *Beetles.*—Wood-boring beetles are very destructive, especially the round-headed borer (*Saperda candida*) (see Plate of BEETLES), and the flat-headed borer (*Chrysobothris femorata*). The former is one of the worst enemies of apple culture in the United States; and like the others does its damage as a grub, born from an egg laid in the bark, where it bores into and feeds upon the sapwood. A special description of these beetles and other apple-boring beetles, with advice as to control of similar pests, is given in *Entomological Circular No. 32*, and *Bulletin 22*, of the Bureau of Entomology, United States Department of Agricul-

ture. Various root borers and fruit borers are also to be feared here and in foreign lands, especially in Australia, where also a harlequin fruit bug is dangerous. The plum curculio over a great deal of its range is easily second in importance to the codling moth. *Moths.*—Important enemies are to be found among the Lepidoptera, which place eggs on the newly set fruit, whence caterpillars develop within the developing fruit, or which destroy the leaves. The codling moth, tent caterpillar, cankerworms (q.v.), and lesser apple worm are prominent among these. In Europe the principal damage is done by a small white, black-spotted ermine moth (*Hyponomeuta padellus*), and in Japan by a moth (*Laverna herellera*), whose larvæ live in the core of the fruit. The worst American insect of this class is the codling moth, which may be treated by spraying with an insecticide (q.v.). Paris green and arsenate of lead are most frequently used for this purpose. *Scales.*—The San José and oyster-shell scales, which attach to the bark and suck the sap, are two of the most serious enemies of the tree. *Aphids.*—Several species, especially the woolly aphis, are troublesome pests. A calendar showing the kind and approximate time of spraying to check insect pests and diseases is given below:

Directions for making and applying these sprays may be found in the article FUNGICIDE.

Fossil Forms. The genus *Pyrus* is known in a fossil state from the Cretaceous of North America and the Tertiary of North America and Europe.

Consult: J. A. Warder, *American Pomology, Part I, Apples* (New York, 1867); Bailey, *Field Notes on Apple Culture* (New York, 1886); Report of the Kansas State Horticultural Society, *The Apple* (Topeka, 1898); Reports of United States Department of Agriculture, Division of Pomology (Washington); S. A. Beach, N. O. Booth, and O. M. Taylor, *The Apples of New York* (2 vols., Albany, 1905); F. A. Waugh, *The American Apple Orchard* (New York, 1908); L. Woolverton, *The Canadian Apple Grower's Guide* (Toronto, 1910); S. W. Moore, *Practical Orcharding on Rough Lands* (Akron, Ohio, 1911).

APPLE, HENRY HARBAUGH (1869—). An American clergyman and educator, born at Mercersburg, Pa. He graduated from Franklin and Marshall College in 1889 and from the Theological Seminary of the Reformed Church in the United States in 1892. Ordained to the ministry of his denomination, he became pastor of St. John's Church in Philadelphia (1892)

SPRAYING CALENDAR FOR DISEASES AND INSECT PESTS OF THE APPLE

NAME OF TROUBLE	I TREATMENT	II TREATMENT	III TREATMENT	IV TREATMENT	V TREATMENT
Scab	Copper sulphate solution or lime-sulphur solution before buds break.	Bordeaux mixture or lime-sulphur solution when leaf buds are open but before flower buds expand.	Bordeaux mixture or lime sulphur solution as soon as blossoms have fallen.	Bordeaux mixture or lime sulphur solution 10–12 days after (III).	Repeat (III) once or twice at intervals of two weeks.
Rust	" "	" "	" "	" "	" "
Brown spot	Bordeaux mixture at same time as II treatment for apple scab.	Same as III for apple scab.	Same as IV for apple scab.	Repeat (I) if second brood is troublesome.	NOTE–This disease is liable to cause loss of foliage near harvest time. Ammoniacal copper carbonate should be used for late treatments. Lime sulphur has usually less caustic effect on leaves than Bordeaux mixture.
Bitter rot	Bordeaux mixture or lime-sulphur mixture about 8 weeks after blooming.	Bordeaux mixture or lime sulphur solution 10 days to 2 weeks later.	Ammoniacal carbonate of copper or lime-sulphur mixture as substitute for Bordeaux 2 to 3 weeks after (II).	Repeat at 2 weeks intervals when bitter rot is severe.	
Tent caterpillar	Arsenate of lead or Paris green in II treatment for scab.	Repeat (I) in 8 to 10 days.			
Spring cankerworm	Arsenate of lead or Paris green before blossoms open or as soon as they fall.				NOTE–To lessen expense, combine insecticides and fungicides—i.e., use Paris green or lead arsenate with Bordeaux mixture or lime-sulphur solution whenever the poison is desired.
Codling moth	Same as III treatment for scab, with lead arsenate added.	Repeat (I) before blossom buds open.	Repeat (I) 8 to 9 weeks after petals fall.		
Plum curculio	" "				
Bud moth	Arsenate of lead or Paris green as soon as tips of leaves show in bud.				
San José scale. Oyster-shell scale	Winter treatment with strong lime-sulphur mixture or late winter application of a miscible oil.				

and of Trinity Church in York, Pa. (1898). In 1909 he was chosen president of Franklin and Marshall College. Besides holding official position in several other denominational organizations, he was, in 1905, president of the Potomac Synod of the Reformed church.

APPLE BRAN'DY. Brandy produced by distilling the fermented juice of apples. It was at one time extensively produced in New Jersey, where it was known as "Apple-jack," and on account of its ardent and intoxicating qualities as "Jersey Lightning." The process of manufacture is similar to that employed in distilling the juices of other fruits, which will be found described in DISTILLED LIQUORS.

APPLEBY, WILLIAM REMSEN (1865—). An American metallurgist and educator, born in Hoboken, N. J. He graduated from Williams College in 1886 and studied at the Columbia School of Mines in 1886–87. During the two following years he was assistant analytical and pharmaceutical chemist in the New York College of Pharmacy. He became professor of mining and metallurgy at the University of Minnesota in 1890, and in 1891 professor of metallurgy and dean of the School of Mines. He was made a member of several scientific societies.

APPLE OF DISCORD. A golden fruit bearing the inscription, "For the fairest," which was thrown by Eris, or Discord, into the midst of the company at the marriage of Peleus and Thetis. The prize was claimed by Juno, Minerva, and Venus, and was adjudged to Venus by Paris, who was called in to make the award. The decision brought about the Trojan War.

APPLE OF SOD'OM. See SODOM, APPLE OF.

APPLE SHELL, or **APPLE SNAIL.** A large, globose, amphibious mollusk of the warmer parts of Africa and America, of the family Ampullariidæ. They inhabit marshes, attaching their large eggs to the leaves of water plants, where they are searched for and devoured by birds. They possess both lungs and gills, and in some regions use both these organs in rapid alteration, as was observed by Semper (*Animal Life*, p. 191, New York, 1881) in the Philippines. "The ampullaria," he remarks, "lying not far from the surface of the water, protrudes above it a breathing siphon, and inhales air through it; then it closes its lungs, reopens the siphon, and admits a stream of water through it into the branchial cavity." The shells are large, thin, brilliantly striped (see Colored Plate of SNAILS), and are known in South America as idol shells. See Plate of ABALONE, ETC.

AP'PLETON. A city and the county-seat of Outagamie Co., Wis., 100 miles by rail northwest of Milwaukee, on the Chicago and Northwestern, and the Chicago, Milwaukee, and St. Paul railroads (Map: Wisconsin, E 4). It is situated on the falls of the Fox River, which by a series of dams is navigable for steamboats and, with a fifty-foot fall, supplies extensive water power for various manufactures, chief of which are paper and pulp. The dairying interests also are important. Appleton is the seat of Lawrence University, a Methodist Episcopal institution, organized 1847, and has two libraries and three hospitals. The city was settled in 1848 and incorporated as a village in 1853 and as a city in 1857. It has adopted the commission form of government. Pop., 1890, 11,869; 1900, 15,085; 1910, 16,773; 1920, 19,561.

APPLETON, CHARLES EDWARD (1841–79). An English editor. He was born at Reading, and was educated at St. John's College, Oxford, and in Germany. He is remembered chiefly as the organizer of the movement for the "endowment of research," and as founder (1869) and editor (1869–79) of the *Academy*, the distinguishing characteristic of which was its signed articles. Consult John H. Appleton and A. H. Sayce, *Life and Literary Relics* (London, 1881).

APPLETON, DANIEL (1785–1849). An American publisher. He was born in Haverhill, Mass.; first engaged in the dry-goods business there and in Boston, and in 1825 removed to New York to follow the same business. He gradually combined the importing of books with the dry-goods trade and finally devoted himself entirely to the book business, publishing his first book in 1831. The firm which he established, known ever since as D. Appleton and Company, is continued by his descendants.

APPLETON, GEORGE SWETT (1821–78). An American publisher, the third son of Daniel Appleton. He was born in Andover, Mass., studied at Leipzig, and for a number of years was a publisher and bookseller in Philadelphia. In 1849, with three brothers, John, William, and Sidney, he succeeded to his father's publishing business in New York. He was a scholar and art connoisseur, becoming literary adviser to the firm. *Appleton's Art Journal* and the *Popular Science Monthly* were planned by him.

APPLETON, JAMES (1786–1862). An American temperance reformer, born at Ipswich, Mass. When a young man he served in the Massachusetts Legislature. He fought as colonel of militia in the War of 1812 and was promoted to be a brigadier-general. Having removed to Maine, he was elected to the Legislature of that State in 1836. In 1837 he presented to the Legislature a report in which were advanced the principles that afterward became the basis of the Maine liquor law.

APPLETON, JESSE (1772–1819). An American author and educator. He was born at New Ipswich, N. H.; graduated at Dartmouth College in 1792, and was ordained pastor of the Congregational Church, Hampton, N. H., in 1797. He taught in several New England academies and from 1807 to 1819 was president of Bowdoin College. President Franklin Pierce was his son-in-law. *The Works of Jesse Appleton* were published in two volumes in 1836, by Prof. A. S. Packard. Consult: biographical sketch by Rev. Dr. Nicholls in a collection of Appleton's addresses (1820); memoir by Rev. B. Tappan prefixed to *Sermons and Lectures of Jesse Appleton* (1822).

APPLETON, JOHN (1815–64). An American diplomatist. He was born at Beverly, Mass., and graduated at Bowdoin College in 1834. In 1838 he was editor of the *Eastern Argus*, published in Portland, Me. Seven years later he became chief clerk of the Navy Department at Washington; then he held a corresponding position in the State Department. He was *chargé d'affaires* to Bolivia (1848–49), a member of Congress from 1851 to 1853, secretary of legation in London (1855–56), Assistant Secretary of State (1857), and Minister to Russia (1860–61).

APPLETON, JOHN HOWARD (1844—). An American chemist. He was born at Portland, Me., and received his education at Brown University, where he became instructor in 1863 and professor of chemistry in 1868. He wrote a

series of popular text-books that are well known for their attractive form and clearness of exposition. The series includes: *The Young Chemist* (1878); *Qualitative Chemical Analysis* (1878); *Quantitative Chemical Analysis* (1881); *Chemistry of the Non-Metals* (1884); *The Metals of the Chemist* (1891); *Chapters on the Carbon Compounds* (1892); *Lessons in Chemical Philosophy* (2d ed., 1890); *The Assay-Book for Students* (1906).

APPLETON, NATHAN (1779–1861). An American merchant, born at New Ipswich, N. H. He was in partnership with his brother Samuel in Boston. With others, he started the first power-loom for weaving cotton in the United States. He was one of the Merrimac Company whose enterprise founded the city of Lowell (q.v.). He served several terms in the Massachusetts Legislature; in 1830 and in 1842 he was a member of Congress, where he was one of the prominent advocates of a tariff for protection. He published (1858) *Remarks on Currency and Banking.* Consult R. C. Winthrop, *Memoir of Nathan Appleton* (Boston, 1861).

APPLETON, SAMUEL (1766–1853). An American merchant and philanthropist, brother of Nathan Appleton, born at New Ipswich, N. H. He passed his boyhood on a farm. In 1794 he and his brother Nathan went into the English trade in Boston, and afterwards added cotton manufacturing, in which they made a fortune. He retired from active business in 1823 and devoted his entire income to benevolent and scientific purposes, for which he bequeathed $200,000. Consult the Memoir in *Massachusetts Historical Society Proceedings* (1855–58).

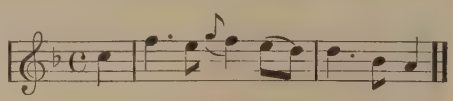
APPLETON, THOMAS GOLD (1812–84). An American poet, artist, and scholar, patron of art and science, born in Boston. He was a brother-in-law of the poet Longfellow and was a noted wit and raconteur. He founded the Boston Literary Club. His verses are collected in *Faded Leaves;* his prose in *A Nile Journal* (1876); *Syrian Sunshine* (1877); *Windfalls* (1878); *Chequer Work* (1879). A *Life and Letters of Thomas Gold Appleton* was edited by Susan Hale (1885).

APPLETON, WILLIAM HENRY (1814–99). An American publisher. He was born at Haverhill, Mass., and studied in secondary schools. In 1848 he became the senior member of the firm of D. Appleton and Company, and for 60 years was prominent in the book trade. He was active in the struggle for an international copyright. Among the publications brought out by him were *The New American Cyclopædia* (1858–63); *Webster's Spelling-Book* (1858); cyclopædias of *Drawing* (1857), *American Biography* (1887–1900), *Applied Mechanics* (1897), and an *Annual Cyclopædia* (1885–1903). In 1872 he wrote *Letters on International Copyright.*

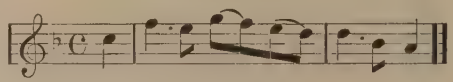
APPLIQUÉ, ă'plē'kā' (Fr. *appliqué,* from *appliquer,* to apply). In architecture and decoration, any design or feature having the appearance of being independently made and applied or attached to the surface of the object it is intended to adorn. The so-called "strap work" of the English Elizabethan and Jacobean styles (1558–1625) is sometimes so designated because it imitates certain woodwork and metalwork of Germany and the Netherlands, in which jigsaw or cut-out patterns on metal, ivory, or wood, were applied to furniture, jewel-boxes, book-covers, etc., and secured by nails or rivets with decorative heads. Such façades as have this appearance of having been brought from elsewhere and fastened to the buildings they decorate (a fashion of design usually open to severe criticism) are sometimes called appliqué façades, sometimes frontispieces. In textile art appliqués of lace or of some contrasting material cut into decorative patterns are very common decorative devices.

When an applied ornament, however, is *sunk into* the body of the decorated object, it ceases to be *appliqué* and becomes an inlay. See ELIZABETHAN ORNAMENT.

APPOGGIATURA, ă-pŏd'jă-tōō'rà (It. from *appoggiare,* to lean, rest). One of those melodic ornaments which are regarded as accessory notes having no time value and which are printed in small characters. There are two distinct varieties of the appoggiatura, the long and the short. The *Long Appoggiatura* was a device of the early classic composers, who disliked to use unprepared suspensions and invented the idea of covering or disguising them by writing them in small notes, as mere embellishments of the melody. This unhappy inspiration has been a source of needless trouble to the music student, who is obliged to learn various rules for the proper execution of this device, in which a note is given one value in writing and another in performance. The time of an appoggiatura is taken from that of the following or "principal" note, and the appoggiatura note is marked with its actual value, while the principal note is marked with the value which both together have. The general rule for its execution is that the appoggiatura is played exactly as if it were written as a large note, and the following note is given what remains of its face value, as shown in the following examples:



WRITTEN THUS.



PLAYED THUS.

The *Long Appoggiatura* always occurs *on* the beat, and has therefore the accent which the principal note *appears* to have. When written before a chord, the appoggiatura only delays the note to which it belongs.

This device has been entirely discarded by modern composers, and Dr. Hugo Riemann wisely suggests that in new editions of the old works it should be removed, and the notes rewritten in the form in which they are to be played.

The *Short Appoggiatura,* now commonly called a grace-note, also originated in the early classic period. It is written as an eighth note, with a stroke through the stem, and is played so quickly that it really has no perceptible time-value. Opinions differ as to whether it should be played on the beat or before it, the difference being merely a question of accent. The classic tradition and conservative opinion demand its execution on the beat, but many musicians of the present day consider it more graceful and more truly ornamental if played without accent,

before the beat. The final decision must be left to the taste of the performer.

APPOINT'MENT (Fr. *appointement*). In English and American law, the act of vesting an estate in one's self or in another, under a power or authority so to do, conferred by the owner of the land. Such powers are created by deed or will, and must be exercised in the manner prescribed by the instrument conferring the power, but only by an instrument competent to create or transfer an interest in real estate. See POWER OF APPOINTMENT.

Appointment to Office is the formal designation, by one in whom the authority has been lawfully vested, of a person to hold a public office or perform a public duty. The term is not properly applicable to the choice of an officer by public election. Usually a certificate, or commission, signed by the appointing officer, is required by law, and this becomes a public record and constitutes the appointee's evidence of title to the office, and his justification for exercising its powers, without which such exercise constitutes usurpation. As to the nature of the rights conferred by an appointment, see OFFICE, and articles and authorities there referred to; also DE FACTO.

APPOLD, ăp'old, JOHN GEORGE (1800–65). An English inventor. His chief inventions were an improvement of the centrifugal pump, a process for dressing furs, and an apparatus for paying out submarine telegraph wire, which was very useful in laying the Atlantic cable.

AP'POMAT'TOX COURT-HOUSE. A village in Appomattox Co., Va., 23 miles east of Lynchburg, on the Norfolk and Western Railroad. The village is the seat of an agricultural school and a government experiment station. Here General Lee surrendered the army of Northern Virginia to General Grant, April 9, 1865, and virtually ended the Civil War. Pop., about 500.

APPONYI, ŏp'pō-nyī, ALBERT, COUNT (1846—). Son of György, and a prominent member of the Hungarian Diet. He was originally the leader of the Conservative "National Party," but in 1899 joined the Liberal Party and in 1901 was elected president of the Chamber of Deputies. He resigned in 1903, announced his secession from the Liberal Party, and in 1904 reorganized the National Party. With his followers he joined the coalition which brought about the fall of the Tisza cabinet in 1905. In April, 1906, he became Minister of Education in the compromise Wekerle cabinet. He visited America in 1904 as a delegate to the World Peace Conference at St. Louis, and again in 1911, when he lectured in the interests of International Peace. He published *Esthetics and Politics, the Artist and the Statesman* (1895) and *A Brief Sketch of the Hungarian Constitution and of the Relation between Austria and Hungary* (1908).

APPONYI, GYÖRGY (George), COUNT (1808–99). A Hungarian statesman. He was a member of the Presburg Diet of 1843–44, and Hungarian Court Chancellor in 1847. He was the leader of the Conservative Party, and opposed the revolutionary movement of 1848–49. He lived in retirement until 1859, when he became a member of the Austrian Reichsrath, where he displayed great ability as a leading advocate of various plans for restoring the Constitution to Hungary. In 1861 he opened the Diet at Budapest as Royal Commissioner and presided over the sittings of the Upper House. He was most influential in bringing about the transformation of Austria-Hungary on the present dual basis.

APPOR'TIONMENT (Lat. *ad,* to + *portio,* part, share, portion). A partition and readjustment of legal rights or obligations to conform to a change in the relations of the parties thereto, and to adjust their respective interests in the subject-matter affected by the change. Apportionment is of frequent occurrence in the law, and may conveniently be considered, first, with reference to the division of claims, or rights, and, second, with reference to the division of obligations, or burdens.

Apportionment of rights occurs where a person having an interest in land or a contract right, entitling him to the use or profits of the land or to payments of money, parts with a share or portion of such right or interest to another. Thus, if the owner of land which is subject to a lease at a fixed rent, sells a portion thereof, the purchaser is entitled to have the entire rent apportioned so that he shall receive the share due from the parcel of which he has become the owner. So, also, apportionment of rent takes place where an entire tenement or estate is partitioned among tenants in common, or passes by will or otherwise to several persons in parcels. Again, if the owner of land under cultivation, for the benefit of such land and of every part of it, enjoys an easement or profit *à prendre* in the land of another, as to take water for irrigation, or manure or seaweed for fertilizing it, a conveyance of a part of his land carries with it a right to a proportionate enjoyment of such easement or profit. This will, of course, be true only in cases where the right so claimed and enjoyed is apportionable or divisible in its nature. A right of way or a right to pasture one's cattle on a neighbor's land would not ordinarily be apportionable, though it is said that a right to pasture a certain number of cattle may be apportioned. The foregoing are all cases of apportionment "in respect of the estate or interest enjoyed" and present no great difficulty. But where the apportionment claimed is "in respect of time," as where the new right accrues between fixed periods of payment, the law is not so simple or consistent. At common law, rents, annuities, dividends, and similar payments falling due at fixed periods were not deemed apportionable in respect of time. That is to say, if an annual rent or a dividend were due on the first day of January, a conveyance of the land or of the corporate shares on the 31st of December would carry with it the entire rent or dividends. No part of it being due until the whole was payable, it was not considered capable of being apportioned. Interest on money loaned was an exception, as in theory of law interest was earned—i.e., accrued—from day to day (*per diem in diem*), notwithstanding the fact that by agreement of the parties the payment was postponed to a fixed date. The inequitable operation of this rule regarding fixed payments and the inconveniences resulting from it have brought about a general change in the law, by statute, both in England and in the United States, and it is now provided that all rents, annuities, dividends, and other periodical payments in the nature of income, are to be considered as accruing from day to day and to be apportionable in respect of time accordingly. At the present time the question of the appor-

tionment of fixed payments presents itself most frequently in connection with the respective claims to income of life tenants and remaindermen, or of the executor of a deceased testator and the person entitled under his will to corporate stocks left by him. The calculation of the respective shares of the parties is sometimes intricate and difficult, depending upon tables of longevity, but the principles governing their interests are as simple as they are just and convenient.

Apportionment of obligations depends on very different principles from those which result in apportionment of rights or claims. Indeed, it may be asserted, as a general proposition, that burdens are not apportionable. A tenant cannot, by alienating a portion of his tenement, relieve himself of any part of his obligation to pay rent; nor can a person, by rendering only a part of the service which he has contracted to perform, entitle himself to compensation for the service rendered. Rights are assignable; obligations are not assignable. No man can at his own will, or by his own act, rid himself of a legal duty by transferring it to another. This is true even of burdens which, in theory of law, rest upon land, as mortgages, servitudes, and other incumbrances. The partition of the land among several owners will not, in general, relieve any portion thereof of the burden which rests upon the whole and upon every part and parcel thereof, although, as between themselves, the several owners may be entitled to an equalization of the obligation which each is equally liable to perform. (See CONTRIBUTION; EXONERATION; SUBROGATION.) The severity of this rule has been relaxed in a few exceptional cases. Thus, it is held that where a person fails to complete a contract for personal services, in consequence of subsequent disability or death, compensation may be recovered for the services actually rendered. (See RESCISSION; CONTRACT.) Again, in cases where a tenant under a rent is evicted from a part of the premises by paramount title—i.e., by some one having a title superior to that of his landlord—the rent is apportioned, the tenant being liable only for the use and occupation of the part actually retained by him. If, however, the eviction be by the landlord himself or by a stranger, or even if it be by the destruction of the premises, in whole or in part, there will be no apportionment of the rent, the tenant in the former case being freed from all his obligations under the lease, and in the second case continuing liable for the whole rent, notwithstanding the eviction. See EVICTION; LANDLORD AND TENANT; RENT; and the authorities noted under the various titles above referred to.

APPORTIONMENT BILLS. In the United States, laws passed by Congress after each decennial census, to define the number of members of the House of Representatives to which the several States are entitled. Every State has at least one member. Twelve apportionment bills have been passed. The first Constitution adopted by the original thirteen States fixed the number of members at 65, and the ratio of representation at 30,000. Representative population then meant all free white citizens and three-fifths the number of slaves; two-fifths of the slaves, all aliens, and Indians not taxed, were excluded from any share in choosing members of Congress. The Fifteenth Amendment to the United States Constitution conferred the franchise on the emancipated slaves in the South. The following figures show the variations of apportionment made for each census:

Period	States	Members	Pop. to a member
1789	13	65	30,000
1790	15	105	33,000
1800	16	141	33,000
1810	17	181	35,000
1820	24	213	40,000
1830	24	240	47,700
1840	26	223	70,068
1850	32	234	93,423
1860	34	243	127,381
1870	37	293	131,425
1880	38	325	151,913
1890	44	356	173,901
1900	45	386	193,175
1910	46	433	211,887

The House had grown rapidly in number of members until 1830, when it was found that it would soon become unwieldy unless the number of representative population required to a member should be largely increased; so the ratio was increased by one-half (raised from 47,700 to 70,680). Since then the purpose has been to keep the House below 300 members, and the ratio is raised regularly, while the number of members is seldom increased unless by the addition of new States. In the various State legislatures a similar practice prevails. At stated intervals, generally of ten years intermediate with the Federal period, a reapportionment is made. This period is often taken advantage of by the party in the majority, who, by combinations of various kinds, "gerrymander" the State, and so redistrict that their opponents are in a hopeless minority at the polls on many succeeding election days.

AP'POSI'TION (Lat. *appositio*, a setting before, from *ad*, to + *ponere*, to place). A term in grammar signifying the annexing of one substantive to another, in the same case or relation, in order to explain or limit the first; as, *my brother, the physician; Thomas the Rhymer.* Whole sentences or clauses admit of apposition. Thus: "Napoleon sought the way to India through Russia, a stroke of genius." Sometimes a connecting word is used where logical propriety would require apposition; as, *the city of London*, for *the city London.*

APPOSITION, IN GROWTH. See GROWTH.

APPRAISE'MENT (from Eccles. Lat. *appretiare*, to value at a price, to rate, from Lat. *ad*, to + *pretium*, price). The official or formal valuation of property, in accordance with legal requirements, or by agreement between the parties interested. Official appraisements in legal proceedings are regulated generally by statute, and are most frequently resorted to in the case of merchandise subject to customs duty; of the personal estate of a decedent; of property taken for public use under the right of eminent domain, or damaged by authorized public works, such as canals; of wrecked property; of property of bankrupts or insolvents; and of property levied upon under judicial process, or distrained for rent. Unofficial appraisements are often provided for by the agreement of parties interested, as in the case of insured property which is injured or destroyed. When an appraisement is duly made, in a legal proceeding or by mutual agreement, the value set upon the property is, as a rule, conclusive upon the parties interested therein. The person appointed or agreed upon to make an appraisement is known as an appraiser. He need not be a technical expert,

but must be "reasonably competent." Official appraisers are usually required to make their return or report in writing and under oath.

The United States revenue laws provide for the appointment by the President of appraisers and general appraisers of customs in the several collection districts, and, where these are lacking, for the appointment of merchant appraisers by the collector of the district. See CUSTOMS; TARIFF LAWS.

AP'PREHEND' (Lat. *apprehendere*, to seize). To take a person into custody by warrant of law for the purpose of subjecting him to criminal process. The apprehension of the person accused of crime is not, strictly speaking, a part of the criminal process, but may precede it, or may occur at any stage in its progress prior to execution of the sentence imposed. Indeed, in some jurisdictions, it may be dispensed with altogether, where the sentence does not call for the physical punishment of the offender. In England and the United States, however, the trial of a person accused of crime cannot proceed without apprehension or personal submission of the accused to the process of the court. The term "arrest" (q.v.), which is, in strictness, applicable only to detention in civil cases, is now commonly employed in all cases of taking a person into custody under legal process.

AP'PREHEN'SION (Lat. *apprehensio*, a setting upon, grasping, understanding, from *ad*, to + *prehendere*, to seize). A term denoting the subjective aspect of perception and imagination, as presentation and representation denote their objective side. Two special uses of the word may be noticed. 1. The phrase "direct apprehension" is employed for the habitual recognition of objects and persons whose presence in our surroundings is a matter of course. We do not, in strictness, "recognize" the clothes that we put on every morning, the pen with which we write, the familiar faces of our household; there is no trace of associative supplementing, or of any well-marked mood of familiarity. Rather, we apprehend them directly. Their look and touch set up a certain bodily attitude, the attitude of easy "at-homeness"; and it is the vague, ill-defined mood of "at-homeness" which mediates the recognition (q.v.). 2. Stout has carried this reduction a step further, in his doctrine of "implicit apprehension." "It is possible," he says, "to distinguish and identify a whole without apprehending any of its constituent details." It is possible, e.g., to understand the meaning of a word—something that stands for a highly complex combination—without any mental imagery whatsoever; the meaning is implicitly apprehended by an imageless thought. There is something fascinating about this assumption of "a mode of presentational consciousness which is not composed of visual, auditory, tactual, and other experiences derived from and in some degree resembling in quality the sensations of the special senses," yet which possesses "a representative value or significance for thought"; but its assumption is unnecessary. We know that the "meaning" which accrues to a perception is largely the result of a predetermination. (See DETERMINING TENDENCY.) Originally the conscious context which gave meaning was elaborate, but eventually this context may disappear and the meaning be carried in physiological terms. So the sound, or articulatory "feel," or sight of the word—or even an unconscious nervous "set"—might come, in time, to carry the meaning which had originally been carried by associated images. Moreover, there can be no understanding, even of the most familiar word, without the arousal of the mood of "at home," with its constituent organic sensations; and there can be little doubt that these are the real vehicle of the word's meaning. Consult G. F. Stout, *Analytic Psychology* (London, 1909), and E. B. Titchener, *A Text-book of Psychology* (New York, 1910).

APPREN'TICE (LL. *apprenticius*, learner, from *apprehendere*, to grasp). A person, generally a minor, lawfully bound to the service of another, in consideration of maintenance and instruction by that other in some art or trade. It was formerly the law in England that a minor seeking to pursue any trade or art involving skill and experience must serve an apprenticeship of seven years, but this was repealed by Act of Parliament in 1814. Except as hereinafter stated compulsory apprenticeship has never existed in the United States. At present the apprentice system in England and in many of our States applies chiefly to orphans or to the children of paupers, and to some extent in this country to minors who, because of delinquency or improper guardianship, are taken in charge by the State acting *in loco parentis*. In such cases the apprenticeship is usually compulsory, i.e., with or without the consent of the minor affected, but in voluntary apprenticeships, even under the old English system, the consent of the minor was always requisite. The system is now regulated by statutes in most of our States, and their provisions must be strictly complied with, or the apprenticeship will be invalid. Ordinarily the consent of the minor, and of his father, mother, or guardian, is required; the apprenticeship is limited to the age of 21 in the case of boys, and 18 in the case of girls, and ceases upon the death of either the master or the apprentice. By section 4509 of the United States Revised Statutes, a boy who has attained the age of 12 years may be apprenticed to the sea service, with his consent and that of his parents, such apprenticeship to cease when he becomes 18 years of age. The Thirteenth Amendment to the United States Constitution, prohibiting "slavery or involuntary servitude, except as a punishment for crime," it has been judicially declared, does not relieve an apprentice from doing service against his will. Consult Kent, *Commentaries on American Law* (14th ed., Boston, 1896); Austin, *The Law Relating to Apprentices* (London, 1890), for the English laws; and the works referred to under the titles CONTRACT; MASTER AND SERVANT.

Apprentice, Naval. Apprentices are enlisted for the United States naval service between the ages of 15 and 17 to serve until they reach 21 years of age. Minors between the ages of 15 and 17 are not enlisted without the consent of their parents or guardians. The applicant must be of robust frame, intelligent, of perfectly sound and healthy constitution, free from all physical defects or malformation, and not subject to fits. He must also be able to read and write. Upon enlistment boys are rated as third-class apprentices and receive $9 per month and one ration. After completing their tour of service in a cruising training-ship, if qualified, they are advanced to apprentices of the second class at $15 per month. After serving one year in cruising ships of war, if qualified, they are advanced to apprentices, first class, at $21 per

month. Apprentices, first class, during the last year of their enlistment, may be given acting appointments as petty officers, third class, and if they serve the probationary period in the United States navy, they must be recommended to a permanent appointment previous to discharge. Upon the expiration of the enlistment of an apprentice, he will, if recommended, receive an honorable discharge. As soon as practicable after the apprentices are enlisted, they are forwarded to the naval training-station at Newport, where they receive instruction in English studies and in the rudiments of the profession of a seaman, for a period of six months. At the termination of this period the apprentices are transferred to the cruising training ships. There are three departments of instruction and training—seamanship, gunnery, and English, the last embracing the ordinary curriculum of an elementary school. There is also special instruction as buglers, carpenters, sail-makers, and blacksmiths. The course of instruction on board the cruising training ships is of six months' duration. The instruction begun at the shore station is continued aboard the cruising vessels with an increase of practical work. When transferred to the regular service cruisers, the instruction is still continued, and the apprentices are regularly examined before being advanced in rating. Should the term of enlistment of an apprentice expire while he is abroad, he is to be sent to the United States as soon as practicable unless he desires to reënlist.

APPROACH'ES (Fr. *approcher*, It. *approcciare*, ML. *appropriare*, come near to, from Lat. *ad*, to + *prope*, near). A term used in the science of fortification, to describe the sunken trenches or passages constructed by an attacking force to cover and protect their advance on a fortified position. Care is taken in the construction of approaches, which are usually in a zigzag course, to avoid enfilade or direct fire, particularly the former. The style of approaches built will depend altogether on the character and strength of the besieged, and the time available for the work. Generally, continuous lines of breastworks are built, parallel to the opponents' lines. If excavation is difficult or impossible, breastworks of sandbags and gabions are built. Approaches are often called *saps*, the operation *sapping*, the diggers *sappers*. The end of the sap nearest the enemy is called the *saphead*. (See SAP.) Important examples of this branch of military operations are the works constructed by the French and English troops in the Crimean War of 1854, at the siege of Sebastopol, and more recently the extensive works built by the Japanese in their attack and capture of the strongly fortified and stubbornly defended position of Port Arthur. See FORTIFICATION; SIEGE AND SIEGE WORKS.

APPRO'PRIA'TION (late Lat. *appropriatio*, a making one's own, from *ad*, to + *proprius*, one's own). 1. The act of applying specific property to a particular use. 2. The act of reserving property for a designated use. In its first signification, the term is applied to unlawful acts, such as those of conversion (q.v.) or embezzlement (q.v.); and to lawful acts, such as the adoption of a design or symbol as a trade-mark, or the final setting aside of specific goods under an executory contract of sale (q.v.) for the purpose of transferring the title or ownership to the buyer. In this signification, also, it is used in the phrase appropriation of payments. When X owes Y several debts, X has the right to appropriate a payment which he makes to any of the debts. If he pays, without exercising the right, Y may appropriate the payment to any debt. In case a payment is made without appropriation at the time, by either X or Y, and subsequently they disagree as to its appropriation, the courts will apply it in accordance with their conception of the justice of the case. These conceptions, as announced in various reported decisions, are tending toward the establishment of fixed rules. Such rules are applied, however, only to voluntary payments, of which the debtor had the power of appropriation. If, for example, a payment is made under judicial process, as upon the sale of the debtor's property under the foreclosure of a mortgage, it will be appropriated ratably toward the claims for which the mortgage was security.

In the second of the above significations, the term "appropriation" is found most frequently in constitutional and statutory provisions. By Article I, Section 9, of the United States Constitution, it is declared: "No money shall be drawn from the treasury, but in consequence of appropriations made by law." In England, "Not a penny of revenue can be legally expended, except under the authority of some Act of Parliament." The most important statute of this sort is the annual Appropriation Act, by which definite sums are reserved for specified objects. Consult the works mentioned under the titles referred to in this article, and for appropriation by a debtor those referred to under the title CONTRACT; for appropriation of funds by the government consult Story, *Commentaries on the Constitution of the United States* (5th ed., Boston, 1891), and Von Holst, *Constitutional Law of the United States of America* (Chicago, 1887).

APPROVE'MENT. The inclosing, by the lord of a manor, of a part of the common (q.v.), or waste lands of the manor, for the purpose of cultivation and improvement. When the acts of approvement and inclosure are completed, the land so inclosed loses its character as common land and is converted to the use of the lord. In general, the lord cannot exercise this right to the exclusion of rights of common, and therefore he can only approve a part of the common land, leaving enough of the waste to satisfy the needs of commoners. The matter is wholly regulated by statute. Consult Pollock and Maitland, *History of English Law* (2d ed., Boston, 1899), and authorities referred to under COMMON.

APPROX'IMA'TION (Lat. *approximare*, to approach, from *ad*, to + *proximus*, nearest). In mathematics, a process or a calculated result not rigorously exact, but approaching the truth with continually increasing exactness, or near enough for a given purpose; e.g., the process of solving a higher numerical equation by Horner's method gives a root that, as the process is extended, approaches the true root with continually increasing exactness; multiplying the diameter of a circle by 3.1416 gives the circumference near enough for most purposes. It should be remembered that a result cannot be more accurate than the data, and that in mensuration the data are not usually carried beyond thousandths of a unit; hence the great importance of approximation, even in ordinary arithmetical calculations.

APPUI, ä'pwē'. See Point d'Appui.

APPUN, äp'pun, Karl Ferdinand (1820–72). A German naturalist, born at Bunzlau. In 1849 he undertook a journey of exploration to South America, where he remained for 19 years. The three years from 1868 to 1871 he spent in his native country, after which he returned to his wanderings in South America, where his death was caused by an accident with sulphuric acid. Appun's studies were extended over a large area in Venezuela, Brazil, and British Guiana. His published works include *Unter den Tropen, Wanderungen durch Venezuela, am Orinoco, durch Britisch-Guayana, und am Amazonenstrom in den Jahren 1849–68* (1871).

APPUR'TENANCE (OF. *apurtenance, apartenance,* from Lat. *ad,* to + *pertinere,* to belong). In law, a subordinate right to another's land which is an incident to the estate of the persons entitled to enjoy the right. Upon conveyance of the principal estate, the appurtenances pass to the grantee without being expressly mentioned in the grant. An appurtenant right is the antithesis of a right in gross, which is a property right attached to the person of the owner. It is not an incident of real estate and may be conveyed apart from it. Appurtenances are classified as profits, sometimes called rights of common, and easements. A profit appurtenant is the right of the owner of real estate, as such, to take a portion of the soil or product from the land or water of another, as to pasture cattle, cut timber, catch fish, take ore or gravel or the like. An easement appurtenant is any right of the owner of real estate, as such, in or over the land of another, which does not involve taking any part or product of the land, as a right of way, or the right to have light and air pass over the land of another. See Easement; Profit; Servitude; and the authorities referred to under Real Property.

APRAXIN, ä-präks'in, Fedor Matveyevitch (1671–1728). A distinguished Russian admiral. When hardly 10 years of age he entered the service of Czar Fedor Alexeyevitch, and at 12 that of Peter the Great, who conceived a great attachment for him, which lasted during the life of the monarch. In 1692, when but 21, he was appointed governor of Archangel, a post of considerable importance in those days. Rising gradually in rank and favor, he was after the year 1700 the most powerful and influential person at the court of the Czar, who made him chief admiral of the Russian navy, of which, in fact, Apraxin may be considered the creator. While Peter was fighting the Swedes in the north, Apraxin was building war vessels, fortresses, and wharves in the south. In 1709 he was appointed president of the admiralty; in 1708 he defeated the Swedish general Lybeker in Ingermanland and saved the newly built city of St. Petersburg from destruction (in appreciation of which services he received a medal from Czar Peter); in 1709, on Peter's return from abroad, Apraxin was made one of his secret advisers and given the title of Count; in 1710 he captured the important town of Viborg, in Finland, and in 1711 commanded in the Black Sea during the Turkish War. The following year he returned to the north, and in 1713, with a fleet of 200 vessels, sailed along the coast of Finland, took Helsingfors and Borgå, and defeated the Swedish fleet. The result of his great successes was that at the peace of Nystad, in 1721, Russia obtained possession of the coveted Baltic Provinces and became the leading power in the Baltic Sea. In 1715 and again in 1718 Apraxin was found guilty of embezzlement and extortion, but, owing to the high favor in which the Czar held him, he escaped serious punishment and lost nothing in reputation. Even for the fine which Apraxin had to pay he was more than recompensed by his royal friend, who presented to him many private estates. Remaining Peter's closest adviser and best aid, Apraxin accompanied him in his Persian War in 1722 and was present at the siege of Derbend. His last naval expedition was in 1726, when he repaired with the Russian fleet to Reval, to defend that place against an expected attack by the English. He died at Moscow.

APRAXIN, Stepan Fedorovitch, Count (1702–60). A Russian general. In 1737 he served against the Turks, gaining rapid promotion, being appointed ambassador to Persia in 1742, general-in-chief in 1746, and field-marshal in 1756. In Elizabeth's court he was a strong opponent of Prussian influence and in the Seven Years' War, as field-marshal, led an army of invasion into Prussia, defeating the Prussian Field Marshal Lewald at Grossjägerndorf, 1757. In the midst of success, he retreated, at the call of Bestuzheff, who wanted to raise Paul to the Russian throne over his father (Peter III), who was the legitimate heir, as the Empress Elizabeth fell dangerously ill. On recovering, the latter removed Bestuzheff and put Apraxin into prison. Of the manner of his death there exists the following legend in Russia: The court-martial reported to the Empress that the prisoner denied any guilt, whereupon she recommended it to apply the last remedy—to set him free. At the next session, when Apraxin persisted in claiming innocence, the president of the court-martial urged his colleagues to apply "the last remedy." No sooner were these words uttered than Apraxin, thinking they referred to torture, fell in a fit of apoplexy.

A'PRICOT (Fr. *abricot,* Sp. *albaricoque,* Portug. *albricoque,* from Ar. *al-birqūq, al-burqūq*). A fruit (Lat. *Prunus armeniaca,* i.e., Armenian plum) resembling in several respects both the peach and plum and really intermediate between them. It is supposed to be a native of China and was brought into Europe at the time of Alexander the Great. The flesh of the apricot is firm, sweet, and aromatic; the stone is smooth and slightly furrowed, like that of some plums. The skin is downy, like that of the peach. The tree resembles the plum more than the peach, in that it has ovate, acuminate, and cordate, smooth, double-toothed leaves, on long stalks, and solitary, sessile, white flowers which appear before the leaves.

The apricot is grown abundantly in France, Italy, Turkey, Syria, and Palestine, and to some extent in Australia and South Africa. The tree is as hardy as the peach, but the danger of loss from frost, owing to its early blooming habit, as well as from plum curculio, has restricted its cultivation in the eastern United States. In California and Oregon it is extensively raised. In England it is a favorite with gardeners and is grown both in the open and as espalier or cordon on protected walls. In the eastern United States, when trained in similar manner to a northern or northeastern wall, the buds are usually sufficiently retarded to escape frost.

In the eastern United States the apricot is usually budded or grafted upon the plum. This fits it for heavy soils; on light soils it does well when worked upon the peach, and in California, where apricot stocks can be obtained, it is worked upon the apricot itself. In New York State there are commercial orchards of apricots, top-worked on the plum. The Russian apricot is a hardy form of *Prunus armeniaca*, and although not in itself of merit for its fruit, may prove to be a valuable stock for the more desirable forms. The Japanese apricot, which is chiefly grown for its blossoms, is *Prunus mume*. Orchard culture is, in general, the same as for the peach. (See PEACH.) The apricot has numerous varieties, of which some of the best are Holland (Breda), Moorpark, Early Golden, and Peach. The fresh fruit is now commonly found in the markets. Large quantities are also dried in California and Oregon in evaporators. The product is extensively shipped to different parts of the United States and abroad, for cooking purposes. Apricot pits are now exported to Europe where an oil similar to almond oil is extracted from the kernels. In the Orient the kernels are largely eaten like almonds. Dried sheets of apricot paste form an important part of the rations of the Mohammedan soldier. For composition and food value of the fruit, see general article on FRUIT. For illustration see Plate of ABUTILON and DRUPES.

Diseases. The apricot is subject to the same diseases as are the peach and plum. The most common disease is the *leaf rust*. It may be prevented by the thorough use of the standard fungicides (q.v.).

APRIES, ā′prī-ēz (Gk. *Ἀπρίης, Apriēs;* Uaphres, Egyptian, *Uaḥ-eb-rē*′). An Egyptian King of the twenty-sixth dynasty. In the Old Testament he is called Pharaoh-hophra. He reigned from 589 to 570 B.C., at the time when the Babylonians subjected Palestine and threatened Egypt. He aided the Jews in their resistance against Nebuchadnezzar, but was unable to prevent the fall of Jerusalem. Apries seems, however, to have warded off the Babylonian attack upon Egypt. The revolt of his native troops sent against the Cyrenæans in aid of the Libyan King Adikran led to the usurpation of Amasis (q.v.). Herodotus, who in general gives a strangely distorted account of Apries, relates that the usurper kept him alive for some time, until at last he was forced to yield up the dethroned King to an infuriated mob. This story is, however, not confirmed by the Egyptian inscriptions.

A′PRIL. See MONTH.

APRIL FOOL. The first of April, known as "All Fools' Day," has long been in America, and for a still longer period in many European countries, a day for mocking unwary persons by sending them on bootless errands or making them the victims of some other practical joke. The custom seems to have been unknown to German antiquity. Grimm regards it as having been introduced into Germany from France, in comparatively modern times. Various theories have been held as to the origin of the custom. One writer traces the custom to the miracle-play formerly represented at Easter, which sometimes showed the sending of Christ from Annas to Caiaphas and from Pilate to Herod; another finds the origin in some ancient pagan festival, such as the Huli festival held by the Hindus on March 31, or the Feast of Fools, celebrated by the Romans on February 17, at which similar tricks were played. In France the victim is called *un poisson d'Avril*, 'An April fish' (possibly from the reopening of the fisheries at that season); in Scotland, a gowk or a cuckoo.

APRIL HOPES. One of the most striking and characteristic of Howells's books, published in 1887. The heroine, Alice Pasmer, is a well-born, well-bred New England girl, but with a Puritan conscience which "makes no allowance for human nature."

A PRIO′RI (Lat. from something prior, foregoing, *a*, from, and *prior*, prior). In Aristotelian terminology, a designation applied to arguments from cause to effect, as opposed to *a posteriori* (Lat. from something posterior, following), which describes arguments from effect to cause. But since Kant's day *a priori* has become an epithet, often polemic, applied to judgments alleged to have a validity independent of experience. Its antonym in this meaning is still *a posteriori*, which means 'resting upon experiential proof.' The attitude one takes toward the question of the possibility of *a priori* judgments is one of the most crucial tests of one's affiliation among the philosophic schools. Rationalists, Intuitionalists, and Criticists (i.e., followers of Kant) maintain that many of our judgments are *a priori;* Empiricists deny it. The debate, however, seems to be conducted upon a false assumption, shared by most of the protagonists on either side, viz., that experience comes piecemeal, or, that technically, it is atomistic in character. If such were the case, then any valid universal judgment would have to be *a priori*, for no number of *isolated* experiences could point to a general law. But experience does not grow by the accretion of unrelated elements; rather is its growth a process of organic expansion under stimulation, which for practical purposes must be regarded as proceeding from the external world. In the knowledge thus acquired, there is the coöperation of what may be distinguished as two factors, the nature of the organism and the nature of the stimulus that gives rise to a content in consciousness. Now, these two factors may conveniently be designated the *a priori* and the *a posteriori* constituents of knowledge. But it is of the utmost moment to guard against the error of supposing that antecedently to experience there is a thing called mind which comes to the act of experience ready equipped with either a determinate nature or with full-blown knowledge of some sort. The literature of the subject is enormous. Omitting all reference to ancient philosophers, some of the noteworthy books bearing on the topic are: J. Locke, *Essay Concerning Human Understanding* (best ed., by Fraser, 2 vols., Oxford, 1894); Leibnitz, *Nouveaux essais sur l'entendement humain*, English by Langley (New York, 1896); also selections translated by Duncan (New Haven, 1890) and by Latta (Oxford, 1898); D. Hume, *Treatise of Human Nature*, book i, part iii (Selby-Bigge ed., Oxford, 1888); D. Hume, *An Enquiry Concerning Human Understanding* (Selby-Bigge ed., Oxford, 1894); Kant, *Kritik der reinen Vernunft*, English by Max Müller (London, 1896); Hegel, *Encyclopädie der philosophischen Wissenschaften im Grundrisse* (Heidelberg, 1830), in part translated into English by Wallace under the titles, *Hegel's Logic* (Oxford, 1892–94) and *Hegel's Philosophy of Mind* (Oxford, 1894); R. H. Lotze,

Logik (Leipzig, 1880), edited in English by B. Bosanquet (2 vols., Oxford, 1888); J. S. Mill, *Logic* and *Examination of Sir W. Hamilton's Philosophy* (London, 1867; last in author's lifetime, 1872); E. Caird, *A Critical Account of the Philosophy of Kant* (2 vols., New York and London, 1889); F. H. Bradley, *Principles of Logic* (London, 1883); B. Bosanquet, *Logic* (Oxford, 1888); L. T. Hobhouse, *Theory of Knowledge* (London, 1896). See also KANT; DEDUCTION; INDUCTION; LOGIC; EMPIRICISM; TRANSCENDENTALISM.

A'PRON (by wrong division into *an apron* for *a napron*, OE. *napron*, OF. *naperon*, Fr. *napperon*, dimin. of *nappe*, cloth, tablecloth, from Lat. *mappa*, cloth, cf. *napkin*). An outer garment, originally of linen but often of cloth or leather, covering the front of the person and intended to protect other clothes from injury. It is used in Coverdale's translation of the Bible (1535) and also in the Authorized Version, to render the Hebrew word *chagorah*, applied to the covering of fig-leaves made by Adam and Eve after the Fall. It has been applied also to various mechanical devices used as a means of protection as (1) in military affairs, a rectangular piece of lead, with a projection on the under side, used to cover the vents in old-fashioned cannon; (2) in shipbuilding, the piece of curved timber set just above the forward end of the keel, to join the several pieces of the stem and connect them more firmly with the keel (see SHIPBUILDING); (3) in engineering structures, a platform placed at the base to protect it from heavy shocks; (4) in carpentry, the horizontal piece of timber which takes a carriage-piece or rough string on a staircase, and also the ends of joists which form the half-space or landings; (5) in plumbing, the lead sheeting or flushing dressed on the slates in front of a dormer window or skylight; (6) in mechanics, the piece which holds the cutting tool in a planing machine; (7) in architecture, a more or less flat member placed against or above anything for protection, as the decorative member under a veranda cornice. Besides the obvious uses of aprons in the original sense, they are worn also in elaborately decorated forms as part of the costume of Freemasons (see MASONS, FREE) in the lodge; while bishops and deans in the Church of England wear an apron of black or purple silk which is an abbreviation of the older cassock.

AP'ROSEXTA. Lack of power to concentrate the attention. The term is most frequently used to describe a condition of mental vacuity, inattention, and restlessness present in many children who suffer from adenoids (q.v.).

APSE (for derivation, see APSIDES). An architectural term used by Greeks and Romans to designate a vaulted structure, such as a domical chamber, or even a triumphal arch. The Romans applied it particularly to the large, semicircular niche that projected from some of their temple cellas or basilicas; in the temples it was the place for the cult image of the god; in the basilica it was the prætor's tribunal, where he sat surrounded by his assessors. In both cases it was the culminating point of the structure. The partial derivation of the Christian church or basilica from the Roman basilica or law court makes it natural that this semicircular projection or apse should appear as an integral part of the earliest churches. Early Church writers called it *exedra*, *concha*, or *conchula hematis*. The higher clergy were seated on a bench around the apse; the bishop took the prætor's place in the centre of the semicircle. Being the most sacred part of the church, the apse received the richest and most artistic decoration, and the most sacred subjects were depicted upon its semidome and walls. The width of the apse usually corresponded to that of the nave or central aisle of the church, whose end it seemed to form. It was not until the seventh or eighth century that smaller apses were often placed in the same way at the ends of the side aisles. They may have developed from the small sacristies which had for centuries usually been placed there.

Byzantine architects gave a polygonal form to the exterior, while preserving the interior semicircular outline (e.g., Ravenna). Square apses,

APSE FLANKED BY TWO APSIDIOLES.
S. Pedro Avila (Spain)

very rare at first, became common in the eleventh, twelfth, and thirteenth centuries, especially in Cistercian abbeys. The development of transepts led sometimes to the use of apses at their terminations, as in the Romanesque churches at Cologne and in the French Gothic churches of Senlis, Noyon, and Soissons. Many German Romanesque (and a few Gothic) churches have an apse at the west as well as the east end. The addition of an ambulatory (q.v.) with radiating chapels greatly enriched the east end of the church, both internally and externally; while the lengthening of the eastern portion between the apse and the transepts to accommodate the choir, transferred thither from its former position in the crossing and eastern part of the nave, further increased the importance and splendor of the apse, the whole eastern part of the church, including the apse, ambulatory, and chapels, being thereafter generally known as the "choir." This change seems to have begun in the twelfth century. The development of Gothic construction, with its multiplied buttresses, pinnacles, and flying arches, gave still greater magnificence to the exterior of the apse, in contrast to its primitive plainness (Amiens, Le Mans, Cologne cathedrals). See CHOIR, CHURCH.

APSHERON, äp'she-rōn'. A peninsula of Russia on the west shore of the Caspian Sea (Map: Russia, G 6). It is famous for its immense deposits of naphtha, probably the richest

in the world. The soil is sterile, and strong winds prevail. See BAKU.

AP'SIDES, ăp'sĭ-dēz (Gk. pl. of *ἁψίς, apsis,* loop, juncture). The two extreme points in the orbit of a planet—one at the greatest, the other at the least distance from the sun. The term "apsides" is applied in the same manner to the two points in the orbit of a satellite—one nearest to, the other farthest from, its primary; corresponding, in the case of the moon, to the perigee and apogee. A straight line connecting these extreme points is called the line of apsides, or the major axis of the orbit. In the planetary orbits this line has no fixed position in space, but undergoes a motion in the plane of the orbit. This fact in the orbit of the earth gives rise to the difference between the anomalistic (q.v.) and sidereal years. This motion of the line of apsides is especially remarkable in the orbit of the moon, an entire revolution taking place in 3232.57 days, or a little less than nine years.

APSID'IOLE. A small apse or apse-like projection; used especially of the small semicircular chapels radiating from the apse or ambulatory, or projecting from the east side of a transept, in early mediæval churches. See APSE; CHURCH.

AP'SLEY HOUSE. The mansion built by Lord Bathurst in 1785, and purchased in 1820 by the government for the Duke of Wellington in reward for the latter's services to the nation in the Napoleonic wars. In 1830 its windows were broken by the mob on the anniversary of Waterloo, and the Duke was forced to have them protected by iron shutters.

APSLEY STRAIT. See BATHURST ISLAND.

APT, ăpt (anciently, Lat. *Apta*). The capital of the arrondissement of the same name, in the department of Vaucluse, France, on the Coulon River and the Mediterranean Railway (Map: France, S., K 5). It contains a communal college, library, meteorological station, and manufactures silk. There is some trade in grain and fruit. Its cathedral is supposed to have been built about the eighth century, and it contains numerous specimens of Romanesque architecture. Roman remains have been found in the vicinity, for in ancient times Apt was the chief city of the Vulgientes and received much attention from Julius Cæsar, who gave it the name of Apta Julia. It came into the possession of France in 1481. Pop., 1901, 5948; 1906, 6418; 1911, 6336.

AP'TERAL (having no wings, Gk. *ἀ, a,* priv. + *πτερόν, pteron,* wing). A term applied to Greek and Roman temples without lateral colonnades, or *pteromata,* outside the *cella;* and also to Christian churches which either had no aisles or whose façades had the form of a single unbroken gable, not divided into three sections.

AP'TERYG'OTA. A prime division of Insecta, embracing primitive insects without wings and including the Thysanura and Collembola. See BRISTLETAIL; SPRINGTAIL.

AP'TERYX (Gk. *ἀ, a,* priv. + *πτέρυξ, pteryx,* wing). The scientific name for a genus of small ratite birds of New Zealand, comprising the order Apterygiformes. It has come into general use and, except locally, has taken the place of the native name "kiwi." The term "wingless" is incorrect, for while the fore limbs are greatly reduced and functionless, yet there are present the humerus and a single complete digit.

This remarkable group of birds was for a long time a puzzle to ornithologists. Sham first described an apteryx in 1813, and not until the accumulation of material in 1833 was it possible to assign it even its approximate place in systematic classification. Owen investigated its anatomy so carefully that, supplemented by Parker's later studies, the structure of few birds is even to-day more thoroughly understood. Its body shows a confusing mingling of primitive and specialized characters. For example, while the plumage covers almost the entire body uniformly, yet the wings, nostrils, and oil-gland are extremely specialized. Until the middle of the last century almost no living birds had been seen by travelers or naturalists, and not until 1847 did a second species become known. Three years later a third was discovered. In 1851 the first living apteryx reached England, and since then many have thrived in various zoölogical gardens and have laid eggs, none of which, however, have been fertile. They are ill adapted for exhibition, as their nocturnal habits keep them hidden from view, usually concealed beneath straw or any material at hand. In 1872 a complete account of the apteryx was published by Sir W. Buller. This extent of knowledge is very fortunate, for these birds, so highly interesting as relics of past times and an extinct fauna (see MOA), are to-day approaching extinction. Portions of their haunts have recently been set aside as game preserves, so there is a bare chance that they may exist for some time and possibly hold their own for years. Six forms are recognized: the apteryx, or kiwi, of North Island, *Apteryx bulleri* or *mantelli; Apteryx oweni,* a very different species, known as the Gray Apteryx, is confined to South Island, while a spotted sub-species of this form, *Apteryx oweni occidentalis,* is found on both islands. *Apteryx australis, lawryi,* and *haasti* complete the list. Consult Pott's articles in the *Transactions of the New Zealand Institute.*

The apteryx, or kiwis, are about the size of common fowls and are robust in form, with massive legs and feet, having a short hind toe (not present in other existing Ratitæ, no visible wings or tail, a very long, down-curved flexible bill, with the nostrils at the extreme end, and a covering of loosely vaned, almost hairlike feathers, which have no after shaft. The southern and northern kiwis are dark reddish-brown, striped lengthwise with yellowish-brown, but Owen's kiwi, which is much smaller than the others, is light grayish-brown transversely barred with black. Fossilized species are also known from remains found in company with the bones of moas. The females are about one-sixth larger than the males—a fact connected with their extraordinary reproduction, for the female lays only one yellowish-white egg (or uncommonly two) annually, which is gigantic in proportion to the size of the bird, that of the North Island species measuring 5 by 3 inches, or nearly a quarter of the bulk of the mother's body. This is deposited in a depression in the ground, and is incubated wholly by the male; and the young one when hatched is well grown, well feathered, and able to take care of itself.

These birds are natives of the mountainous forested parts of New Zealand; they are entirely nocturnal in their habits, and doze inertly in the daytime, in a rolled-up attitude. In former days, when they were numerous, they went about in small companies, and toward morning the woods rang with their shrill cries. The loss of flight-power is compensated by great strength

of the feet (the sharp claws of the toes are good weapons), and they run swiftly. Their food consists mainly of earthworms, which are obtained by plunging the bill deeply into the ground, the location of the worm having been detected, probably, by the sense of smell aided by that of touch. The nostrils differ from those of all other birds in being at the extremity of the upper mandible, and the bird makes a continual sniffling sound as it moves about. Other insects and some fruits are also eaten. The common statement that when quiet the kiwi sustains its weight by resting upon the point of the bill is an exaggeration; this attitude is rarely taken. Their numbers are greatly decreased, and these birds will soon become extinct, no doubt, as a wild species. Kiwis are still numerous, however, in some of the more secluded forests; but the Norway rat is fatal to all ground birds. Kiwi feathers were prized by the Maoris for hair-like ceremonial mats.

Consult Newton, *Dictionary of Birds* (London and New York, 1893–96), for a general history of investigations. For anatomy, consult: Owen, *Transactions of the Zoölogical Society*, vol. ii (London, 1846); Parker, *Transactions of the Philosophical Society* (London, 1891, 1892). For habits, consult Buller, *Birds of New Zealand* (2d ed., London, 1888), various articles in the *Transactions* of the New Zealand Institute, and Hutton and Drummond, *Animals of New Zealand* (1905). See Plate of CASSOWARIES, ETC.

AP'THÆ. See APHTHÆ.

AP'THORP, WILLIAM FOSTER (1848–1913). An American writer and musical critic, born in Boston, Mass. He graduated at Harvard in 1869 and studied music under J. K. Paine and B. J. Lang. He is well known as the author of *Hector Berlioz: Selections from his Letters and Writings*, with a biographical sketch, a pioneer work in English on this composer; and books of musical criticism, including *Musicians and Music Lovers* and *The Opera, Past and Present*. He lectured at the Lowell Institute, Boston, and the Peabody Institute, Baltimore, and taught at the New England Conservatory, Boston, and the College of Music of Boston University. From 1892 to 1901 he wrote the analyses of musical compositions which appeared in the programme of the Boston Symphony Orchestra. For twenty years after 1881 he was musical critic of the Boston *Transcript*.

APULEIUS, LUCIUS. A Latin satirical writer of the second century. He was born about 125 A.D., at Madaura, in Africa, where his father was a magistrate, and a man of large fortune. Apuleius first studied at Madaura, then at Carthage, which at one time enjoyed a high reputation for its school of literature. Afterward he went to Athens, where he entered keenly upon the study of philosophy, displaying a special predilection for the Platonic school. The fortune bequeathed to him at his father's death enabled Apuleius to travel extensively. He visited Asia and Italy and was initiated into numerous religious mysteries. The knowledge which he thus acquired of the priestly fraternities he made abundant use of afterward in his *Metamorphoses*, or *Golden Ass*. He went also to Rome, perhaps about 150, and practiced law there; at this time, too, he published, it would seem, his *Metamorphoses*. His first appearance in literature arose from a lawsuit. He had, about 155, returned to Africa, and had gone to Oea, a town on the coast near the modern Tripoli. Having married there a middle-aged lady, named Pudentilla, very wealthy, but not particularly handsome, he drew down upon his head the malice of her relatives, who desired to inherit her riches, and who accused Apuleius of having employed magic to gain her affections. His defense (*Apologia*, still extant) spoken before Claudius Maximus, proconsul of Africa, was an eloquent and successful vindication of his conduct. After this event his life appears to have been devoted zealously to literature and public oratory, in both of which he attained great eminence. He was extremely popular, so that Carthage and other cities erected statues in his honor.

The *Metamorphoses*, or *Golden Ass*, the work by which his reputation has survived, is a romance or novel, whose principal personage is one Lucian, supposed by some, chiefly on the evidence of the eleventh and last book, to be the author himself. Lucian, in search of adventure and keen for knowledge of various mysteries, is by an accident transformed by magic into an ass; in this guise he has all sorts of adventures till at last he recovers his human form by eating roses in the hands of a priest of Isis. It has been often regarded as a satire on the vices of the age, especially those of the priesthood, and of quacks or jugglers affecting supernatural powers, though Bishop Warburton and other critics fancied they could detect in it an indirect apology for paganism. More probably it is only a series of amusing stories without serious purpose. Its merits are both great and conspicuous, as are also its faults. Wit, humor, satire, fancy, learning, and even poetic eloquence abound. Apuleius had a wonderful power of accurate and vivid observation of details, and his stories are highly realistic. The style is vigorous and exuberant, but is also disfigured by excessive archaisms, and there is a frequent affectation in the metaphors, etc. The name *Golden Ass* is not due to Apuleius himself, but is a complimentary designation of later times. The most exquisite thing in the whole work is the episode of Cupid and Psyche (imitated by La Fontaine). It has been by some supposed to be an allegory of the progress of the soul to perfection. Besides the *Apologia* and *Golden Ass*, we have from the pen of Apuleius an anthology in four books, called *Florida*, a work on the dæmon of Socrates, one on the doctrines of Plato, one on *The Universe*, etc. Many of his works are lost. A recent edition is by J. van der Vliet, the *Metamorphoses* (Leipzig, 1897); *Apologia* and *Florida* (Leipzig, 1900). Much better is that by R. Helm, the *Apologia* (Leipzig, 1895); the *Metamorphoses* (Leipzig, 1907); *Florida* (Leipzig, 1910); and the *De Philosophia Libri*, by P. Thomas (Leipzig, 1908). The *Golden Ass* was translated into English by T. Taylor (London, 1822), by Sir G. Head (London, 1851), by Walter Pater (q.v.), in his Marius the Epicurean, and by H. E. Butler (Oxford, 1910). Butler also translated the *Apologia* and the *Florida* (Oxford, 1909). A still earlier translation by Adlington in 1566 has been republished, with an introduction by Whiblery (London, 1893), and again with an introduction by T. Seccombe (New York, 1913). An English version of the works of Apuleius was published in London, 1853. Consult also for Apuleius's life and works E. Rohde, *Rheinisches Museum*, pp. 66–113 (1885); and the edition of the Cupid and Psyche story by L. C. Purser (London, 1910).

APU'LIA. A part of ancient Italy lying along the Adriatic Sea, and bounded on the west and south by the Frentani, Samnium, Lucania, and Calabria (Map: Italy, L 6). Modern Apulia (It. *Le Puglie*) comprises the provinces of Bari, Foggia, and Lecce. It is a vast plain drained by numerous small streams flowing toward the Adriatic; on the whole, however, the land is *pauper aquæ*, as Horace called it. The country has extensive areas of pasture land, and the raising of domestic animals is the chief occupation of the inhabitants, as it was in ancient times. Chief towns: Bari, Brindisi, Foggia, and Lecce. Pop., 1881, 1,519,064; 1901, 1,949,423; 1911, 2,128,632. According to old poetic traditions, Daunus, King of the Apulians, when banished from Illyria, had settled in Apulia. The chief towns of Apulia were Arpi, Barium, Canusium, Luceria, and Venusia (birthplace of Horace). The Romans first came in contact with the Apulians in 326 B.C., when a friendly alliance was formed; but the Apulians joined the Samnites, the Tarentines, and finally Hannibal in attempts against Roman supremacy. Much of the Second Punic War was fought in Apulia, and here the Romans lost the disastrous battle of Cannæ (q.v.). After the fall of Hannibal Apulia was wholly subjugated by Rome. When Augustus divided Italy into districts, the *Regio II* was made to include Apulia and Calabria.

APURE, ä-pōō'rā. An important tributary of the Orinoco, rising in the eastern slopes of the Andes near Bucaramanga, in Colombia, South America. Flowing eastward it enters Venezuela, receiving from the south the Caucagua River and from the north the Portuguesa, the Guarico, and others; finally joining the Orinoco 200 miles above Ciudad Bolivar. It is more than 700 miles long, navigable through the greater part of its course.

APURIMAC, ä'pōō-rē'mäk (Peruvian *upu*, principal, chief + *rimac*, oracle). A Peruvian river, one of the head streams of the Ucayali (q.v.) (Map: Peru, C 6). It flows from Lake Vilafro in the high Andes in lat. 15° S., about 100 miles northwest of Lake Titicaca, and flows northwest throughout about 500 miles of its course, but after uniting with the Perene it is known as the Tambo. It flows eastward and then northward for a distance of 100 miles to its place of union with the Quillabambi, to form the Ucayali, which in turn, uniting with the Maranon, forms the Amazon. The Apurimac possesses the peculiarity that its tributaries, the chief of which are the Pampas, Mantaro, and Perene, are received from the west side. Among the tributaries of the Amazon it probably rises nearest to the Pacific Ocean. The Apurimac and its tributaries are of the nature of great mountain torrents, and their rocky and rugged banks are generally difficult of access and oftimes wholly inaccessible. The valleys through which they flow vary in climate and productiveness with change of altitude. The lower valleys yield the products of the tropics, and the upper ones those of temperate and cold climates. The basin of the Apurimac, as a whole, is said to be the finest part of Peru, and to contain the largest proportion of native population—the best specimens of the aboriginal civilization.

APURIMAC. A department of Peru (Map: Peru, C 6). Area, 8189 square miles. The surface is largely elevated and well watered. Coffee, rubber, sugar, and cacao are grown, and gold and silver are mined. Cattle raising is a minor industry. The population was officially estimated in 1896 at 177,387. Capital, Abancay.

A'PUS (Gk. *ἄπους*, without feet). A genus of entomostracous crustaceans, within the family Apodidæ and the sub-order Phyllopoda. The more common species are 2 or 3 inches in length, and in the general shape of the large, shield-like carapace recall horseshoe crabs. In spite of the generic name, from 11 to 60 pairs of feet or appendages are present. Their eggs when dried in the mud may remain dormant for months or even years and in this state be transported long distances attached to the feet of water birds. They usually swim back downward and thus protect their soft body from the attacks of water beetles and other aquatic enemies. For many generations parthenogenetic reproduction by unfertilized eggs may take place, and in the case of some species the males have never been discovered.

AQUÆ GRATINÆ. See AIX-LES-BAINS.

A'QUÆ SEX'TIÆ (Lat. Sextian waters). A town of ancient Gaul, famous for the victory of Marius over the Teutones, Ambrones, and other German tribes, in 102 B.C. It is now known as the French town of Aix, in Provence.

AQUÆ SO'LIS (Lat. waters of the sun). Now the English town of Bath (q.v.); an ancient Roman city, remarkable for its magnificent edifices and for the medicinal property of its springs. Recent excavations have brought to light the remains of many Roman bath-houses.

AQUÆ STATIELLÆ. See ACQUI.

AQUAMARINE, -mā-rēn' (Lat. *aqua*, water + *marinus*, belonging to the sea). A bluish-green variety of beryl that is used as a gem. It is found in a number of localities in the United States, the richest-colored gems coming from Royalston, Mass. A celandine green variety of apatite is also called aquamarine.

AQUA RE'GIA (Lat. royal water). A name given to a mixture of nitric and hydrochloric acids, which may be used as a solvent for gold, whence its name, as gold was called by the alchemists the king of metals. It is usually prepared by mixing one part of nitric acid with from three to four parts of hydrochloric.

AQUARELLE. See WATER-COLOR PAINTING.

AQUA'RIANS. A name applied to several different sects in the early Church. It was used (1) of some of the Ebionites, who were charged with idolatrous veneration of water as the source of life; (2) of Manichæan ascetics who rejected the use of wine as a luxury. (3) The name was chiefly used of the followers of Tatian (q.v.), who advocated the use of water instead of wine in the eucharist. They lasted to the time of Augustine, in the fourth century.

AQUA'RIUM (Lat. a watering-place for cattle, from *aqua*, water). A tank or vessel containing either salt or fresh water, in which either marine or fresh-water plants and animals are kept in a living state. From 1854 to 1860 there was a mania for these scientific toys, and they became not only an aid to study, but a source of rational amusement, depending in principle upon the relations discovered by science between animal and vegetable life, and particularly upon the consumption by plants under the action of light of the carbonic-acid gas given forth by animals, and the consequent restoration to the air or water in which they live of the oxygen necessary for the maintenance of animal life. The aquarium must, therefore, contain both plants and animals, and in something like a

proper proportion. Zoöphytes, annelids, mollusks, crustaceans, and fishes may thus be kept in health and their habits observed. If perfectly balanced, the aquarium requires little care beyond the replacing of water lost in evaporation, but where there is a preponderance of animal life the water must be frequently aërated, which can be accomplished by taking up portions of it and pouring them in again from a small height. The fresh-water aquarium is frequently provided with a fountain, which produces a continual change of water; but even where this is the case, the presence both of plants and animals is advantageous to the health of both. When sea water cannot be easily procured for the marine aquarium, a substitute may be made by mixing with rather less than 4 quarts of spring water 3½ ounces of common table salt, ¼ ounce of epsom salts, 200 grains troy of chloride of magnesium, and 40 grains troy of chloride of potassium. With care the water may be kept pure for a long time. No dead animal or decaying plant must be permitted to remain in it. Salt water, artificially prepared, is not fit for the reception of animals at once; but a few plants must first be placed in it, for which purpose some of the green algæ, especially species of Ulva, are most suitable. The presence of a number of mollusks, such as shore snails, is necessary for the consumption of the continually growing vegetable matter, and of the multitudinous spores, particularly of algæ, which would otherwise soon fill the water, rendering it greenish or brownish, and non-transparent, and which may be seen beginning to vegetate everywhere on the pebbles or on the glass of the tank. In a fresh-water aquarium, pond-snails, such as species of Lymnæa or Planorbis, are equally indispensable. For large aquaria, tanks of plate glass are commonly used; smaller ones are made of bottle-glass or crystal.

Aquaria should be placed where they have sufficient access to good light. This is, of course, essential to the green plants and will also prevent the excessive growth of dangerous fungi. The gills of fishes, their eyes, and any wound on the body are frequently attacked by these fungi. These can often be removed in the case of fresh-water forms by a temporary bath in a common salt solution, sufficiently strong and for a sufficient length of time to kill the fungi. The fish, although severely affected by the salt, will revive upon being flushed with an abundance of fresh water. The plants or animals with which the aquarium is to be stocked must vary with the tastes and purposes of the individual. Among fishes, the goldfish (q.v.) stands first in beauty, variety of fantastic forms, and in tenacity of life. The sticklebacks (q.v.) are desirable because of their small size and their interesting nest-building and breeding habits. Crabs and anemones are common objects in marine aquaria. Notable large public aquaria are maintained in various cities of Europe. From a scientific standpoint, the aquaria at the Naples Marine Station have been of great importance. In Great Britain the Brighton Aquarium has long been prominent, and of much service to science. In America the aquarium of the United States Bureau of Fisheries at Washington, D. C., and the New York City Aquarium are worthy of mention. The latter was installed in old Fort Clinton, on the Battery, long known as Castle Garden, where in 1897 it was perfected by Dr. Tarleton Bean. It has seven great floor-tanks, or pools, and nearly 100 wall-tanks, lighted from above and in the rear, and disposed in two tiers, the upper viewed from a gallery. Both marine and fresh-water fishes and other aquatic animals are displayed, and the mechanical arrangements are of the highest excellence. It is sustained by the city, under the control of the New York Zoölogical Society, and is entirely free to the public. For detailed directions as to the establishment and management of aquaria, see Eggeling and Ehrenberg, *The Fresh-water Aquarium* (New York, 1908).

AQUA'RIUS (Lat. the water-bearer). The eleventh sign of the zodiac, through which the sun moves in parts of the months of January and February; its conventional symbol is ♒, which is probably intended to represent a stream of water. It is also the name of a zodiacal constellation whose position in the heavens may be found by producing a line in a southerly direction through the stars in the head of Andromeda and the wing of Pegasus.

AQUAT'IC ANIMALS. See DISTRIBUTION OF ANIMALS.

AQUATIC PLANTS. A term applied to many widely distributed plants that live either wholly or partly in water. Some aquatic plants have their inflorescence, and even part of their foliage, above the surface of the water; others are in water entirely; still others are attached by roots to the bottom. The algæ, which are exclusively aquatic, seem adapted to perform under water all the functions of their life. Aquatic plants are generally of less compact structure than plants belonging to other classes and are therefore better adapted for rising in their growth toward the surface of the water. But many of them, including some of the algæ, are also provided with air-bladders of considerable magnitude, as may be seen in some of the common seaweeds. Some of the more common aquatic plants are shown in the accompanying plate and deserve brief descriptions.

Cat-Tail (*Typha latifolia*), sometimes called bulrush or tule, grows to the height of 5 or 6 feet. Its rootstocks are astringent and diuretic and abound in starch. Its young shoots are much eaten by the Cossacks of the Don and are sometimes used in England under the name of "Cossack asparagus." Its pollen is inflammable and has been used as a substitute for lycopodium.

Long-leaved Pondweed (*Potamogeton lucens*) is one of some 65 species and a number of varieties, included in the genus *Potamogeton*, which belongs to the family Naiadaceæ. The long-leaved pondweed has thin elliptical leaves that float on the surface of ponds or slow streams. It is indigenous to the United States and is found from New Brunswick to Washington and south to Florida and California.

American Lotus (*Nelumbium luteum*), also known as yellow nelumbo, yields edible tubers and seeds. The seeds are sought after by children, and the farinaceous roots are agreeable when boiled. The plant is found as far north as Ontario.

Water Hyacinth (*Eichhornia speciosa*), which belongs to the family Pontederiaceæ, occurs in tropical and subtropical streams of the American continents, being a native of tropical South America, and is widely cultivated in Europe. It is capable of growing on marshy banks, but attains a much larger size when floating on the water, as it usually does, without being attached to the bottom. The rosettes formed by its leaves above

the surface of the water are sometimes no less than two feet high. The rapidity with which they multiply may be seen from the fact that, within a few years after having been introduced for the purpose of beautifying St. John's River, in Florida, they threatened to render navigation on the river an impossibility. Great masses of these plants accumulate along the shores and are often driven by wind and current until they form obstructions extending over the entire breadth of the river, and through which not only small boats, but even paddle-wheel steamers, cannot penetrate. Such obstructions have developed in northern South America and, as already stated, on St. John's River and its tributaries in Florida. An agent of the United States Department of Agriculture, who undertook, in 1897, to investigate the danger thus caused to navigation in Florida, came to the conclusion that perhaps the best way of exterminating the nuisance is to spread among the water hyacinths their natural enemies, the water weeds, or water pests (*Elodea canadensis*); further, to disseminate among them some virulent disease capable of destroying them; and finally, to reconstruct the bridges, so that the mass of obstructing plants may be freely carried out into the ocean.

Common Arrowhead (*Sagittaria latifolia*) is a widely distributed plant with beautiful, white, scentless flowers. It is indigenous to North America, where it extends as far south as Mexico, being found in shallow waters throughout the United States and Canada. The name arrowhead, or *Sagittaria*, is given not only to the common American plant, but to an entire genus of aquatic plants belonging to the family Alismaceæ. The generic name of these plants refers to the shape of their leaves. The plants include natives of both cold and warm climate, and are distinguished by flowers having three herbaceous sepals and three colored petals, with numerous stamens and carpels. This species is also a native of Europe and Asia. The Chinese arrowhead, *Sagittaria sinensis*, has long been cultivated in China and Japan for its edible corms, which abound in starch. It is grown in ditches and in ponds and has arrow-shaped, acute leaves and a branched polygonal scape (leafless stem). A large number of species and varieties of arrowhead are native in American waters.

Water-Lily (*Castalia odorata*), often called the "sweet-scented water-lily," has a large white flower of great beauty and of very sweet smell. Its home is North America. Besides this plant, the name "water-lily" is commonly applied to other species of *Castalia*, as well as to plants of the genera *Nymphæa* and *Nelumbo*, all of which belong to the family Nymphæaceæ. Great Britain produces three species, viz., *Castalia alba* (the white water-lily), *Nymphæa lutea*, and *Nymphæa minima* (yellow water-lilies); all these have heart-shaped leaves floating on the water, those of the yellow lilies being raised by the stalks a little above the surface. The seeds of these species, as well as those of the water-lily of the Nile (*Nymphæa lotus*), are farinaceous and are sometimes used as food. The stems of *Nymphæa lutea* are used by the Turks in making a refreshing beverage.

Consult: Britton and Brown, *Illustrated Flora of the Northern United States, Canada, and the British Possessions* (New York, 1913). The structural characters of aquatic plants are discussed at some length under HYDROPHYTES. See also BENTHOS; HALOPHYTES; MANGROVE SWAMP; PLANKTON; SWAMP.

AQUATINT. A variety of etching, the peculiarity of which consists in the resin ground with which the plate is prepared. The outline was first etched in the usual manner (see ETCHING), and the plate cleaned. Then, according to the French, or *dry*, method, the plate was inserted in a box partly filled with powdered resin set in motion by a fan. An even surface having been thus obtained, the plate was heated and the acid applied. The result was a soft background, not unlike that of a mezzotint. Gradations of tone were gained by successive bitings, and white surfaces by the use of varnish. According to the English, or *wet*, method, the plate was treated with a solution of resin dissolved in spirits of wine, the evaporation of which left the resin evenly spread over the plate. Aquatints were printed in black and white, sepia, or in color. The latter effect was obtained by separate printings for each color in France, or partly by printing and partly by hand, as in England. In delicacy of color the aquatint surpasses all prints and could give an almost perfect imitation of water color. The aquatint was invented (or at least perfected) by Jean Baptiste Leprince, a pupil of Boucher. His first plate dates from 1750, the first English print by Paul Sandby from 1775. The greatest of French artists in this medium were François Janinet (1752–1813), Philibert Debucourt (1755–1832), and somewhat later Descourtis, Alix, Morret, Sergent. In England the aquatint flourished somewhat later than in France and was chiefly used in book illustration. The principal English aquatintists were Malton, Stadlet, Bluch, Sutherland, Jukes, Reeve, and Dubourg. A fine example of an English book thus illustrated is David Cox's *Treatise on Landscape Painting and Effect in Water Color* (1814). The collecting of aquatints has in recent years become very popular, and phenomenal prices are paid for good examples. A single print by Debucourt was lately sold for £300. Consult *The Connoisseur*, vol. xxvi (London, 1910).

AQUA TOFANA, tô-fä'nȧ (Lat. *aqua*, water, of Tofana; see below). A poisonous liquid described as a clear, colorless, tasteless, and odorless fluid, a few drops of which were sufficient to produce death, which resulted slowly and without pain or fever, under a constant thirst, and weariness of life, and an aversion to food, the strength of the victim diminishing gradually. It is said to have been invented by a Sicilian woman named Tofana, who lived about 1650–1730. She sold the preparation in vials marked "Manna of St. Nicholas of Bari," and it was much sought after by young wives who wished to get rid of their husbands. It is now believed to have been a preparation of arsenic.

AQUAVIVA, ä'kwȧ-vē'vȧ, CLAUDIO (1543–1615). The fifth general of the Jesuit Order, appointed in 1581, its greatest general and best administrator. He was noted for his attempt to increase the importance and effectiveness of the order through the enforcement of a rigid and uniform system. To this end he wrote *Ratio Studiorum Societatis Jesu* (1586; rev. ed., 1599), and *Directorium Exercitiorum Spiritualium* (1599).

AQUEDUCT (Lat. *aquæ ductus*, a conduit of water). Broadly speaking, this word means any conduit for conveying water, but usage, both

AQUATIC PLANTS

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1 CAT-TAIL — TYPHA LATIFOLIA
2 PONDWEED — POTAMOGETON LUCENS
3 AMERICAN LOTUS — NELUMBIUM LUTEUM
4 WATER HYACINTH — EICHHORNIA SPECIOSA
5 ARROWHEAD — SAGITTARIA SAGITTIFOLIA
6 WATER-LILY; POND-LILY — NYMPHÆA ODORATA

ancient and modern, has practically limited the word to masonry conduits with little or no more slope than is necessary to cause the water to flow through them by gravity. Such limitations generally exclude mere channels or ditches (canals) in the natural earth, on the one hand, and closed conduits (pipes) under pressure, on the other, except as these form links in an aqueduct of composite type. The masonry portions of some modern aqueducts are under pressure for a part or all of their lengths, and frequently sections of iron or steel pipes under pressure are used to convey the water of an aqueduct beneath a deep valley. Inverted siphons, as these depressed sections are called, are the modern substitute for the aqueduct bridges of earlier days, or for the circuitous routes necessary to avoid the construction of such bridges. Siphons were not unknown to the Romans, who lacked, however, knowledge of cast-iron pipe, or any other pipe of large size, capable of conveying water under heavy pressure. The general abandonment of the masonry aqueduct for conduits or pipe lines of cast or wrought iron, steel and wood, with a consequent diminution in the cost of rights of way, labor, and material, has resulted from a variety of causes, such as shorter routes and smaller conduits. Marked characteristics of the modern aqueducts have been great boldness and freedom in the use of the tunnel, including tunnels under heavy pressure, as in parts of the New Croton, the Catskill, and the Los Angeles aqueducts, and also in the employment of long-span arches for aqueduct bridges, or the substitution of iron or steel (at present the latter) for masonry bridges. In the latest aqueducts bridges have given way almost entirely to tunnels.

Ancient Oriental peoples, such as the Persians and Phœnicians, used a system of subterranean channels of masonry with vertical shafts at intervals, such as Polybius described (x, 23, 3) for Hecatompylos, the capital of the Arsacidæ. The Pelasgic and Mycenæan cities, such as Mycenæ and Argos, were thus supplied. Herodotus describes, as one of the most remarkable works of Greek lands, the aqueduct of Samoas, built by the engineer Eupalinos with a gallery 8 feet square. He also saw at Tyre three aqueducts with arches and viaducts which were imitated at Carthage before the Roman conquest. The early Latin tribes in Italy continued the Pelasgic tradition, as is shown in the famous outlet of the Alban Lake. The water supply of Athens and its plain can still be studied in a variety of conduits and aqueducts earlier than Hadrian's more striking constructions. The custom of subterranean aqueducts was at first also followed by the Romans, whose Appian aqueduct had less than 300 feet supported on arcades above ground. Gradually, with the increase of luxury and the desire to carry the water to the higher hills of Rome, more of the aqueduct was arcaded, and the water brought from a greater distance.

The principle of the inverted siphon was used in the aqueducts of Patara, Pergamum, and Aspendos, in Asia Minor, at Constantinople, at Tebessa in Africa, and at Lyons, where it can be studied in great detail; but Vitruvius (vii, 6), in describing this method, warns against it in the case of large volumes of water, whose pressure would not be withstood by the lead or terra-cotta pipes then in use. In a few cases expensive bronze pipe was used to resist pressure. The careful grading of the aqueduct to prevent a too rapid flow was assisted by curves in the line of construction. This explains apparent peculiarities in direction. Tunnels were often cut, sometimes over three miles long. The fall recommended by Vitruvius is six inches in every 100 feet, but it was usually greater. At the head of the aqueduct a large reservoir, or *piscina*, was established; minor basins were constructed at intervals along the line for filtering and clarifying the water by passing it through gravel. The channel for the water, or *specus*, between 2 and 4 feet wide, and 4½ and 6½ feet high, was originally of stone, lined with hydraulic cement; afterwards of concrete faced with brick. At frequent intervals were blowholes through the top or sides, to afford ventilation and access to the interior, and their place was taken in the subterranean sections by inspection wells, or *putei*. The channels were large enough to admit the workmen along their entire length for inspection and repair. Leakages were frequent, and the heavy lime incrustations, if not periodically removed, gradually reduced the size of the channels and their carrying capacity. In many cases several water supplies were carried on the same arches, being joined at a certain distance from their source, and each water being usually carried in its separate channel. This is the case with the Marcia, which carries also the Tepula and the Julia.

At the city end of the aqueduct a capacious reservoir was constructed called a *castellum aquarum*, where the water was cleared by passing through several chambers and from which it was then distributed over the city. These *castella* were sometimes, as in the case of the Claudia and the Alexandrina, at Rome, important artistic structures. Here there were separate purifying and storing compartments for each class of structures supplied; in the Republican period there were only three—public fountains, baths, and private houses. But under the Empire the subdivision became much more elaborate. Certain very large single buildings, such as baths, had separate reservoirs. The water was carried into buildings by lead pipes through an official bronze joint stamped with its exact capacity and serving as a meter. The conservation and regulation of the water supply, the exact allowance to individuals, corporations, and public buildings, was secured by a very careful administration. This care was not only applied in Rome itself, but was coextensive with the entire line of aqueduct as it was tapped at intervals and used by towns, settlements, and private owners for drinking and irrigation. To assist the administration, a strip of land 30 feet wide was reserved along the entire course, as government property, and marked by boundary stones at intervals of 240 feet. The administration was under the care of the censors, and then of the quæstors and ædiles; but under Augustus the bureau was better organized, and put in charge of a *Curator Aquarum*, with his two assistants, his clerks, his consulting engineer, and his various classes of officials and of artisans comprising a *familia* of slaves: ushers, lictors, and criers, as well as pipe-layers, pavers, masons, levelers, measurers, inspectors, reservoir keepers, etc. As usual with Roman buildings, the aqueducts were built by contract, and the use of unskilled labor made their cost relatively small. The Appia is said to have cost

$675,000. The repairing of the Appia and Anio Vetus, and building of the Marcia in 144–140 B.C., cost only about $850,000. Under the more lavish Empire the Claudia and the Anio Novus cost about $4,000,000, but none of the others were as expensive as these.

ROMAN AQUEDUCTS

Among the Roman aqueducts those of Rome itself possess the greatest interest, because of their number, length, and boldness of design and execution. Two of them, in fact, are still in use, and water from the very source that supplied one of them (Marcia), restored in 1869, is now delivered to the city through a modern water-works system. Not only are they in remarkable preservation, but, most happily for engineers and archæologists alike, they are described in some detail by a Roman engineer who was water commissioner of Rome in 97 A.D., named Sextus Julius Frontinus, in his *Two Books on the Water Supply of Rome.* This work was first made available to English readers in 1899, through a translation by Clemens Herschel, an American hydraulic engineer, who gives not only the Latin text, but also a photographic reproduction of the oldest Latin MS. in existence, in the library of the Benedictine monastery at Monte Cassino. Besides all this, the book in question contains several chapters of comment by the translator, both on the aqueducts and the water supply of Rome in general. Mr. Herschel concludes that the capacity of the ancient Roman aqueducts has been greatly overrated, and that, instead of the 400,000,000 gallons a day given by some writers, based on Frontinus's calculations, "thirty-eight million gallons one day with another" is "a fair estimate at which to set the water supply within the walls of ancient Rome in 97 A.D., though the total ranged, no doubt, some 20,000,000 gallons per day either side of that mark from time to time. This would make about 38 gallons per day per inhabitant, which is still a very large figure when use alone, not waste, is taken into account; and when, further, we consider that by far the greater part of the people undoubtedly used only such water as was carried to their homes in jars on the heads of slaves and other women." Still, Frontinus describes nine aqueducts in use in his day, the main facts regarding which may be summarized as follows:

1. *Aqua Appia*, built by and named after the censor, Appius Claudius, in 312 B.C. Its springs were between the sixth and seventh milestones from Rome, and its course was about 11 miles long. All but 300 feet was underground. The exact size of its channel is uncertain, but is given by several authors as about 2.5 feet wide and 5 feet high in the clear.

2. *Anio Vetus*, constructed 272–270 B.C. by M. Curius Dentatus and Fulvius Flaccus. All but 1100 feet was underground. Remains may be traced both near Tivoli and near the Porta Maggiore. Its water is taken from the river Anio, about the twentieth milestone, 3 miles beyond Tivoli, and its course, which is very circuitous, is about 43 miles long. It was about 3.7 feet wide and 8 feet high inside, of heavy masonry of peperino stone, plastered on the inside.

3. *Aqua Marcia*, named after the prætor, Quintus Marcius Rex, 144–140 B.C., had its source in springs between Tivoli and Subiaco, near the thirty-sixth milestone from Rome, was over 62 miles long, and carried into the city 195 feet above sea level, so as to reach the top of the Capitol. Near its head it is 5.7 feet wide and 8.3 feet high, and farther on it is 3 × 5.7 feet. This and the two preceding aqueducts were built of rough-hewn dimension stone, 18 × 18 × 42 inches, or more, while the later ones, except Claudia, were of concrete and brick. The greater part of Marcia was underground, but there were some long stretches on arches—over 7 miles—some of which are still standing and bear parts of two and three other aqueducts (Anio Vetus, Claudia, and Anio Novus) above them. This is especially the case near Tivoli, where there are superb viaducts and bridges alternating with tunnels. There are about 6 miles of arcades near Rome.

4. *Aqua Tepula*, 125 B.C., leading from springs on the slopes of the Monti Albani, had at first an independent channel, on the arcades of the Marcia, 6 feet above it, or 201 feet above sea level. It was 2.7 feet wide by 3.3 feet high, and commenced not far from the eleventh milestone.

5. *Aqua Julia*, the first imperial aqueduct, constructed by M. Agrippa, under Augustus, in 33 B.C., took water from springs near the source of Tepula (twelfth milestone), and was mixed with the latter to cool it, and entered Rome on the arcades of the Marcia, about 212 feet above sea level. Its channel was 2.3 feet wide and 4.6 feet high. Portions of Marcia, Tepula, and Julia, one above the other, are still in existence at Porta Tiburtina.

6. *Aqua Virgo*, 19 B.C., also constructed by Agrippa. Aqua Vergine, as it is now called, is still entire, having been restored by Popes Nicholas V and Pius IV. The source of the Aqua Virgo is near the eighth milestone, only 80 feet above sea level; its channel was 14 miles long, and it entered the city 13 feet lower. The channel was about 1.6 feet wide and 6.6 feet high. It still supplies the famous Trevi fountain and others.

7. *Aqua Alsietina*, about 10 A.D., constructed by Augustus, now called the Aqua Paola, starts at a pond near the fourteenth milestone, and supplies the fountains in front of St. Peter's and the Fontana Paola, on the Montorio. Its original object was irrigation, and the supply of the Naumachia of Augustus, which was a sheet of water for the representation of sea fights. Its water, which was undrinkable, reached Rome in a channel 24 miles long, about 55 feet above the sea, the lowest level of any.

8. *Aqua Claudia*, 38–52 A.D., commenced by Caligula and completed by Claudius, starts near the thirty-eighth milestone and is about 45 miles long. Its line of nearly 10 miles of magnificent arches still stretches across the Campagna and forms one of the grandest of Roman ruins. At its upper end its channel was 3.3 feet wide and 6.6 feet high. When it reaches the Campagna, it carries the Anio Novus (see below), the lower aqueduct being of dimension stone and the upper of brick, lined with concrete. The water of these two aqueducts reached the Palatine 185 feet above the sea; but at Porta Maggiore the water in Anio Novus was at an elevation of 230 feet and Claudia 9 feet lower.

9. *Anio Novus*, also 38–52 A.D., was nearly 62 miles long, thus being the longest of the aqueducts, and starting at the Anio, near the thirty-eighth milestone. Its channel had a width of 3.3 feet and a height of 9 feet. Some of its arches

are over 100 feet high, and its ruins are as superb as those of the Claudia, the two combining before entering Rome.

10. *Aqua Trajana*, built in 109 A.D., started at Lake Bracciano, was about 40 miles long, followed nearly the same route as Aqua Alsietina, and its waters join to form the supply of the present Aqua Paola. It was used for supplying the Janiculum and the Trastevere.

11. In 226 A.D. an eleventh and last aqueduct was built, called *Aqua Alexandrina*, to supply the Campus Martius. The other aqueducts sometimes credited to old Rome were probably branches of some of the eleven.

Although stone continued in use for aqueducts under the Empire, concrete with *opus rectículatum* and concrete with brick were used both in various parts of Italy and even in Rome itself, especially in the Aqua Alexandrina and Nero's additions to the Claudia. There remain many imposing Roman aqueducts in different parts of the Empire. The high viaducts and bridges in France, such as those near Nîmes, Cahors, and Lyons; in Spain at Segovia, Mérida, and Tarragona; at Constantinople, at Beirut, at Cherchel, and Carthage are especially imposing—higher and bolder than anything at Rome; some have two, some three superposed stories of arcades, with a total height of between 100 and 300 feet. The Pont du Gard and the aqueduct of Segovia are the finest in existence. The stonework in the provinces is even superior to the average in Rome. The following examples may be mentioned: *Italy:* Minturnæ (fine *opus reticulatum*, very decorative), Genoa (very early, c.210 B.C.), Puteoli, Pompeii, Termini in Sicily. *Gaul:* Nîmes (Pont du Gard), Lyons (4 aqueducts in *opus reticulatum*, with siphons and bridges), Metz (with a great bridge of 114 arches), Paris (3 aqueducts of late Roman date), Frejus (a superb example, built under Claudius, 30 miles long, with many arcades), Antibes (2 aqueducts, one still in use), Arles, Marseilles, Aix, Vienne, Autun, Besançon, Poitiers (4), Cahors (a superb three-storied viaduct), Toulouse, and many others. *Germany:* Mainz, Treves, Cologne, Solicinium, Windisch. *Spain:* Segovia (built under Trajan, 12 miles long, with a superb viaduct of 119 arcades, 818 yards long, in two stories), Tarragona (built in the Republican Period, c.210 B.C., 6 miles long, with magnificent two-storied viaduct of 11 and 25 arches), Chelva, Seville, Mérida (2 aqueducts, one still in use; the other by Augustus, with a viaduct of three stories), Consuegra, Calahorra. *Portugal:* Elvas, Evora, Beja. *Africa:* Tebessa, Constantine (3), Tipasa, Cherchel (Cæsarea), Orléansville, Carthage (Punic and Roman), Makter (with a viaduct). *Asia:* Anzarba, Beirut (with a bridge), Palmyra, Baalbek, Petra, Sinope, Nicomedia, Antioch, etc.

The Oriental provinces of the Empire, preserving Greek engineering traditions, were more scientific, as shown by frequent use of siphons. The Byzantine emperors continued the Roman traditions, as shown by the aqueducts of Valens and Justinian at Constantinople, in connection with which are the wonderful cistern-reservoirs in the city with their forests of columns. Adana, Mopsuestia, and many other Eastern cities were provided by Justinian with aqueducts. The Gothic kings attempted the same, as in the extremely bold viaduct at Spoleto, loftier than any Roman work; their work in Spain was continued by the Moors, as at Elvas. The Mohammedans throughout the East continued the construction of aqueducts; but the Middle Ages in Europe were comparatively inactive in this branch of engineering. The Gothic aqueduct at Solmona and that at Coutances are perhaps the finest in Europe of this age. The Renaissance renewed the art, beginning with the Roman popes of the sixteenth century. France soon followed suit, as in the aqueduct of Arceuil at Paris built for Marie de' Medici, in 1613, and that of Maintenon under Louis XIV. In 1753 Charles III built the great aqueduct of Caserta, about 30 miles long. The aqueduct of Marseilles, begun in 1847 and over 40 miles long, with 75 tunnels and several viaducts, is the only work of modern engineering construction comparable artistically to the Roman; it could have been built for a fraction of the cost ($1,200,000) by using siphons.

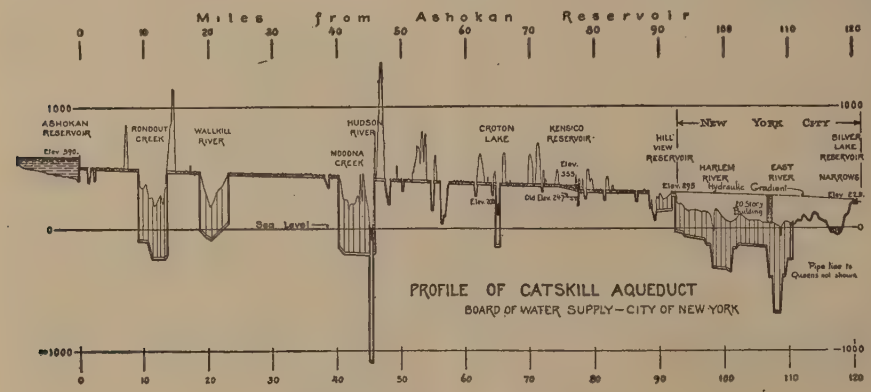
MODERN EUROPEAN AQUEDUCTS

Among the European aqueducts constructed during the latter part of the nineteenth century may be mentioned, first, that conveying water from Loch Katrine to Glasgow, built in 1855–60. This has been supplemented by a short connection with Loch Arklet, and connections with other lochs were projected in 1913. The new water-supply conduits of Manchester and Liverpool, built in 1881–92 and 1885–94, respectively, are partly masonry structures and partly pipe lines. The Liverpool supply is brought from Lake Vyrnwy, a distance of 68 miles, partly in tunnel. The Manchester supply comes from Lake Thirlmere, a distance of nearly 96 miles, through 36 miles of concrete conduit and 14½ miles of tunnel, making 50½ miles of masonry aqueduct, and through 45 miles of iron pipe. The largest tunnel is 8½ miles in length, and the longest inverted siphon, of iron pipe, is about the same length. Another inverted siphon is under a head of 480 feet. The masonry aqueduct is 7 feet in diameter. Since their original construction the three aqueducts just named have been brought up to their full or more than their full capacities, as originally designed, by duplicate and in some cases triplicate conduits, for the whole or portions of their length.

Vienna, Austria, completed a 55-mile aqueduct in 1873 and later extended it to 65 miles to gain more water. It has a carrying capacity of 36,500,000 gallons and a total fall of 985 feet, a large part of which is in a series of drops in the first 10 miles of the original construction. These drops, with gates, were designed to keep the aqueduct from being under pressure. After the drops, most of the aqueduct is in tunnel. The first Kaiser-Franz-Joseph Aqueduct, as it was called, becoming inadequate, plans for a second one of the same name were made about 1899 and had been nearly executed in 1910. It is 114 miles long and takes in six mountain streams, the highest being 1658 feet above the city. Its capacity is 55,000,000 gallons a day. Of its total length 44 miles are in rock or earth tunnel, apparently lined with concrete. The longest tunnel is 17,630 feet. Valleys are crossed by inverted siphons of cast-iron pipe, one of which is about 6 miles long, besides which there is at least one masonry arched bridge crossing. The typical tunnel sections are of horseshoe shape, about 7 feet high and 6½ feet wide, with a water depth of about 5½ feet. In some places the arch of the rock tunnel was left unlined.

AMERICAN AQUEDUCTS

In the United States notable aqueducts were completed by New York in 1842 and a second in 1890 (Old and New Croton); Boston in 1848 and a second in 1878; Brooklyn in 1859; Baltimore in 1862 and a second in 1880; Washington in 1863, with a second one begun in 1883, abandoned before fully completed and finally put in use in January, 1902; St. Louis, Mo., about 1893; the Metropolitan Water Board (Boston and surrounding towns) in 1897; and Jersey City, put in use in 1904 (on this work masonry aqueducts and tunnels are used only where steel pipe lines are not available). In 1917 New York City had completed its third aqueduct, larger and longer than the two earlier ones, Los Angeles, Cal., had completed the longest aqueduct as distinguished from a pipe line, ever yet undertaken, while in 1923 San Francisco had



PROFILE OF THE CATSKILL AQUEDUCT

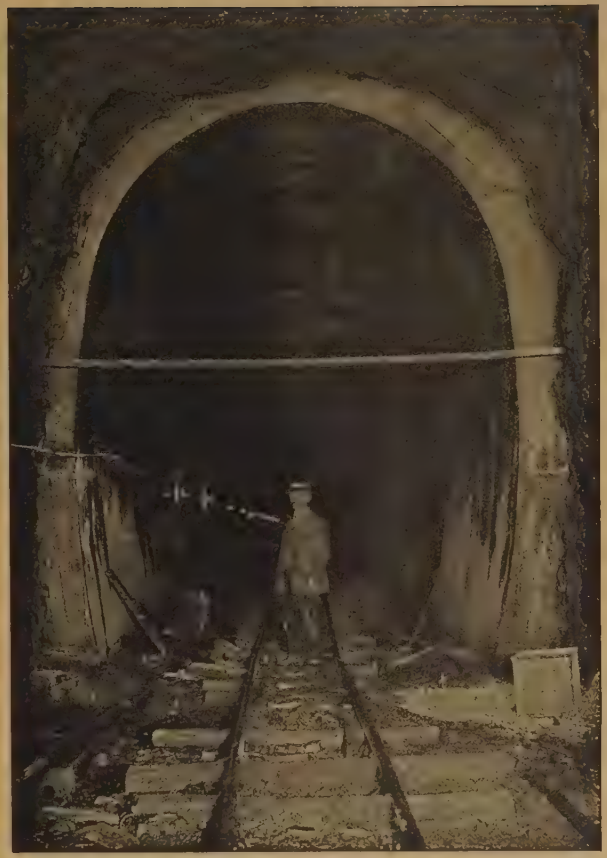
requiring shafts from 18 to 402 feet deep for its construction. About 7 miles of the tunnel is under pressure, including the crossing beneath the Harlem River, where there is a pressure of 55 pounds when full. Most of the pressure tunnel is 12¼ feet in diameter, but under the Harlem, where the masonry is lined with cast iron, the diameter is only 10½ feet. In general the aqueduct is shaped like a horseshoe, 13.53 feet high and 13.6 feet wide, has a fall of 0.7 foot per mile and an original rated carrying capacity (see below) of about 318,000,000 gallons a day. At the Jerome Park storage reservoir, in the north part of the city, and some 23 miles from the upper end, it is reduced to a rated capacity of 250,000,000 gallons a day and changed to a circular section 12¼ feet in diameter, for over 6 miles. When the New Croton Aqueduct was designed, it was estimated that it would carry 318,000,000 gallons a day, while flowing to a depth of 12,842 feet in the horseshoe sections. Gaugings after its completion fixed the carrying capacity at about 302,500,000 gallons.

under way its great Hetch Hetchy water development and aqueduct.

The *Old Croton Aqueduct*, supplying New York City, had a total length of 38.1 miles and a total fall of 43.7 feet, the ordinary grade being 1.1088 feet per mile. It was of brick-lined masonry, the bottom being an inverted arch of 6.75 feet chord, 0.75 feet versed sine; sides, 4 feet high, battered to 7.42 feet apart at top; covered with semicircular arch, giving total interior height of 8.64 feet and cross-sectional area of 53.34 square feet. The Harlem River was crossed on a granite masonry arched bridge, 100 feet high in the clear, and about 1400 feet long, the water being conveyed in two 36-inch cast-iron pipes and one 90½-inch wrought-iron pipe, the latter added in 1860. The Manhattan valley was crossed by inverted cast-iron pipe siphons, two miles long, the original two 36-inch pipes being supplemented by a 48-inch in 1853 and a 60-inch in 1861, the latter being reported as the largest iron pipe cast up to that time. The aqueduct was designed to carry 72,000,000 gallons a day.

The *New Croton Aqueduct*, like the old one, begins at Croton Lake, formed by a dam on the Croton River, and extends to 135th Street, New York City. Its total length is 30.75 miles, or 33.10 miles if the pipe line extension to the Central Park reservoir is included. Of the masonry aqueduct, 29.63 miles is in tunnel,

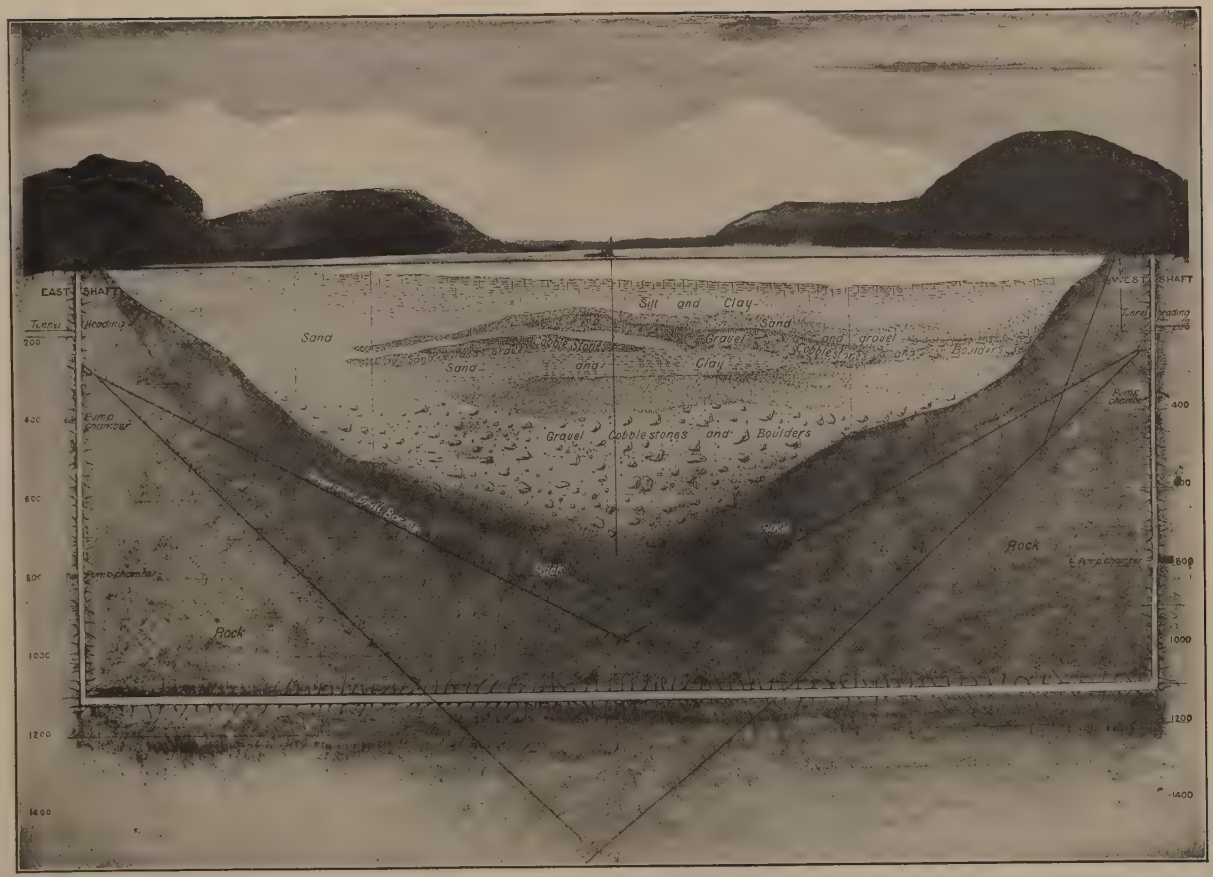
The Catskill Aqueduct, designed to furnish New York City with an additional water supply of 500,000,000 gallons a day from streams in the Catskill Mountains, west of the Hudson River, was put under construction late in 1906 and was practically finished in 1913. It was dedicated Oct. 13, 1917, and straightway was put in service to supply the various boroughs of New York. With the growth of the city the supply was not considered in any way inexhaustible and its completion and extension was constantly in mind. The aqueduct proper is 92 miles long, beyond which, first a tunnel and then pipe lines extend to a total length of 34 miles, including branches, to connect with various parts of the city pipe distribution system. The aqueduct extends from the Ashokan impounding and storage reservoir to the Kensico storage reservoir, 30 miles north of the City Hall in New York, and on to the Hill View storage and equalizing reservoir near the Yonkers-New York City line, some 15 miles from the City Hall. At the outset the aqueduct had a daily capacity of some 250,000,000 gallons, but provision was made for streams and impounding reservoirs so that it could be used to its full capacity. Over 25 per cent of the length of the aqueduct is under



TYPICAL GRADE TUNNEL ON THE LINE OF THE AQUEDUCT. BONTICOU GRADE TUNNEL 17 FEET HIGH, 13 FEET, 4 INCHES WIDE, END OF COMPLETED CONCRETE ARCH LINING; COMPLETE INVERT REMAINS TO BE LAID

HUNTER'S BROOK STEEL-PIPE SIPHON. ERECTING STEEL-PIPE ON CONCRETE CRADLES PREVIOUSLY PLACED. PIPE WILL BE IMBEDDED IN CONCRETE AND BACK-FILLED WITH EARTH AND LINED WITH 2 INCHES OF PORTLAND CEMENT MORTAR

THE CATSKILL AQUEDUCT

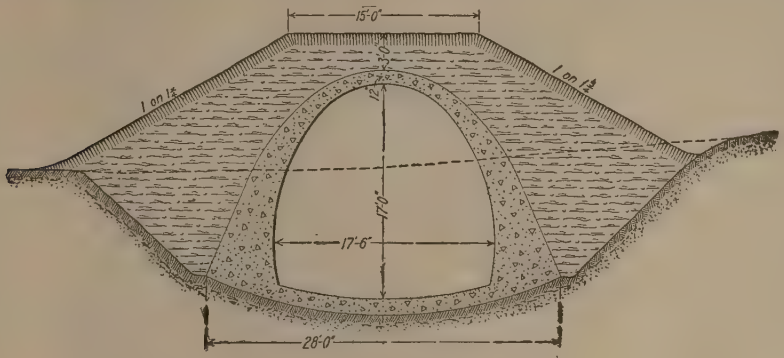


THE CATSKILL AQUEDUCT

CROSS-SECTION SHOWING SIPHON CROSSING THE HUDSON RIVER AT STORM KING

pressure, including a number of deep tunnels, driven from vertical shafts through rock.

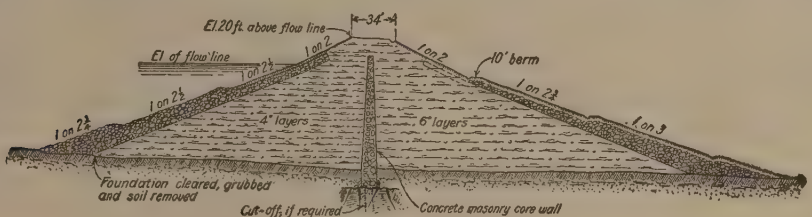
The fourth type of Catskill Aqueduct includes seven so-called inverted siphons, 6 miles in aggregate length. These are steel pipe, 9 and 11 feet in diameter, 7/16 to 3/4-inch thick, lined with 2 inches of cement mortar and covered outside with concrete, the whole in an earth embankment.



CUT AND COVER SECTION CATSKILL AQUEDUCT.

The most remarkable of these tunnels is the one beneath the Hudson River, a few miles from West Point. This tunnel is 1100 feet below the surface, 3022 feet from shaft to shaft. The shafts and tunnel are lined with concrete and have a finished diameter of 14 feet. Of its length of 92 miles, 55 miles of the Catskill

From the Hill View reservoir the Aqueduct system conveys water to all the five boroughs



TYPICAL SECTION OF ASHOKAN DIKE

Aqueduct are of the cut-and-cover type, horseshoe-shaped, 17 feet high and 17½ feet wide, the maximum size, built of concrete. These portions are not under pressure, nor are the 24 grade tunnels, aggregating 14 miles in length, horseshoe in shape, 17 feet high and 13½ feet wide, also lined with concrete. Besides the grade

of New York City. For the first 17½ miles this is a pressure tunnel 15 to 11 feet in diameter, concrete lined in solid rock at depths of 200 to 750 feet below the surface. The city aqueduct tunnel goes beneath the Harlem River, Manhattan Island, and the East River into Brooklyn. Cast-iron and steel pipe extend from the

GRADE TUNNEL, CATSKILL AQUEDUCT.

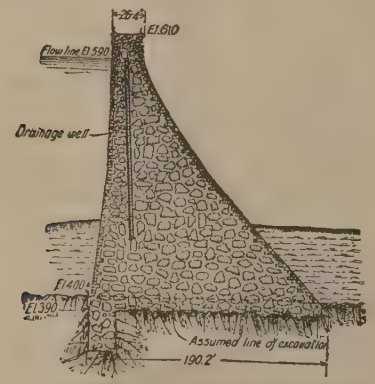
SECTION OF PRESSURE TUNNEL, CATSKILL AQUEDUCT.

tunnels there are 7 deep concrete-lined pressure tunnels, totalling 17 miles in length, about 14 feet in diameter.

Brooklyn end of the tunnel to supply Brooklyn, Queens, and Richmond boroughs. To reach the Staten Island a cast-iron pipe was laid on the

bed of the Narrows supplying Silver Lake reservoir.

A second stage in the Catskill Aqueduct development was the construction of a diversion reservoir and its connection with the main source of supply at Esopus Creek, by an aqueduct or tunnel 18 miles in length. There was involved the building of a dam at Gilboa with a maximum height of 160 feet, consisting of an overfall or masonry portion 1300 feet in length and an earth section with a length of about 1000 feet, the whole forming a diversion reservoir by impounding the water of Schoharie Creek of some 20,000,000,000 gallons capacity. By means of the Shandaken Tunnel the natural direction of flow would be reversed and the water of the creek carried to Esopus Creek and thence into the main supply at Ashokan Reservoir. This Shandaken tunnel has a horseshoe section 10



OLIVE BRIDGE DAM — MAXIMUM MASONRY SECTION

feet 3 inches by 11 feet 6 inches concrete lined grouted on rock and was excavated through the Catskill Mountains, headings being developed from eight shafts. This tunnel was designed for a maximum capacity of 600,000,000 gallons a day, but would be operated intermittently as required.

The Catskill Aqueduct crosses beneath the New Croton Reservoir and thus could be used to supply water through either the Old or New Croton aqueducts.

The *Wachusett Aqueduct* for Boston and vicinity has a rated daily capacity of 300,000,000 gallons. It is 12 miles long, if the 3 miles of canal at its lower end are included, and leads from the site of a handsome masonry dam on the Nashua River, at Clinton, Mass., to the Sudbury reservoir, a part of the old Boston water works, now controlled by the Metropolitan Water Board. The first two miles of the Wachusett Aqueduct is in tunnel, through rock so compact that about one-half of it required no lining. After the tunnel come 7 miles of aqueduct proper, built in embankment or in excavation. Both tunnel and covered aqueduct are built in the general shape of a horseshoe, from 11½ to 13½ feet wide and from 10½ to 11 feet 10 inches high, and are of concrete, with the lower portion lined with one course of brick. Below the section just described there are 3 miles of open channel or canal. The aqueduct is carried over the Assabet River on a handsome granite masonry bridge of seven 29½-foot spans.

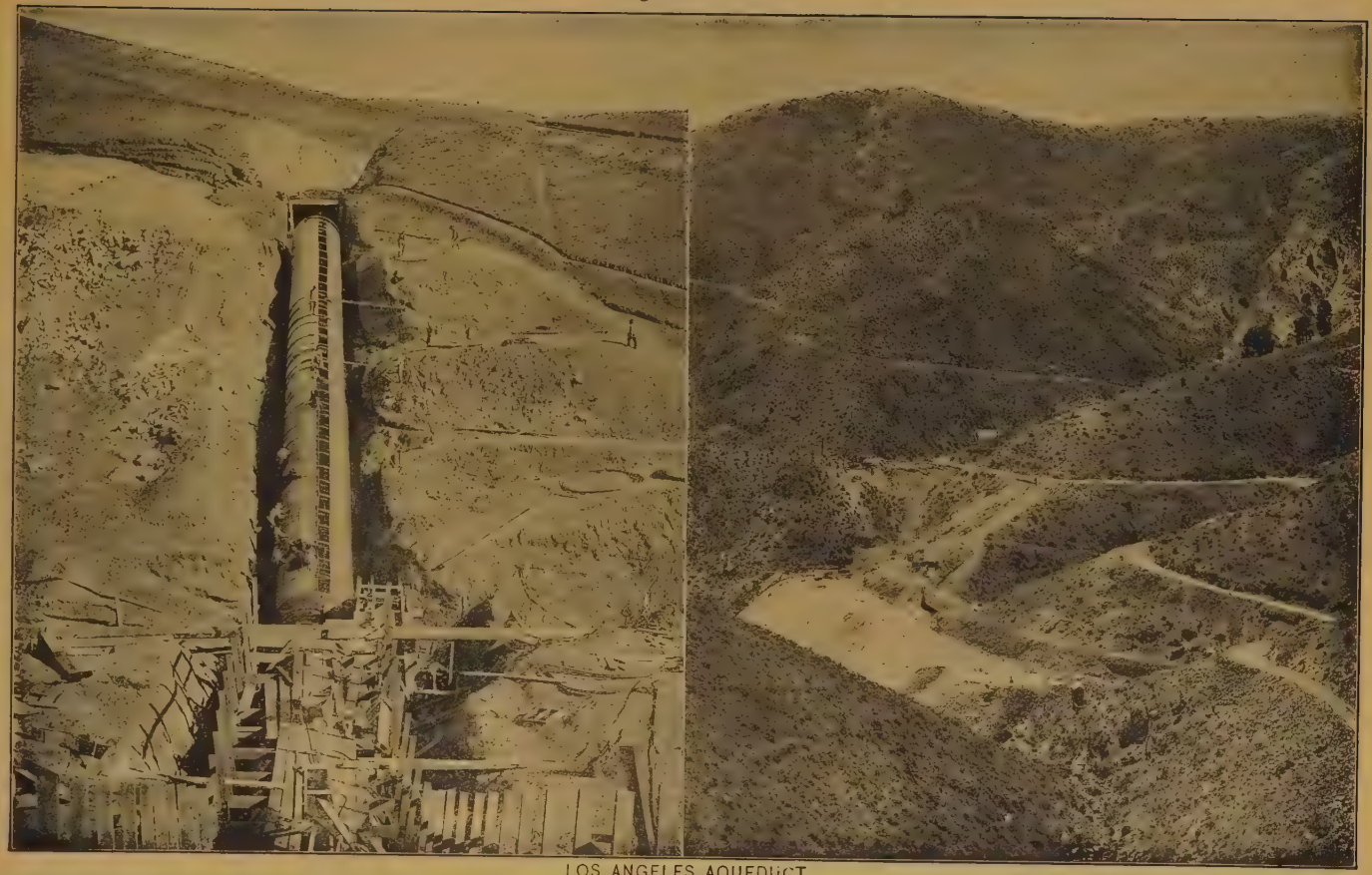
The *Cabin John Arch*, which carries the first Washington aqueduct across a creek of the same name, was for many years the largest single-span masonry bridge in the world, having a length of 220 feet and rising to a height of 101 feet in the clear. The rise of the arch, from the spring line, is 57½ feet. The bridge is 20 feet wide, and its total length is 420 feet. It was built of large granite blocks, with sandstone parapets and coping. It cost $237,000.

The *Los Angeles Aqueduct* was begun in 1907 and completed in 1913, going into operation in 1914. It is approximately 235 miles long, including 8.5 miles of reservoir flow and some 10 miles of power canal. It has a rated capacity of 259,000,000 gallons a day, so that a considerable quantity of water is available for irrigation until it is needed for domestic consumption. The aqueduct diverts the entire flow of the Owens River, through an intake 11 miles north of Independence, Cal., near the foot of Mount Whitney (Sierra Nevada Mountains). The intake is at elevation 3812 feet above sea level, and as the business section of Los Angeles is some 275 feet above sea level, the highest parts of the city can be supplied by gravity.

By keeping the aqueduct at the hydraulic grade for as great a distance from the intake as was feasible the head of water is conserved and brought relatively near the city, where the inevitable drop is to be utilized to develop, ultimately, 120,000 horse power of electrical energy, to be transmitted to Los Angeles for sale for light and power purposes or for use by the city itself. The aqueduct is notable (1) for its great length, (2) on account of the construction difficulties involved, and (3) because it was built, including a large cement plant and an extensive telephone system, almost wholly by the city.

The aqueduct crosses a long and desolate stretch of the Mojave Desert and extends for miles along mountain sides, through mountains, across valleys. The first 21 miles of the aqueduct is an unlined canal, 59 feet wide at the water depth of 7 feet. Then come about 40 miles of concrete, lined open ditch, 30 feet wide at the water surface, with slopes 1 to 1 for a water depth of 10 feet, below which there is a curved bottom 1½ feet deep in the centre. For the remaining distance the aqueduct is closed, sometimes on the hydraulic grade and sometimes under pressure, with various types of construction. Altogether there are about 98 miles of covered conduit, with concrete or reinforced-concrete bottom and sides and reinforced-concrete covers, flatwise. There are also about 43 miles of concrete-lined tunnels, some of which are under pressure, and 12 miles of inverted siphons of either riveted steel plates or reinforced concrete. One of the principal tunnels is of horseshoe shape, 10 feet 10 inches high and 9½ feet wide. The standard reinforced-concrete siphons are 10¾ feet in diameter. The Jawbone steel siphon is from 10 to 7½ feet in diameter, 8000 feet long, under a maximum head of 850 feet.

Hetch Hetchy Aqueduct. After many years of discussion and plans the city of San Francisco started a much-needed water supply development in 1919 by awarding the contract for the Hetch Hetchy dam situated on the Tuolumne River about 150 miles east of the city. From the reservoir thus formed water will be carried to San Francisco and the metropolitan district by means of a system of aqueducts with an



LOS ANGELES AQUEDUCT

THE ELLSMERE SIPHON. Built of concrete strongly reinforced with steel. View shows the forms arranged for the concrete and the reinforcing.

A DEEP DEPRESSION ON THE JAWBONE DIVISION CROSSED BY STEEL PIPE LINE. View shows typical topography and construction difficulties involved.

A section of the Antelope siphon showing steel pipe ten feet in diameter.

One of the aqueduct tunnels in the Langas division.

Open concrete lined ditch above Haiwee Reservoir.

ultimate capacity of 400,000,000 gallons a day. At the same time due to the height of the reservoirs in the mountains there would be developed 200,000 hydro-electric horse-power. The aqueduct is being constructed in sections as needed, the first or Mountain section beginning at Early Intake and extending after a short open canal in a tunnel through the mountains 18.3 miles to Moccasin Creek, where a power plant is located. The Foothill division has about 17 miles of aqueduct from Moccasin Creek to Oakdale Portal and then there is 45 miles of steel pipe across the San Joaquin Valley to Tesla Portal. The Coast Range tunnel would extend 31 miles to the east side of San Francisco Bay at Irvington Gate House where the line would divide in three, the main portion extending westerly under the bay through a pipe line of 200,000,000 gallons capacity to the San Francisco peninsula, another section going to the east bay cities, and the third southwest to San José. The new aqueduct by means of a connection of 23 miles between the Alameda Creek and the Crystal Springs reservoir of the Spring Valley Water Company would be connected with that system. The Hetch Hetchy supply can be made available through the Spring Valley system as required so that the distribution facilities can be used so long as they are adequate.

Winnipeg Aqueduct. This important water supply system dates from 1913, the first water passing through in 1919. The country traversed is generally flat and the aqueduct was 80 miles in length from the intake at the lake reservoir to within 17 miles of Winnipeg. It was built of concrete pipe and arch sections and has a nominal capacity of 85,000,000 gallons a day though this is exceeded.

Consult: Frontinus, *De Aquæductious* (Eng. trans. by Herschel, 2d ed., New York, 1913); Friedländer, *Darstellungen aus der Sittengeschichte Roms* (Leipzig, 1888–90); Leger, *Les travaux publics des Romains* (Paris, 1875); Wegmann, *The Water Supply of the City of New York* (New York, 1896); White, *The Catskill Water Supply of New York City* (ib., 1913); *Complete Report on the Construction of the Los Angeles Aqueduct* (Los Angeles, 1916); *Journal of the American Water Works Association, Proceedings of the American Society of Civil Engineers;* current files of *Engineering News Record* (New York) and *Engineering* (London).

A'QUEOUS HU'MOR. A limpid fluid which occupies the anterior chamber of the eyeball, the space between the cornea and the lens. In fœtal life the chambers are divided by the membrana pupillaris (q.v.) and in adult life by the iris. It consists of water, with, according to Berzelius, about a fiftieth of its weight made up of chloride of sodium and extractive matters held in solution. This watery secretion is produced by epithelial cells covering the posterior surface of the iris and the ciliary muscle. (See Eye.) It is rapidly resecreted if allowed to escape through a wound in the cornea.

AQUEOUS ROCKS. In geology, rocks which have been laid down as mechanical, chemical, or organic deposits from water. They belong to the stratified rocks, which also include rocks deposited from air (æolian deposits).

I. The mechanical deposits from water are derived from the destruction of preëxisting rocks. Rain and rivers move considerable quantities of disintegrated material, depositing it wherever the load is too great for the volume and velocity of the current. Waves, rolling against a shore, break from it small and large fragments, carry these fragments back with them, and deposit them in layers on the bottom of the basin. The coarse particles are left nearest the shore, forming conglomerate or gravel; finer particles are carried somewhat farther out, forming sand, which by cementation becomes sandstone, quartzite, novaculite, or, when mixed with feldspar, arkose or graywacke; still finer particles are carried yet farther out and are deposited, to form mud or clay, which by cementation or consolidation becomes mudstone, shale, or slate.

II. Chemical deposition from water may be due to the mingling of solutions, to changes in the temperature or pressure of water containing substances in solution, or to the simple evaporation of water. For convenience in discussion, chemical precipitates may be divided into three general classes: (*a*) precipitates of the alkalies and alkaline earths, giving calcareous tufa, sinter, travertine, stalactite, onyx marbles, oölite, gypsum, rock salt; (*b*) siliceous precipitates, giving chert (flint or hornstone), geyserite, siliceous sinter; (*c*) ferruginous precipitates, giving iron ores. Their deposition is frequently promoted by minute forms of vegetable and animal life that live in the water. So that some examples are closely related to class iii of the group.

III. Organic deposits originate in the growth and decay of organisms, either *in situ* or after transportation. Deposits of this character are commonly made in water which is deeper and quieter than that in which chemical deposits are made. They may be divided into (*a*) calcareous accumulations, resulting in shell marl, chalk, limestone, dolomite; (*b*) siliceous accumulations, such as infusorial earth, siliceous ooze, some forms of flint or chert; (*c*) ferruginous accumulations resulting in certain bog ores; (*d*) carbonaceous accumulations, known as peat, lignite, brown coal, or coal.

Rocks of mechanical and organic deposition form the great mass of the aqueous rocks. The common order of occurrence from the shore outward—conglomerate, sandstone, mud, and limestone—corresponds in a general way with increase in depth of water. It follows, therefore, that if at any point the body of water is transgressing on the land, resulting in deepening of the water, the vertical order of superposition of mechanical deposits will be conglomerate, sandstone, shale, and limestone; and, vice versa, if the water is receding, the order will be reversed. There is thus a change of character of the sediments in any series both laterally and vertically. See Geology; Lithogenesis.

AQ'UILA (Lat. *aquila*, an eagle). A constellation lying on the celestial equator. Its brightest star, Altair, is of the first magnitude, and has a parallax (q.v.) of 0".23. A *nova* or temporary new star was discovered in this constellation by Mrs. Fleming on negatives taken at Harvard in 1899.

AQUILA. A companion of Paul mentioned in Acts xviii. 2 f., 18, 26; Rom. xvi. 3 f., 1 Cor. xvi. 19, and 2 Tim. iv. 19. He is said to have been "of Pontus by race," but a Jew, probably a proselyte. Expelled from Rome, when the Jews were driven out of the city after the insurrection of Chrestus (see Suetonius, *Vita Claudii*, 15) c.49 A.D., he went to Corinth, where he probably was converted to Christianity by

Paul. Like him, he was a tent-maker by trade. His wife, Prisca (q.v.), or Priscilla, is often mentioned before him, always together with him, and seems to have been a strong personality. The couple moved over to Ephesus, where they saved the life of Paul at the risk of their own necks. When Apollos (q.v.) came to Ephesus, they undertook to "expound unto him the way of God more perfectly" (Acts xviii. 26). From Rom. xvi. 3 f., it has been inferred that they afterwards returned to Rome, but many scholars regard these salutations as later additions, possibly from another epistle. The author of 2 Timothy still places them in Ephesus. Later tradition connects Aquila with Luke as his lifelong companion and makes him one of the 70 disciples sent out by Jesus (Luke x. 1). See the commentaries on Acts, the Lives of Paul, and Lipsius, *Apokryphe Apostelgeschichten*, vol. i, pp. 203, 399; vol. ii, pp. 2, 367 (1883–90).

AQUILA, ä′kwê-là, Degli Abruzzi (It. Aquila of the Abruzzi). An episcopal city in south Italy, on the Terni-Solmona Railway, 62 miles southeast of Terni (Map: Italy, H 5). It is pleasantly situated on a hill beside the Aterno, and because of its altitude (2200 ft.) it is a favorite summer resort. The streets are broad, the houses picturesque, and the churches numerous and interesting. In 1703 it was almost destroyed by an earthquake, in which 2000 persons perished. The historical vicissitudes of the city are interesting. Frederick II built it in the thirteenth century to check papal depredations. Soon afterward Manfred razed the city, following which it was rebuilt by Charles I, and the free peasantry of the district maintained it as an almost independent republic until the Spaniards compelled its subjection in 1529. It has linen, leather, paper, and wool factories, and is an important saffron and lace market. Pop., 1881, 14,720; 1901, 21,261; 1911, 21,724.

AQUILA, Greek Version of. See Aquila, Ponticus.

AQUILA, ä′kwê-là, Johann Kasper (1488–1560). A German Protestant reformer. He was born in Augsburg, studied at Ulm and in Italy, and in 1515 was appointed chaplain to Franz von Sickingen. He accepted Lutheranism and was imprisoned, but was released, and while court chaplain to the Elector of Saxony at Wittenberg (1524–27), through his knowledge of Hebrew assisted Luther in translating the Bible. Against the Interim (q.v.) he wrote *Christliche Bedenken auf das Interim* (1548) and *Das Interim illuminiert* (1548), for which a price was set on his head by Charles V. In 1552 he was restored to his pastorate at Saalfeld, which Luther had procured for him in 1527, and filled that office until his death.

AQUILA, Ponticus, i.e., Aquila of Pontus. A celebrated translator of the Old Testament into Greek. He was born at Sinope in Pontus, Asia Minor, and is said by Epiphanius to have been a relative of Emperor Hadrian, who in the twelfth year of his reign, i.e., 128 A.D., sent him to rebuild Jerusalem as Ælia Capitolina. He became a Jewish proselyte and a disciple of Rabbi Akiba, under whose guidance he made his translation before 135 A.D. His version was marked by an extreme literalness and was preferred by the Jews to the so-called Septuagint. Justin seems to have known it in 160 A.D., and Irenæus refers to it in 177 A.D. Origen copied it in the third column of his Hexapla and used it, with Theodotion's, in his recension of the Septuagint. The scattered quotations in the Church fathers and the margins of manuscripts have been best published by Field, *Origenis Hexaplorum quæ supersunt* (Oxford, 1875). Specimens have been recently discovered in Cairo and published by F. S. Burkitt, *Fragments of the Book of Kings, according to the Translation of Aquila* (Cambridge, 1897), and C. Taylor, *Origen's Hexapla* (part of Ps. xxii) (Cambridge, 1901).

AQ′UILA′RIA. See Aloes Wood.

AQ′UILE′GIA. See Ranunculaceæ.

AQUILEIA. See Aquileja.

AQUILEJA, ä′kwê-lā′yà (or Aglar, ä-glär′, as it was called in the Middle Ages). A small town of the Austrian crown-land of Görz and Gradisca, situated on the Lagunadi Grado, which is at the head of the Adriatic, about 25 miles west-northwest of Trieste (Map: Austria, C 4). This once flourishing seaport has dwindled to an insignificant fishing place of a few thousand inhabitants, with little to remind one of its former prosperity and importance but its ancient cathedral and the remains of the Patriarch's Palace. It offers, however, a rich field to antiquarians. Strongly colonized by the Romans in 183 B.C. as a bulwark against the Celts, it became in time the second city of Italy, and in 168 A.D. was so strongly fortified by Marcus Aurelius as to be considered the most important post of the Empire on the north. In the reign of Hadrian, its population was between 300,000 and 500,000. It was the meeting place of the Æmilian Way (q.v.) and the roads and Alpine passes leading to central and southeastern Europe, and one of the principal naval ports; it was thus an important centre of trade. The surrounding country supplied wine, oil, cattle, and hides. Here the Emperor Maximinus perished (238), and in the vicinity Constantine II lost his life in a battle against his brother Constans (340). When the town was destroyed by Attila (452), it had 100,000 inhabitants. It never recovered, although between 556 and 1750 it was the seat of a patriarch. In 1809 it was acquired by Austria. Consult: G. Bartoli, *Le Antichite d'Aquileja* (Venice, 1739); Zahn, *Austria Friulana* (Vienna, 1877); Meyer, *Die Spaltung des Patriarchats Aquileja* (Berlin, 1898).

AQUIN, ä′kăn′. A seaport on the south shore of the island of Haiti, 50 miles west of Jacmel, and a few miles east of Aux Cayes. It exports dyewood. The population numbers about 22,000.

AQUI′NAS, Thomas, or Thomas of Aquino (c.1226–74). One of the most influential of the scholastic theologians, who bears the honorable titles and epithets of *Doctor Communis* ('Universal Doctor,' fourteenth century); *Doctor Angelicus* ('Angelical Doctor,' sixteenth century); *Princeps Scholasticorum* ('Prince of Scholastics'); *Doctor Ecclesiæ* ('Doctor of the Church,' 1567); "Patron of all Catholic Schools" (1880). He was of the family of the counts of Aquino, in the kingdom of Naples, and was born in the castle of Roccasecca, directly north of Aquino, about 50 miles northwest of Naples, about 1226. He received the rudiments of his education from the Benedictine monks at Monte Cassino, which was only a few miles away, and completed his studies at the University of Naples. A strong inclination to philosophical speculation and theological study determined the young nobleman, against the will of his family, to enter (1243) the Order of Dominicans. In order to frustrate

the attempts of his friends, especially his mother, to force him to give up his monastic life and enter the world, his order sent him to Rome and thence to Paris. On his way thither his brothers overtook him at Acquapendente, and by force brought him to the castle of St. John, near Aquino, and there he was closely guarded for a year, and every effort was made to break his resolution to remain a monk. But at length his mother came to his release, and he went, in the company of the General of the Dominicans, to Paris and thence to Cologne, about 1245, where he studied under Albert the Great (Albertus Magnus) (q.v.). At Cologne he pursued his studies in such silence that his companions gave him the name of the "Dumb Ox." But Albert is reported to have predicted "that this ox would one day fill the world with his bellowing." He accompanied Albert to Paris in 1245 and back to Cologne in 1248, when he was commissioned by his order, the Dominican, to establish a theological school there. In it Aquinas taught until in 1251 (or 1252) he was sent to Paris to teach in the Dominican monastery of St. Jacques. He defended his order in his *Contra Impugnantes Dei Cultum et Religionem*. He was already a distinguished scholar and teacher. He continued to lecture with great applause in Paris, till Urban IV, in 1261, called him to Italy to teach philosophy in Rome, Bologna, Pisa, and other places. Finally he came to reside in the convent at Naples (1272–74), where he declined the offer of the dignity of archbishop, in order to devote himself entirely to study and lecturing. It was while there that the following incident is said to have occurred. One day Christ appeared to him and said: "You have written ably about me. What reward would you like to have?" He said: "Lord, nothing, except thyself." Being summoned by Gregory X to attend the general council at Lyons, he was taken ill on the way in the castle of his niece at Ceccano. Realizing that it was his last illness, he was at his own request transferred to the neighboring Cistercian monastery of Fossanuova, so that he might die in a religious house. He lingered there a month and died on March 7, 1274. Dante held (*Purgatorio*, xx, 68) that he was poisoned at the instigation of Charles I of Sicily, who dreaded the evidence that Aquinas would give of him at Lyons; but it is probably not true. His relics were fought for, and his right arm is now in St. Jacques, Paris, other parts in Salerno and Naples, and the rest of his body in Rome. He was canonized July 18, 1323.

Even during his life Aquinas enjoyed the highest consideration in the Church. His voice carried decisive weight with it. A general chapter of Dominicans in Paris made it obligatory on the members of the order, under pain of punishment, to defend his doctrines. Like most of the other scholastic theologians, he had no knowledge of Greek or Hebrew and was almost equally ignorant of history; but his writings display a great expenditure of diligence and dialectic art, set off with the irresistible eloquence of zeal. His chief works are: *A Commentary on the Four Books of Sentences of Peter Lombard*, the *Summa Theologiæ*, *Quæstiones Disputatæ et Quodlibetales*, and *Opuscula Theologica*. He gave a new and systematic foundation to the doctrine of the Church's treasury of works of supererogation, to that of withholding the cup from the laity in the communion, and to that of transubstantiation. He also treated Christian morals according to an arrangement of his own, and with a comprehensiveness that procured him the title of the "Father of Moral Philosophy." The definiteness, clearness, and completeness of his method of handling the theology of the Church gave his works a superiority over the text-books of the earlier writers on systematic theology. His *Summa Theologiæ* is the first attempt at a complete theological system, but he died ere he could complete it. In his philosophical writings, the ablest of which is his *Summa de Veritate Catholicæ Fidei contra Gentiles*, he throws new light upon the most abstract truths. The circumstance of Aquinas being a Dominican, and boasted of by his order as their great ornament, excited the jealousy of the Franciscans against him. In the beginning of the fourteenth century Duns Scotus (q.v.), a Franciscan, came forward as the declared opponent of the doctrines of Aquinas, and founded the philosophico-theological school of the Scotists, to whom the *Thomists*, mostly Dominicans, stood opposed. The Thomists leaned in philosophy to nominalism (q.v.), although they held the abstract form to be the essence of things; they followed the doctrines of Augustine as to grace, and disputed the doctrine of the immaculate conception of the Virgin. The Scotists, again, inclined to realism and to views of the Semipelagians and upheld the immaculate conception.

Aquinas's life was spent in such great toil, not only as an author but as a teacher and as the trusted servant of his order and the adviser of popes, that it was comparatively brief. Yet its literary product was enormous. His mind was remarkably clear, so that although he was the very embodiment of the scholastic method of endless analysis and questionings, he wrote in a way intelligible and interesting to the modern reader. One of his great services is the prominence he gives to Aristotle, upon whose works he wrote elaborate commentaries. Plato also was his master, and to the fathers he yielded loyal submission. He also was a profound Bible student, as he showed in his *Catena Aurea*, which is an exhaustive theological interpretation of the Gospels. In fact, take him all in all, there is no theologian of the past who deserves and rewards study more than he, and the Roman Church does well in accepting him as her great master in theology. Pope Leo XIII in his Encyclical, "Æterni patris" (Aug. 4, 1879), declared that the philosophy and theology of Aquinas was the proper basis for all such teaching in Catholic Christendom.

His works, all written in Latin, were first printed by Pope Pius V (Rome, 1570–71, 17 vols., folio; mod. ed., Paris, 1871–80, 34 vols., 8vo; probably final form, sanctioned by Pope Leo XIII, Rome, 1882). The greatest of the works, the *Summa Theologiæ*, was reprinted in 8 volumes (Paris, 1869); German translation, 12 volumes (Ratisbon, 1886–92). The *Summa de Veritate Catholicæ Fidei* has been published in French, with Latin text (Paris, 1854). Modern English translations of parts of all the works have been published as follows: *Catena Aurea* (8 vols., London, 1841–45); *On the Rulers and Members of Christian States*, from *De Regimine Principum* (London, 1860); *Homilies upon the Epistles and Gospels for the Sundays of the Christian Year*, and the *Festival Homilies* (London, 1873): *On the Two Commandments of Charity and the Ten Commandments of the Law* (London, 1880); *Notes on the Angels* (London,

1888); *Maxims and Prayers and the Little Office* (London, 1890); *On the Sacrament* (London, 1890); *Aquinas Ethicus, or the Moral Teachings of St. Thomas* (London, 1892); *The Lord's Prayer*, made up of parts of the *Summa*, in condensed translation (London, 1892). For interpretation of his work in general, consult L. Schütz, *Lexicon. Sammlung, Uebersetzung und Erklärung der in sämmtlichen Werken des heiligen Thomas von Aquinas vorkommenden Kunstausdrücke und wissenschaftlichen Aussprüche* (Paderborn, 1895). For his biography, consult: in English, R. B. Vaughan (London, 1893), Pius Cavanagh (1890); in German, C. Werner (Regensburg, 1858–59), J. Tansen (Kevelaer, 1898); in Dutch, H. J. Schaepman (Utrecht, 1898).

AQUINO, ä-kwē'nō. A town in the province of Caserta, Italy, 5 miles northeast of Pontecorvo. It is the seat of a bishop, and, in addition to the Via Latina, which is near by, there are ruins of the Roman town, Aquinum. The most interesting of these are fragments of the temples of Diana and Ceres, a gateway now known as the Porta San Lorenzo, and a theatre. In 1224 the philosopher Thomas Aquinas was born in the neighboring castle of Roccasecca. Aquino is also celebrated as the birthplace of Juvenal. Pop., 1911, 3222.

AQ'UITA'NIA. The Latin name of a part of Gaul, originally including the country between the Pyrenees and the Garonne, peopled by Iberian tribes. Augustus, when he divided Gaul into four provinces, added to Aquitania the country lying between the rivers Garonne and Loire. Shortly before the extinction of the Roman Empire, Aquitania passed into the hands of the West Goths. In 507 it was conquered by Clovis, King of the Franks, and during the Merovingian dynasty became an independent duchy. Though subjugated by Charlemagne, the duchy again claimed independence under the weak monarchs of the Carlovingian dynasty. In 1137 Aquitania (or Aquitaine, a name later supplanted by the name *Guienne*) was united to the crown of France by the marriage of Louis VII with Eleanor, heiress of Aquitania. In 1154 it was united with England, as the result of the marriage (1152) of Henry Plantagenet with Eleanor, whom Louis had divorced, and a long series of disputes took place between England and France respecting Aquitania, which was ultimately united to the crown of France by Charles VII in 1451.

ARA, ä'rȧ, *or* ARARA. See COCKATOO.

ARABAH, ä'rȧ-bȧ. The name used in ancient times to designate the entire length of the deep depression extending through the Jordan valley and the Dead Sea as far as the Gulf of Akabah. It was consequently applied to the district around the Lake of Galilee (Deut. iii. 17); the Dead Sea was called the "Sea of the Arabah" (Deut. iv. 49), and the "Brook of the Arabah" (Amos vi. 14) was probably the Wadi el Ahsa falling into the Dead Sea from the south. At present the term is confined to the southern part between the Dead Sea and the Gulf of Akabah, while the northern part including the Jordan valley and the Dead Sea is called El ghor, 'the depression.' Consult Hull in *Memoirs of the Palestine Exploration Fund* (1886); Lartet, *Voyage d'Exploration de la Mer Morte* (1880); Blankenhorn, in *Zeitschrift des deutschen Palästina-Vereins* (1896); Musil, *Petræa: Edom* (1907–08).

AR'ABA'TA (native South American name). The straw-colored howling monkey. See HOWLER.

ARABESQUE, ăr'ȧ-bĕsk' (Fr.). The term signified originally 'resembling Arabic work' and was properly applied to ornament which, by its intricate and fantastic character and avoidance of naturalistic representation, might be held to suggest Arabic decoration. (See ARABIAN ART and MOHAMMEDAN ART.) Its use came, however, to be extended so as to apply to any intricate decoration of a conventional or fanciful character, such as the foliated scroll patterns of late Greek, Roman, or Pompeiian friezes, panels, and pilasters, and even to the complex interlaced designs of Byzantine, Irish, Scandinavian, and Romanesque art of the early Middle Ages, in which grotesque symbolic monsters were intertwined with vines and scrolls. When the Renaissance sought to revive the arts of classical antiquity, the Roman ornamentation was imitated more or less freely, and the term "arabesque" applied to much of the resulting decoration, although this in no wise resembles Arabic design. The most celebrated designer of such arabesques was Raphael, who made a special study of the painted stuccoes of the Baths of Titus, the Golden House of Nero, and the ruins on the Palatine, and produced in the famous arabesques of the Loggie of the Vatican, designs of marvelous fertility of invention, which powerfully influenced the decorative art of the sixteenth century. In common usage to-day any conventional pattern of an intricate character, composed of graceful interlaced curves and more or less fantastic forms, is called an arabesque

ARABESQUE.

a, Arabian Arabesque. *b*, Italian Arabroque.

ARABESQUE. In music, the ornamentation of a theme by means of grace notes, trills, arpeggios, etc. Since Schumann used the term as a title for one of his piano pieces (op. 18), an extremely graceful composition in free rondo form, several other composers have given the same title to works similar in character and form. Among the finest examples are the two exquisite arabesques in E and G by Debussy.

ARABGIR, ä'rȧb-gēr'. See ARABKIR.

ARABIA. The great southwestern peninsula of Asia, called by the inhabitants *Jazirat al 'Arab*, 'the peninsula of Arabia'; by the Turks and Persians, Arabistan. Its northern boundary depends upon whether Arabia Petræa and the Syrian Desert are included or not, and is consequently drawn either from Akaba to Koweit, from Port Said due east to Akaba and Koweit, from Port Said to the southern end of the Dead Sea and then across to the head of the Persian Gulf, or from the Egyptian border to Akaba or al Ahsa and then in a semicircle around the Hammad to the Persian Gulf. On the east it is bounded by the Persian Gulf and the Gulf of Oman; on the south by the Indian Ocean and the Gulf of Aden, and on the west by the Red Sea and, if the Sinaitic peninsula is included, the Isthmus of Suez. When the name is taken in its widest sense, Arabia may be said to be situated in lat. 12° 40′ to about 35° N., and long. 32° 30′ to 60° E., its greatest length from north to south being about 1500 miles, its greatest breadth about 1200 miles, and its area about 1,200,000 square miles; without Arabia Petræa and the Syrian Desert, it would reach to lat. 29° 30′ N., begin with long. 35° E., and have an area of about 1,000,000 square miles.

The name "Arabia" is probably derived from *'Arab*, 'desert,' of which the feminine form is still used to designate the arid depression between the Dead Sea and the Ælanitic Gulf. (See ABABAH.) *'Arab* was the name given by the Hebrews to the desert, to a particular people in the desert, and to the steppe-dwellers of north Arabia in general (Isa. xxi. 13; Ezek. xxvii. 21; Jer. xxv. 24). Already Shalmaneser III characterized Gindibu, who came with 1000 camels to the battle of Qarqar (854 B.C.) as an Arabian (*Ar-ba-a-a*), and after his time *Arabu*, *Arabia*, or Aribi occurs frequently in the Assyrian inscriptions. It is not impossible that the Erembi (*'Ερεμβοί*) in Homer are Arabians (*Odyssey*, iv, 84), as Zeno and Strabo maintained, but it cannot be regarded as certain. Darius I (521–485 B.C.) mentions *Arabaya* among the subject lands, always placing it after Babylonia and Assyria, but before Egypt (*Behistun Inscription*, i, 15). In Sabæan inscriptions *'Arab* is used apparently as a designation of the nomads in north Arabia (*Corpus Inscriptionum Semiticarum*, iv, p. 123). In his article on 'Arabia' in *Encyclopædia Biblica*, Nöldeke has pointed out that one of the oldest poets employs the term *'arraba* for 'speaking plainly,' i.e., 'speaking in Arabic.' Gradually the name extended from the nomad to the settled people in north Arabia, from north Arabia to the whole peninsula.

Ptolemy divided the country into *Arabia Petræa*, *Arabia Felix*, and *Arabia Deserta*. By Arabia Petræa he understood the Roman province of Arabia, including the territory east of the Araba taken by the Nabatæans, the later Idumæa or the Negeb (q.v.), and the Sinaitic peninsula; by Arabia Felix he meant the independent country west and south of the desert, from Akaba to Bab-el-Mandeb and Oman, and by Arabia Deserta, probably the Hammad and Nufud standing more or less under Parthian influence. The name "Arabia Petræa" was derived from Petra, the capital of the ancient Nabatæan kingdom and of the Roman province. As Petra means 'rock,' Arabia Petræa was in later times wrongly interpreted as Stony Arabia. Arabia Felix, like the Greek *'Αραβία εὐδαίμων* (*Arabia Eudaimon*), was an essentially correct translation of *'Arab al yaman*, which meant the Arabia that is on the right hand, i.e., on the south, and also on the lucky side. In Ptolemy's time the region south of Akaba (q.v.) was evidently called by the Arabs *al Yaman*, 'The South,' in distinction from the region north of this point called *al Sham*, 'The North.' The Dahna desert, south of Nejd, is not likely to have been known to Ptolemy. The Arab geographers of the Middle Ages give us the names of various provinces, and these have for the most part continued in use to the present time. The present provinces are (1) *al Tih*, the Sinaitic peninsula; (2) *Hejaz*, or the 'barrier,' a name originally referring to its position between Tihama, the coastland, and Nejd, the highland, but later assumed to refer to its location between al Sham (Syria) and al Yaman (Yemen); (3) *Asir*, the alpland south of Hejaz, known under this name only during the last century, formerly belonging in part to Hejaz and in part to Yemen; (4) *Yemen*, the southwestern corner of the peninsula, having, like Hejaz and Asir, its Tihama, or littoral, on the Red Sea and including Nejran; (5) *Hadramaut*, east of Yemen, along the southern coast; (6) *Mahra* and *Shihr*, the ancient *Habashat*, the incense country farther east to the border of Oman (7) *Oman*, the southeast projection into the Indian Ocean; (8) *Hasa*, formerly called *Hajar* and *Bahrain* (the two seas, referring to the Persian Gulf on both sides of al Katar); (9) *Bahrain*, now used as a designation of Uwal and seven other islands in the Persian Gulf opposite Hasa; (10) *Dahna*, the great territory between Hadramaut, Oman, and Nejd; (11) *Nejd*, in the interior; and (12) *Nufud*, the desert north of Jebel Shammar. The Hammad is divided into three parts, *Badiyat al Sham*, *Badiyat al Jazira*, and *Badiyat al 'Irak*, deserts of Syria, Mesopotamia, and Babylonia, respectively; while southern Belka and al Makra are now counted as belonging to Syria.

Our information concerning the physical geography of Arabia comes partly through such classical writers as Eratosthenes, Strabo, Pliny, and Ptolemy, and Arab geographers like Hamdani, Ibn Haukal, Istakhri, Mukaddasi, Idrisi, Ibn al Mujawir, and Ibn Batuta, and partly through modern explorers. Much of our knowledge is due to the accounts of north Hejaz, or the Land of Madyan, by Beke, Burton, Doughty, Huber, Euting, and, most recently, Jaussen and Savignac; of the holy cities by Varthema, Leiblich, Burckhardt, Burton, Hurgronje, and Maltzan; of Asir by Tamisier; of Yemen by Niebuhr, Forskål, Arnaud, Halévy, and Glaser; of Hadramaut by Wrede and Hirsch; of Oman by Wellsted, Palgrave, and Zwemer; of Hasa by Pelly; of Bahrain by Bent; of Nejd by Sadlier, Wallin, Doughty, Lady Anne Blunt, and Palgrave; and of various parts of Arabia Petræa by Seetzen, Burckhardt (the discoverer of Petra), Laborde, Brünnow and Domaszewski, Palmer, Trumbull, Lagrange, Schmidt, Musil, Stanley, Hull, Petrie, and others. Yet their visits were for the most part merely tours of reconnoissance. No part of the country has been properly surveyed, and more than one-third of it is absolutely a *terra incognita*. How far its character may have changed in historic times is impossible to determine. But De Goeje has expressed the conviction that the great wadies, Humth, Dawasir, Hanifa, Rumma, and others, were once perennial streams; and Caetani, *Studi di Storia Orientale*

(Milano, 1911), has given strong reasons for the belief that the desiccation has taken place in the last few thousand years, and that in earlier times the huge peninsula had physical features and climatic conditions far different from those now prevailing and more conducive to the development of human life. The largest portion of the country lies in that great desert zone which stretches from the shores of the Atlantic to those of the northern Pacific. The interior, so far as it has yet been explored, seems to be a great plateau, in some places reaching a height of 8000 feet. The western border crest of this plateau may be regarded as part of a mountain chain, beginning in the north with Lebanon and stretching south to the Strait of Bab-el-Mandeb. From Bab-el-Mandeb another chain runs northeast, parallel to the coast, to Oman. The elevation of the mountains in the extreme south of the peninsula is estimated at 13,000 feet. From the mountain range on the west the plateau slopes to the northeast and forms in general a vast tract of shifting sands, interspersed here and there about the centre with various ranges of hills, which, like the shores of the peninsula, are generally barren and uninteresting.

One of the chief characteristics in the physical aspect of the country is the scarcity of permanent rivers. Like most desert regions, Arabia has a large number of river courses, or *wadies*, among which the Wadi al-Rumma is the longest, traversing under different names the entire country from west to east. But they are, almost without an exception, either completely dried up or only filled with water now and then in the rainy season. Springs are very few, and in the cultivated parts of the country large numbers of wells, cisterns, and reservoirs are prepared for the reception of rain water.

Arabia has, on the whole, an African climate. Though surrounded on three sides by the sea, its chains of hills exclude in a great measure the modifying influence of air currents from the ocean. In several parts of Arabia hardly a refreshing shower falls in the course of the year, and vegetation is almost unknown; in other torrid districts the date palm is almost the only sign of vegetable life. Over vast sterile tracts hangs a sky of almost perpetual serenity. The time and duration of the rainy season varies in the different parts of the country. In Yemen it lasts from June to September and is often followed by a shorter rainy season in the spring. In the coast regions of Hadramaut and Oman it lasts from February to April, while in the highlands of the former it takes place between April and September. Light frosts mark the winters in the centre and northeast. During the hot season the simoom (q.v.) blows, but only in the northern part of the land.

The districts which are not too arid for culture produce wheat, barley, millet, dates, tobacco, indigo, cotton, sugar, tamarinds, coffee, balsam, aloe, myrrh, frankincense, etc. Arabia has but a small area of forests, but has vast stretches of desert grass, fragrant with aromatic herbs, and furnishing admirable pasturage for the splendid breed of horses. Coffee, one of the most important exports, is an indigenous product of both Arabia and Africa, as are also the date palm and banana. The trade in coffee, dates, figs, spices, and drugs was once very important, but is now much smaller than formerly. Arabia has few manufactures, but carries on a transit trade in foreign fabrics, besides importing these to some extent for its own needs.

In the animal kingdom an African character prevails generally. Sheep, goats, and oxen satisfy the immediate domestic and personal necessities of the inhabitants, to whom the camel and horse are trusty companions in their far wanderings. Gazelles and ostriches frequent the oases of the deserts, where the lion, panther, hyena, and jackal hunt their prey. Monkeys, pheasants, and doves are found in the fertile districts, where flights of locusts often make sad devastation. Lizards and venomous snakes are numerous. Fish and turtle abound on the coast. The noble breed of Arabian horses has been cultivated for several thousand years, but the horse is of less general importance in Arabia than is popularly supposed. The most characteristic of all animals in the peninsula is the camel; the breed of Oman is celebrated for its beauty and swiftness. Among the minerals of Arabia may be mentioned iron, copper, lead, coal, basalt, and asphaltum, and the precious stones emerald, carnelian, agate, and onyx. Pearls are found in the Persian Gulf.

According to Palgrave's estimate, Hejaz has about 1,000,000 inhabitants; Yemen, 1,000,000; Hadramaut and Mahra, 1,000,000; Oman and Hasa, 2,500,000; and Nejd, 2,000,000, which would give to Arabia a population of about 7,500,000. These figures are probably too high; but with our total ignorance concerning the larger part of the interior, and in the absence of a regular census for any district, it is not possible to verify any statement on this point. The Arab is of medium stature, compactly built, and of brown complexion. Earnestness and pride are distinctive characteristics; by nature he is quick, sharp-witted, lively, and passionately fond of poetry. Courage, temperance, hospitality, and good faith are his leading virtues; but these are often marred by a spirit of sanguinary revenge and rapacity. His wife keeps the house and brings up the children. Even in the desert the children are generally taught to read, write, and calculate. The Arab cannot conceive a higher felicity than the birth of a camel or a foal, or that his verses should be honored with the applause of his tribe. The Arabs are, as a rule, monogamists, although frequently the wealthy chiefs have several wives. Matrimonial ties are severed at will, and the ill-treated wife can always find refuge in her father's tent.

Arabian life is either *nomadic* or *settled*. The wandering tribes, or Bedouins, are well known to entertain very loose notions of the rights of property. The settled tribes, styled Fellahs, are despised by the Bedouin, who scorns to be tied down to the soil, even where such bondage might make him wealthy.

Ethnography. Concerning the earliest inhabitants of the peninsula we have no definite knowledge. Doughty found in the northern deserts stone implements of a well-known type furnishing evidence of man's existence there in the Paleolithic Age. Whether the race that produced them was swept away or merged with tribes coming from the west, we have no means of determining. On the whole, the latter theory seems preferable to the assumption that the Semites were the descendants of the Stone Age people first occupying the country. The Semitic type may have developed in Africa before the invasion of Arabia, or it may be the result of a fusion of the invaders with the aborigines, as

in Babylonia, Syria, and Abyssinia. The stock that already was, or was destined gradually to become, Semites may have shown, at its first appearance in Arabia, the power to absorb and to assimilate which has been a characteristic trait ever since. The tribes that emigrated from Arabia and became known in history as Akkadians, Assyrians, Lulubians, Gutians, Amorites, Aramæans, Hebrews, and Chaldæans brought with them Semitic speech, though they spoke different Semitic languages. When these migrations took place, the population had not yet attained the degree of homogeneity found in later times. Before the leveling influence of Islam came in, there were always marked differences between the settled tribes of the south and the nomads of the north, those on the Erythræan and those on the Persian Gulf and the Indian Ocean. Islam united Arabia, but also sent out its sons to all parts of the Moslem world and drew to it slaves and foreigners who had accepted this faith. This must be borne in mind when the present Arab type is considered. It presents examples of the tall and the short, the long-headed and the broad-headed, the brunette and the blond, the straight-haired and the wavy-haired, evidencing considerable intermixture with Negroid and Aryan elements. Differences continued to exist between the Kalb, or southerners, and the Kais, or northerners, between the city-dwellers and the nomads; but the unity of language and religion made it possible for the Arab to make a strong impression upon the world outside of his peninsula. He took a leading part, together with the Persian, in developing Moslem civilization. The Arabic alphabet spread with the Arabic religion; the Arabic numerals were indeed derived from India, but in the hands of the Arabs became an instrument for a higher development of mathematics. The Arabs fostered commerce and geographical exploration, created a new order of architecture, made the productions of the Greeks accessible to European nations, and in the cultivation of the sciences, philosophy, literature, and art were far in advance of the rest of the world. Even away from Arabia they have maintained their peculiar genius, and when they intermarried with conquered or converted peoples, have to a remarkable extent impressed upon them their own characteristics. Hamites, Negroes, Aryans, Mongolians, and Malays have received a large infusion of Arab blood; and Keane rightly emphasized the absorptive power of the Arabs, to whom not only the mass of kindred Semites in Asiatic Turkey, but also other ethnic elements embracing Islam have the tendency of becoming more and more assimilated. See Plate, RACES OF ASIA, accompanying ASIA, and the articles on SEMITES. For various topics connected with the ethnography of Arabia consult *The Encyclopedia of Islam, A–D* (Leyden, 1908–13).

Politically, Arabia is divided as follows: The Sinaitic peninsula forms a dependency of Egypt. The western coast, forming the two vilayets of Hejaz and Yemen, as well as the region of Hasa, on the eastern coast, belong to Turkey. Oman is administered by an independent imam, while Aden (q.v.) forms a dependency of Great Britain, which exercises a protectorate over a considerable territory. The remainder of the country is divided into a number of independent or semi-independent states, under hereditary or chosen chiefs, bearing the title of emir, sheikh, or imam. Their function appears to be limited to leading the troops in time of war, levying tribute, and administering justice. A spirit of liberty in the people moderates the authority of their chieftains; but instances of extreme despotism have not been infrequent, in both early and modern times. The most important cities of Arabia are Mecca, Medina, and Jidda in Hejaz; Hodeida, Sana, Mocha, and Aden in Yemen; Makalla in Hadramaut; Maskat in Oman; Katif in Hasa; Riad and Hail in Nejd.

History. While historic data do not carry us beyond the last centuries of the second millennium B.C., the expeditions of Naram Sin, of Agade to Magan (East Arabia) and Gudea, of Lagash to Magan and Meluhha (West Arabia), as well as those of the Egyptian kings of the third and fourth dynasties, to the Sinaitic peninsula, may have taken place in the fourth millennium, and show that the country was then inhabited. The invasion of Babylonia by the Semitic Akkadians (see ACCAD), probably in the fifth millenium B.C., and those of Assyrians, Gutians, Lulubians, Amorites, Aramæans, Hebrews, and Chaldæans (q.v.) at various times after them, testify to the movements of peoples upon the peninsula and, to some extent, to their character, before the appearance of our first South Arabian inscriptions. The history of the last 3000 years may be divided into two great periods—one extending from the establishment of the Minæan kingdom to Mohammed, and the other from Mohammed to the present day. Each of these naturally falls into a number of subperiods. In the first there are those of (1) the kings of Ma'in c.1200–750; (2) the *mukarribs*, or priest-kings, of Saba (c.750–525); (3) the kings of Saba (c.525–115); (4) the kings of Saba and Raidan (c.115 B.C.–300 A.D.); (5) the Aksumite invasions and the kings of Himyar (300–570). Although some eminent scholars still hesitate to bring the Minæan inscriptions back further than to the ninth century (see MINÆANS and SABÆANS), there is a growing tendency to concede that they are earlier than the Sabæan. The failure of any mention of the powerful Minæan kingdom, which had its outposts in northern Hejaz and al Tih, in the inscriptions of Assyrian kings who invaded that very region, while mention is made of the Sabæans, is significant, as is also the fact that the Minæans (Mainim) are referred to as invaders of Palestine in the days before Saul in Judges x. 12. The list of about 30 kings in Ma'in certainly covers a number of centuries. Nothing that is known to us concerning the origin of the alphabet prevents the assumption that the peculiar characters used in the Minæan inscriptions were already invented in the twelfth century B.C. (See ALPHABET.) It is not impossible that, in a period of comparative weakness on the part of the rulers in Ma'in, Saba was independent, and a Queen reigned in Marib, nor that this Queen of Sheba visited Solomon in Jerusalem, perhaps for political purposes, to enter into an alliance with the King, who had such vital interests at Ezion-geber on the Gulf of Akabah against their common enemy, the Minæan King, holding control of the land of Midian immediately south of this place. Similarly, the Sabæan mukarribs may have sought aid from Assyria. Tiglath Pileser IV (745–728), Sargon II (722–705), Sennacherib (705–681), Esarhaddon (681–668), and Asurbanipal (668–625) made expeditions into north Arabia and had dealings not only with the Sabæans

but also with the Kedarenes, the Dedanites, and the Nabatæans. In 715 a number of Hejaz tribes, among them the famous Tamudi, or Thamud, referred to by Mohammed, were deported to Samaria (q.v.). The conquest of Egypt by Cambyses in 525 paved the way for the subjugation of North Arabia, which was organized as a satrapy called Arabaya by Darius Hystaspis. It was no doubt the danger of the Persian approach that consolidated the Sabæan power in the south, and the rulers appear as kings after 525. Alexander was not able to carry out his plan to go into Arabia; and the Ptolemies who established trading stations on the Erythræan held peaceful relations with the tribes of Hejaz and Yemen. During the period of the kings of Saba and Raidan the most important event was the invasion of the country by the Romans. In the year 24 B.C. Augustus sent the prefect of Egypt, Ælius Gallus, with his ally, the Nabatæan King Obodas II (28–9 B.C.), against the Sabæan power. The army of 10,000 men reached the territory of Saba, took the cities of Nejran, Nashk, and Kamina, but were unsuccessful in their siege of Marib and returned to Egypt. The Nabatæan kingdom, which had extended into Hejaz, to Damascus, and toward the borders of Egypt, became a Roman province in 106, the year being fixed by an inscription of Rabel II dated in 405 of the Seleucid era and the twenty-fourth year of the King. The Palmyrene kingdom, flourishing especially under Odenath I, Odenath II, and Zenobia (q.v.), was overthrown by Aurelian in 272. Other buffer states, however, were established by the Lahmids of Hira, the Ghassanids of Bosra, and the Banu Kinda in Nejd. In the south the growing power of the Himyarites, leaning on the Sasanids, was only checked temporarily by the Aksumite occupation of Saba and Raidan (300–378 and 525–570), but practically ended by the Persian conquest in 570.

In the second period of Arabian history the centre of power shifts from Yemen to Hejaz. It may be divided into the following subperiods: (1) Mohammed and the three first caliphs (570–656); (2) Ali and the Umayyads (656–750); (3) the Abbasids (750–900); (4) the Karmatians and the Fatimids (900–1171); (5) the Ayyubids (1171–1260); the Mamluks (1260–1517); and the Ottoman Turks, the Portuguese, the Wahabis, and other independent powers (1517—). Through the pressure of Christianity, represented by Abyssinia and the Byzantine Empire, and Mazdaism, represented by the zealous Sasanid dynasty, south Arabia lost its power and independence. But about the time when the end came, the man was born who was destined to weld together all Arabia by a new religious faith and a new political organization, to destroy the Persian Empire and all but annihilate the religion of Zoroaster, reduce Oriental Christianity to insignificant fragments, conquer northern Africa, Spain, and Sicily, and finally absorb the Byzantine Empire itself. He belonged to the tribe of the Kuraish. This tribe, living in and about Mecca, had risen to great prominence on account of its noble descent, its enterprise, and its wealth. Its members became the perpetual guardians of the sacred Kaaba at Mecca. This structure from the earliest times had been a place of pilgrimage for the peoples of the entire peninsula. In the great fairs which were annually held not far from Mecca, the first steps toward Arab unity were made. These annual meetings were marked by the celebration of athletic games and poetic contests and possessed also a certain religious character which made them in some respects similar to the Olympian Games of ancient Greece, with which they may also be compared for their effect upon the building up of an Arabian nationality. The way, then, was prepared for Mohammed, who, through the teaching of Islam, was destined to unite the entire peninsula under his rule within the short period of 10 years; for after he had won over the powerful Kuraish to his doctrine and had provided himself in this manner with an efficient army, the chaotic condition of political life in Arabia made the spread of his faith all the more easy. Arabia enjoyed the most prosperous period of its history during the reigns of the first three caliphs (632–656), under whom Syria, Egypt, and Persia were conquered. Then the tide of Moslem conquest swept westward over the whole of northern Africa and the Spanish Peninsula, and seemed about to engulf ancient Gaul, when it was arrested between Poitiers and Tours by Charles Martel, ruler of the Franks (732). The removal of the capital first to Kufa under Ali and then to Damascus under the Umayyads had tended to reduce the importance of Mecca and Medina, and with the spread of Islam the direct influence of Arabia itself gradually declined. This was especially true after the year 750, when the Umayyads were overthrown by the descendants of Abbas. So long as Damascus had been the centre of the Moslem world, the Arab element had been preëminent, and the great generals and administrators of the caliphs had been drawn chiefly from the inhabitants of the peninsula; but with the establishment of the Abbasid dynasty of caliphs, who removed the seat of the Mohammedan power in the east to Bagdad, and the rise of a great Mohammedan realm in the extreme west, the magnificent rôle which Arabia had played came to an end. The Abbasid caliphs continued indeed to be recognized, after the insurrection quelled by Hajjaj, in Hejaz; but independent amirates grew up in Yemen and Oman. The tenth century was characterized in Arabia by the spreading power of the Karmatians, a religious and political sect whose founder was Abdallah ibn Maimun, though it was named after Hamdan al Karmat. (See MOHAMMEDAN SECTS.) In 900 Hasa was conquered; in 929 Mecca was taken and the sacred stone carried away; in 951 Oman was subdued. The whole peninsula was ruled by the mahdi and caliph of this powerful sect. The Fatimids were able to some extent to restore order in Hejaz; but the growing power of the grand-sharif of Mecca soon made their authority merely nominal. By the services of Saladin in freeing Mecca and Medina from that awful scourge, the lord of Montreal (Shobek), Reinaud de Chatillon, the Ayyubids gained much prestige and influence in Hejaz; and Mamluks like Nazir (1310–1345) retained some power in Hejaz and were prayed for as caliphs in Mecca, though every attempt to gain control of Yemen was a failure. The imamates, sultanates, and amirates of Hasa, Oman, Yemen, and Nejd were quite independent. In 1508 the Portuguese captured Maskat and held it until 1659, when it fell into the possession of a line of native rulers who succeeded in extending and consolidating their power. The present dynasty established itself in 1741. Selim I conquered Hejaz in 1517

and Yemen some years later. The caliphate of the Ottoman sultans was recognized in Hejaz until 1803, though the real power was in the hands of the grand-sharif. After the Wahabite occupation the Turkish government was restored, and the province was then ruled by a wali, or governor, sent from Constantinople. Yemen was lost to the Turks in 1630 and ruled by the imam of Sana until 1871, when the suzerainty of Turkey was recognized again. Meanwhile Aden (q.v.) had been taken by England in 1811. Towards the middle of the eighteenth century there appeared in Nejd a prophet, less original but also less self-indulgent than the founder of Islam, less radical but more sincere than Hamdan al Karmat, Mohammed ibn Abd al Wahhab. He was a stern reformer, preaching temperance and justice, himself an ascetic and a just man, unwilling to make any concessions or compromises, opposed to current superstitions, and counting as such the veneration of the Prophet, the saints, and the sacred places. Under his successors the Wahabite sphere of influence expanded. Kerbela was destroyed in 1802; Mecca was sacked in 1803 and remained in the hands of the Wahabites until 1813. Mohammed Ali sent his son Tusun to cope with this power, and later a greater general, his son Ibrahim, who by 1818 had greatly reduced its territory and prestige. The Saud dynasty at Riad continued, however, to be independent and only yielded to the growing strength of the Rashids at Hail. Mohammed Ali sent 11 expeditions into Asir, which was especially devoted to the Wahabite cause, but in 1841 had to conclude an inglorious peace. Asir thereafter remained practically independent. Turkish control over Yemen was more nominal than real, and sanguinary wars between Arabs and Turks left the situation in this respect unchanged. In the Great War the Arab movement for complete independence from Turkey was encouraged by the British who promised to recognize the autonomy of the Hejaz if its revolt were successful. The independence of the Hejaz was proclaimed by Husein ibn Ali, June 5, 1916, who assumed the title of King of the Hejaz, and the Hejaz was recognized as an independent State in the treaty of peace with Turkey. See SUPPLEMENT.

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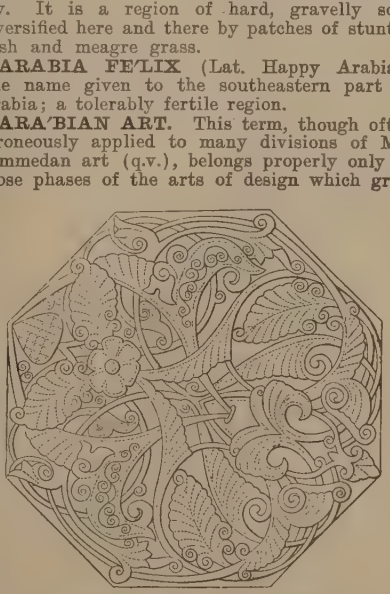
ARABIA DESER'TA (Lat. Deserted Arabia). The name applied by ancient geographers to the northern and central third of the country. It is a region of hard, gravelly soil, diversified here and there by patches of stunted bush and meagre grass.

ARABIA FE'LIX (Lat. Happy Arabia). The name given to the southeastern part of Arabia; a tolerably fertile region.

ARA'BIAN ART. This term, though often erroneously applied to many divisions of Mohammedan art (q.v.), belongs properly only to those phases of the arts of design which grew



ARABIC CARVED PANEL FROM CAIRO.

up under Arab dominion, chiefly in Arabia, Syria, northern Africa, and Sicily. The Arabs were not originally an artistic nation, but employed the artists of the peoples they conquered in the seventh to ninth centuries. Gradually, like the Romans, they developed an architecture and decorative arts distinctly their own, wholly different from those of the conquered nations though derived largely from them. Architecture was highly developed in mosques and palaces; carving, inlaying of marble, wood, and mother-

of-pearl in intricate geometric patterns, manuscript illumination, caligraphy, and certain forms of work in brass and in glass, were brought to high perfection. As in most of the phases of Moslem art, the representation of living beings, human or animal, was rigidly excluded. The Moorish art of north Africa was an offshoot from the Arabic art of Egypt. Consult Gayet, *L'Art Arabe;* Bourgoin, *Les arts arabes* (Paris, 1873); Prisse d'Avennes, *L'art arabe* (Paris, 1877); Saladin et Migeon, *Manuel d'art musulman* (Paris, 1907); Fago, *Arte arabe* (Rome, 1909).

ARABIAN GULF. See Red Sea.

ARABIAN MU'SIC. The influence of the Arabs upon modern music is distinctly felt in many of our orchestral instruments. Their musical system, however, has left no traces, because it was rather a philosophical and mathematical speculation than a practical system. Although in early times the Arabs had primitive instruments and characteristic melodies, we cannot speak of a distinctly Arabic system of music until after the conquest of Persia by the Arabs in the seventh century A.D. With wonderful rapidity the conquerors assimilated the musical art of the conquered, so that in a short time the pupils rose to the position of masters. Since then the music of Persia and Arabia is like two great streams flowing side by side and frequently intermingling. Already in the eighth century we find theoretical writings on music by Arabic authors. When Al Farabi, in the tenth century, attempted to supplant the Arabic system by that of the Greeks, he failed, because the Arabic-Persian system had already reached a high development. The theoretical founder of the Arabic-Persian school is Sifa al-Din, an Arab by birth, who lived in the fourteenth century. The Arabic system constructed a scale by joining together a tetrachord (D, E, F♯, G), and a pentachord (G, A, B, c, d), so that the semi-steps are between the third and fourth and sixth and seventh degrees. Each whole tone was divided into three third tones, so that the octave contained 17 third tones. These third tones were not regarded as chromatic alterations of a fundamental tone, but were denoted by the theorists by separate numbers, so that the first tone of the second octave was 18, of the third octave 35. Octaves and fourths are regarded as consonances, thirds and sixths as dissonances. The fifth was a disputed interval. Out of a possible number of 84 scales, the theorists selected 12 as practicable. These were called *Makamat*. Besides these complete scales there were recognized six *Awasat*, combinations of from five to nine third tones, which stood in the same relation to the scales as the tropes of the Plain Chant stood to their respective modes. While the theorists continually introduced new systems of wonderful ingenuity, the practical musicians were guided chiefly by their ear, and this led them to conceive their melodies in a scale corresponding exactly to our D major. The principal instrument of the Arabs was the lute (q.v.), which they adopted from the Persians. The tanbur had a circular or oval body, a very long neck and three strings. The kanun was a kind of cembalo with 75 gut strings (three to each tone) over a square resonator. Among the instruments played with a bow the principal one was the rebab or rebic, which has developed into our violin. The kemangeh was made of a cocoanut over which was stretched a membrane. The strings were fastened on an excessively long and thin neck. The chief wind instrument was the zamr or zurna, a kind of oboe. The nefyr is a trumpet similar to ours. The nakarich is our kettledrum. The number of instruments used by the Arabs is enormous. There are 32 kinds of lutes, 12 kinds of kanuns, 14 instruments played with a bow, 3 kinds of lyre, 28 kinds of flute, 22 kinds of oboes, 8 kinds of trumpets, and drums. Consult Land, *Over de Toonladders der Arab. Musick* (Amsterdam, 1880); A. Lappage, *La musique arabe* (Paris, 1905); J. Rouanet, *La musique arabe* (Algiers, 1905); J. Rouanet and E. N. Yafil, *Répertoire de musique arabe et maure* (Algiers, 1905); R. Mitjana, *L'orientalisme musical et la musique arabe* (Upsala, 1907); G. Tesenti, *Canti e ritmi arabici* (Rome, 1910); P. Tripodo, *Lo stato degli studi sulla musica degli Arabi* (Rome, 1904).

ARABIAN NIGHTS. The common English title of a collection of stories called in Arabic *alif laila wa laila*, 'Thousand and One Nights.' In regard to the number of the stories as well as their form and arrangement the different copies of the text vary greatly. There are, as Zotenberg has shown, three distinct groups of manuscripts: (1) those from Asia containing, as a rule, only the tales told on 281 nights, but presenting a comparatively old and excellent text; (2) those from Egypt, more complete but scarcely more than a century old; and (3) some of Egyptian or Tunisian origin showing the influence of both types. None of these manuscripts contains all of the stories; and the Arabic text of some of the most famous among them has only been found and published in recent years by Zotenberg and Nöldeke. This variation in the manuscripts, while also an index of the popularity which the collection enjoyed, is due to their gradual growth and to the different centres in which the traditions regarding them developed. They were first made known to Europe by Antoine Galland (1646–1715), a French Orientalist, who succeeded, after much effort, in obtaining a manuscript. Between 1704 and 1717 Galland's translation appeared in 12 volumes under the title of *Mille et une Nuits, contes Arabes traduits en Francais.* The stories of the eleventh and twelfth volumes Galland did not find in any manuscript, but heard them from the lips of the Maronite Hanna, who had accompanied the physician Declos to Paris. Hanna seems to have used a manuscript not known to Galland. Among his stories were those of Ali Baba and the Forty Thieves, Ali Khuja, the Bewitched House, Ahmed and the Fairy, and the Two Jealous Sisters. While received with great enthusiasm by the general public, doubts were freely expressed in learned circles as to the genuineness of the tales published by Galland. Oriental scholars did not hesitate at first to declare against their authenticity and denounce them as forgeries. Having taken only an obscure place in the literature of the East, and their style unfitting them from being classed among models of eloquence or taste—having no object of a religious, moral, or philosophical nature in view, while the manners and customs delineated in them were different from all received ideas of those of the Moslem nations—their success took the critics by surprise. It was not long, however, before such skepticism gave way, and they were recognized

not only as genuine productions but as a characteristic expression of eastern thought and manners. The success of Galland's translation spread the tales throughout Europe. Few books have been translated into so many different languages and given delight to so large a number of readers. In addition to the translations into European languages we must bear in mind that the Arabic original has also been the source of renderings into many eastern tongues, notably Persian, Turkish, and Hindustani, so that more than any other compilation, with the single exception of the Bible, the Arabian Nights has encircled the entire world. It may be said that in these Oriental tales there has sprung up a new branch of literature, for their influence on the literature of the present day is easily discernible. Here are found depicted, with much simplicity and great effect, the scenes of the town life of the Moslem. The prowess of the Arab knight, his passion for adventure, his dexterity, his love, and his revenge, the craft of his wives, the hypocrisy of his religious teachers, and the corruptibility of his judges, are all dramatically delineated—far more vividly represented, in fact, than is possible in a book of travels; while gilded palaces, charming women, lovely gardens, and exquisite repasts captivate the sense of the reader and transport him to the land of wonder and enjoyment. Besides entertaining the mind with the kaleidoscopic wonders of a teeming and luxurious fancy, which is their most obvious merit, they present a treasure of instruction upon life in general and Oriental life in particular. This is undeniable, notwithstanding the fact that the aspects of society they depict are far from standing high in the social scale either as to civilization or morality.

The inquiry into the origin and date of the Arabian Nights may be said to have begun with Galland himself. In his dedicatory epistle he suggested that the stories came from India by way of Persia and took their present form in the middle of the thirteenth century. Scott, in 1811, indicated his belief that the original Arabian Nights consisted of a far smaller number than the 1001 in 36 parts, and that upon the original stock various novelists of the Moslem world engrafted their performances. Hammer-Purgstall was the first to call attention, in *Journal Asiatique*, pp. 253 ff. (1827) to a passage in Masudi's *Muruj al dhahab*, written in 947 A.D., referring to a book called "Thousand and One Nights" translated from a Persian work entitled *Hazar Afsanah*, or 'Thousand Tales,' telling the story of the King and his wazir, Sharazad and Dinazad. De Sacy replied in the *Mémoires de l'Académie des Inscriptions*, pp. 30 ff. (1833); showing evidence of an Arabic-Egyptian origin and a date as late as 1450. Hammer-Purgstall reiterated his opinion in *Journal Asiatique*, pp. 175 ff. (1839); and quoted another passage from Nadim's *Kitab al Fihrist*, written 987, confirming Masudi's account. The story known to Masudi and Nadim has many points of resemblance to our *Arabian Nights*. In both the framework is essentially the same—a king who was in the habit when wedding a damsel to kill her after having spent one night with her, and a damsel who entertained a king with stories so fascinating that he respited her each night in order that he might hear the continuation. This continued for 1000 nights, at the end of which period the king decided to preserve his consort's life. Nadim also gives the name of the heroine as Shahrazad, and says that the book was written for Humai, daughter of Bahman. Firdausi makes Humai the daughter and wife of Bahman Ardashir, i.e., Artaxerxes Longimanus. Lane, in 1839, sided with De Sacy and emphasized the points that seemed to indicate an Egyptian origin at the end of the Mamluk, or beginning of the Turkish, period. That was substantially also the attitude of Weil (1838). De Goeje distinguished between the final edition in Egypt, c.1450 and the earlier forms of the work, made the translation of the Persian Hazar-Afsanah the nucleus, and regarded this Persian story as a variation of an old Persian legend of which another form is found in the Book of Esther (*De Gidd*, 1886). Burton in his *Terminal Essay*, which also appeared in 1886, took the same view, except that he did not attempt to trace a connection between the Persian heroine and Esther. The necessity of eliminating later glosses was suggested by A. Müller in Bezzenberger's *Beiträge* (1888); and Zotenberg, on the basis of a careful examination of the various groups of manuscripts, hinted at an earlier eastern and a later Egyptian form of the collection, *Notices et Extraits des Manuscripts de la Bibliothèque Nationale*, pp. 167 ff. (1887). Mardrus thinks that 13 stories go back to the tenth century, that the collection as a whole assumed a definite shape in the thirteenth century, and the same tales may be as late as the sixteenth. The title, however, of the book known to have existed in the tenth century seems to suggest a much larger number. There are 264 stories, divided on 1001 nights, in the manuscript that has the most. The Achikar story found among the recently discovered Elephantine papyri (q.v.) shows that this kind of literature flourished and was widely spread in the Achæmenian period. While there is little resemblance between Esther and Shahrazad, and Ahasuerus (q.v.) is not Artaxerxes, but Xerxes, it is, therefore, not impossible that the romance was written in the Seleucid period or even before Alexander. That Shahriar appears as a Sasanid king, reigning in the Ganges valley, and having his brother as vassal in Samarkand shows how even the framework suffered change; and new stories were undoubtedly substituted for, and added to, the old ones. The additions made in Egypt must have been considerable, and the interpolations and changes in the text numerous.

Regarding the character of the stories and the material contained in them, we may distinguish three categories: (1) beast fables, (2) fairy tales, and (3) anecdotes. Of these, the beast fables represent probably the oldest structure, reverting, as they eventually do, to the primitive beliefs which attributed to animals human powers and evident superhuman faculties. Some of them are clearly of Indian origin, coming from the Panchatantra which was translated into Persian in the reign of Khosru Anushirvan (531–579), and from Persian, into Arabic by Mukaffa in the time of Almanzur (754–775). The fairy tales show the eastern imagination at its best, though it should be remembered that some of the tales are transformed myths that again belong to a more primitive age than one which was able to exercise the imaginative fancy for its own sake, independent of doctrines or of symbolical purposes. Burton assumes that

the fairy tale proper in the *Arabian Nights* is "wholly and purely Persian" (*Terminal Essay* to his translation, p. 127), and so far as the stimulus toward this branch of literature is involved, he is unquestionably right. Characteristically Arabic, on the other hand, are the stories introduced to prove a point or to point a moral, while the incidents and anecdotes, historical and otherwise, are likewise the genuine production of the Arabic mind. The poems introduced into the stories, to which justice is done only in the excellent translation of Burton, are drawn either from the *Moallakat* (q.v.), the courts of Harun al Rashid, al Asma'i and Abu Nuwas, al Hariri's *Makamat*, or the later Egyptian poets.

In judging of the obscene allusions with which many of the tales are well stocked, and the frankly indelicate manner in which incidents are related that shock Occidental sensibilities, it must be borne in mind that many themes may be discussed in the Orient with perfect simplicity that would be regarded as improper among us, so that not everything which seems obscene was really intended to be such. But making due allowance for this difference between the Oriental and Occidental point of view, there remains a large residuum of erotic material that is undoubtedly introduced to add piquancy to the tales. Such material, however, has its value for the student of customs and manners, who is given an insight into conditions existing at one time in the Orient which is not to be had in any other way. Indeed, apart from the entertaining character of the tales, they abound in references to religious and social customs and manners of thinking that make them a perfect storehouse of valuable material for the one who wishes to study the Orient, and modern scholars have done much toward utilizing this material in their researches regarding Mohammedanism and Arabic antiquities as well as Arabic history. No systematic study has as yet been undertaken of the relations of the Arabian Nights to Mediæval European literature. In Boccardo's *Nuova Enciclopedia* (1882) the article on *Mille e una notte* discusses the possible influence on Boccaccio and Giovanni of Florence, and the manifest imitation of Shahryar in Ariosto's Astolfo. Toldo, in *Miscellanea di Studi Critici in honore di Arturo Graf*, pp. 491 (1903), suggests that some other stories found their way from the *Arabian Nights* of the tenth century to France, Italy, and Germany. Further investigation along these lines would be of great value.

The best editions of the Arabic text are those of Macnaghten (Calcutta, 1839–42; lithographed, Bombay, 1879) and the Bulak editions of 1835 (2 vols.) and 1885 (4 vols.). A shorter and at times expurgated text is given by M. Habicht and Fleischer (12 vols., Breslau, 1825–43). That of Salhani (5 vols., Beirut, 1888–90), is even more changed, not to offend Christian taste. Galland's French (1704) was soon followed by an English rendering, which as early as 1713 had already reached a fourth edition. The first English translation which in part, at least, was made from the Arabic was by Jonathan Scott (6 vols., 1811). It was not complete. Torrens, in 1838, began an independent translation, of which, however, only one volume was published. E. W. Lane published a translation which gave only an abridged text. Of the 100 tales in the Bulak edition he rendered only half into English; a popular edition was published in 1847, *The Thousand and One Nights*. The notes constitute a valuable feature. Lane's edition has been repeatedly reissued, the last one being in six volumes, edited by Joseph Jacobs (London, 1898). John Payne's translation, based upon the Macnaghten MSS. and prepared for the Villon Society, was issued in nine volumes (London, 1882–84). It was a work of great merit as a literary production, but was privately printed and is very scarce. The most excellent English translation, however, is that of Sir Richard Burton, in ten volumes (1885–86), with a "Terminal Essay" embodying the results of Burton's researches as to the origin, age, and character of the tales. To this he subsequently added six supplemental volumes (1887–88), containing tales not included in Macon's edition and drawn from other printed texts and manuscripts. An abridged and expurgated edition of Burton's work was prepared by Lady Burton and issued in six volumes (London, 1887–88). There are four noteworthy translations in German. The earliest was that of Habicht published at Breslau in 15 volumes (1824–25). This was followed by a translation by Zinserling, which was based upon the French translation of Hammer-Purgstall (3 vols., Stuttgart, 1823). Gustav Weil's translation appeared in three volumes at Stuttgart in 1838–43, and that of Max Henning in the *Reclam Universal Bibliothek* (Leipzig, 1896 et seq.). Of these the most reliable is that of Weil. In France Galland's translation has been superseded by that of Mardrus in eleven volumes (Paris, 1899–1904), and editions have been issued by Caussin de Perceval (9 vols., Paris, 1806), Edouard Gautier (7 vols., 1822–24), M. Destain (6 vols., 1823–25), and Silvestre de Sacy (3 vols., 1838).

The success of Galland's venture gave rise to many imitations that appeared in France, England, and Germany, all more or less expurgated and altered to adapt them for popular use. A complete bibliography of the *Arabian Nights* is given in Chauvin, *Bibliographie des ouvrages arabes*, vol. v (Paris, 1901).

ARABIAN SEA (anciently, Lat. *Mare Erythræum*, or the Red Sea) (Map: Asia, F 7). The northwestern part of the Indian Ocean, lying between Arabia, India, and Baluchistan. Its southern limit is generally supposed to be on a line from Cape Comorin, in Hindustan, to Cape Guardafui, in Africa. By the Gulf of Aden it communicates with the Red Sea and also with the Mediterranean through the Suez Canal (q.v.). On the northwest it forms the Gulf of Oman, with its continuation called the Persian Gulf. Among its eastern inlets may be mentioned the gulfs of Cutch and Cambay. The only important river it receives is the Indus, from the east. Its most important islands are the Laccadives and Socotra. The commercial significance of the Arabian Sea was very great in ancient times, when the products of the Orient were conveyed hither by sea to be transported by caravans to Europe. But with the discovery of the all-sea route to India, in 1497, its importance was lost until the opening of the Suez Canal in 1869 gave a fresh stimulus to commerce in that quarter. At present it is again a busy water thoroughfare. Consult C. F. Oldham, "Topography of the Arabian Sea," in *Asiatic Journal*, vol. lxiv (Calcutta, 1896).

ARABIA PETRÆ'A (Lat. Rocky Arabia).

The northwestern and more hilly region of Arabia, into which *Arabia Deserta* merges.

ARABICI, or ARA'BIANS. A sect in Arabia, in the third century, which held that the soul dies with the body and will be raised again with it. Eusebius says that Origen, at their invitation, held a debate with them at a considerable synod, convinced them of their error, and they renounced it.

AR'ABIC LAN'GUAGE AND LIT'ERATURE. The Arabic is one of the Semitic languages (q.v.). Arabia is generally supposed to have been the home of the whole Semitic family at a remote period of history. Even if, as many scholars think, the stock originally came from Africa, it is admitted that the peninsula was the distributing centre of the vast majority of Semites. From there the Akkadians (see ACCAD) pushed their way into Babylonia, the Amorites and Hebrews into Syria, and the Aramæans into the countries around the Syrian desert. What the language of Arabia was in the fifth millennium B.C. can only be inferred from a comparison of the four great branches of Semitic speech; and such a comparison suggests that even then there were marked dialectical differences, becoming accentuated among the emigrants in their new environment and developing within Arabia itself. Our earliest inscriptions, coming from Yemen and possibly going back to the second millennium B.C., reveal certain archaic features already lost in the Akkadian, showing the persistence of the original type. While these inscriptions indicate the general character of the language in the extreme south, we have as yet only slight hints as to how man spoke in other parts of Arabia 3000 years ago.

More than 2000 inscriptions secured through Halévy, Euting, and especially Eduard Glaser (q.v.), have made us to some extent acquainted with the various dialects spoken in Yemen, Kataban, and Hadramaut during a period of, at least, 1500 years. Aside from *su* instead of *hu* and initial *s* in the causative, peculiar to the Minæan and connecting it with the East Semitic languages, and certain minor differences, a remarkable stability characterizes the written language of south Arabia throughout these centuries. (See MINÆANS; SABÆANS.) The spread of Islam, and with it the language of the Koran, caused the gradual disappearance of the earliest known type of Arabic. Only survivals of it are found in the modern dialects of Mahra, Shihra, and Socotra. As to the origin of the peculiar script used for it in ancient times some scholars hold that it is an adaptation of the North Semitic alphabet, while others maintain that it developed independently as the result of contact between Minæan colonies in north Arabia and the Philistines in Gaza and the Negeb who had come over from Crete, where a system of writing had long been in vogue. (See ALPHABET; CRETE.) Elements of the South Semitic alphabet are found in north Arabia in the Lihyanian, Thamudenic, and Safaitic inscriptions. In a greatly modified form language and script have both survived in the Tigrina, the Tigre, and the Amharic. See ETHIOPIC.

It was the North Arabic, however, that was destined to become one of the great languages of the world, in the hands of the pre-Islamic poets, Mohammed and the Moslem writers. It adopted a later form of the Aramaic alphabet. By a system of diacritical points new letters were formed making it possible to indicate a number of consonantal sounds for which the Aramaic alphabet had no special characters; while, on the other hand, some of the Aramaic letters were not used. At a later time some letters were used, in an abbreviated form, to indicate the main vowel sounds, and others were employed to signify certain peculiarities of pronunciation. It is now known that the rounded cursive script, the *Neskhi*, is not a modified form of the more pointed Kufic, as was for a long time supposed. The former has been found in papyri dated in the seventh century, and it is probable that the Koran was first written in this script. The Kufic, first employed in the city of Kufa, was one of several variations, intended to give the writing a more ornate form. It was used, along with the *Neskhi*, for some centuries.

Before Mohammed the speech of the North Arabian tribes found its most perfect and beautiful expression in the songs of the great poets. In comparison with this classical language the Koran exhibits certain peculiarities of the prophet's own dialect, that of the Kuraish in Mecca. These were to some extent obscured, but not obliterated, by the later vocalization which was done on classical models. While the language of the Koran profoundly influenced theologians and jurists, poets naturally sought their patterns among the acknowledged masters of the past; and it may be said that the language of the songs became the literary language of the Moslem nations. Since the Koran must be used and explained, and the daily prayers offered, in Arabic, the language spread far and fast among the converted or conquered peoples. But it could not long remain unaffected by the vernacular in the lands subjected to Islam, and, as all parts of Arabia participated in the conquest, dialectical differences also tended to spread and to perpetuate themselves. The earlier history of the modern dialects is little known. There are some songs and stories, however, from Irak, Africa, and Spain, already quoted in the Middle Ages, that show the peculiarities characteristic of the dialects of Babylonia and northwest Africa. At the present time the main dialects are those of Arabia, Syria, Irak, Egypt, northwest Africa, and Malta.

The literature in this language may be divided into the following periods: (*a*) 328–610 A.D., (*b*) 610–750, (*c*) 750–1000, (*d*) 1000–1258, (*e*) 1258–1517, (*f*) 1517 to the present time. To the pre-Islamic period belong a few Syrian inscriptions, like those of al Namara (328), Zabad (512 and 513), and Umam al Jimal. The most important productions, however, are the songs of famous poets of which collections were made by Moslem authors. Among these are the Moallakat, a *diwan* made by Hammam, consisting of a characteristic song of each of the following poets: Amr al Kais, Antara, Labid, Tarafa, Zuhair, Amr ibn Kulthum, and Harith ibn Hilliza. Other names were substituted for the last two, or two more were added, in later collections. The name "Moallakat" means 'the excellent ones' and not 'the suspended ones,' as it was understood by some Moslem writers who, ignorant of earlier conditions, imagined that they had been hung upon the Kaaba in Mecca. Another *diwan* was made up by al Alam consisting of six poems by Amr al Kais, Antara, Labid, Tarafa, Nabigha, and Alkama. Songs

have been preserved in later *diwans* of a very large number of pre-Islamic poets. Among them were such men as Umayya ibn abi al Salt, Kab ibn Zuhair, al Absi, Shanfara, a Jewish poet, Samu'al ibn Adiya, and a Christian, Adi ibn Zaid of Hira. There were also poetesses in Arabia in pagan times. The treasury of ancient song was gathered together in the *Mufaddaliyat, the Hamasa* of Abu Tammam (q.v.); the *Hamasa* of al Buhturi, the *Kitab al Aghani* of Abu'l Farajal Isfahani, the *Jamharat ash'ar al 'Arab* of Abu Zaid, the *Ikd al farir* of Ibn al Rabbihi, the *Mukhtarat al Shaarai* and elsewhere. The songs of the Banu Hudhail and those of the poetesses also formed such *diwans*, or collections. Besides the *shair*, or singer, the *rawi*, or narrator, also cultivated his art, and some stories have come down to us. The text of all these pre-Islamic productions is often fragmentary and poorly preserved. A new period began with Mohammed (571–632). The Koran, which gave birth to a religion and which founded the greatest politico-religious system of the Middle Ages, soon dominated all branches of intellectual activity. The earliest products of this domination were grammar and lexicography, the necessary instruments for the exegesis of the Koran. Schools were founded in Basra, Kufa, and Bagdad, where the sciences were studied, especially by Persian Mohammedans. Such a one was the first grammarian of Basra, Abd al-Rahman ibn Hormuzd (c.730). Among the noteworthy grammarians and lexicographers may be mentioned: Abu'l-Aswad al-Duali (eighth century), the inventor of the diacritical points; Khalil ibn Ahmad (718–791), of Oman, the founder of Arabic metrics and the author of the first Arabic lexicon, *Kitāb al-'Ain;* his disciple, Sibawaihi (796), author of an extensive grammar (translated into German by Jahn, Berlin, 1894); Ibn Duraid (d.934), author of the lexicon *al-Jamharah;* Ismail ibn Abbad al-Sahib (d.995), author of the lexicon *al-Muhīt;* Jamal al din abu'l Fadl Mohammed b. Mukarram b. Manzur al Ansari (1232–1311), author of an extensive lexicon, *Lisān al-'Arab;* al-Zamakhshari (d. 1143), author of a grammar, *al-Mufassal,* and a lexicon, *Assās;* and Ibn Malik (d.1273), who wrote a grammar in 1000 verses under the title *Kitāb al-Alfiyah.*

As all Mohammedan philosophy, theology, law, and statecraft is derived primarily from the Koran, its interpretation became the object of discussion at a very early period. Hence an immense literature of commentaries and supercommentaries grew up, only the most important of which can be mentioned: those by al-Tabari (d.923), Hasan al-Nisaburi (d.1015), Abu'l Kasim ibn Satama (d.1019), al-Zamakhshari (d.1143), Mohammed al-Kurtubi (d.1272), Fakhr al-din Razi (d.1209), al-Baidawi (d.1286), and Jalal al-din al-Suyuti (d.1505). But Mohammedanism, as a system, rests as much upon the oral as upon the written law. The sayings and doings of Mohammed and his immediate followers form the science of the Hadith or traditions, which vary both as to value and authenticity. Around these there has also grown up a large literature; the great collections of such traditions were made by al-Bukhari (d.870), Muslim (874), Ibn Maja (d.887), al-Tirmidhi (892), and Abu Dawud al-Sijistani (d.941).

As early as the end of the seventh century a school of Mohammedan jurisprudence was founded in Medina by Abd Allah ibn Masud (d.652), Abd Allah ibn Abbas (d.687), and Sulaiman ibn Yasan (d.722). Its decisions were collected toward the end of the eighth century by the distinguished jurist Malik ibn Anas (d.812) whose *'al-Muwaṭṭa'* became the code for Hejaz, Tunis, Algeria, and Morocco, and was further developed by Yahya ibn Yahya Utbi (d.868), and Ibn abu Zaid al Kairawani (d.999). There are three other recognized codes, of Abu Hanifah (d.767), recognized in Bagdad, Transoxiana, India, China, and by the Turks, of Muhammed al-Shafii (d.820), recognized in Egypt, Iran, and Java, and of Ahmad ibn Hanbal (d.855). Other codes, to the number of 72, are proscribed as heretical. These have produced an extensive literature of commentaries and pandects, which has not exhausted itself in our own day.

The activity of the Mohammedans was not confined to philological and theological studies. With the accession of the Abbasides a new field was opened by the introduction of foreign civilizations. Learned men were invited from other countries and remunerated in a princely manner. The works of Greek, Syriac, Old-Persian, and Indian writers were translated into Arabic. Schools of philosophy were founded at Bagdad, Cordova, Cairo, etc., where the writings of Aristotle, Plato, and the Alexandrian philosophers were expounded and commented upon. Dogmas, hitherto regarded as sacred, were freely discussed and rejected. (See MUTAZILITES.) From these schools issued the philosophers al-Kindi (eighth century), al-Farabi (960), Ibn Sina (Avicenna 980–1037), al-Ghazzali (1111), Ibn Bajah (1138), Ibn Tufail (d.1185), and Ibn Roshd (Averroes, 1153–98), whose works, subsequently translated into Latin, were studied for many centuries in European universities.

In mathematics the Mohammedans made great advances by introducing the numerals and other modes of notation, the sine instead of the chord, and by extending the application of algebra. Astronomy was zealously cultivated in the schools of Bagdad, Cairo, and Cordova. According to Ibn al-Nadbi (1040), the library at Cairo possessed two celestial globes and 6000 astronomical works. In the ninth century the three sons of the librarian, Musa ibn Shakr, calculated accurately the diameter of the earth and the precession of the equinoxes. At the same time lived al-Farghani, author of an astronomical encyclopædia, which was translated in the twelfth century by Johannes Hispalensis. In the tenth century al-Battani (Albatagnius) flourished, to whose name is attached the introduction of trigonometrical functions, and the observation of the obliquity of the ecliptic. Among the astronomers whose works were translated into Latin may be mentioned Thabit ibn Korrah (901), Jabir ibn Aflah, who in 1196 constructed the first observatory at Seville, and Nasir al-din al-Tusi, the paraphraser of Euclid. Medicine and natural history were cultivated by the Mohammedans with a like success. In the seventh century the writings of Galen, Hippocrates, Paul of Ægina, etc., were translated from the Greek into Arabic. Ibn abi Usaibiah (1203–69) devotes a whole volume to the medical literature in Arabic. Among the medical writers may be mentioned Mohammed al-Razi (tenth century), whose works were translated into Latin; Ali ibn Ridwan (1061); Ibn Sina

(Avicenna); Abu'l-Kasim (1107), who wrote on surgery and surgical instruments; Abd al-Malik ibn Zuhr (1162), and Abd Allah ibn al-Baitar (1248), whose Materia Medica had great vogue.

History in all its forms was cultivated at an early time by the Mohammedans; several chronicles were written in the days of the Umayyad dynasty. Persian historiography influenced the Arabs to record the events of their past life as a people; and the growing interest in the prophet and his times furnished a healthy stimulus. From the middle of the eighth century we have an uninterrupted series of historians. The earliest of these were Mohammed ibn Ishak (d.768), whose biography of Mohammed was enlarged by Ibn Hisham (d.821), and Mohammed al-Wakidi (d.822), who wrote the history of the prophet at Medina. No less than 140 titles of works written by al-Kalbi (c.819) are mentioned, dealing largely with history and genealogy. It was a Persian, Abu Jafar al-Tabari (838–923), who produced the first universal history in Arabic, beginning with creation. A similar work was produced by Ibn al-Athir (1160–1234). Of the early historians mention must also be made of Ibn Kutaibah (892) and al-Baladhuri (892), who deals especially with the early conquests of the Arabs. In the tenth century wrote al-Hamdani (945), Hamzah al-Isfahani (961), and al-Masudi (956), who has left us a history of civilization. Among the historians of later centuries mention may be made of Ibn Maskawai (1030), al-Makin (1273), Ibn al-Amid (b.1254), al-Biruni (1308), historian of chronology and the Herodotus of India, Abu'l-Fida (d.1331), and Ibn Khaldun (d.1406), the greatest of all Arabic historians and the first to compose a philosophy of history. The chief historians of Spain were Ahmad al-Dhabbi (1195), Ibn Bashkuwal (d.1182), Mohammed ibn al-Abbar (d.1259), and Ahmad al-Makkari (d.1631). Among the noted historians of Egypt were Abd al-Latif (d.1231) and al-Makrizi (d.1441), of Maghrib al Kairawani (d.1070) and Ibn Khaldun; and of Spain al Kustubi (d.1182). More characteristic of Arabic historiography are the numerous local histories and biographical monographs produced. Among the most remarkable of these are the works of Jalal al-Din al-Suyuti (1505), author of 510 works, among which were histories of Cairo and Damascus; of Abu Ubaidah (d.824), author of 105 monographs, among which are histories of Mecca and Medina; of Ali ibn Asakir (1175), author of a history of Damascus in 80 volumes, of Baha al-din ibn Shaddad (1234), author of a history of Aleppo, Mohammed al-Shahrastani (1153) wrote a history of religious and philosophical sects which is still our chief authority on the subject. The most noteworthy biographical writers were Abu Zakariyah al-Nawawi (1274) and Ibn Khallikan (1282), who treats of 865 persons. Bibliography was treated of by Mohammed ibn Ishak al-Nadim (995), who wrote the *Kitab al Fihrist*, Ali ibn Yusuf al-Kifti (1248), and Hajji Khalfa (1658). With the exception of Ibn Khaldun the Arabic historians lack critical sense; they are mostly mere chronographers. In geography they displayed much greater ability and have left us works of lasting value. The chief geographical writers are Ibn Hisham, Khurdadhbah (d.912), al-Masudi, Ahmad ibn Fadlan (d.921), Abu Ishak al-Istakhri (tenth century), Ibn Haukal (d.977), al-Mukaddasi (d.985), the traveller Ibn Batutah (d.1377), Yakut (d.1178), who, like al-Bakri (d.1094), wrote an extensive geographical dictionary, al-Kazwini (d.1276) and Abu'l Fida.

Besides these advances in the solid branches of knowledge the genius of the Arabs continually flowered into poetry. From Bagdad to Cordova the Mohammedan world was full of sweet singers. Collections of the works of older poets (*diwans*) were made, of single writers, and of the poems of individual tribes, or arranged according to the subject matter of the poems. In the Umayyad period Akhtal, Farazdak, and Jarir are considered the greatest poets. A woman, Laila al Akhyaliyya (d.706), also won fame. Abu Nuwas, Muti ibn Ayas, Muslim ibn al-Walid (d.757); Abu'l Asahiya, Abu Tammam, Abu Firas (d.968, Mutanabbi, Ibn Farid, the mystic and Abu'l Ala al Ma'arri, were the most eminent poets in the flourishing period of the Abbasides. The royal poets Abd al-Rahman (d.788) and Al-Mutamid (d.1095) of Spain; al-Tughrai (d.1120), the panegyrist of Mohammed, al-Busiri (d.1279) and Umar ibn Rabia (d.1328) also deserve mention. Though much of this poetry was scholastic in form al-Mutanabbi (965) is considered one of the greatest Mohammedan poets and his *diwan*, with its 289 poems, was always widely read. A new species of poetry was invented, the *Makamat*, a sort of rhymed prose in a finished and most ornamental style and exhibiting merely the literary prowess of the writer. Of such a kind were the writings of Ahmad al-Hamadhani (d.1007) and Abu Mohammed al-Hariri of Basra (d.1121). Side by side with this scholastic poetry there grew up a large mass of popular verse, which refused to be bound by the canonical metres and which developed the strophe, otherwise unknown to Arabic literature. A particular form of this was the *Muwashshah*, or girdle poem. The epistolary style developed by Abu Bekr al Khwarizmi (q.v.) and further by Al Hamadhani (q.v.), reached its perfection in the works of Abu'l Ala al-Ma'arri (q.v.), one of the foremost poets in the Moslem world and a very radical thinker. A popular and at times fantastic prose literature also made its appearance, in which the eastern craving for the wonderful and gorgeous was richly gratified. This was largely influenced by non-Arabic literatures, as in the *Fables of Bidpai*, translated in 750 by Abd Allah ibn al-Mukaffa from the Persian, in *The Seven Wise Masters*, and in the *Arabian Nights* (q.v.). Pure Bedouin romances are the stories of *Saif ibn dhi Yazan*, of the *Banu Hilal*, of *al Zir*, and especially the *Antar Romance*, which gives the most faithful picture of desert life, and which was not without influence upon the romance and chivalry of mediæval Europe.

All this culture of the early centuries of Mohammedanism presents a strong contrast to the decline which is evident from the ascendency of the Turks in the sixteenth century to our own day. Scholastic discussions on dogmatics and jurisprudence, and purely grammatical disquisitions became the order of the day. The expedition of Napoleon to Egypt presaged the introduction of western culture to the East, and a slow intellectual resurrection has commenced. The printing presses of Bulak, Fez, Constantinople, Beirut and of several Indian cities are extremely productive, and edition after edition is quickly exhausted. Newspapers in Arabic are now published all over the East, and even in western cities, e.g., Paris and New York. Writ-

ers have also begun to attempt, with more or less success, to imitate European forms of thought and sentiment. Of these may be mentioned Michael Sabbagh of Syria (*La Colombe Messagère*, Arabic and French, Paris, 1805); the Sheik Rifaa of Cairo (*The Broken Lyre*, Paris, 1827); *Manners and Customs of the Europeans* (Cairo, 1834); *Travels in France* (Cairo, 1825). But despite all this, the results obtained in Egypt during the period from 1798 down to the English tutelage, in 1882, were meagre. Mohammed Ali introduced the printing press in 1821 and founded a school for mathematics. Some of the works of the best European writers were translated into Arabic; the vice-regal library was founded in Cairo in 1870. Few great scholars and writers have as yet appeared; and it is as yet uncertain whether the attempt to develop the common speech into a literary language will be more successful. The endeavor to substitute the Roman script for the Arabic (furthered notably by Prof. W. Fiske) has not been effective. Only in Malta has the Latin alphabet been used for the last 60 years. The following modern poets deserve mention: Hasan al-Attar (1766–1838); Abd Allah Pasha al-Fikri (1834–90); Aisha Ismat Hanun, daughter of Ismail Pasha; and Mohammed Uthman Jalal (b.1829), the translator of Racine and Molière. To these may be added the historians Abd-Allah al-Sharkawi (1737–1812, and Abd al-Rahman al-Jabarti (d.1826), both historians of the French occupation; Ali Pasha Mubarak (1823–93), the topographist of Cairo and Alexandria; and the great jurist Ibrahim al-Bajuri (1783–1861), rector of the al-Azhar University. In Syria the beginnings of a new life are due to European and American efforts. The American Presbyterian missionaries and the French Jesuits (since 1869) have started a new life in Beirut by means of the printing press and modern schools. A real interest in the old literature has been awakened, many of the masterpieces being reëdited in a critical spirit. In this connection may be mentioned the philologist and poet Nasif al-Yaziji (1800–71), who wrote the critical observations in De Sacy's edition of Hariri (*Epistola Critica*, Leipzig, 1848); Butrus al-Bistani (1819–83), author of a dictionary and a general encyclopædia; Ahmad Faris al-Shidyak (d.1884), the grammarian; Khalil Sarkis (1877), the historian of Jerusalem; and Louis Cheikho, the learned editor of the old Arabic poets. In the old home of the faith, Mecca, literary activity still continues to our own day, but upon the old theological and dogmatic lines. Worthy of mention are Ahmad Dahlan (d.1886), theologian and historian, the author of more than 20 works, and Mohammed ibn Umar al-Nawawi, by origin a Malay, the author of 18 works upon different subjects, the first of which appeared in 1879. In India European influence in literature is confined to the publications of the *Biblica Indica;* and to a few writers such as Siddik Hasan, husband of the Sultanee of Bhopal (d.1889). The same condition prevails in the Maghrib (Northwest Africa). But French culture has already begun to exercise an influence upon Arabic literature in Algiers; and the same may in course of time be expected from the French occupation of Morocco (1911). As yet, however, productions of the lithographic press at Fez are all confined to the older Islamic theological, legal, and historical literature.

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ARABIC NU'MERALS. See NUMERALS; and ALGORISM.

ARABIC VER'SIONS. See BIBLE.

THE NEW INTERNATIONAL ENCYCLOPÆDIA

SECOND EDITION

VOLUME II

NEW YORK
DODD, MEAD AND COMPANY
1926

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Printed in the U. S. A.

The University Press, Cambridge, U.S.A.
Boston Bookbinding Co., Cambridge, U.S.A.

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KEY TO PRONUNCIATION

For a full explanation of the various sounds indicated, see the Key to Pronunciation in Vol. I.

ā as in ale, fate.
ȧ " " senate, chaotic.
â " " glare, care, and as *e* in there.
ă " " am, at.
ä " " arm, father.
å " " ant, and final *a* in America, armada, etc.
a " " final, regal, pleasant.
ą " " all, fall.
ē " " eve.
ė̄ " " elate, evade.
ĕ " " end, pet.
ẽ " " fern, her, and as *i* in sir, etc.
e " " agency, judgment.
ī " " ice, quiet.
i̇ " " quiescent.
ĭ " " ill, fit.
ō " " old, sober.
ȯ " " obey, sobriety.
ô " " orb, nor.
ŏ " " odd, forest, not.
o " " atom, carol.
oi " " oil, boil.
o͞o " " food, fool, and as *u* in rude, rule.
ou " " house, mouse.
ū " " use, mule.
u̇ " " unite.
ŭ " " cut, but.
u " " full, put, or as *oo* in foot, book.
û " " urn, burn.
y " " yet, yield.
B " " Spanish Habana, Córdoba, where it is like English *v* but made with the lips alone.

ch as in chair, cheese.
D " " Spanish Almodovar, pulgada, where it is nearly like *th* in English then.
g " " go, get.
G " " German Landtag = *ch* in Ger. ach, etc.
H " *j* in Spanish Jijona, *g* in Spanish gila; like English *h* in hue, but stronger.
hw " *wh* in which.
K " *ch* in German ich, Albrecht = *g* in German Arensberg, Mecklenburg, etc.
n̲ " in sinker, longer.
ng " " sing, long.
N " " French bon, Bourbon, and *m* in the French Étampes; here it indicates nasalizing of the preceding vowel.
sh " " shine, shut.
th " " thrust, thin.
TH " " then, this.
zh " *z* in azure, and *s* in pleasure.

An apostrophe ['] is sometimes used as in tā'b'l (table), kăz''m (chasm), to indicate the elision of a vowel or its reduction to a mere murmur.

For foreign sounds, the nearest English equivalent is generally used. In any case where a special symbol, as G, H, K, N, is used, those unfamiliar with the foreign sound indicated may substitute the English sound ordinarily indicated by the letter. For a full description of all such sounds, see the article on Pronunciation.

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THE NEW INTERNATIONAL ENCYCLOPÆDIA

AR'ABIN. The chief constituent of gum-arabic, obtained by precipitating an acidulated aqueous solution of gum-arabic with ordinary alcohol.

ARABI PASHA, ä-rä'bē pä-shä', properly AHMED ARABI (c.1841–1911). Leader of the national party in Egypt in 1882. He was born of fellah parents in lower Egypt, and his early youth was spent as a laborer. He served for 12 years as a private soldier in the Egyptian army and gradually rose to the rank of colonel. He took advantage of the discontent which prevailed in Egypt on account of the foreign influence to organize a rebellion on the issue of "Egypt for the Egyptians." The lack of energy shown by the Khedive Tewfik permitted Arabi to acquire great influence. He participated in the revolt against Nubar Pasha, obtained the removal of the ministry, and entered the new cabinet as Minister of War (1882). In this position he became a virtual autocrat, setting aside the Anglo-French financial control. England now intervened, and a war ensued. On July 11–12, 1882, an English fleet bombarded Alexandria. Arabi withdrew, and the British undertook a vigorous campaign against him, completely defeating him Sept. 13, 1882, at Tel-el-Kebir. He surrendered the following day, and a sentence of death was passed upon him, but it was commuted to life exile in Ceylon. The movement he had headed collapsed, and its only result was the permanent establishment of British control in Egypt. He was pardoned by the British government, returning to Egypt in 1901. His death occurred on Sept. 21, 1911. Consult: Long, *The Three Prophets—Chinese Gordon, Mohammed Ahmed (el Mahdi), Arabi Pasha* (New York, 1884); Broadley, *How we Defeated Arabi and his Friends* (London, 1884). See EGYPT.

ARABKIR, ä'räb-kēr', or **ARABGIR.** A town of Asiatic Turkey, about 170 miles northwest of Diarbekr (Map: Turkey in Asia, H 3). It lies on the route from Aleppo to Trebizond and is of considerable commercial importance. Cloth is manufactured and fruit, grown in the vicinity, is exported. The population is estimated to be between 20,000 and 30,000. This includes a considerable number of Armenians, who have been subject to frequent persecution. There was a severe massacre in 1895.

AR'ABY. A poetical form, especially current in the Renaissance, for Arabia.

ARACAJU, ä-rä'kä-zhōō'. The chief port, and since 1855 the capital of the Brazilian state of Sergipe, situated about 7 miles from the coast on the river Cotindiba, which furnishes good anchorage to ships of less than 12 feet draught (Map: Brazil, K 6). The city is regularly built and contains an agricultural school. Hides and sugar are exported. It is connected by rail with Capella and Signão Diaz in the interior, and has an estimated population of 6000, including Indians.

AR'ACAN'. See ARAKAN.

ARACARI, ä-rä'kä-rē' (Portug.). A toucan of the genus *Pteroglossus*. See TOUCAN.

ARACATÍ, ä'rä-cä-tē'. A city in the state of Ceará, Brazil, on the river Jaguaribe, 10 miles from its mouth, and 75 miles southeast of Ceará (Map: Brazil, K 4). Its harbor is shallow, with a shifting bar at the entrance, but can be entered at high tide. Its exports are cattle, hides, cotton, and sugar. It maintains regular steamship communication with Pernambuco and has a population of about 10,000. It was founded in 1723.

ARA'CEÆ. See ARUM.

ARACHIS, ăr'ä-kĭs. See PEANUT.

ARACHNE, ä-räk'nē (Gk. Ἀράχνη, *arachnē*, lit. spider). The mythical Lydian girl who ventured to challenge Athene to a contest in weaving. The goddess, angered at finding no flaw in the girl's work, changed her into a spider. Her fate, and especially her skill with the shuttle and the loom, have been a favorite theme among the poets.

ARACH'NIDA (Gk. ἀράχνη, *arachnē*, a spider). A class of air-breathing arthropods including the mites, scorpions, spiders, and a few other less well-known groups. The typical Arachnida have the head and the thorax more or less fused into a "cephalothorax," four pairs of legs, and no antennæ, the maxillary palps functioning as antennæ. The eyes are all simple and vary in number from 2 to 12. By the number and arrangement of these eyes the species of spiders are determined. The abdomen possesses no true legs, but the three abdominal spinnerets of spiders are homologous with legs. Besides the spinneret glands in the abdominal region of spiders there are poison glands in the last abdominal segment of scorpions, located at the base of the sting. In other forms the poison is emitted through the hollow jaws. The Arachnida breathe by means of tracheæ, like other insects,

or by means of sacklike bodies called "lungs" that open on the under side of the abdomen; but some forms breathe by both tracheæ and lungs. All the Arachnida are carnivorous save some of the mites, which live on plant sap. Most of the animal feeders prey upon other insects and hence are the friends of agriculture. A few forms are parasitic on warm-blooded vertebrates and fish and cause or accompany such diseases as itch and mange. The history of this class goes back to Palæozoic times.

Classification.—The Arachnida are divided into seven or more orders: (1) Solpugida, or wind scorpions; (2) Scorpionidea, or scorpions; (3) Pseudoscorpionidea, or Chernetidea, book scorpions; (4) Pedipalpi, or whip scorpions; (5) Phalangidea, or harvest men; (6) Araneæ, or spiders; and (7) Acarina, or mites. The following groups are believed by many to fall into the class Arachnida, but their relationships are doubtful: Linguatulida, or tongue parasites of the dog; Tardigrada, or water bears; Pycnogonida, or sea spiders; Xiphosura, or king crabs. See MITES; SCORPIONS; SPIDERS; HARVEST MAN.

ARACH'NOID MEM'BRANE (Gk. ἀραχνοειδής, *arachnoeidēs*, like a spider's web). One of the three coverings of the brain and spinal cord. It is a thin, glistening membrane, which lies loosely between the dura mater externally and the pia mater internally. Between the pia mater and the arachnoid membrane in some situations there are considerable intervals (subarachnoid spaces). The corresponding interval between the arachnoid and dura mater is called the subdural space. See NERVOUS SYSTEM AND BRAIN.

A'RA CŒ'LI (Lat. Altar of Heaven). The name given to the famous church of the Virgin erected on the summit of the Capitoline Hill in Rome. It was the only Christian edifice on the Capitol, and was for centuries called Sancta Maria in Capitolio; but popular legend connected it with the possession by Christianity of the stronghold of paganism, and the Middle Ages imagined a dream of Augustus, to whom the Sibyl announced that here was the altar of the Son of God; hence *Ara Cœli*. The church took over all the celebrity of the pagan Capitol, and was the meeting-place for the city council and the people. The present edifice is a basilica dating chiefly from the ninth century, with a handsome Renaissance ceiling.

ARAD, ŏr'ŏd. Two towns of the kingdom of Hungary. 1. *Old Arad* (Hung. *O-Arad*). The capital of the county of Arad, situated on the right bank of the Maros, a tributary of the Theiss, about 37 miles north of Temesvár (Map: Hungary, G 3). The town has many handsome streets and fine modern buildings, such as the theatre, town hall, and the palaces of justice and industry. The former strong fortifications are now rather out of date. Arad is the seat of a Greek-Oriental and of a Rumanian bishop. It is one of the most important commercial and industrial towns of Hungary. Its manufactures include alcohol (one of the largest distilleries in Europe), starch, leather, and machinery. There is a considerable export trade in grain, tobacco, wine, and cattle. Pop., 1890, 42,050; 1900, 56,260; 1910, 63,166.

During the seventeenth century it was often captured by the Turks. Fortifications erected in 1763 made Arad an important position in the Revolutionary War of 1848–49, when it was occupied for a considerable time by the Austrian general, Berger, who capitulated here in July, 1849. From this place Kossuth issued the last proclamation to the Hungarian patriots. After the capitulation at Világos, Aug. 13, 1849, Arad was surrendered to the Russians by the order of Görgey. Here, on October 6 of the same year, a number of Hungarian generals were executed by order of the Austrian commander, Haynau. A beautiful monument commemorating this event stands in Liberty Square. In 1909 a bronze monument to Kossuth was erected.

2. *New Arad* (Hung. *Ujarad*). A town in the county of Temes, on the left bank of the Maros opposite Old Arad, with which it is connected by a long wooden bridge. It has a large trade in flour and wood. Pop., 1910, 6006.

AR'ADUS. See ARVAD.

ARÆ'OSTYLE. See INTERCOLUMNIATION.

ARAF, är'âf, or more accurately AL A'RĀF. The name given in the Koran (Sura vii, 44) to the partition separating heaven from hell. Mohammed vividly portrays those standing by the partition saluting the happy inhabitants of Paradise without being able to enter it, while on the other hand they are also terrified at the sight of those who are condemned to the tortures of hell-fire. In Mohammedan theology al-Araf is a sort of limbo for those whose good and evil works so balance one another that they cannot enter Paradise until the last day of judgment; but in addition to this class, there are others who, according to the views of some theologians, are consigned to al-Araf.

ARAFAT, ä'rà-fät', MOUNT, or JEBEL AL-RAHMAH (Mount of Mercy). A granite hill some 12 miles east of Mecca. According to a Mohammedan legend, when Adam and Eve were cast forth from Paradise for eating the wheat which deprived them of their pristine purity, Adam fell at Ceylon, and Eve on Mount Arafat; and after much wandering Adam finally joined Eve on this mountain, where they recognized each other (*ta'ārafa*). The object of this story is to account for the name; but other etymologies have also been proposed by Arabic authors. The mount is about 200 feet high and a mile and a half in circuit. It is the real goal of the Mohammedan pilgrimage to Mecca, for while the visit to the Kaaba—the sanctuary at Mecca —may be made at any time, it is known as the "small pilgrimage." The "great pilgrimage," which ends with a visit to Arafat, can only be made in the month *Dhu'l-Hijjah*, i.e., 'month of pilgrimage.' The ninth day of this month, the most sacred of the year, is spent by the pilgrims at Arafat, to which they proceed in a body on the evening of the eighth day. The day is spent in prayers and in listening to a sermon which always lasts many hours. On the top of the mount, above the platform where the *wuḳuf*, or sacred assembly is held, there was once a shrine which was destroyed by the Wahabites (q.v.). This shrine is said to have had the name of Ilal, though this may have been the name of the god worshiped there in pagan times. Consult Burton's account in his *Pilgrimage to El-Medina and Kaaba, Mecca and Medina*, chap. xxviii; Snouck-Horgronje, *Het mekkaansche Feest* (1884–89).

ARAGO, ăr'à-gō; *Fr. pron.* à'rà'go', DOMINIQUE FRANÇOIS (1786–1853). A celebrated French astronomer and natural philosopher, born at Estagel, near Perpignan, in the Department of Basses-Pyrénées. At the age of 17 he entered the Ecole Polytechnique at Paris, where the

spirit, promptitude, and vivid intelligence he exhibited in his answers to the questions of Legendre excited the admiration of every one. In 1805 he became secretary to the Bureau des Longitudes at Paris. Two years afterward he was engaged, with Biot and others, by the French government, to carry out the measurement of an arc of the meridian, which had been commenced by Delambre and Méchain. Arago and Biot had to extend it from Barcelona to the Balearic Islands. The two savants established themselves on a lofty summit near the eastern coast of the Spanish peninsula, where they lived for many months, communicating by signals across the Mediterranean with their Spanish collaborators in the little isle of Iviza. Before Arago completed his calculations, Biot had returned to France, and war had broken out between France and Spain. Arago was now held to be a spy; his signals were interrupted; and with great difficulty he succeeded in making his escape to Majorca, where he voluntarily imprisoned himself in the citadel of Belver, near Palma. At last he obtained his liberty on condition of proceeding to Algiers, which he did; but on his way back to France was captured by a Spanish cruiser, and sent to the hulks at Palamos. He was, however, liberated after a time and sailed once more for France; but almost as he was entering the port of Marseilles, a tempest arose which drove the vessel across the Mediterranean all the way back to the coast of Africa, landing it at Bougia. He went by land to Algiers, where he was compelled to remain about half a year, and whence he again set out for Marseilles in the latter part of June, 1809. After having narrowly escaped another capture by an English frigate, Arago finally found his way to Marseilles. As a reward for his sufferings in the cause of science, the Paris Academy of Sciences suspended its standing rules in his favor; and though only 23 years of age, he was elected member in the place of Lalande, who had just died, and was appointed professor of analytical geometry and geodesy in the Ecole Polytechnique. Afterward his attention was devoted more to astronomy, magnetism, galvanism, and polarization of light. In 1811 he read before the Academy a paper of fundamental importance on chromatic polarization. In 1812 he began his extraordinary course of lectures on astronomy, etc., which fascinated all Paris—the savants by their scientific rigor and solidity, the public by their brilliancy of style. In 1816, along with Gay-Lussac, Arago established the *Annales de Chimie et de Physique* and demonstrated the value of the undulatory theory of light. In the same year he visited England, making the acquaintance of various persons distinguished in science, especially Dr. Thomas Young. In 1818 appeared his *Recueil d'observations géodésiques, astronomiques, et physiques.* In 1820 he turned his facile and inventive genius into a new channel and made several important discoveries in electro-magnetism. Oersted had shown that a magnetic needle was deflected by a voltaic current passing along a wire. Arago pursued the investigation and found that not only a magnetic needle, but even non-magnetic substances, such as rods of iron or steel, were subject to deflection, exhibiting during the action of the voltaic current a positive magnetic power, which, however, ceased with the cessation of the current. Some time after, he demonstrated that a bar of copper and other non-magnetic metals, when moved circularly, exert a noticeable influence on the magnetic needle. For this discovery of the development of magnetism by rotation, he obtained in 1825 the Copley Medal of the Royal Society of London, and in 1834, when he again visited Great Britain, especial honors were paid to him by the friends of science in Edinburgh and Glasgow. Four years previous to this second visit to Great Britain he was made perpetual secretary of the Academy and director of the observatory, a position which he retained till his death. As secretary of the Academy he wrote his famous *éloges* of deceased members, the beauty of which has given him so high a place among French prose writers. In politics, too, his career was remarkable. He was a keen Republican and took a prominent part in the July Revolution of 1830. In the following year he was elected by Perpignan as member of the Chamber of Deputies, where he occupied a position on the extreme Left. In the February Revolution of 1848 he was chosen a member of the Provisional government, and appointed Minister of War and Marine. In this position he resisted the proposed measures of the Socialist party, regarding the Constitution of the United States as the ideal of democracy. His popularity in his own department was the means of preventing the discontented population of Basses-Pyrénées from proceeding to lawless and violent measures. He opposed the election of Louis Napoleon to the presidency, declared himself against the policy of the new ministry, and refused to take the oath of allegiance after the coup d'état of 1851. Napoleon, in a letter, paid a high tribute to his talents and virtues and excused him from taking the oath as director of the observatory. In his general character Arago was sociable and a brilliant conversationalist., He was the intimate friend of Alexander von Humboldt. His collected works, edited by Barral, were published in Paris (17 vols., including a biography of Arago, 1854–62). Alexander von Humboldt wrote an introduction to the German translation of Arago's works.

ARAGO, Etienne Vincent (1802–92). A French dramatist and politician, a brother of the famous astronomer, Dominique François Arago, born near Perpignan, Basses-Pyrénées. He was the author, with various collaborators, of about 100 comedies and vaudeville pieces which were successfully produced in Paris, among them *Les Pages de Bassompierre* and *Les Mémoires du diable*, and was director of the Vaudeville from 1829 to 1840. As a journalist, he was one of the founders of *La Réforme*, an advanced Republican newspaper. His poetical comedy, *Les Aristocraties* (1847), the success of which at the Théâtre Français was ended only by the Revolution of 1848, was an expression of the same radical sentiments which made him, as a member of the Constituent Assembly, an opponent of Louis Napoleon's pretensions and caused his own exile (1849–59). His highest political station had been that of director-general of the post office for several months in 1848. Upon the restoration of the Republic in 1870 he resumed a position of influence, being for a short time mayor of Paris. In 1871 he was elected to the National Assembly, but soon resigned. He became archivist of the Ecole des Beaux-Arts in 1878, and later director of the Musée du Luxembourg. Besides his dramatic

works he also wrote several volumes of historical and other verse and a novel.

ARAGO, François Victor Emmanuel (1812–96). A French politician, son of the astronomer. He became an ardent Republican, and on Feb. 24, 1848, when the abdication of the King was announced in the Chamber, Arago, who had penetrated thither, demanded the deposition of the Orleans family and protested in the name of the people against a regency. Under the provisional government he was sent to Lyons as commissary-general and prevented a serious insurrection by applying half a million francs to relieve immediate distress. A little later he was elected to the Constituent Assembly and was soon sent as envoy to Prussia, where he interested himself for the oppressed Poles, procuring the liberation of General Microlawski. He resigned as soon as Louis Napoleon was elected to the presidency and became in the Constituent, and later in the Legislative Assembly, one of the future Emperor's most active opponents, vigorously protesting against the expedition to Rome. After the coup d'état (Dec. 2, 1851), he quitted political life and returned to his law practice, but in 1870 became a member of the Government of National Defense, first as Minister of Justice, and later as Minister of the Interior, replacing Gambetta in the latter office. In 1871 he was elected a member of the National Assembly, and on the organization of the Senate in 1876 he was elected to that body, where he sat until his appointment as Ambassador to Switzerland in 1880. He retired in 1894.

ARAGO, Jacques Etienne Victor (1790–1855). A French traveler and writer, brother of the astronomer. In 1817 he accompanied an expedition, under Freycinet, in a voyage round the world. Afterward he wrote plays, poems, and novels, and in 1835 undertook the management of the theatre at Rouen, but having become blind in 1837, he resigned. His early voyage he described in two books of travel, *Promenade autour du monde* (1822) and *Voyage autour du monde* (1838). In 1849, though deprived of sight, he formed a company of prospectors and started for California in search of gold. But his companions deserted him at Valparaiso. On his return he published his painful experiences under the title, *Voyage d'un aveugle en Californie et dans les régions aurifères* (1851). He died in Brazil.

ARAGON, ăr'ă-gon. A captaincy-general of Spain and former kingdom, situated in the northeastern part of the country, and bounded on the north by the Pyrenees, which separate it from France, on the east by Catalonia and Valencia, on the south by Valencia and New Castile, and on the west by New and Old Castile (Map: Spain, E 2). It comprises the three provinces of Saragossa, Teruel, and Huesca, with a total area of 18,298 square miles. The southern and northern parts of the country are mostly mountainous, while the central portion is occupied by a plain, intersected by the Ebro and its tributaries. The climate is varied, owing to differences in elevation. In the mountains it is cool, while in the lower parts it is exceedingly hot and dry. This difference of climate is accompanied by corresponding variation in vegetation, and the agricultural products of the region embrace the hardier grains, such as corn and wheat, as well as delicate fruits like the olive and vine. Agriculture is in a backward state owing in part to scarcity of population, but chiefly because of the burdens laid by the government on agrarian communities. In the province of Teruel are found deposits of sulphur, copper, lead, and salt, which are mined to some extent. The manufacturing industries are confined to the production of linen and woolens and some leather goods. The commerce of the region is insignificant on account of the agricultural and industrial backwardness, as well as of the lack of transportation facilities. Pop., 1887, 912,197; 1897, 892,513; 1900, 912,711; 1910 (census of December 31), 952,743. Capital, Saragossa, pop. commune (1910), 111,704.

Aragon came into the possession of Rome after the overthrow of the Carthaginian power in Spain, and was made a part of the province of Hispania Tarraconensis. It was conquered by the Visigoths early in the fifth century, and these in turn were subdued by the Moors after 711. A remnant of the Christian inhabitants who escaped to the mountains and settled in the region between the Sierra de la Peña and the Pyrenees managed to maintain their independence. For a long time Aragon was ruled by counts of Gothic origin. Subsequently it was incorporated with Navarre, but in 1035 it attained its independence under Ramiro I, the son of Sancho the Great, and now made its appearance as a kingdom. A long conflict was carried on with the Arabs, amounting, perhaps, to nothing more at times than mere guerrilla raids, but resulting in the gradual acquisition of individual strongholds and towns. On the capture of Huesca in 1096, the capital of the country was removed from the mountain valleys to the plateau of northern Spain. The conquest of Saragossa in 1118 brought the valley of the Ebro under the rule of the kings of Aragon. In 1137 Aragon was united with Catalonia by the marriage of Petronella, the daughter of Ramiro II, with Count Raymond Berengar IV of Barcelona. This union at once raised Aragon to a prominent position in the Iberian peninsula. Through the activity of the seafaring population of Catalonia, the kings of Aragon gained possession of the Balearic Islands, Sicily, Sardinia, and Naples in the course of the two following centuries. At the same time the consolidated strength of the kingdom was directed against the Mohammedans, and in 1238 the important city of Valencia, with the surrounding region, fell into its power. Aragon has been noted for its free political institutions in the Middle Ages; as a matter of fact, the great mass of the population was without any political rights; only a few had the privileges. But the power of the king was greatly limited by the privileges enjoyed by the towns, which in effect formed a republican state within the monarchy. Their affairs were administered by municipal officers, and their representatives met in *juntas*, which were charged with the maintenance of public safety and the control of common affairs. At the head of the united towns stood the justiciar of Aragon, to whom, on certain questions, even the king had to yield. The towns availed themselves of the king's financial embarrassments to wring charters of privileges from the crown. Pedro IV, in the fourteenth century, first attempted to assert the power of the crown over the cities; but though he was partially successful, the task was not completed until after the union of Aragon with Castile. During this period Barcelona developed into

one of the greatest Mediterranean ports and entered into rivalry with the Italian cities, and especially with Genoa, against which continual wars were waged. By the marriage of Ferdinand of Aragon with Isabella, heiress to the crown of Castile, in 1469, the two states were united in 1479. The bond between the two, however, was only a personal one until 1516, when, on the accession of Charles I, the states were definitely merged into a new Spain, with which the subsequent history of Aragon is identified. During the later Middle Ages the history of Aragon was closely connected with that of Sicily (q.v.).

ARAGONA, ä′rȧ-gō′nȧ. A city of Sicily, 78½ miles by rail south of Palermo, and 6½ miles by rail north of Girgenti (Map: Italy, H 10). In its vicinity are rich sulphur mines, and the mud-volcano of Maccaluba, 135 feet high and 860 feet above the sea, which emits carbureted hydrogen gases. Pop., 1900, 11,985; 1911, 15,961.

AR′AGONITE (named after Aragon, see below). An anhydrous calcium carbonate, identical with calcite (q.v.) in composition but differing from it by crystallizing in the orthorhombic system. Aragonite occurs in prismatic crystals, sometimes pseudo-hexagonal in shape. It is also found in radiated aggregates of needle-like forms. Further, stalactite, incrusting, columnar, and coral-like forms occur, the last named being known as *flos ferri*, from its occurrence in beds of iron ore. The prevailing color of aragonite is white, shading into violet, yellow, and pale green in some varieties. Its lustre is vitreous. A silky, fibrous variety is known as *Satin spar*. Aragonite was first found in Aragon, Spain, whence its name. In the United States aragonite is found in several localities in California, Connecticut, Illinois, Missouri, New Mexico, Pennsylvania, and New York. The well-known varieties of Mexican onyx, largely used by architects for wainscoting and interior decoration, are forms of aragonite.

ARAGUATA, ä′rȧ-gwä′tȧ (native name). The ursine howler. See HOWLER.

ARAGUAYA, ȧ-rä′gwȧ-yä′, or RIO GRANDE. A large river of Brazil, rising in the Sierra Cayapo, in lat. 18° 10′ S. and long. 51° 30′ W. (Map: Brazil, H 5). It flows northeasterly between the states of Goyaz and Matto Grosso, inclosing in its course the large island of Bananal (q.v.). Near San Francisco, in lat. 5° 30′ S., the Araguayā joins the Tocantins, which empties into the Atlantic Ocean about 50 miles to the east of the main estuary of the Amazon. The Araguayā is more than 1300 miles long and navigable in stretches for more than half that distance, but falls and rapids hinder its use as a route of trade. A line of small steamers plies its waters to the rapids of Santa Maria.

ARAI HAKUSEKI, ä′rī hä′kōō-sā-kē (1657–1725). One of the most noted of modern Japanese scholars, Confucianists, and stylists, who, by his life and writings, illuminated and adorned the ideas that long molded Japanese society. When Iyeyasu "caused confusion to cease and order to prevail," native and Chinese learning revived in Japan, and a brilliant group of scholars in Yeddo set forth the philosophical doctrines of Chu-Hi. Of these, Hakuseki is best known. He became more liberal than his master, Seiga, but he was still orthodox, as against the Kogaku, or (in government view) "heretical" school of philosophy. As patronized by Iyeyasu and his successors, the Tycoons, from 1615 to 1868, this philosophical system became a sort of established church, and heretics were made to feel severe political opposition, which sometimes ended in imprisonment and death. Yet scattered over the country, the pupils of Hakuseki and other masters instructed young gentlemen and helped powerfully to mold the public opinion by which the Mikado was restored to power in 1868. Hakuseki left an autobiography (written in 1716), a very rare kind of literature in Japan, which, however, was not destined for publication. In 1701 he composed his greatest work, the *Hankampu*, a history of the Daimios of Japan from 1600 to 1680. This work is in 30 volumes, and though requiring immense research, it was completed in a few months. After this his most important work is the *Tokushi Yoron*, a general view of Japanese history for 2000 years. His *Seiyō Kibun*, or 'Annals of the Western Ocean,' which was translated by S. R. Brown, in the *Transactions* of the North China Branch of the Asiatic Society (London, 1827–31), is the first attempt of a Japanese writer to give an account of Europe. Consult Aston, *History of Japanese Literature* (New York, 1899), and Florenz, *Geschichte der japanischen Litteratur* (Leipzig, 1906).

ARAKAN, ä′rȧ-kän′, or ARACAN. The northern division of Lower Burma, British India, extending along the Bay of Bengal from about 18° to 21° 33′ N. lat., and covering, with the adjacent islands, an area of 18,540 square miles (Map: Burma, Siam, B 3). The surface is very mountainous in the interior, which is traversed by several parallel ridges. There are vast forests and marshes covered with a thick growth of grasses and underbrush. The lower part of the country is intersected by many streams from the hills and is especially well adapted to the cultivation of rice, indigo, pepper, and raw sugar. Many tropical fruits grow wild. Petroleum, iron, and coal are found, and the chief articles of export are rice, salt, and teak wood. The chief port is Akyab (q.v.). The town of Arakan, situated in the interior to the northwest of Akyab, which before the British conquest is said to have numbered nearly 100,000 souls, is a place of ruins. The natives of Arakan are shorter and somewhat less round-headed than the Burmese proper, with whom they belong by race and language. A caste system with monogamy prevails among them. The population increased from 671,899 in 1891 to 760,848 in 1901. About 70 per cent of the inhabitants are Buddhists, while the remainder are chiefly Mohammedans. Arakan was once an independent kingdom, but began to decline at the end of the seventeenth century because of internal strife. A century later it fell into the possession of Burma, from which it passed to Great Britain in 1826. Anthropological details concerning the peoples of Arakan will be found in Lewin, *Wild Races of Southeastern India* (London, 1870), and Risley, *Tribes and Castes of Bengal* (Calcutta, 1891).

ARAKTCHEYEFF, ä′rȧk-chā′yĕf, ALEXEI ANDREYEVITCH, COUNT (1769–1834). A Russian statesman. Of noble though poor family, he rose rapidly to high rank under the favoritism of Paul, who made him commandant of his bodyguard at Gatchina. On his accession to the throne, Paul made him commandant of St. Petersburg, conferred upon him the baronial title, dismissed him in a short while, made him Count in 1799, and again retired him in eight

months. After Paul's assassination, Araktcheyeff was kept near the person of Alexander I, became Minister of War in 1806, and in the late years of that Emperor's reign was his all-powerful adviser in matters of internal policy. The will of the Emperor, whom he almost worshiped, was carried out at all hazards, and as the energetic Araktcheyeff did not stop short of any cruelty, his name became synonymous with terror to all liberal thinkers. In 1833 he deposited 50,000 rubles, of which three-quarters of the principal and accumulated interest is to be awarded in 1925 for the best history of Alexander's reign. It was provided that the remainder shall cover the expense of printing the work, to form a second prize, and to be paid for translations of the work into French and German. As he left no heirs and made no will, Nicholas I granted his estate at Gruzino and all his possessions to the Novgorod Corps of Cadets, henceforth known as Araktcheyeff Corps, so as to perpetuate the memory of the statesman.

ARAL, ăr'*al* (*Russ. pron.* ȧ-räl'), or **ARAL-DENGIS, LAKE** (for derivation, see below). A lake between 150 and 200 miles east of the Caspian Sea, within the limits of Russian central Asia, between lat. 43° 43′ and 46° 45′ N., and traversed by the meridian of 60° E. long. (Map: Asia, E 4). It lies in the Aralo-Caspian lowlands, is bounded by the steppes and deserts of Khiva, by the land of the Kirghis, and by the plateau of Ust-Urt, separating it from the Caspian. Its greatest length is about 230 miles; its greatest width is 182 miles; and its area, according to Strelbitski, is 25,050 square miles; this does not include its four large islands, occupying about 1000 square miles. After the Caspian Sea it is the largest lake in the Eurasiatic continent, and, next to Lake Superior and the Victoria Nyanza, it is the fourth largest in the world. It lies at a height of 163 feet above the level of the ocean and about 250 feet above that of the Caspian. Its numerous islands gave rise to its name of Aral-Dengis (Khirghiz, Turk. *aral*, island + *dengis*, sea, lake). The largest of these is Nikolai. The bluish tinge of its water suggested to the Russians the name of Blue Sea. In ancient times it was called the Lake of Oxiana, and during the Middle Ages the Sea of Khovaresm, or Khuarism. It is fed by the Syr-Darya (the ancient Jaxartes) on the east side and the Amu-Darya (or ancient Oxus) on the south. It is shallow, its average depth hardly reaching 50 feet. There are unmistakable signs of its drying up, especially in its southern part. It is a salt-water lake, but contains less salt than the ocean, and freezes to a considerable distance from the shore. It is very rich in fish, which are caught here in great quantities, sturgeon, herring, carp, and some seals being the most important. In spite of the fact that there are many kinds, it is remarkable that there are none of the salt-water variety. In the affluents the Scaphirhynchus species has recently been discovered, a variety not found anywhere else in the world at present, but abundant in the Tertiary period. Owing to the shallowness of its waters, navigation is difficult; but Russian steamers have been launched upon it, and took part in the operations against Khiva in June, 1873. Its history is very remarkable. Sir Henry Rawlinson and Colonel Yule collected references made to it in Greek, Latin, Arabic, and Persian writers and tried to establish the fact that the area it now occupies has been dry land twice within historical times—the Jaxartes and the Oxus then running south of the Sea of Aral to the Caspian. It is very remarkable that the Amu (Oxus) changed its bed considerably within one decade, as is proven by a comparison of the maps carefully prepared in 1859 and 1870. See *Proceedings of Royal Geographical Society*, vols. xi, xvi, and i (N.S., 1879); also *The Shores of Lake Aral*, by Major Wood (London, 1876); *Nachrichten über den Aral-See und den unteren Lauf des Amu-darja, von den ältesten Zeiten bis zum XVII Jahrhundert*, von Dr. W. Barthold (from the Russian original by H. von Foth, Leipzig, 1910).

ARA'LIA (derivation uncertain). A genus of plants, the type of the family Araliaceæ. These plants are dicotyledonous, and consist of trees, shrubs, and herbaceous plants, resembling the Umbelliferæ, both in their general habit and in their botanical characters, but differing essentially in the fruit, which is not formed of two separable carpels as in the Umbelliferæ. The fruit of the Araliaceæ consists of several one-seeded cells and is often succulent. The family contains about 400 known species, natives of tropical, temperate, and cold climates, generally possessing stimulant and aromatic properties. The principal genera are *Aralia*, *Panax*, *Hedera*, and *Fatsia*. Poisonous qualities are not developed as in the Umbelliferæ. The herbage of many species affords good food for cattle, and some are used for human food. The genus *Aralia* contains a considerable number of species —trees, shrubs, and herbaceous plants. *Aralia nudicaulis*, commonly called wild sarsaparilla, is a native of the United States. It is a species of low growth, having a solitary radical leaf with a trifid stalk and ovate serrated segments; the scape is shorter than the leaf. The root is said to be equal in value to sarsaparilla as an alterative and tonic. *Aralia racemosa*, well known as spikenard, has large, spicy, aromatic roots. *Aralia spinosa*, and *Aralia hispida*, also natives of North America, produce an aromatic gum-resin. *Aralia spinosa* is sometimes called toothache tree; it also bears the name of angelica tree. It is a native of moist woods in Virginia and Carolina, growing to a height of 10 or 12 feet, with a single stem, spreading head, doubly and trebly pinnate leaves, and ovate leaflets, and is very ornamental in a lawn. *Aralia polaris*, found in the southern island of New Zealand, and in the greatest abundance and luxuriance in the Auckland Islands, is a herbaceous perennial, 4 to 5 feet high, with large orbicular masses of green foliage and waxy flowers, which present a very striking appearance. *Aralia edulis*, now called *Aralia cordata*, is employed in China as a sudorific. Its shoots are very delicate and pleasant when boiled; and the roots, which have an agreeable aromatic flavor, are used by the Japanese as carrots or parsnips are by Europeans. This plant has recently been introduced into cultivation in the United States under the name "Udo." Aralias abound in the warm valleys of the Himalaya. The natives collect the leaves of many as fodder for cattle, for which purpose they are of great value in a country where grass for pasture is scarce; but the use of this food gives a peculiar taste to the butter. Chinese rice paper is cut from cylinders of the pith of *Aralia papyrifera*, or *Tetrapanax papyriferum*. Ginseng, the root of *Panax quinquefolium*, is one of the most impor-

tant products of the family Araliaceæ. Large quantities of ginseng are collected and shipped to China, where wonderful medicinal qualities are attributed to it. For fine specimens almost fabulous prices are paid. Modern pharmacy does not consider it of great value. The astringent roots of *Gunnera scabra*, sometimes classed with the *Aralias*, are used in tanning, and its fleshy leaf-stalks are eaten like those of rhubarb. It has been seen on the sandstone cliffs of Chile with leaves nearly 8 feet in diameter, each plant bearing four or five of these enormous leaves. It has been introduced into Great Britain and is found to succeed well in the climate of Edinburgh. The only representative of this family in the British flora is the ivy (q.v.), *Hedera helix*. *Fatsia horrida*, a member of this family, is common along the Pacific coast, extending well into Alaska. It has slender, rope-like stems, crowned with large leaves. Stems and leaves are covered with prickles that sometimes make severe sores upon persons who come in violent contact with them. The popular name for the plant is Devil's Club.

Fossil Forms. The genus Aralia and an allied genus, *Araliæphyllum*, have been described from many localities in the Cretaceous and Tertiary rocks of North America and Europe, where they are represented by about 25 species.

A'RAM, EUGENE (1704–59). An English schoolmaster and scholar, born at Ramsgill, Netherdale, in Yorkshire. His father was a gardener and could afford to keep Eugene at school for only a short time; but even while assisting his father the boy found time for study. He married early and became a schoolmaster, first in Netherdale and afterward at Knaresborough, where he continued to teach till 1745. At Knaresborough lived one Daniel Clarke, a shoemaker, and an intimate acquaintance of Aram. On one occasion Clarke happened to buy a quantity of valuable goods, which he easily obtained on credit; but, to the surprise of everybody, he soon after disappeared, and no trace of him could be discovered. Suspicion lighted upon Aram, not as Clarke's murderer, but as his confederate in fraud. His garden was searched, and in it were found some of the goods which Clarke had bought. Aram was arrested and tried, but acquitted for want of evidence. He now left his wife at Knaresborough and went to London and other parts of England, teaching here and there, and, in spite of his roaming life, contrived to acquire a knowledge of botany, heraldry, Chaldee, Arabic, Welsh, and Irish and planned a comparative dictionary of all the European languages. His most important scholastic achievement was his discovery of the similarity of the Celtic to other European languages. He was at work on his dictionary when he was suddenly dragged away from his ushership at Lynn Academy, in Norfolk, and committed to prison on a charge of murder. The remainder of the story is well known. In 1759 a skeleton was dug up near Knaresborough, which the inhabitants suspected to be that of Clarke; for they had now come to the conclusion that the unfortunate man had met with foul play, especially as Aram's wife had, on several occasions, made strange statements to the effect that her husband and a man named Houseman knew more of Clarke's disappearance than they chose to tell. Houseman was now confronted with a bone of the skeleton which had been discovered. He very emphatically denied that it was Clarke's. People naturally wondered how he could be so positive, and they became convinced that if the skeleton was not Clarke's, Houseman must know where Clarke's body was. At last he confessed that he had been a spectator of the murder of Clarke by Aram and one Terry. He named the place where the body had been hidden. The skeleton was dug up, and Aram was tried at York for the murder of Clarke, on Aug. 3, 1759. He conducted his own defense and attacked, with great acumen, the doctrine of circumstantial evidence; but to no effect, for a verdict of guilty was returned, and he was condemned to be executed within three days. In the interval he confessed his guilt to two clergymen. While in the condemned cell he wrote a defense of suicide, but failed in a practical illustration of the doctrine. For further details consult N. Scatcherd, *Memoirs of Eugene Aram* (London, 1838), and for an idealized portrait, Bulwer's novel, *Eugene Aram* (London, 1832); also Hood, *The Dream of Eugene Aram* (London, 1845).

AR'AMÆ'ANS. A branch of the Semites (q.v.). The remarkable spread of Aramaic speech beyond the limits of the kindred groups that originally developed and employed it (see ARAMAIC) renders it often difficult to determine the true ethnic relations of peoples whose language might lead to their classification as Aramæans. But a number of important states in north Syria and in Mesopotamia and many nomadic or semi-nomadic tribes south of Assyria and east of Babylonia are so distinctly referred to as Aramæans (Heb. *aram*, pl. *aramim*, *'am aram*, 'people of Aram'; Ass. *aramu*, *arame*, *arime*) in our oldest sources that there is little room for doubt in regard to their character. Thus Damascus is called Aram-Damascus or only Aram in the Bible; in the inscription of Zakir, King of Hamath and Laash, Bar Hadad of Damascus is styled "king of Aram," and Pognon is perhaps right in reading one of the Assyrian designations of the Damascene territory, '*mat* Aram, 'the country of Aram.' Aram Zobah occurs as well as Zobah (Coele Syria), Aram Beth Rechob and Beth Rechob (south of Lebanon), Aram Beth Maakah and Beth Maakah (south of Hermon), in Hebrew sources; and Geshur (in Jolan) is said to be "in Aram" (2 Sam. xv. 8). As Zakir distinguishes Bar Hadad as "king of Aram," it may perhaps be inferred that neither Hamath nor any of the other north Syrian states mentioned in the inscription, such as Hadrak, Unki, Gurgum, and Kue, was Aramæan in the ninth century. The distinction in language between the earlier Hadad and Panamu inscriptions and the later Bar Rekub inscription suggests that neither Samal nor Jaudi was peopled by Aramæans, but that an Aramaic-speaking military colony was put in Samal. Aram Naharaim, the Narima of the Tel el-Amarna tablets, and Naharin of the Egyptian inscriptions, was clearly located between the Belich, the Chabur, and the Euphrates, and between this river and the Orontes. After the downfall of the Mitannian (q.v.) power this region became definitely Aramæan. The most important city was Harran (q.v.). Bit Adini (see BETH EDEN), between the Belich and the Euphrates, with its capital, Tell Barsib, was perhaps the most formidable Aramæan state with which the Assyrians had to cope. Northeast of it were Shupria and Bit Zamani, with its capital Amida, and south of it Bit Chadippe,

Lake, Hindan, and Suḫu, with its fortress Suru, immediately above the Babylonian border. Between the lower Zab and the Diyala were the Itu and the Gurumi; between Elam and Babylonia, farther south, the Bagdadu, the Ḫindaru, the Tukudu, and the Gambulu. Over 40 tribes are mentioned as belonging to the Arumi, or 'the Aramaic hordes' (*aḫlamê aramaiê*). Some of them also lived in Babylonia between the Tigris and the Euphrates; and large numbers crowded into the cities, especially Sippar, Nippur, Uruk, Kish, Kutha, and Babylon itself.

It is not known where the original home of the Aramæans was. Amos (i. 5) threatens the Aramæans of Damascus, Bikat Aven (Coele Syria), and Beth Eden with deportation to Kir and declares (ix, 7) that Yahwe has brought Aram from Kir, Israel from Egypt, and the Philistines from Caphtor (Crete). In Isa. xxii. 6, 7, Kir is mentioned along with Aram, Elam, and apparently Shot (Suti). Winckler has suggested that Kir may refer to the Kares (Κᾶρες) mentioned by Arrian (iii, 8, 5) together with the Sittakenes (Suti), and the city of Karai (Κάραι) is said by Diodorus (xix, 12, 1; xvii, 110, 3) to be four days south of Sittacene. There was probably a tradition in the time of Amos that the Aramæans of Syria and Mesopotamia had come from this region between the Tigris and the mountains of Elam; and he held out the prospect of their return from present prosperity to former poverty, barbarism, and insignificance. Other traditions seem to be represented by the genealogies of Aram (Gen. x. 22, 23) and Nahor (Gen. xxii. 21–24). Few of the names can be identified with known tribes or localities, but they apparently point to north Syria, the Syrian Desert, and Mesopotamia. As one of the sons of Nahor is Kesed, the eponym of the Chaldæans (Kasdim), this may explain the statement in Deut. xxvi. 5, "A nomad Aramæan was my father." Modern scholars generally assume that the Aramæans pushed their way from northwest Arabia into Syria, Mesopotamia, Assyria, Babylonia, and the district beyond the Tigris, and the movement is supposed to have begun in the middle of the second millennium B.C. In the course of time they gave their language to many nations, spread the use of the alphabet far and wide, and exercised a profound influence on the development of civilization. Consult: Nöldeke in *Zeitschrift d. Morg. Ges.*, xxv, 113, and article "Aram" in *Encyclopædia Biblica* (1899); Ed. Meyer, "*Die Israelitien*, p. 235 (1906); Sina Schiffer, *Die Aramäer* (1911).

ARAMA'IC. The language spoken by the Aramæans (q.v.) and by a number of peoples adopting their speech. It is doubtful how much of the inscriptional material or of the later literature can be regarded as coming from men of Aramæan blood. The Nerab priests may have been Aramæans, but Zakir, of Hamath, clearly distinguishes himself in this respect from Bar Hadad, of Damascus, whom he calls "king of Aram," and the kings of Samal and Yaudi do not seem to have been Aramæans. The Elephantine papyri were written by Jews and Samaritans. The Nabatæans were Arabs. While the common people in Palmyra were Aramæans, the aristocracy, consequently the literary class, were also Arabs. In the kingdom of Osrhoene, the Aramæans no doubt formed an important ethnic element, but the reigning family and the dominating circles were of Arabic origin. Akkadians, Assyrians, Mitannians, and Hittites had left their strains in the blood, and large masses of the old Aramæan population had been put to death or deported by the Assyrians. In southern Babylonia, where the Gnostic sect of the Mandæans chiefly made its converts, the population was at all times very mixed.

Used as a medium of international communication already in the time of the later Assyrian (cf. 2 Kings xviii. 26) and Chaldæan empires, and adopted as the official language of the Achæmenian Empire, the Aramaic gradually became the vernacular of many nations. It was employed in daily life, while the native languages, Assyrian, Akkadian, Hebrew, Phœnician, and others, became less generally used, being restricted to certain localities and circles of society, the public worship, and the assemblies of the learned. A language thus perpetuated by foreigners naturally developed many dialectical differences. Religious reasons also occasionally accentuated these. Both Jews and Mandæans spoke Babylonian Aramaic, but the former were influenced by the language of the Hebrew Bible. Monophysitism caused a break between Jacobites and Nestorians which affected to some extent the dialects they spoke; and the religious exclusiveness of the Jews and Samaritans tended to make their dialects diverge. Nevertheless, Aramaic has everywhere certain morphological and syntactical peculiarities that differentiate it from other Semitic languages. Perhaps the most characteristic is the emphatic ending *a* of the noun, originally a post-positive definite article, though it later lost this force and was employed even in the case of an indefinite noun. The only analogy in Semitic to this *status emphaticus* is the enclitic demonstrative or post-positive article *an* in Minæo-Sabæan. Between the Aramaic dialects spoken in the Tigris and Euphrates valley, from the Armenian mountains to the Persian Gulf, and all the western dialects there is the striking difference that the former used an initial *n* (sometimes even an *l*) for the *y* of the latter in 3 masc. sing. and pl. of the imperfect.

As regards the script the old North Semitic alphabet was substantially the same during many centuries, whether it was used for Phœnician, Moabitish, Aramaic, or Hebrew. (See ALPHABET.) On the part of Aramaic-speaking peoples, however, there grew up a tendency to give to the letters a *square* form. The development of this type can be followed most clearly in Egypt, where it appears as early as on the Sakkarah (482 B.C.) and Carpentras (fourth century) steles and, in spite of the more cursive hand, in the Elephantine papyri (fifth century). It had reached a high degree of perfection in the Palmyrene and Nabatæan inscriptions of the first century B.C., and was used by Hyrcanus, son of Tobias (183–176 B.C.) in his inscription at 'Arak el Emir. The Syriac inscription in the tomb of Queen Helena of Adiabene (q.v.) shows that Estrangelo was used among the Aramæans to the east of Osrhoene. Estrangelo is closely allied to cursive Palmyrene. It was retained by the Nestorians, while a more cursive hand was cultivated by the Jacobites. Montgomery thinks that the script used on some Babylonian incantation bowls published by him is an earlier adaptation of cursive Palmyrene. The Mandæans employed a script that is closely akin to that on pre-Sasanian coins and the earliest forms of Pahlavi; and the Manichæan texts in Persian language found at Turfan in Chinese

Turkestan are written in an alphabet derived from a later Syriac type.

Our oldest Aramaic inscription is that of Zakir, King of Hamath and Laash (c.800 B.C.), discovered in 1903 by Pognon and published by him in 1907. (See HAMATH.) To the beginning of the eighth century belongs the inscription by Panamu, son of Karil, King of Yaudi, on a stele dedicated to Hadad, found at Gerjin in 1890. From the reign of Tiglath Pileser IV (745–728) come the inscription on the monument to Panamu erected by Bar Rekab and found at Tachtali Bunar in 1888 and that of Bar Rekab found at Zinjirli in 1891. A number of Aramaic inscriptions are found on Assyrian weights discovered by Layard in 1853 at Calah, the modern Nimrud. They come from the reigns of Tiglath Pileser IV, Shalmanezer V (728–722), Sargon (722–705), and Sennacherib (705–681). The two inscriptions from Nerab, near Aleppo, come from the seventh century. There are observations in Aramaic on Babylonian documents from the last Chaldæan dynasty (625–539). The bronze bowl found at Olympia, now at Athens, inscribed to Nagid, son of Mepha, may come from the seventh century. From the sixth comes the great inscription discovered at Taima in northwest Arabia, and also those of Senk Kaleh between Teheran and Tabriz, and Wladikawkaz in the Caucasus. Those found in Mysia, Lycia, Cappadocia, and Cilicia date from the fifth century.

Of very great importance are the Aramaic papyri found on the island of Elephantine at the southern end of Egypt in 1903–06. (See ELEPHANTINE PAPYRI.) In addition to records concerning the affairs of the Jewish community and its Yahu temple, they contain also the Achikar story and a translation of the Behistun inscription. Most of these documents are dated and cover the period from 494 to 400 B.C. The Papyri Blacassiani from Sakkarah and the Papyri Dravettiani from Memphis were probably written in the fifth and fourth centuries. Dated Nabatæan inscriptions cover the period from 40 B.C. to 95 A.D. of the Sinaitic, which are also Nabatæan; three are dated in 190, 211, and 231 A.D. The earliest of the Palmyrene is dated in 9 B.C., the latest in 271 A.D.

We possess literary remains of the Judæan, Samaritan, and Galilean dialects of Aramaic spoken in Palestine. In the Judæan dialect are written the documents in Ezra vi. 8–vi. 18; vii. 12–26, some of which may go back to the fifth century; Dan. ii 4b–vii. 28, probably written in the second century B.C.; the Book of the Hasmonæans; some of the Aramaic words in Josephus and the New Testament; the Fast Rolls; Aramaic sayings in the Mishna; the Targum Onkelos to the Law, and the Targum Jonathan to the Prophets. Only the translation of the Pentateuch is of importance for the Samaritan dialect. The Aramaic sections in the Palestinian Talmud are our chief documents in the Galilean dialect; some sections in Palestinian Midrashim, and a mosaic inscription in Kefr Kenna are also written in this dialect. There is an unmistakable kinship between the Galilean and Christian Palestinian dialects. The latter is now known to us not only through the Jerusalem Lectionary, since in the last few years a number of other works have been discovered. Unfortunately the first Aramaic gospel, written in the Galilean dialect, is lost; and no part of the Christian Palestinian literature seems to be older than the breach between Malikites and Nestorians or Jacobites in the fifth century.

No Aramaic dialect has furnished us with a richer literature than that spoken in Osrhoene. Edessa became one of the great centres of Christianity in the East. Through the translation of the Bible in the second century A.D. the literary language of Edessa spread throughout Mesopotamia and northern Syria, and even into Egypt, as the recently discovered Nile liturgy shows. Until the fourteenth century an extensive literature was produced, embracing not only exegetical, doctrinal, and homiletic expositions, rituals, and religious poetry, but also history and romance. Even after the Arabic conquest Syriac continued for some time to be the current language in Mesopotamia and northern Syria. Among the Sabians of Harran, which remained pagan, a philosophical and scientific literature developed in classical Syriac. Of this literature, however, nothing has been preserved in the original tongue. Thabit ben Korrah wrote 16 works in Syriac which were highly praised by Bar Hebræus.

Ten thousand Judæans were deported in 597 and settled in or near Nippur. Several thousand more were carried away in 586 and 581. They adopted the Aramaic dialect spoken in Babylonia, and had used it for many centuries when the academies of Sura, Pumbeditha, and Nehardea were established. The discussions concerning the Law and the interpretations of the Tannaim by the scholars in these academies are recorded in the Babylonian Gemara. (See TALMUD.) The text of the Bible and of the Mishna is in Hebrew, the comments of the Babylonian scholars in Aramaic; and the latter covered the period from c.200 to 600 A.D. Differences are perceptible in the language used at various centres of learning. The Jewish incantation bowls found at Nippur show what the popular dialect was c.600 A.D. Even the later Gaonim at Sura still cultivated it, though the Arabic was gaining ground.

Closely allied to Babylonian Talmudic is the dialect spoken by the Mandæans. A number of their sacred books, such as the Ginza, the Qolasta, the Sidra Yahya, and many inscriptions on incantation bowls, have been preserved. (See MANDÆANS.) The Mandæic is important, not only because of the insight it affords us into the peculiarities of the faith of these pagan Gnostics, but also because it exhibits the Aramaic speech of Babylonia uninfluenced by the Bible.

Aramaic is still spoken as a living language in a few places. In the villages of Malula, Bakha, and Jubb Adin, northeast of Damascus, a dialect is used which has a marked resemblance to the Christian Palestinian Aramaic of 13 centuries ago. The Turani spoken by the Jacobites of Tur Abdin, the Fellíhi of the Nestorians around Mosul, and the Urmi, which has now, in the hands of the American missionaries at Urmia, developed into a literary language, have been more influenced by the neighboring tongues of Arabs, Kurds, Turks, and Persians. All of these dialects, save possibly that of Urmia, seem to be dying out. See SEMITIC LANGUAGES.

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AR'AMIN'TA. A favorite name among the Restoration dramatists, although never given by them to very prepossessing characters. Vanbrugh, in *The Confederacy*, christens with it the wife of Moneytrap, a snobbish creature with a weakness for titles, and Congreve gives it to the principal female character in his comedy of *The Old Bachelor*.

ARAMIS, ȧ'rȧ'mēs'. The least sympathetic of Dumas's *Three Musketeers*, and the one never really loved by the author. His valor and resource were marred by his insincerity. He attains high Church honors, finally becoming the head of the Jesuits.

ARAN, ăr'an, SOUTH ISLES OF. Three small islands situated near the entrance to Galway Bay, off the west coast of Ireland. The principal and the most northerly of them is called Inishmore and is 7 miles long and 2 miles broad. The next is called Inishman, and the third, lying to the southeast, Inisheer. Their total area is about 18 square miles, and they all form the barony of Gore. The soil is for the most part sandy, and the only remarkable feature of the islands is the number of antiquities it contains. The islands contained at one time about 20 churches and monasteries. There exist remains of old fortresses, supposed to have been built in the first century A.D. The main industry is fishing, and the principal village is Kilronan, on Inishmore, with a population of 460. Total pop., 1911, 2679. The islands are memorable as the scene of dramas, notably *Riders to the Sea*, by the Irish playwright, J. M. Synge.

ARANDA, ȧ-rän'dȧ, DON PEDRO PABLO ABARACA DE BOLEA, COUNT (1718–99). A Spanish statesman, born in Saragossa, of a distinguished Aragonese family. He at first followed a military career, and rose to the rank of general. In 1760 he was appointed by Charles III Ambassador to the court of Augustus III, King of Poland. In 1766 he was recalled to Madrid on account of its disturbed state, and became President of the Council of Castile and Prime Minister. He soon restored order in the capital, expelled the Jesuits from Spain, suppressed the banditti in the Sierra Morena, and promoted a liberal policy. In 1773 he was removed from his post through the influence of the clergy and sent as Ambassador to France, where he remained until 1787. In 1792 he was again made Prime Minister, but was soon deposed through the agency of Godoy, Duke of Alcudia, the Queen's favorite. He remained President of the Council of State, which he had organized; but upon opposing the foreign policy of Godoy he was banished to Aragon, where he died.

ARANEÆ, or **AR'ANE'IDA.** An order of Arachnida. See SPIDERS.

ARANGO Y PARREÑO, ȧ-rän'gō ē pȧ-rā'nyō, FRANCISCO DE (1765–1837). A Cuban statesman. He was born at Havana, was admitted to the bar in 1789, and twice represented Cuba in the Cortes of Spain. It was through his exertions that the tobacco monopoly was done away with and the ports of Cuba were opened to foreign trade. He is best known for his works treating of Cuban economies, many of which have been translated into other languages. Consult, for biography, the preface of *Obras del Excmo, Señor Don Francisco de Arango y Parreño* (Havana, 1888–89).

ARANJUEZ, ȧ'rȧn-hwĕth' (from Lat. *Ara Jovis*, altar of Jupiter). A town in the province of Madrid, Spain, situated on the left bank of the Tagus, 28 miles south-southeast of Madrid, in a beautifully wooded valley, 1500 feet above sea level (Map: Spain, D 2). The town is built in the Dutch style and has broad and regular streets intersecting each other at right angles. It is famed for its palace and gardens, the latter in one of the most beautiful parks in the world. The place owes its existence to an idiosyncracy of Philip II. He erected a splendid palace where had been but a shooting villa, and for several months of the year Aranjuez became the seat of government. The place naturally acquired more or less importance from this circumstance, its population at one time reaching 20,000. The various sovereigns who occupied Aranjuez beautified it by erecting new structures or extending the gardens. Aranjuez is known historically for the treaty of alliance concluded here between France and Spain on April 12, 1772, and as the scene of the abdication of Charles IV on March 19, 1808. Agriculture, and especially the raising of horses and mules, are the leading industries. Pop., 1900, 12,670; 1910, 12,175.

ARANSAS, ȧ-rän'sȧs, BAY. An inlet of the Gulf of Mexico, on the coast of Texas, about 15 miles northeast of Corpus Christi Bay (Map: Texas, F 6). It has a length of about 18 miles, and its greatest width is about 8 miles. It is connected with the gulf by a narrow channel, known as Aransas Pass. It has a sandy bar, which detracts from its commercial importance, and is protected by a lighthouse. On Nov. 20, 1864, the pass was the scene of a battle between the Confederate and the Federal troops, which resulted in the capture of the former's fortifications at the pass.

ARANSAS PASS. See ARANSAS BAY.

ARANY, ŏ'rŏ-ny', JÁNOS (1817–82). Next to Petöfi, the greatest of modern Hungarian poets. He was born at Nagy-Szalonta, March 1, 1817. His parents were simple peasants and very poor, but he was their only son and they spared no effort to give him an education. At four he had already learned to read from letters traced in the ashes on the hearth, and the Psalms were his first spelling book. From the first he was an indefatigable reader and had soon exhausted the resources of the local library, both in Hungarian and in Latin. At the age of 15 he entered the college at Debreczin, where he quickly distinguished himself, but his dreams were of a romantic career. Like Petöfi, he had felt the fascination of the stage, and in 1836 joined a company of strolling players; but after a few months poverty and hunger brought him, footsore and discouraged, back to his father's house. Here he put aside romantic aspirations

and, having obtained an appointment as notary, settled down to a life of routine. It was not until the summer of 1845 that certain absurdities in the life of the county officials "awoke the voice of satire within him" and inspired his first poem, a satirical epic, *Az elveszett alkotmány* ('The Lost Constitution'), and, the Kisfaludy Society of Pesth having offered a prize for the best humorous poem, he submitted it and was successful. Two years later he obtained a second prize with the first part of his great trilogy, *Toldi*, an epic founded wholly upon Magyar traditions, which immediately brought him into widespread popularity and won him the friendship of the leading men of letters of his day and country. Petöfi, among others, wrote to him, saying: "While others win their laurels leaf by leaf, we must grant you at once the full crown." Arany's popularity soon extended to the lowest ranks of the people, for he had saturated himself in childhood with the folklore of his race, and he excelled above all in the art of weaving these old legends and traditions into the fabric of his poems, and in appealing to that spirit of national pride which is a leading characteristic of the Magyar race. From this time on his career was determined. In 1860 he removed to Pesth, becoming first director and then secretary of the Kisfaludy Society, and in 1870 general secretary of the Hungarian Academy of Science, a position which he held until shortly before his death, Oct. 22, 1882. A monument was raised to his memory at Pesth in 1893. Among his more notable works should be mentioned *Murány ostroma* ('The Siege of Murány'); *King Buda's Death*, an epic in 12 cantos; the second and third parts of the *Toldi* cycle, *Toldi's Love* and *Toldi's Evening;* some exquisite ballads, which many Hungarian critics think have been unsurpassed, and numerous translations, including Aristophanes, and portions of Goethe, Tasso, Shakespeare, and Burns. Petöfi is often called the poet of youth, and Arany the poet of mature life. Arany's own estimate of his worth is interesting. "My talent," he wrote, "is always urging me onward, but my lack of energy constantly drags me back; and so I remain, like the greater part of my work—a fragment!" This verdict falls far below that of his countrymen, who unite in regarding him as the poet who raised Hungarian poetry to a hitherto unknown height, as unequaled in his versatility and artistic finish and in his power of combining the spirit of the primitive Magyar folksong and the classic polish of his own verse in perfect harmony. There are numerous German translations of his poems; among others, Kertbeny (Leipzig, 1851); L. Kórodi (Kronstadt, 1863); Sponer (Leipzig, 1880); and Dux (Pesth, 1861).

ARA PACIS AUGUSTÆ. The Altar of Peace was erected by the Roman Senate in the Campus Martius to commemorate the establishment of universal peace by Augustus. The corner-stone was laid July 4, 13 B.C., when Augustus returned from Spain and Gaul, but the monument was not dedicated until Jan. 30, 9 B.C. Fragments of it have been discovered from time to time beneath the Palazzo Ottoboni-Fiano on the Corso; an excavation of the site, begun by the Italian government in 1903, was never finished. The altar stood in an oblong court, 31 × 27½ feet, surrounded by a wall 21 feet high, with a wide door in each of the long sides. All the extant fragments of sculpture in relief are from this wall, which bore as its principal decoration a series of beautiful panels occupying the upper portion of the outer face. Interest attaches chiefly to two friezes, each of which represents a group of men, women, and children about to take part in a sacrifice; as the faces are highly individualized, it is fairly certain that they are portraits from life, and many scholars hold that one frieze represents members of the imperial family. In technique these sculptures give us the high-water mark of Roman achievement.

ARAP'AHO (probably, tattooed people). An important Algonquian tribe of the North American plains, living in three principal divisions, viz., the Hitunena, 'Beggars' or Gros Ventres, associated with the Assiniboin in northern Montana (600); the northern Arapahos, living with the Shoshones upon a reservation in Wyoming (800); and the southern Arapahos, associated with the Cheyennes in Oklahoma (980). These last, together with the Cheyennes, sold their reservation by treaty in 1892, and are now citizens, holding allotments in severalty. In character the Arapahos are friendly and accommodating and display a superior adaptability to civilization. They are also of a fervent religious spirit and were among the principal adherents and propagators of the ghost-dance religion in the winter of 1890. In the early border wars they were usually friendly or neutral, notwithstanding the fact that their allies, the Cheyennes, were among the most determined of the hostiles. Consult Kroeber, *The Arapaho* (New York, 1904).

ARAPAIMA, ä'rà-pī'mà (probably native name). A genus of South American river fishes, closely related to the herrings, and having the body covered with a mosaic of strong, bony, compound scales. They are the largest freshwater fishes in the world, attaining a length of 15 feet and a weight of 400 pounds. They are much valued as food, both in the fresh and in the salted condition, by the people of Brazil and Guiana. The principal species is *Arapaima gigas*, which is taken by spearing.

ARAPILES, ä'rà-pē'lâs. A village of Spain in the province of Salamanca, situated about 4 miles southeast of the town of Salamanca (Map: Spain, C 2). It was famous as the place of the battle of Salamanca, in which the French forces under Marmont were defeated by the allied troops under Wellington, on July 22, 1812. Pop., 1910, 543.

ARARAT (*Ararat*, in the old Armenian dialect *Aiarat*, i.e., the plains of the Aryans). The ancient name of the fertile plateau through which flows the river Aras, or Araxes. Ararat appears in the Old Testament (2 Kings xix. 37) as the place to which the sons of Sennacherib fled after murdering their father. In Assyrian texts the country is also mentioned frequently from the ninth century B.C. onward under the form Urarti, though it would appear that the name was used somewhat indefinitely for a larger district than the Ararat of classical writers. It was the ambition of the Assyrian kings to include Urarti in their dominions, and frequently military expeditions were made against *Nairi*, as the vast tract to the north and northeast of Assyria was commonly termed, or the land of the Chaldi. (See CHALDÆANS.) It occupies the centre of the mountainous region of Armenia, belonging partly to Turkey and partly to Russia. According to Genesis (viii. 4) it

was on the "mountains of Ararat" that Noah's Ark rested after the Deluge, from which it appears that Ararat was properly the designation of an entire district. Such, however, was the general interest in the biblical tradition that the name "Ararat" became attached to a particular mountain, the one called by the Armenians *Masis Leusar*, or 'mountains of the ark'; by the Turks *Aghri-Dagh*, 'steep mountain'; and by the Persians, *Koh-i-Nuh*, 'Noah's mountain.' It rises in two volcanic cones, known as the Great Ararat and the Little Ararat; the former, which attains the height of 16,912 feet (according to another measurement, 17,212 feet) above sea level, is covered with perpetual snow. The latter rises to a height of 12,840 feet. Mount Ararat is, next to Mount Demavend, the highest elevation of western Asia, and since 1827 it forms the point where the Russian, Turkish, and Persian territories meet, its summit being in Russian territory. In 1840 the form of the mountain was partially changed by a frightful and destructive earthquake. Previous to this period, at the base of the mountain and at a point where a stream runs from a wild gorge, there stood the village of Arguri, or Aguri. It was surrounded by gardens and orchards and had upwards of 1000 inhabitants. In the ravine, 2300 feet above the village, stood the Armenian convent of St. James. The beauty and mild air of the district made Arguri a favorite summer resort of the richer inhabitants of Armenia. It was destined to undergo a great change, however. On July 2, 1840, dreadful shocks of earthquake were felt. Great masses of the mountain were thrown into the plain, the ravine was closed, the convent and chapel disappeared, and the village and the gardens which surrounded it were buried under rocks, earth, and ice, with all the inhabitants. The mountain was climbed by Dr. Perrot of Dorpat in 1829, and since then by many others. Consult: J. J. Perrot, *Reise zum Ararat* (1839); D. N. Freshfield, *Travels in the Central Caucasus and Bashan* (1869); J. Bryce, *Transcaucasia and Ararat* (1896); H. B. Lynch, *Armenia* (1911).

ARARAT, or PI'LOT MOUN'TAIN. A mountain about 3000 feet high, situated in Surry Co., N. C.

ARARIPE, ä'rä-rē'pā, SERRA. A low mountain chain forming the southwestern boundary of the states of Ceará and Piauhy, Brazil (Map: Brazil, J 5). It forms part of the mountain system that extends southward from the northeast coast at a point just to the west of the mouth of the Parahiba River. It is, besides, the watershed between that river system and the São Francisco, to the eastward.

ARARO'BA POWDER, or GOA POWDER (q.v.). A substance found deposited in the wood of *Andira araroba*, a Brazilian tree. From Goa powder is extracted a drug, chrysarobin (q.v.), used in medicine as a stimulant in chronic skin diseases, especially psoriasis, and as a parasiticide in ringworm. It is a pale orange-yellow, finely crystalline powder, odorless and tasteless, or slightly bitter.

ARAS, ä-räs' (the ancient Gk. 'Αράξης, *Araxēs*). A river in Caucasia, formed by the junction of the Bingol-Su and the Kaleh-Su, and formerly uniting its waters with those of the Kura (ancient *Cyrus*), at Zhevad, after a course of about 500 miles, but since 1897 it has resumed an ancient course, from near Karadonly, to the Bay of Kizil-agach of the Caspian, almost paralleling for this distance the Kura through which its waters flowed before. In the time of Strabo these rivers were separated in this manner, and they had been united, for their lower course, only in comparatively modern times. The old bed was visible at places, and on an island once stood an old capital of Armenia, Artaxata. The main stream is the Bingol-Su, which rises in the Bingol-Dagh Mountains, Asiatic Turkey, in lat. 41° 30′ N. and long. 41° 10′ E. and, flowing north-northeast, is joined a little below Hasan-Kaleh by the Kaleh-Su, after which the combined stream is called the Aras (Map: Turkey in Asia, M 3). About 52 miles west of Kazyman it crosses the Russian frontier, traverses the territory of Kars and the government of Erivan; then forms for a long distance the boundary line between Russia and Persia. On its banks are found many traces of ancient canals and other proofs that the surrounding country was once densely populated.

ARA'TOR. A Christian Latin poet of the sixth century. He was born in Liguria, studied at Milan, became a jurist under Theodoric, and was an official under Athalaric, Theodoric's successor. About 540 he took orders as a subdeacon of the Roman church. He is best known for his *De Actis Apostolorum*, a poem in very creditable hexameters, but much overweighted with reflective and allegorical passages. He also wrote an *Epistola ad Parthenium* in the elegiac distich. Consult Max. Manitius, *Geschichte der christlich-lateinischen Poesie* (Stuttgart, 1891).

ARA'TUS (Gk. Ἄρατος, *Aratos*) (271–213 B.C.). A distinguished statesman and general of Sicyon. At the time of Aratus's youth Sicyon was in the hands of tyrants, who were chiefly partisans of the Macedonian kings. Clinias, the father of Aratus, was an active supporter of the opposite side, and in the course of a party struggle was assassinated (264). Many members of his party were obliged to flee from the city, and Aratus was rescued by a relative and taken to Argos. Here he spent his youth and, through his strength of body and of mind, became a recognized leader of the exiled band. In his twentieth year (251), putting himself at the head of a few followers, he made his way to Sicyon, secretly entered the town, drove out the tyrant, and reëstablished a government of the people. Owing to the long rule of the tyrants, he at first met with many difficulties in his efforts at reorganization, but he successfully overcame these and was recognized as the first man in the state. Under his lead Sicyon joined the Achæan League, in which it soon rose to a position of first importance. In 245 he was made general of the league, an office which he held in the course of his career 17 times. Through his influence many other Greek cities joined the confederacy. In 224 the league was hard pressed by the Spartans under Cleomenes, and Aratus found himself obliged to join hands with Antigonus, King of Macedonia. An alliance was made, and the Spartans were defeated at Sellasia, in 221; but through this step the Macedonians gained a foothold in Peloponnesus. Aratus was greater as a statesman than as a general, but he was sincere throughout his life in his efforts to enlarge and strengthen the league. He was finally poisoned, in 213, by order of Philip, the successor of Antigonus. Two annual festivals (the Aratea) were instituted by his countrymen in his honor. Near the end of his life he wrote his memoirs, in 30 books. Consult Müller,

Fragmenta Historicorum Græcorum (Paris, 1868–74).

ARATUS OF SOLI. A Greek physician and poet of Cilicia. About 270 B.C., at the request of the Macedonian King, Antigonus Gonatas, he wrote a Greek didactic poem, entitled *Phænomena*, founded on the astronomical system of Eudoxus, of Cnidos, and appended to it another poem, *Diosemeia*, giving rules for prognostication of the weather. A pure style and correct versification mark both poems, which were translated into Latin by Varro, Cicero, Cæsar Germanicus, and Rufus Festus Avienus. In his *Georgics* Vergil was somewhat indebted to Aratus for material. Aratus was a native of the same province as St. Paul, who quotes from him in his speech on Mars Hill (Acts xvii. 28). Critical edition by Maass (Berlin, 1892).

ARAU'CAN, or **AR'AUCA'NIAN STOCK.** An important South American Indian people, calling themselves *Mapu-che* ('people of the land') and their language *Chilidugu*. Their territory included at one time the whole of modern Chile, which overflows beyond the Andes, some bands straggling as far as Buenos Ayres, and latterly southward over the Argentinian Pampas. The Chilean Araucanians number some 70,000, and much intermixture with the Spanish population has taken place. The Araucanians were rather loosely organized, but a warlike and independent race. The story of their heroic resistance to the European invaders has been told in verse in A. de Ercilla's famous epic *La Araucana*, and in prose by T. Guevara, *Historia de la Civilización de Araucanía* (3 vols., Santiago, 1898–1905). They still show themselves hostile to many aspects of foreign culture, Christianity in particular. To the Araucanian (the *Aucan* of Brinton) stock belong the Picunche ('people of the north'), Pehuenche ('piñon people'), Huilliche ('people of the south'), Moluche ('people of the east'), or Manzañeros ('crabapple people'), Ranqueles (at the source of the Rio Chalileo), etc. The Puelche, Chono, and Tehuelche are entirely separate peoples, and not Araucanian. Consult Lenz, *Estudios Araucanos* (Santiago, 1895–97), the writings of Guevara, Latcham, Medina, Schuller, etc.

ARAUCANIA, ä'rou-kä'nê-â. The country of the Araucos or Araucanian Indians, a territory in the southern part of Chile, occupying portions of the provinces of Arauco, Bio-Bio, Cautin, and Malleco. The country is divided from north to south into four parallel regions, which were formerly administered by hereditary *toguis*, or hereditary princes. The total number of Araucanians cannot be given with accuracy, but in 1907 it was estimated at 101,000. In physical type they resemble their kindred of the pampas. Their language is of such harmonious and adaptable character that a serious attempt was once made by a missionary student to introduce it into Europe to supersede Latin. The Araucanians remained independent longer than any other native tribe on the American continent and fought for their liberty, with intervals of precarious truce, from 1537 to 1773. During the war between Spain and the Chilean colonists, Araucania remained neutral. In 1861 a French adventurer named Antoine Tounens was elected King of Araucania, under the name of Orélie Antoine I, but was deposed and sent back to France by the Chilean government. The rule of Chile was recognized by the Araucanians in 1870. Consult A. Polakowsky, "Die heutigen Aurakamen" in *Globus*, No. 74. (Brunswick, 1898.)

AR'AUCA'RIA (from *Araucania*, a territory in the south of Chile). A genus of plants of the family Pinaceæ, or pines, consisting of lofty trees, natives of South America and Australasia. The species, of which there are 15, are all evergreen. The leaves are broader than those of pines and firs, which, however, the trees resemble in their general manner of growth. *Araucaria imbricata*, sometimes called the Chile pine, a native of the Andes of Chile, forming forests on their western declivities, attains a height of 150 feet. Its trunk is quite straight and free from knots. The bark of the young trees is studded with leaves from the base upward, even until the tree is 12 or 15 years of age. The branches are in whorls of 5 to 8. Young trees have branches almost from the ground; old trees have tall naked stems, with a crown of branches. The female strobile (cone) is roundish ovate, 6 to 8 inches in diameter, with scales terminated by a long awl-shaped point, and seeds wedge-shaped and more than an inch in length. The outer and inner bark of full-grown trees are each 4 to 6 inches in thickness. From both outer and inner bark, and indeed from all parts of the tree, resin flows readily and in great abundance. The leaves are lanceolate, about an inch in length, and half an inch in breadth near the base, sharp-pointed. The timber is heavy, solid, hard, fibrous, yellowish-white, and beautifully veined. It is suitable for masts of ships. The resin, which is white, has a smell like frankincense and a not unpleasant taste. The seed is pleasant to the taste, not unlike the chestnut, and is a most important article of food among the natives. It is eaten raw, boiled, or roasted. A spirituous liquor is distilled from it. A single strobile sometimes contains between 200 and 300 seeds, and one tree may be seen loaded with 20 or 30 of these great strobiles. This Araucaria was introduced into Great Britain at the end of the eighteenth century and is now pretty frequently planted. *Araucaria brasiliana*, the Brazil pine, has loosely imbricated lanceolate leaves and a looser and more spreading habit than *Araucaria imbricata*. The seeds or nuts are sold as an article of food in Rio Janeiro. The resin which exudes from the tree is mixed with wax to make candles. *Araucaria excelsa*, the Norfolk Island pine, a native of Norfolk Island, New Caledonia, etc., attains a height of 160 to 220 feet, free from branches to 80 to 100 feet, with a trunk sometimes 11 feet in diameter. The wood is white, tough, close-grained, and so heavy as almost to sink in water. The leaves of the young trees are linear and spreading; those of the adult are ovate and closely imbricated. The cones are 4 to 5 inches in diameter, nearly globular. *Araucaria cunninghamii*, the Moreton Bay pine, a native of the shores of Moreton Bay and banks of the Brisbane River in Queensland, very much resembles the last. It attains a height of 150 to 200 feet, and a diameter of 3 to 6 feet. The leaves of the adult trees are lanceolate and imbricated. The wood is yellowish and is used for boat building, house carpentry, and the common kinds of furniture. *Araucaria bidwillii*, the Bunya Bunya, is an important tree of Queensland, where it attains a height of 100 to 150 feet and a diameter of 3 to 4 feet. The timber is not quite so valuable as that of the Moreton Bay pine. The seeds, of which there is said to be

an abundance every three years, are as much as 2 inches long and three-quarters of an inch broad, and are much used for food by the aborigines. An important resin is obtained from this tree.

There are a number of species and varieties grown in greenhouses in the United States, where they are prized for their graceful appearance. This is especially true of *Araucaria excelsa*. The species do not flourish in the open, except in the southern States. Nearly all the leading species are successfully grown as ornamentals in California. See Plate ASH AND ARAUCANIA.

Fossil Forms. Araucaria, and several allied genera, have been found abundantly in rocks of Mesozoic and Tertiary ages in nearly all parts of the world. The oldest representative of the group is the genus *Walchia*, which occurs in rocks of Permian or uppermost Carboniferous age, and which grew to a great size, equaling that of the tallest spruces of modern times. Throughout Mesozoic rocks of America, Europe, and Asia, the genus *Araucaria* and its allies have been widely recognized by their leaves, branches, fruits, and in some cases by even large trunks. The type genus *Araucaria* appears first in rocks of Lower Jurassic Age; it reached a considerable degree of expansion in Cretaceous time all over northern Europe and Greenland, and at the end of the Eocene Tertiary it became extinct over that region, probably because of climatic changes which forced it to migrate farther to the southward. It will hence be seen that the modern representatives of this genus are mere relics of a once extensive group of plants which in those earlier times furnished the great forest trees that covered a large part of Europe and Asia, and to a lesser degree portions also of the American continent.

Consult: F. von Mueller, *Select Extra-Tropical Plants Readily Eligible for Industrial Culture* (Melbourne, 1895); G. Bentham, *Flora Australiensis* (London, 1863–78); G. Nicholson, *Illustrated Dictionary of Gardening* (London, 1888); L. H. Bailey, *Cyclopœdia of American Horticulture* (New York, 1900–01).

ARAUCO, ä-rou'kō. A province of Chile, bounded by the provinces of Concepción, Bio-Bio, Malleco, and Cantin, and the Pacific Ocean (Map: Chile, C 11). Its area is 2457 square miles. It has a fertile soil and contains some coal. There are extensive forests, and cattle-raising is an important industry. The population in 1910 was 62,259. Capital, Lebu, with a population of about 3500. See ARAUCANIA.

ARAUJO DE AZEVEDO, ä-rou'zhō̤ dā ä'zā-vā'dō̤, ANTONIO DE (Conde da Barca) (1754–1817). A Portuguese statesman and diplomatist born at Sa, near Ponte de Lima. In 1789 he was appointed Ambassador to The Hague. In 1797 he negotiated at Paris a treaty with France, but it was rejected by the Directory. A few months later he went as Ambassador to Berlin. After the Peace of Amiens he served as Ambassador to St. Petersburg. In 1803 he was recalled to Lisbon, to assume the office of Minister of Foreign Affairs. As head of the state he did much for its material advancement; but with the capture of Lisbon by Napoleon and the dethronement of the royal family in 1807, he accompanied the court to Brazil. During the first years of his residence in the New World he devoted himself to scientific and literary pursuits. He founded at Rio de Janeiro a school of fine arts and one of medicine and chemistry. He introduced the cultivation of tea and in many ways encouraged agriculture and industries. In 1814 he was Minister of Marine for the colonies of Brazil, and the next year received the title of the Count of Barca. At his death he was Minister of Foreign Affairs. Among his literary works were two tragedies, and translations from Horace, Gray, and Dryden. He died in Rio de Janeiro.

ARAUJO PORTO-ALEGRE, pōr'tō ä-lā'grā, MANOEL DE (1806–79). A Brazilian architect and poet. He was born at Rio Pardo, in the province of São Pedro, studied art at Rio de Janeiro, and art and architecture in Paris and Italy, and in 1837 was appointed professor in the Academy of Art at Rio de Janeiro. He was appointed consul general at Stettin in 1859. He designed the church of Santa Ana and the Rio Bank, wrote a number of moderately successful comedies, *Colombo* (an uncompleted epic), and a volume of poems entitled *Brasilianas* (1863).

ARAUNA, ä-rou'nä. A South American tribe of Tacanan stock, living along the Madre de Dios, a northern tributary of the Beni River, on the Peru-Bolivia frontier. Although evidently of considerable importance, contemporary accounts concerning them differ radically, Heath (1883) asserting that they are naked cannibals, ugly and ill-formed, while Labre (1885) describes them as sedentary agriculturists, and Armentia (1887) says that they are gentle and friendly and of remarkably light complexion. According to Labre, also, they have temples with images of wood and polished stone, and hold women so impure as to exclude them from religious rites and not even to permit them to know the names of the gods. See TACANA.

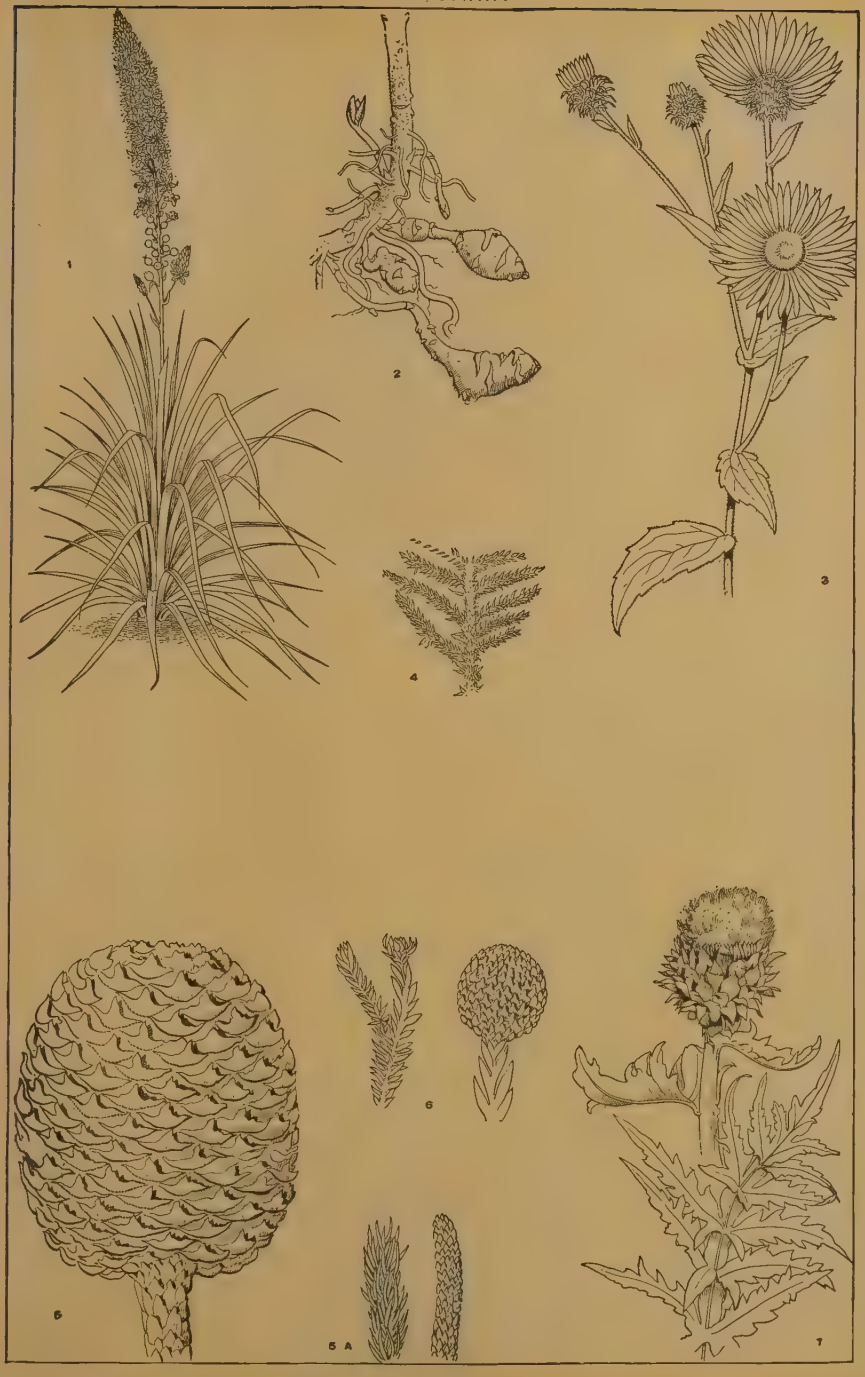
ARAURE, ä-rou'rā. A town in the state of Lara, Venezuela, on the Acarigua River, 20 miles south of Barquisimeto (Map: Venezuela, D 2). The surrounding region is noted for its fertility in the production of cotton, coffee, and cattle, while near by is the scene of the battle of Araure, Dec. 4, 1813. Population, 4000.

ARAVALLI, ä-rä'vŭ-lē. A mountain range in Rajputana, British India, extending from about lat. 22° 40′ N., long. 74° E., to lat. 26° 50′ N., long. 75° E. (Map: India, B 3). It is about 300 miles long, with a width ranging from 6 to 60 miles. The river system of the Aravalli mountains is very extensive, especially on the north and south slopes. The vegetation is poor, and the valleys inclosed between the hills are mostly sandy and utterly devoid of vegetation.

ARAWAK, ä'rä-wäk. A tribe living on the Corentyn River in Dutch Guiana, from which the great Arawakan stock (q.v.) derives its name. The word signifies 'meal eaters,' in allusion to cassava bread, which forms a principal article of diet with the tribe (they call themselves simply *lukkunu*, i.e., 'men'). The Arawak cultivate both cassava and corn, but depend largely also on hunting and fishing. They have the clan system, with descent in the female line, and practice the couvade.

ARAWAKAN, STOCK. The most widely extended linguistic stock of South America, its tribes formerly reaching, with interruptions, from southern Brazil and Bolivia to the northernmost extremity of the continent, and including also, until the irruption of the Caribs, the whole of the West Indies, several villages being even established upon the mainland of Florida. Columbus made his first landing and

ARAUCARIA



1. ASPHODEL (Asphodelus albus).
2. JERUSALEM ARTICHOKE (Helianthus tuberosus), showing tubers.
3. A WESTERN ASTER (Aster townsendii).
4. A FOSSIL SPECIES OF NORFOLK PINE (Araucaria).
5. NORFOLK PINE (Araucaria excelsa).
5A. TIPS OF BRANCHES OF NORFOLK PINE.
6. CONE AND BRANCH OF A FOSSIL ARAUCARIA.
7. GLOBE ARTICHOKE (Cynara scolymus).

earliest discoveries in Arawakan territory, and the names preserved from Haiti, Cuba, and the Bahamas are readily explained from the existing dialects of this stock. The Arawakan tribes were pressed upon by the Caribs from the lower Orinoco, and these fierce invaders had already seized many of the southern Antilles at the time of the discovery, the occupation being then so recent that the women of the island Caribs, most of whom were Arawak captives, still spoke that language. Physically, the Arawakan tribes are rather undersized, with apparently low vitality. They include several different types. Their plane of culture is rather above that of their neighbors. Those of the islands cultivated corn, manioc, and cotton, as well as tobacco, which came first to European knowledge through them. They were skillful weavers and artisans in wood, stone, and native gold. Considerable study has been made of the mythologies of the stock. Of more than a hundred existing Arawakan tribes, the most important are the Anti, Arawak, Baniva, Baré, Baure, Goajiro, Guaná, Manaos, Maneteneri, Maipure, Marauha, Moxo, Passé, Piro, Taruma, Wapisiana. In their recent studies of the languages of Ecuador, northern Peru, Bolivia, northwest Brazil, and southern Colombia, Rivet and Beuchat seek to extend very much the original territory occupied by the Arawakan stock. Consult recent writings of Rivet and Beuchat, Chamberlain, Koch-Grünberg, M. Schmidt, K. von den Steinen, etc., particularly Koch-Grünberg's *Die Aruak-Sprachen Nordwestbrasiliens* (Vienna, 1911), and a list and discussion of the tribes of the Arawakan stock by Chamberlain in the *Journ. de la Soc. d'Amér. de Paris*.

ARAXES, ȧ-răk′sēz. See ARAS.

ARAYAT, ȧ-rī′ȧt. A town of Luzon, Philippines, in the province of Pampanga, about 12 miles northeast of Bacolor (Map: Luzon, E 6). It was occupied by American troops under General Young on Oct. 12, 1899, during the Filipino insurrection. Near by, in the fork, and at the junction of the Grande and the Chico de la Pampanga rivers, is an extinct volcanic cone 3564 feet high. Pop., 1903, 12,904.

ARBACES, ärʹbȧ-sēz (Gk. *Ἀρβάκης, Arbakēs*). According to Ktesias, a general of Sardanapalus, King of Assyria, who in connection with Belesys, commanding the Babylonian troops, organized a conspiracy against Assyria, and after defeating Sardanapalus founded the Median Empire, establishing a dynasty that lasted until its overthrow by Cyrus. Sardanapalus is Asurbanipal (668–625 B.C.), after whose death Cyaxaras of Media and Nabopolassar of Babylonia made their first attack upon Nineveh, which was frustrated by the aid of Madyas, Protothyas's son, the Scythian King. Ktesias seems to have confused Asurbanipal with Sinsariskun, who was overthrown by the two allies (c.606 B.C.). Since he identifies Astyages, whose kingdom was taken by Cyrus in 550 B.C. with Aspadas, it is possible that Artæus, Artynes, and Astibaras represent the private names of the predecessors of Astyages, Deioces, Phraortes, and Cyaxares, while the first five names in his list are those of rulers over the petty Median principality whence Deioces came. There seems to be, in his account, a confused memory of the first struggles between Median princes and Shalmaneser III (860–825 B.C.) and the advance of a united Media upon Assyria after Elam's fall (c.640 B.C.) leading to the destruction of this great power. See MEDIA.

ARBACES. 1. The King of Iberia in Beaumont and Fletcher's *King and No King*. 2. The ruler of Media in Byron's *Sardanapalus*.

ARʹBALEST (Lat. *arcus*, bow + *ballista*, a military engine, from Gk. *βάλλειν, ballein*, to throw), ARBALIST, ARCUBALIST, ARBLAST. A weapon of indefinite antiquity, known also as crossbow or bow-gun. Some Roman forms are depicted on extant monuments, and it was from the Romans, possibly indirectly, that the arbalest in use in the Middle Ages was derived. It was employed chiefly in the twelfth century and later, although it was not unknown in the tenth and eleventh centuries. There were at least eight distinct forms, varying in size and construction. Some were carried by foot soldiers, others were permanently fixed on fortifications like modern cannons; some hurled short, thick arrows (called "quarrels," or bolts); others shot stones, leaden balls, or other projectiles. The larger ones were worked by placing the foot in a loop, drawing the cords up with the hands, while the gun was maintained in an inverted position. When the weapon became so improved that the bow was made of steel, it required, in order to bend it, a separate machine called a "moulinet." In the crude formations of mediæval tactics the arbalestiers, or crossbowmen, were an important branch, and were usually advanced to the first line of battle. They were divided into two branches, the mounted and unmounted, and their supplies of arrow ammunition were carried in carts. The use of the arbalest against Christians was prohibited by the Lateran Council of 1139 on the ground that it was "a thoroughly diabolical weapon." But this prohibition was ineffective. Richard the Lion-Hearted was noted for his skill with the arbalest. One clause of the Magna Charta prohibited King John from employing foreign crossbowmen. In the fourteenth century the arbalest was superseded in England, to a great extent, by the longbow. See ARCHERY.

ARBEʹLA (Gk. *Ἀρβηλα*, Assyr. *Arbailu*, the city of four gods, from *arba*, four + *il*, god). An ancient town of Assyria, now the Turkish town of Erbil or Arbil, situated in lat. 36° 9′ N., long. 44° 4′ E., to the southwest of Mosul. It is famous as having given name to the battle in which Alexander the Great finally defeated Darius, 331 B.C. The battle was really fought near Gaugamela, some 70 miles to the northwest of Arbela. See ALEXANDER THE GREAT.

ARʹBER, EDWARD (?—). An English scholar. Fellow of King's College, London, and emeritus professor of English literature in Mason College, Birmingham. To him English scholarship is greatly indebted for 30 careful reprints. They comprise *Tyndale's New Testament, 1525* (1871); *A Transcript of the Registers of the Company of Stationers of London, 1554–1640* (1875); *English Reprints* (14 vols., 1868–71); *An English Garner* (8 vols., 1877–96); *An English Scholar's Library* (16 nos., 1878–84); *British Anthologies* (10 vols., 1899–1900); *The First Three English Books on America* (1885); *The Story of the Pilgrim Fathers, 1606–23* (1897); *British Anthologies* (1899–1901); *A Christian Library* (1907).

ARBITRAGE, ärʹbĭ-trâj *or* ärʹbĭ-träzhʹ (Lat. *arbiter*, umpire, judge). A term applied to transactions which take advantage of differences of prices for the same articles in different markets. At the same time that the trader buys in the cheaper market, he sells in the dearer. The margin between the two prices must be suffi-

cient to do more than cover the costs of exchange to insure a profit. The rate of profit is of necessity small, being frequently measured in small fractions of 1 per cent. The objects of such arbitrage transactions may be bullion or coin, bills and exchanges, or stocks and bonds.

AR'BITRA'TION (Lat. *arbitratio*, judgment, from *arbiter*, umpire, judge). The submission of a dispute, which might otherwise be the subject matter of a civil litigation, to the decision of a private person instead of a court of justice. This is not permitted in criminal cases; nor are the parties to a civil dispute necessarily bound by an agreement to arbitrate, even though the agreement be upon a valuable consideration. At common law, contracts for the adjustment and settlement by arbitration of all disputes and differences between the contracting parties are not treated as binding so as to oust the jurisdiction of the courts. For example, if a landowner grants to another the privilege of laying waterpipes across certain land, in consideration of the latter's payment of a specified sum and of his agreement to pay all damages caused by the breaking or leaking of the pipe, a stipulation that the damages shall be fixed by arbitration is not enforceable. The landowner can maintain an action at law for any damages so caused and refuse to abide by his agreement to arbitrate them. This, it has been judicially declared, both in England and the United States, rests "upon the general policy of the law, that parties cannot enter into a contract which gives rise to a right of action for the breach of it and then withdraw such a case from the jurisdiction of the ordinary tribunals." On the other hand, if a property owner and an insurer enter into an agreement that the former shall pay a certain premium, in consideration of which the latter, upon the destruction of the property, shall pay the former such a sum of money as shall be settled and ascertained by arbitration, the contract is binding in all of its provisions, and the insured has no cause of action until an arbitration has been had, or it has been prevented or dispensed with by the insurer. The legal distinction between these two classes of cases is well established, but it is not always easy to determine within which class a particular controversy falls. If it falls within the first class, either party has the power to revoke the arbitration, even after his submission of the dispute to the arbitrator; although by so doing he subjects himself to an action for damages for breach of contract, if his agreement to arbitrate was upon a valuable consideration.

This power of revoking a submission has been modified by statute in England and in many American jurisdictions. It is provided, in some of our State constitutions, that the legislature shall enact laws providing for arbitration or shall establish courts of conciliation. The tendency of modern statutes is to extend the limits of private arbitration, to conform the proceedings therein, so far as practicable, to those of a court or an official referee, and to give to an award of arbitrators the force and effect of a judicial decision. In the absence of legislation, however, a judgment cannot be entered on an award, nor can the determination of an arbitrator be enforced by execution. If the defeated party refuses to carry out the award, his opponent must sue upon it. There is no appeal from an award, as there is from the decision of an inferior court; but it may be corrected in some cases, and it may be set aside for various reasons, such as fraud practiced by the prevailing party, or misconduct on the part of the arbitrators, or their failure to conform to the terms of the submission. As a rule, however, an award will not be set aside for purely technical or formal defects. Unless some flagrant error in the proceedings is disclosed, courts are disposed to uphold an award in an arbitration to which the parties have assented, and on which they have been fairly heard. Consult: Morse, *Law of Arbitration and Award* (Boston, 1872); Russell, *A Treatise on the Power and Duty of an Arbitrator and the Law of Submissions and Awards* (8th ed., London, 1900).

ARBITRATION, INTERNATIONAL. The settlement of disputes between states by judges of their own choosing and in conformity with their respective rights. Arbitration tribunals may be special or general, temporary or permanent, restricted or open. It is essential that the contracting states formally agree to refer their differences to an independent tribunal and bind themselves to abide by its award. The persons or states chosen as arbitrators should formally accord their consent and accept the obligation. The reference is usually made by special agreement signed on behalf of the contending parties, stating the questions to be submitted, summarizing the points of law or fact involved, defining the limits of the arbitration, and in cases indicating the course of procedure. In case the matters in dispute are of vital importance, their arbitration is usually based upon a special treaty, sanctioned by the legislative body to which the treaty-making power is intrusted—in the United States, the Senate. In case of mere financial claims of private citizens of one state against another, arbitration may be based upon mere executive agreements. In many cases an agreement is reached in advance by the executives of the countries concerned that some pecuniary damages shall be paid: the only question remaining for decision being the amount of damages. The tribunals appointed to determine this question are usually made up of representatives of the two nations involved, although representation of disinterested nations may be employed. Under The Hague convention of 1899 provision is made that in case of questions in dispute affecting neither the vital interests nor the honor of the nations involved in controversy, international commissions of inquiry shall be appointed to examine and report upon the local circumstances. Such commissions have no power of making decisions, but their reports may serve as the basis either of direct diplomatic settlement of disputes or of formal arbitration. Such a commission was appointed in 1904 under agreement between Great Britain and Russia, to inquire into the questions arising from the firing upon British trawlers in the North Sea by the Russian fleet. All its findings were accepted by the two powers. In 1913 it was proposed by the United States Secretary of State to the diplomatic representatives of foreign powers at Washington that the principle of international commissions of inquiry be extended to all questions whatsoever, and that the Powers bind themselves not to declare war or begin hostilities pending the investigation of such a commission.

Arbitration is largely an outgrowth of relations between jurisdictions independent politically, but closely interdependent in respect to religion, culture, and economic interests, between

jurisdictions in the same plane of civilization, and the consequent development and recognition of international duties and liabilities. The attitude of Greek civilization toward the barbarian world rendered conciliation with non-Greeks impossible; among the Greeks themselves, however, arbitration was freely employed. Questions relating to religion, commerce, and boundaries were frequently submitted to arbitrators, and in some cases treaties of alliance made express provision for arbitration of all disputes. The foreign policy of Rome, contemplating universal conquest, precluded the employment of arbitration. During the Middle Ages arbitrations again became frequent. The breakdown of the Roman Empire had destroyed political unity; the growth of the Church had reconstituted the cultural unity essential to arbitration. The predominance of the popes, as delegates of God, constituted them the natural judges of all international causes, and brought to their tribunal many of the differences between kings and peoples. Some of the treaties of mediæval times stipulated that all disputes should be referred for settlement to the Pope, and that excommunication should be the penalty for failure to accept his decision. The great prelates were often chosen as voluntary arbitrators, though perhaps oftener on occasions involving private interest and internal policy than on those of actual international conflict. One of the most celebrated of arbitration decisions is that of Pope Alexander VI, tracing an imaginary line from pole to pole in his division of all lands discovered in the New World between Spain and Portugal. Even after the decline of papal supremacy, Gregory XV acted as arbitrator of the question of the "Valtelline" forts in the seventeenth century, and Pope Clement XI gave the casting vote as umpire between Louis XIV and Leopold I, the chosen arbitrators by Article 8 of the Treaty of Ryswick. Under the feudal system vassals were naturally predisposed to look to their lords for the determination of their conflicting claims. The efforts of the emperors of the Holy Roman Empire to succeed to the position of the popes in this regard resulted in an occasional recognition of their jurisdiction—never of their supremacy. With the establishment of absolute monarchies, and the religious schisms of the Reformation Period, arbitration declined.

The change in international relations produced by modern means of transportation, with the resultant complex social and political intercourse and the vast economic loss involved in modern war, has tended more and more to the employment of the method of arbitration in international disputes, and its gradual recognition as the most humane, economical, and enduring method for their determination. The questions submitted involve not only the adjustment of claims relating to the rights of nations as between themselves, but also those of individuals against foreign governments. During the nineteenth century there were over 130 important arbitrations, and almost as many more minor commissions for the settlement of purely financial claims. Both in the numbers and the questions involved the United States and Great Britain have unquestionably led the way. The most important of these is the Treaty of Washington (q.v.), of which one article instituted a Joint High Commission, which at Geneva in 1871 determined the questions relating to the *Alabama* Claims (q.v.). Hardly inferior in numbers or importance have been the arbitrations between states of Latin America. In both cases the conditions of arbitration, as described above, have been fully met: essential identity of culture, despite political independence. As a result of the increasing cultural homogeneity of the world at large, the possible field of arbitration is becoming world-wide.

Disputes that may arise between nations fall into three general classes: (1) those which involve the national independence, the vital national interests, or the national honor; (2) those which concern the interpretation of treaties between nations; (3) those involving financial claims of citizens of one nation against the government of another. It is generally admitted that the graver questions under (1) are not susceptible of arbitration. It would have been impossible to induce the Boers to submit to arbitration the question at issue between themselves and Great Britain—the independence of the Boer republics. In general treaties of arbitration it is customary to exclude such questions from the scope of arbitration. The second class of questions is normally disposed of by arbitration, and the third, which accounts for four-fifths of all international disputes, is now universally handled through arbitral tribunals, in so far as they cannot be settled through ordinary diplomatic negotiations.

There are no general principles that will determine, in all cases, whether the national independence, vital interests, or honor is involved in a dispute. The Hague convention in 1899 left the determination of this question to each nation, and this manifestly leaves many opportunities for rupture of international relations. The current tendency appears to be in the direction of narrowing the range of non-arbitrable questions. The *Alabama* Claims settlement is especially significant as extending the range of arbitration. It is to be borne in mind that for many years Great Britain refused to submit the claims to arbitration, on the ground that the national honor was involved.

Arbitration may be based upon a special treaty or convention, or upon a general treaty covering all cases of a given kind. General arbitration treaties are especially common in Latin America. Such treaties have been concluded between Great Britain and France (1903); France and Italy, Great Britain and Spain, France and Spain, and France and Italy (1904). While the above-mentioned treaties except questions of national independence, vital interests, and honor from arbitration, the treaty between Holland and Denmark (1904) covers all questions whatsoever.

In 1904 arbitration treaties were negotiated by the United States with Germany, Great Britain, Italy, Spain, and Portugal, for the submission of judicial disputes and disputes relating to the interpretation of treaties to The Hague Tribunal, but were not ratified by the United States Senate. In 1911 arbitration treaties were signed by the United States Secretary of State and by the ambassadors of the United Kingdom and France, providing for the submission to The Hague Tribunal, or to some other arbitral tribunal, of all disputes arising out of claims of rights made by the one party against the other under treaty or otherwise, and susceptible of decision by the application of the principles of law or equity. The treaties provided further

for the creation of Joint High Commissions of Inquiry, to which any controversy might, by the request of either party, be submitted for impartial investigation, before being submitted to arbitration; such commissions to report on the facts in controversy and to make recommendations. The reports of the commissions were not to be regarded as decisions either as to the facts or as to the law. The treaties further provided that in case the parties disagreed as to whether a difference was subject to arbitration or not, the question was to be submitted for decision to an international Joint High Commission of Inquiry. The latter provision was stricken out by the United States Senate, in consequence of which action the treaties were allowed to lapse by the Executive.

The following is a list of some of the principal arbitrations and adjustments to which the United States has been a party:

1. Between the United States and Great Britain, under the Jay Treaty of 1794, providing for three mixed commissions: one to settle the identity of the St. Croix River, on the northeastern boundary; one to determine the compensation for impediments imposed by some States to the collection of debts by British creditors, in violation of the treaty of peace; a third to settle the question of contraband, rights of neutrals, and finality of decisions of prize courts.

2. Between the United States and Great Britain under the Treaty of Ghent, 1814, providing for three commissions: one to settle the ownership of certain islands in Passamaquoddy Bay and the Bay of Fundy; a second to determine the boundary of the United States from the St. Croix to the St. Lawrence; a third to determine the boundary of the United States along the middle of the Great Lakes to the water communication between Lakes Huron and Superior and to the Lake of the Woods.

3. Between the United States and Great Britain, in 1818, regarding the obligation of Great Britain to restore slaves in the British possessions at the time of signing the Treaty of Ghent. Referred to the Emperor of Russia, who decided that the United States was entitled to compensation for slaves transported from territories restored under the treaty. Two mixed boards created to determine the claims disagreeing, the sum of $1,204,960 was finally accepted by the United States.

4. Between the United States and Spain, in 1819, regarding the satisfaction of American claims against Spain during her occupation of Florida. By the terms of the Treaty of Florida, the United States agreed to settle these claims.

5. Between the United States and Great Britain, in 1827, for the settlement of the northeastern boundary. The King of the Netherlands was chosen arbitrator, but his award was not accepted by the United States. The matter was compromised in the Webster-Ashburton Treaty.

6. Between the United States and France the claims of American citizens growing out of French depredations at sea during the Napoleonic wars, and the French Beaumarchais Claim, and claim to special commercial privileges under the Louisiana Cession Treaty, were adjusted by Minister Rives in 1831 by an indemnity to the United States of $5,558,108.07.

7. Between the United States and Great Britain in 1855 to determine by a mixed commission the "Reserved Fisheries Rights" under the Reciprocity Treaty of 1854, which renewed the privileges renounced in 1818, of taking and curing fish in "unsettled bays, harbors, and creeks" along the Canadian shore. The commission defined "rivers and river-mounts" reserved under the treaty, and concluded its work in 1866.

8. Between the United States and Great Britain, in 1871, by the terms of the Treaty of Washington, providing for the submission to arbitration of: (1) The San Juan water boundary. Referred to the Emperor of Germany, who sustained the American claim. (2) The Nova Scotia fishery rights. (3) Claims and counterclaims growing out of the Civil War, other than the *Alabama* Claims. (4) The *Alabama* Claims. Under the second, an award of £1,100,000 was given to Great Britain, and under the third, £386,000.

9. Between the United States and Great Britain, and Germany in 1889, to determine their claims in the island of Samoa. The appointment of the Chief Justice of Samoa was referred to the King of Sweden and a joint commission established. In 1899 complications arose, resulting in a joint high commission proceeding to the Samoan Islands. There resulted an agreement for their partition, signed in Washington, Dec. 2, 1899.

10. Between Great Britain and the United States, in 1892, regarding the Bering Sea seal fisheries. The commission gave a divided award, mainly in favor of Great Britain, in 1893; but in favor of the United States' admission of the necessity for regulation of pelagic sealing and the proposal for such regulations. Later, in 1896, a further commission was created to award the amount of damages due to Canadian sealers under the former decision. This was fixed at $471,151.

11. Between Great Britain and the United States, in 1897, to determine the boundary between Alaska and Canada. After a decision was reached, the commissioner's work was interfered with by an Act of the British Columbia Legislature. A subsequent determination of the question was reached on the same lines in 1899.

12. Between the United States, Great Britain, and Germany in 1899 for the adjustment of claims of German citizens arising out of the bombardment by American and British warships of Samoan villages.

13. Between the United States and Russia, in 1902, in the Russian Seal Cases. The dispute grew out of the seizure in 1891 by a Russian cruiser of four American vessels in Bering Sea. The arbitrator decided in favor of the United States, laying down the principle that a war vessel may not pursue a vessel of another nation beyond territorial waters.

14. The settlement, in 1903, of the Alaska Boundary dispute, by a joint commission representing the United States and Great Britain.

Consult: Balch, *International Courts of Arbitration* (Philadelphia, 1896); Moore, *History and Digest of International Arbitrations to which the United States has been a Party* (Washington, 1898); Darby, *International Arbitration, International Tribunals* (London, 1900); Foster, *Arbitration and The Hague Court* (Boston, 1904); Quesada, *Arbitration in Latin America* (Rotterdam, 1907); Jones, *International Arbitration* (London, 1907); Morris, *International Arbitration and Procedure* (New Haven, 1911). See HAGUE CONFERENCE; HAGUE

TRIBUNAL; INTERNATIONAL PEACE MOVEMENT; INTERNATIONAL LAW; ALABAMA CLAIMS.

ARBITRATION, LABOR. See LABOR AND CAPITAL, RELATIONS OF.

ARBOGA, är-bō'gȧ. An ancient city in Sweden, in the province of Westmannland, 10 miles from the mouth of the Arboga River, by which, with the aid of a canal, the lakes Hjelmar and Mälar are united (Map: Sweden, E 7). Of all the churches, cloisters, and chapels, there remain only the town and parish churches, the former with an altar-piece of Rembrandt. Church assemblies were held here in 1396, 1412, 1417, 1423, and 1474; diets in 1435 (the first in Sweden), 1440, 1471, 1529, and 1561, at the last of which certain articles, known as the Arboga Articles, were passed. By these Eric XIV was enabled to limit the power of the nobles. In 1625 Gustavus Adolphus here issued an edict commanding that copper coin of the realm should maintain full value of that metal. Pop., 1901, 5250.

AR'BOGAST, ARBOGAS'TES (?–394). A Frank who, banished from his country, became a distinguished general in the Roman service. During the reign of Gratian he successfully commanded an expedition against the Germans, in 381; under Valentine II he was commander in Gaul. After winning the favor of his army by his ability and his victories over the Gauls, he defied the authority of Valentinian, who killed himself in 392, though a later story declared that he was murdered by Arbogast's orders. Eugenius, Arbogast's client, was proclaimed Emperor, since he himself, as a barbarian, could not gain the throne; but after suffering a defeat at the hands of Theodosius, near the river Frigidus, north of Aquileia, Arbogast killed himself.

ARBOIS, är'bwä'. A town of France in the department of Jura, France, 6 miles northeast of Poligny (Map: France, N., F 6). It is situated in the valley of the Cuisance, which is noted for its excellent wine. Pasteur spent his boyhood in Arbois, and there is a statue in his honor. Pop., 1911, 3926.

ARBOIS DE JUBAINVILLE. See JUBAINVILLE, MARIE HENRI D'ARBOIS DE.

ARBOLEDA, är'bō-lā'dȧ, JULIO (1817–62). A Colombian poet and political leader. He was born at Barbacoas and was educated in Europe. In 1856 he joined the Conservative revolt in Antioquia and soon became the leader of his faction. He concluded an alliance with President Moreno, of Ecuador, and made war upon the Federalist dictator, Mosquera. With the support of the states of western Colombia, he assumed supreme power, but soon afterward was assassinated. In a literary way he is chiefly known for his poems, which, including *Dios y la virtud*, *Estoy en la cárcel*, and *Me ausento*, gave him high rank among Spanish-American poets. The manuscript of his most important work, *Gonzalo de Oyón*, was almost completely destroyed by an enemy, and only fragmentary copies are preserved.

AR'BOR DAY (Lat. *arbor*, tree). A day set apart by the legislatures of most of the States and Territories of the United States for the annual planting of trees by the people and more especially by the school children. B. G. Northrop, while secretary of the Connecticut Board of Education, seems to have been the first—in 1865—to suggest the annual planting of trees under the direction of a State government. J. Sterling Morton was probably the first, however, to propose the setting apart of a certain day annually for the purpose, and in 1872, largely through his efforts, the custom was instituted in Nebraska. At present Arbor Day is observed in nearly every State and Territory; in some as a legal holiday, in others as a school holiday. In addition, several States, including New York, publish an Arbor Day manual. The exact date is not uniform throughout the country, though it generally falls late in April or early in May in the northern States, while in the southern States the day occurs in December, January, or February.

ARBOR DIA'NÆ (Lat. tree of Diana, the alchemic name of silver). An arborescent precipitate of metallic silver from a solution of silver nitrate, produced by the addition of a metallic element such as mercury.

AR'BORE'TUM (Lat. from *arbor*, a tree). A park or nursery containing a collection of specimen trees. See BOTANIC GARDEN; FORESTRY; HORTICULTURE; NURSERY.

AR'BORICUL'TURE (Lat. *arbor*, tree + *cultura*, care, cultivation). A term referring to the scientific cultivation of trees. It embraces that part of horticulture which treats of the planting and cultivation of ornamental and fruit trees and that part of forestry known as sylviculture. The horticultural growing of various trees is discussed under the corresponding special headings. Forest practices are described under FORESTRY.

AR'BOR VI'TÆ (Lat. tree of life), *Thuja*. A genus of plants of the family Pinaceæ, allied to the cypress, and consisting of evergreen trees and shrubs with compressed or flattened branchlets—small, scale-like, imbricated leaves. Species of arbor vitæ are found in the north temperate zones of both hemispheres. The common arbor vitæ (*Thuja occidentalis*) is a native of North America, especially between lat. 45° and lat. 49°, but has long been well known in Europe. It is a tree 40 to 50 feet high; its branches are horizontally expanded, and the strobiles (cones) small and obovate. The young leafy twigs have a balsamic smell, and both they and the wood were formerly in great repute as a medicine; the oil obtained by distillation from the twigs, which has a pungent and camphor-like taste, has been recommended as a vermifuge. The wood of the stem is reddish, soft, and very light, but compact, tough, and durable, bearing exposure to the weather remarkably well. The tree is common in Great Britain, planted chiefly as an ornament. It seldom attains so great a size as in its native country. It flourishes in cool, moist localities. The Chinese arbor vitæ, *Thuja orientalis*, a native of China and Japan, which is immediately distinguishable from the former species by its upright branches and larger, almost globose, and rough strobiles, is also, in Great Britain and upon the continent of Europe, a common ornament of pleasure grounds; but it does not attain so great a size as the preceding, and is more sensitive to the cold of severe winters. The balsamic smell is very agreeable. The tree yields a resin with a pleasant odor, to which medicinal virtues were once ascribed; hence the name, "arbor vitæ," given to this species and extended to the genus. There are several other species of Thuja, some of which seem well suited to the open air in the climate of Great Britain. Among them are *Thuja plicata*, California to Alaska, and *Thuja*

dolabrata, a native of Japan, a tree of great height and thickness. In favorable forest conditions *Thuja plicata* becomes a rather large tree, 150 to 200 feet tall, the timber of which is very valuable. There are about 60 horticultural varieties of the American species, that vary in habit of growth, color of foliage, or other characteristics. Many of these are popular in landscape gardening. A tree common in North America and there known by the name of white cedar is sometimes included in the genus Thuja, under the name of *Thuja sphæroidea*, but is more generally ranked in the genus *Cupressus* as *Cupressus thyoides*. (See CYPRESS.) Closely allied to the genus Thuja is *Callitris*. See SANDARAC.

Fossil Forms. The genus Thuja, like many other forms of conifers, is represented by ancestral forms in Cretaceous rocks of northern Europe, and with the advance of time is found to have migrated from northerly to more southerly regions, till during Miocene time it disappeared from Europe. Thuja is also known in the Miocene beds of Dakota.

AR/BOS, FERNANDEZ (1863—). A Spanish violinist and composer, born in Madrid, Dec. 25, 1863. He received his first instruction on the violin from Monasterio in Madrid, later studying with Vieuxtemps and Joachim. Soon after becoming concertmaster of the Berlin Philharmonic Orchestra he resigned in order to accept a position as teacher of violin at the Conservatory in Hamburg. At the request of the Queen of Spain he returned to his native city in the capacity of principal professor of violin at the Conservatory of Madrid. In 1890 he settled in London where he appeared as soloist and conductor with signal success, acting also as professor of violin at the Royal College of Music. He began in 1902 to spend three months of every year in Spain, visiting the principal cities as conductor of the Madrid Symphony Orchestra. His compositions include a comic opera, *El Centro de la Tierra* (1895); three trios for piano, violin, and 'cello; some orchestral works, and numerous compositions for violin.

ARBROATH, är-brōTH′ (Celt. *aber*, confluence, mouth + *Brothock*), ABERBROTHWICK, ăb′ĕr-brōth′ĭk, or ABERBROTHOCK, -ŭk. A seaport town in Forfarshire, Scotland, on the North Sea, about 17 miles by rail east-northeast of Dundee (Map: Scotland, F 3). Here King William the Lion founded a Tyronesian abbey in honor of Thomas à Becket in 1178. The King was interred in it in 1214. In the abbey, Bruce and the Scottish nobles met in 1320, to resist the claims of Edward II to Scotland. Its ruins, which are cruciform, 270 by 160 feet, are very picturesque, presenting lofty towers, columns, Gothic windows, etc. The chief industries of Arbroath include flax spinning, jute spinning, the manufacture of sail cloth, boots and shoes, and tanning. There are chemical and iron works. The harbor admits vessels of 400 tons and is protected by a breakwater. The chief exports are grain, potatoes, fish, pork, and paving stones. Arbroath is a royal burgh, and, in conjunction with Montrose, Brechin, Forfar, and Bervie burghs, returns one member to Parliament. Pop., including St. Vigeans, 1901, 24,677; 1911, 22,730. The famous Bellrock lighthouse stands in the sea 12 miles southeast of Arbroath.

AR/BUCKLE, JOHN (1838–1912). An American capitalist and philanthropist, born in Scotland. He came to the United States with his parents when he was still a child, and was educated in the public schools of Allegheny, Pa. In 1871 he removed to New York City, where, with his brother Charles, he established a coffee business. The sale of coffee in packages, a specialty of the house, having proved immensely profitable, Arbuckle soon conceived the idea of selling sugar in the same way. To further his plan he made an agreement with H. O. Havemeyer, by which the latter was to provide the sugar to be sold. But the retailing of this commodity in package form was so successful that the American Sugar Refining Company, of which Mr. Havemeyer was president, decided to go into the business itself and refused longer to supply Arbuckle. The latter thereupon began the refining of raw sugar for himself, initiating a bitter struggle of many years with his rival. After Arbuckle had been shown that the Sugar Company could sell coffee, as well as sugar, in packages, for the sake of retaliation, a compromise was at last effected in 1901. The Sugar Company had not found the sale of coffee profitable and was ready to give up handling it. Mr. Arbuckle then expanded both departments of his business until he was one of the leading merchants of the United States. In addition to his sugar and coffee enterprises, he was engaged in the wrecking business, and, after spending many years in working out a system for the floating of sunken ships, at length succeeded in putting into operation a device which expelled the water by means of compressed air. Among the ships raised by this method were the United States cruiser *Yankee* and the United States collier *Nero*. During his later years Mr. Arbuckle devoted much of his great fortune to philanthropy and was particularly interested in making life easier for working girls. On a farm of 800 acres at New Paltz, N. Y., he gave occupation to many men from New York and Brooklyn, to whom outdoor air was a necessity.

ARBUÉS, är-bwās′, PEDRO (1441–85). A Spanish inquisitor. He was born at Epila, Aragon; became a member of the Augustinian College at Saragossa, and in 1484 was appointed first inquisitor of Saragossa by Torquemada, inquisitor-general. He was a tireless persecutor of all heretics, real or suspected, and was finally slain through a conspiracy of those who feared that the Inquisition might reach them. He was canonized by Pope Pius IX in 1867.

AR/BUTHNOT, JOHN (1667–1735). A Scottish author and physician, the contemporary and friend of Pope and Swift. He was the son of an Episcopal clergyman, and was born at Arbuthnot, Kincardineshire. He studied medicine at Aberdeen, but took his degree at St. Andrews. Arbuthnot's father lost his preferment at the outbreak of the Revolution. His sons' prospects being thus blighted in their own country, the family were compelled to go abroad to seek their fortune. John went soon after to London and there supported himself by teaching mathematics. In 1697 he published an examination of Dr. Woodward's account of the Deluge, which brought him into notice as a person of unusual ability. Accident called him into attendance on Prince George of Denmark, who thenceforth patronized him. In 1709 he was appointed physician in ordinary to the Queen, and in 1710 was elected a member of the Royal College of Physicians. On the death of Queen Anne, in 1714, he lost his place at court, and his cir-

cumstances were never so prosperous afterward. In 1717 Arbuthnot, with Pope, helped Gay in a farce, entitled *Three Hours after Marriage*, which, however, proved a complete failure. In 1723 he was chosen second censor of the Royal College of Physicians, and in 1727 he pronounced the Harveian oration for the year. He died at Hampstead in 1735.

Arbuthnot's literary fame rests upon two humorous pieces. In 1712 he published the *History of John Bull*, one of the most amusing of political satires. After his death appeared (in Pope's *Works*, 1741) the *Memoirs of Martinus Scriblerus*, in which every kind of pedantry is ridiculed. John Bull as a nickname for the typical Englishman has been traced back farther than Arbuthnot, but *Scriblerus* is one of the important sources of Sterne's *Tristram Shandy*. Arbuthnot was one of the most amiable of men. To him Pope addressed his best *Epistle* and Swift said that if there were a dozen Arbuthnots in the world he would burn his *Gulliver's Travels*. Consult G. A. Aitkin, *Life and Works of Arbuthnot* (London, 1892).

ARBUTHNOT, Marriot (1711–94). A British admiral. He became a commander in 1746 and a captain in 1747; was commissioner of the navy at Halifax, N. S., from 1775 to 1778; became a rear-admiral in 1778, and in 1779 was appointed vice-admiral and placed in command of the North American Station. In conjunction with Sir Henry Clinton he captured Charleston, S. C., after a long siege, in 1780 (May 12), and in March, 1781, fought an indecisive engagement with a French fleet off Cape Henry. He surrendered his command to Rear-Admiral Graves in July, 1781, returned to England, and though he saw no more actual service, he became by seniority Admiral of the Blue in 1793. As a naval officer he was absurdly inefficient, being ignorant of even the rudiments of naval tactics, and as a man he seems to have been known to his contemporaries as a coarse and blustering bravo. Consult Ralfe, *Naval Biography* (London, 1820).

ARBUTUS, är'bū-tŭs *or* är-bū'tŭs (Lat. the wild strawberry tree). About 10 species of shrubs and trees belonging to the family Ericaceæ, natives of western Europe and western North America. In many species the leaves are evergreen and shining, the branches usually smooth and red. Such a species is *Arbutus Unedo*, the 'strawberry tree,' extensively planted as an ornament in parks. It is a native of the south of Europe and is not hardy in the colder parts of the United States. It is highly valued in California. The flowers, which are white, are produced in great abundance; the fruit, which resembles a strawberry in size and color, is ripened the second year. In this way flowers and fruits occur together, and, with the bright green leaves, make the tree very attractive. The fruit is edible and often utilized, especially in Spain, where sugar and a spirit are manufactured from it. A second species, *Arbutus menziesii*, is the madroña of California. It is fairly hardy, and as a tree often attains a height of 80 to 100 feet. *Arbutus arizonica*, a tree 40 to 50 feet high, has the bark of the trunk white, of the branches red, which, together with the pale-green leaves, makes a pleasing contrast.

ARBUTUS, Trailing (*Epigæa repens*). A prostrate or trailing plant, called Mayflower in New England and ground laurel in the southern States, with evergreen leaves, rusty, bristly shoots, and axillary clusters of fragrant, rose-colored or white flowers, opening in early spring; found in sandy or rocky soil, especially in the shade of pines. It grows from Newfoundland to the Saskatchewan, and south to Florida, Kentucky, and Wisconsin.

ARC (Lat. *arcus*, a bow). Any part of a curved line. It is usually limited to a part not including a cusp, and more particularly is applied to part of the circumference of a circle, as in the following statements: The straight line joining the ends of an arc is called its chord. Arcs of different circles are similar when they subtend equal central angles of their respective circles; if these circles are equal, so are the similar arcs. Circular arcs have the same numerical measure as the central angles which they subtend, and hence are commonly said to measure and to be measured by those angles. Like their subtended central angles, arcs may be considered as positive or negative and as exceeding 360°. (See Angle.) An arc is distinguished as major or minor, according as it is greater or less than a semi-circumference. The arc equaling in length the radius of a circle is called a *radian;* it is nearly 57° 17′ 44.8″. There are, therefore, 2π radians in a circumference.

ARC, Electric. See Electric Arc, Electric Lighting.

ARC, Joan of. See Joan of Arc.

ARCACHON, är'kà'shôN'. A charming French town and favorite watering place on the Bay of Biscay, in the department of Gironde, on the south side of a lagoon, the Basin d'Arcachon, 34 miles southwest of Bordeaux by rail (Map: France, S., C 4). Its popularity as a resort began in 1854. Its fine broad sands are admirably adapted for bathing, and the place is sheltered by sand hills covered with extensive pine woods of the Landes. Its main street stretches 2½ miles along the shore, with the pine forests immediately behind. The climate is always temperate, averaging in summer 47° F. and in winter 41°. Its numerous villas among the firs are much frequented in the winter by invalids afflicted with lung disease. Scientific oyster culture is practiced here on a large scale. The trade is chiefly with England and Spanish towns. Pop., 1901, 8259; 1906, 9279; 1911, 10,266. Consult *Arcachon* (Paris, 1899).

ARCADE' (Fr. from Lat. *arcus*, bow, arch vault). A row of arches supported by columns or piers. In Roman architecture, which first made use of the arcade systematically, the arches were invariably supported on piers, which were adorned with engaged columns carrying entablatures in structures like the Coliseum (q.v.), but left plain in utilitarian structures like the aqueducts. The earliest use of columns to support an arcade was in the palace of Diocletian at Spalato in Dalmatia (c.300 A.D.). In the early Christian basilicas columnar arcades were used to separate the nave and aisles; in Byzantine architecture both piers and columns were used as arch supports, as occasion demanded. The builders of the Romanesque and Gothic periods developed the clustered pier as an arch support and made admirable decorative use of arcades in the triforium (q.v.) galleries or passages and on the west fronts of their churches; of this the most noted example is the cathedral of Pisa. Very beautiful are the arcades inclosing the cloisters of many cathedrals and abbeys. The Renaissance employed both the columnar

and the Roman type of arcade, the former being especially common in the courtyards, loggias, and cloisters of Florence, northern Italy, and Spain. The street arcades of Bologna and of the Rue de Rivoli, Paris, are famous.

The term is often applied not merely to a row of arches, but to the entire passage or structure of which they are the front. It is also used, improperly, of any glass-roofed street or alley flanked by shops or stalls. A small decorative arcade applied against a wall is called an *arcature* (q.v.).

AR'CADELT, JACOB. A Flemish composer who assisted in founding the classical Italian school of music. The date of his birth is uncertain, but is believed to have been during the first quarter of the sixteenth century. His works are among the masterpieces of contrapuntal music of the Middle Ages. He was the most popular composer of his day, and his popularity induced many persons, for business reasons, to add his name to works written by others. During a residence in Rome (1539–55), as teacher and as singer in the Papal Chapel, he composed many madrigals. His works also include motets and masses. Arcadelt probably died about 1570–75, while in Paris with Cardinal Charles, Duke of Guise, whose service he entered in 1557. Consult Burney, *General History of Music*, vol. iii (London, 1789), and Ambros, *Geschichte der Musik*, vol. ii (Leipzig, 1909).

ARCADES, är'kā-dēz. A masque written by John Milton in 1634 and published in 1645. It was acted shortly after *Comus*, before the Countess Dowager of Derby, wife, first of Fernando, Earl of Derby, and afterward of Thomas Egerton, Lord Ellesmere, when she was living at Harefield, near Uxbridge. It was set to music by Mr. Lawes at the same time. In it the Countess's guests appear on the scene in pastoral habit and move toward the seat of state with a prefatory song of compliment. A "genius of the wood" then comes forward and describes the significance of the occasion, after which the piece closes with two more songs of flattery.

ARCA'DIA (Gk. *Ἀρκαδία, Arkadia*). The middle and highest part of the Peloponnesus, bounded on the north by Achaia, on the east by Argolis, on the south by Messenia and Laconia, and on the west by Elis. According to Pausanias, it derived its name from Arcas, the son of Callisto. Next to Laconia, Arcadia was the largest country in the Peloponnesus. It had an area of 1800 square miles and was girt round by a circle of mountains, which cut off to a large extent its communication with the rest of the peninsula. Mountains also intersected it in different directions, forming a number of small cantons. The western part of what was anciently Arcadia is wild, bleak, and rugged, and covered with forests; the eastern is more fertile; and in the southeast are two plateaus, in which lay the chief ancient cities. The loftiest peak in Arcadia is Mount Cyllene, in the northeast, 7790 feet. The small rivers are either tributaries of the Alpheus, or empty into inland lakes drained by underground channels (*katavothra*). The chief cities were Tegea and Mantinea in the southeast, and the great city, Megalopolis, founded in 370 B.C. by Epaminondas as the capital of the Arcadian Confederacy. Farther north were Orchomenus, Pheneus, Clitor, and Psophis. Owing to its isolation, Arcadia remained little affected by the Dorian conquest of the Peloponnesus, and its inhabitants were regarded as belonging to the original population of the peninsula; a belief confirmed by their dialect, which preserves some early forms and shows strong resemblances to the Cyprian. The nature of the country also prevented any lasting union among the inhabitants and enabled the Spartans to maintain their supremacy until the battle of Leuctra. The confederation organized by Epaminondas had no real permanency, and until the Roman conquest the country was the scene of civil strife. The inhabitants were brave, hardy, and fond of fighting, so that they were in great demand as mercenaries. Among their shepherds and hunters the chief deities seem to have been Pan, Artemis, and Zeus, who was worshiped with human sacrifices on Mount Lycæon till a comparatively late date. A form of pastoral poetry seems to have developed in Arcadia, which was at first crowded into the background by the Sicilian bucolics of Theocritus; but later revived and influenced the Roman poets, whence Arcadia, or Arcady, has become a synonym for an idyllic pastoral country of peace, innocence, and simplicity.

ARCADIA. The title of various pastoral romances, suggested, doubtless, from the use of the word in Vergil's *Eclogues*, where it is spoken of as a realm of bucolic content. One of these romances is by Sannazaro, and appeared at the close of the fifteenth century; another is by Sir Philip Sidney, and was published in 1590; a third is by Robert Greene, published in 1589; and a fourth by Lope de Vega, in 1598. In 1640 Shirley wrote a dramatization of Sidney's tale. Consult W. W. Greg, *Pastoral Poetry and Pastoral Drama* (London, 1906).

ARCA'DIUS (c.377–408). The first Emperor of the East (395–408). He was born in Spain, and was the son of the Emperor Theodosius, after whose death the Roman Empire was divided into the Eastern and the Western Empires. Arcadius lived in Oriental state, and his dominion extended from the Adriatic Sea to the river Tigris and from Scythia to Ethiopia; but the real rulers over this vast Empire were, first, the Gaul Rufinus, later the eunuch Eutropius, who openly assumed the reins of government and the command of the army, while Arcadius reposed in luxurious indifference. In 399 Eutropius was deposed by another usurper, Gainas, who, in his turn, soon fell a victim to his own ambition. Afterward Eudoxia, the wife of the Emperor, assumed the supremacy. One really great man adorned this period, the virtuous and eloquent Chrysostom (q.v.), who was persecuted by Eudoxia, and through her influence exiled in 404, on account of his firm opposition to Arianism, which the Empress herself favored. During the reign of Arcadius his territories suffered by barbarian incursions, earthquakes, and famine, but nothing could disturb the indifference of the monarch. He died, unlamented, in 408. See HONORIUS, and consult *The Cambridge Medieval History*, vol. i (New York, 1911).

ARCA'NI DIS'CIPLI'NA. See DISCIPLINA ARCANI.

ARCA'NUM, THE GREAT. In the Middle Ages the Latin word *arcanum*, literally meaning 'secret,' was used of any of the most valued preparations of alchemy (q.v.); but the name "great arcanum" was especially applied to the highest problems of the science, the discovery of such supposed great secrets of nature as the elixir of life or the philosopher's stone.

AR'CATURE (Fr. *arcature*, Lat. *arcus*, a bow, arc, curve). In architecture, especially that of the Middle Ages, a small or subordinate decorative arcade applied against a wall or built into it. The most common occurrence of arcatures is on the interior of side-aisle walls under the windows, especially in French Romanesque and Anglo-Norman churches of twelfth and early thirteenth centuries (e.g., Durham, Peterborough); rarely on exteriors as at Christchurch. In the Gothic styles beautiful arcatures occur on choir inclosures as well as under side-aisle windows. The attic wall under the eaves and above the main cornice of Rheims is decorated with an arcature of unusual beauty.

ARC DE TRIOMPHE DE L'ETOILE, ärk de trē'ōNf' de lā'twäl' (Fr. triumphal arch of the star). The largest triumphal arch in the world. It stands at the head of the Champs Elysées, Paris, and was begun by Napoleon in 1806 and completed by Louis Philippe in 1836. It was designed by Chalgrin and is profusely ornamented with reliefs representing the Napoleonic victories, in commemoration of which it was erected. See ARCH, TRIUMPHAL.

ARC DE TRIOMPHE DU CARROUSEL, ärk de trē'ōNf' dụ kà'rōō'zĕl' (Fr. triumphal arch of the tilting match). An arch built by Napoleon I at Paris, in the square inclosed by the Tuileries and the Louvre, in commemoration of his victories during 1805–06. It is a smaller copy of the Arch of Constantine at Rome. See ARCH, TRIUMPHAL.

AR'CE, *Sp. pron.* är'thā, FRANCISCO (1822–78). A California pioneer. He removed to Alta, Cal., in 1833, and soon afterward became secretary to Gen. José Castro, then commanding the Californian forces and an officer in the Mexican army. In 1846, while bringing a number of horses, supposed to belong to the Californian government, from Sonoma to the south, he was attacked (June 6) by a company of Americans, supposedly instigated by Capt. John C. Frémont. The "Arce affair" attracted widespread attention and marked the beginning of the Bear-Flag Revolt, which resulted in the seizure of California by the Americans.

ARCEL'LA. A genus of amœboid protozoans, having a chitinous test or shell which is single and circular in shape, somewhat like the umbrella of a jellyfish. There are two nuclei and more than one contractile vacuole. These organisms have the power of secreting carbonic-acid gas in the form of minute bubbles in the cytoplasm, by this manner floating near the surface of the water. They are common among bog-mosses and confervas.

AR'CESILA'US (Gk. *'Αρκεσίλαος, Arkesilaos*) (316–241 B.C.). A Greek philosopher, founder of the Middle Academy. He was born at Pitane, in Æolis; studied philosophy at Athens, first under Theophrastus the Peripatetic, and afterward under Crantor the Academician, and through the latter became acquainted with Polemon and Crates, by whom, as well as by Crantor, he was profoundly influenced in his philosophic views. After the death of Crantor he became the head of the Academic school. Arcesilaus marks a reaction against the dogmatism of the Stoic school of philosophy, and an intended return to the method and attitude of Plato and Socrates. He denied the Stoic doctrine of a "convincing conception," which he affirmed to be, from its very nature, unintelligible and contradictory. He also denied the certainty of intellectual and sensuous knowledge, and recommended abstinence from all dogmatic judgments. In practice, he maintained, we must act on grounds of probability. Though Arcesilaus confined his activity to teaching by the Socratic method and wrote nothing, his influence on the future course of philosophic thought was far-reaching. He had clearness of thought, cutting wit, and readiness of speech; his frank and generous disposition charmed his opponents as well as his disciples. Consult Zeller, *Geschichte der griechischen Philosophie* (Leipzig, 1893).

ARCESILA'US. The name of four kings of Cyrene. See BATTIADÆ.

ARCH (Lat. *arcus*, anything curved, a bow, vault, arch). A structural device for spanning an opening by means of a number of wedge-shaped units arranged in a curve convex upward; and hence, also, any structure having the form or appearance of an arch. The supports of an arch may be walls, piers, or columns; the capstones from which it springs or on which it rests are its *imposts;* the wedge-shaped pieces composing it are called *voussoirs;* the upper part of the arch is its *crown*, the portions near the impost are the *haunches;* the two lowest voussoirs are the *springers;* the central or crowning voussoir is the *keystone;* the inner outline or edge of the arch is its *intrados*, the outer line or edge is its *extrados*, and its under surface is its *soffit*. The molded band which often surrounds the opening is called an *archivolt* (q.v.). The wall spaces on either side of an arch, or between adjacent arches, are *spandrels;* a flat vertical slab or filling under an arch, above a lintel or beam set at or near the impost-level, is its *tympanum*. An arch composed of only two stones leaning against each other is an *Egyptian* arch. *A segmental* arch is one whose curve is less than a semicircle; a *horseshoe* arch, one whose curve is more than a semicircle; a *stilted* arch, one whose imposts are set below its actual springing; a *pointed* arch, one whose intrados is formed by intersecting curves, drawn from two opposite centres; a *Tudor* or *Persian* arch, one whose curves are drawn from four centres. A *cusped* or *foiled* arch is one whose soffit is adorned with pointed projections (cusps) bounded by tangent circular curves (foils). A *horizontal* or flat arch is one in which, though radiating voussoirs are used, the intrados curve has been flattened nearly or quite to a straight horizontal line. A *corbeled* or false arch is one formed by horizontal courses successively projecting till they meet at the crown. All true arches exert outward lateral pressures called *thrusts;* the masses of masonry which receive and resist these are *abutments*. *Discharging* or *relieving* arches are those which, imbedded in a wall, relieve the weight on the structure below. *Inverted* arches are employed in foundations to distribute the weights of the piers that rest on them. A *vault* is an arched construction extended to cover an inclosed space and not merely an opening in a wall. The term "arch" is applied not only to masonry structures, but to curved roof-ribs or trusses of timber or metal; it is also loosely used of the whole opening spanned by an arch, and even (see ARCH, TRIUMPHAL) of the entire structure containing an arch as its chief feature.

History.—The Egyptians knew the round arch, but relegated it to works of engineering and private architecture; the same is true of the

Greeks. The arch in the Assembly Hall at Priene (time of Alexander) is supposed to be the only decorative Greek arch found. But the Babylonians and Assyrians knew and used both the pointed and the semicircular arch in their palaces, tombs, and temples. All the openings in Assyrian palaces were arched. In ancient Italy the Pelasgic and Etruscan populations used the arch in the same way for secular and sepulchral buildings; only in temple architecture, borrowed from the Greeks of the historic age, was the architrave supreme. It was the Romans who first developed the arch as a dominating feature of external as well as internal design, especially in secular buildings, and applied the vault to cover spacious interiors in temples, baths, and halls. Etruscans, Romans, and early Christians knew only the semicircular arch. But the Persians and Mohammedans, beginning in the sixth and seventh centuries, brought into use a variety of other forms: the pointed, the horseshoe, the ovoid, the stilted arches. The pointed arch became, in fact, the favorite Mohammedan form. It was, perhaps, a knowledge of this Oriental usage that suggested to French builders of the time of the first crusade the use of this form in vaulting; and thus was laid the basis for one feature of Gothic construction, though otherwise there cannot be any connection between the styles of the East and Gothic architecture. In Europe the round-arched style of the Romanesque period was succeeded by the more flexible pointed style of Gothic. Gothic architects produced the greatest number of sub-forms and by-forms of the arch, not all of them pointed. Then the Renaissance returned to the round arch. Modern architects have no style to hamper them and therefore use all kinds. See ABUTMENT; ARCADE; ARCH, TRIUMPHAL; ARCHITECTURE; ARCHIVOLT; BRIDGE; SPANDREL; TIMBREL; VAULT.

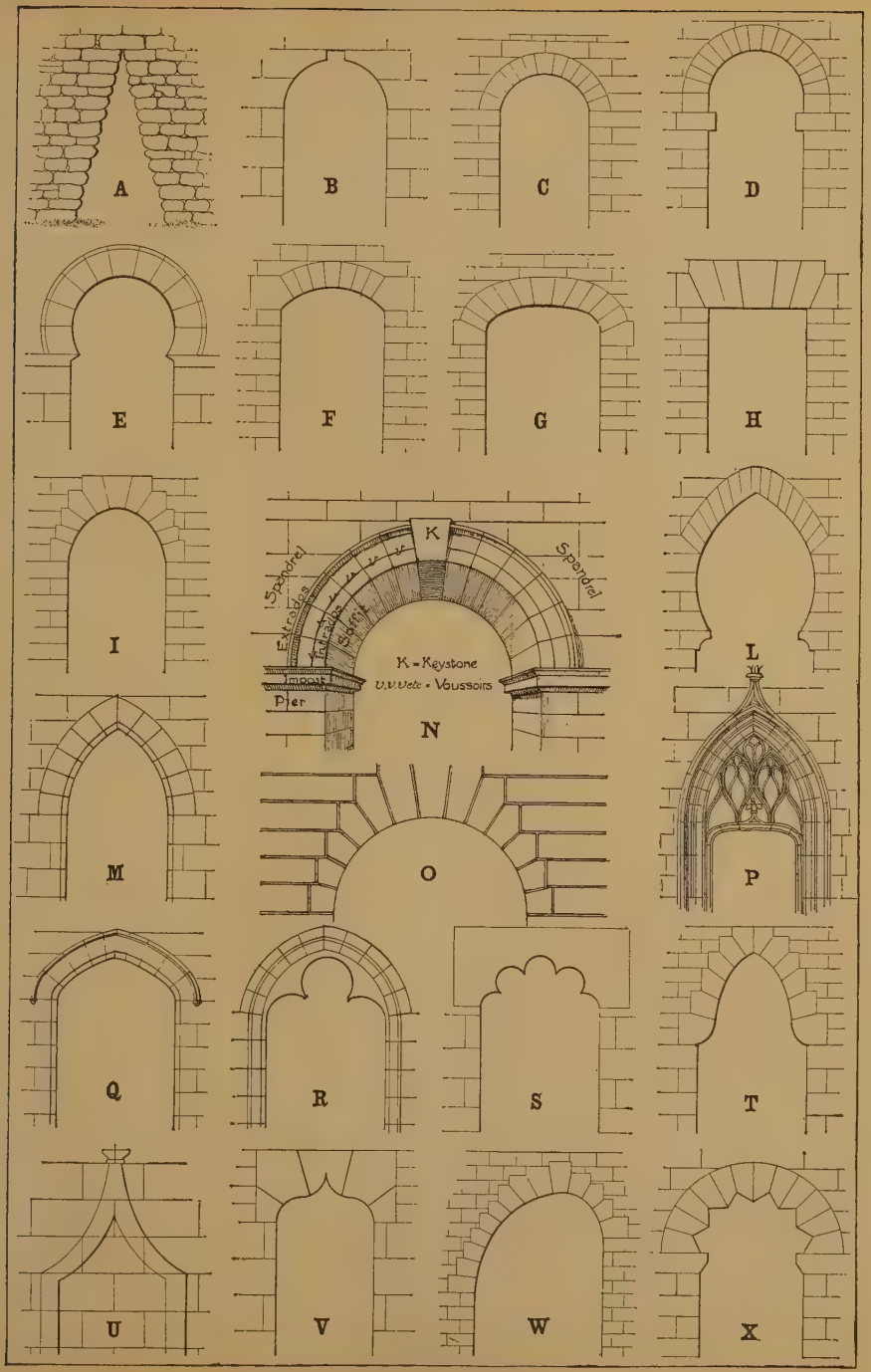
ARCH, TRIUMPHAL, or MEMORIAL. Usually a free-standing arch, spanning a road; though sometimes city gates and monumental doorways are turned into memorial arches. These arches are erected to commemorate triumphs or successful campaigns, or even great peaceful events, or an entire reign, or even a great family. They appear to have originated with the Romans. Nearly 150 such Roman arches remain wholly or in part, of which about 60 are in north Africa. At Rome they were placed along the Triumphal Way followed by the triumphing general and his army from the Field of Mars to the Capitol. The earliest arches mentioned at Rome are those of Stertinius (196 B.C.) and Scipio Africanus (190 B.C.). Then the Fabian gens erected one to itself (c.120 B.C.). But it was under Augustus that the custom took root everywhere, as is shown in the Roman Forum, at Aosta, Susa, Rimini, Fano, etc. From that time until the fall of the Empire in the fifth century such arches followed Roman dominion throughout the civilized world, and they are found in France (Saint-Rémy, Reims, St. Chamas, Orange, etc.), Spain (Caparra, Bara), north Africa (Timgad, Tebessa, Thugga, Haïdra), Syria (Palmyra, Gerasa, Baalbek), Asia Minor, etc. The early arches were of stone and without much carving, being mainly arched bases for a group of triumphal statuary. But under the Empire, though still crowned by the triumphal quadriga and other figures in bronze, the arches themselves became of great artistic importance and often represent the most successful effort of Roman genius at combining architectural and sculptural design. They were then built of marble. The number of openings varied from one to four, according as special arcades were or were not made for foot passengers, or two main arches provided for vehicles in place of one. Still another favorite form was the Janus arch, or Tetrapylon, a solid cube, with arches at right angles, usually placed at the intersection of avenues, as at Philippopolis, Gerasa, and Rome. Few cities were built under the Empire without one or more of these arches, but only in Italy and south France were they profusely decorated with relief sculptures. The most perfect of all such sculptured arches is that of Trajan, at Benevento (114 A.D.); then come those of Titus (80), Septimius Severus (203), and Constantine (312) at Rome, and that of Tiberius at Orange. The sculptures commemorated events of these emperors' reigns, and the attic contained the dedicatory inscription. One of the slenderest and most elegant is the one erected on the Mole at Ancona, to celebrate the enlargement of this port by Trajan. The Renaissance resurrected the arch after a lapse of 1000 years (Arch of Alfonso at Naples, fifteenth century), and it has since the seventeenth century steadily increased in popularity in Italy (Arco della Pace, Milan); France (Arc de l'Étoile, Arc du Carrousel); Germany (Brandenburger Thor, Berlin; Siegesthor, Munich), and America (Memorial Arch and Bridge, Hartford, Conn.; Washington Arch, New York; Memorial Arch, Brooklyn).

The term is also used to designate, in early Christian basilicas, the arch with its spandrels which incloses the upper part of the opening of the apse; this was usually decorated with an important mosaic picture. Consult: Baumeister, *Denkmäler des klassischen Altertums* (Munich, 1885–88); Daremberg and Saglio, *Dictionnaire des antiquités grecques et romaines* (Paris, 1881–92); Bellori, *Veteres Arcus Augustorum* (Rome, 1690); and Philippi, *Ueber die römischen Triumphalreliefe* (Leipzig, 1874); Frothingham, *Roman Arches of Triumph* (New York, 1909).

ARCH, JOSEPH (1826–1919). An English labor leader. He was born in humble circumstances; was a farm laborer; educated himself, and became a Primitive Methodist preacher. In 1872 he headed the movement for the betterment of the condition of farm laborers in England and founded and was president of the National Agricultural Laborers' Union. In 1873 he visited Canada and the United States to study the condition and prospects of labor and the question of emigration. In 1885 he was elected to Parliament from northwest Norfolk as a Liberal; was defeated in 1886, and reëlected in 1892 and in 1895. In 1898 his autobiography, edited by the Countess of Warwick, was published.

ARCHÆOLOGICAL (är'kē-ō-lŏj'ĭ-kal) **INSTITUTE OF AMERICA.** A society for the promotion of archæological investigation and research. It was organized in Boston in 1879, and now has 18 affiliated societies, with headquarters in different American cities. The Institute founded the American School of Classical Studies in Athens in 1881; the American School of Classical Studies in Rome in 1895; the American School in Palestine in 1900, and the School for American Archæology in 1907. These are supported partly by private subscription and partly by the aid of several American colleges. The Carnegie Institution of Washington sup-

ARCHES



A. TRIANGULAR.
B. FALSE OR CORBELLED
C. SEMI-CIRCULAR, With keystone.
D. STILTED.
E. HORSESHOE.
G. SURBASED OR OVAL.
H. FLAT OR HORIZONTAL.
I. ELLIPTICAL.
K. KEYSTONE.
L. LANCE-SHAPED.
N. TYPICAL OR ROMAN ARCH, With parts named.
O. RUSTICATED.
P. FLAMBOYANT.
Q. TUDOR-
S. FIVE-LOBED.
T. REVERSED OGEE.
U. INFLECTED, COUNTER CURVED.
V. OGEE.
W. RAMPANT-

ports a fellowship in the American School of Classical Studies at Athens, and grants $1500 annually for excavations. In 1912 the School of Classical Studies in Rome was absorbed by the American Academy at Rome (q.v.). The society conducted important excavations of the site of ancient Assos in 1881–83, and has aided the school at Athens in its excavation of Grecian sites, notably that of the Heræum, in the Argolid. A summer field session of the School of American Archæology is held in the southwestern part of the United States, and many important studies of the archæology of this region have been made. Valuable investigations have been made also in several parts of Central America. Besides the *American Journal of Archæology*, a bi-monthly magazine, the society publishes various papers and supplemental reports, and more important publications are in course of preparation, notably a facsimile reproduction of the Codex Venetus of Aristophanes, and important descriptions of the results of special archæological investigations. The society has about 2000 members. Its presidents have been: Prof. Charles Eliot Norton, 1879–90; Seth Low, 1890–96; Prof. John Williams White, 1896–1903; Prof. Thomas D. Seymour, 1903–08; Prof. F. W. Kelsey, 1908–12; Prof. H. L. Wilson, 1912—.

ARCHÆOLOGY, är'kē-ŏl'ŏ-jĭ (Gk. *ἀρχαιολογία, archaiologia,* antiquarian lore, from *ἀρχαῖος, archaios,* ancient + *λόγος, logos,* science). The science of antiquities—that is, of the material remains of ancient peoples. But from the fact that in its origin and development it has been primarily and chiefly concerned with the artistic and architectural remnants of the Græco-Roman world, archæology is often taken to mean the science of Greek and Roman antiquities, in which sense the term will be used in this article, without losing sight of the connection subsisting between these monuments and those of the more ancient peoples to whom they owe in great measure their inception.

As a science, archæology cannot justly be said to have existed before the last century, although the way had been gradually paved for it from the time of the Italian Renaissance. The passion for the artistic relics of Græco-Roman civilization, which at the end of the fifteenth century took such surprising hold upon the cultured classes of Italy under the papal sway, led to the foundation of museums, in which were gathered statues of bronze and marble, vases, inscriptions, gems, jewelry, and coins, affording material for study and comparison. The spoils brought over from Greece by her Roman conquerors, and the mania for collecting treasures from the same source which had been displayed by many Roman amateurs, as well as the great artistic and architectural activity in imperial Rome under the guidance of Greek masters, rendered that city a mine for the early archæologists; and, furthermore, much filtered in from Greece itself. (Cf. Lanciani, *Ancient Rome in the Light of Recent Discoveries,* Boston and New York, 1889.) It must be admitted that these collectors were enthusiastic rather than scientific, and that the works of art discovered were ruthlessly restored to present a pleasing appearance, often at the complete sacrifice of accuracy. Heads and bodies of totally different style were frequently joined in hybrid combinations which still mislead the uninformed.

The father of modern archæology is Johann Joachim Winckelmann (1717–68) (q.v.), whose writings, although superseded in many points, are still of value; by his genius he marked out the field since so successfully cultivated. He was the first to present to European scholars an authentic account of the discoveries made in the Campanian city of Herculaneum (q.v.), and, more than all, was the first to write a systematic history of ancient art (*Geschichte der Kunst des Alterthums,* 1764; see Winckelmann's complete works, edited by Meyer and Schulze, Dresden, 1808–20). By a passage in Winckelmann's writings, Lessing (q.v.) was stimulated to the composition of his great æsthetic essay, "Laocoön," and Goethe also was powerfully influenced by him. Thus the seed of the new science was planted, to develop after the era of the wars of the French Revolution. Like his predecessors, Winckelmann knew Greek art only through the copies of the Roman period, or the few originals of later times; but even through this haze he was able to distinguish some of the characteristics of the period, so that his works prepared the way for the better appreciation of the discoveries of the early nineteenth century.

Then came Napoleon's invasion of Egypt, which opened the treasures of the Nile valley to European scholars, while the discovery of the key to hieroglyphic writing threw new light on the early history of the East. In Greece itself English scholars were at this time accomplishing all that could be done under the Turkish régime. The most notable achievement was the splendid work of James Stuart (q.v.) and Nicholas Revett, *The Antiquities of Athens* (4 vols., 1762–1816). The expedition sent out by the Society of Dilettanti (see DILETTANTI SOCIETY) to continue their work, however, accomplished but little. At length the true character of the art of the fifth century B.C. became clear when, in 1803–12, Lord Elgin brought the sculptures of the Parthenon to London. (See ELGIN MARBLES.) In 1811 the English and German explorers recovered the remains of the remarkable pedimental groups of the temple on the island of Ægina. These were purchased by Prince Ludwig of Bavaria and placed in the Glyptothek at Munich. (See ÆGINETAN SCULPTURES.) In the following year the same explorers recovered the reliefs from the temple of Apollo Epicurius at Bassæ, near Phigalia, in Arcadia, which were subsequently acquired by the British government and form a most important part of the archæological treasures of the British Museum. The successful termination of the Greek War of Independence (1821–29) opened a new mine from which something was immediately realized by the French exploration of the Morea (Peloponnesus) in 1829, which brought to the Louvre the first specimens of the Olympic sculptures. Soon after this the little temple of Athena Nike was rescued from the Turkish bastion, in which it had been incorporated, and replaced again at the western end of the Acropolis of Athens. In Sicily the exploration of the many Greek sites led to the discovery of the early sculptures of Selinus (q.v.), while the systematic excavation of Pompeii (q.v.) brought to light the paintings and household ornaments of the first century. At about the same time the discovery of the great necropolises of Etruria, especially that of Vulci, in 1828, not only opened the whole field of Etruscan art, and especially of mural painting,

to study, but also added thousands of vases, Greek and Etruscan, to the material available for reconstructing the life and thought of the past. The importance of the vases, not for art alone, but for the study of daily life and mythology, was at once recognized; but unfortunately the strict methods of scientific interpretation were not at first followed, and for many years the wildest subjectivity sought to find a whole system of mystic symbolism in these gifts to the dead. Fortunately this has now been superseded by a careful study of the language and methods of the Greek potter. (See VASE.) This growth of material, making necessary some organization of the laborers in the new science, brought about the foundation in Rome, of the "Istituto di Corrispondenza Archeologica," by Bunsen, Gerhard, the Duke of Luynes, and others, on Dec. 9, 1828. This was one of the most important steps in the history of archæological progress. This institution, now the Imperial German Archæological Institute (Kaiserlich-Deutsches Archäologisches Institut), has, by its publications and by the training of young scholars, been of inestimable value. The French School of Archæology, established at Athens in 1846, as well as the activity which began to be displayed by certain Greek savants under the Bavarian régime, had also an important influence on the development of archæology. A large part in this development was played by the pupils of F. A. Wolf, especially by A. Boeckh, whose aim was a complete reconstruction of ancient life, and who were therefore ready to welcome light from other sources than the literary monuments which had so long absorbed the attention of classical scholars. The discoveries of Layard at Nineveh (1845–46), and the subsequent decipherment of the cuneiform inscriptions (q.v.), revealed the ancient civilization of Assyria and Babylonia and gave new material for a more accurate estimate of the relative position of Greek culture and art. Important contribution was made to the British Museum by the discoveries of Sir Charles Fellows in Lycia (1840), of Wood at Ephesus (1867–74), and of Newton at Branchidæ, Halicarnassus, and Cnidus.

The study of Greek inscriptions (see INSCRIPTIONS) under Boeckh and Franz, and of comparative linguistics under Bopp and his successors, contributed their share to the modern archæologist's equipment. This narrative brings the account down to the last 30 years of the nineteenth century, during which a series of discoveries were made whose full importance cannot perhaps yet be fully estimated.

The first place in this series of discoveries must be given to the excavations of Heinrich Schliemann (q.v.) at Troy, Mycenæ, and Tiryns, which brought to light the remains of pre-Homeric Greece and revolutionized our conceptions of the development of the early Ægean civilization. These finds have been supplemented and explained by the work of Flinders Petrie and others in Egypt, of the English on Melos, and especially by the most recent explorations in Crete. The peculiar Cypriote civilization, which first attracted attention through the finds of de Vogüé in 1862 (now in the Louvre) and the collections of Cesnola, has since been studied scientifically in 1883 by Ohnefalsch-Richter and by other German and English scholars.

Of the greatest importance in the development of archæological study in Greece has been the establishment of other foreign schools besides the French Institute in Athens. The first of these was the Athenian branch of the German Archæological Institute (1874), which was followed by the American School of Classical Studies (1882), the British School (1886), and a branch of the Austrian Archæological Institute (1897). Italy, Russia, and Denmark have also made provision for their archæologists who desire to study in Greek lands. Through the aid of foreign archæologists many of the most important excavations in Greece and Asia Minor have been made possible. Thus, the Germans have excavated Olympia (1875–81), Pergamon, Priene, and Miletus; the French, Delos and Delphi; the Americans, Eretria, the temple of Hera, near Argos (1892–95), and Corinth (see HERÆUM; CORINTH); the British, Megalopolis and Melos, and the Austrians, Ephesus. Side by side with the foreigners, has worked the Greek Archæological Society (Ἑλληνική Ἀρχαιολογική Ἑταιρία, *Hellenikē Archaiologikē Hetairia*), founded in 1836, and always one of the most active agencies in the exploration of Greek soil. To it is due the excavation of the northern and southern slopes and the summit of the Acropolis, the great sanctuaries of Eleusis, Epidaurus and Oropos, and the palace and many graves at Mycenæ (q.v.).

In Italy the progress of discovery has been somewhat limited by a refusal to permit foreigners to engage in the work; but archæological study flourishes not only among the Italians, but under the direction of the German and French Institutes and the American School established in 1895.

As may be inferred from this brief outline, archæology is an eminently progressive science and in all its departments subject to constant revision. The steady increase of material and the filling of gaps in the general structure, as well as continual correction or rejection of hastily formed theories and insufficiently supported conclusions, will occupy savants for generations to come. We can deal only provisionally with the most certain and generally accepted data, supplementing the statements of ancient writers, by the monuments and interpreting the monuments in turn by our literary sources.

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most important is the old series of the German Archæological Institute; *Annali* and *Bolletino dell' Istituto di Corrispondenza Archeologica* (Rome, 1829–85), and the *Monumenti inediti* (12 vols. and supplement, Rome, 1829–85; Berlin, 1891); *Archäologische Zeitung* (Berlin, 1843–85) which has been succeeded by the *Jahrbuch des kaiserlich deutschen archäologischen Instituts* (Berlin, 1885 ff.). Other important periodicals are the *Mittheilungen des kaiserlich deutschen archäologischen Instituts, Athenische Abtheilung* (Athens, 1876 ff.); *Römische Abtheilung* (Rome, 1886 ff.); *Antike Denkmäler*, folio (Berlin, 1887 ff.); *Jahrbücher des Vereins der Altertumsfreunde im Rheinlande* (Bonn, 1842 ff.); *Compte Rendus de l'Academie des Inscriptions et Belles Lettres; Monumenti Antichi dei Lincei; The Year's Work in Classical Studies.* For the Roman antiquities of Germany, *Archäologisch-epigraphische Mittheilungen aus Osterreich* (Vienna, 1877–97), superseded by *Jahreshefte des österreichischen archäologischen Instituts* (Vienna, 1898 ff.). In French, *Revue archéologique* (Paris, 1884 ff.); *Gazette archéologique* (Paris, 1875–89); *Bulletin de correspondance hellénique* (Athens, 1877 ff.). In Italian, *Monumenti antichi* (Milan, 1889 ff.); *Notizie degli scavi di Antichità* (Rome, 1876 ff.). In Greek, *Ἐφημερὶς Ἀρχαιολογική, Ephēmeris Archaiologikē* (Athens, 1837–60, 1862–74, 1883 ff.). In English, *Journal of Hellenic Studies* (London, 1880 ff.), *Annual of the British School in Athens* (cf. Annual), *the British School in Rome*), and *American Journal of Archæology* (Baltimore, Boston, Princeton, Norwood, 1885 ff.). The American School of Classical Studies at Athens has published volumes of papers (1885–97) and the British School an *Annual* since 1895.

For our purpose we may divide the general subject of classical archæology, from an historical point of view, into the following periods:

1. Neolithic Period from about 10,000 B.C. to 3315 B.C.

II. Minoan, or Ægean Period, from 3315—the time of the first dynasty of Egypt (?), to 1450 B.C.

III. Mycenæan Period, from c.1450 B.C. to the Dorian conquest, c.1200 B.C.

IV. Earlier Hellenic Period, from 1200 B.C. to the era of the Persian Wars, c.500 B.C.

V. Period of Hellenic Ascendency, from c.500 B.C. to the Macedonian supremacy, c.350 B.C.—the period of Phidias and Praxiteles.

VI. Period of Hellenic Dissemination and Decline, from c.350 B.C. to the Roman conquest, c.150 B.C.—the period of Lysippus and of the Rhodian and Pergamene schools, so called.

VII. Roman Period, from c.150 B.C. to c.150 A.D. or later—the period of the union and united achievement of Greek and Roman civilization. For convenience, the consideration of Roman art, properly so called, will be reserved to the last period.

I. **The Neolithic Period.** The beginnings of this period in the Eastern Mediterranean are only tentatively dated by evidence deduced from the finds at Cnossus in Crete (see later). But it does not seem fantastic to give the tenth millennium B.C. as perhaps approximately the correct date for the starting point of this period. Its termination is marked by the introduction of bronze, and this metal probably came into use in the Ægean in the neighborhood of the close of the fourth millennium B.C. This primitive culture was of longer duration in some places than others: in Cyprus it lingered on until a fairly late date. Remains of this period have been discovered in the second city so called, at Troy, on the Acropolis at Athens, at Tiryns, and in many of the Ægean Islands such as Amorgos, Syros, Sophnos, Naxos, Paros, and in Thera and Melos. The pottery is the most common type of remains from this period. It is hand-made with decorations as a rule consisting of incised lines at times filled with some white substance. The color of the ware produced by firing is usually gray or red; the surface is hand-polished. Besides the pottery particularly characteristic are the rude "idols," either of clay or stone, which represent commonly a nude female. By some this type of statuette has been associated with the cult of the great eastern goddess Ishtar, or Astarte. The burials of this age are in cist graves. See MELOS; SANTORIN; TROY.

In the West this period is represented by the pre-Sicel, and first Sicel graves in Sicily, and the earlier remains of Italy. The developments of the Bronze Age in Italy are independent of the Mycenæan Period. The products of Mycenæan art reached the West only as importations, apparently late and in small quantities.

II. **Minoan, or Ægean, Period.** The period of Eastern Mediterranean culture which has here been termed Minoan, or Ægean, derives its name "Minoan" from the fact that the chief seat of this civilization, so far as is known at present, was located at Cnossus in Crete, and from the additional fact that Minos was the legendary King under whom Crete rose to the position of thalassocrat of the Eastern Mediterranean. The name "Ægean" has been added as an alternative perhaps to be preferred because the same culture which manifests itself in Crete has been discovered to have existed in other islands of the Ægean, and the name seems more appropriate than the more local one of Minoan. One other name, Carian, had been recently put forward as the proper designation of this culture; but the evidence for the acceptance of this name, as will be seen later, does not appear to be very strong.

Up to the time of Schliemann's discoveries at Mycenæ in 1876, knowledge of the inhabitants of the Greek mainland and the islands of the Eastern Mediterranean who lived there back of the fifth century was largely derived from literary sources. With the opening of the wonderful shaft graves of the acropolis at Mycenæ, the discovery of the great tholos tombs there and elsewhere in Greece, and the uncovering of the palace and citadel of Tiryns, a vista was opened up which reached several centuries beyond the time of the Dorian invasion. So much did the evidence presented point to Mycenæ as the seat of this culture that, in spite of the fact that remains of the same civilization were found widely distributed over Greece, the name "Mycenæan" was attached to it. The assumption was even made, and at the time with much show of reason, that it was from the mainland of Greece, and particularly from Mycenæ, that this culture spread to the islands. For the reason, furthermore, that this same culture was the only one known to antedate the coming of the Dorians, the custom established itself of designating as Mycenæan the whole period from the time of the arrival of this folk back to the close of the Stone Age.

In 1900, however, Dr. A. J. Evans began a series of excavations at Cnossus in Crete, which have been followed by others of various scholars in that island and elsewhere, notably in Melos, and which made it clear that the name "Mycenæan" as applied to the culture of the Eastern Mediterranean of the second millennium before our era was a misnomer. At Cnossus the distinguished English scholar found traces of an unbroken continuity of occupation extending from a time well in the Neolithic Age down to the last years of the second millennium B.C. At this latter date a disturbance occurred which argues for the intrusion of a stock from elsewhere, probably from the Greek mainland. From these same excavations it was also learned that what had been regarded at Mycenæ as the choicest expression of its culture here at Cnossus followed the real florescence of Cretan life and represented in reality a decadent stage of culture. For this reason Evans felt justified in considering the civilization shown at Mycenæ as a late form of Cretan culture. This view, as will be seen presently, is not exactly correct.

It is true, nevertheless, that the finds at Crete and Melos, to mention no others, render it imperative that the name "Mycenæan" be lifted from the civilization belonging to the greater part of the second millennium B.C. and the two millenniums before that, and that some other name be substituted. While it is true that the name "Minoan" has many arguments in its favor on the grounds of picturesqueness and tradition, perhaps it would be better to use the more general one of "Ægean," which makes it clear that this culture was not confined to Crete, but diffused throughout the Ægean Sea. The name "Carian" may be disregarded until the question of the origin of the people who produced this civilization is considered.

Disregarding the Neolithic Age in the Ægean basin, which has left almost nothing behind but stone implements and rude pottery, the makers of the Minoan or Ægean culture were a people who from first to last moved forward to a high plane of civilization. At Cnossus and Phæstos in Crete the remains of great palaces have been uncovered. At Cnossus the excavations have shown a great engineering people who were capable of building intricate structures, who understood drainage, and actually supplied the building with a latrine quite modern in its arrangement. The walls of the palaces at Cnossus (for there were two—one built upon the remains of an earlier structure) were decorated with frescoes which show that the people who dwelt here lived in luxury in a highly organized and even mannered society.

The questions therefore at once arise: when did these people live, were they autochthons, and, if not, whence did they come? An attempt will now be made to answer these questions.

First, as to the dating of the Minoan Period; of the nine divisions into which, for convenience of classification, Evans has separated the Minoan Period, the stratum representing the first —i.e., the stratum following immediately after and resting upon the last of the Neolithic deposit—was found to contain black, hand-polished pottery which, on the authority of Petrie, is not to be distinguished from certain vases found in tombs of Egypt dating in the first dynasty. This discovery to a certain extent defines the beginning of the Minoan Period; for according as one accepts Petrie's dating, 5510 B.C., for the first dynasty, or that of Lepsius, 3892 B.C. or that of Meyer, 3315 B.C., the beginning of the Minoan Period will reach back to 5510 B.C. or come down to as comparatively late a date as 3315 B.C. Evans himself, perhaps by way of compromise, elects 3892 B.C. as correct. It is best perhaps to be even more careful still and accept the more conservative date 3315 B.C. as given by Meyer. For the chronology of later periods Egypt has again afforded material. In a tomb containing seals which bear the cartouches of Senusert II and Amenemhat III (both kings of the twelfth dynasty) were found polychrome vases characteristic of the second division of the second trio of periods which Dr. Evans has classified as middle Minoan. This would mean that the middle of this period is to be located probably in the nineteenth century before our era. Meyer gives 2000–1800 as the time of this dynasty. It is this middle Minoan Period which saw the arrival of the first age of bronze in the Eastern Mediterranean, and it is in the middle of it that the palaces of Cnossus and Phæstos were built. The third division of the middle Minoan Period, in which comes the florescence of Minoan culture and the erection of the second palace, appears to be dated by the discovery at Cnossus of a diorite figure belonging to the twelfth dynasty (which, according to Meyer, begins with the year 1788 B.C.) and by the finding of a vase bearing the name of the Hyksos King Khyan. The time of the supremacy of these invaders of Egypt seems to have lasted from the eighteenth to the seventeenth century B.C. The middle period of the next division, Late Minoan, is synchronized with the eighteenth dynasty of Egypt (which began 1580 B.C.), and it lasted down to the year 1450 B.C. The last period of Minoan culture at Cnossus includes the time of the eighteenth and the nineteenth dynasties, or, in other words, the time between 1450 and 1200 B.C. This is the moment, so to speak, when the hegemony of the Eastern Mediterranean passed from Crete to the Greek mainland; it is the period which, from the great discoveries of Schliemann at Mycenæ, has been and may properly be called Mycenæan.

In a word, there is reason to believe, on the most conservative grounds, that the period of Minoan culture reached with unbroken continuity from about the fourth millennium B.C. to the neighborhood of 1200 B.C. How far beyond the fourth millennium it may be assumed these people lived here during the Neolithic Age is not certain. But one might postulate perhaps, without too great a risk, a date somewhere in the neighborhood of 10,000 B.C. as that which marked the arrival of the first dwellers on the site at Cnossus. From that time until practically the beginning of the first millennium B.C. there is evidence for the continuation, with certain vicissitudes, of the same race as occupants of the site. This must be taken into consideration during the endeavor to discover whether or not the culture of the Ægean in those early days was autochthonous or alien.

The question now arises whether these people are indigenous or invaders. In answer it may be noted that, in Greece proper, in the Ægean, and particularly in Crete, as well as in Asia Minor, certain pre-Hellenic features appear in Greek speech seemingly having no relationship with Aryan or Semitic sources. If this means anything, it is that in pre-Hellenic days in this

part of the Mediterranean there was in use a pre-Greek speech which had no affiliations with the Aryan or Semitic tongues. Moreover, as Mackenzie argues (see "Cretan Palaces," *Annual of the British School in Athens*, vol. xii, pp. 216 ff.), since the origins of writing in the Ægean can be traced back to a period close to the fourth millennium before our era, there must have been a unity of language in this quarter which, in its turn, would speak for a racial unity. In other words, there seems to have been, at least in Minoan times, one race occupying the mainland of Greece and the islands of the Ægean.

That Caria could have been the original habitat of this race is unlikely, for, rather than bringing any influence into the Mediterranean, Caria, on the contrary, received influences from the Mediterranean, and even then not until the period of Mycenæan supremacy.

Two other sources have been suggested as those from which this Ægean, or Mediterranean, race may have come, viz., the north and the south. Phœnicia may be disregarded in any serious consideration. Fortunately for the solution of the problem, the remains from the Minoan Period are sufficient to afford means for arriving at a possible answer.

In the first place, while anthropometry is not infallible, the majority of the measurements of skulls of the earlier Minoan Period in Crete show the race as a whole to have been dolichocephalic. That some skulls are mesocephalic and a fewer number still are brachycephalic may simply indicate that certain contaminations were beginning to creep in. The race, moreover, was black-haired and of a dark complexion. If this people had been of northern origin, perhaps one might have expected to find some indication of fair hair and of broad skulls.

To approach the matter from another side, it is interesting to note that Mackenzie (see above) has shown most convincingly that the loin cloth, which is so distinctive a dress of the Minoan man, is the normal costume of a habitant of a warm climate. If therefore it is worn so constantly by the Minoan men, and it can be shown furthermore that the elaborately flounced dress of the Minoan women is only an evolution from the loin cloth, the only apparent explanation for its use by the Minoans is that the Ægean man must have brought it with him from his original home into a colder climate; for it is not likely that so light a costume would have been developed in a locality which, like the Mediterranean, demands some warmth in clothing. That he did cling to his original form of dress is to be explained by the fact that people are slow to adopt new costumes when moving out of their normal environment. The northerner, for example, who finally found his way into Greece from the cooler regions of the north continued to wear the tunic or shirt which he had found so necessary in his original home. The loin cloth, on the other hand, was the persistent form of dress in Crete worn from the beginning of the middle Minoan Period to the time of the end of the later Palace Period. It is, furthermore, the regular male attire in Egypt from the time of the earliest dynasties downward. It is therefore more than probable that the continuation of this form of apparel in Crete, which is a type of dress so characteristic of Egypt and appropriate to it as a warm climate, affords sufficient reason for supposing that its presence in the Mediterranean means that the wearers brought it with them when they migrated perhaps from this warm country to a colder environment. On the other hand, those who adhere to the northern-Achæan theory for the origin of the Ægean people are compelled to explain how it is that upon the appearance of this folk upon the shores and in the islands of the Ægean Sea it elected to wear a style of dress not only unfamiliar to them in their original home but appropriate only to a warmer climate than that of Greece and the adjacent islands.

Finally, the type of palace in use with these people speaks rather for a race which moved northward than for one which had migrated in a southerly direction. So it is that the type of palace found in the late Minoan Period, which is identical with the contemporary Mycenæan type of the Greek mainland, is distinguished from the earlier form of palace by the introduction of a central hearth in the hall, or megaron. In other words, the earlier palace at Crete, without a hearth, is a type appropriate to a warmer climate, whereas the form which appears later on at Crete, Melos, and Tiryns, and was the one apparently developed by people of the same stock which had penetrated farther to the north, has, for the sake of meeting the conditions imposed by the cold of the more northern land, introduced a central hearth, in the megaron or hall. The occurrence of this type of building later in Crete seems to indicate that in the late Minoan times, when the Greek mainland conquered Crete, either the conquerors imported this type from their home in Greece or the conquered borrowed from their invading kinsfolk this more appropriately northern form of palace.

There is, then, every reason to believe that the eastern Mediterranean in Minoan times was in close contact with the south. That it owed anything, on the other hand, to the north is much to be doubted. But whether this affiliation is to be understood to mean that the Minoans, so called, or, better, the Ægean people, were to a large extent of Africo-Libyan stock cannot be definitely stated. It is to be noted, however, that in the earlier years of this culture the race is preponderatingly dolichocephalic and that only as time progresses does its character in this direction change until late in the Minoan Period the broad-headed, or brachycephalic, stock predominate. Since the craniological evidence, although not infallible, seems therefore to support at the start Egypto-Libyan relations, it seems reasonable to think that this gradual change in the form of the head means a slow infusion of the broad-headed types from the north.

This dark-skinned, black-haired, long-headed race has been one of great vitality. It has persisted in spite of the various fusions of other people, and it is one capable of great artistic achievement. It is perhaps this stock which is responsible at a later date for the wonderful productions of Greece of classical times.

If, as noted above, architecture was so successfully practiced by the Ægean people, it is quite as true that the handicrafts were successfully prosecuted. The pottery of the best Minoan style, for example, is a style possessing a daintiness of fabrication which loses nothing by comparison with works of classic times. The minor arts in general were quite as cleverly followed,

and it may be assumed that work in the precious metals was also of a high order. But this can be only surmised because of the unfortunate sack of the palaces of Crete by a people who took practically all that was wrought in gold or silver.

The Minoans were, then, a people of a highly matured civilization, using both linear and pictographic forms of writing. (See WRITING.) For amusements the upper classes at least enjoyed boxing contests and bull baiting. At Cnossus is a theatral area that might have well served for some of these events, as they were pictured in the frescoes and by the other arts.

Pastimes, however, did not occupy all their time. Cnossus has furnished abundant evidence which, supplemented by material from other sources, shows that these Ægean people were as distinctly religious as their successors in the Mediterranean basin. So far as can be made out the Minoans worshiped, above all others, a nature goddess whose symbols are sometimes serpents, at others doves—possibly to signify her two aspects as a chthonic and a heavenly deity. With her seems to have been associated a male god who perhaps occupied the indeterminate position of son or consort. This god may have been the divinity whose manifestations were the thunder and lightning, for his attributes were the double axe and the bull's head or even merely the horns. This god may be the one who later in Greek religion appears as Zeus, and who, as a result of the later invaders' worship of a male divinity, usurped the high place previously occupied by the mother goddess. Other divinities, less intelligible, however, were in the Minoan theogony, among whom may be classed the demonic creatures which at times are anthropomorphic and at others zoömorphic. Even inanimate objects, such as trees and betyls, or pillars, seemed to have found a place in the Ægean religion.

This religion apparently was not free from outside influences. There is, in fact, a possibility that the Dove goddess of the shrine found in the palace at Cnossus is to be associated in some way with the Dove Cult of the Syrian Semiramis, or Astarte of the Phœnicians. But there is no way by which it can be determined whether Crete was in this instance the borrower or the giver. So, too, there seems to be reason for associating the fantastic demons mentioned above with certain Egyptian religious types. Even the figure with the sistrum on the Harvester Vase points in the same direction toward Egypt. But whatever was the situation, it is likely that the Ægean religion was primarily indigenous and only tinctured by outside influences.

The painted sarcophagus from Hagia Triada in Crete shows what seems to be the celebration of some religious rite at a tomb, thereby suggesting that in common with other primitive people the Minoans practiced ancestor worship.

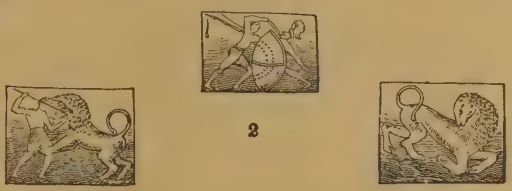
Both cremation and inhumation were practiced, the latter custom predominating. This, as well as the fact of three forms of tomb—the tholos or chamber tomb, the shaft, and the pit grave, would seem to hint at the fusion of stock referred to above. The latter type of tomb consists of a deep well from the bottom of which opens a cavity for the reception of the body. Since burial customs are very slow to change, and there is no reason to look for more than one form in a completely homogeneous race, the suggestion lies at hand that these three forms of tomb suggest three elements in the race itself. When they came in, no one can say.

This, then, is the race which dominated the Ægean from practically the fourth to the first millennium B.C. Its forebears seem to have resided in the same area for a period reaching well back to the tenth millennium B.C. What occasioned its blotting out is a question. But so far as can be discerned, Cnossus was sacked at the end of Evans's late Minoan II Period, and Crete itself as a whole together with other places in the Ægean felt the force of the same conquest. If any reason for the disaster may be given, it would seem to be that the gradual movement southward from Europe of northern people led to an exodus, so to speak, from the Greek mainland to the islands of the Ægean of the folk kindred to the Ægean population. This southward migration was not sudden. There are echoes of it in the chronicles of Rameses III (about 1200 B.C.) which speak of the restlessness of the "isles of the sea." It is likely that these waves of discontent which were breaking so faintly upon the shores of Egypt were occasioned by some disturbance at an earlier date. In some cases the incomers in small groups may have blended with the older folk; in other instances, large forces may have entered as conquerors. In either situation the intrusion must have occasioned some disturbance which may have at times expressed itself in migrations of the older inhabitants. In other words, the movements had been going on probably for several centuries, although it was not until the disturbance had penetrated into the Mediterranean that Egypt heard rumors of it. But the final result of these intrusions from the north must have been disastrous to Minoan culture, for after this time the Cretans are no longer distinguished in Egyptian records by the name of Kefti. In place of this appellation other tribal names appear. Gradually Egypt pays less and less attention to the Mediterranean people until from the tenth to the seventh century there is no contact between the two peoples. When at the latter date Greece again resumes relations with Egypt, she has fused into an entity which has produced the Greeks of historic times. The final cause of the blotting out of Ægean civilization in all probability was the invasion of the Dorians. These warriors, armed with iron weapons, soon overran the country held by a bronze-using folk; and the succeeding centuries, from the time of their appearance to the seventh century, were necessary before the invaders could be fused with the older stock into the race known as the Greeks.

It is of this Minoan-Mycenæan culture that the poems of Homer seem to preserve a reminiscence. This does not mean, of course, that all the descriptions in the poems are accurate pictures of the life of this time; for, as a matter of course, the poet nodded, and anachronisms dealing with the culture of his own time slipped in. It is, as a fact, unfair to expect in Homer more than a traditional account of the general conditions of life in the times of which he sang.

The most complete record of this civilization, as already seen, is to be found in the island of Crete, and especially at Cnossus, where the excavations of Dr. Evans have made it clear that the culture enjoyed there the greatest longevity and the most unbroken continuity. An understanding of this Minoan culture, as it has been

1



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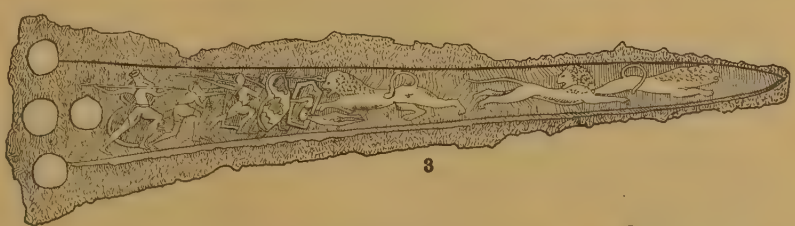

3

4

5

1. THE VAPHIO CUP.
2. GOLD INTAGLIOS.

3. INLAID SWORD BLADE.
4-5. TWO CUPS.

1. ISLAND IDOL.
2. HEAD OF BULL FROM CNOSSUS.
3. SIEGE SCENE FROM SILVER VASE.
4. GOLD MASK.
5. SILVER PIN AND GOLD ORNAMENT.
6. GEM.

called, is best obtained by considering the finds at Cnossus.

On the eastern slope of the hill Kephala, Cnossus, primitive pottery of blackish clay was found, hand-made, hand-polished, and decorated with incised designs filled with white chalk. The same kind of ware was discovered by Schliemann at Hissarlik, and that coupled with the fact that it is always found at Cnossus associated with stone celts, and perforated maces of serpentine and other stone, shows that the civilization we are dealing with is that of a very primitive people. Furthermore, the deposit of yellow clay in which these finds have been made leads to the supposition that the race had advanced no farther than a form of living in which the houses were built of wattles daubed over with wet clay, the disintegration of which gave rise to the deposit already mentioned.

This early civilization lasted down to the period when copper and other metals began to come into use in the Ægean. At this time, without any break in the continuity of occupation—if one may judge from the finds—the people passed from their more primitive state, and began to use painted pottery instead of the polished, incised ware. This pottery, so distinctive of Crete, and called "Minoan" by the discoverers, is characterized by the use of brilliant colors on a shiny black. The decoration is of two kinds—rectilinear and curvilinear—and is usually done in lustreless cream, or cream-white, yellow, orange, red, and crimson, on a slip that runs through gray-brown and to purple-black. The style often shows in the earlier stages a direct translation of the incised patterns of the Neolithic to the painted designs of the Minoan Age. This argues for an uninterrupted transition from the Neolithic into the Minoan civilization.

The people who now turned out the polychrome Minoan pottery became the builders of great architectural constructions. At Cnossus is the same story of superimposition that one reads in the ruins of Hissarlik. An earlier palace rests on the neolithic remains, and on top of this first palace comes another later one. Gypsum blocks denote the earlier parts of the palace, while the later structure is shown by rubble work. This great structure, which might well have been the abode of Minos, ruler of the sea, speaks of a powerful people, whose magnificence must have far excelled that of the princes of Mycenæ. Curiously enough, very little gold has been found; but this is probably to be accounted for by the invasion that seems abruptly to have broken in upon the life at Cnossus.

The later changes that appear in the palace seem to be due to people of the Mycenæan Age. At this time the ceramic style becomes less primitively naturalistic and exhibits more Egyptian influences. The discovery of a small Egyptian figure, dating about 2000 B.C., is of great value in giving the later phases of the life at Cnossus. It was found on top of the neolithic stratum in connection with fragments of "Kamaraes" style, just antedating the Mycenæan. This is a polychrome ware taking its name from its first place of discovery in Crete. At a still later date come the frescoes which show men with vases, who closely resemble the Kefti ('People of the Sea') of the Egyptian monuments of the sixteenth to fifteenth century B.C. Moreover, the roundels found in the "throne room" of the palace approach in style the plaques of Tell El Yehudieh, which date from the early thirteenth century. Inasmuch as this room belongs to the latest period of the palace, we have a definite date for the close of the Cretan-Minoan civilization. The pottery of this time is that of the developed Mycenæan style. Since there is a remarkable absence of remains later than the best Mycenæan period, it is fair to assume that at this date the centre of gravity was transferred elsewhere, probably to the Greek mainland.

The excavations at Cnossus have thrown a deal of light on the question of the Mycenæan, or Homeric palace. Here the building of the ruling prince is grouped around a great central court. On either side of this is a complex of rooms, sometimes grouped around their own halls, sometimes opening out as magazines from long corridors. The building, moreover, shows numerous stories, and in it are many of the conveniences that would conduce to the comfort of its occupants. In a retired part of the building is a series of rooms that seem to have been the private apartments of the prince, and associated with them a bathroom, and a latrine connected by an elaborate system of drain pipes with a sewer that led outside of the building. Elsewhere in the palace is the so-called "throne room" with its *sella*, and bench for the councilors. Opening from the room is a tank, used perhaps for supplying water for some ceremonial rite. The double ax, the significance of which has already been discussed, appears frequently in the frescoes and carved upon the stones of the palace. A shrine devoted to its cult was found in the building. Attached to the palace is a theatre (see above), which seems to have been devoted to such spectacles as the bull fights and boxing matches mentioned above.

Of the artistic development of these Minoans we can form a fair estimate from the numerous wall paintings, the ivory carvings, seals, and the few bits of gold work. The paintings, which are often done with a beauty of facial expression not achieved again for centuries, include the cupbearers, already cited as resembling the figures of the Rekhmara tomb in Egypt, or marine scenes, or a whole field of lilies, with a touch of naturalism in its wind-blown petals.

The discoveries at Cnossus (and the same civilization was found not only throughout the island but elsewhere in the Ægean) point to a highly developed race which, taking its origin perhaps as far back as 10,000 B.C., in the Neolithic Age, lorded it in the eastern Mediterranean before the rise of Mycenæ. Indeed the culture represented by the finds at the latter place seems to point to a degeneration of the Minoan civilization. Perhaps, with Evans, we should call Mycenæan civilization "late Minoan."

III. **Mycenæan Period.** The remains of this period were first brought prominently into view by the excavations of H. Schliemann at Mycenæ, and from this fact is derived the name adopted for this civilization. It is not to be supposed that Mycenæ was the centre from which the art spread, though the characteristic series of vases is more completely illustrated in Argolis than at any other single site. The characteristic products of this period have been found on the mainland of Greece in Bœotia (Orchomenus, Gha), Attica (Athens, Eleusis, Sparta, Thoricus), Thessaly (near Volo), and especially in Argolis and Laconia (Amyclæ): Delphi and the island of Cephallenia have also

yielded Mycenæan remains. It will be noticed that these sites are for the most part in eastern and southern Greece. The same civilization is found on Melos, Thera, Amorgos, and at Ialysus, in Rhodes; other remains are in Crete, which plays a prominent part in the heroic legends, and is now known to have had cities and palaces far finer than anything yet found on the mainland. Troy is also a Mycenæan site, but with this exception Asia Minor has not been brought within the sphere of influence of this culture.

The remains of this period fall naturally into several groups: 1. The fortifications, represented by the walls of the sixth city at Troy, a large part of those of Mycenæ, and especially the well-known wall surrounding Tiryns, as well as the defenses of many other less important sites. These walls are built of huge stones, roughly hewn and laid in clay mortar. In general, there is only one great gate, though there are also smaller gates, or mere sally ports. The gate is flanked by a large tower and is often approached by a narrow and crooked passage. 2. The dwellings, chiefly the royal palaces. The latter are best seen at Tiryns, Mycenæ, and, above all, at Cnossus, in Crete. The usual plan shows a court, on one side of which is situated a great hall, containing the hearth and approached through a vestibule. Around this hall and the court is arranged a complex of lesser rooms, and the whole structure is carefully placed inside the great fortification, which in general seems to have contained little but the residence of the ruler and his immediate dependents. The palace was built of wood and sun-dried brick, but the walls were stuccoed and painted, and metal incrustations and decorations of carved alabaster and glass paste were often employed. The palaces at Cnossus Tiregus have yielded remarkable specimens of wall painting, and the plan at Crete shows a much greater extent than is found in Greece, although it is not as yet (1914) wholly cleared. The smaller houses found in some places, as at Melos, Troy, Crete, and Mycenæ, also show the large hall and its vestibule, but as a rule no further rooms. A house of circular plan, perhaps serving as the prototype of the tholos, or "bee-hive" tomb, has recently been discovered in Crete: in its origin it may possibly go back to the tent form of dwelling. Additional accommodation in the conventional type seems to have been obtained by juxtaposition of unconnected buildings, rather than by a series of connected rooms. 3. The tombs form the third great class of Mycenæan buildings. The most important are the "bee-hive" tombs, of which the most notable examples are those of Mycenæ and the so-called "Treasury" at Orchomenus in Bœotia. These tombs are built of huge, carefully squared stones, laid in regular courses of superposed rings, so arranged that each course projects inward beyond the course below, thus making the interior a dome. The side of a hill is usually hollowed out to receive the building, which is wholly concealed by the replaced earth. The approach is always by a long passage, with side walls of stone, and the façade of the tomb was richly decorated with columns and adornments in colored stone, elaborately carved. The interior was carefully smoothed and apparently decorated with metal plates or rosettes. This type of tomb, although square in plan and elevation, occurs in Crete. In some cases a small side chamber for the dead is found. Besides the great tombs, a series of similar grave chambers, cut in the rock or excavated in the hillsides, and approached by similar passages, shows the common Mycenæan mode of disposing of the dead. Burning seems to have been unusual at this time. 4. It is, however, in the products of its art, even more than in its architectural triumphs, that this period is sharply characterized. The excavation of Mycenæ and Tiryns yielded a series of painted vases, which still occupy a place by themselves in the history of Greek ceramics. Made on the wheel, of graceful form, they are decorated with marine plants and animals, birds, and, in the later work, rude drawings of men and animals. The decoration is by means of a "glaze" paint, varying from brown to black, or under intense heat becoming red. (For details, see VASES.) Even more marked are the gems and gold work of this time. The drawing is often rude, but the spirit and vigor are astonishing. The gold cups of Vaphio (see Plate), with scenes in relief representing the capture and taming of wild bulls, show an art uncontaminated by the influences of Assyria and Egypt, and at the same time distinguished by the spirit which marks the later Hellenic products. It is an indigenous, Ægean outgrowth. More foreign in technique and decoration are the sword blades, inlaid with scenes of hunting and wild life, which much resemble objects found in Egyptian tombs. If we omit the purely ornamental spirals and other motives forming part of the decoration of the façades of buildings, of larger works of art, the lions over the gate of Mycenæ, and the rudely carved slabs which once marked the site of shaft graves, were for a long time the only representatives. Crete, however, has yielded reliefs of bulls and other sculptures which show that the Ægean art did not confine its skill to small objects only. Space does not permit a detailed description or even a list of the Minoan and Mycenæan works; they may be found fully illustrated in the published works mentioned below.

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IV. **Early Hellenic Period.** The dark age, from the Dorian invasion to the rise of sculpture in the seventh century B.C., is bridged, from an archæological point of view, chiefly by the painted vases, the earliest varieties of which have been already mentioned. It seems clear that we are now in the presence of a new element, and nowhere can this be better studied than in the pottery. The whole style of ornamentation is changed. Gold ornaments are much rarer. The prevailing decoration, not merely on vases, but on metal ornaments, is the "geometric," i.e., meander patterns, circles, and various combinations of straight lines. Instead of the Age of Bronze we now find the Age of Iron. The artistic situation thus well agrees with the overturning of the old Achæan kingdoms by the invading Dorians, as pictured in Greek legend.

The funeral urns and other representatives of the so-called "Dipylon style" (from the Dipylon gate of Athens, near which in ancient tombs the finest specimens of this class have been discovered) appear to extend over a period from about 1000 to about 700 B.C. at latest. The patterns upon this pottery are "geometric," derived apparently from weaving and textile fabrics, rather than from nature, as in the Mycenæan ware. The human and animal figures upon them are eminently schematic and conventional. Pictures of nautical scenes (sea fights and the like) and funeral processions are prominent. The figured examples seem to have been introduced later than those with merely a geometric pattern, though this style continues in use till the end. It is not improbable that Athens was the chief seat of its manufacture.

The Mycenæan influences seem to have survived on the islands and the Asiatic coast, where also the connection with the Orient was maintained, and in consequence we find in these regions the development of a number of local types, all strongly influenced by Oriental motives and yet with well-marked peculiarities. The favorite decoration is with rows of animals; lions, boars, panthers, cattle, deer, as well as griffins and sphinxes, appear, either in procession or grouped heraldically. By the seventh century these have crowded back the geometric types, and, further, the merely ornamental decoration begins to give place to actual scenes, either of daily life or from the legends of the past. For the pottery, see VASES.

About the opening of the seventh century begins the class of Corinthian vases still at first strongly Oriental, but later exhibiting the mythological scenes. The commercial importance of Corinth during the seventh and sixth centuries gave this ware a wide distribution, and many of the best specimens have been found in Italy. Chalcis also developed a local style of wide distribution, and both Corinth and Chalcis contributed to the formation of the Athenian style, which, taking its rise early in the sixth century B.C., as the result of a gradual transition from the Dipylon methods rapidly became so popular as practically to drive out of the general market all other styles. The reddish color of the clay was artificially heightened, and the decoration was applied in a very lustrous black glaze, relieved only by the occasional employment of purple, red, and white. Toward the end of the sixth century a new style, the "red-figured," begins to displace the "black-figured" technique. Here the body of the vase is covered with the black glaze, the figures being left in the color of the clay, while details are represented by fine black lines. The greater delicacy which this style made possible brought it at once into favor, and in it were executed the great masterpieces of Greek ceramic art.

Painting in Greek archæology can hardly be separated from ceramics, architecture, and sculpture before the time of Polygnotus (fifth century B.C.). We therefore take up next the consideration of these two latter developments, in brief outline, referring for details to the special articles on GREEK ART and ARCHITECTURE.

The history of the origin of Hellenic architecture rests largely upon conjecture and reasoning from analogy. Although in its development, as known to us from existing monuments, we have to deal with it as manifested chiefly in temple-building (private dwellings being of comparatively little account among the Greeks and those known dating from comparatively late times), it is plain that we have to seek for its primitive principles in domestic structures, which were of

wood and sun-dried brick. It is during this period that the temple forms became fixed, and the oldest stone buildings were erected, though the full perfection of architecture is not manifested till the fifth century. The point, however, which chiefly concerns us in this place is the rise of the two great orders, the Doric and the Ionic, connected, as their names imply, with the two great branches of the Greek race, the Dorians and the Ionians. One of the distinguishing marks of these orders is the form of the columns employed; and it is to these that we must turn our attention here, leaving the discussion of the several varieties of temple, whether *in antis* (with the front recessed and columns between the projections of the side walls), prostyle (with columns across the front), amphiprostyle (with a front at either end), or peristyle (surrounded by columns), as well as the details of the architrave and roof, for another page.

The Doric column, which we find to have been employed in the Heræum at Olympia, in the old temple at Corinth, and in those of Selinus, as well as in other buildings of this and the succeeding periods, is traceable at least to the seventh century B.C. It is characterized in general by the absence of a distinct base (though this seems clearly to have been an original element of this species of column), by an outward sweep at the top called the echinus, and by a square plate (the abacus) between the echinus and the architrave, as well as by the fact that the edges of the fluting (q.v.) are sharp, and not flat, as in the Ionic. The nearest prototypes of this form of column, which is marked, particularly in the oldest examples known to us, by great heaviness of proportion, seem to be Egyptian, although Doric architecture offers a new element in the *entasis* (or slight bulge) in the shaft, which serves to correct a familiar optical illusion of concavity.

The Ionic column, on the other hand, which is of lighter and more ornamental design, has always a distinct base, with a succession of moldings above it, while the grooves in its shaft do not meet in arrises, but are separated by flat bands. Its chief point of interest, the capital, consists of double spirals, parted in the earlier forms by a palmette device. On the origin of this form of capital much has been written; although the question is not as yet settled, it seems likely that the Ionic capital goes back to an Oriental prototype, whether a conventionalized Assyrian palm form or a derivative of the Egyptian lotus. Consult *American Journal of Archæology*, 1886, pp. 1–20, "A proto-Ionic Capital," by J. T. Clarke; id., pp. 267–285, "A Doric Shaft and Base Found at Assos," by the same author (there is a full bibliography in both articles); Goodyear, id., pp. 271 et seq. (an attempt to derive all palmette as well as lotus patterns from the Egyptian lotus, cf. id., *A Grammar of the Lotus*), and especially Puchstein, *Das ionische Capital* (Berlin, 1887).

The Corinthian capital, with its acanthus leaves, so extensively used by the Romans on account of its more elaborate character, may be considered a variety of the Ionic influenced by metal work. It does not come into use until the next period, and was never very common until after the fourth century B.C. (Cf. Baumeister, op. cit., the article "Baukunst," with the authorities there cited.)

While in painting, metal work, and architecture it is possible to trace the connection with the Mycenæan Age, in sculpture the line seems abruptly broken. It is not till the latter part of the seventh century B.C. that monumental sculpture, whether in the round or in relief, again begins to develop among the Hellenes. We find shapeless fetiches of wood and stone venerated in various parts of Greece down to the second century A.D. and later. A step beyond this primitive worship brings us to rude cultus statues of wood and stone. We should expect the same Oriental influences to manifest themselves here as in the case of ceramic art; and when we look to the early statues themselves, such as the various so-called Apollo-figures of the seventh and sixth centuries (typical is the famous "Apollo of Tenea," in Munich), we seem to find unmistakably Egyptian elements. The frontality of the figure, the heavy masses of hair, the high set of the ears, the advancement of the left leg in such statues are unmistakable reminiscences of Egyptian works, with which the Greeks were especially brought into contact about this period. On the other hand, statues like the "Nicandra" of Delos, the "Hera" of Samos, and other closely draped female figures, with the feet just appearing below the drapery, may be compared with the seated statues from Branchidæ, in the British Museum, and with what seem to be their older Chaldæan prototypes from Tello. The closely draped standing female figures show markedly the influence of sculpture in wood; either from the flat board, as the "Nicandra," or the round log, as the "Hera." Such works are frequently spoken of as *Xoana*. Though the inspiration for these types may have been derived from the Asiatic connections of the Ionians, and the trade with Egypt through Naucratis, the Greek artist was by no means a mere imitator, but early began to strive after development and variety along many lines.

The series of works of archaic sculpture from the period under discussion has rapidly increased through recent excavations, and we are able to trace with tolerable clearness the attempts made by the vigorous Greek artists to gain increased naturalness and lifelikeness in their figures, while gradually acquiring the full mastery of material and technique requisite for the free exposition of the sculptor's ideal.

To the opening of the marble quarries of Naxos and Paros we owe much. The marble thence obtained is a wonderfully fit material, easily worked, and in its very hue imitating human flesh. The earlier material had been wood or coarse limestone, the so-called "poros," which could not be finely carved, and needed to be painted in order to show details. The early marble statues show that the technique of wood carving, easily available for the softer "poros," was at first used for the new and harder material, and at all times color was largely employed in Greek sculpture.

Of inestimable value for the study of the sculptures of this period are the archaic statues discovered on the Acropolis of Athens, which undoubtedly antedate (how much we cannot say) the Persian invasion of 480 B.C. The tyranny of Pisistratus in the sixth century formed an epoch in the artistic as well as literary life of Athens, only to be paralleled by the Periclean Age. Material and style show that we have to do with various schools, partly the marble sculptors from the islands, partly

the native Attic artists, developing along the lines of the heavier "poros" style, but largely influenced by the more delicate and elaborate Ionian developments. For an account of the painted decoration of some of the female statues, consult an illustrated article by Russell Sturgis, in *Harper's Magazine* for September, 1890.

But the development of the period was not confined to Attica alone, nor merely to sculpture in the round. The pedimental groups of the gigantomachy from the Megarian treasure-house at Olympia, and of "Heracles and the Hydra" from the Acropolis of Athens, wrought in high relief from poros, a sort of tufa, and, like all such work, stuccoed and painted, are also of special note, together with the early metopes of Selinus in Sicily; while the elaborate grave stelæ of the wrongly so-called "Marathon Warrior" type, with complete polychrome decoration supplementing the details of the bas-relief, are the forerunners of the exquisite monuments of the Ceramicus to be mentioned hereafter. To this period also belong the Æginetan marbles (see ÆGINETAN SCULPTURES) and the reliefs from the treasuries of Cnidus and Athens at Delphi.

Figures like the "Winged Victory" of Archermus, and the sphinx, if not also the lion, show the influence of the East, particularly of the Asiatic Orient, in the sculpture of this epoch. But we feel, in contemplating the Acropolis statues, that we are on Greek ground and that the artists are rapidly bringing in a nobler native art.

We have hardly entered upon the list of these important monuments; but it must suffice to have indicated in some degree their relations.

We now pass to the mention of the kindred class, bronze works.

Together with the rude terra-cotta dedicatory figurines of early workmanship, we find also many small bronzes, which exhibit a gradual development from the rude and primitive to the delicate and refined. An elaborate and truly remarkable technique, however, is manifested in such consummate works of archaic Greek art as the bearded bronze head found on the Acropolis, or the similar head of Zeus from Olympia. The art of hollow casting in bronze, long known in Egypt, seems to have been brought to Greece by Samian artists and by the end of the sixth century was adopted for larger works. Ægina early attained fame for its artists in bronze, of whom Onatas was the chief, and the influence of this technique, with its sharp lines and fine engraving, is plainly seen in the marble sculptures of the Æginetan temple. The new art came to be regarded as more noble than the cutting of marble, and was especially cultivated in the Argive and the Sicyonian schools.

To the period under discussion belongs another development in metal work, viz., the minting of coins. The earliest coins, properly so called, seem to date from about the beginning of the seventh century B.C., and to have been struck by the Lydian monarchs (possibly first by Gyges). Their material is electrum, or 'white gold,' a native alloy of gold and silver, in about the proportion of three to one. Phidon of Argos, a tyrant of uncertain date, but not earlier than the seventh century, is said to have been the first to issue coins among the Greeks, Ægina being the seat of their mintage. The name "tortoises" was bestowed upon them from the figure on the obverse, the reverse (which was the side struck by the upper die in minting) having upon it the familiar "incuse-square," or punch-mark so prevalent in archaic coinage.

In Greece proper sprang up, subsequent to the Æginetan, a coinage at Corinth, the so-called "colts," from the Pegasus on the obverse, and at Athens the so-called "maidens," or "virgins," from the Athena-head of the obverse, also called "owls," from the type of the reverse. We see in all these types a sacred symbolism, which continues unbroken in coinage till the Macedonian Period.

The greatest Greek cities in this early period were the Achæan colonies of Magna Græcia, foremost among which was Sybaris, afterward overthrown by her great rival Croton. The coinage of the Achæan Confederacy, which seems to have existed in this region, is far superior in artistic workmanship to that of eastern Hellas, and is distinguished by having, instead of an incuse square on the reverse, an incuse type, generally the same as that of the obverse (Poseidon, bull, boar, etc.).

Sicilian coinage, notably that of Syracuse, which in the fifth and fourth centuries reached so high an artistic position, also began in the sixth century.

All the coinage here mentioned, except the Lydian, is of silver. For a full discussion of ancient coins, with exhaustive bibliography, consult Head's *Historia Numorum* (Oxford, new ed.); also particularly Percy Gardner's admirable *Types of Greek Coins* (Cambridge, 1883), and G. F. Hill, *Greek and Roman Coins*, (London, 1899). The period here outlined corresponds to Head's archaic period, 700–480 B.C. See also NUMISMATICS.

The minting of money became gradually diffused through the Greek world, so that there was hardly a town of any consequence without a coinage, some towns being known to us only from their coins.

Intimately connected with die cutting is gem-engraving, for the details of which consult the work of Middleton, *The Engraved Gems of Classical Times* (Cambridge, 1891).

V. Period of Hellenic Ascendency. The period which we now enter upon is naturally subdivided by that great convulsion of the Greek world, the Peloponnesian War (431–404 B.C.), into an earlier and a later half, in which diverse social and political influences are at work, wherefore it will be of advantage to keep this subdivision in mind. The most noteworthy development of this time for us is that of sculpture and statuary, for the great monuments of the painter's art have irretrievably perished. It must be borne in mind that no hard and fast line separates these Greek periods, such as divides the Mycenæan from the later times. The great development in Greek art is indeed later than the Persian wars, but the germs are in the later sixth century, and many works, which artistically belong to the archaic period, were made after 500 B.C. The same remark applies to all the later periods; the dates given are merely convenient approximations.

In the early part of this period the development of bronze statuary was continued chiefly by the so-called Argive-Sicyonian school. We find Ageladas of Argos and Canachus of Sicyon famous as statuaries in bronze about the end of the sixth century. Gold and ivory (in the famous chryselephantine work) and marble were

more popular in Attica, where the quarries of Pentelicus furnished inexhaustible material. Pythagoras of Rhegium (the author of the limping "Philoctetes"), and Calamis and Myron among Attic artists, the latter famed for his "Discobol" and bronze cow, are the forerunners of Phidias in the development of the great art of the fifth century. Here also belong the sculptures from the temple of Zeus, at Olympia, whose artistic origin has been sought in many schools, perhaps with most probability in Ionia.

Greek sculpture, however, reached its highest ideal development, though not its full legitimate growth, in Phidias, son of Charmides, pupil of Ageladas, of Argos, the superintendent of the Parthenon sculptures, and the artist of the chryselephantine Athena Parthenes, who was as well the creator of the highest anthropomorphic type of Greek religion in the great chryselephantine Zeus at Olympia, of whose calm and marvelous beauty and dignity we can now, unfortunately, gain but feeble conception.

We have noticed Phidias's activity in connection with the Parthenon, but we must not leave unmentioned the other great buildings of the time, the Propylæa, the so-called Theseum, the Erechtheum, the temple at Eleusis, and that at Rhamnus. Meanwhile a like architectural activity was going on across seas in Ionia, Sicily, and Magna Græcia.

Painting as a great and independent art was developed contemporaneously with Phidias, by Polygnotus, of Thasos, whose paintings in the *Lesche* (portico) at Delphi have been fortunately described to us by Pausanias. He must have powerfully influenced the art of the ceramic painters, as we seem to be able to trace in their works. After him may be mentioned Agatharchus, of Samos; Apollodorus, the first painter of pictures in the more modern sense (i.e., on flat, movable surfaces, anciently not of canvas, but of board); Zeuxis, the contemporary of Socrates, whose "Centaur Family" is minutely described to us by Lucian, and Parrhasius, of Ephesus.

The work of the Argive-Sicyonian school was carried forward by Polyclitus. He was the author of the "Doryphorus" (spear-bearer), and "Diadumenus" (youth binding on headband), which are known to us through Roman copies; and he established a canon of proportion characterized by a certain squareness and heaviness.

After the stormy period of the Peloponnesian War we find Cephisodotus and Praxiteles, probably his son, carrying Greek plastic art to its legitimate and logical conclusion and to fullest bloom and perfection. The "Eirene" (Peace) with the baby "Plutus," preserved in Munich, a replica of a work of Cephisodotus, is a gracious and lovely figure; but Praxiteles's marble "Hermes," with the baby "Dionysus," found in the place designated by Pausanias, the Heræum at Olympia, in exquisite sensuous beauty, in perfection of manly strength and grace, and in the combination of the divine ideal with human form, as well as in complete mastery of technique, surpasses all that is left us of ancient art, while the pensive expression of the god's face indicates but too clearly the speculative thought that was undermining the old faith. There is no more perfect image of the period than this marvelous statue. It is to Praxiteles that we are to attribute the development, if not the invention, of languid but not yet effeminate figures, with hand supported on hip, such as the famous "Faun," of which several replicas exist, perhaps even the torso of the original. Praxiteles is preëminently the sculptor of youthful beauty, not merely in man but also in woman, as proved by his famous "Cnidian Aphrodite," inadequately preserved in replicas.

Side by side with Praxiteles must be mentioned Scopas, of Paros, whose art was rather that of the Peloponnesian school, while Praxiteles is Attic. The remains of his work from the temple of Athena Alea at Tegea, though scanty, make it possible to recognize his style in a number of other sculptures, such as the Meleager, the Ares Ludovisi, and a head of the youthful Heracles. These show distinctly his power in "tragic intensity of expression."

To the last half of the fifth and first half of the fourth century we may assign those most exquisite funeral monuments of the Athenian Ceramicus, such as that of Dexileos and the deeply pathetic relief of Hegeso. The early reliefs show decidedly the influence of Phidias, while later the work of Scopas evidently became the model. Indeed many archæologists are disposed to see the actual work of this master in some of the best of these monuments.

Portraiture also began in this period with Silanion, and from this time probably date the beautiful Lateran Sophocles and some of the types of Socrates and Plato. Heretofore the statues set up in honor of men had been ideal in their type rather than a portrayal of the real features of those honored.

The growth of the Attic drama in the fifth century led to the architectural development of the theatre, though most of the theatrical buildings known to us belong at the end of this period or early in the next. For a consideration of the form and development of these structures, see THEATRE.

In ceramics we must consider the Attic development, which in this period is of absorbing interest, and gives us much light on painting on a larger scale, as well as on contemporary manners and customs. The rise of Attic black-figured ware has already been mentioned. As a special form of this we must mention particularly the fine Panathenaic amphoras, with figures of the armed Athena, in which the sacred oil was presented to victors at the Panathenaic games. These vases are interesting as being continued in an archaistic form into the fourth century (cf. Baumeister, *Denkmäler*, article "Panathenaia" and Branchitsch, *Die Panathenaischen Preisampheren*). A special class of peculiarly Attic vases are the beautiful white *lecythi* (oil or perfume flasks), which were interred with the dead, and which exhibit scenes from the burial and also from daily life, exquisitely depicted in colors on the white slip with which the body of the vase is covered. The series begins early in the fifth century, and continues during the fourth, in the variations of style throwing much light on the development of painting, and forming an interesting parallel to the contemporary series of grave reliefs.

In the "red-figured" ware, which far surpasses in artistic merit the black-figured, and of which the rise as a separate variety has already been mentioned, scenes from the myths, while not excluded, yet make room for delightful bits of social and domestic life. In the development of this style the "cylix," or shallow cup on a rather high foot, plays an important part, es-

pecially in the early part of the fifth century, when such masters flourished as Euphronios, Duris, Hieron, and Brygos. Consult Hartwig, *Griechische Meisterschalen* (Stuttgart and Berlin, 1893).

Various grotesque forms of vases, such as the rhyton (in the shape of a head, generally that of an animal), later came into use, and we find numerous examples of the pyxis, or woman's toilet box. But the art gradually sank, and vase painting was fast dying out at the beginning of the Alexandrian Period.

In the domain of numismatics we must briefly mention the periods of transitional art (480–415 B.C.) and of finest art (415–336 B.C.). We have here not to deal particularly with Athenian coinage, which, like the Panathenaic amphoras, keeps a designedly rude and archaic character in order to maintain its position among foreign peoples, with whom the Attic State came in contact through its wide maritime relations and commercial dealings, but rather with such beautiful work as that of the Syracusan die-cutters Euænetus and Cimon, in the period subsequent to 415 B.C., whose splendid decadrachms are justly reckoned among the highest achievements in this branch of art. We may trace, however, through the coins of this entire epoch that same gradual mastery of material and development from the more severe to the more graceful style, which is marked in other lines of art. But coinage still maintains the symbolism which characterized it from the beginning, the purely human and individual element appearing distinctly only in the special marks of magistrates and mint masters, which are kept subordinate to the main design.

VI. **Period of Hellenic Dissemination and Decline.** The development of Macedon under Philip and the conquests of Alexander changed the entire aspect of the Greek world. We have henceforth to consider a Hellenism synonymous with civilization rather than the geographical Hellas with her outlying colonies.

In Greece itself the greatest influence is exerted at the opening of this period by Lysippus of Sicyon, who not only continued the prestige of the Argive-Sicyonian school, but also introduced a new canon in statuary, making the figure more slender and the head proportionally smaller than in the preceding art and forming a marked contrast to the canon of Polyclitus. His work is known to us from copies of his "Apoxyomenos" (a youth scraping himself with the strigil); and a marble copy at Delphi of one of a series of statues of the family of Daochus, of which the bronze originals were at Pharsalia. This is the figure of Agias. Lysippus was also in a way court sculptor to Alexander the Great, as Apelles was his painter. His influence extends immediately to Rhodes in Charles of Lindus, one of his best-known pupils, and artist of the famous "Colossus of Rhodes."

The splendid "Victory of Samothrace," now in the Louvre, which may be dated about the beginning of the third century, is one of the greatest monuments of this period, and deserves to be ranked with such splendid figures as the "Victory of Pæonius of Mende," set up at Olympia a century or more earlier, and with the Victories from the balustrade of the Temple of Athena Nike, at Athens.

The Pergamene art, cultivated especially under the Attalid kings, of which we see such astonishing examples in the frieze of the great altar of Zeus at Pergamon (q.v.), belong to the earlier part of the second century B.C. This represents a colossal gigantomachy and exhibits great mastery of technique, violence of action, and the free expression of physical suffering, of which qualities the latter two belong rather to sculpture than painting. Somewhat earlier than the great altar are the well-known statues of the "Dying Gaul" (miscalled the "Dying Gladiator"), as well as the Gaul and his wife in the Ludovisi Gallery. As intimated above, this is as it were the grand finale of Greek sculpture, in which this art, though overstepping its due bounds, still appears great. To this period also belongs probably the development of the Rhodian school, though some scholars prefer to date the great product of that school, the Laocoön group, now in the Vatican, at the end of the second century or beginning of the first century B.C. To this school in its Asiatic development belongs the "Farnese Bull," the great work of Apollonius and Tauriscus of Tralles.

Single statues which seem to belong to this period, but cannot be assigned with certainty to any definite artist, are the "Aphrodite of Melos," one of the most beautiful works of the later classical art; the "Apollo Belvedere" (q.v.); and the "Torso of the Belvedere," a noble fragment, whose correct restoration, though often attempted, has probably not yet been found. To this period also belongs the full development of genre scenes, though this begins still earlier. Such are the group of the "Boy and the Goose," the "Drunken Old Woman," the "Fisherman," the fine "Old Market Woman" of the Metropolitan Museum of Art, New York City, and especially the large mass of reliefs, which seem to owe their origin to Alexandria and to be the product of the same tendencies which led to the bucolic poetry. Portraiture also flourished, not only in statues and busts of the living, but in ideal portraits of the great men of the past, as Homer and Anacreon.

With the painting of the Alexandrian Period we come more closely into contact than with the earlier art of this kind through the wall decorations of Herculaneum, Pompeii, and Rome, which follow the traditions of this epoch. Apelles (q.v.) of Colophon represents the highest development of Greek painting. His idealized portraits of Alexander were as famous as Lysippus's statues. Protogenes of Caunus, who worked at Rhodes about the end of the fourth century, is also distinguished in this department. Antiphilus at the court of Ptolemy is characterized as "most eminent in facility." But the list of great Greek painters closes with Theon of Samos, of the third century (cf. the article "Malerei," in Baumeister, *Denkmäler*).

Among other species of art we find the eminent gem-engraver Pyrgoteles, employed by Alexander; and this branch of the sculptor's profession, ever excessively popular among the ancients, was fostered by that monarch's successors.

In vase painting we note little else than decline, the latest development manifesting itself in Magna Græcia, Etruria, and Campania. The painted vases of southern Italy, which present a distinctly funereal element side by side with a marked influence from the drama, give us much valuable archæological material. Asteas (of Pæstum?), Pytho, and Lasimus are its only masters known to us by signature. We have also some Campanian vases with Latin inscriptions of the third century. The end of vase-

painting seems to fall about the beginning of the second century B.C.

We may here depart from our chronological order to consider briefly the peculiar ware of Etruria. When side by side with primitive geometric pottery, continued seemingly over a long period, and more or less skillful imitations of Greek painted ware (particularly Attic), we find the so-called *vasi di bucchero*, a peculiar class of pottery of black clay, about which we have but little exact knowledge and of which examples have been found not merely in Etruria, but also in the Orient, in Cyprus, in Greece proper, and on the coasts of the Black Sea. The earliest of such vessels in Etruria are made without the potter's wheel, but in the manufacture of the later (and darker) ware, this was employed. The earliest figures are incised; subsequently relief decoration appears. In the latter case Greek types are employed, at first roughly, afterward more skillfully and with a mold or incised roller. In individual cases polychrome painting occurs. This art seems to have continued into the sixth century.

Before leaving the subject of pottery we must also notice the Megarian relief ware, assigned to the third and second centuries B.C., and the Aretine ware, apparently of the first century B.C. and later. See AREZZO.

In numismatics the new development under Alexander and his successors, designated as "the period of later fine art from the accession of Alexander to the death of Lysimachus" (336–280 B.C.), and marked by the influence of Lysippus, is succeeded by a period of decline in art extending to the Roman conquest (280–146 B.C.). Excellent likenesses of sovereigns, first that of the deified Alexander, then those of other and living princes, make their appearance upon coins, and continue down to the later Roman Empire, giving a valuable series of historical portraits. Gold coinage now begins to occupy a prominent position, and continues side by side with silver and bronze to be a medium of exchange under the Roman Empire.

In the minor arts our attention is particularly drawn to the terra-cotta figurines of this period, particularly those of Tanagra in Bœotia, which in their charming shapes and lovely coloring give us so many delightful pictures of Greek life. Such figures have their origin in very early times, but from the time of Praxiteles, whose style they often reproduce, down to the Roman period and later, they formed a favorite household decoration, and were buried in great numbers with the dead. See TERRA-COTTA.

Bronze mirrors may also be alluded to here before we pass out of the domain of Greek classic art. Of these some most beautiful specimens exist, their lids forming a class of *chefs-d'œuvre* in metal graving, while their handles are often statuettes of finest workmanship.

VII. **Roman Period.** The Roman connoisseurs had a passion for objects of Greek art, but in the period upon which we are now entering certain other elements demand our attention. As among the Greeks the introduction of foreign art was met by a native element, which at first colored and afterward completely overpowered, by the strength and vigor of its own development, external influences, so we find in Italy among the Etruscans, the masters in so much of the Romans, and makers of the peculiar bucchero ware already mentioned, a native element which reacted upon the art from without, though in a much slighter degree than that of Greece and with inferior genius. This Etruscan art was not the oldest in Italy; for we find specimens of *situlæ* (pails) of beaten metal, perhaps to be designated as Umbrian, the decoration of which, while it seems to show certain elements derived through the Greeks, has but little affinity with Etruscan art.

The influences at work among the Etruscans, as we have noticed in the case of their figured pottery, were principally Greek. The native elements were chiefly their sombre religious tendencies, and a marked aptitude for portraiture. We find "realism combined with poverty of style." The chief Etruscan monuments are funereal, consisting of decorated tombs, sarcophagi, and ash urns, upon which Greek ornamentation and Etruscan portraiture are not very happily blended.

The same tendency to portraiture appears among the Romans, fostered by the importance attached to ancestral *imagines* (portraits in wax), which played so marked a part in their funeral ceremonies. Their masters in this were Etruscan artists.

Hand in hand with the art of plastic portraiture, in which Roman artists learned from Etruscan masters, went that of honorary statuary in bronze, which after the Second Punic War were to be seen at Rome in large numbers. Most Romans of any distinction were honored in this way. It was just after this time that their Greek conquests began to bring the Romans decidedly under the sway of Hellenic art.

In architecture the markedly Roman characteristic is the great employment of the arch and its natural development, the vault. The former, although not unknown to the Greeks, was but rarely used by them. These features rendered possible such great works as the aqueducts, to say nothing of the Colosseum, the Pantheon, and the other huge structures of imperial times. In temple construction we find Etruscan influence at work in the earlier period in both form and decoration. Later Greek architecture is combined with native elements in elaborate and luxuriant structures.

The so-called Attic Renaissance in sculpture about the beginning of the period we are now considering, i.e., when Greece had been brought under Roman dominion, introduced no new elements, but carried on with enfeebled ability the old. This revival is best known to us through the "Farnese Hercules," an exaggerated work of which the motive is derived from Lysippus.

The school of the first century B.C., founded by Pasiteles, a native of southern Italy, and continued by his pupil Stephanus, and Stephanus's pupil, Menelaus, deserves mention as exercising somewhat of independent influence. It is characterized by a return to the types and style of the end of the archaic period, but combines them with types and technique belonging to its own time. During this period we also find the growth of the archaistic style, which imitated the stiff drapery, awkward smile, and other peculiarities of the archaic art.

Asia Minor supplied most of the sculptors at Rome in the time of the late Republic and Early Empire. Best known among such is Agasias (q.v.), the artist of the so-called "Borghese Warrior."

From the time of Augustus on, we meet, side by side with a vast importation of ancient

Greek works and reproductions of them in copies, a host of portrait statues and busts, triumphal arches and elaborate public and private buildings of all kinds. A most splendid specimen of Roman portrait-statuary, now in the Vatican, is that of Augustus in general's uniform. In it are admirably combined grand and realistic portraiture and rich decorative effects. Especially noteworthy also are the reliefs of the Ara Pacis Augustæ (q.v.) and of the triumphal arches, such as that of Titus. In these fields of portraiture and historical relief the art of Roman times offers much that shows originality and strength, but in general it is imitative of the Greek. Consult Wickoff, *Roman Art*, translated by Eugénie Sellers Strong (London and New York, 1900), H. B. Walters, *Art of the Romans* (New York, 1911), and E. S. King, *Roman Sculpture* (New York, 1907).

Of idealistic bronze statuary we have a beautiful example in the "Victory of Brescia" of the first century A.D.

The era of Hadrian is the last period of vigorous impulse in art among the Romans. That Emperor's passion for ancient art, both Egyptian and Greek, and his encouragement of new works, both at home and abroad, are well known. To his reign are to be assigned the various idealized portraits of his famous Bithynian favorite Antinoüs.

In numismatics the last period of continued decline, 146–27 B.C., and that of the coinage of the Roman Empire down to Gallienus (27 B.C. to 268 A.D.) falls in here. The material is vast, and here, too, the element of realistic portraiture is prominent.

The luxury of the Romans manifested itself in the multiplication of elaborate mosaics, rich jewelry, wonderful intaglios, both in stone and in paste, costly glassware and the like. But of all this art, which cannot be fully discussed here, suffice it to say that it involves no new principles. It is merely the bloom of that decay which was fast consuming the ancient world.

Further information concerning single branches of archæological research is presented under the titles of ancient countries. The articles on these countries include the art, monuments, language, religion, laws, etc., of the early inhabitants. Among such articles are: Assyria; Babylonia; Egypt; Phœnicia; China; Japan; Persia; Ceylon and India. For information with regard to the arts of ancient countries, the reader is referred to the series of special articles on Assyrian Art; Babylonian Art; Egyptian Art; Bible Antiquities; Chinese Art; Japanese Art; Indian Art; Anglo-Saxon Art; etc. More specific information about discoveries at particular places is included under the titles of those places—as, for example, Karnak; Koyunjik; Persepolis—and under the names of the excavators, such as Botta; Dörpfeld; Ledyard; Leake; Pétrie; Peters; Mariette; Maspéro; Evans; Schliemann; etc. See further the articles on Agriculture; Aqueduct; Architecture; Armies; Navies; Brick; Building; Costume; Cuneiform Inscriptions; Glass; Hieroglyphics; Numismatics; Rosetta Stone; Amarna Letters. For biblical archæology, in addition to the general title, see Atonement, Day of; Baal; Dagon; Essenes; Festivals; Judges, Book of; Levites; Magic; Nazirite; Priests; Proselyte; Purim; Remphan; Rimmon; Sabbath; Sacrifices; Sadducees; Scribes; Tabernacle; Tammuz; Temple; Teraphim; Urim and Thummim; Vows.

ARCHÆOLOGY, American. The purpose of archæological research is to contribute to the history of man in the world, and of American archæology to contribute to the history of the American race. The principal problems are those of origin, characteristics, and relationships, migrations, geographical distribution, culture history, and chronology. In many respects the western hemisphere forms a distinct archæological field, and one of peculiar interest to the student. In the first place the two great continents, with their insular appendages, form a single ethnic province. From the earliest times the lands were inhabited by a race of mankind unknown to the Old World till the Caucasian discovery, and though the province is vast, yet throughout its extent the tribes and their works bear in a striking degree what may be called the family resemblance. In the second place, the American aborigines, from the Arctic to the Antarctic, were remarkably similar in cultural development. True, some of the tribes discovered by Caucasians represented lower savagery, while others occupied the planes of higher barbarism verging on civilization, yet the cultural range represented by their works is narrower than that of any other important ethnic province except Australia. Furthermore, the aboriginal tribes survived until the spirit of inquiry among the European invaders of the Continent had been developed and until observation and records were well advanced. By reason of the several conditions a distinctive science of archæology has grown up in the western hemisphere. Thus, in America prehistoric artifacts are interpreted in the light of the observed uses of historic examples, recorded by early explorers or studied by present-day investigators. The modern works are interpreted in the light of primitive arts, industries, laws, languages, and faiths, and thus the ancient and the modern, the prehistoric and the historic, the living and the dead, are correlated in a simple yet comprehensive scheme at once coëxtensive with the world's greatest ethnic province and sufficiently definite to outline a considerable part of the early course of human development.

The subject matter of research comprises every material resource from which significant information may be drawn and more particularly the materials of antiquity. These include all remains of man and his works not directly connected with the people of to-day and thus fully explained by that association. The vast extent of the material is indicated by the following partial synopsis:

I. **Human Remains**—mummies, skeletal, and other parts found imbedded in natural formations or variously deposited in tombs, earth and stone mounds, caverns, and simple graves of varied type.

II. **Art Remains**—the work of man's hands developed in stone, metal, clay, wood, bone, shell and other materials; built, carved, woven, modeled, etc.

Major Works (fixed). 1. *Inhabited sites*—village sites, middens, towns. 2. *Habitations*—earth, wood, bone, stone, concrete. 3. *Defensive works*—walls, stockades, forts. 4. *Burial places*—graves, mounds, pyramids, tombs. 5. *Religious works*—altars, shrines, kivas, temples, monumental sculptures. 6. *Civic structures*—council houses, kivas. 7. *Diversional structures*

—chunky grounds, ball courts. 8. *Fixed records*—rock inscriptions, pictographs. 9. *Mines, quarries, workshops.* 10. *Agricultural remains*—old fields, terraced fields, canals, aqueducts. 11. *Highways and bridges.* 12. *Storage facilities*—granaries, cisterns, reservoirs, enclosures.

Minor Works (portable). 1. *Implements and utensils*—knives, scrapers, axes, adzes, chisels, picks, hammers, abrading stones, projectile weapons; mortars and pestles, receptacles, textile appliances, lamps, musical instruments, etc. 2. *Recording devices*—wampum, quipu, inscriptions on bark and skins, in books, etc. 3. *Transporting devices*—boats, litters, cradles, sleds, etc. 4. *Furniture*—stools, chairs, tables, benches, beds. 5. *Clothing*—skins, bark, grass, textiles, etc. 6. *Embellishments*—personal and non-personal. 7. *Sacred and ceremonial objects*—totems, talismans, idols, etc. 8. *Problematical objects* (use undetermined).

By the study of this diversified material the archæologist seeks to contribute to the solution of the various problems of the American race. It is impossible, however, to present more than a very brief review of the material in the present connection.

Human Remains. Bones of prehistoric men are exceedingly common in the mounds and other burial places of central and eastern United States; skeletons, with and without integument, have been found in caves throughout nearly the whole extent of both Americas, and are fairly common in the arid districts; and mummies of prehistoric bodies with complete wrappings have been found in large numbers, especially in Peru. The chief lesson taught by these remains is that the prehistoric inhabitants of the various regions correspond more or less closely, in most cases exactly, with the tribes found there by Caucasian explorers, the correspondence extending to the preparation of the body, the mode of burial, and the mortuary sacrifices, as well as to the somatic or physical characteristics of the individuals. In some cases diversities between the living and the dead have been found of such sort as to indicate migrations or displacements of tribes, and in a few instances these have thrown useful light on early movements of the aborigines; but in a general view these indications are of minor importance. By some students numbers of prehistoric crania have been grouped by types—e.g., dolichocephalic and brachycephalic—assumed to represent distinct genetic stocks or races, but since the types merge in very large series, since both are sometimes found in the same mound or cemetery and even in the same living clan, the value of the cranial classification would seem but secondary at the best. In some instances certain features of the prehistoric skeletons, especially the crania, throw light on customs. Thus, large numbers of crania taken from the burial places of Peru bear testimony to the fact that the critical operation of trephining was practiced more frequently even than in a modern military hospital, and with a degree of success hardly exceeded by that of the best modern surgery. Similarly the distribution of deformed crania throws light on cradle customs and on the half-intentional flattening of infantile heads in prehistoric times, while the pathologic conditions occasionally revealed by the buried bones serve to extend our knowledge of certain diseases and wounds and of the medical practice of the early tribes.

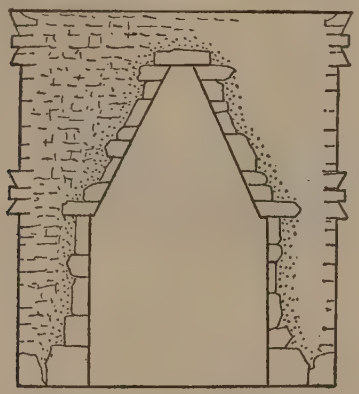
Art Remains. It should be kept in mind that the mere classification and description of the artifacts is but a preliminary step to their employment in the solution of the real problems of man and his activities. By comparing them with the works of living peoples and of historic tribes and nations, we determine the culture status of the people to whom they belonged at successive periods and develop from their study a clear understanding of the arts and industries involved in acquirement of materials, in manufacture, in distribution, and in utilization.

Major Works. *Inhabited Sites.*—The very general occupancy of the inhabited areas of the continent in early times is attested by the almost universal distribution of ancient village sites, kitchen middens, and ruins of substantial pueblos, some of which may well be ranked as cities. The simpler village sites and middens mark the dwelling places of the more primitive communities and contain the refuse of dwelling and food consumption and various minor relics telling of the arts and industries and manner of life of the people. These sites are most numerous along the shores of land-locked waters and the banks of rivers, where the hunter and the fisher found abundant supplies of aquatic game. The dwelling places of the more advanced peoples are marked by more substantial traces, the extent and character of the remains, industrial and architectural, signalizing them as the centres of culture and tribal dominion. They retain in many instances the remains of earth, wood, stone, and concrete construction illustrating every class of architectural achievement known to semi-civilized peoples, such as dwellings, civic and religious structures, tombs, fortifications, playhouses, agricultural works, quarries and mines, reservoirs, aqueducts, milling places, bridges, roads, and prisons. Between the simplest sites and the most advanced may be found examples illustrating every stage of the native civic development, all, however, presenting close analogies to the occupied sites of the tribes and nations existing on the arrival of Old World peoples; while widely diversified in character, all fall well within the culture range of the American race.

As a rule, the deposits of refuse called "middens" mark the sites of villages or of temporary periodical residence where at suitable seasons edible shell fish of numerous varieties were gathered and consumed. They contain many species of shells, but the more marked traces are those of the remains of oysters, clams, and the like. Middens are so numerous on some of the shores as to be practically continuous for many miles. The accumulations in places are so large as to be referred to as hills, the largest reaching perhaps 100 feet in height and covering tens or even hundreds of acres. Their mass is, in some cases, so great as to indicate long periods of occupation, and the inclosed artifacts are so distributed as to confirm this impression. The middens are especially prevalent along the Atlantic shores of North and South America and portions of the Pacific shores of the northwestern United States and Chile.

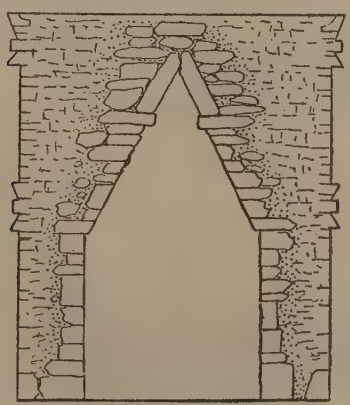
Habitations.—The dwellings of the aborigines comprised structures of diversified characteristics. Regarding the houses of the more primitive peoples, constructed of leaves, bark, brush, bones, mats, skins, earth, and snow, archæology

can furnish but meagre data and must infer their nature from a study of the works of the post-Columbian tribes. Of the structures of durable materials such as stone, concrete, and adobe bricks, there are abundant traces in southwestern United States, in Mexico, and in Central and South America. It is not possible,



MAYA ORDER, YUCATAN.

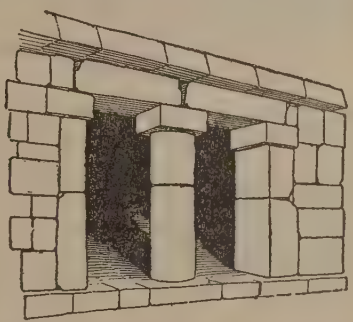
however, always to separate the domiciliary from the religious, defensive, and civic structures, and a difference of opinion has arisen especially with respect to the purpose of some of the greater buildings of middle America. Morgan considered these community dwellings, whereas others believe them to have been devoted to religious orders; in either case, however, they could be classed as dwellings. Of this type are the so-called monasteries and nunneries of the Maya province. That the communal dwelling was an institution of great importance in many parts of America is fully attested by ethnologists and historians. There can be little doubt



MAYA ORDER, YUCATAN.

that a large portion of the earthworks distributed along river valleys and more especially on the lowlands and flood plains of rivers were domiciliary, accommodating villages or the residences of dignitaries or rulers, while they served also as retreats for all the people in times of great flood or as citadels for defense on the near approach of warlike neighbors. Multitudes of minor mounds of earth and stone found in widely separated regions are merely the refuse of dwellings, as those left by the earth lodges of the Missouri valley, while perhaps a majority are mortuary.

Defensive Works.—Evidence is abundant that the ancient as well as the modern aborigines were often at war, and that the more cultured peoples gave much attention to military affairs, to the perfection of arms, and the construction of defensive works. Safety from the persistent encroachment of foes was often obtained or sought by the selection of strong defensive positions for permanent residence. The picturesque "Cliff Palace," Arizona, the impressive "Hill of Flowers," Mexico, and the wonderful citadel of Machu Picchu, Peru, are excellent examples. Defensive works, pure and simple, are of common occurrence, although it cannot be said that, judged by European standards, any particular military science is indicated. Passes in the hills, steep approaches to inhabited sites, and narrow necks of land connecting village sites



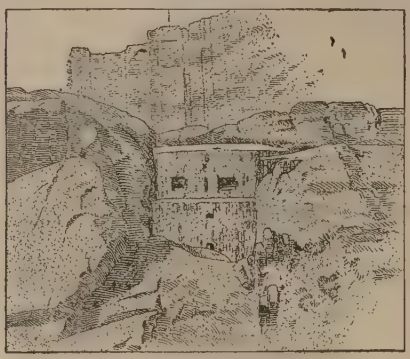
DOORWAY TO MAYA TEMPLES, YUCATAN — WIDE EXTERIOR DOORWAY DIVIDED BY A ROUND COLUMN SUPPORTING STONE LINTELS.

with adjacent highlands were defended by rude walls of stone, and villages were often surrounded by stockades, earthworks, and inclosures of stone built at great expense of time and labor. Examples of military structures are the remarkable earthern inclosures at Newark and at Fort Ancient, Ohio, and the strong masonry fortification at Mitla, Mexico, and of Sacsahuaman, Peru.

Burial Places.—American antiquities contribute most interesting evidence of the mortuary customs of the aborigines. The range of burial methods and of mortuary structures and monuments is so diversified, however, as to make brief presentation difficult. Caverns and rock shelters are natural burial places and were extensively used. Various devices, as the erection of cairns of stone and mounds of earth, were employed by the primitive tribes to secure the bodies of their dead against desecration by wild beasts. In the Mississippi valley mounds were sometimes erected over burial cists of timbers or over the charred bodies and the altars of clay on which precious belongings were sacrificed by burning. In the Middle West the bodies were encased in rude coffins built of slabs of stone, while in some regions graves were dug to great depths, as in Panama, Colombia, and Ecuador. The Mayas often deposited their dead in cists in the faces of their temple pyramids, and the Peruvians erected chulpas

or hewn stone provided with burial cells. Of all the classes of ancient remains, burial places yield the richest and most varied material for the study of the history of the race.

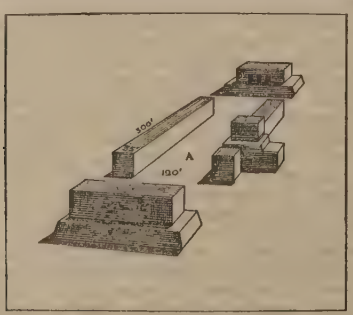
Religious Works.—Most ambitious of the aboriginal works of whatsoever branch are those devoted to the gods and to the rites and cere-



A CLIFF HOUSE, COLORADO.

monies of religion. From the lowest civilized nation the material representatives of the deities —the fetiches and idols—were provided with sacred receptacles or places of abode, and in the higher stages the genius of the native artificer was expended on the shrine, the temple, and the sculptured image. Among the more noteworthy examples of temple architecture are the pyramid temples of Mexico and Central America, while the colossal monolithic sculptures of Mexico, Copan, and Quirigua are marvels of elaboration. Rock-cut temples were not uncommon among the more advanced peoples. The face of the hill of Texcocingo, valley of Mexico, displays the battered remnants of colossal figures cut in the living rock, which originally were inclosed in sanctuaries or temples built against the hill. The ruin-crowned Hill of Xochicalco is pierced by a system of hallways and chambers, doubtless devoted to sacred purposes.

Diversional Structures.—The playgrounds of the primitive tribes were level spaces, natural



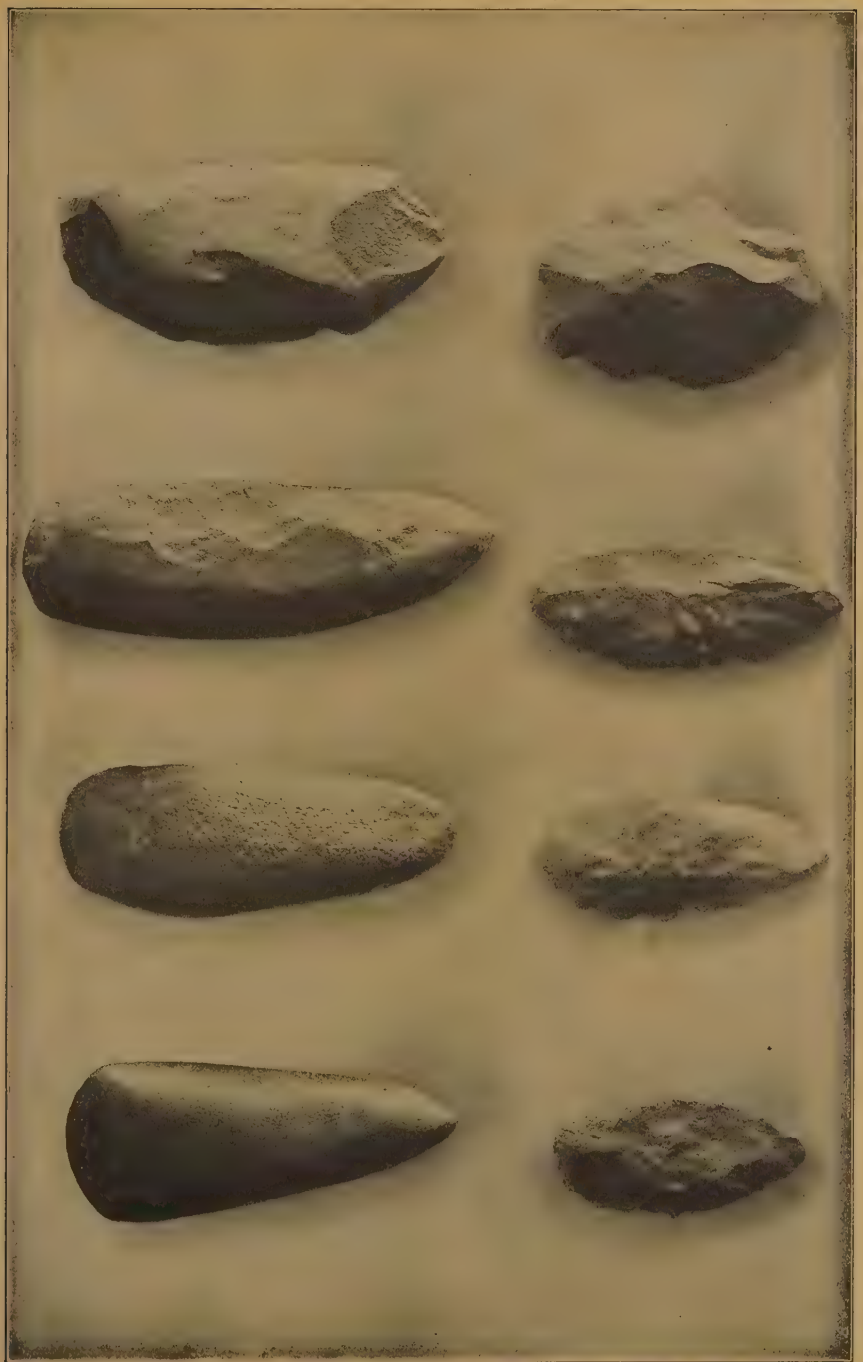
ROUGH SKETCH OF BALL OR TENNIS COURT.
The game was played in A, a space 120 feet by 600 feet.

or artificial. No examples of these have been identified, although the chunky game, played by the tribes of the southern States, is represented by many of the symmetrical and beautifully finished discoidal stones employed. The Maya peoples and perhaps others had ball courts of elaborate design, imposing dimensions, and architectural pretension. An example in Chichen Itza has two parallel walls of dressed stone, each 274 feet long, 26 feet high, and 30 feet thick, separated by a space 120 feet wide in which the game was played. Surmounting one wall are the remains of a handsome temple with giant serpent columns facing the court, while another remarkable building subjoins this on the east base, and two temples with columned porches face the court at the ends. Two stone rings fixed in opposite walls, 25 feet above the floor, afforded the test of skill. To win the game the ball had to be passed through these rings by a rebound from the hip of the player.

Highways and Bridges.—Without wheeled vehicles and draft animals other than dogs the aborigines had little need of broad highways. Mere trails served the purpose of the primitive tribes who had no more important vehicle than the dog travois, but the Peruvians employed in transportation immense herds of llamas and in times of trouble moved large armies for long distances. The Peruvian highways, traces of which still remain, were built by the Inca rulers to connect the northern with the southern provinces and the highland with the Pacific coast. They are the highest native achievement in this branch. The Sierra road was upward of 1000 leagues in length and traversed one of the most rugged mountain regions in the world. The lowland roads were paved in places with slabs of stone, while those crossing deserts were marked by stakes of wood. In middle America urban paved ways were common, as the "Road of the Dead" at San Juan Teotihuacan and the causeways of Tenochtitlan. Without a knowledge of the keystone arch the aborigines were unable to construct stone bridges of long span, but short spans were effected by means of the offset arch, as at Palenque, where an excellent example in cut stone is preserved. Long spans were accomplished by means of cables of vines or osiers fixed to the living rock or to heavy buttresses of masonry.

Storage.—The requirements of the storage of agricultural produce and other possessions led to the erection of special buildings for the purpose, as in Peru, but underground storage was utilized by most village peoples. The exploration of some of the ancient village sites in Ohio has brought to light a large number of storage pits, or caches. Provision for water conservation was essential in all arid and semi-arid regions. Shallow reservoirs are common in the arid region of the southwestern United States; in Yucatan, where little water is found on the surface, underground cisterns are numerous; and in Peru during the Inca period reservoirs and aqueducts of hewn stone, of extraordinary design and great extent were in use. Deep wells were dug in some regions, as at Manabi, Ecuador, and springs were walled up and terra-cotta pipes laid by various peoples.

Mines and Quarries.—Materials for the manufacture of implements and utensils, and for building were gathered from the surface or quarried from the rock in place. The quarrying of flint and other varieties of brittle stone for implements was a leading industry among the northern tribes. The evidences of this work, still extant, are of astonishing magnitude and indicate



STAGES IN MANUFACTURE OF CELTS FROM RIVER PEBBLES. Ranging from partially chipped pebble to finished implement, from near Luray, Virginia.

STAGES IN MANUFACTURE OF CHIPPED IMPLEMENTS FROM QUARTZITE COBBLES. Ranging from "Turtle Back" or "Paleolith" to arrowpoint, from District of Columbia.

AN EXAMPLE OF ABORIGINAL MODELING IN CLAY.

SIDE AND FRONT VIEWS OF AN ANCIENT EARTHENWARE VASE FROM OAXACA, MEXICO.

A MASTERPIECE OF MAYA SCULPTURE.

THE "TURTLE," PROBABLY AN ALTAR, QUIRIGUA, GUATEMALA.
DIAMETER 8 FEET.

a degree of enterprise and persistence not usually ascribed to the aborigines. The largest quarries, so far as examined, are those at Flint Ridge, Ohio; in the suburbs of Washington, D. C.; at Mill Creek, southern Illinois; in northeastern Oklahoma; in Wyoming; and in the State of Hidalgo, Mexico. The excavations cover many acres and in cases even square miles of the surface. Quarries of soapstone and of mica occur in great numbers in the Appalachian region, and hematite mines, where the ore for weapons and red and yellow oxides for paint were mined on a large scale, have been located near Leslie, Mo. Extensive mining of turquoise was carried on in New Mexico, Arizona, and Nevada, and the ancient Mexicans were probably supplied from these northern sources. The copper mines of the Lake Superior region, especially those of Isle Royal, from which this metal was distributed over half of North America, are of great magnitude. The bits or masses of native metal were removed by breaking up the containing rock matrix with sledges of stone, with the aid of fire. The quarries and mines were not carried far underground, most of them taking the form of deep open pittings, which are now largely filled up. The quarries from which stone for building was obtained in middle and South America as yet have not been thoroughly examined, but those at Mitla, Mexico, make it clear that the great blocks of stone were hewn out with rude stone hammers and picks, and at Ollantaitambo, Peru, blocks of porphyry weighing scores of tons were hewn out and transported over extremely difficult roads and were built into the great fortress, while others much larger were left by the way.

Agricultural Remains.—Most of the aboriginal tribes subsisted to a greater or less extent on the products of agriculture, the most remarkable prehistoric evidences of which are found in Peru, where, especially about Lake Titicaca, the mountain slopes are terraced elaborately to the height of hundreds or even thousands of feet. The Inca system of cultivation was wonderfully developed, and granaries were established for the preservation of stores of corn to be used in times of war or famine. Traces of the ancient agriculture are found in other regions, especially in southern Mexico. In Michigan there still remain ridged fields which, it is believed, were devoted to crop growing. In some regions the remains of reservoirs and irrigating canals are found, as in Arizona and Peru, indicating systematic cultivation of arid areas.

Fixed Records.—Traces of the graphic arts are among the most valuable contributions of the past to the history of culture. Rude attempts at the delineation of living subjects, especially men and animals, have been made by most primitive peoples; where painted on the walls of caves or engraved on rock surfaces these endure for long periods. Countless examples are found throughout America. Although their purpose cannot be fully determined, it is apparent that many of these delineations were designed as records or reminders and that through their employment progress was made in the development of the glyphic systems of the more cultured peoples and toward a system of record in which phonetic elements were gradually coming into use. The greatest advance in this direction was made by the Maya peoples of middle America, whose inscriptions in glyphic characters executed in a style of much maturity are found sculptured on the faces of colossal images, as at Quirigua and on large slabs of limestone, as at Palenque.

Minor Artifacts. On account of their durability, implements and utensils of stone, more than any other class of relics, are pregnant with the story of the past of humanity. Especially is this true of such of these artifacts as have become associated with geological formations, thus affording a means of determining questions of age, both absolute and relative. Objects of metals, bone, shell, and clay, also, are found in large numbers and extend the range of our information in numerous directions. First of all in the world of craft is the hammerstone—the king of implements—found in countless numbers on ancient sites. In the very early stages of culture fragments of stone and pebbles and bowlders were used to do many things with, and finally to shape many things with, and gradually themselves took shape by use, and artificial forms were worked out to increase effectiveness. Stone was quarried and metals were mined with them. Implements, utensils, and sculptures were shaped by them, and finally when nuggets of metal were found and swaged with their aid, the way was opened to civilization. Without the hammerstone no approach could ever have been made to the proud stage of culture known as enlightenment. Axes, hatchets, chisels, scrapers, abrading stones, projectile points, etc., were essential adjuncts of the arts of life among every people and are trustworthy indices of early primitive life and culture. Projectile points—the penetrating heads of arrows, spears, darts, and harpoons—are the most numerous and widely distributed of all artifacts and throw light on the story of the hunter, the fisher, and the warrior of all peoples. Among the articles of especial interest, recovered from caverns and from tombs in arid regions, as Arizona and Peru, are the complete weapons—the bows and arrows, the darts and dart-throwers of the people; and marvelous indeed as works of art are the carved and gilded dart-throwers, or atlatls, of ancient Mexico. Domestic utensils also had a wide range of form and use, and receptacles of stone, clay, wood, and wicker, and the varied milling appliances claim the especial attention of the archæologist. Spinning and weaving appliances and articles of costume in textile and tissue, preserved in abundance in arid regions, as well as personal ornaments of many materials, are of deepest interest to the historian of the race, as are objects of religious use—fetiches, charms, talismans, idols, and paraphernalia—including many things the precise employment of which is unknown.

As already mentioned, pictographs were engraved on rock surfaces by the primitive tribes, and glyphic inscriptions were carved on monuments by the more advanced nations. Similar ideographic designs were executed on bark and skins by the ruder tribes, while among the more cultured peoples paper made of the maguey plant came into use, and the long sheets filled with ideographic inscriptions in brilliant colors, complex design, and masterly execution were folded and bound in book form after the manner of the Orient. Most of these codexes were destroyed by the Spanish invaders or were otherwise lost, but fortunately a few excellent examples found their way into the libraries of Europe. Students are now engaged in the in-

terpretation of these writings as well as of the inscriptions sculptured in stone and wood and modeled in stucco, and have made much progress in determining their general significance and application, although thus far no key has been found by means of which they may be read. It is now known that these writings are not largely historic records in the ordinary sense of that term, but rather are calendaric in function, fixing the routine day by day, and the season of the elaborate religious practices of the priesthood, or connected with the affairs of state, recording dates, duties of officers and servitors, titles to land, concessions, tributes, etc. Many of the characters used retain recognizable traces of the pictorial originals, while some have become wholly conventional, resembling in a measure the alphabetic characters of the Chinese. It is clear that some of the characters at least stand for sounds, syllables, or words, rather than for ideas, and that a system of phonetic writing was in process of formation. This manifest approach to such a system marks the highest cultural achievement of the American race.

Arts and Industries. Having classified and described the diversified antiquities, the various activities involved in acquiring the materials used and in the shaping, distribution, and utilization of the things made should receive the attention of the archæologist. Among these activities the following are especially noteworthy: 1. *Food-acquiring arts*—hunting, fishing, agriculture. 2. *Food-preparing arts*—dressing, preparing, cooking, serving. 3. *Material-acquiring arts*—collecting, quarrying, mining. 4. *Building arts.* 5. *Sculptural arts*—fracturing, crumbling, scraping, carving. 6. *Plastic arts*—modeling. 7. *Metallurgic arts*—swaging, casting. 8. *Tissue-working arts*—hide dressing, tanning. 9. *Textile arts*—basketry, weaving, knitting, etc. 10. *Graphic arts and writing.* 11. *Arts of war*—use of weapons and offensive and defensive works. 12. *Transportation arts.* 13. *Clothing arts.* 14. *Embellishing arts.*

The character of each of these activities is recorded with varying fullness by the available materials of antiquity. In arid regions even the most fragile and perishable of art materials, as cotton, wool, and feathers, and the fabrics made of them, are preserved from pre-Columbian times almost without change, as in Peru, and serve to show what the peoples used, what they made, and how it was made. The story of the food-acquiring industries is told by weapons of the chase, especially those of stone, metal, and bone, and that of agriculture by the simple tools employed in cultivating the soil and by built and excavated storage places. The food-preparing arts are well represented by nut-cracking, mealing, and cooking utensils, and by the countless tools for cutting, rubbing, and pounding.

The varied activities connected with the acquirement of the materials employed in the arts, and with the preparation of these to serve the needs of man are of the greatest interest, but would require a volume for adequate presentation. Quarrying, mining, and transporting are included in this group, while the industries connected with the manufacture of implements and other articles of use and beauty are receiving of late years attention proportionate to their importance among the industries responsible for culture advancement.

The remains of the products of the building arts tell with great clearness the story of the varied activities in this connection of the ancient people and the sculptural, plastic, metal working, textile, and tissue-working arts are amply revealed in the multitude of implements which have been found. The activities connected with the graphic arts and writing, naturally varied and highly specialized, may be readily inferred from the nature of abundant remains.

The activities of war are practically unceasing among primitive tribes and employ the energies of the peoples in countless ways—in the preparation of weapons and the erection of defenses and in expeditions of offense—and are amply illustrated by the remains of antiquity. The remains of devices used in transportation tell of enterprises of vast importance, and the transported materials, as in earthworks and buildings, throw much light on the prowess of the people. The distribution of products of manufacture also makes it clear that trade often extended to distant lands.

The remains of the products of the personal arts—clothing and ornament—as well as of the embellishing arts generally reveal a wide range of activities varying in accordance with the materials used, the methods employed, and the æsthetic attainments of the people. It goes without saying that all the activities of the prehistoric peoples resembled closely the corresponding activities of the aborigines of post-Columbian times recorded by the ethnologist and historian.

Problems of the Race. Having assembled the material data of antiquity, as above outlined, and having acquired from the study of such data all that can be learned of the characteristics and activities of the race, the archæologist is prepared to apply his knowledge to the solution of the larger problems of race history—a work which he must share with the ethnologist and the historian and in which he must enlist the aid of students of many other branches of science—the geologist, the palæontologist, the physical anthropologist, the anatomist, the psychologist, and the geographer. The essential problems are those of:

1. *The origin and development of the race.*
   a. Characteristics and relationships.
   b. Migrations, distribution, population.
2. *The origin and development of culture.*
   a. Language and literature.
   b. Social organization and customs.
   c. Religion and religious customs.
   d. Arts and industries.
   e. Æsthetics.
3. *Chronology.*

The early stages of man's career are naturally unrecorded in traces of his handiwork, and the historian must rely on such skeletal remains as may be encountered. The Old World has supplied numerous well-verified examples of the physical remains of man extending back to the close of the Tertiary Age, but America has yielded no fully accepted data attesting great antiquity. For the present, therefore, it may be assumed that the race originated in the Old World and that America was peopled at a comparatively recent period by aberrant groups. As the land areas of the two continents are related in the present period, the course of migration would seem inevitably to have been by way of Bering Strait, and a study of the physical and

cultural characteristics of the aborigines tends strongly to support the view that they are in the main at least offshoots from northern Asiatic stems. It cannot be said with respect to problems of race origin that skeletal remains thus far discovered furnish data of great value, but the evidences of racial variation within America as exhibited in the several ethnic regions afford a promising field for research—a field as yet but imperfectly worked. Although general migratory movements resulting in the settlement of the continent may be safely inferred, the archæologist is without material evidence of such movements, and the more recent movements of the tribes and stocks which undoubtedly took place are not recorded with any considerable degree of fullness or certainty in the remains of antiquity, physical or cultural. The distribution of man over both Americas must have become general in the distant past, and in recent times the currents of migration have reached such a state of equilibrium that movements go on with equal facility in all directions. It is true that density of population has varied greatly with the regions and that certain large areas yield only meagre traces of protracted occupancy, but this latter condition may be due in part to the fact that the culture of these areas was so primitive as to leave slight traces to attract the attention of the explorer and collector. However, some idea of the density of population may be inferred from the character and abundance of the evidences left. That there were ever more people than at the period of discovery, generally estimated at from 10,000,000 to 20,000,000, does not seem probable.

Problems of the origin and growth of culture—of the intellectual development of the race—may be studied to excellent advantage in America. Investigations relating to the history of culture proceed on the theory that from the simplest possible beginnings in the manual arts gradual advance was made until the highest round of the ladder of culture was reached, and that a study of the entire series must reveal the steps, the processes, and the laws of advancement. The dynamic forces responsible for advancement are primarily the exacting requirements of physical existence, and secondarily the ever-present desire for betterment, increased comfort, and pleasure. The never-ceasing struggle for existence necessarily led to the development of energies and the awakening of ambitions, to steady advance in skill and ability, and to the improvement of the means and methods of winning from nature the necessities of life. The course of this struggle is amply illustrated in the vast range of the material phenomena of the arts—the subject matter of archæological research.

The archæologist does not have to concern himself with the multitude of American languages, except in so far as the methods of recording and writing are concerned, while the problems of social organization and customs are naturally left largely to the ethnologist. At all stages of primitive progress religion has been a chief factor in shaping and advancing culture, and the best products of the human hand and brain have been the offspring of the belief that the powers of nature, personified in a multitude of forms, could be influenced by offerings and appeals. It followed that the more elaborate, costly, and beautiful the offerings, the stronger the appeal, so that all material objects pertaining to worship—implements, utensils, fetiches, images, altars, sanctuaries, and temples—were elaborated and beautified to the limit of capacity and taste. Thus the æsthetic sense and æsthetic art were developed along with the development of religion and religious art. It may be said without fear of contradiction that no people at corresponding stages of culture advancement had a more elaborate system of religious beliefs and a wider range of personified deities than the Americans, and certainly none gave so large a share of their thought to æsthetic elaboration. Their decided genius for embellishment is manifest on every hand. It is further observed that the struggle for advantage through the increase of personal attractiveness and the attractiveness of personal belongings contributed unceasingly to the development of the arts of taste.

While the fundamental force making for progress was the ever-active struggle for enhancement of welfare and pleasure, the direction in which advancement was made and the rate of the movements depended largely on the diversified conditions imposed by environment. Where conditions were favorable, progress was rapid; where unfavorable, stagnation or retrogression followed.

Through the researches of archæology, assisted by the culture phenomena of the present, the remains of antiquity, more especially those of the later "age of stone," the problems of culture are finding solution, not complete in detail, but sufficiently full to satisfy the broader requirements of history.

Chronology. The archæologist is in constant search for evidences of human antiquity in America, and hundreds of suggestive observations bearing on this subject are on record. None of the acceptable observations indicate an antiquity of man at all comparable to that indicated by observations in Europe and Asia. Briefly, there is a strong presumption that mankind existed in North America about, if not anterior to, the last ice invasion of the Pleistocene, 8000 to 30,000 years ago; yet positive evidence is far from complete, as indicated by the fact that not a single reported association of human remains and works of art with even the latest Pleistocene deposits is accepted without reserve by either anthropologists or geologists. In a few instances human bones have been found in such associations as to suggest the high geologic antiquity of man in America. The best known instance is that of the Calaveras skull alleged to have been found imbedded in auriferous gravels near Angels, Cal., interest in which was enhanced by frequent reports of the finding of stone implements in gravels of a corresponding age, and, in cases, beneath heavy sheets of lava. At the time the associations were reported the gravels were supposed to be Pleistocene or Quaternary, and the lava still more recent, so that the accounts bore an air of credibility. Subsequently, it was ascertained that the auriferous gravels, and even the overlying lava beds, are of Tertiary Age, so that the alleged associations would seem unworthy of consideration unless supported by the strongest possible direct evidence. Recent researches have shown (1) that the alleged finds of human relics in the gravel reported may be ascribed, as a rule, to accidental inclusion in comparatively recent times, the contents of superficial village sites having descended into the open mines, to

be discovered there by workmen entirely ignorant of the significance or possible provenance of the finds. These conditions, even if certain of the recovered objects are of great antiquity, since none are distinctive, make separation impossible and render the evidence nil; (2) that at least some of the artifacts alleged to have been found in the gravels were manufactured from the volcanic rock overlying the gravel beds; (3) that the Calaveras skull is of a type corresponding precisely with that of Indians still living in the same vicinity; (4) that its state of preservation corresponds closely with that of modern bones after a few years' burial in the limestone caverns or calcareous earths of the region; and (5) that the contemporary testimony concerning the finding of the cranium is contradictory, with the burden against the original allegation. Other reports of the occurrence of human remains in geologic deposits have come from Trenton, N. J., and other sites, notably at Lansing, Kans., and in Brazil and Argentina. With regard to the Trenton finds of crania, Hrdlicka has shown that most of them are of Algonquian type, while two are of north German type. The Lansing remains are assigned by some authorities to late glacial times, but geologists and anatomists fail to agree as to the period. The evidence obtained in Brazil and Argentina is embodied in a formidable array of literature, but recent critical examinations of the whole body of evidence leave it without any very substantial support. It is a most significant fact that caverns, the natural dwelling places of very primitive men, have yielded thus far in America no trace of man's early presence. On the whole, it may be said that while the human remains and antiquities of America throw much light on the chronologic problems of recent times, they afford but uncertain aid with respect to the beginnings and earlier stages of occupancy down to the close of the last glacial invasion of North America.

Bibliography. The literature of American archæology may best be consulted in the following general works in which extended citations are given: Bancroft, *The Native Races of the Pacific States*, vol. iv (New York, 1875); Nadaillac, *Prehistoric America* (New York, 1884); Winsor, *Narrative and Critical History of America* (Boston, 1884); Payne, *History of the New World called America* (2 vols., Oxford, 1892); Hrdlicka, "Early Man in South America," *Bul. 52, Bur. Am. Ethnol.* (1912); Joyce, *Archæology of South America* (1912); Hodge, "Handbook of the American Indians," *Bur. Am. Ethnol.* (1907). Current publications relating to American archæology are cited fully in the *American Anthropologist*.

ARCHÆOPTERIS, är'kē-ŏp'tē-rĭs (Gk. *ἀρχαῖος, archaios*, ancient, primitive + *πτερίς, pteris*, fern). A genus including some of the oldest known fossil ferns, originally described by Dawson in 1863 to include species from the Chemung group of the Upper Devonian. The leaves are bipinnate with obovate inequilateral pinnules; the fertile leaves having oval spore cases instead of pinnules. Perhaps the largest species is *Archæopteris jacksoni*, fine examples of which, attaining a length of 5 feet, are often found in the flagstone quarries of the upper horizons of the Catskill group in the central portions of the Catskill Mountains of New York. See FERN; CARBONIFEROUS SYSTEM; DEVONIAN SYSTEM.

ARCHÆOPTERYX, är'kē-ŏp'tē-rĭks (Gk. *ἀρχαῖος, archaios*, ancient, primitive + *πτέρυξ, pteryx, wing, bird*). The oldest known bird, found fossil in the Jurassic lithographic stone of Solenhofen, Bavaria, where it was discovered in 1861. It was a creature about the size of a crow, bird-like in form, having a rather short, blunt beak, the upper jaw of which was furnished with 13 teeth, and the lower with 3 teeth on each side, each planted in a separate socket. Its most extraordinary feature, however, is a lizard-like tail of 20 vertebræ, from each of which springs a pair of well-developed quill feathers. "The vertebræ of the neck and back were bi-concave, the sternum seems to have been keeled, and the manus had three free digits. The tibia and fibula do not coalesce, and the former was furnished with a series of feathers (wing-quills) very similar to those of the tail." These are divisible, as in modern birds, into primaries and secondaries. That it was able to fly is not doubted; the form of its feet, also, indicate arboreal habits, and that it scrambled about, as well as made short flights, is suggested by the fact that each finger of the hand, as well as the toes, was armed with a claw. The tail

ARCHÆOPTERYX MACRURA.
(Specimen from Solenhofen, studied by Owen.)

must have impeded rather than assisted flight, and it is interesting to note that in later birds this cumbersome member soon became modified into substantially the present form before the Cretaceous Era came to a close. (See BIRD.) It was first thoroughly studied by Owen (*Philosophical Transactions*, London, 1863); later information is summarized in Newton, *Dictionary of Birds*, article "Fossil Birds" (New York, 1893–96).

ARCHA'IC (Gk. *ἀρχαικός, archaikos*, old-fashioned, primitive, from *ἀρχή, archē*, beginning, origin). A term applied to the primitive stage of the art of a good period. Archaic art differs from the merely primitive in that it implies promise of future excellence. The term is especially applied to Greek art before c.450. *Archaistic* is applied to an imitation of this style; as when Greek artists under Augustus reproduced Greek sculpture of the sixth and early fifth centuries.

ARCHAN'GEL (Gk. *ἀρχι-*, prefix denoting dignity of rank + *ἄγγελος*, messenger, angel). A term occurring twice in the New Testament, 1 Thess. iv. 16 and Jude 9. The idea contained in the term is due to the Old Testament development of the conception of angels, which, in its earliest stage, was based upon an earlier animism and involved nothing more than the positing of supernatural beings, whose vocation, generally speaking, was to be in varied ways agents of God, with whom they were so closely associated as at times to be distinguished from him

rather by degree than by kind (cf. Gen. xviii. 33 with xix. 1). Gradually, however, the idea of moral distinctions among these angelic beings appeared, from which grew the conception of "evil angels" (Ps. lxxviii. 49; cf. 1 Chron. xxi. 1). Finally, under the Babylonian influence of the Exile and the Persian and Greek influences of post-exilic times, there appeared among these supernatural hosts the idea of ranks and even of names (Zech. ii. 3 f.; iii. 1, iv. 1, 11–14; Dan. iv. 13, viii. 16, x. 13, xii. 1). Both of these developed ideas—moral distinctions and ranks and names—are carried over into the New Testament writings, where use is frequently made of them. The first place in these ranks is evidently intended to be referred to in our term. See ANGEL.

ARCHANGEL. The capital city of the Russian government of Archangel, situated in lat. 64° 33′ N., and long. 40° 33′ E., on the right bank of the Dvina River, 26 miles above its entrance into the White Sea, and 740 miles northeast of St. Petersburg (Map: Russia, F 2). It is the largest and most important city in the world situated so near the Arctic Circle. The city is of ancient origin, and among its most noteworthy buildings is the handsome cathedral finished in the beginning of the nineteenth century. It is said to be the handsomest and best-lighted cathedral in Russia. The other buildings of interest are the bazaar or mart, the marine hospital, and the wooden "little house" of Peter the Great. The importance of the city is considerable, since it serves as an outlet for the products of the far northern and western part of Siberia. The chief articles of traffic are fish, skins, furs, timber, wax, iron, tallow, bristles, and caviar. At its annual fair, in September, about 14,000,000 rubles' worth of goods changes hands. The value of its exports and imports amounts to about 8,000,000 rubles ($4,500,000) annually, and it is visited by some 800 vessels from July to September, the only period of the year when the harbor of Archangel is entirely free from ice. Of the foreign vessels visiting the port the British and Norwegian are the most numerous. Considerable inland shipping is carried on by a large number of smaller vessels navigating the Dvina. The fact that the harbor is ice-bound during the greater part of the year has been the greatest obstacle to the commercial growth of the city. The site was visited in 1553 by the English expedition under Chancelor in search of a northeast passage to India. An English factory was erected soon after. The origin of the town dates from 1584, when a fort was erected. Pop., 1911 (est.), 35,414.

ARCHAN'GEL, or ARKHANGELSK, ärkän'gĕlsk. A government of Russia, between 61° and 71′ N. lat. and 28° to 66° E. long., extending along the White Sea and Arctic Ocean from Finland and Norway east to the Ural, and bounded on the south by the governments of Vologda and Olonetz. Its area, exclusive of large internal waters, is 326,063 square miles. It is the largest government of the Empire, and occupies the entire north of European Russia. Its greatest length, from west to east, is 990 miles; its greatest width, from north to south, is 132 miles. Four large navigable rivers flow through Archangel—the Petchora for 528 miles, the Onega 132 miles, the northern Dvina 265 miles, and the Mesen 265 miles, all emptying their waters into the White Sea. The northwestern and the northeastern parts are mountainous, reaching a height of more than 4900 feet. The climate of the central part of Archangel is very severe. In the extreme northeast it is perceptibly milder, and the open sea is never frozen. The great wealth of Archangel is in its forests, which cover more than half of its area. Lumbering is therefore the leading industry. Shipbuilding is also carried on. Some of the inhabitants are engaged in agriculture, which, at its best, is poorly developed; in fishing and hunting along the shores of the Arctic and the White Sea; and in the rearing of deer, which constitutes the almost exclusive occupation of the Samoyeds in the northern districts. Archangel is one of the most sparsely populated governments of Russia. The population was 331,200 in 1890, 426,200 in 1909, and was estimated to be 449,400 in 1911. Ninety-eight per cent of the people are Russians. Of the different tribes, as the Lopars, Zyrans, Samoyeds, etc., there are not more than 6000 persons. Consult A. P. Enlehardt, *A Russian Province of the North* (Westminster, 1889).

ARCHANGEL, NEW. See SITKA.

ARCHANGELICA, ärk'ăn-jĕl'ĭ-kȧ. See ANGELICA.

ARCHAS, är'kȧs. A character in Fletcher's *The Loyal Subject;* a much too "loyal subject" of the unworthy and thankless monarch in that play.

ARCH'BALD. A borough in Lackawanna Co., Pa., 10 miles northeast of Scranton, on the Delaware and Hudson, and the New York, Ontario, and Western railroads (Map: Pennsylvania, K 3). Its chief industry is coal mining, but there are some silk mills. The surrounding region is of interest from a geological standpoint on account of the enormous glacial potholes that have been uncovered here. Hills to the north of the town contain markings made in the Ice Age by the movement of glaciers into the valley below. There is very little timber. Pop., 1890, 4032; 1900, 5396; 1910, 7194.

ARCHBALD, ROBERT WODROW (1848—). An American lawyer and sometime judge of the United States Commerce Court, born in Carbondale, Pa. He graduated from Yale in 1871, studied law, and after admission to the bar began practice at Scranton, Pa. In 1885 he was appointed a law judge; in 1888, presiding judge of the 45th Judicial District of Pennsylvania; and in 1901, United States District Judge for the Middle District of Pennsylvania—a capacity in which he served for 10 years. Upon the creation of the United States Commerce Court in 1911 he was commissioned one of its judges by President Taft. Rumors of venality and unprofessional conduct on the part of Judge Archbald were investigated by the Judiciary Committee of the House in 1912. This investigation resulted in the formulation of 13 charges against him, each of which, in effect, charged him with attempting to use his office for financial gain, especially in efforts to purchase at a reduced figure property from coal companies which were then having or would have had litigation before his court. Articles of impeachment covering these charges having been preferred by the Judiciary Committee, and the House, in one deciding vote, having accepted the findings, the articles were at once forwarded to the Senate.

In December, 1912, the Senate, sitting as a Court of Impeachment, found Judge Archbald guilty as charged on five counts of the indictment, but acquitted him on eight. The outcome

automatically removed Judge Archbald from his seat on the Commerce Court bench and deprived him of the right of again holding office under the government. This was the ninth impeachment tried by the Senate within the history of the United States. Consult *Proceedings of the United States Senate and the House of Representatives in the Trial of Impeachment of R. W. Archbald* (1913). See COMMERCE COURT.

ARCHBISHOP, ärch'bĭsh'ŭp (Gk. *ἀρχι-, archi-*, chief + *ἐπίσκοπος, episkopos*, overseer). The title given to a metropolitan bishop who superintends the conduct of the suffragan bishops in his province and also exercises episcopal authority in his own diocese. The archbishop was probably originally the bishop of the chief town. The office appears as early as the fourth century. In the Oriental church the archbishops are still called "metropolitans," from the circumstance mentioned. In the African church, on the other hand, the term used was "primus." The great archbishoprics of the early Church were those of Jerusalem, Antioch, Ephesus, Alexandria, Constantinople, and Rome. Since the sixth century the Archbishop of Rome has borne the name of Pope (*papa*). There is an official letter by Justinian, addressed to "John, Archbishop of Rome and Patriarch," and several ecclesiastical constitutions are addressed to "Epiphanius, Archbishop of Constantinople and Patriarch." The Synod of Antioch, in 341, assigned to the archbishop the superintendence over all the bishoprics and a precedence in rank over all the bishops of the Church, who, on important matters, were bound to consult him and be guided by his advice. By degrees there arose, out of this superiority of rank, privileges which at length assumed the character of positive jurisdiction in ecclesiastical matters. Many of these rights passed to the patriarchs (q.v.) toward the end of the fourth and during the fifth century, and still more to the Pope in the ninth. The archbishops still retained jurisdiction, in the first instance, over their suffragans in matters which were not criminal, and over those who were subject to them they acted as a court of appeal. They possessed also the right of calling together, and presiding in, the provincial synods; the superintendence and power of visitation over the bishops of the metropolitan see; the power of enforcing the laws of the Church; the dispensation of indulgences, and the like. The archbishops further enjoyed the honor of having the cross carried before them in their own archiepiscopate, even in presence of the Pope himself, and of wearing the *pallium*.

In the Established Church of England there are two archbishops, both appointed by the sovereign, of whom the one has his seat at Canterbury, the capital of the ancient kingdom of Kent; the other at York, the capital of Northumbria. But though, as ruling over a province in place of a single diocese, both have enjoyed the rank of metropolitans from the first, the Archbishop of Canterbury has all along enjoyed, not merely precedence as the successor of Augustine and the senior archbishop, but as possessing a preëminent and universal authority over the whole kingdom. This preëminence is marked in the titles which they respectively assume—the Archbishop of Canterbury being styled the Primate of All England (*metropolitanus et primus totius Angliæ*), while the Archbishop of York is simply called Primate of England (*primus et metropolitanus Angliæ*). It is also indicated by the places which they occupy in processions—the Archbishop of Canterbury, who has precedence of all the nobility, not only preceding the Archbishop of York, but the Lord Chancellor being interposed between them. Previous to the creation of an archbishopric in Ireland the authority of the Archbishop of Canterbury extended to that island. The amount of control which belongs to an archbishop over the bishops of his province is not very accurately defined; but if any bishop introduces irregularities into his diocese or is guilty of immorality, the archbishop may call him to account and even deprive him. In 1822 the Archbishop of Armagh, who is Primate of All Ireland, deposed the Bishop of Clogher on the latter ground. To the Archbishop of Canterbury belongs the honor of placing the crown on the sovereign's head at his coronation; and the Archbishop of York claims the like privilege in the case of the Queen-Consort, whose perpetual chaplain he is. The province of the Archbishop of York consists of the six northern counties, with Cheshire and Nottinghamshire. The rest of England and Wales form the province of the Archbishop of Canterbury. The dioceses of the two archbishops—that is to say, the districts in which they exercise ordinary episcopal functions—were remodeled by 6 and 7 Will. IV, c. 77. The diocese of Canterbury comprises Kent, except the city and deanery of Rochester, and some parishes transferred by this act; a number of parishes in Sussex called "peculiar"; with small districts in other dioceses, particularly London. The diocese of the Archbishop of York embraces the county of York, except that portion of it now included in the dioceses of Ripon and Manchester; the whole county of Nottingham, and some other detached districts. In Ireland there are two Protestant archbishops, elected by their fellow-bishops out of their number, and four Roman Catholic. Of the former, the Archbishop of Armagh is Primate of All Ireland; the Archbishop of Dublin being Primate of Ireland. They formerly sat alternately in the House of Lords; the three bishops who, along with them, represented the Church of Ireland, being chosen by rotation.

The Roman Catholic church in England and Wales has three archbishops; in Scotland two archbishops, while the Episcopal church in that country has no archbishop, but a *primus*. An English archbishop writes himself, "by divine providence"; a bishop being, "by divine permission"; and an archbishop has the title of "Grace," and "Most Reverend Father in God," while a bishop is styled "Lord," and "Right Reverend Father in God." The archbishop is entitled to present to all ecclesiastical livings in the disposal of diocesan bishops, if not filled within six months; and every bishop, whether created or translated, was formerly bound to make a legal conveyance to the archbishop of the next avoidance of one such dignity or benefice belonging to his see as the archbishop should choose.

The only archbishops in the United States are those of the Roman Catholic church, now 14 in number. Up to 1789 the ecclesiastical government of that church in this country continued under the vicar apostolic of the London district, the local superior at that time being Father John Carroll, of Baltimore. In 1789 Baltimore was erected into an episcopal see, and Father

Carroll became bishop. In 1808, after New Orleans, New York, and Boston had been erected into sees, Baltimore was raised to metropolitan rank, Father Carroll becoming the first archbishop, as he had been the first bishop, in this country. The dates of the establishments of other archiepiscopal sees in this country are as follows—the first date being that of the foundation of the see, and the second of its elevation to a metropolis: Oregon City, 1846, 1846; St. Louis, 1826, 1847; New Orleans, 1793, 1850; New York, 1808, 1850; Cincinnati, 1821, 1850; Dubuque, 1837, 1893; San Francisco, 1853, 1853; Milwaukee, 1844, 1875; Boston, 1808, 1875; Philadelphia, 1808, 1875; Santa Fe, 1850, 1875; Chicago, 1844, 1880; St. Paul, 1850, 1888.

ARCHBOLD, John Dustin (1848–1916). An American capitalist, born in Leesburg, Ohio, and educated in the public schools. In 1864 he went to the Pennsylvania oil regions and spent 11 years in the oil industry. At the end of that period he became a director of the Standard Oil Company and served also as its vice president until the dissolution in 1911. He was then made director and president of the reorganized Standard Oil Company of New Jersey. Known to be an officer or director in numerous large corporations, he was for many years recognized as the practical head of the great oil interests of the country. In 1912 he came prominently into public notice by the publication of a series of letters which had been stolen from his files. These communications revealed more or less intimate business relations with several well-known public men and dealt especially with contributions made by the Standard Oil Company to the campaign funds of political parties. An investigation into campaign contributions was at that time being held by a committee of the Senate, and Mr. Archbold was called before it. He declared that he, representing the Standard Oil Company, had made a contribution of $125,000 to the Republican campaign fund of 1904, and that Theodore Roosevelt was aware that such a contribution had been made. He declared further that a demand for a second contribution of $150,000 was refused, and that the subsequent prosecution of the Standard Oil Company by President Roosevelt's administration was an indirect result of that refusal. Mr. Roosevelt testified before this committee that Mr. Archbold's assertions were unquestionably false as to his (Roosevelt's) knowledge of contributions by the Standard Oil Company, and he produced letters written by him to his campaign managers directing them to return such contributions if they were offered.

ARCHCHANCELLOR. The highest dignitary of the Holy Roman Empire. The title dates from the ninth century, when it was used by the Carolingians. From the tenth century the Archbishop of Mainz claimed the position in the German Empire. In the eleventh century the Archbishop of Cologne claimed the dignity and duties for Italian matters, and he was gradually admitted to be the Emperor's representative in Italy. In the twelfth century the Archbishop of Trier claimed a similar position in Burgundian affairs. The threefold division and the three Archchancellors were recognized in the Golden Bull (q.v.) of 1356. The Elector of Mainz retained the dignity until the end of the Holy Roman Empire in 1806. See Ducange, *Glossarium*, under the word *archicancellarius*.

ARCHDALE, ärch'dāl, John (fl. 1664–1707). A Colonial Governor of North Carolina, born in England. He came to New England as the agent for Governor Gorges, of Maine, in 1664; was a commissioner for Gorges (1687–88); and was Governor of North Carolina, of which he was also a "proprietary." He reorganized the administration of the Colony, conciliated the Indians, and introduced the culture of rice. In 1698 he was elected a member of Parliament, but he declined to take the oath because of his Quaker principles. He published *A New Description of the Fertile and Pleasant Province of Carolina, with a Brief Account of its Discovery, Settling, and Government up to this Time* (London, 1707; and in B. R. Carroll, *History of the Colony of South Carolina*, 1836). Consult Alexander Hewatt, *Historical Account of the Rise and Progress of the Colonies of South Carolina and Georgia* (London, 1779).

ARCHDEACON, ärch'dē'kŭn (Gk. *ἀρχι-, archi-*, chief + *διάκονος, diakonos*, servant, minister of the church). An ecclesiastical dignitary whose jurisdiction is immediately subordinate to that of the bishop. The archdeacon originally was simply the chief of the deacons, who were the attendants and assistants of the bishop in church affairs. His duties consisted in attending the bishop at the altar and at ordinations, assisting him in managing the revenues of the church and directing the deacons in their duties. From being thus mere assistants, archdeacons in the fifth century began to share the bishop's powers, and step by step attained to the authority they now enjoy, which from the ninth century became in many respects distinct from that of the bishop. Several synods protested against the innovation, but it was continued in the eleventh and twelfth centuries, when the archdeacons were recognized as the most influential of prelates. In the thirteenth century, their powers were limited by the establishment of episcopal courts. Their dignity and influence are now very much reduced in the Roman Catholic church, and many of their former functions are now exercised by vicar-generals.

In the Established Church of England, each diocese has from two to four archdeacons. No person can be appointed to this office who has not been six years a priest. His duties include visitation of the parishes, holding synods, ordering repairs of churches, and in other ways being, as the canon law calls him, 'the bishop's eye.' He is addressed as 'Venerable.' In the American Protestant Episcopal church the archdeacon exercises analogous functions, but the office is only found in some of the dioceses, and the number in the dioceses where it has been introduced varies from one to six. The office is found in all branches of the Church of England and also in the Lutheran church.

ARCHDUKE, ärch'dūk' (*arch* + *duke*, from Gk. *ἀρχι-, archi-*, chief + Lat. *dux*, leader). Archduke and archduchess are titles now taken by all the princes and princesses of the house of Austria. The title seems to have originated in the tenth century for Lorraine, when the latter was divided into two duchies of Upper and Lower Lorraine. It was once used for the ruler of Austria about the middle of the twelfth century. Rudolph IV of Austria, who died in 1365, called himself Palatinus Archidux. The title was formally conferred on the Hapsburgs by Frederick III in 1453. Various noble houses, especially that of Bavaria, disputed the title with the Hapsburgs, but since Rudolph II, Ger-

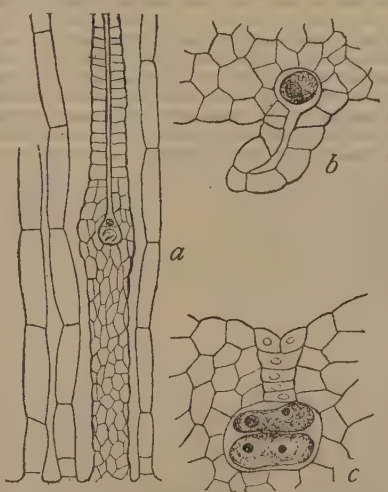
man Emperor from 1576 to 1612, their precedence has been established. Consult Selden, *Titles of Honor* (1672); and Ersch und Grüber, *Encyklopädie der Wissenschaften und Künste* (article, *Erzherzog*).

ARCHEAN (är-kē′an) **SYSTEM** (from Gk. *ἀρχαῖος, archaios*, ancient). A name proposed by J. D. Dana, in 1872, for the entire series of crystalline rocks that forms the oldest underlying fundamental complex of the earth's crust. Earlier names applied to this series were: Azoic, Primitive, Huronian, and Laurentian, of American geologists, and *Urgebirge* and *Primitivgebirge* of the still earlier Germans, Werner and Lehmann. The rocks of this system consist of a complex series of gneisses, granites, and schists, with a host of associated massive igneous intrusions, all of which have suffered profound disturbances and metamorphism to such an extent that it is extremely doubtful if at the present day there exist any traces of their original characters. They form, as a rule, the cores of the great mountain masses and are the original sources from which were derived, by erosion through countless ages, all the forms of later sedimentary rocks, which they underlie with marked unconformity. Various classifications of Archean rocks have been made in the attempt to organize them into stratigraphic groups, but owing to the complex nature of the series, and to the almost complete absence of reliable data for determining the relative age of the component formations, no one classification has as yet received general recognition. These Archean rocks of undoubted primeval origin, together with certain others, which because of their probable sedimentary derivation have been separated under the name Algonkian, antedate in respect of the time of their formation the rocks of the Cambrian system, and can be described to better advantage under the title PRE-CAMBRIAN FORMATIONS, to which article the reader is referred for further information. See also ALGONKIAN SYSTEM; TACONIC SYSTEM.

ARCHEDEMUS, är′kē-dē′mŭs (Gk. *Ἀρχέδημος, Archedēmos*), called GLAMON (the 'bleareyed'). A demagogue and popular speaker in Athens at the end of the fifth century and the beginning of the fourth century B.C. He is said to have been a foreigner who worked his way by fraud into the Athenian franchise, was poor, and was generally disliked by reason of his restless activity and meddlesomeness. By bringing an accusation against Erasinides, he took the first steps toward the impeachment of the Athenian generals who took part in the battle of Arginusæ (q.v.), 406 B.C.

ARCHEGONIUM, är′kē-gō′nĭ-ŭm (Gk. *ἀρχέγονος, archegonos*, first of a race, primal). The peculiar female organ of Bryophytes (mosses and liverworts), Pteridophytes (ferns, club mosses, etc.), and Gymnosperms (conifers, etc.), which together are often spoken of as Archegoniates. It is a flask-shaped organ, consisting of a *neck* more or less elongated and a *venter* more or less bulbous. A single egg occupies the venter, and in the process of fertilization the sperm enters by the open neck of the archegonium and comes in contact with the egg. Among the mosses the archegonium is a free and often-stalked organ. Among the liverworts the archegonia are variously disposed on the thallus body, while in mosses they are borne in a cluster at the apex of the leafy shoot or of its branches, the terminal rosette of more or less modified leaves forming what is often called a "moss flower." Among the ferns the archegonia are usually borne upon the under side of the inconspicuous sexual plant (prothallium), the venters being imbedded in the tissue and the necks more or less projecting. In the water ferns, quillworts, and little club mosses the female plant is developed as a tissue within the spore, whose heavy wall breaks or cracks at a certain place, and in the exposed part of the female plant the archegonia are developed. Among the conifers the spore, with its contained female plant, is retained within the ovule, and hence the archegonia are not exposed, but lie imbedded in the superficial part of the female plant (endosperm), toward the micropyle (the passageway left by the integument of the ovule). Among the conifers the male cells are brought to the archegonium by growing pollen tubes. The pollen grain, containing the male cells, rests at the base of the micropyle, upon the apex of the nucellus (central part of the ovule). The tube penetrates the tissue of the nucellus and reaches the embryo sac (megaspore), just within which are the archegonium necks. It then pierces the sac wall, enters and crushes the neck, and discharges its male cells into the egg.

Among the flowering plants no archegonia are developed, the embryo sac containing a free egg, along with other free cells of a much-reduced female plant.



ARCHEGONIA.
(*a*) of a moss, (*b*) of a fern, (*c*) of a liverwort, showing in each case the neck and the venter containing the egg.

The development of an archegonium and its preparation for fertilization are matters of great morphological interest. It begins as a single superficial cell of the sexual plant. By repeated cell divisions the layer of cells constituting the neck and venter is formed, and this surrounds a single row of axial cells. The cells of this row (variable in number) which lie within the neck are called the "neck canal cells," while the lowest cell of the row, the one within the venter, forms the egg. When the archegonium is nearly mature, the row of neck canal cells breaks down and leaves an open neck; and usually just before fertilization the cell in the

venter cuts off a small cell toward the neck called the "ventral canal cell," which rapidly disorganizes and leaves the egg free and alone in the venter, ready for the approach of the sperms through the neck.

One of the interesting facts in connection with archegonia is that the apical neck cells secrete a substance which attracts the sperms toward them. For example, this substance is not the same in mosses and ferns, so that even if archegonia of the two groups are close together the moss sperms and the fern sperms will be attracted only to their own archegonia.

ARCHEGOSAURUS, är'kē-gō-są'rŭs. See STEGOCEPHALIA.

ARCHELAUS, är'kē-lā'us (Gk. *'Αρχέλαος, Archelaos*).—1. One of the Heraclidæ who, when driven by his brothers from his native land, fled to Macedonia and founded the town of Ægæ. He was the mythical founder of the royal house of Macedonia. See below, under 3.—2. A Greek philosopher and pupil of Anaxagoras. He was born at Athens, and was the son of Apollodorus or Myson. The outlines of his system were those of his teacher, but for the details of his cosmology he went back to the ideas of the earlier Ionic physicists. (See GREEK PHILOSOPHY.) He admitted a primitive matter, consisting of infinite particles similar in nature to the bodies formed from them. He also admitted a ruling Mind. Matter and mind he held to be mingled, and identified the primitive matter with air. Out of this air, thus endowed with mind, there arose, by processes of thickening and thinning, cold and heat, or water and fire—the former passive, the latter active. From the action of fire and water were formed the atmosphere and the mud out of which the heavenly bodies were developed. Living organized beings, at first of low type, sprang from the mud, and gradually the races of animals were formed. Man he held to be superior to other beings, by reason of his artistic and moral powers.—3. King of Macedonia, natural son of Perdiccas II. He came to the throne in 413 B.C., after murdering the rightful heir. Archelaus improved the internal condition of his kingdom, introduced changes for the better in the currency and in the army, and showed himself a warm patron of art and literature. Agathon, Euripides, Zeuxis, and other men of eminence visited his court, and only Socrates refused an invitation to go thither. Euripides wrote a drama, *Archelaos* (now lost), in his honor, introducing his mystical ancestor (see above, under 1). The palace of Archelaus was adorned with magnificent paintings by Zeuxis. Archelaus was either murdered or accidentally slain by his favorite, Cratæus or Crateuas, in 399 B.C.—4. A distinguished general of Mithridates. In the winter of 88–87 B.C. he was sent to Greece with a large fleet and army to oppose the Romans in that quarter. On the way he seized the Cyclades, together with Delos, and, by granting the latter island to Athens, won over that city to the side of Mithridates. On his appearance in Greece, the Achæans, the Laconians, and the Bœotians (except the people of Thespiæ), at once flocked to his standard. A three days' battle was fought in the neighborhood of Thespiæ, with indecisive result, but Archelaus was forced to fall back upon Athens and Piræus. In the summer of 87 B.C., Sulla landed in Greece and proceeded against Archelaus. After long and hard fighting Athens and Piræus were taken, in March, 86 B.C., and Archelaus retreated to Chalcis. Here he was joined by reinforcements from Mithridates, but he met with a crushing defeat at Chæronea. Of 120,000 men that Archelaus led into battle, barely 10,000 reassembled at Chalcis. In the meantime Mithridates sent into Greece a further force of 80,000 men under Dorylaus. With this force Archelaus faced the enemy at Orchomenus in 85 B.C. His army was almost entirely destroyed, but Archelaus himself, after hiding for several days in a swamp, finally escaped to Chalcis. Peace followed, but Archelaus, by his conduct in the negotiations, awakened the suspicions of Mithridates, and was, as a result, driven to side with the Romans in the second and third Mithridatic wars. (See FIMBRIA; MITHRIDATES; SULLA.)—5. Son of the preceding. He married Berenice, daughter of King Ptolemæus Auletes, in 56 B.C., and ruled over Egypt for the short space of six months during the banishment of Ptolemæus. He lost his life in a battle against Aulus Gabinius, proconsul of Syria.—6. Grandson of the preceding. He obtained from Marcus Antonius the province of Cappadocia, which he retained during the reign of Augustus. Tiberius accused him of political innovations and condemned him to death; but he was already old and broken, and he died at Rome soon after his trial, in 17 A.D.—7. A Greek sculptor, born at Priene, celebrated for his bas-relief representing the "Apotheosis of Homer," which was found in the seventeenth century on the Via Appia, near Bovillæ. The relief appears to be the votive offering of a poet made for a victory won at a poetic contest. Its time is placed all the way from 150 B.C. to the beginning of the first century A.D. The relief was purchased in 1819 for the British Museum.—8. Son of Herod, tyrant of Judæa. He succeeded his father in 4 B.C., and maintained his position against an insurrection raised by the Pharisees. His heirship to the throne being disputed by his brother Antipas, Archelaus went to Rome, where his authority was confirmed by Augustus, who made him Ethnarch of Judæa, Samaria, and Idumæa. After a reign of nine years he was deposed by Augustus, on account of his cruel tyranny, and banished to Vienna in Gaul, where he died. His territories were added to the Roman province of Syria.

ARCHENHOLZ, är'kĕn-hōlts, JOHANN WILHELM, BARON VON (1743–1812). A German historian. After service in the army, he gained his discharge at the close of the Seven Years' War and passed several years in travel, visiting almost all the principal cities of Europe and supporting himself by authorship. He wrote *Geschichte des siebenjährigen Krieges* (1789; 13th ed., 1892), which, when compared with the generally dry style of his German contemporaries, deserves praise on account of its narrative interest. He also wrote *Annalem der britischen Geschichte* (20 vols., 1789–98), and biographies of Queen Elizabeth of England and Gustavus Vasa of Sweden.

AR'CHEOZO'IC E'RA. The period of geological time compassed by the formation of the rocks of the Archean system (q.v.). It is therefore the earliest of the major time divisions. No fossils or other direct evidences of life have come down to us from the Archeozoic, but the existence of some form of life at that time is inferred from the presence of carbonaceous materials and the probable occurrence of carbonates. Owing to their absence and to the very

great difficulties encountered in establishing any orderly arrangement of the rocks, no estimate of the duration of the era is possible, although it must have been very great.

ARCH'ER, BELLE (1860–1900). An American actress, named Arabella S. Mingle, but known as Miss Archer after her marriage in 1880 to Herbert Archer, from whom she was divorced in 1889. She was born at Easton, Pa., and made her début at Washington, D. C., with William Florence in *The Mighty Dollar*. Afterward she appeared in *Pinafore*, *Hazel Kirke*, etc., and for some time played with E. H. Sothern, as Rose in *Lord Chumley* (1888) and in other pieces. She also supported Alexander Salvini, and in Daly's company took the part of Maid Marian in the later productions of Tennyson's *Foresters*. In 1894, after having left the stage for a time, she resumed her career as a star, and afterward was for a while leading woman with Sol Smith Russell.

ARCHER, BRANCH T. (1790–1856). A Texas patriot. He was born in Virginia, where in early life he practiced medicine. In 1831 he went to Texas, took part in the Revolution, and in 1835 presided over the "consultation" called by the American settlers to consider the subject of independence. During the same year he was one of the three commissioners sent to Washington to solicit aid from the United States. In 1836 he was Speaker of the Texas House of Representatives, and from 1839 to 1842 was Secretary of War for the new Republic.

ARCHER, FREDERIC (1838–1901). An American organist, born at Oxford, England. He studied music in London and Leipzig, and held musical positions in England and Scotland until 1880, when he was appointed organist of Plymouth Church, Brooklyn, N. Y. Afterward he became conductor of the Boston (Mass.) Oratorio Society, director of Carnegie Music Hall, Pittsburgh, Pa., and in 1899 organist of the Church of the Ascension, Pittsburgh. He founded, in 1885, the *Keynote*, which for a time he edited. In 1896 he established the Pittsburgh Symphony Orchestra. He published, besides numerous compositions for the organ, *The Organ* and *The College Organist*.

ARCHER, JOHN (1741–1810). An American physician. He was born in Maryland, and graduated at Princeton in 1760, the first man in the United States to receive the degree of doctor of medicine, when he graduated at the Philadelphia Medical College in 1768. He was an officer in the army of the Revolution, a member of the Maryland General Assembly, and a representative in Congress from that State for three terms, 1801–07.

ARCHER, WILLIAM (1856—). An English dramatic critic, born at Perth, Scotland. He received the degree of M.A. at Edinburgh University in 1876, and was on the staff of the Edinburgh *Evening News* from 1875 to 1878. He was a dramatic critic of the London *Figaro* from 1879 to 1881; was called to the bar at the Middle Temple in 1883, and succeeded Dutton Cook as dramatic critic of the London *World* in 1884, where he remained till 1905. Subsequently he was dramatic critic for the London *Tribune* and for *The Nation*. Reinforced by Bernard Shaw and a few others, Archer introduced Ibsen to the English stage, and indeed to the English-speaking world; his efforts gained for *The Pillars of Society* its first London production in 1880, and it was his translation of *A Doll's House* that was presented nine years later. In 1890–91 he edited and in part translated the prose dramas of Ibsen, and published them in five volumes; this edition was followed by his *Collected Works of Ibsen* in 11 volumes. Archer has been a tonic influence upon the whole course of English and American contemporary drama. Among his works pertaining to the English drama are: *English Dramatists of To-day* (1882); *Henry Irving*, a study (1883); *About the Theatre* (1886); *Study in the Psychology of Acting* (1886); *W. C. Macready*, a biography (1890). He translated from the Norwegian Kielland's beautiful *Tales of Two Countries* (1891), and from the Danish a large part of Georg Brandes's *William Shakespeare* (1898). He visited the United States in 1899 to study the stage here, and after his return published *America To-day* (1900). Later books include: *Poets of the Younger Generation* (1901); *Real Conversations* (1904); *A National Theatre: Scheme and Estimates* (with H. Granville Barker, 1907); *Through Afro-America* (1910); *The Life, Trial, and Death of Francisco Ferrer* (1911); *Play-Making* (1912).

ARCH'ER-FISH. Any of the small spiny-rayed East Indian fishes of the family Toxotidæ. They are said to eject from their mouths drops of water aimed at insects. These, when the aim is good, fall to the water and are seized as prey by the fish. Specifically, the name is applied to *Toxotes jaculatrix*, which, because of this interesting habit, is often kept in house aquaria in the East.

ARCH'ERY (OF. *archerie*, from LL. *arcarius*, bowman, from Lat. *arcus*, bow). The use of the bow and arrow is still practiced by enthusiasts as a means for the capture and destruction of game; but its main use to-day, except in a few remote nations, is as a recreation and healthful exercise. The use of the bow and arrow is coeval with man's authentic history; thus Ishmael "dwelt in the wilderness of Paran and became an archer" (Gen. xxi. 20). The archery of Jonathan is specifically referred to in Holy Writ, and Josephus, the Jewish historian, alleges that the bow was considered the most efficient weapon of the Jews. It was deadly in the hands of their conquerors, the Babylonians, who have left many sculptured memorials of their prowess with it. It is not surprising, therefore, to find that their near neighbors, the Persians, cultivated its practice, or that the Scythians carried the lesson of its value to the Greeks, from whom it passed, with the empire of the world, to the Romans. These, in their turn, were vanquished by the superior skill of the archers of the Goths, Huns, and Vandals.

Both as a weapon of the chase and for military purposes, the bow was for centuries most formidable in the hands of the English. With the longbow they decided the fate of nations, as at Crécy (1346) and Poitiers (1356) and Agincourt (1415). The skill of their hunters and the wonderful feats of their archers have come down to us from many sources. Especially are the ballads rich in incidents of their prowess. One old black-letter ballad, reprinted in Percy's *Reliques*, tells of "Three Archers," one of whom, shooting before the King, split a wand in two at a distance of 400 yards; and then, not satisfied with this example, tied his eldest son, a lad of seven years of age, to a stake 120 yards off, and cleft an apple placed on his head.

In a treatise on martial discipline, by Ralph Smithe, written in the time of Elizabeth, we have a picture of the English archer: "Captens and officers should be skillful of that most noble weapon the long-bow; and to see that their soldiers, according to their draught and strength, have good bowes, well nocked, well strynged, everie strynge-whippe in their nocke, and in the middes rubbed with wax braser, and shutting-glove, some spare strynges trymed as aforesaid; every man one shefe of arrows, with a case of leather defensible against the rayne, and in the same four-and-twenty arrowes, whereof eight of them should be lighter than the residue, to gall or astoyne the enemye with the hailshot of light arrowes before they shall come within the danger of their harquebus shot. Let every man have a brigandine or a little coat of plate, a skull or hufkyn, a maule of leade of five foote in lengthe, and a pike, and the same hanging by his girdle with a hook and a dagger."

In Queen Elizabeth's reign the practice of archery ceased to be a national necessity; yet she was able to offer Charles IX of France 6000 men, one-half of whom should be archers; and shortly before the beginning of her reign the celebrated scholar, Roger Ascham, who was a lover of all kinds of sport, wrote the classic work on archery, *Toxophilus, or the Schole of Shooting*, in 1545, in which he gave minute directions on attitude and the manner of drawing the bow. It is a very practical book; indeed, one point he makes is worth transcribing even to-day. Young archers, he says, generally fall into the fault of fixing the eye on the end of the arrow rather than on the mark. To obviate this evil he advises them to shoot in the dark by night at lights set up at their proper distances—a very shrewd bit of advice.

England had not a monopoly of skill in archery; even in the Middle Ages the Egyptians, Arabs, and Turks ran them close. Baumgarten, indeed, relates that he saw 60,000 Mamelukes assembled in a spacious plain, who exhibited almost incredible agility in shooting on horseback, shooting arrows while in full career, and mounting and remounting on either side of their horses and shooting time and again, yet seldom or never missing their mark. He even asserts that horsemen shot while guiding two horses, one under either foot, as men ride in a circus, and their arrows found their mark.

So universal, indeed, was the skill in archery before the advent of gunpowder that no country has been discovered in which it was not the chief reliance of the natives in the chase and war. Vasco da Gama found it in the East Indies and Columbus in the West. The Amazons of South America opposed the invading Spaniards with it. It was found by Cabral in Brazil, and in the uttermost solitudes of the Arctic regions it was in use among the Eskimos. Even to-day the pigmy Bosjemen, in the far interior of Africa, bring the mightiest of game to earth with their poison-tipped arrows: a very ancient and widespread practice to which Justin bears witness in the time of Alexander, and Pliny among the Gauls, as well as Vergil and numerous other classical chroniclers.

But the introduction of gunpowder gradually put an end to the use of the bow and arrow, notwithstanding valiant efforts to maintain the ancient traditions. The Rolls of Parliament are full of indications of the gradual falling off of the voluntary practice of archery at the town butts. It was almost unheard of until it came into new life in London in the year 1760 as an exercise conducive to the improvement of health, and as such it met with a very favorable reception—so much so that by 1781 the Royal Toxophilite Society was formed. The almost continuous wars in which Great Britain for the next 30 years was involved put a limit to it; but after the peace of 1813 archery gradually assumed a stronger position, attested even to this day by numerous societies, popular gatherings, and contests. Modern practice in archery is mainly confined to shooting at targets, although a few sportsmen use it for still hunting. The modern targets are set at various ranges, and the concentric rings of gold (in the centre), red, blue, and black and white have a value in counting of 9, 7, 5, 3, and 1, respectively. In America there are annual competitions of the National Archery Association, and other annual contests by the Potomac Archery Association and the Eastern Archery Association. In these there are contests in "Double national rounds" of 96 arrows at 60 yards and 48 arrows at 50 yards; "Double Columbia rounds" of 48 arrows at 50 yards, 48 arrows at 40 yards, and 48 arrows at 30 yards; "Double York rounds" of 144 arrows at 100 yards, 96 arrows at 80 yards, and 48 arrows at 60 yards; "Double American rounds" of 60 arrows at 60 yards, 60 arrows at 50 yards, and 60 arrows at 40 yards; "Potomac rounds" of 24 arrows at 80 yards, 24 arrows at 70 yards, and 24 arrows at 60 yards; as well as competitions for the longest flight and team competitions of 96 arrows at 60 yards for men and 96 arrows at 50 yards for women.

The crossbow, or arbalest, was shorter than the longbow. It was mounted on a stock, and discharged by means of a catch or trigger. This form of archery was chiefly used by the English at the sieges of fortified places and in naval battles. Ultimately its use was, in the reign of Henry VII (1485–1509), forbidden by law, but continued intermittently for a long time.

Partly as the result of the growing popularity of tennis, archery began to lose ground in this country in the early '80s of the last century, but about the year 1905 there appeared definite symptoms of a revival of interest in it, and during the next few years this interest steadily increased, so that by 1913 flourishing archery clubs had been formed in many of the larger cities throughout the United States. The annual meeting of the National Archery Association at Boston, Mass., in July, 1913, brought together one of the largest assemblages of archers ever seen in this country.

Consult: Roger Ascham, *Toxophilus, or the Schole of Shooting* (London, 1868); G. A. Hansard, *The Book of Archery* (London, 1840); E. S. Morse, *Archery, Ancient and Modern* (Worcester, Mass., 1792); Maurice Thompson, *The Witchery of Archery* (New York, 1878)—a charming book, and the standard American treatise on the subject; T. Roberts, *The English Bowman* (London, 1801); T. Waring, *A Treatise on Archery* (London, 1828).

ARCH'ES, COURT OF. The court of appeal of the Archbishop of Canterbury, as metropolitan of the province. The name is derived from the ancient place of sitting, which was in the Church of St. Mary of the Arches, now usually called Bow Church, in London. The judge of the Court of Arches is styled the Official Principal, although he has for several centuries received

the additional title of Dean of the Arches. Appeals from judgments of this court are heard before the judicial committee of the Privy Council (q.v.). The Court of Arches is empowered to hear such suits as are sent up to it by letter of request from the consistorial courts of the bishops of the province of Canterbury after they have issued commissions of inquiry and the commissioners have made their report. The Court of Arches is the only ecclesiastical tribunal which has authority to pass sentence of deprivation against a clerk in holy orders. Since 1875 the judge of the provincial courts of Canterbury and York has performed the functions of official principal of the Court of Arches, under the Public Worship Regulation Act of 1874.

ARCHETYPE, är'kē-tīp (Gk. *ἀρχέτυπος, archetypos;* Lat. *archetypum,* a stamp, die, or model). The original design or pattern after which anything is made or modeled. In numismatics an archetype is the standard coin to whose weight, shape, and design all others of the issue must conform. In palæography the name is applied to an original manuscript from which a number of others are copied, these being then described as constituting a single "family." (See TEXTUAL CRITICISM.) In biology the archetype is an assumed system or structure on which any group of living organisms, whether animal or vegetable, is said to have been made.

ARCHEVITES, är'kē-vīts. A people mentioned in Ezra iv. 9. The term probably refers to the inhabitants of Erech in Babylonia (see URUK), who were deported to Samaria by "the great and noble Asnappar"—i.e., Ashurbanipal (668–626 B.C.)—possibly because they had united with Babylon in the revolt of Shamash-shumukin.

ARCHIAC, är'shē'ăk', ETIENNE JULES ADOLPHE DESNIER DE SAINT SIMON, VICOMTE D' (1802–68). French geologist and paleontologist, born at Rheims. He began the study of geology in 1830, paying particular attention to the geologic formations of France, Belgium, and England. His most important work is *Histoire des progrès de la géologie, 1834–1839* (8 vols., 1847–60).

ARCHIANNELIDA, är'kĭ-ăn-nĕl'ĭ-dă (Gk. *ἀρχι-, archi-,* chief, first, primitive + Neo-Lat. *Annelida,* from Lat. *annellus, anellus,* little ring). A group of small primitive marine worms, regarded by Parker and Haswell as a class, embracing only the families Polygordiidæ and Histriodrilidæ, the latter minute egg-devouring parasites of the lobster.

ARCHIAS, är'kĭ-as (Gk. *Ἀρχίας, Archias*), AULUS LICINIUS. A Greek poet, known only through the famous oration *Pro Archia Poeta,* which Cicero delivered in his behalf in 62 B.C. He was born in Antioch, about 119 B.C., but early settled in Rome, where he gained the patronage of the prominent men of the day, as Marius and Lucullus, by writing poems on their warlike deeds. He had obtained citizenship in Heraclea, a city that had a formal treaty with Rome, and, on the basis of this fact, desired Roman citizenship, in accordance with a law passed in 89 B.C., which had given Roman citizenship to all individuals who could prove that at the time of the passage of the law their names had been included in the list of citizens of a city in Italy that had treaty relations with Rome. However, his status as a citizen of Rome was challenged, and his case was pleaded by Cicero. The decision of the judges is not known.

ARCHIATER, är'kĭ-ā'tĕr (Gk. *ἀρχίατρος, archiatros,* chief physician, whence Ger. *Arzt,* physician). A title given by the successors of Alexander to their chief physicians; and, later, by some Roman rulers to their favorite medical attendants, who were usually Greeks. It was bestowed also on state physicians. In the latter sense the use of the title spread to all large towns, since in these a certain number of doctors were selected as *archiatri,* with salaries and perquisites from the public treasury; they were required to minister to the poor without charge. They also served in the same capacity as modern health officers. Consult Watson, *The Medical Profession in Ancient Times* (New York, 1856), and Goldhorn, *De Archiatris Romanis* (Leipzig, 1841).

ARCHIBALD, är'chĭ-bâld, SIR ADAMS GEORGE (1814–92). A Canadian statesman. He was a native of Nova Scotia, and was chosen to the Colonial Legislature in 1869 and in 1888. In 1856 he was Solicitor-General, and one of the Liberal leaders. He was active in bringing about the confederation of the British Provinces, and in 1867 was President of the Council in the cabinet formed by Sir John Young, and Secretary of State for the Provinces. During 1870–72 he was Lieutenant-Governor of Manitoba, and afterward served two terms as Lieutenant-Governor of Nova Scotia, and for a short period as Judge of Equity. He was knighted in 1885. In 1886 he was returned to the Dominion House of Commons.

ARCHIBALD, JAMES FRANCIS JEWEL 1871—). An American war correspondent and writer. He was born in New York City and graduated from Ohio Wesleyan University. Having served as war correspondent in the Chino-Japanese War, and with General Miles in several Indian campaigns, he volunteered as an aid-de-camp in the Fifth Army Corps during the Spanish-American War. He was a member of the first scouting expedition that landed in Cuba about a month before the outbreak of hostilities and was the first American wounded in the war. Afterward he saw much varied service as correspondent in all parts of the world: in the Sudan, South Africa, Venezuela, the Philippines, Russia, Morocco, Albania, and Portugal. He became a fellow of the Royal Geographical Society and of the Royal Society of Arts of London. His published writings include *Blue Shirt and Khaki* (1901), *Tales from the Trenches,* and several plays.

ARCHIDAMUS, är'kĭ-dā'mŭs (Gk. *Ἀρχίδαμος, Archidamos*) II (?–427 B.C.). A son of Zeuxidamus, and King of Sparta. He became King after the banishment of his grandfather, Leotychides, 469. In the fourth year of his reign Greece was shaken by a terrible earthquake, and Sparta was left a heap of ruins. Archidamus was at that time foremost in crushing the uprising of the Helots. Before the Peloponnesian War he spoke in favor of arriving at a peaceable settlement of the matters under dispute. In 431 he led an army into Attica, and in the three following years conducted campaigns. He was the father of the famous Agesilaus.

ARCHIDAMUS III (?–338 B.C.), son of Agesilaus and King of Sparta. He succeeded his father in 358. In 367 he defeated the Arcadians in the so-called "Tearless Battle." In 362, shortly before the battle of Mantinea, he successfully defended Sparta against Epaminondas.

At the beginning of the Sacred War he attacked the Phocians. In 338 he led an army to Italy to aid the Tarentines, and was killed in battle on the same day on which Philip won the battle of Chæronea.

ARCHIDAMUS IV, a grandson of Archidamus III, and King of Sparta. It is not known when he came to the throne or how long he ruled. He was King in 294 B.C., for he was defeated in battle in that year by Demetrius Poliorcetes.

ARCHIDAMUS V, a grandson of Archidamus IV, brother of Agis IV, and King of Sparta. On the occasion of his brother's murder (240 B.C.) he fled, but subsequently returned with the object of reëstablishing his power. He was, however, almost immediately slain by his brother's murderers, who feared his vengeance. Archidamus V was the last king of the Eurypontid line.

ARCHIDAMUS. A Bohemian lord in Shakespeare's *A Winter's Tale*, appearing only in Act i, Scene 1.

ARCHIL, är'kĭl (of uncertain origin), or **ORCHIL,** ôr'kĭl (*Orseille*). A coloring substance obtained from various species of lichens. The archil is not originally present in the lichens, but is developed by the following treatment: The lichens, collected from rocks near the sea, are ground into a pulp with water and diluted ammonia is added; certain colorless acids (erythric acid, etc.) contained in the lichens gradually change, under this treatment, into a purple substance, *orcein*, which is the coloring principle of archil. (If in the same process the carbonate of sodium or of potassium is added to the pulp, ordinary litmus is produced in place of *orcein*.) Archil imparts a beautiful and durable violet color to marble. It has also been used in coloring wines, and was formerly used in wool dyeing, yielding red and violet shades. It is brought into the market in three different forms. The name *archil* is commonly applied to the ordinary pasty form. When offered in the form of a dry mass, it is called *persis*, while powdered archil is known as *cudbear*. The lichens used in the manufacture of archil grow on the rocky coasts of South America, Madagascar, Zanzibar, the Canary Isles, and a number of other places. They belong principally to the genus *Roccella*. They are sometimes called orchella weed, or dyer's moss.

ARCHILOCHUS, är-kĭl'ō-kŭs (Gk. Ἀρχίλοχος, *Archilochos*). A native of the island of Paros, who flourished in the seventh century B.C., and is regarded as the first of the Greek lyric poets, although the origin of the elegy is ascribed to Callinus, a writer who flourished a short time before Archilochus. Glimpses of his life, especially of the calamities which befell him, were frequently given in his writings, which are strongly personal throughout. His father's name was Telesicles; his mother was a slave called Enipo. At an early age, becoming entangled in political contests, he abandoned his native town and led a colony of its citizens to Thasos, in 650 or 640 B.C. While here, as he informs us in some extant verses, he lost his shield in a battle against the Thracians, yet not through cowardice. Subsequently he was banished from Sparta, to which he had gone, some say because the Spartans resented the frivolous verses in which he had vindicated his conduct in running away from the fight; others, because of the license of his verses. He is said to have gained the laurel wreath at the Olympic games by an ode in honor of Hercules, but this is doubtful. Having returned to Paros, he took part in the war which broke out between it and Naxos, in the course of which he lost his life. The Delphian oracle, it was said, pronounced a curse upon his slayer. Variety, novelty, and satirical bitterness, of a narrow and personal sort, characterized his lyric poems, so much so that "Archilochian bitterness" and "Parian verse" became bywords in ancient times. He scourged his enemies in the most merciless fashion and always displayed the most malicious skill in selecting for his sarcasm the points on which they were most sensitive. It is said that Lycambes, who had promised his daughter Neobule in marriage to Archilochus, having failed to fulfill his promise, was so severely satirized by the poet that, to escape ridicule, both father and daughter hanged themselves. The ancients ranked Archilochus with Homer. They dedicated the statues of both on the same day and placed the head of Archilochus beside that of Homer on the same herm. As Homer was the creator of epic poetry, so Archilochus was regarded as the inventor of the poetry of the passions and of biting raillery, of iambic poetry; the iambic trimeter Archilochus brought to perfection. He became the model for the Old Athenian Comedy and for later poets—e.g., for Horace in his earlier period, that of the Epodes, which he sometimes calls *iambi*. He is said to have invented many new metrical forms, but his fame and influence were due primarily to his native genius. Only bare fragments of his compositions remain. They have been edited by Bergk, *Poetæ Lyrici Græci* (Leipzig, 1882).

ARCHIMAGE, är'kĭ-māj. 1. The foul magician who, in Spenser's *Faerie Queene*, assumes the guise of the Red Cross Knight and thereby entices Una from her search. He stands in the allegory for the personification of Falsehood. 2. The personification of Indolence in Thomson, *Castle of Indolence* (1748).

ARCHIMANDRITE, är'kĭ-măn'drīt (late Gk. ἀρχιμανδρίτης, *archimandritēs*, from Gk. ἀρχι-, *archi-*, chief + μάνδρα, *mandra*, a fold, i.e., a convent). The title of the highest order of superiors of convents in the Greek church, corresponding to abbot (q.v.) in the Latin church; except that, strictly speaking, an archimandrite presides over several monasteries, whereas the *hegumenos* was over only one, and so the latter was nearer to an ordinary abbot. The Russian bishops are chosen from among the archimandrites.

ARCHIMEDEAN MIR'ROR, är'kĭ-mē'dē-ăn. See MIRROR.

ARCHIMEDES, är'kĭ-mē'dēz (from *Archimedes' Screw;* see below). A genus of fossil Bryozoa of the family Fenestellidæ, common in some so-called "Archimedes Limestones" of the early Carboniferous Age in the Mississippi valley and in some of the southwestern States. The minute animals of this genus dwelt in colonies attached to the ocean floor and secreted a calcareous framework of spiral form, the axis of which resembles the Archimedes' screw (q.v.). Continuing the comparison, the thread of the screw is produced as a reticulated expansion, upon the upper surface of which are situated the cells that served as dwelling places for the individuals. The cell-bearing portion of the colony is seldom found connected with the spiral axis, having, by reason of its delicacy, been usually broken off by the action of the waves. Some

nearly complete examples have been found in the soft shales of the Keokuk group at Crawfordsville, Ind. See also BRYOZOA; CARBONIFEROUS SYSTEM; and for illustration, see Plate of POLYZOA.

ARCHIMEDES (Gk. Ἀρχιμήδης, *Archimēdēs*) (287–212 B.C.). A Greek geometrician and mechanician, the greatest mathematician of antiquity. He was born in the State of Syracuse, in the island of Sicily. He studied probably under Conon at the University of Alexandria, spending the major part of his life in Sicily. He was killed in the sack of Syracuse. The most important among his extant works include three on plane geometry, three on solid geometry, one on arithmetic, and three on mechanics. In the treatise on the measurement of the circle, the value of π is given as a number less than $3\frac{1}{7}$ and greater than $3\frac{10}{71}$. He also gave formulas for the area of the circle and the ellipse, and for the sector of a spiral whose equation is $r=c\theta$. His demonstration that the area of a segment of a parabola is two-thirds that of the inclosing parallelogram is the first real example of the quadrature (q.v.) of a curvilinear surface. His method of exhaustion is suggestive of the modern methods of calculus. In the works on solid geometry are treated the volumes of spheroids and conoids. His arithmetical work, known by its Latin title, *Arenarius* ('sand-reckoner'), contains his famous attempt to express the amount of sand required to fill the universe. This work has given rise to the conjecture that Archimedes invented a new and powerful system of notation, all knowledge of which perished with the work itself. Besides his work in pure mathematics, Archimedes also made valuable contributions to applied mathematics, including applications of geometry to the theory of machines, as levers, pulleys, and screws. He also improved the methods of finding centres of gravity. In accordance with a wish of Archimedes, Marcellus raised in his honor a tomb, on which was engraved a sphere inscribed in a cylinder. Cicero, in his *Tusculan Disputations*, gives a charming account of his discovery of the tomb in 75 B.C. The most noted editions of Archimedes' works are those of J. Torelli (Oxford, 1792), J. L. Heiberg (Leipzig, 1881), and T. L. Heath (Cambridge, 1897).

ARCHIMEDES, THE PRINCIPLE OF. One of the most important principles in the science of hydrostatics, so called because the discovery of it is generally ascribed to the Syracusan philosopher. It may be thus stated: A body, when entirely surrounded by a fluid, is buoyed up by a force equal to the weight of the fluid it displaces. This is an immediate consequence of the principles of fluid pressure, which prove also that the line of action of the upward force is vertically through the centre of gravity of the displaced fluid. When bodies lighter than water are wholly immersed in it, they displace an amount of water of greater weight than their own, so that if left free to adjust themselves they rise to the surface and float, only as much of their bulk being submerged as will displace a quantity of water weighing the same as themselves. Accordingly, while bodies heavier than water displace, when put into it, their own volume, bodies lighter than water displace, when allowed to float on the surface, their own weight of the fluid. Bodies of the same density as water, according to the principle of Archimedes, have no tendency to rise or sink in it, for the water displaced by them weighs precisely the same as they do. Similar statements may be made with respect to bodies surrounded by other liquids or by gases, e.g., the atmospheric air. The buoyancy of balloons is an illustration of the principle of Archimedes as applied to the atmosphere. See HYDROSTATICS.

ARCHIMEDES' SCREW (called also SPIRAL PUMP). A machine for raising water, said to have been invented by Archimedes, during his stay in Egypt, for draining and irrigating the land. Its simplest form consists of a flexible tube bent spirally round a solid cylinder, the ends of which are furnished with pivots, so as to admit of the whole turning round its axis, as is shown in Fig. 1. The machine is placed in an inclined position, so that the lower mouth of the tube may dip below the surface of the water to be raised. The lowest bend of the tube will be filled with water, and if now the handle be made to turn in the direction of the hands of a watch, the mouth of the spiral tube will be raised above the surface; and the water inclosed in the tube, having no means of escape, will flow within it until, after one revolution, it will occupy the second bend. The first bend has meanwhile

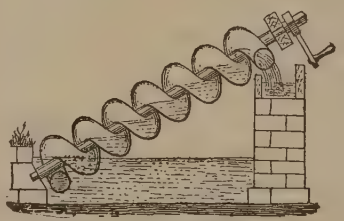


FIG. 1.

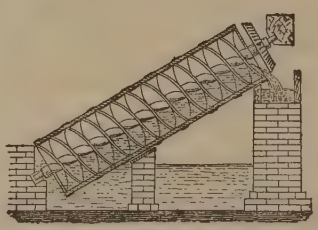


FIG. 2.

received a second charge, which, after a second revolution, flows up into the second bend and takes the place of the first charge, which has now moved up to the third bend. When, therefore, as many revolutions of the cylinder have been made as there are turns in the spiral tube, each of the lower bends will be filled with water; and in the course of another revolution, there being no higher bend for the water of the first charge to occupy, it will flow out of the tube by its upper mouth. At each succeeding revolution the lowest bend will be charged and the highest discharged. It will be seen that there may be room to dispose a second tube side by side with the first, round the cylinder, in which case the screw would be called double-threaded. In the ordinary construction of these machines the cylinder itself is hollowed out into a double or triple-threaded screw, and inclosed in a water-tight case, which turns round with it, the space

between the threads supplying the place of tubes. It is sometimes found convenient to fix the exterior envelope and to make the screw work within it, the outer edge of the latter being as close as possible to the former without actual contact, as is shown in Fig. 2. This modification of the Archimedes' Screw receives the name of "water screw," and frequently of "Dutch screw," from its use in Holland for draining low grounds.

ARCHIPELAGO, är'kĭ-pĕl'ȧ-gō (Gk. *ἀρχι-πέλαγος archipelagos*, chief sea, originally the Ægean Sea, to distinguish it from the other smaller Grecian waters; from *ἀρχι-, archi-*, chief + *πέλαγος, pelagos*, sea). A term now applied to any definite sheet of water interspersed with many islands, but formerly restricted to the Ægean Sea (q.v.), and its islands. The islands are usually divided into two groups, the Cyclades and the Sporades. Of the former group Delos, Lyra, Cythnos, Thera, Andros, and Melos are more prominent; of the Sporades, some of which belong to Turkey, Rhodes, Cos, Patmos, Samos, and Lemnos are the more significant. They are of volcanic origin, have a healthful climate and beautiful scenery. These islands have played an important part in the course of Greek history. For a more detailed description, see CYCLADES; SPORADES; and individual islands.

ARCHITECTS, AMERICAN INSTITUTE OF. A society established in 1857. In 1912 it had 34 chapters, 303 fellows, 678 members, and 59 honorary members.

ARCHITECTURE, är'kĭ-tĕk'tûr (Lat. *architectura*, Gk. *ἀρχιτεκτονία architektonia*, from *ἀρχι-, archi-*, chief + *τέκτων, tektōn*, worker in wood; carpenter, craftsman). In its widest sense this term includes any kind of building such as works of military and naval construction and civil engineering; but, strictly speaking, it is building raised by certain æsthetic qualities to the rank of art, as distinguished from purely utilitarian or mechanical building. Its name shows that it was regarded by the ancients as the chief art, comprising all others, the architect being director of works, and responsible for whatever sculpture and painting was used in connection with the building. This ancient tradition ruled throughout the Middle Ages, and it was not until the Renaissance in the fifteenth century that architecture lost its right to govern the other arts. Because architecture had this character of the most universal art, using sculpture and painting in subordination, the formation of what we call an architectural style—like the Greek or the Gothic style—was a complex and gradual process. For architecture, being one of the earliest and most constant expressions of civilization, is not the artificial product of the free conception of a few artists, but is fundamentally affected, on the one side by the religious and social elements of society, whose demands it must meet, and on the other by the material elements such as the influences of climate, of materials of construction and decoration, which limit or in certain directions stimulate artistic originality. So that in every age architecture is a faithful mirror of contemporary society, and at once the most material and the most ideal of the fine arts.

Egypt. In respect to historic development, Egypt and Babylonia—the valleys of the Nile and of the Tigris and Euphrates—are rivals for seniority in the field, which they seem to have held alone for one or more thousand years, while the rest of the world went without architecture. It is true that the extant monuments of Egypt between c.5000 and 2500 B.C. are works of mere building rather than of art. The pre-pyramidal tombs; the pyramids themselves; the primitive chapels or temples connected with them (such as the "Temple of the Sphinx"); the early mastaba-tombs and all other works of the Ancient Empire, have few truly architectural features. The pyramids, temples, and tombs have no moldings, decorations, or details that indicate style. It is incontestable that palaces and temples existed in this early age, but the use of perishable materials and subsequent rebuildings doubtless account for their total disappearance. It is only in the Middle Empire (c.2200) that the type of columnar temple was evolved, which became the glory of Egypt, and that tombs were made—as at Beni-Hassan (see TOMB)—where there were columns and other features with a distinct artistic character—such as the "Doric" type, and the clustered-palm type. The destructive invasion of the Shepherd Kings has forever obscured this second stage of Egyptian architecture, and for a knowledge of its possibilities the Golden Age is that of the New Empire, especially between c.1600 and 1300, supplemented by the much later constructions of the Ptolemaic Age, almost equally magnificent. Some of the temples were entirely excavated in the rock like those at Abu-Simbel (q.v. for illustration); others were partly excavated, partly structural, as at Deir-el-Bahari; but the great majority were built entirely in the open and of stone masonry. A few are sepulchral temples, such as the Ramesseum (q.v.) of Rameses II near Medinet Habu, but with these exceptions they are purely temples to the gods. Each temple of the usual type was approached through a long avenue of sphinxes or statues, was preceded by an immense façade of pylons connected with an encircling wall, with an open columnar court, at the opposite end of which was a hall of columns forming the prelude to the sekos or dark inner sanctuary. This is undoubtedly the earliest conception of a large columnar interior in architectural history, and though its proportions may be heavy, the composition was artistic and imposing, and both sculpture and color were used with architectural details to enhance the effect. Karnak, Luxor, the Ramesseum, Edfu, and Philæ are the masterpieces of a period covering some 1500 years (for illustrations of EDFU and LUXOR, see those titles). No vaults or arches were used in any part of this architecture—only the straight lintel, the column, and sometimes piers fronted by figures of Osiris. The heavy columns, of so many forms as to rebel at any classification by orders, were placed very close together, so that the effect was not one of spaciousness.

Babylonia and Assyria. The beginnings of Babylonian architecture are, like those of Egyptian art, lost in the mists of antiquity, but it reached its full development long before the Egyptian, and, while the latter remained isolated, stood at the head of a long architectural genealogy, for Elam and Assyria literally copied it; Persia, the Hittites, the Phœnicians and other nations borrowed from it, and its influence was felt even to China and India. Through nearly 5000 years previous to Nebuchadnezzar's time this architecture underwent little change. There could be no sharper contrast than that which it presents to Egyptian types. Owing to the lack of stone and scarcity of timber, brick,

for the most part sun-baked, was the chief building material. Hence the arch and vault, carried by massive walls, took the place of the stately pillared halls, stone lintels and ceilings and sculptured piers and columns of Egypt. The temples had no large interiors, but were stepped pyramids, remarkable mainly for their great height, their external mass, and the brilliant coloring of their receding stories, faced with glazed tiles. Only in the royal palaces did the Babylonians excel, creating a type which the Assyrians developed with numerous halls and chambers grouped around three main courts. The palace at Tello, the temples at Erech and Ur, give the usual types; but the excavations at Nippur and Babylon have disclosed other splendors. Meanwhile the better preservation and more thorough study of the Assyrian ruins enable us to judge somewhat of the details of the earlier style. The temple observatory and the palace of Sargon at Khorsabad were destroyed by some great catastrophe—probably by fire—while they were still occupied, perhaps at the time of the fall of Nineveh; but their plans and decoration in sculpture and color can be reconstructed from extant remains. Glazed bricks and tiles and alabaster slabs carved in relief were the chief means of adornment. Neither the palaces nor the temples, however, could approach the monumental grandeur and stateliness of Egyptian architecture.

Hittites and Phœnicians. The Hittites, the rivals of both Egypt and Assyria, were great builders; like the Egyptians, they used stone and were constructors of fortresses. Of their temple architecture little is known; but their palaces—one of which has been excavated at Senjerli and another at Boghaz-Köi—appear to have been of a type similar to the Assyro-Babylonian. Their works were scattered from the confines of Assyria to the Syrian coast and as far northwest as the interior of Asia Minor. Of the architecture of the Phœnicians very little remains; they also built in stone, and like the Hittites used at first the Cyclopean and polygonal masonry. The great fortifications and ports of Arvad, Tyre, Sidon, and the colonies of Africa and Italy show that the utilitarian side of this architecture was more developed than the religious; for the temples themselves were but small shrines, none of them equaling, apparently, the temple of Jerusalem in size and splendor, though the actual work on this temple was done by Phœnician artisans and artists.

The Ægean Style. It was the migrating Pelasgic tribes of Asia Minor, the Mediterranean islands, Greece and Italy, whose works formed the first link between these early architectures of western Asia and that of the pre-Hellenic and Hellenic world, forming what is called the Ægean style, which flourished mainly between c.2000 and 1000 B.C. The cities of Crete, as Cnossus, and of other islands, of Troy and other cities in Asia Minor, Tiryns, Mycenæ, Argos, and others in Greece, besides many early Italian cities, such as Norba and Lignia, show how impressive and rugged a style of construction was combined by these races with a delicate and varied decoration, especially in the bee-hive domical tombs (Mycenæ, Thoricus, Vaphio, etc.) and in the royal palaces, which were as important in their way as those of the Assyrian kings.

Persia. The second connecting link was Persia. Its great palaces and tombs at Susa, Persepolis (q.v. for illustration), Meshed Murgab, and Pasargadæ, with monuments from Cyrus to Artaxerxes, show the influence of Egypt in their great columnar halls—though they are far more spacious and light than the Egyptian—of Babylon and Assyria in the use of brickwork, sculptured colossi, and friezes of reliefs, and in the curious double-animal capitals and the enameled tiles. From Lycia and the Greeks of Asia Minor came the high stone basements for their structures, the flutings of their columns, and many details. The hall of Xerxes at Persepolis is more than twice the size of the great hall at Karnak, and shows how such columnar interiors, once introduced into western Asia, were appreciated and developed. The later dynasties of Persia—both Parthian and Sassanian—threw off many of these foreign elements in a tendency to return to the brickwork, the domes, vaults, and arches of truly Oriental type, as can be seen in the palaces at Sarbistan, Firuzabad (q.v. for illustration), and Ctesiphon.

Greece. Meanwhile, even before the rise of Persian architecture, the Greeks had originated the Doric and Ionic (for illustration, see these titles) orders in all their essential features. The temple, which is the one central type in this architecture, appears to have developed out of the main hall of the Pelasgic royal palace, as it is seen in Crete, Troy, Tiryns, and Mycenæ, through a middle stage of crude brick walls, wooden columns, architraves, and gables, with terra-cotta revetment and decoration, into the final type of stone temple which was reached as early as the seventh century B.C. It is in Sicily and southern Italy that the earliest works of the Doric style are to be found (Syracuse, Selinus, Metapontum), while the earliest Ionic temples were in Asia Minor, at Samos and Ephesus; but these hardly rival the Doric in age, and their ruins do not belong, like those of the Doric temples, to the primitive structures. The normal type of these temples was a building raised on a three-stepped platform, and consisting of one main cella-chamber (*naos*) usually supplemented at one end by a smaller chamber (*opisthodomos*), and preceded at the other end by a pronaos, the whole being surrounded by a colonnade on all four sides, surmounted by an entablature and covered by a gabled roof terminating in pediments (q.v.). The æsthetic Greeks did not plan great columnar halls or courts like those of the Egyptian temples, but relied on external effects almost entirely; on refined beauty of outline and proportion. Never, until the period of decadence, was there any attempt at impressive size. The Doric style was heavy in proportion and plain in ornament, in comparison with the Ionic, but provided for more considerable figured sculpture in the friezes, metopes, and gables. It prevailed at first over nearly the entire Hellenic world, gaining gradually in delicacy and lightness, especially when handled by artists with Ionian blood, as was the case at Athens, which contains in the Parthenon and the Theseum the two finest works of the developed Periclean Age, though they are almost rivaled by some Italian and Sicilian works, such as the temples of Pæstum (q.v. for illustration) and Girgenti. At this time other works, such as the Propylæa at Athens, became worthy to stand beside the temples, and here the two styles—Doric and Ionic—were for the first time combined. The originality and daring of this Attic school were also shown in the Porch of the Maidens in the Erechtheum (q.v. for illustra-

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TEMPLE OF KARNAK, FROM THE RESTORED MODEL
IN THE METROPOLITAN MUSEUM OF ART, NEW YORK

tion). The succeeding Age of Praxiteles, and the Alexandrian Period brought even slimmer Doric proportions, increased favor for the more decorative Ionic style (temples of Miletus and Ephesus), development of the still richer Corinthian order (see COLUMN), and of colossal forms of public, civil, and sepulchral architecture (such as the propylæa, theatres, odeons, stoas, the altar at Pergamus, the mausoleum of Halicarnassus), in which Oriental splendor and love of the colossal overruled Hellenic restraint.

Rome. This prepared the way for Roman architecture. In the Royal and Early Republican Periods Rome had followed the Etruscan and Latin types: wooden temples with terra-cotta revetments in a *quasi*-doric style and civil structures of stone, vaulted and arched. These two types remained fundamental, except that before the close of the Republic stone had replaced wood and terra-cotta in the temples, the Ionic style had been introduced by Greek artists, and the Greek column and entablature had been added as a surface decoration and reënforcement to the constructive arcades in secular buildings. The Greek spirit informed the Roman in the sphere of art, without conquering it, for ordinarily it is not difficult to distinguish the two styles. The Roman temples are rarely peristyles, but prostyles, with a very deep portico or pronaos in front, and this alone would be sufficient to make their appearance differ fundamentally, even without the substitution of the richer and more slender Corinthian and Composite forms for the Doric and Ionic. But the true nature of Roman architecture appears in its civil structures: in theatres and amphitheatres, aqueducts, triumphal arches, palaces, villas, and, above all, in the baths or thermæ. The Roman genius for composition shines in such great combinations of structures as the Villa of Hadrian, the Palace of the Cæsars, the Forum of Trajan (see FORUM), and the Baths of Caracalla and Diocletian. And the great vaulted interiors of some of these buildings, such as the Basilica of Maxentius and the Baths of Caracalla, surpass anything previously conceived of in architecture. It was, indeed, the Romans who first conceived the design of vast unencumbered interiors with lofty roofs, and the grandeur of the circular Pantheon of Hadrian (120 A.D.) has never been surpassed. With the Greeks, architecture had been plastic; with the Romans, who developed the ideals of the Alexandrian Greeks, it was pictorial. It also combined, in the highest degree, utility and comfort with imposing and costly appearance. The whole civilized world was filled with the monuments of this art, which fell heir to the cultures of both the Orient and Greece.

Early Christian. With the advent of Christianity architectural development coincided with the building and decorating of churches. The public basilicas of Rome and the basilical halls of private houses offered admirable prototypes for the Christian halls of worship. The early Christian architecture, with thin brick walls, wooden ceilings, and long colonnaded interiors, at first prevailed everywhere, poverty of architectural form and detail being partly concealed by rich mosaic and marble ornamentation.

Byzantine and Basilical Styles. As early as the sixth century, however, the Oriental constructive spirit asserted itself once more in the Hellenic Provinces, and two sharply contrasted styles henceforth flourished side by side: the wooden-roofed Latin basilical architecture in the West, especially in Italy,—Rome, Ravenna, Salonica, central Syria, North Africa, being full of early basilicas; while in the East, especially Constantinople with St. Sophia (q.v. for illustration) the Byzantine architects developed a new type of church, wholly of masonry of brick or stone, in which a dome borne on pendentives was the central feature. (See DOME.) Ravenna, Greece, Asia Minor, and Syria possess numerous Byzantine churches; but the richest and finest of Byzantine churches, next to that of St. Sophia, is the church of St. Mark at Venice, dating from 1047. While the Byzantine style underwent, in the course of succeeding centuries, certain changes, such as the heightening of the drums of the domes, the decoration of the exterior with marble or alternate courses of stone and brick, the use of accessories like porches, colonettes, etc., these differences were of minor importance.

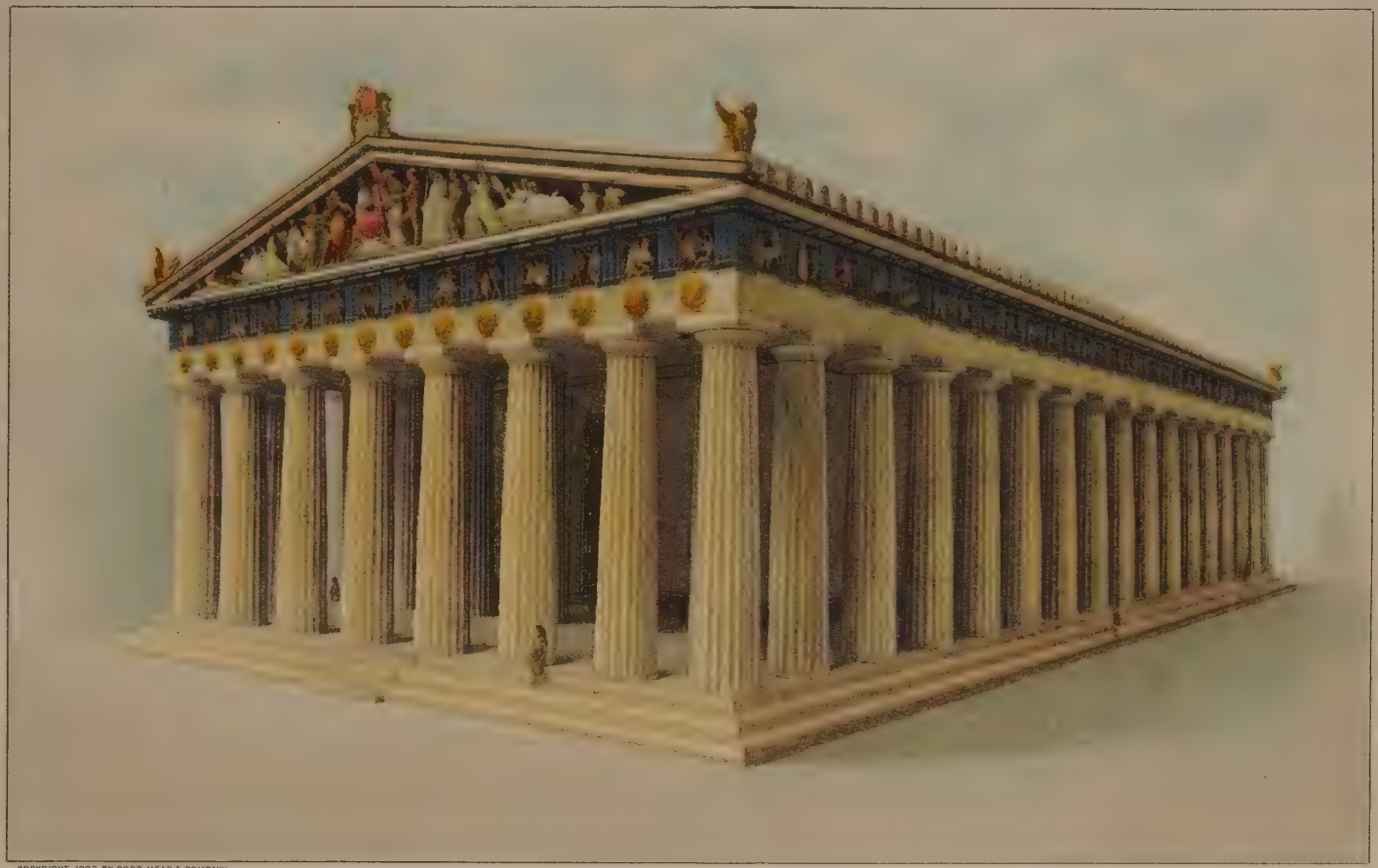
Mohammedan. In the West, on the contrary, the new civilization resulting from the awakening of the northern races in the eleventh century and their fusion with the old stock created for itself a new architecture of which the first phase is called Romanesque, the second Gothic. But before describing its characteristics, a phase of Oriental architecture which arose in the meantime must not be omitted—that of the Mohammedan peoples in the great empire founded by the Arabs in the seventh century. Syria, Palestine, Persia, Egypt, North Africa, Spain, Asia Minor, and other lands, wrested mainly from the Byzantines, were filled with monuments of a varied and rich style, based primarily on Byzantine and Persian models adapted to new purposes and different ideals. The mosques, mausoleums, minarets, khans, hospitals, bazaars, palaces, oratories, and fountains form a varied group of buildings. The Moorish school of Spain from the time of the mosque of Córdova to the Alhambra (q.v.) of Granada; and the Egypto-Arabic school of Cairo, from the mosques of Hassan and Tulun to that of Kaït Bey, are the best known; but the Syrian and Palestinian school, centred at Damascus, and the Persian school, centred at Bagdad and Ispahan, were fully as important—the latter sending out offshoots as far as distant India and Asia Minor. The development of the dome, the stilted, horseshoe and pointed arches, stalactite vaulting, geometrical decoration, particularly in brilliant faïence and mosaic—these are characteristics of the Mohammedan schools. The Golden Age began in the tenth century. The dominant type of mosque comprised a cloistered court leading to a low pillared hall of many aisles, as in the mosques of Kairwan, Damascus, and Cairo. The dome, at first used solely over the tomb in sepulchral mosques, was later used over the prayer-hall also, as in the famous Aksa Mosque and Dome of the Rock at Jerusalem. In the eleventh century the final fixed types had been reached; the minaret had become an essential adjunct; the geometrical style of ornament was complete with its bewildering tracery, and the dome had triumphed over the flat ceiling. In India, especially under the Moguls after 1494, the Persian forms of dome, minaret, and arch were blended with many Hindu features in magnificent mosques, palaces, tombs of sandstone and marble, of which the Taj at Agra (q.v.) is the most perfect example. The latest addition to the artistic heritage was through the Turkish conquest of Constantinople in the fifteenth cen-

tury, which led to a return in even greater force of the primitive influence of Byzantium.

Romanesque. Meanwhile Europe had enjoyed the architectural revival of the Romanesque Period. First Italy, then Germany and France, and finally England and Spain had felt the new artistic currents. There were no national styles, far less was there any unity throughout Europe. Each province had special characteristics. In parts of Italy, such as Tuscany and Rome, the arrangement of the early Christian basilica was preserved almost intact with the added enrichment of marble and mosaic incrustations and new architectural details. It was the same in most of Germany and northern France until the twelfth century. Some sections, as Venice and Sicily, were even strongly affected by Byzantine art. But the most fertile novelty of the age was the development of the vault, which found expression particularly in central and southern France and northern Italy. The dome (Périgord), the tunnel vault (Provence, Burgundy, Spain, etc.), and the groin or cross-vault (Lombardy) were all successfully used to cover churches of the basilical type of plan. The future of architecture lay in this development. Gradually the ribbed groin-vault gained the supremacy and spread to Germany, Normandy, and other provinces of France, preparing the way for the Gothic style. The great crypts, the porches, towers, façades of rich and varied types, a decoration of figured and ornamental sculpture, made possible by the use of stone in place of brick, were among the prominent features. This phase of vaulted Romanesque was rich, heavy, and impressive. It was particularly the style of the monastic orders.

Gothic. Out of it there gradually grew, in the course of the twelfth century, in the north of France, the Gothic architecture (q.v. for illustration), the perfect embodiment of vaulted constructive design (see VAULT) formed of three main elements: ribbed groin-vaults to cover the interior spaces; piers to receive their vertical weight; and flying buttresses, to transmit and resist their thrusts. The last-named feature, the flying buttress, or, more properly, the flying arch and buttress, was the culminating invention of the Gothic designers. It was the outcome of nearly a century's experiments in the effort to devise some means of adequately resisting the powerful outward thrusts of the high central vaults of nave and choir, without increasing the massiveness of the internal piers separating the aisles on which these vaults rested. By the flying arches these thrusts are transmitted to the massive buttresses built outside the side aisles, and the internal piers have to support only the vertical weight of the vaults. It was an anticipation of modern engineering principles. Thus resulted a species of stone skeleton which, when perfected, freed architecture from the thraldom of heavy walls; hence the development of large windows with their tracery and stained glass, the slender piers, the lofty vaults. The new style was hailed everywhere and spread from the region of Paris gradually over Europe, being best understood in Spain and England, less so in Germany, and least of all in Italy. It coincided with the bloom of mediæval sculpture, which remained the handmaid of architecture, contributing to the rich harmony of the style. For the first time since Roman days, a single general style prevailed throughout western Europe, though varied in detail by local schools and national peculiarities. The typical cathedrals are those of Paris, Amiens (q.v. for illustration), Rheims, and Cologne (the latter completed, however, only in recent times), having great choirs with radiating chapels and aisles, a transept with façades, a nave with two or four side aisles, a western façade with two flanking towers. Single towers in the centre of the front, as at Ulm; square screen façades, as at Peterborough; plain, square-ending apses, as often in England—all such features are variations from the orthodox French type. So are the many cases, especially in Italy, where wooden roofs in place of ribbed vaults are used with Gothic forms, but in violation of Gothic principles. The development of the Gothic styles was progressive. The French churches of the twelfth century retained many Romanesque forms and heavy proportions, as at Sens, Senlis, Noyon, and Laon. Larger windows and lighter tracery, more slender proportions, and greater height of vaulting came with the Golden Age of the thirteenth century, with Notre Dame in Paris (1163–1230), Chartres, Rheims, Amiens, and St. Denis. The attenuated geometric style reigned in France in the fourteenth century; then the flamboyant until the sixteenth century. In England the Early English corresponds to the thirteenth, the Decorated to the fourteenth, and the Perpendicular to the two succeeding centuries. Other countries had corresponding but less clearly marked divisions. The general tendency was increase of decorative richness and variety of form, a loss of scientific as well as artistic values, the invasion of prettiness in place of breadth and strength.

The Renaissance. Although Italy had created some large monuments in a *quasi*-Gothic style, monastic churches, such as Santa Croce and Santa Maria Novella in Florence, and the Frari in Venice; cathedrals, such as Siena and Milan (q.v. for illustration), Italian artists were prepared for the Renaissance style introduced by Brunelleschi and his followers early in the fifteenth century, a style based on the study of Roman monuments adapted to mediæval needs. The new style employed the dome very successfully in its churches, but it was preëminently a decorative and not a constructive style, and, like the Roman architecture which it followed, found its best expression in civil, not in religious monuments. Single artists stamped their works with a special style. Brunelleschi, Alberti, Bramante, Sansovino, Michelangelo, Palladio, are not merely names—they are types. The Roman scheme of using the constructive arch within a decorative framework of pilasters or columns and entablatures became a Renaissance commonplace. The palaces and civic buildings of Florence, Rome, Venice, Lombardy, Genoa (for illustration, see these titles), represent the essential features of the style rather than such churches as those of Santo Spirito at Florence, St. Peter's at Rome, La Salute at Venice. Although early Renaissance decoration is exquisitely delicate, later developments tended first toward magnificence and later toward coarseness and final vulgarity. The imitation of classic art was at first not complete; Alberti aimed at it, but it reached its cold perfection only under Palladio, just before the opposite school of fantastic irregularity, called the Baroque, came to the front before the close of the sixteenth century. The style was at first almost entirely in the hands of Florentine artists, who introduced it everywhere; then the



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THE PARTHENON, FROM THE RESTORED MODEL
IN THE METROPOLITAN MUSEUM OF ART, NEW YORK

Lombards took the lead under Bramante, with a branch in Venice; finally the Roman school, with Michelangelo, Raphael, Vignola, and many others, obtained supremacy.

Meanwhile the Renaissance style was spreading over Europe, where it first blended with and then superseded Gothic. This occupied nearly the entire sixteenth century, for although it penetrated to France about 1500, it did not obtain national foothold in Germany until about 1550, nor in England much before 1600. In none of these countries was it used in its original purity, being everywhere affected by national peculiarities. The most artistic changes were those in France, whose château architecture, especially in the Loire region and near Paris, produced masterpieces of composition worthy of comparison with the best Italian work. Blois, Chambord, the Louvre, the Tuileries, the Luxembourg, and Versailles form an unsurpassed series. For illustrations of the Louvre, the Luxembourg, and Versailles, see these titles.

Germany was more foreign to the classic spirit; and the percentage here and in England of purely classic design was much smaller than in Italy or France. The classic orders were less frequently used, and architecture retained more mediæval features. The most interesting classes of buildings in Germany during the latter sixteenth and early seventeenth centuries were the princely castles and residences, of which the finest example is the Heidelberg Schloss; and the town halls, like those of Altenburg, Bremen, and Augsburg.

The Renaissance in Italy produced a codification of Roman architectural principles (of Greek types nothing was known) which was embodied in a series of books, the most important being the *Regola delle cinque ordini d' architettura* of Giacomo Barozzi da Vignola (1507–73) (q.v.). On these books was based the practice of Europe in the seventeenth and eighteenth centuries. In Italy the purest classic type prevailed during the latter part of the Renaissance. Bramante employed Roman details with great elegance and purity, as did also his successors, Peruzzi, Antonio da San Gallo the younger, Palladio, and especially Vignola and Giacoma della Porta, who assisted Michelangelo on the dome of St. Peter's and the Capitol in Rome. Toward the end of the sixteenth century there also appeared a tendency toward extreme freedom in decoration, producing the so-called Baroque style (see Barocco), which ultimately caused the degeneracy of Italian architecture. Until, and to some extent during, the time of Bernini (1589–1680), however, the Baroque is quite in harmony with the revived Roman style and lends piquancy to it; as in Bernini's colonnade before St. Peter's.

The Italian classical movement was continued in France. At first felt in the sixteenth century in the work of Pierre Lescot at the Louvre, Jean Bullant at Ecouen, and Philibert de l'Orme at the Tuileries, its influence increased until the middle of the seventeenth century and culminated in the prodigious undertakings of the reign of Louis XIV (1643–1715), at Versailles, Marly, Trianon, and Paris. The movement affected not only the buildings themselves but their emplacement. The large lines of the plan of Paris may be traced to the reign of Louis XIV.

The principles established in the seventeenth century continued in the eighteenth and developed into the current French architecture of the present day. French decoration is, in large measure, an adaptation of the Baroque style and has passed through phases which correspond to the reigns and have taken the names of succeeding monarchs—style Louis XIV, Louis XV, Louis XVI. (See Rococo.) French architecture crystallized about the formation of the Académie Royale d'Architecture in 1671, which is now merged with the Institute. Its school is perpetuated in the Ecole des Beaux-Arts (q.v.).

In England the course of revived classicism had not the strength developed in France, but it received a powerful impulse from Inigo Jones (1573–1652) and his follower, Sir Christopher Wren (1632–1723), the great architect of St. Paul's Cathedral, who was contemporaneous with the reign of Louis XIV. It derived also a certain consistency from the use of the book and drawings of Palladio, introduced by Richard Boyle, Earl of Burlington (1695–1753). The term "English Palladian" applies well to work done until after the time of Sir William Chambers (1726–96). The German people during the seventeenth and eighteenth centuries produced much interesting architecture, but developed little which is characteristically national. They yielded easily to Italian and French influences.

Throughout the early part of this period Flanders and Holland adopted the classical and Baroque traditions of Italy, with which country they were in close commercial relations. The architecture of Spain in the sixteenth century developed a peculiar form of Renaissance called Plateresque and in the seventeenth and eighteenth centuries is a picturesque outgrowth of the Italian Baroque. See Churrigueresque.

Colonial Architecture. In general this name is applied to the architecture of any colony which reflects the contemporaneous work of the mother country. It is here used of the very important Colonial styles developed in the Americas during the eighteenth century.

The Spanish colonies, especially Mexico, produced interesting architecture directly derived from the late Baroque buildings of Spain, sometimes called Churrigueresque (q.v.) which was, doubtless, occasionally executed by native workmen with Aztec traditions. As in Spain, it shows a tendency to concentrate decoration at points, as about doors or towers, where it is contrasted with large, plain wall surfaces. There is also a brilliant use of colored tiles. Mexican architecture is famous for the development of the low Spanish domes, of which there are many fine examples by the native architect Tresguerras. In the neighborhood of southern California the use of sun-dried brick (adobe) gave origin to a unique form of Spanish-Colonial which is called "Mission Architecture."

The term "Colonial" (sometimes also "Georgian"), as applied to the English colonies, includes all the work done under the influence of English examples in the eighteenth and early nineteenth centuries; chiefly, that is, during the reigns of the four Georges. Unlike the Spanish the northern buildings are elegant, precise, and a little dry in style, with a decided leaning toward classicism, not in accuracy of design but in purity of line and proportion. Before 1730 building was confined to dwellings, chiefly of wood. As the country became settled and it was possible to build with more elegance, carpenters and builders instructed themselves by the use of English architectural books by Sir William Chambers and others, or compilations from them, which fixed the practice at least in the northern

colonies. Perhaps the most interesting product of the New England Colonial style is the series of charming meeting-house steeples suggested by the spires of Sir Christopher Wren's and James Gibbs's churches in London.

In New York and the middle part of the country there is the same adaptation of English details, but with broader and richer effects. In the South, where brick was quite generally used, the ample country residences gave fine opportunities.

Colonial architecture was influenced to a slight degree by French practice. From 1784 to 1787 Thomas Jefferson was Minister to France, and not only took much interest in architecture, but also assisted young American architects, like Charles Bulfinch (q.v.), in their studies. In the buildings which he superintended, however, his house at Monticello, Va., and the University of Virginia, he followed English text-books chiefly. A French draughtsman named Mangin was employed on the City Hall in New York, finished 1811, but the actual architect was John McComb. An able Frenchman, Pierre Charles l'Enfant, made the plans according to which the city of Washington was laid out.

The Capitol at Washington, although the dome and wings were built in the nineteenth century, may still be considered the chief Colonial monument, the central part being the work of architects trained in the eighteenth century.

The Nineteenth Century. The regular sequence of developing styles ceases in an abrupt way with the wars of the French Revolution. Before that time no style of architecture had ever existed which was not in the main the result of natural evolution. Since the close of the eighteenth century, however, there has occurred a series of imitative fashions chasing one another rapidly across the background of equally mutable social conditions.

The first of these fashions is the so-called *Style Empire*, the character of decorative design influenced in part by new study of Roman antiquity and partly reproduced from the work of the preceding reign and fitted to the grandiose requirements of Napoleon's brief dominion. The French Republic had shown a marked deference to what were supposed to be the thoughts and ambitions of the Roman Republic, and a fancied attempt to reproduce the Roman forms is evident in all the work of the Napoleonic epoch. This, however, applies only to the larger masses, for in the furniture and metal work of the time there is more of Louis Quinze than of Æmilius Paulus—a formalized rococo rather than a modernized Greco-Roman style. The endurance of this fashion was brief, however. The Arc de l'Etoile and the great Church of the Madeleine in Paris were begun and their character determined during this period. Also the character which we associate with Paris of wide and elegant avenues was fixed by Percier and Fontaine, although such arcades as those of the Rue de Rivoli and the Rue Royale were not destined to become a favorite addition to important streets. The influence of the Empire style was hardly felt outside of Paris; and for succeeding students it has been rather a fashion in costly furniture and the hanging of walls with silk than an architecture of dignity.

With the return of peace there came to Europe a long period of singular artistic sterility, due in part to the extraordinary changes, political, social, and above all industrial, of that period. In Great Britain and Germany and later in the United States, the study and imitation of Greek architecture were stimulated by the publication of several remarkable books, which for the first time made known to the world of culture the real form and aspect of the Greek monuments. Certain phases of imperial Roman art were also thus published to the world as models for imitation. Under these influences there were built Greek and Roman porticoes with square box-like churches or commonplace public buildings behind them, such as the British Museum and St. Pancras's Church in London. Smaller churches of this sort are somewhat abundant in Great Britain and in America, where the Greek details were applied with considerable taste and ingenuity to secular buildings as well as to churches. Unfortunately, both in England and the United States, the use of lath-and-plaster and of other cheap substitutes for fine materials became very generally prevalent. Architecture had, indeed, become to the general mind a mere matter of external dress and superficial aspect, not of fundamental structural design. In the absence of any true appreciation of the real problem of architecture, it was thought quite sufficient to dress a building, planned without taste and cheaply constructed, in the garb—so far as colonnades and decorative details were concerned—of the refined and perfect Greek architecture, or of the stately and impressive Roman style. But such a method of design could never produce really fine buildings nor remedy the essential incongruity between the structure and its dress. The Greek Revival of England, Germany, and the United States, and the Roman copyism of France and the rest of Europe, failed to rescue architecture from its banality and lifelessness. No new style and no vital and rational architecture could result, though some of the products of these movements—the British Museum at London, the St. George's Hall at Liverpool, the Ruhmeshalle at Munich, for instance—were at least externally dignified and decorative in effect.

During the same period (1825–50) in which one group or school of architects were thus copying Greek and Roman façades, another group in England were preaching the revival of the Gothic style as the only hope of architecture. In their eyes the classic styles represented paganism and an alien civilization; the English Gothic was a national and Christian architecture, and for churches and schools, at least, the only rational and appropriate style to copy. Like the neo-classic movements, this was really an intellectual and sentimental rather than an æsthetic propaganda. Not the thoughtful designing of buildings as to plan, construction, and decoration, on principles of sound reasoning guided by a cultivated taste, but the copying of the forms of some dead style or the imitation of ancient buildings, was still deemed the proper path to follow. Hence this movement, like the other, though promoted with enthusiasm by men of sincere purpose, lofty aims, and high culture, failed to produce either a new style or a really vital revival of an old one. The progress of archæology led, however, to increasing consistency and correctness of design; while in the second phase of the movement, from 1850 to 1870 or 1880, greater intelligence and freedom in the adaptation of details and originality in the invention of new combinations, the following of

Italian Gothic models in much of the secular architecture, and a great and general improvement in the arts and crafts of building, led to the erection of many interesting and highly ornate buildings. As was to be expected, the best results were attained in ecclesiastical and scholastic edifices, but the Houses of Parliament by Sir Charles Barry (see WESTMINSTER PALACE), the Assize Courts at Manchester and several town halls, are also in many respects worthy of admiration. The name "Victorian Gothic" is often applied to the later phases of the movement.

In France there was no parallel to either of these developments. The so-called Neo-Grec movement, led by Duc, Duban, and Labrouste between 1830 and 1850, was a concerted effort by these able architects to introduce more of Greek refinement and of personal originality into the official and public architecture of France, wholly dominated at that time by the rigidly classic Roman teaching of the Ecole des Beaux-Arts. Complete freedom in the handling of the orders as well as in the general composition of architectural designs, and a refined but somewhat dry treatment of profiles and other details, characterized the work of these men in the court of the Beaux-Arts, the column of the Bastille, the west wing of the reconstructed Palais de Justice, and the Library of St. Geneviève. These works strongly influenced the successors of Duc, Duban, and Labrouste and introduced into the French architecture of the period 1850–80 a new element of flexibility and elegance not found in the more purely archæological or the utterly commonplace contemporary architecture of other countries. Meanwhile, however, under the Second Empire of Napoleon III (1852–70), a new and more powerful tendency appeared in the admirable work of Visconti and Lefuel, to whom was intrusted the completion of the Louvre (q.v.). In this they followed, not blindly but with careful regard to the spirit and character rather than the detail, the models left by Lescot in the Court of the Old Louvre: that is, the best work of the style of Henry II. Nearly all public and monumental architecture in France has since been either in a free version of this style, or inspired from that of the preceding reign (Francis I), but modified and adapted to modern uses with a skill and good taste which are characteristic of the French among modern nations. Another important building which has strongly influenced later French architecture is the Opera of Charles Garnier, an over-ornate but admirably composed design. In the adornment of buildings with decorative sculpture externally and with mural paintings within, the French stand far ahead of all their contemporaries. A disturbing element in the evolution of modern styles has been the invention or adoption of new materials and processes of building, to which it was difficult to adapt the forms of the traditional styles, while architects trained in these lacked the courage and resource to evolve rational new forms and combinations suited to the new requirements. After all, styles and details are not made in a day, and the best architecture has always been the product of slow evolution from traditionally accepted forms. The introduction of iron and steel columns and trusses, making possible the light and broad-spanned roofs of modern railway stations and armories, was due to the engineers first of all, and architects have been slow to make these new resources serve highly æsthetic ends. The recently developed vogue of concrete, and adoption of steel-frame construction for very lofty buildings, have introduced new problems with which architects are still struggling with more or less success. In spite of the persistence of historic style forms, the modern buildings that have resulted are wholly unlike any that have preceded them and reveal the evolution of a new style, not in the details used so much as in the use made of the details. An earnest of this modern style is seen in the Library of St. Geneviève, Paris, with its internal iron columns and light trussed arch-ribs, though this dates back to about 1845–50. The great groups of exhibition buildings at Paris in 1889 and 1900, at Chicago in 1893 and at St. Louis in 1904, and the recently completed Pennsylvania Terminal at New York exhibit various phases of this development. (See STYLE.)

In the United States, with the decline of the Greek Revival, a period of architectural sterility supervened, which lasted until about 1880. The Greek movement left behind it a considerable number of buildings which, in spite of the fundamental error underlying the movement, were dignified in mass, refined in detail, and solid in construction, e.g., the Washington Capitol, Treasury and Patent Office, the Marine Exchange and Girard College at Philadelphia, the Custom House at Boston, and many others. The period that followed was destitute of guiding ideas, taste had sunk very low; politics and the conquest of the wilderness of the West occupied all minds; and then came the desolation and exhaustion of the Civil War, followed by wild speculation and the panic of 1873. There were but a handful of trained architects in the country. The official architecture of governmental buildings of that time is exemplified in the State, War and Navy Departments at Washington, the Post Office at New York, the City Hall at Philadelphia, and the State Capitol of New York at Albany—dull and heavy designs, badly planned, mechanically executed; supposedly "inspired" from contemporary French architecture! But new agencies had been set in motion tending to better things: museums of art (the Metropolitan of New York dating from 1871); the influence of several strong men trained in Paris, the increasing tide of European travel; and the new prosperity which, after the completion of the Union Pacific Railroad in 1869 and final recovery from the panic of 1873, furnished new resources with which to meet new and increasing demands for buildings. Students of architecture began to supplement their American training by two or three years of study in Paris and travel in Europe, and an extraordinary activity in building was accompanied by a remarkably rapid awakening and development of the public taste. For 15 years or more the influence of H. H. Richardson (q.v.) was paramount, beginning with his fine Trinity Church in Boston (1876) and was continued by a remarkable series of public, private, and ecclesiastical buildings, designed in a vigorous though highly personal style based on French and Spanish Romanesque precedents. This was succeeded by a growing taste for classic and Renaissance types, greatly stimulated by the enthusiasm awakened by the show palaces of the Columbian Exposition at Chicago in 1893. Rapid progress was made in both the design and construction, as well as the planning of monumental edifices and groups

of buildings, owing both to the improvement of taste in the public and to the increasing numbers of trained architects and draughtsmen, many of them educated in Paris. Building activity became greater in the United States than in any other country, and vast sums were spent yearly on business buildings, palatial residences with superb gardens, libraries, and university groups. The development of the elevator or lift, between 1865 and 1880, made practicable buildings of 8 to 12 stories in place of the old-limit affair of 5; and steel-frame construction, first developed in a practical way in Chicago about 1886–88, and adopted in New York since 1892, made possible the "sky-scraper" of 20 or more stories, represented by the Woolworth building (1912) of 57 stories. Eclecticism has prevailed as to style in late years, the details of Gothic architecture having found great favor for many kinds of buildings, while versions of classic and Renaissance styles, freely handled, rule in the majority of buildings of a monumental character, varied by the occasional employment of Greek forms and details.

Recent Architecture. The profound peace enjoyed by the people of western Europe and America in recent years has encouraged extensive building. In Europe the necessary monuments and public buildings have been built according to customary formulas, but in minor works there has been a tendency toward extreme eccentricity. An abandonment of old conventions and the development of new has created the so-called *Art Nouveau* or *Style Nouveau*, which is represented in all the arts, but has had most effect in architecture. So far as the *Style Nouveau* has contented itself with the abandonment of meaningless excrescences and tended to bring architecture back to its fundamental relations of color, line, and form, its work has been beneficial. But it has seldom stopped at this point. It has usually proceeded to the invention of new forms which have little reason for existence and little beauty.

Like most modern art movements, the *Style Nouveau* crystallized in Paris. In France, however, its eccentricities have in general been mitigated and even avoided by the prevailing good taste of the nation. In the Exposition of 1900 at Paris the new spirit was seen in nearly all the architecture, though only a few of the buildings displayed the bizarre and extreme freakishness of the *Pavillon Bleu*. A large part of the current design of apartment houses and hotels in France is in the new spirit, sometimes very happily handled, but often devoid of true architectural dignity and consistency.

The most extreme development of the *Style Nouveau* may be studied in Germany and Austria. Although the results in the former country are sometimes happy, especially in suburban residences, they frequently violate all laws of structural expression and propriety. In Vienna, an important centre of the movement, there are many examples of modern design controlled by good taste. The application of color to stuccoed exteriors has received much attention in that city. In Bohemia the new art has run to riotous extremes in external design. A good example of a rational style is the City Hall of Copenhagen, by Martin Nyrop. In Holland and the Low Countries generally there has been much interesting work in brick.

In England, where the art of William Morris, one of the forces underlying the *Style Nouveau*, had its home, the less attractive phases of the movement have not found encouragement. Since the Victorian Gothic revival in the middle of the nineteenth century the sympathy of English architects has been with mediæval motives and ideals. Classic conventions have been used solely for secular buildings and then not with interest and often without correctness. Of the Mediæval manner, Romanesque or Gothic, the churches of John Francis Bentley (d.1902) and especially his Roman Catholic Cathedral of Westminster may perhaps be considered the most characteristic. There is also a new cathedral at Liverpool by Gilbert Scott, and a huge building for the London County Council on the bank of the Thames.

Undoubtedly the most powerful later architectural achievements have been in the United States. The rapid advance in individual fortunes and in the general well-being of the people, the invention of new and facile methods of construction, already mentioned, and the consequent necessity of a prodigious amount of building have already been alluded to. In recent years this phenomenal architectural activity has been accompanied by a remarkable awakening of interest in the problems of city planning and municipal embellishment, an awakening not confined to the United States. Indeed, Germany has been for years a leader in this field, and there have been International Congresses of city planning in London, Düsseldorf, and other European cities.

Among American cities, Washington has presented the most promising field for experiments, inasmuch as it is still possible to carry out, in its main features, the original design of De l'Enfant for the laying out of that city (1791). In 1902 a commission for formulating plans was appointed; its report was adopted in 1904, and some work has been already executed in pursuance of its recommendations. A commission was appointed to plan the rearrangement of considerable portions of the city of New York, but its remarkable report has never been officially adopted nor any part of it carried into execution. Chicago, Pittsburgh, Cleveland, San Francisco, and many other cities have followed these examples. Among important buildings erected by the Federal government or by States and cities within recent years are the Offices of Congress at Washington, the Custom House, Public Library, and Municipal Offices in New York; State capitols for Minnesota at St. Paul and for Wisconsin at Madison; the very monumental Union Railway Station at Washington; and the New York Central and Pennsylvania terminals at New York, both of colossal dimensions and immense cost.

If libraries and museums be included under the category of *educational architecture*, this division probably constitutes the most important and prolific field of American architecture during recent years. All the great universities and many colleges have made substantial additions to their buildings. Among the most prominent examples of extensive plans now being carried out are those of the National Military Academy at West Point, the Naval Academy at Annapolis, the University of California at Berkeley, and Columbia University in New York City. In ecclesiastical architecture the most notable achievements in recent years have been the completed portions of the cathedral of St. John the Divine, the many-storied Broadway Tabernacle, the superb new St. Thomas's Church, all in New

A MODERN AMERICAN TOWER BUILDING

THE WOOLWORTH BUILDING, NEW YORK CITY

York City, St. Paul's Church in Chicago, and extensive cathedral projects for Baltimore and Washington.

In *commercial architecture* the bank buildings have generally been the most elegant and pleasing, partly because of their moderate height and simple and massive construction. Among the prominent examples of "sky-scrapers" are the tower-like Singer, Metropolitan Life, and Woolworth buildings in New York, the latter 792 feet 1 inch in height above sidewalk.

In this brief survey there has been no place for the architecture of Farther Asia, of India, and the neighboring provinces; of China and Japan; still less for the architecture of Mexico, Central America, Peru, etc. All these are described under their especial heads, and under ARCHITECTURE, ANCIENT AMERICAN. The details of all the styles here mentioned are also given under the subdivision *Architecture* of such separate titles as ASSYRIAN ART; BABYLONIAN ART; BAROCCO; BYZANTINE ART; CHRISTIAN ART; EGYPTIAN ART; GOTHIC ART; GREEK ART; MOHAMMEDAN ART; PERSIAN ART; PHŒNICIAN ART; RENAISSANCE ART; ROMAN ART; ROMANESQUE ART. Under the general head ART, HISTORY OF, a review is given of all the various classes of titles under which the architectural material in this encyclopædia is classified, such as biographies of architects, descriptions of various kinds of buildings, definitions of terms, etc. The history of the science and material of construction is given under BUILDING.

Bibliography. An excellent introduction to the principles and appreciation of architecture is by Sturgis, *How to Judge Architecture* (New York, 1903), and of more popular character, Wallis, *How to Know Architecture* (New York, 1910). A systematic handbook of styles is Rosengarten, *A Handbook of Architectural Styles* (Eng. trans., London, 1878). More recent, and with references and a larger enumeration of monuments, is Hamlin, *A Textbook of the History of Architecture* (New York, 1909). Fergusson, *A History of Architecture in All Countries* (London, 1893; American revision, New York, 1905), has value, but is out of date; a recent, reliable, and scholarly work is Simpson, *A History of Architectural Development* (London, 1912). Two volumes have appeared of the three required to complete Sturgis's *History of Architecture* (New York, 1905—). Fletcher and Fletcher, *A History of Architecture* (London, 1905) follows the comparative method. Another compact one-volume history is by Stratham, *History of Architecture* (London, 1912). Lübke, *Geschichte der Architektur* (Leipzig, 1884), is somewhat antiquated, but generally accurate. Ramée, *Histoire de l'architecture* (Paris, 1885), is still useful. A critical history, from the standpoint of pure construction and form, has now been given in Choisy, *Histoire de l'architecture* (Paris, 1899), without an enumeration of monuments, and extremely technical. Two series of separate handbooks, each covering some special style or country, and together forming a complete whole, are being published—one in France, the other in Germany. The general title of the French series is *Bibliothèque de l'enseignement des beaux-arts* (see ART, HISTORY OF): Laloux, *L'architecture grecque* (Paris, 1888); Corroyer, *L'architecture romane* (Paris, 1887), and *L'architecture gothique* (Paris, 1891); and Palustre, *L'architecture de la Renaissance* (Paris, 1892), are the only volumes on architecture alone; but the rest of the field is covered in the architectural sections of the following general volumes: Maspero, *Egyptian Archæology* (London, 1895); Babelon, *Oriental Antiquities*, translated by B. T. Evetts (New York, 1889); Martha, *L'archéologie étrusque et romaine* (Paris, 1884); Perate, *L'archéologie chrétienne* (Paris, 1892); Bayet, *L'art byzantin* (Paris, 1883); Gayet, *L'art arabe* (Paris, 1893), and *L'art persan* (Paris, 1895).

The German series is more detailed and is solely architectural. It is the *Handbuch der Architektur*, ed. Durm (Darmstadt, 1895; now issued from Stuttgart), and contains special volumes on the theory and practice of architecture as well as its history. Its four sections are entitled: I. *Allgemeine Hochbaukunde* (materials; statics; methods; forms); II. *Baustile* (history, in four sections: Ancient, Mediæval, Renaissance, and Modern); III. *Hochbau-Constructionen* (elements of structure; foundations; external features; internal features; specific details); IV. *Entwerfen, Anlage und Einrichtung der Gebäude* (composition; buildings for dwelling and trade; buildings for agricultural and provisioning purposes; public houses, clubs, halls, etc.; buildings for health, charity, etc.; educational, scientific, and artistic establishments; civic, governmental, administrative, and military buildings; religious and memorial structures; the city). There are a number of octavo volumes in each of these sections and subsections, several of which have been published. In the historical section the most valuable are: Durm, *Die Baukunst der Griechen* (Darmstadt, 1892), and *Die Baukunst der Etrusker und der Römer* (Darmstadt, 1885). Others are: Essenwein, *Die Ausgänge der classischen Baukunst* (Early Christian), and *Die Fortsetzung der classischen Baukunst im oströmischen Reiche* (Byzantine); Franz Pascha, *Baukunst des Islam* (Darmstadt, 1896); and Essenwein, a series of works on *Die romanische und die gothische Baukunst* (Darmstadt, 1889–92), including his volumes on *Military Architecture* (*Kriegsbaukunst*), and *Domestic Architecture* (*Wohnbau*); also Halak, *Der Kirchenbau* and *Einzelheiten des Kirchenbaues*.

There are two principal dictionaries of architecture in English; *The Dictionary of Architecture* of the English Architectural Publication Society, on a large scale, never completed; and Russell Sturgis, *Dictionary of Architecture* (3 vols., New York, 1901–02). Gwilt, *Encyclopædia of Architecture* (London, 1888), is handy to consult. In French there is Planat, *Encyclopédie de l'architecture et de la construction* (Paris, 1890–93). An excellent modern architectural manual is Guadet, *Eléments et théorie de l'architecture* (4 vols., Paris, 1902). The bibliographies for particular phases and periods of architecture will be found under the various articles treating of them.

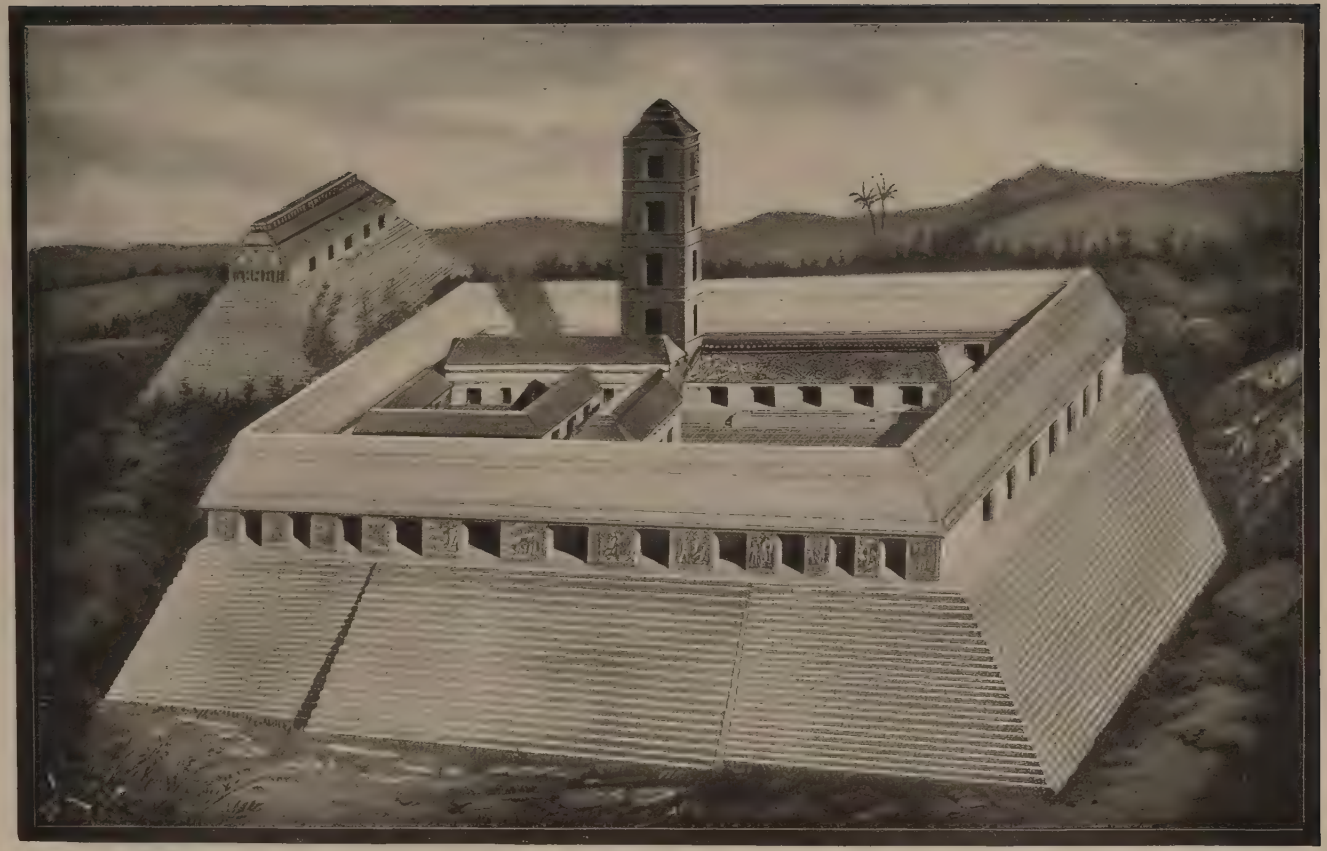
ARCHITECTURE, APPRECIATION OF. Since architecture is an art which touches life at many points and concerns both the public and the individual in many important relations; since, moreover, good architecture can flourish only where there prevails an enlightened public taste, and the public taste is but the sum of the individual tastes of the community, it is important that every citizen should be capable of a correct appreciation of architectural works, i.e., qualified to pass intelligent judgments upon the

merits and defects of the buildings he sees, based not upon caprice or mere personal likes and dislikes, but upon knowledge and good taste. A person wholly ignorant of architecture may like or dislike particular buildings, but his appreciations are valueless. The general standard of architectural taste is determined by the number and culture of those who, without professional training, know enough of the principles and of the great masterpieces of the art to discriminate between the good and the bad. For the attainment of this knowledge and of the good taste which should control its use, the chief means are reading, travel, and the study of plans, photographs, and other illustrations of architecture. Fortunately the abundance of books, periodicals, and illustrations available in public and private libraries makes possible a fairly broad knowledge of architecture, even for persons of moderate means and those unable to travel and see in person the great masterpieces of the art abroad.

Architecture is not, as too many seem to think, an art merely of the external dress of buildings, still less, as Ruskin's writings apparently imply, a matter wholly or chiefly of ornamental detail. It is, first of all, an art of *building;* it is based on construction and planning, upon which the decorative treatment, both internal and external, is really dependent. A true work of architecture is the material realization of an artistic conception, of which the planning, construction, composition, and decoration are, so to speak, the four corner stones. In the plans the architect seeks to meet utilitarian requirements by the arrangement of rooms and "circulations" (corridors, etc.); structural requirements by the disposition of the walls, supports, piers, etc.; and æsthetic requirements by the proportioning of all the parts. Planning is thus the foundation of architectural design, construction, its means of realization; composition determines the main lines and masses of its visible aspect, and decoration dresses the whole in pleasing details. Good planning, sound and rational construction, pleasing masses and proportions, harmonious, appropriate, and refined detail and ornament, and a general expressive effect suitable to the purpose, function, size, materials, and constructive system of the building, are all found in good architectural works. The historic styles are the methods of design and combinations of form evolved in different ages and lands, and the study of these constitutes the study of the history of architecture; but *style*, as a quality, is character independent of any particular historic expression. All the above considerations are involved in the appreciation of architecture. Consult: Sturgis, *How to Judge Architecture* (New York, 1903); Statham, *Architecture for General Readers* (New York, 1895); Wallis, *How to Judge Architecture* (New York, 1911); Guadet, *Théorie de l'Architecture* (Paris, 1902); Hamlin, *A History of Architecture* (New York, 1909); Fletcher, *A Comparative History of Architecture* (London, 1905); T. G. Jackson, *Reason in Architecture* (London, 1906); Van Pelt, *A Discussion of Composition, especially as applied to Architecture* (New York and London, 1902). See ARCHITECTURE; DECORATIVE ART.

ARCHITECTURE, ANCIENT AMERICAN. No historical sketch of aboriginal American architecture is possible with our lack of reliable data as to the history of the American races and their relation to each other. The tribes whom we are accustomed to group under such heads as "Mound Builders" and "Cliff Dwellers" (for illustration see these titles), although far from being the earliest inhabitants of our continent, never produced any works that enter the domain of art, though some of the "pueblos" show careful construction and plan, especially in Arizona and New Mexico; for example, Casa Grande (q.v. for illustration), Chihuahua, and Bonito. The peoples of Maya and Nahuatl nationality who founded the confederacies of Mexico, Central America, Peru, and other South American states, developed an architecture that may fairly be compared with that of Farther Asia, especially India. But no sure historic records of the age of these monuments give an earlier date than the twelfth century A.D.; though plausible conjecture goes back to the fifth century B.C. for the earliest Maya examples. The earliest ruins are those of the Mayas, and among them we can distinguish local variations and historic development; for example, those of Chiapas, of which the most important are at Palenque, differ from those in Yucatan, which are much later. The ruins at Copan, in Honduras, form the connecting link between the Palenque style and that found at Uxmal, Chichen-Itza, Izamal, and other ruined cities of Yucatan. Guatemala also has monuments of the Palenque, and later types, at Utatlan, Cahuinal, Tikal, etc. The fortified city of Tenampua, in Honduras, is especially interesting. The Maya ruins of Central America are the more monumental the nearer they approach the frontier of Yucatan. The arrangement of the buildings is according to one general scheme: they rise from a mound, surmounted by a platform on which the building or buildings stand. This mound is entirely or partly natural, cut into terraces about 5 feet high or lines of stone steps. The lines of the mound are made by rubble and retaining walls faced either with colored stucco or large slabs (Palenque) or with dressed stone (Chichen-Itza and Uxmal). The separate buildings rise from a base in the form of a truncated pyramid, and the chambers and passages are covered with vaults formed of the triangular corbel arch of projecting horizontal courses. Among the most impressive structures are the pyramids; one at Izamal is between 700 and 800 feet long and contains several chambers. They usually rose in front of each temple. These pyramids were crowned by shrines and bear some resemblance to Buddhist buildings in India. The greatest variety of monuments is at Chichen-Itza. There was a lavish use of decorative sculpture either as integral part of the architecture, or in the form of accessory steles, pillars, obelisks, statues. The famous "Tablet of the Cross" from Palenque is the most tasteful simple piece. An idea of the way in which the Maya buildings were grouped is given by the ruins of Palenque, Umaland, and Chichen-Itza. For illustrations, see these titles.

The Mayas suffered from invasions of Nahuatl peoples in the sixth century A.D., but though more recent, the Nahuatl monuments appear not to have survived so well; perhaps because this people preferred the less durable material of adobes, cemented together with mortar, to the stonework of the Mayas. This is exemplified in the Pyramid of Cholula, originally crowned by a magnificent temple destroyed by Cortés. It measures 1440 feet square—an area nearly four



MEXICAN ARCHITECTURE

THE TEMPLE OF PALENQUE—RESTORATION

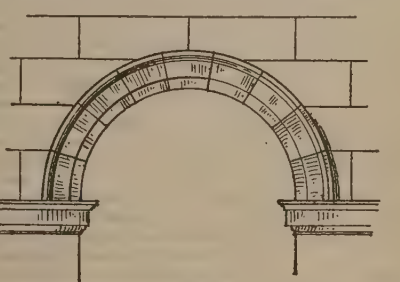
times that of the Pyramid of Cheops; its height was 177 feet, and it was divided into four terraces. Ruins of debated character occur at Xochicalco, in Mexico, Huatusco, and Centla. Here, as with the Mayas, the truncated pyramid is the main form of substructure. It is curious that even less remains of the Aztec monuments, erected only during the two centuries preceding the Spanish Conquest. Probably it was because, being the centres of civilization at that time, they bore the brunt of Spanish vandalism, while the older cities, long since deserted, remained immune and often unknown. Perhaps slightly earlier than the Aztec domination are the cities of the Zapotecs in Central America, whose capital, Mitla, was captured and ruined by Aztecs c.1500 A.D. The palace at Mitla has called forth the most enthusiastic praise for the beauty of its masonry, the symmetry of its proportions, and the classic restraint of its ornament. This palace consists of an interior quadrangle, 130 × 120 feet, surrounded on three sides by mounds crowned by other buildings. It is built not entirely of dressed stones, as at Palenque, but of faced rubble, as in Yucatan. The main hall was supported by six columns, supporting heavy beams, a most unusual arrangement. It must be remembered that the manual labor of facing the masonry and executing the sculptured decoration in all these buildings of Central America and Yucatan was vastly increased by the lack of metal implements. We finally come to Peru, which is studded with ruins of the greatest interest, bold in construction and massiveness, though lacking in that richness of sculptured ornament so characteristic of the styles thus far mentioned. Pachacamac, Chimu, Tiaguanaco, Titicaca, and Cuzco are the most important sites. The fortresses are of especial interest; also great engineering works, such as aqueducts, reservoirs, and bridges. The temples, called *huacas*, are composed of truncated pyramids, usually of stone. That of Obispo is 150 feet high, with a base 580 feet square, covering eight acres. Some of these pyramids served as sepulchres, like one near Obispo, surrounded by an inclosing wall 14 feet high. Another at Moche was 800 × 470 feet and about 200 feet high. The palaces were built of adobes and were formed of an irregular series of buildings on a terraced mound. That at Chimu is typical. The ruins at Tiaguanaco are, perhaps, the earliest and belong to a civilization prior to that of the Incas. Most remarkable are the numerous erect monoliths comparable to the Celtic monoliths in the Mediterranean (e.g., Malta), and in England (e.g., Stonehenge). For books of reference, consult the bibliography under ARCHÆOLOGY, AMERICAN.

ARCHITRAVE, är'kĭ-trāv (Gk. ἀρχι-, *archi-*, chief + Lat. *trabs*, beam). The lowest member of the entablature (q.v.), which rests immediately upon the columns, also called the epistyle. The term also designates the lintel over a square-headed window or doorway. It is even sometimes applied to the molded bands carried around the top and sides of a window or door. For illustration, see ENTABLATURE.

ARCHIVES, är'kīvz. See RECORDS, PUBLIC.

ARCHIVES, HOTEL DES. The name signifies the equivalent of Hall of Records, but although general in its meaning and applicable to any French building for storing official records, it is applied as a special name, by preëminence, to an important seventeenth to eighteenth century building in Paris in which is stored a priceless collection of historic records and original manuscripts of treaties and decrees from the time of Dagobert to that of Napoleon. The building, sometimes known as the Hôtel Soubise from the family to whom it formerly belonged, is a stately example of the richest private architecture of the time of Louis XIV, with a magnificent entrance court, of which the simple but dignified house façade forms the rear elevation. It was remodeled in part and decorated in the eighteeenth century; particularly rich is the oval chamber with paintings by Boucher, and the "Salle des Bourbons," both in the style of Louis XV. The collections are open to the public on certain days.

ARCHIVOLT, är'kĭ-vōlt (It. *archivolto*, from *archi*, chief + *volto*, vault, arch). A molded or otherwise decorated band or series of bands around the opening of an arch. In the classic styles the bands and moldings project from the general plane of the wall, the outer molding most of all. In mediæval architecture the moldings are cut into the voussoirs and recede successively inward from the plane of the wall as they approach the soffit, or intrados. The term "archivolt" is, however, rarely used of these



ARCHIVOLT.

mediæval moldings. In good design the moldings of the archivolt are confined to the voussoirs, and define correctly the intrados and extrados of the arch. Archivolts are sometimes used, with purely decorative intent, even where the extrados of the arch is stepped. In the Baroque style (q.v.), and in some modern work, an interrupted archivolt is used in combination with rusticated voussoirs—a doubtful device, though picturesque. Archivolts may be merely painted, in interior decoration; and they may be flat bands of marble or glazed tile, as in Assyrian buildings. See DRIPSTONE.

ARCHLUTE, ärch'lūt' (It. *archiliuto*). A large double-necked lute about 4 feet 5 inches long, used in the seventeenth century for the lowest part in instrumental music and accompaniments. The neck contained two sets of tuning pegs, the strings were of catgut or metal, and the compass was two octaves, from C below the bass clef. The sound board, with a circular hole, was of pine, while the back was made of strips of pine and cedar glued together and richly ornamented. See LUTE; THEORBO.

ARCH OF ARCA'DIUS, HONO'RIUS, AND THE'ODO'SIUS. See THEODOSIUS, ARCH OF.

ARCH OF AUGUS'TUS. See AUGUSTUS, ARCH OF.

ARCH OF CLAU'DIUS. See CLAUDIUS, ARCH OF.

ARCH OF CON'STANTINE. See CONSTANTINE, ARCH OF.

ARCH OF DRU'SUS. See DRUSUS, ARCH OF.

ARCH OF HA'DRIAN. See HADRIAN, ARCH OF.

ARCH OF JA'NUS QUAD'RIFRONS. See JANUS QUADRIFRONS, ARCH OF.

ARCH OF SEPTIM'IUS SEVE'RUS. See SEPTIMIUS SEVERUS, ARCH OF.

ARCH OF TI'TUS. See TITUS, ARCH OF.

ARCH OF TRA'JAN. See TRAJAN, ARCH OF.

ARCHON, är'kŏn (Gk. *ἄρχων, archōn*, literally leader, chief, from *ἄρχειν, archein*, to begin, lead, rule). A generic title for the highest magistrate, the actual ruler, in Athens, and other Greek cities. The Athenian archon is the only one whose history and duties are well known. There were nine archons at Athens, chosen yearly by lot. The first was called "The Archon," or, since he gave his name to the year, Archon Eponymos, the 'Namesake Archon'; the second was the Archon Basileus, the third Archon Polemarchus; the other six were Thesmothetæ. During the Athenian democracy the archons were law officers, the Archon Eponymos having charge of suits relating to the family, the Basileus of religious cases, the Polemarch of those involving foreigners, and the Thesmothetæ of a variety of other cases. According to Athenian tradition the last king, Codrus (q.v.), was succeeded by a life archon; in 752 B.C. the office was limited to 10 years. Up to this time, only members of a certain family could be archons; but in 713 B.C. the office was opened to all nobles (Eupatridæ), and in 683 B.C. it was made annual. Finally, in 457 B.C., it was opened by law to citizens of the three upper classes and in practice to all citizens. The historical development seems rather to have been the reduction of the power of the Basileus, by giving first the military command to a new officer, Polemarch ('general'), and then by adding a civil ruler as the civil head of the state, thus restricting the 'king' to religious functions. The military command was still held by the Polemarch at the time of the battle of Marathon (490 B.C.); that battle was fought by Miltiades (q.v.), as Polemarch. The same Greek word is often used to denote rulers who, strictly, bore other official titles.

Among the Jews of the Dispersion the title "archon" was used to denote members of the official body exercising control over their independently organized communities, as at Alexandria, Antioch, and Rome. In the New Testament it is used specifically of members of the Sanhedrin (e.g., Nicodemus, John iii. 1), of the officer presiding over the synagogue (e.g., Jaïrus, Luke viii. 4); and, generally, for rulers, magistrates, and men of influence. In the sense of ruler it is applied to Christ in Rev. i. 5: "Ruler [archon] of the kings of the earth," and to Satan in John xii. 31: "The prince [archon] of this world." In the mystical jargon of the Gnostics the term "archon" was frequently employed; hence one of their sects, especially opposed to Judaism, received the name "Archontics." See GNOSTICS; HERESY; HERETICS.

ARCH-PRIEST, ärch'prēst'. A name dating from the fourth century and equivalent to the Greek *prōtopresbyter*. It was usually applied to a senior priest attached to a cathedral, whose duties were to assist the bishop, to act as his substitute in the performance of the church offices, and to have general oversight of the cathedral clergy; also to those placed in large towns to occupy similar positions respecting the local clergy. This title in later times gave way to that of *dean*, as applied to the former, and *rural dean*, to the latter class of arch-priests.

ARCH'WAY (*arch* + *way*). A vaulted passage between walls; or any passage, vaulted or not, terminating in an arched opening at each end.

ARCHYTAS, är-kī'tas (Gk. *Ἀρχύτας*). The son of Mnesagoras, or Hestiæus, of Tarentum, a distinguished philosopher, mathematician, general, and statesman. He lived in the first half of the fourth century B.C. and was thus a contemporary of Plato, whose life he is said to have saved by his influence with the tyrant Dionysius. He was seven times elected general of his city, though it was customary for the office to be held for one year only; he was never defeated. His connection with Plato belongs to the time of the latter's visit to lower Italy. He was drowned on the Apulian coast and is said to have been buried near Matinum, in Apulia. Archytas was a man marked for his morality, self-control, and gentleness. As a philosopher, he belonged to the Pythagorean school. His services to the science of mathematics were many and important, and he passed as the founder of scientific mechanics. He was the first to distinguish harmonical progression from arithmetical and geometrical progression; he also solved the problem of doubling the cube. (See CUBE.) Among his mechanical contrivances was a flying pigeon made of wood. He is said to have invented the pulley. As an astronomer, he taught that the earth is a sphere rotating on its axis once in 24 hours and that the heavenly bodies move about it. He further made original contributions to the knowledge of musical tones. In philosophy he must have influenced Plato not a little, and perhaps, also, Aristotle. The mathematical fragments of Archytas have been carefully collected by Blass in *Mélanges Graux* (Paris, 1884). The other fragments which are attached to the name of Archytas, and which relate to ethics, logic, and physics, are probably for the most part not genuine. They are to be found in Mullach, *Philosophorum Græcorum Fragmenta*, vol. i (Paris, 1860–81). The two letters ascribed to Archytas, one addressed to Dionysius and the other to Plato, and the work *On the Ten Categories*, are also spurious.

ARCHYTAS OF AMPHISSA (c.240 B.C.). A Greek poet, to whom some hexameter lines are attributed by Plutarch, Athenæus, and Stobæus. He is spoken of by Diogenes Laërtius as an epigrammatist upon whom Bion wrote an epigram. Nothing is known of the details of his life and work beyond the scanty information given by the authors named.

ARCIF'ERA (Lat. *arcus*, bow + *ferre*, to bear, carry). A group of anurous amphibians, the toads, having a tongue, with the clavicle and coracoid of each side connected by a longitudinal arched cartilage, allowing contraction and expansion. See TOAD.

ARCIS-SUR-AUBE, är'sēs' sur ōb' (Fr. Arcis on the Aube). Capital of the arrondissement of the same name in the French department of the Aube, and remarkable on account of the battle fought here, March 20–21, 1814, between Napoleon and the allied forces under Prince Schwartzenberg (Map: France, N., K 4). The battle began with several skirmishes on the first,

and ended in a general engagement on the second day, when the French retreated over the Aube. It was sanguine but indecisive. After the battle Napoleon determined to operate in the rear of the allies, and left the road to Paris open, assuming that they would not venture to proceed without attempting to secure their rear. The allies marched, nevertheless, on the capital, and thus decided the campaign. Arcis-sur-Aube is the birthplace of Danton. Its industries are silk and cotton spinning, stocking weaving, and it has an important trade in grain. Pop., 1901, 2774; 1911, 3033.

AR'CITE. One of the two Theban knights who, in Chaucer's *Knight's Tale,* are at first close friends, but who, having seen the lovely sister-in-law of Theseus from their prison window, both claim her as mistress and later joust fiercely for her hand, in which tourney Arcite is slain.

ARC LAMPS AND ARC LIGHT'ING. See ELECTRIC LIGHTING, *Arc Lamps.*

ARCO DEI LEONI, dā'ĕ lā-ō'nē (It. Arch of the Lions). A gate in Verona, built supposedly in the third century A.D. Originally it had two arches, but at present only one remains. It is a dainty bit of architecture, with Corinthian columns, above which is a story pierced with three openings between pilasters. It is situated in the Via Leoni and is coeval with the Porta de' Borsari.

ARCO DELLA PACE, dĕl'lâ pä'chā (It. Arch of the Peace). A large arch of white marble, with smaller ones on either side, surmounted by a bronze figure of Peace driving a six-horse chariot. It was erected in Milan, Italy, in 1807, in honor of Napoleon, but not completed until 1838, and was consecrated to Peace in 1815.

ARCOLE, är'kō-lā. An Italian village in the province of Verona, situated on the left bank of the Alpone and famous for the victory gained by Bonaparte over the Austrians under the chief command of Alvinczy, Nov. 17, 1796. From the 14th to the 16th the French vainly attempted to rush the bridge across the Alpone held by the Austrians under Mittrowsky; on the 17th they forded the stream below the bridge and took the enemy in the rear. In the series of battles around Arcole the Austrians lost 18,000 men, and, as a result of the battle, they were compelled to abandon the relief of Mantua, which was besieged by the French.

ARÇON, är'sôN', JEAN CLAUDE ELÉONORE LE MICHAUD, LEMICEAUD, D' (1733–1800). A distinguished French engineer. He was born at Pontarlier, and was educated as an engineer in the military school at Mézières. During the Seven Years' War he acquired considerable reputation, especially in the defense of Cassel, his work being distinguished by a remarkable fertility of invention. His most famous scheme was a system of floating batteries designed to reduce Gibraltar (1780), then in the hands of the English and defended by Governor Elliot. The attempt, however, was not successful, mainly because of the fact that his efforts were indifferently supported. When the French under Dumouriez overran Holland, Arçon took several strongly fortified places, among others, Breda. After his retirement from the army he was called to the Senate (1799). His important work is *Considérations militaires et politiques sur les fortifications* (Paris, 1795).

ARCO'NA. See ARKONA.

ARCOS DE LA FRONTERA, är'kôs dâ lâ frôn-tā'râ (Sp. Bow of the Frontier, alluding to its being built in bow shape and to its position on the frontier). A town on the right bank of the Guadalete, in the province of Cadiz, Spain (Map: Spain, C 4). It is situated on a conical height 545 feet above sea level, and is a remarkably picturesque city with steep, crooked streets. Above the city stands the castle of the dukes of Arcos, now in ruins. Beyond are the Ronda Mountains. Seven monasteries, two parish churches, with the main church of Gothic style, are among its interesting buildings. The manufactures include leather, mats, thread, and rope. There is considerable trade in oil, wine, and fruit. Pop., 1900, 14,393; 1910, 13,983.

Arcos is the Arcobriga (Celt. *briga,* town) of the Romans. It was wrested from the Moors by Alfonso the Wise, and strongly fortified as a frontier town, in 1264.

AR'COSO'LIUM (Lat. *arcus,* arch + *solium,* seat, chair of state). A name given to the niches, surmounted by an arch, that were used, for example, in the early Christian catacombs, for the burial of the more illustrious dead. They usually contained a carved marble sarcophagus and were ornamented with frescoes.

ARCOT, är-kŏt' (Tamil *Arkaṭ,* Six Woods). A city in the presidency of Madras, India, the capital of the district of North Arcot, on the right bank of the Palar River, 65 miles west of Madras (Map: India, C 6). It is a railway junction, has a military cantonment, contains some mosques in a tolerable state of repair, and the ruins of the Nawab's palace. Of great antiquity and mentioned by Ptolemy, it is noteworthy because of its history, the most brilliant incident of which was its capture and defense by Clive (q.v.), in 1751. It was acquired by the East India Company in 1801. The walls of the famous fort now serve as a dyke which protects the city against periodical inundation. Pop., 1901, 10,734; 1911, 11,475.

ARC'TIC (Gk. *ἀρκτικός, arktikos,* northern, from Gk. *ἄρκτος, arktos,* bear, north). A term meaning 'lying near the constellation of the Bear.' The Arctic Circle is a circle drawn round the North Pole, at a distance from it equal to the obliquity of the ecliptic, or 23½°. The corresponding circle round the South Pole is the Antarctic Circle. Within each of these circles there is a period of the year when the sun does not set, and another when it is never seen, this period increasing as we approach the pole itself. At the pole it is six months in length, if we neglect the effects of refraction (q.v.).

ARCTIC CUR'RENT, HIGH'LANDS. See ARCTIC REGION.

ARCTIC DISCOV'ERY. See POLAR RESEARCH.

ARCTIC O'CEAN. See ARCTIC REGION.

ARCTIC PLANTS. See ARCTIC REGION.

ARCTIC RE'GION. Mathematically speaking, that portion of the surface of our globe which surrounds the North Pole within the limits of the Arctic Circle, and thus, extending 23½° in every direction from the pole, covers an area of 8,200,000 square miles.

Geographically, it is preferable to define the Arctic region as that portion of the northern hemisphere which is subjected to Arctic influences. These influences may be considered, on land, to extend southward as far as the northern limit of tree growth. Within this limit the Arctic region includes, in the western hemi-

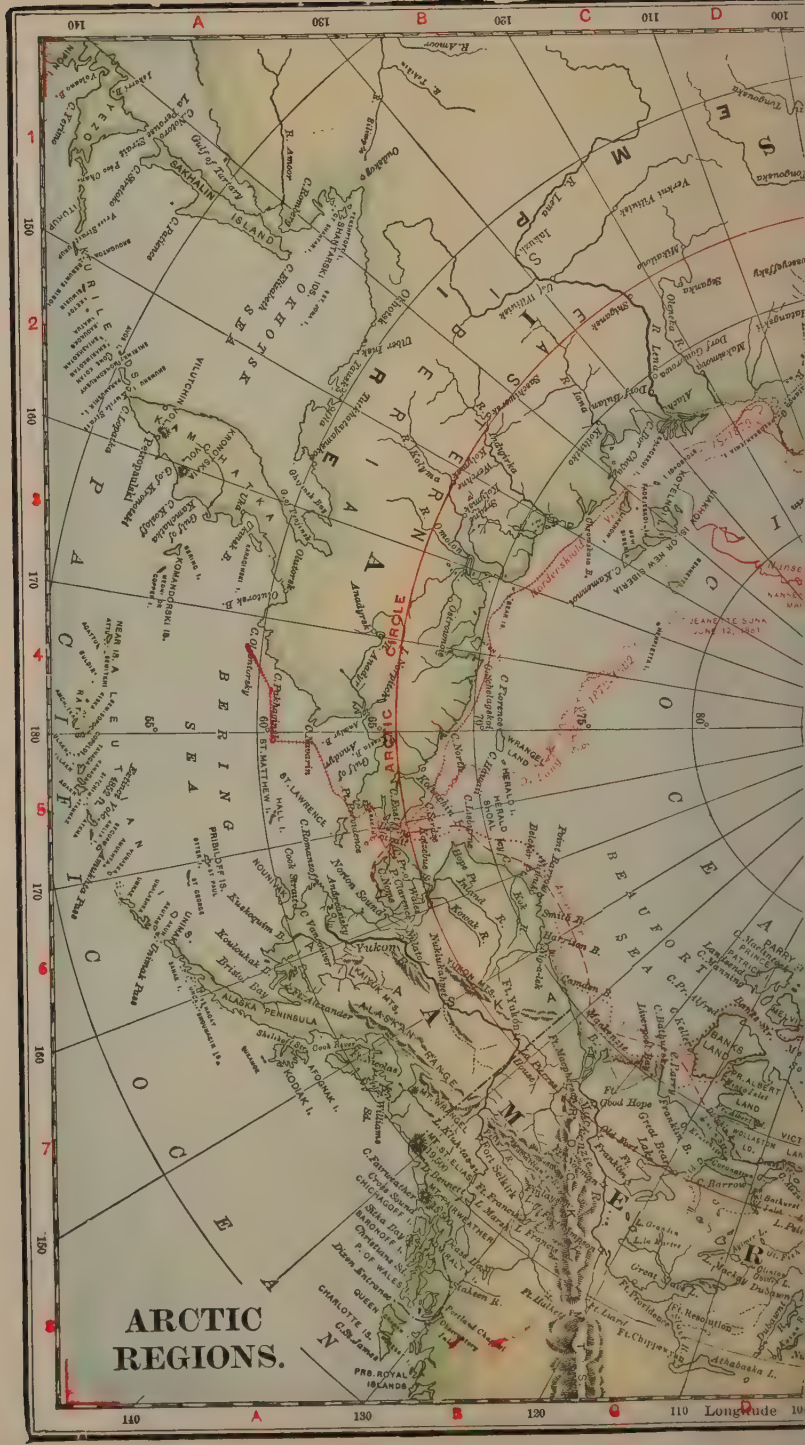
sphere, the western and northern coasts of Alaska, that part of the mainland of Canada north of a line connecting the mouth of the Mackenzie with Fort Churchill on Hudson's Bay (59° N.), the northern part and the eastern coast of the peninsula of Labrador, the whole of the American Arctic Archipelago, and of Greenland. In the Eastern Hemisphere the Arctic region includes the whole northern fringe of the Eurasian coast from the Kola Peninsula, in 35° E. long. to the Chukchee Peninsula, the easternmost tip of Siberia, together with the outlying islands or island groups to the north of Europe and Asia. In September, 1913, the Russian naval officer, Captain Wilkitzky, discovered the east coast of a new land extending from 30 miles north of Cape Chelyuskin, the most northern part of Asia, for 200 miles northwest to lat. 78° N., long. 86° E. He named it Nicholas II Land. It is probably a large island. The lack of strict dependence of climate on latitude is perhaps nowhere better illustrated, for the Arctic region, as thus defined, extends as far south as 51° 30′ N.—the latitude of London—along the Labrador coast, which is inhabited by the Eskimo in his native environment, while in northern Europe it is pushed back to beyond 71° N., where lies the northernmost city of the world, Hammerfest, Norway.

The Arctic is a region of snow and ice; for months in the winter the sun is below the horizon, and though for other months in summer it never sets, its heat is not strong enough in most quarters to reduce the quantity of snow and ice which form in the cold season. The longest day and the longest night at latitude 70° are about two months each; 10° farther north they are about three months each; at the pole they divide the year almost equally.

Topography. The land surface of the Arctic region has been as yet but incompletely explored, although the unremitting interest in Arctic exploration is gradually adding to our knowledge of its extent and details. The loftiest region is Greenland, along the east and west coasts of which there are mountains rising from 3000 to 8000 feet above sea level, culminating possibly in Petermann Peak, with an estimated altitude of 8000 to 11,000 feet. The name "Arctic Highlands" was given to that portion of the American continent which lies between Hudson's Bay and the mouth of the Mackenzie River, reaching far below the Arctic Circle. The district lies partly within and partly without the barren or treeless stretches of northern North America. The southern portion has elevations of 1700 to 2000 feet above sea level. The portion north of Great Slave, Great Bear, and Athabasca lakes has a gentle and regular slope toward the Arctic Ocean. The usage of the term "Arctic Highlands" may, perhaps, be extended so as to include the highlands west of Smith Sound. The name was also applied by Ross in 1818 to the region around Cape York (lat. 76° to 78°, long. 67° W.), in Greenland; and the most northern Eskimos, who live on the seacoast at the foot of these mountains, have until recently borne the name of "Arctic Highlanders," given to them by Ross. The northern part of Seward Peninsula in Alaska is characterized also by a broken topography, with mountains rising 5000 feet or more above sea level. Banks Land and other large islands off the coast of the North American continent, including Baffin, Ellesmere, Grinnell, and Grant Lands, are comparatively low, with rounded mountains in the interior. In Baffin Land the central plateau is from 600 feet to 800 feet above the sea, and isolated mountains attain a height of 2000 feet. In the eastern part of Siberia the surface is broken by low mountain ranges and by wide river valleys. The portion of Siberia lying west of the Yenisei River, however, is a low, almost unbroken plain, having a dense growth of moss and containing numerous and extensive swamps, features that are comprehended under the general term of *tundra* (q.v.). Portions of Franz-Josef Land, including Rudolf Island (lat. 80° to 83°) are elevated, the mountains and plateaus rising 2000 feet or more above the sea. Upon these plateaus and that of Spitzbergen, and particularly upon that of Greenland, extensive "ice caps" have formed. The outer edges of these masses of ice are forced through the fiords in the form of glaciers, which discharge icebergs. See GLACIER; GEOLOGY.

Geology. The geology of the Arctic lands presents a great variety of features, which, however, are comparable in general to those exhibited in more southern latitudes. Extensive coal beds and numerous fossil remains in sedimentary strata bear evidence that the conditions prevailing in former ages were favorable for the development of a diversified fauna and flora, such as do not at present exist. The Carboniferous strata are the most significant as to the past climatic conditions. They have been found in Banks Land, North Devon, and Spitzbergen. Coal beds and strata of the Tertiary Age have been discovered in Greenland and Grinnell Land, and similar deposits are known to occur as far north as 82°, in which poplar, pine, birch, and hazel flora are represented. In Spitzbergen a Carboniferous flora has been obtained, comprising no less than 26 species, of which some are new, but others common to the coal measures of England and the United States. Greenland (q.v.) consists principally of gneisses, schists, and granite, with later intrusions of basalt, and is noteworthy as the source of the mineral cryolite. Most of the islands off the North American Continent are made up of crystalline rocks and Paleozoic sediments, of probably Cambrian and Silurian Age. The northern part of Seward Peninsula has been found recently to be composed of metamorphosed sediments of undetermined age, and of Cretaceous limestones. The great island groups north of Euro-Asia, including Franz-Josef Land, are formed of early Paleozoic and pre-Cambrian rocks overlaid by basalt. Very little is known as to the geological features of northern Siberia.

The Arctic Ocean is the body of water encircling the North Pole, and included between the northern boundaries of Europe, Asia, North America, Greenland, and the north Atlantic Ocean above the Arctic Circle, with which latter ocean it is in open connection, while it is in communication with the Pacific Ocean only through the narrow Bering Strait. It drains a vast area, including the northern parts of North America and of Asia. The great rivers, Obi, Yenisei, and Lena, in Asia, and the Mackenzie, in Canada, empty into this ocean. Its area is estimated at between 4,000,000 and 5,000,000 square miles. How much of this area is covered by land is uncertain; but the considerable depth of soundings taken by Arctic explorers would seem to indicate an extensive polar sea. It is possible that land exists to the


ARCTIC REGIONS.
ARCTIC CIRCLE
Longitude
140
130
120
110
100
A
B
C
D
1
2
3
4
5
6
7
8
150
160
170
180
ASIA
NORTH AMERICA
SEA
OCEAN
BERING
OKHOTSK
BEAUFORT
SIBERIA
ALASKA
GREENLAND
SAKHALIN ISLAND
ALEUTIAN ISLANDS
PRIBILOF IS.
KODIAK I.
QUEEN CHARLOTTE IS.
PRS. ROYAL ISLANDS
BANKS LAND
WRANGEL LAND
Yukon
Mackenzie R.
Lena R.
Kolyma R.
Anadyr R.
Amur R.
Behring Strait
Behring Sea
Arctic Ocean
Hudson Bay
Baffin Bay
Davis Strait
Greenland
Alaska
Siberia
Yukon R.
Mackenzie R.
Great Bear L.
Great Slave L.
Athabaska L.
Winnipeg L.
Lake Superior
Lake Michigan
Lake Huron
Lake Erie
Lake Ontario
Hudson Bay
James Bay
Baffin Bay
Davis Strait
Greenland
Labrador
Newfoundland
Nova Scotia
New Brunswick
Prince Edward I.
Anticosti I.
Vancouver I.
Queen Charlotte Is.
Alexander Archipelago
Aleutian Is.
Pribilof Is.
Kodiak I.
Sakhalin Island
Yezo
Kamchatka
Okhotsk Sea
Behring Sea
Behring Strait
Arctic Ocean
Beaufort Sea
Banks Land
Wrangel Land
Parry Archipelago
Prince Albert Land
Victoria Land
Boothia Peninsula
Melville Peninsula
Melville I.
Prince of Wales I.
Victoria I.
Baffin Land
Ellesmere Land
Grant Land
Greenland
Iceland
Spitzbergen
Nova Zembla
Franz Josef Land
New Siberian Is.
Wrangel Land
Herald I.
Herald Shoal
Jeannette Isl.
June 12, 1881
Lena Delta
Yana R.
Indigirka R.
Kolyma R.
Anadyr R.
Anadyr Gulf
Kamchatka
Okhotsk Sea
Amur R.
Sakhalin Island
Yezo
Behring Sea
Behring Strait
St. Lawrence I.
St. Matthew I.
Hall I.
Nunivak I.
Pribilof Is.
Kodiak I.
Alaska Peninsula
Aleutian Is.
Unimak I.
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Arctic Ocean
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St. Matthew I.
Hall I.
Nunivak I.
Pribilof Is.
Kodiak I.
Alaska Peninsula
Aleutian Is.
Unimak I.

NORTH POLE
Meridian of Greenwich
from Greenwich
ARCTIC CIRCLE
GREENLAND
BRITISH ISLES
NORTH SEA
NORWAY
SWEDEN
FINLAND
ICELAND
ATLANTIC OCEAN
NORTH AMERICA
HUDSON BAY
Hudson Strait
BAFFIN BAY
DAVIS STRAIT
DENMARK STRAIT
NEWFOUNDLAND
ST. JOHNS

northwest of the known American Archipelago as a continuation thereof. The water region immediately surrounding the pole is covered with great fields of ice, which are frozen together in winter, but become separated to a greater or less degree (especially at the edges where ice floes are formed) during the summer. This ice area is called the ice pack, and it extends somewhat to the southward of lat. 75° N. above Bering Strait and the adjoining American and Asiatic coasts, between the limits of long. 160° E. and 130° W.; to the westward and eastward of this region the pack limit retreats northward; and in long. 120° W., it is found at about lat. 78° N.; in long. 90° W., at about lat. 78° N.; in long. 85° W., at about lat. 81° N.; in long. 50° W., at about lat. 83° N. On the east coast of Greenland the ice pack descends to lat. 78° N., to retreat again to 82° or 83° N., north of Spitzbergen and Franz-Josef Land, where this latitude is preserved as far east as long. 100° east of Greenwich, when the detour toward the south begins, which reaches its limit at about long. 173° E. This ice is kept in sluggish motion, principally by the winds, in such a manner that a vessel lodged in the ice at a point north of Alaska, or even of Siberia, would gradually drift toward the pole and, passing beyond that, would continue southward until set free from the ice near Spitzbergen or Greenland. Nansen made such a drift in 1893–96. The depth of the Arctic Ocean is variable, being very shoal (only a few hundred feet deep) north of western North America and eastern Asia, where, however, measurements have not been made above lat. 75° north, and very deep (7000 to 13,000 feet) within the Polar Circle to the north of the New Siberia Islands, the Chelyuskin Peninsula (most northern point of Asia), Franz-Josef Land, and Spitzbergen. Northward of the American Arctic Archipelago along the 70th meridan west of Greenwich the depth rapidly increases, a sounding of 9000 feet at the pole on Peary's expedition in 1909 having failed to reach bottom. Northward of the continent of Europe the depth is from 600 to 1200 feet. The Arctic Ocean is apparently affected by tides, in which the monthly variations are more important than are the semi-diurnal, but both these are masked by the influence of the winds and the ice. The assumption that a great portion of the Arctic Ocean has for a long time been covered with a solid pack of ice has suggested for it the name of Paleocrystic Sea, or the Sea of Ancient Ice.

Arctic Currents. The open connection between the north Atlantic and the Arctic oceans offers an opportunity for a free interchange of waters between the two. On the east side of the north Atlantic the drift of the surface water is northward, and on the west side the current flows southward. This latter, called the Arctic Current, passes from the Arctic Ocean through the Greenland Sea and Denmark Strait, between Iceland and Greenland; thence along the eastern coast of Greenland; rounds Cape Farewell, and flows up Davis Strait to about lat. 64° N. Here it probably turns toward the west and joins the Labrador Current. There is another movement of water southward from the Arctic Ocean through the straits and bays which communicate with Baffin Bay. The Labrador Current flows southward along the west coast of Baffin Bay, past Labrador and Newfoundland, until it dips into the eastward drift of the warmer waters off the Banks of Newfoundland, where the divers currents prevailing are but feeble. It has been supposed that a part of this current continued southward along the Nova Scotian and New England coasts, but some other explanation must be offered for the cold current which exists on that coast. The Labrador Current, which has a very low water temperature, carries with it icebergs and floes, which eventually disappear by melting in the vicinity of Cape Race. In this latter region heavy fogs prevail whenever winds from the south carry moist, warm air over the cold water. There is another drift of water northward through Bering Strait, but its volume is not great.

Climate. The annual average temperatures of the Arctic region are below 32° F. On the island of Jan Mayen, 29° F.; in Spitzbergen, 22° F.; Sea of Kara, 13° F.; Point Barrow, 8° F.; Lady Franklin Bay, 2° F. In Spitzbergen the average temperatures are, in July, 40° F.; in December, —2° F.; those of Lady Franklin Bay, in July, 37° F.; and February, —39° F. In other localities Nares experienced a minimum temperature of —74° F.; Greely, a minimum of —62° F.; Nansen, —52° F., and De Long, —72° F. The distribution of average temperatures for January shows a great area extending northward of the central and eastern part of the Asiatic and American continents, from about lat. 75° to beyond the pole, over which the average temperature is below —35° F., from which central area the temperatures increase in all directions, save on one side, to the following temperatures along the Arctic Circle: —30° F. on the North American Continent, +30° F. in Iceland and the north Atlantic, +5° F. in north Europe, —10° F. at Bering Strait, —31° F. in eastern north Asia; but there is actually a decrease of temperature from the polar region to —60° F. in the neighborhood of Verkhoyansk, Siberia, which is the cold pole of the northern hemisphere. The distribution of average temperatures for July shows a circumpolar area of +35° F., which lies mostly north of lat. 80°, between North America and Europe, but lies below lat. 80° elsewhere, and descends to lat. 70° in northern Alaska. From this central cold area the temperatures increase in all directions to the following values along the Arctic Circle: Western north Atlantic, +45° F.; eastern north Atlantic, +50° F.; northern Europe, +55° F.; northern Asia, +60° F.; Bering Strait, +45° F., and northern North America, +55° F. The winds in January near the pole are generally from the north in the neighborhood of Baffin Bay and northward of North America, but north of Asia they appear to be from the south, veering toward the east over northern Europe. In July the winds are from the southwest in Baffin Bay, from the northwest in the archipelago northward of North America, from the east north of Alaska, from the northeast north of Asia, from the north or northeast north of Europe, and from the north-northeast or northwest in the north Atlantic. The cloudiness averages probably between 40 and 50 per cent in January, and between 60 and 70 per cent in July. The annual precipitation is in general less than 10 inches in the Arctic regions, and most of it falls as snow.

The temperature of the Arctic waters varies from several degrees above freezing to even slightly below freezing at and near the surface; but from a distance of 500 or 600 feet below the

surface down to great depths the temperature is about 1° F. above freezing.

Inhabitants. Ranging across the North American Continent, above the Arctic Circle, from Alaska to the eastern end of the archipelago, and also settled on both the west and the east coasts of Greenland, are tribes of Eskimos, a race of aborigines, believed by many authorities to be of Mongolian origin. They live by hunting and fishing, speak an agglutinate language, have no written characters and no well-defined form of government. Whether they have a well-defined form of religion has not been definitely determined. Peary, who examined with some care the isolated tribe in the Whale Sound region of Greenland, reports that the nearest approach to religion is "simply a collection of miscellaneous superstitions and beliefs in good and evil spirits." Other observers, however, report that they have some belief in a future life. For further information see ESKIMO; GREENLAND; ALASKA; ETC. The other important Arctic inhabitants are the Lapps and Finns, and a series of tribes, probably of Mongolian origin, living in the northern part of Siberia; the Samoyedes, Tunguses, Yakuts, Yukahires, and Chukchees. These tribes are supported, some by hunting and fishing, but most by keeping herds of reindeer, which find sustenance in the moss of the tundra. But all the tribes are more or less nomadic in their habits, even those that build villages of timber. Those that depend for livelihood upon their herds of reindeer are sometimes forced to wander to fresh tundra; those that depend upon hunting and fishing follow the game from place to place.

Flora and Fauna. The general similarity of modern life-forms throughout the Arctic lands, which has been noted by Heilprin and others, is interesting from a geological standpoint, in that it shows that areas now separated by stretches of water were probably connected in past ages. It seems quite certain that the area now occupied by Bering Sea and Bering Strait was in comparatively recent times a land surface, and that there was a migration of fauna and flora between the American and the Eurasian continents. However, the uniformity of conditions over wide areas is also undoubtedly a factor causing similarities of life-forms, as is shown by the fact that isolated Antarctic islands have closely similar flora.

Arctic Plants. In many respects these plants resemble alpine plants (q.v.), and, like them, form one of the three climatic groups of xerophytes (q.v.). Dwarf growth is one of the chief characteristics of Arctic vegetation, and is remarkably well illustrated in a juniper stem reported by Kihlman: The stem was but 3⅛ inches thick, and yet showed 544 growth rings. Plants that grow to a height of one or two feet in Sweden are but one or two inches high in the far North. As in the case of alpine plants, reduction is confined to the stems and leaves, the roots and flowers being as large as in warmer climates. Cushion and rosette plants are well developed. The leaf structure is highly xerophytic, leathery and thick-skinned evergreen leaves being particularly abundant.

The Arctic life conditions have been especially well described by Kihlman (*Pflanzenbiologische Studien aus Russisch-Lapland*, 1890, etc.). The cold and darkness of the long winter nights have but little influence on the vegetation. Of greater importance are the short vegetative period, which excludes many plant species from life in Arctic regions, and the prevalence of dry winds at times when transpiration losses cannot be made good. Kihlman thinks that this latter factor is the chief cause of Arctic phenomena. The absence of trees, then, is due not to the shortness of the period of vegetation, nor to the cold, but to dry winds; this is shown by the fact that trees thrive in the coldest known place in the world (Verkhoyansk, Siberia), and also by the fact that the height of the shrubs is determined by the level of the snow in winter. The continuous though not intense light of Arctic regions checks

DRABA ALPINA.

Showing the densely compacted cushion-form of Arctic-alpine plants.

growth, but favors photosynthesis. One of the peculiarities of Arctic plant life is that there are no gradual seasonal transitions. The buds are largely laid down in the preceding season, and spring into active life at once; growth is checked with equal suddenness in the fall.

The Arctic differs radically from the temperate zone in that plant structures are xerophytic, regardless of water and soil conditions. In fact, one may refer all of the Arctic vegetation to one great plant formation, the tundra. While Arctic plants closely resemble alpine plants ecologically, there are interesting floristic differences. Alpine plants are noted for their endemism, while Arctic plants are similar over wide areas, those of Europe and America being almost identical.

About 1700 species of plants have been found in the Arctic region. In the zone nearest the circle grow a few trees, mainly junipers, dwarf willows, and birches. The tree line in the

Samoyed region ends near the 67th parallel of latitude; at the Yenisei River, near the 65th parallel; at the Lena, near the 71st parallel; at the Mackenzie, near the 68th parallel; at Hudson's Bay it runs down to the 60th parallel; in Labrador, to the 52d parallel. In Greenland it lies near the 62d parallel. Flowering plants, grasses, mosses, and lichens extend to the most northern land seen by man. Examples of those found in all sections of the Arctic world are saxifrages (*Saxifraga oppositifolia* is ubiquitous), several varieties of ranunculus, potentillas, poppies (the Arctic poppy, *Papaver nudicaule*, is found even upon the crests of the cliffs in northern Greenland, where it thrusts its head through the edge of the ice cap to reach the sunlight), drabas, cochlearia, etc. The country richest in variety is Lapland, where are found three-fourths of the species known in the Arctic regions. For the varieties characteristic of each country, see LAPLAND; GREENLAND; SIBERIA; ALASKA; SPITZBERGEN; FRANZ-JOSEF LAND; ELLESMERE LAND; GRINNELL LAND; ETC. See also MUSCI; LICHEN; GRASSES; DISTRIBUTION OF PLANTS; ETC.

Arctic Mammals. The similarity of species of Arctic mammals throughout the circle of the globe is even closer than that of plants. Of land mammals there are but few, and many of these are of the same species wherever found. The polar bear (*Ursus maritimus*) has the highest range. Specimens have been found upon the ice pack north of every known land. The bear, however, is never found far from the coast, either inland or at sea. (See BEAR.) The Arctic fox (*Vulpes lagopus*) has almost as high a range, and is also found throughout the entire Arctic land area. The lemming is found in every Arctic country except Franz-Josef Land. The reindeer (*Rangifer tarandus*) is found around the globe occasionally as far north as about the 79th parallel, but does not inhabit the great islands in the Arctic Ocean. The musk ox (*Ovibos moschatus*) has been common within the memory of man as far west as Point Barrow; but at present its range extends from the Mackenzie River east across the continent to Grinnell Land and again across the northern part of Greenland. The Arctic hare (*Lepus glacialis*) is found in the northern part of North America and of Greenland, and in these regions it reaches the highest known land. Among the other Arctic land animals are the wolverine, or glutton (*Gulo arcticus*), which is found in North America and is reported to have existed in Greenland, though such reports lack scientific verification; the Arctic wolf; and the Eskimo dog, which is supposed by most authorities to have been derived from the wolf by taming.

The most important of the sea mammals are the whales and seals. The right whale (*Balænus mysticetus*) is found in the waters east of Greenland, in Baffin Bay, and again north of Bering Strait. The range of individuals is exceedingly wide; a whale bearing a Greenland harpoon has been found in the Bering Strait region. The razor-back, the hump-back, and the bottle-nose, the grampus, the white whale, and the narwhal, are also found in the Arctic Ocean. See WHALE.

Among the pinnipeds, the most remarkable is the walrus (q.v.), which formerly inhabited the seas near the coasts of all Arctic lands, but on account of slaughter by fishermen for ivory, skin, and oil, has been driven from Europe and from the southern part of Baffin Bay. The north Atlantic species (*Odobænus rosmarus*) is still plentiful in the Smith Sound region and in Spitzbergen and Franz-Josef Land, and the Pacific species (*Odobænus obesus*) is found on the northern coast of Alaska and Kamchatka. Among species of hair seals which inhabit the Arctic seas, the most important is the *Phoca fœtida*, whose range covers the Arctic regions near the shores and ice fields, and extends south to Labrador, the Orkneys, the Hebrides, the gulfs of Bothnia and of Finland, and along the coasts of Siberia and Alaska, into Bering Sea. The harp seal (*Phoca Grœnlandica*) and the bearded seal (*Erignathus barbatus*), which is the largest of the north Atlantic pinnipeds next to the walrus, also have a circumpolar distribution. The bladder-nose or hooded seal (*Systophora cristata*) ranges from Greenland to Spitzbergen and along the northern coast of Europe. For other seals, see SEAL.

Arctic Birds. Birds are very plentiful throughout the whole of the Arctic region. The little auk (*Mergulus* or *Alle alle*) and the guillemot (*Uria lomvia*) are found in thousands in whatever region there are cliffs to serve as nesting spots. Raven (*Corvus corax*), snow buntings (*Plectro phenax nivalis*), and sandpipers have been seen in the remotest northern land regions. The snowy owl (*Nyctea nivea* or *nyctea*) and the gyrfalcon (*Falco rusticolus*), though in certain regions rare—as, for instance, Greenland and Franz-Josef Land—still inhabit all Arctic lands. Various species of gulls—Ross's gull (*Rhodostethia rosea*), the glaucus gull (*Larus glaucus* or *hyperboreus*), the ivory gull (*Pagophila eburnea* or *alba*)—also range very far north; Nansen saw Ross's gulls and ivory gulls upon the ice pack above Franz-Josef Land. Among the other characteristic Arctic birds are the eider duck, kittiwakes, skuas, teal, petrels, puffins, and ptarmigans. Further information concerning the mammals and birds of the Arctic region will be found under the names of the animals. See also DISTRIBUTION OF ANIMALS, and the titles of the countries included in the Arctic region.

Arctic Insects. Insects have been collected wherever exploration has extended and vegetation was known. Bees and parasitic hymenopterans occur as far as the Pedicularis or other flowers bloom—up to 82° or more in Grinnell Land, and in Greenland. Beetles are less hardy, and few are known north of the Arctic Circle, but flies, butterflies, and moths have been taken up to 83° on the American side of the pole. Thus the Nares expedition brought back several species of Lepidoptera, mostly of common genera (Argynnis, Colias, Lycæna, etc.) of butterflies, while the few moths represent various families. These insects have only about six weeks in which their larvæ can hatch and feed, and probably do not mature in a single season; but it must also be remembered that the whole 24 hours of the days of their brief career are sunny, and they fly about continuously.

Marine Life. More than 125 species of fishes have been taken within the Arctic Circle, and valuable fisheries exist on the northern coasts of Russia, in the waters about Spitzbergen and Nova Zembla, and might be organized north of Bering Strait. The most important are cod, halibut, flatfish, and related forms; but many bottom-feeding families are represented as far north as knowledge extends. Several species of salmon or trout ascend Arctic rivers, the most

northerly case being that of *Salmo arcturus*, taken in Grinnell Land (lat. 82°). Food for many of these fishes, and for seals and walruses, is afforded by a large variety of mollusks, including squids, clams, and mussels, and a long list of gastropods, chiefly of the families Pleurotomidæ, Buccinidæ, Natacidæ, and Trochidæ. Nearly 100 species have been catalogued, a large proportion of which also exist in temperate latitudes. The great abundance of diatoms and the general prevalence of low algæ sustain these and similar low animals. No mollusks are more widespread and numerous, however, than the pteropods, especially of the genera *Clione* and *Limacina*, and they furnish an important element in whale diet. There are also chitons and sea slugs. Crustacea abound in the Arctic seas. A few are of the higher forms, allied to crabs and shrimps, but mainly they are entomostracans of small size and pelagic life. Such amphipods as *Anonyx* and *Hippolyte* are well represented in the extreme north at various depths, as also are the copepods, isopods, barnacles, and pycnogonids; and the specimens of such species as are also known southward are very much larger than their southern equivalents. All of these, and especially the copepods, are of great economic importance as food for whales. They are an example of the power of resisting cold possessed by these creatures, for they survive freezing for a long period, and their eggs are still more hardy. The shores and shallows of the Arctic Ocean also abound in annelids, of which 20 or more species have been collected, and which form an important element in the diet of the larger denizens of those seas; and the still humbler ranks of life are represented by jellyfishes and hydroids, especially varied and numerous north of Alaska, and by polyzoans and test-bearing protozoans in great numbers. Seaweeds diminish toward the extreme north to a very few olive-colored kinds, and seem to be more abundant north of Europe than in the American Arctic regions.

Discoveries. For explorers the principal entrance to the Arctic Ocean is the passage between Nova Zembla and Franz-Josef Land; the next most convenient entrance is through Davis Strait. American explorers have generally passed up Davis Strait, Baffin Bay, and Smith Sound, and through the very narrow Kennedy Channel; and Markham in 1875 pushed the ship *Alert* through Robeson Channel into the Arctic Ocean, where it wintered at Floeberg Beach, and Peary's steamer *Roosevelt* later wintered at Cape Sheridan on the same coast.

As to the efforts to reach the North Pole itself, it may be stated that by the use of sledges Parry, in 1827, reached 82° 45′, far outstripping all previous records; Markham, of the British expedition under Nares, attained 83° 20′; Lockwood, of Greely's expedition, reached 83° 24′; Peary, in 1900, reached 83° 54′; in 1902, 84° 17′; in 1906, 87° 6′; and in 1909 the pole itself. By the passage eastward toward the New Siberian Islands and the subsequent drift in the ice floe, Nansen's ship, the *Fram*, in 1895, reached 85° 57′; but having previously left the ship, by a sledge journey over the ice-pack, Nansen and Johannsen reached 86° 14′. On April 26, 1900, Cagni, of Abruzzi's expedition, by a rapid march northward from Franz-Josef Land, reached 86° 33′.

For an account of exploration in the Arctic regions, see POLAR RESEARCH. For further information concerning the magnetic phenomena, see MAGNETISM, TERRESTRIAL.

Bibliography. A very good bibliography of the Arctic region is Chavanne, aided by Karpf and Mommier, *Die Litteratur über die Polar-Regionen der Erde* (Vienna, 1878). In this work may be found the titles, classified, of most of the important books that had been written up to the time of its publication. General Greely's *Handbook of Arctic Discoveries* (5th ed., Boston, 1910) also gives valuable lists of books, classified according to the various spheres of Arctic exploration. A fairly comprehensive work covering *The Natural History, Geology, and Physics of Greenland and Adjacent Regions* (London, 1875) was prepared by T. Jones as a manual for the British Admiralty Expedition of 1875–76. The information presented by the contributors to this work extends somewhat beyond the regions "adjacent" to Greenland, but needs to be supplemented, and in a few passages corrected, by the reports of later explorations. Of such reports, the most important are (1) those of the International Polar Expeditions of 1881–83, published by the various coöperating governments. Those of the United States appeared (*a*) by Greely under the title, *Report on the Proceedings of the United States Expedition to Lady Franklin Bay* (Washington, 1888); (*b*) by Ray, under the title, *Report of the Expedition to Point Barrow;* that of Austria, by Wohlgemuth, appeared under the title, *Osterreichische Polarstation Jan Mayen* (Vienna, 1886); that of Denmark, by Paulsen, under the title, *Expedition Danoise, Godthaab* (Copenhagen, 1889–93); that of Great Britain, by Dawson, under the title, *Fort Rae* (London, 1886); that of Russia, by Andreyeff and Lentz, under the title, *Beobachtungen der russischen Polarstationen auf Nowaja Semla* (St. Petersburg, 1886–95), etc. (2) Wright, *Greenland Ice Fields and Life in the North Atlantic* (New York, 1896), which contains a brief description of the flora and fauna of Greenland and a discussion of Arctic glacial phenomena; (3) Conway, *The First Crossing of Spitzbergen* (London, 1897); (4) Jackson, *A Thousand Days in the Arctic* (New York, 1899), which deals with Franz-Josef Land, and *The Great Frozen Land* (New York, 1895), which deals with the Samoyed Peninsula; (5) Peary, *Northward over the Great Ice* (New York, 1898), which contains a valuable chapter on the most northern Eskimos; (6) Peary, *The North Pole* (New York, 1910); (7) Nansen, *Farthest North*, which sets forth the drift of a vessel frozen in the ice across the Arctic Ocean. Of fundamental importance is *The Norwegian North Polar Expedition 1893–1896: Scientific Results*, edited by Nansen. Books on Arctic currents are: Dittmar, *Das Nord-Polarmeer* (Hanover, 1901), and the report published by the Norwegian government of the investigations of the ship *Ingolf* in the region of east Greenland and Iceland.

Valuable works on the inhabitants are: Boas, "The Eskimo of Baffin Land and Hudson Bay" (*Bulletin, American Museum of Natural History*, vol. xv); Pecher, *The Races of Man and their Geographical Distribution* (London, 1876); Ratzel, *The History of Mankind* (3 vols., trans., New York, 1896). For the distribution of animals consult Heilprin, *The Geographical and Geological Distribution of Animals* (New York, 1887); for the distribution of plants consult Heer, *Flora Fossila Arctica* (7 vols., Zurich, 1868–80).

ARCTIUM, ärk'shĭ-ŭm. See BURDOCK.

ARCTOI'DEA. See CARNIVORA.

ARC'TOSTAPH'YLOS (Gk. *ἄρκτος, arktos*, bear + *σταφυλή, staphylē*, grape-bunch). A genus of shrubs and small trees closely related to *Arbutus*. Most of the species are American; two, however, are circumpolar. The red bearberry (*Arctostaphylos uva-ursi*) is one of them. It is a trailing evergreen shrub, which bears small flowers and red berries. Its associated species, *Arctostaphylos alpinā*, has berries which are black when ripe and leaves which are not evergreen. The leaves of *Arctostaphylos uva-ursi* are used in medicine. The manzanita of California is *Arctostaphylos pungens*. It is a shrub or small tree 30 feet high that sometimes forms almost impassable thickets. Only the trailing forms are entirely hardy.

ARCTOWSKI, ärk-tôf'skē *or* -tôs'kē, HENRYK (1871—). A Polish scientist and explorer. He was born in Warsaw and studied chemistry and geology at the universities of Paris, Liége, and Zurich from 1888 to 1896. After a year at the British Museum he set out with the Belgian Antarctic expedition in 1897, in charge of the physical observations. During the two years' stay of this expedition in the south polar regions he discovered and studied the geology of the Antarctic Andes and established the first complete record of meteorological observations made in that part of the world. On his return to Europe he became assistant in the Royal Observatory of Belgium and remained there until his removal to the United States in 1909. He was appointed chief of the science division of the New York Public Library in 1911 and became a member of many American and European scientific societies. His published writings include *Die antarktischen Eisverhältnisse* (1903); *L'enchainement des variations climatiques* (1909), and many reports and articles in scientific journals of this and other countries.

ARCTU'RUS (Gk. *ἄρκτος, arktos*, bear, the Great Bear + *οὖρος, ouros*, guardian). The principal star in the constellation Boötes (the 'herdsman'). Arcturus is of the first magnitude and is very conspicuous in the northern heavens. According to the *Harvard Photometry*, it is exceeded in brightness by only two stars, Sirius and Canopus. Its parallax, as determined by Elkin, is 0".024. Its distance from us is therefore about 8,500,000 times the mean radius of the earth's orbit, and its light takes about 125 years to reach us. It may be found by continuing the curve of the three stars which form the handle of the Dipper, or Ursa Major (q.v.).

AR'CUA'TION. See LAYERING, ARCUATION.

ARCUEIL, ärk'ĕ'y' (anciently, Lat. *Arcus Iulianus*). A suburb of Paris lying 4 miles south of that city (Map: Paris and vicinity). It is a holiday resort and noted for the ruins of an aqueduct built by order of the Roman Emperor Julian and for several aqueducts of modern times. Pop., 1901, 8425; 1911, 11,319.

AR'CUS SENI'LIS (Lat. bow of old age), or GERONTOXON (Gk. *γέρων, gerōn*, old man + *τόξον, toxon*, bow). A change occurring in the cornea of the eye, in consequence of fatty degeneration of its margin. The *arcus senilis* usually commences at or even before the age of 40 years, as an opaque whitish crescent, skirting either the upper or lower margin of the cornea; and from this beginning it extends along the edge till it finally becomes a complete circle, which sometimes assumes a chalky whiteness. On close examination it may be seen that a narrow interval of partially clear cornea always intervenes between the arcus and the opaque sclerotic. As far as vision is concerned, the formation of this circle is of little importance. It is usually associated with arteriosclerosis and fatty degeneration of other portions of the body, including the heart.

ARCY, ärˊsē', GROTTO OF. A cavern of remarkable beauty, 12 miles east of Auxerre, France. It is supposed to have been used in early times as a stone quarry, and possibly the material for the Auxerre cathedral was taken from it. There are three main divisions with an aggregate length of about 2900 feet.

ARD, or **AIRD.** A Celtic root, meaning 'height' (cf. Lat. *arduus*, high), which appears in many geographical names, especially in Ireland and Scotland.

ARDAHAN, är'dȧ-hän'. The capital of a district in the territory of Kars, Transcaucasian Russia (Map: Russia, F 6). It is situated 45 miles northwest of Kars on the Kur River. Its strategical importance on the military route from the Black Sea to the Turkish frontier and as the point of juncture of the roads to Batum, Akhaltsikh, Kars, and Erzerum was recognized by the Turks, who, by constantly improving its fortifications, finally made it a powerful stronghold. In 1877, 20,000 Russians under Devel and Heiman successfully stormed it. By the Treaty of San Stefano and the Berlin Congress (1878), Ardahan and the surrounding country were ceded to Russia. Pop., 800.

AR'DAN. A small South American linguistic stock in the region lying between the rivers Napo and Nanay, in extreme northeast Peru-Ecuador.

ARDASHIR, är'dȧ-shēr' (Pahlavi *Artaxsatar*, later Pers. *Ardasir*). The name of three monarchs of the Sassanian dynasty of Persia (see SASSANIDÆ), and a later form of the old name Artakhshathra, or Artaxerxes (q.v.). The most important of the three was Ardashir I, or Artakhshatar Papakan, who founded the Sassanian dynasty by overthrowing Artabanus, the last of the Parthian kings, and strengthened his power by further conquests, and ruled over Persia 226–240 A.D. His records are contained in the *Kārnāmē ī Artakhshīr ī Pāpakān*, which have been translated into English and Gujerati by Darab Sanjana (Bombay, 1896). The other two of the name were Ardashir II, 379–383; Ardashir III, 628–629. See PERSIA.

AR'DEA. A town in ancient Italy, capital of the Rutuli and their King Turnus (q.v.).

ARDEBIL, är'dē-bēl', or **ARDABIL**, är'dȧ-bēl'. A celebrated town of Azerbaijan, Persia, situated in lat. 38° 15′ N., long. 48° 19′ E., on a plain over 4000 feet above sea level, and 40 miles from the Caspian Sea (Map: Persia, C 2). It has a moderate climate, and its picturesque environs and the mineral springs in its vicinity make it the favorite abode of the Persian rulers, whose tombs it contains. Before the Russo-Persian War (1826–28) the city was strongly fortified under the French. During the war it was captured by the Russians and was subsequently nearly ruined by earthquakes. Since the Middle Ages it has derived some importance from its proximity to the Lenkoran-Tabriz caravan route. Its population is estimated to be above 10,000.

ARDECHE, är'dĕsh'. A department in the

south of France. It takes its name from the river Ardèche, a tributary of the Rhône, and includes the northernmost part of the old province of Languedoc. Area, 2145 square miles. Pop., 1896, 360,599; 1906, 347,140; 1911, 331,801. Ardèche is almost wholly mountainous. The upland, which has winter for about six months, is devoted to pasturage, while the terraces and valleys near the Rhône have a warm climate and produce good white and red wine, olives, dates, almonds, chestnuts, vegetables, etc. Lead, iron, copper, and manganese are mined, and lime is quarried. Leather, silk, paper, and flour are manufactured, and these with lumber form the principal articles of commerce. Capital, Privas.

AR'DEN, Edwin Hunter Pendleton (1864–1918). An American actor and manager. He was born, Feb. 13, 1864, in St. Louis, Mo. He left home at the age of 17, and after a variety of experiences in the West went upon the stage in 1882, with J. W. Keene's company, in Chicago. Besides his engagements with other managers, he traveled for a number of years with his own company and appeared in plays of his own authorship. He has written, either alone or in collaboration, *Eagle's Nest, Barred Out, Raglan's Way,* and *Zorah.*

ARDEN, Forest of. A wood in Warwickshire, in old times very extensive. It is supposed to have been a hunting ground of Robin Hood. Certain authorities believe that Shakespeare used it as a background in *As You Like It;* others assert that his scenery was taken from the forest of Ardennes.

ARDENNES, är'dĕn' (Celt. high wooded valley, from *ard;* Lat. *arduus,* high; the ancient Lat. *Arduenna Silva,* Ardenne Forest). A wild, hilly region, extending over portions of Belgium and France and gradually sloping toward the plains of Flanders. In early times the name was given to a vast forest lying between the Rhine and the Sambre, a distance of about 160 miles. The average height of the hills is less than 1400 feet; but in the east, Mont Saint-Hubert attains an elevation of 2100 feet. Large tracts of this region consist of gently undulating plateaus densely covered with oak and beech forests, while other portions are marshy, heathy, and barren. The districts through which the Meuse and other rivers flow present some extraordinary appearances. The channel of the river is sometimes bound in by rugged and precipitous cliffs more than 600 feet high. The principal rocks of the Ardennes are clay slate, graywacke, quartz, etc., interspersed with extensive strata of Paleozoic limestone. There are coal and iron mines in the northwest; lead, antimony, and manganese are also found. There is little cultivation of grain, but cattle and sheep are extensively raised. Consult A. Meyrac, *Villes et villages des Ardennes* (Charleville, 1898).

ARDENNES. A frontier department in the northeast of France, formerly a part of the old province of Champagne. Area, 2028 square miles; pop., 1896, 318,865; 1906, 317,505; 1911, 318,896. The northeastern part of Ardennes belongs to the basin of the Meuse; the southwest is watered by the Aisne; and both of these rivers, united by the canal of Ardennes, receive several affluents. Agriculture is carried on extensively in the fertile valleys, cereals, grain, and potatoes being the principal crops. In the mountainous districts there are extensive forests and tracts of grazing lands. The vine is cultivated at Mézières, in the southwest. In the north, near Givet, marble is obtained; but the prevailing rock is limestone, veined with lead and iron. Slate, marble, and iron, porcelain clay, and sand for making glass are obtained. Other leading industries are saw milling and the manufacture of iron, leather, flour, and sugar. Most of these commodities are exported. Capital, Mézières. Consult A. Joanne, *Le departement des Ardennes* (Paris, 1898).

ARDENNES, The Wild Boar of. An appellation of William de la Marck, a lawless baron of the reign of Louis XI, whom Scott has introduced in several chapters of *Quentin Durward.*

AR'DEN OF FEV'ERSHAM. The first English "*bourgeois* tragedy." It deals with a murder by a wife and her paramour. The plot was drawn from an actual occurrence contemporary with it. It was first printed in 1592; its authorship is unknown. The play has been attributed both to Shakespeare and to Kyd. In 1736 Lillo, author of *George Barnwell,* began an adaptation of it, which was completed after his death by Dr. Hoadley and produced in 1790. For further information, consult Saintsbury, *History of Elizabethan Literature* (London, 1887).

ARDITI, är-dē'tē, Luigi (1822–1903). An Italian composer and musical conductor. He was born at Crescentino, Piedmont, July 16, 1822. After graduating from the Milan Conservatory in 1842, he began his career as a violin virtuoso, traveling with Bottesini, the famous double-bass player. With the Havana Opera Company, of which he became conductor, he visited New York in 1847 and during subsequent seasons, conducting in 1854 the first performance at the Academy of Music, where he brought out his opera, *La Spia* (based on Cooper's novel, *The Spy*). In 1857 he was conductor at Her Majesty's Theatre in London. In 1869 he conducted *The Flying Dutchman,* the first performance of a Wagner opera in England. In 1878 and many subsequent seasons he again conducted opera in New York. His waltz songs *Il Bacio* (to which Piccolomini gave great vogue) and *Fior di Margharita* (sung by Patti and other great prima donnas), are famous. He was Patti's favorite conductor. His other operas are *I Briganti* (1841) and *Il Corsaro* (1856). He published *My Reminiscences* (New York, 1896), containing a good deal of valuable information besides interesting chitchat. He died, May 1, 1903, at Hove, near Brighton.

ARD'MORE. A city and the county-seat of Carter Co., Okla., about 100 miles south of Oklahoma City; on the Gulf, Colorado, and Santa Fe, the Rock Island, San Francisco, and Oklahoma, and New Mexico and Pacific railroads (Map: Indian Territory, F 4). It is the seat of Hargrove College and St. Agnes's Academy. It controls large commercial interests in cotton and asphalt; has deposits of natural gas and many large oil wells; and is an important stock-raising centre. It has municipal water works. Ardmore was settled in 1886 and incorporated in 1898, but has adopted the commission form of government. Pop., 1900, 5681; 1910, 8618; 1920, 14,181.

ARDOCH, är'dŏg. A small village in Perthshire, Scotland, 8 miles south-southwest of Crieff (Map: Scotland, E 3), with the best-preserved Roman camp in Britain. The camp is 2½ miles north of Greenloaning station on the Caledonian Railway, in the grounds of Ardoch House. The intrenched works form a rectangle 500 by 430

feet, the four sides facing the cardinal points. The north and east sides are protected by five ditches and six ramparts, these works being 270 feet broad on the north side and 180 feet on the east. A deep morass exists on the southeast, and the perpendicular banks of Knaig Water, rising 50 feet high, protect the camp on the west. The prætorium, or general's quarter, now called Chapel Hill, rises above the level of the camp, but is not exactly in the centre, and is nearly a square of 60 feet each side. Three of the four gates usual in Roman camps are still seen. A subterranean passage is said to have formerly extended from the prætorium under the bed of the Knaig. Not far north of this station, on the way to Crieff, may be traced three temporary Roman camps of different sizes. Portions of the ramparts of these camps still exist. Pop., 1901, 916; 1911, 863.

ARDROS'SAN (Gael. *ard*, high + *rossan*, point). A small seaport town and summer resort in Ayrshire, Scotland, on the Firth of Clyde, 32 miles by rail southwest of Glasgow (Map: Scotland, D 4). Its harbor, sheltered by an island off the coast, is one of the safest and most accessible on the west coast of Scotland and has been greatly improved by the earls of Eglinton, to whose efforts the prosperity of the town is largely due. There is a large export of coal and pig iron from this place, and shipbuilding and fishing furnish occupation for many of the inhabitants. On a hill above the town stand the ruins of Ardrossan Castle, said to have been surprised by Wallace when held by the forces of Edward I. Population of the police burgh in 1901, 5933; in 1911, 5760.

ARE, âr (Lat. *area*, piece of level ground). The unit of the French land measure; a square, the side of which is 10 meters (or 32.809 feet) long, and which, therefore, contains 100 square meters = 1076 English square feet. The next denomination in the ascending scale is the *decare*, containing 10 ares; but the denomination commonly used in describing a quantity of land is the *hectare* of 100 ares = 2.47 English statute or imperial acres. See METRIC SYSTEM.

A'REA (Lat. piece of level ground, vacant place). The superficies of any bounded surface or space. The calculation of areas, or mensuration of surfaces, is one of the ultimate objects of geometry. Area is commonly measured by a square unit, as the square inch, square yard, square meter, square degree. (See MENSURATION; QUADRATURE.) In antiquity this word meant any space free of buildings, such as a square, inclosure, court, arena of a circus, space around a temple, or any other public building. In this last connection, the area was consecrated ground. So, in connection with early Christian churches there were areas protected by law, in which the faithful were buried. In modern use the word is applied also to the open space of a narrow front yard or back court, or in connection with a basement.

ARE'CA (Sp. Portug. from Canarese *adiki*). A genus of palms containing about 15 species. The fruit is a fibrous one-seeded drupe, a nut with an outer fibrous husk. *Areca catechu*, the Pinang palm, or betel-nut palm, is a native of the East Indies, whose nut yields a sort of catechu. (See CATECHU.) This areca nut or betel nut, is very much used in all parts of the East, the chewing of it with quicklime and the leaf of the betel pepper being one of the most prevalent habits of the people. (See BETEL.) The fruit is about the size of a hen's egg, smooth, orange or scarlet, the fibrous husk about half an inch thick. When chewed, it reduces the saliva and stains the lips and teeth. It is said to stimulate the digestive organs and to prevent dysentery. Areca nuts form a considerable article of trade in the East. The timber of the palm which produces them, and its leafstalks and spathes, are also used for domestic purposes. The tree is often 40 to 100 feet high, and in general less than a foot in diameter. The leaves are few, but very large, their leaflets one to two feet long. In Malabar an inebriating lozenge is prepared from the sap. *Areca oleracea*, or *Oreodoxa oleracea*, the "cabbage palm" of the West Indies, is a very tall tree, 100 to 200 feet, whose huge terminal leaf bud is sweet and nutritious and is sometimes used for the table as cabbage; but when it is cut off the tree is destroyed. The stem of this tree, notwithstanding its great height, is remarkably slender. The nuts are produced in great numbers; they are about the size of a filbert and have a sweet kernel. *Areca sapida*, now called *Rhopalostylis sapida*, the New Zealand palm, is remarkable as extending southward beyond the geographical limits of any other of its family, as far, indeed, as lat. 38° 22′ S. It is a small palm, only from 6 to 10 feet high, with leaves 4 to 6 feet long. The young inflorescence is eaten. *Areca vestiaria*, a native of the East, is so called because clothing is made from its fibres. For illustrations, see PALMS.

ARECIBO, ä′rā-sē′bō. The chief city of the department of the same name, rather picturesquely situated on the northern coast of Porto Rico (Map: Porto Rico, C 2). It is about 40 miles west of San Juan, with which it is connected by rail, and has a rather shallow harbor and some sugar mills, the product of which is the principal export. The city is surrounded by coffee plantations and fine grazing land. Pop., 1899, 8008; 1910, 9612.

AR'EIOP'AGUS. See AREOPAGUS.

AR'EMOR'ICA. See ARMORICA.

ARE'NA (Lat. sand, sandy place, beach, coast). The central part of an amphitheatre, inclosed by the seats. In it the gladiatorial contests and other games were held, and the name "arena" was given to it because of the sand which was spread to soak up the blood. The term is extended to mean any flat inclosure for the exhibitions of shows, games, sports, and contests, and even figuratively to the region or field of political and other intellectual contests. See AMPHITHEATRE.

AR'ENA'CEOUS ROCKS (from Lat. *arena*, sand), or Psammites, Gravel and Sand Rocks, composed mainly of quartz particles deposited through water or air. They are mechanical sediments produced by the disintegration and removal of silicious rocks by the action of atmosphere, rain, rivers, frost, lake and ocean waves, and other superficial agencies. The arenaceous rocks, or psammites, include plain sand, river sand, sea sand, sandstone, graywackes, quartzite, gravel, shingle, and conglomerate (q.v.). Seldom are they composed entirely of quartz; the quartz being commonly associated with fragments of other minerals such as feldspar, mica, iron ore, hornblende, etc., all of which may be cemented by carbonate of lime or magnesia, quartz, or iron. Arenaceous rocks grade by intermediate stages into argillaceous rocks through increasing admixtures of clay, and into

calcareous rocks by admixture of lime. See ARGILLACEOUS ROCKS; CALCAREOUS ROCKS; ROCKS.

ARENALES, ä'rā-nä'lĕs, JUAN ANTONIO ALVAREZ DE (1755–1825). An officer in the patriot army in the Peruvian revolution against Spain. In 1820, with a body of 1000 men, he was sent from Pisco with orders to strike into the country across the Andes and proceed by a circuitous route to Lima, there to meet the main army—a feat not unlike Sherman's famous march—which he accomplished most successfully, completely defeating the Spanish army at Cerro de Pasco.

AR'ENA'RIA (Lat. *arenarius*, pertaining to sand, from *arena*, sand), or SANDWORT. A genus of plants of about 150 species, belonging to the family Caryophyllaceæ. The species are annual and perennial tufted herbs, rarely somewhat shrubby, and natives of the temperate and colder parts of the world. Some of them are arctic and alpine plants. Many of them are chiefly found in sandy soils. The flowers are generally small and inconspicuous.

ARENBERG, ä'ren-bĕrk, or **AREMBERG,** ä'rem-bĕrk. A duchy of the Holy Roman Empire, with territory mainly in Germany. The lords of Aremberg became important in the twelfth century, but the male line died out in 1280. The heiress married the Count de La Marck and had two sons, of whom the elder became Count de La Marck, and the younger, Lord of Aremberg. The male line died out again, and in 1547 the heiress married a member of the family of Ligne who was made a Count of the Empire by Charles V. He distinguished himself in the Dutch wars. His services and the fortunate marriage of descendants added to the prestige and property of Aremberg, and the title was raised to Duke. See the following articles.

ARENBERG, or **AREMBERG,** AUGUST MARIA RAIMUND, PRINCE (1753–1833). A Belgian soldier and author—also known as Count La Marck—a brother of the Duke of Arenberg. He served in India in 1780, and participated in the Belgian revolt of 1789, but afterwards swore allegiance to the Emperor Leopold II. He was an intimate friend of Mirabeau during the French Revolution, and his *Correspondance entre le Comte de Mirabeau et le Comte de La Marck* (edited by Vacourt, 2 vols., Brussels, 1851) must be considered a valuable contribution to the history of the French Revolution.

ARENBERG, or **AREMBERG,** LEOPOLD PHILIPP KARL JOSEPH, DUKE OF (1690–1754). An Austrian field marshal. He was born at Mons, of one of the most illustrious families of Belgium. At 16 he was colonel of a regiment, and councilor of state to Archduke Charles, the Austrian claimant to the Spanish throne, who subsequently became Emperor as Charles VI. He fought at Malplaquet in 1709 and in the same year became grand bailiff of Hainault. In 1716 he served in Hungary under Prince Eugene, and fought at Belgrade in the following year; on returning to the Netherlands in 1718 he was made military governor of Hainault, and subsequently commander in chief of all the Austrian forces in the Netherlands, with the rank of field marshal. In 1743 he led his troops with great gallantry at Dettingen. Afterward he served in Silesia under Charles of Lorraine, and in 1747 was president of the commission in control of the Netherlands. He was a lover of the sciences and of letters and was a patron of J. J. Rousseau. He also corresponded with Voltaire and with Frederick the Great. The fullest account of Leopold of Arenberg is that given by Gachard, in the *Biographie Nationale*, published by the Royal Academy of Belgium and founded on documents in the Belgian royal archives.

ARENDAL, ä'ren-dâl. A town on the southeast coast of Norway, situated near the mouth of the Nid Elf in the Bay of Christiania, 36 miles northeast of the city of Christiansand (Map: Norway, D 7). It is built partly on piles, partly on rock, with numerous canals intersecting it, and this circumstance, as well as its situation, gives it a very romantic aspect and has caused it to be called "The Little Venice." The bay, which is protected by the island of Tromö, forms an excellent harbor and favors the commerce of the town. The exports are iron from the neighboring mines, timber, and wood pulp. Shipbuilding is also carried on, and, on a smaller scale, distilleries and tobacco factories. Pop., 1900, 4370; 1910, 10,315.

ARENDT, ä'rĕnt, OTTO (1854—). A German economist and politician, born in Berlin. He studied law and political science at Leipzig and Freiburg, and with the appearance in 1880 of his work, *Die vertragsmässige Doppelwährung*, became an active advocate of bimetallism. He was one of the founders of the society for the introduction of international bimetallism (1882), and became the real head of the party in Germany. In 1885 he was elected to the Prussian House of Representatives as a member of the Liberal Conservative party. From 1888 to 1898, he was editor of the *Deutsches Wochenblatt*, in which he advocated colonial expansion and the coalition of national parties. His published works include *Leitfaden der Währungsfrage* (17th ed., 1895); *Die Ursache der Silberentwertung* (1899); *Die parlamentarischen Studienreisen nach West- und Ost-Afrika* (1906); *Geld, Bank, Börse* (1907).

ARENDT, ä'rent, RUDOLF (1828–1902). A German chemist, born at Frankfurt-on-the-Oder. He studied at the University of Leipzig and after 1861 taught at the commercial high school there. The best known among his works is his *Technik der Experimental Chemie* (2 vols., 1881; 3d ed., 1900). Arendt was for many years editor of the *Chemisches Centralblatt*. He also wrote *Anschauungsunterricht in der Naturlehre* (4th ed., 1886); *Leitfaden für den Unterricht in der Chemie* (7th ed., 1899); *Grundzüge der Chemie* (8th ed., 1903).

ARÈNE, à'rĕn', PAUL AUGUSTE (1843–96). A French writer and Provençal poet born at Sisteron. He was director of the Lyceum at Marseilles and afterward of that at Vanves, and gained his first success as an author with his *Pierrot héritier* (presented in 1865), a one-act comedy in verse. His further publications include the dramatic works *Jean des figues* (1870), *Les comédiens errants* (1873), and *Le duel aux lanternes* (1875), some prose fiction, such as *Au bon soleil* (1879), and *Le canot des six capitaines* (1888), and a volume of descriptions of travel, *Vingt jours en Tunisie* (1884). His work was marked by delicate humor. He was a regular contributor to *La République Française*, *L'Evénement*, and *Gil Blas*. Consult Armand Silvestre, preface to *Poésies* (Paris, 1900); Lorenz Petry, dissertation (Halle, 1910).

ARENG' PALM. See GOMUTI.

ARENS, ä'rens, FRANZ XAVER (1856—). An

American musician. He was born at Neef, Germany, but came to America at the age of 10. Later he went again to Germany to study music. He took the regular course at the Conservatory in Dresden, where he graduated in 1885. From 1885 to 1888 he conducted the Philharmonic Orchestra of Cleveland, Ohio, and also appeared in other cities as conductor of music festivals. From 1890 to 1892 Arens was abroad in charge of "American Composers" concerts. In 1900 he founded the People's Symphony Concerts in New York for the purpose of bringing the best music to the poorer classes. The admission fee is merely nominal. From the beginning these concerts were successful, and their scope was gradually extended, so that from a few orchestral concerts, conducted personally by Mr. Arens, chamber-music concerts by regular organizations became a feature. This movement has spread to other cities.

ARENSKI, ä-rĕn'skê, ANTON STEPANOWITCH (1861–1906). A distinguished Russian composer. He was born at Novgorod, July 30, 1861, and died at Tarioki (Finland), Feb. 25, 1906. From 1879 to 1882 he was a pupil of the Conservatory at St. Petersburg, where he studied under Rimski-Korsakoff (q.v.). In 1883 he became professor of composition at the Imperial Conservatory in Moscow, where in a short time he gained a national reputation as a successful teacher. He returned to St. Petersburg in 1895, succeeding Balakireff (q.v.) as conductor of the Imperial Court Chorus. Although a contemporary of the Neo-Russian composers, he has little in common with them; he rather inclines to the ideals of Glinka (q.v.) and Tschaikowski (q.v.). His works comprise the operas: *The Dream on the Volga* (1892); *Raphael* (1894); *Nala and Damayanti* (1899); for orchestra: two *Symphonies* (Bm. and A); *Concerto for piano; Concerto for violin; Fantasie for piano and orchestra.* Chamber music: *String quartets, trios, piano quintet.* Many compositions for piano, songs, and choruses. Theoretical works: *Treatise on Harmony* and *Handbook of Musical Form.*

ARENTS, ä'rents, ALBERT (1840—). A German-American metallurgist. He was born at Klausthal, Germany, and studied mining engineering there and at Berlin. In 1865 he came to the United States and undertook to treat the lead ores in Hampton Co., Mass. He was metallurgist and mining engineer of a number of enterprises in the Western States, and patented many valuable industrial improvements, including a "siphon-tap" for lead blast furnaces.

ARENTZEN, ä'rents-en, KRISTIAN AUGUST EMIL (1823–1900). A Danish poet. He was born at Copenhagen, and after extensive travels he was appointed to the chair of æsthetics in the University of Copenhagen. He published two dramas, *Gunlög Ormetunge* (1852), and *Knud den Hellige* (1853), and a volume of *Digte* (1854, republished as *Ny Digtsamling*, 1867). He is chiefly known for his important critical work, *Baggesen og Oehlenschläger* (8 vols., 1870–78).

AREOIS, ä'rā-ō'ēz. The society of the Areois was a famous institution among the natives of the Society Islands (Tahiti), organized for literary, dramatic, and especially religious purposes. The members traveled from place to place, singing, dancing, and representing historical events and scenes in the lives of gods and heroes. They also devoted themselves to erotic pleasures (love adventures and sexual congress of an absolute reality were acted), which has made the *Areois* stand for a sort of artistic sexualism. Upon the women belonging to the society, infanticide was imposed by oath. It represents one of the most remarkable sides of Polynesian life, for which a parallel has to be sought in the European Middle Ages.

A'REOM'ETER. See HYDROMETER.

AR'EOPAGIT'ICA. A pamphlet advocating unlicensed printing; the greatest prose work of Milton (1644), a plea for freedom of thought.

AR'EOP'AGUS (Gk. *Ἄρειος πάγος, Areios pagos*, hill of Ares). A bare, rocky hill to the west of the Acropolis of Athens, about 350 feet high. The ancients explained the name by saying that here Ares had been tried for the murder of Halirrhothius, or that the Amazons (q.v.), the worshipers of Ares, had attacked the Acropolis from this point. Some modern writers prefer to connect it with the Eumenides (q.v.; see also the account of the *Oresteia*, under ÆSCHYLUS; and ORESTES; and the close of the present article) and the bloodguiltiness, which was tried here, and derive the name from *Ἀραί*, so that the meaning would be 'hill of the curse.' (Consult Frazer, *Pausanias*, ii, 363.) At the south end steps hewn in the rock lead to a series of rock cuttings which cannot now be satisfactorily explained. On the north side, which overlooks the city and is near the deep cleft where the Eumenides were worshiped, seems to have been the place where the court of Areopagus tried cases of willful murder. The Areopagus gave its name to the most venerable court of Athens (Gk. *ἡ ἐν Ἀρείῳ πάγῳ βουλή*, 'the Council on the Areopagus'). It met in the open air, and accuser and accused stood on platforms hewn from the rock. The Areopagus seems originally to have been the council of nobles, such as surrounds the king in the Homeric poems, and naturally, therefore, the "king" archon (see ARCHON) remained its presiding officer. This council appears to have gradually taken into its hands the entire governing power, since we are told that it appointed all officials, including the archons, who entered the Areopagus at the end of their term of office. The Areopagus exercised the supreme judicial power and could bring to an account any official, so that its indirect influence must have sufficed to control the State. In the code of Draco the Areopagus kept its place as the court for all cases of willful murder, and even under the Solonian Constitution it seems to have preserved its place as a guardian of the laws, with the power of procedure against any official, or even private citizen, whose conduct was an offense against good morals or the well-being of the community. Under Solon, however, it seems to have lost its deliberative functions, so that it could no longer take part directly in administration and legislation. Clisthenes seems to have made no formal change in the rights of the Areopagus; but his creation of the Senate of Five Hundred and the power given the popular assembly certainly must have lessened its real influence. It is certain that in 462 B.C. the leaders of the democracy, Ephialtes and Pericles, succeeded in carrying a law which deprived the Areopagus of all those powers by which it exercised a general control over officials and public morals, leaving it only the right of judgment in murder cases, and the oversight of the sacred olive trees of Athena and some sacred lands. In spite of this reduction of its powers, it remained the most venerated body in Athens,

and we find it appointed at times to act for the State, or to conduct investigations of treasonable conduct, as a sort of commission of the popular assembly. In the reforms of Demetrius of Phalerum (317 B.C), the Areopagus seems to have been given once more an oversight over public morals, and especially over offenses against the new sumptuary laws. In Roman times it was, according to Cicero, one of the governing bodies of Athens, and its name appears on decrees with that of the senate and people. Its judicial jurisdiction was also widely extended, and its decisions still commanded great respect. It is doubtful whether the apostle Paul was actually brought before the court of the Areopagus. It seems more probable that his speech was delivered before a body of curious philosophers on the hill of Areopagus, a convenient spot somewhat retired from the confusion of the neighboring market place. In Athenian legend the court was famed as the body which, under the presidency of Athena, acquitted Orestes of the charge, brought against him by the Furies, of bloodguiltiness in murdering his mother, Clytemnestra. The story forms the subject of the *Eumenides* of Æschylus (q.v.). Consult: Philippi, *Areopag und Epheten* (Berlin, 1874); Busolt, *Handbuch* (Nördlingen, 1887); Schömann, *Griechische Alterthümer*, ed. Lipsius (Berlin, 1897); Meier and Schömann, *Der attische Prozess*, ed. Lipsius (Berlin, 1883–87); and Botsford, *The Athenian Constitution* (New York, 1893).

AREQUIPA, ä'rā-kē'pä. A maritime department of Peru (Map: Peru, C 7). Area, 21,951 square miles. It is mountainous in the east and has a fertile soil, but is sparsely settled. The district is subject to severe volcanic disturbances. Copper, mica, borax, and sulphur are mined in the department. The population was officially estimated in 1896 at 229,007. Capital, Arequipa (q.v.).

AREQUIPA. An episcopal city, capital of the department of Arequipa, Peru; situated on the Chile River, 100 miles by rail northeast of the port of Mollendo. Another railroad, which reaches a summit level of 14,460 feet, runs to Puno, on Lake Titicaca, 225 miles to the east. Its situation, on the plateau of Quilca, 7000 feet above sea level, at the foot of the half-extinct volcano Misti, gives Arequipa a very temperate climate. The air is exceedingly dry and the water is impregnated with salts. It is the second city in Peru, is regularly laid out, and has a cathedral, a university, and two national schools. The inhabitants are engaged in the manufacture of jewelry, the cutting of precious stones, and in commerce, the city being the centre of trade for the interior of Peru. Near by is the Arequipa Observatory, a branch of the Harvard College Observatory, at an altitude of 8060 feet. It contains the Bruce Photographic Telescope, the largest instrument of the kind yet constructed, the gift of Miss Catherine W. Bruce of New York. Arequipa was founded in 1540 by Francisco Pizarro, and has ever since been important in the history of Peru, occupying a prominent place in the war for independence. In 1600 the city was almost ruined by an earthquake. In 1868 the city was again subjected to shocks which overthrew nearly all its buildings and killed more than 600 people. Pop., 1889, 30,000; 1896, 35,000; 1908, 35,000 to 40,000.

AREQUIPA, or MISTI. A volcanic mountain of the Andes, Peru, about 20,000 feet high. The volcano has been inactive since 1831.

ARES, ā'rēz. See MARS.

AR'ETÆ'US (Gk. *'Αρεταῖος, Aretaios*). A famous Greek physician and writer of Cappadocia, who flourished in the latter half of the first and the beginning of the second century after Christ. He is considered to rank next to Hippocrates in the skill with which he treated diseases. He was noted for his total want of professional bigotry, and in his accuracy in the detail of symptoms and the diagnosis of disease was superior to most of the ancient physicians. His great work, written in singularly elegant and concise Ionic Greek, is divided into two parts. The first four books treat of the causes and symptoms of acute and chronic diseases; the last four, the cure of the same. They have been translated into various European languages, besides having been frequently edited in the original. The finest edition is the Oxford one of 1723, by J. Wigan. A German translation appeared at Vienna (1790–1802); an English one, by T. F. Reynolds, London, 1837; and there is a Greek and English edition by Dr. F. Adams (London, 1856).

ARE'TE. A unique instance among the Greeks of a woman carrying on a philosophic tradition. See ARISTIPPUS.

AR'ETHU'SA. See ALPHEUS.

ARETHUSA BULBO'SA. A beautiful terrestrial orchid growing in wet bogs of the northern United States. The plant is small, and consists of a slender scape, 6 to 10 inches in height, which arises from a bulb. The lower portion of the scape bears a few green bracts, and the summit is crowned by a brilliant rose-pink flower one to two inches in length. The plant blooms in late spring. For illustration, see Plate of ANEMONE.

AR'ETIN'IAN SYL'LABLES. The syllables *ut, re, mi, fa, sol, la,* used by Guido d'Arezzo.

ARETINO, ä'rā-tē'nō, CARLO (properly CARLO MARSUPPINI) (c.1399–1453). An Italian humanist. He was born at Arezzo (whence his surname), studied the Latin language and literature at Florence under Giovanni da Ravenna and Greek under Manuel Chrysoloras; and, with the patronage of the Medici, lectured learnedly and successfully on the classics. His first lecture, indeed, seems at once to have established his fame; for on that occasion, we are told, he amazed all by quotations from every known author, Greek or Roman. But it also seems to have begun the quarrel between him and the renowned Filelfo, who eventually, through Medicean hostility, was compelled to withdraw to Siena. He was appointed first apostolic secretary, and became in 1444 chancellor of the Republic of Florence. His writings include translations into Latin of the *Batrachomyomachia* and book i of the *Iliad*. His finely sculptured tomb, one of the finest monuments of the Renaissance, is still to be seen at Florence, in the southern aisle of the church of Santa Croce. Consult Nisard, *Les gladiateurs de la république des lettres aux XV^e^, XVI^e^, et XVII^e^ siècles* (Paris, 1860).

ARETINO, GUIDO. See GUIDO D'AREZZO.

ARETINO, LEONARDO. See BRUNI.

ARETINO, PIETRO (1492–1557). A notorious and profligate Italian author of the sixteenth century, who, apart from his comedies, is interesting chiefly for his colossal and successful

impudence. He was born at Arezzo, the son of a shoemaker, Luca, whose surname is unknown; for Pietro, being ashamed of his origin, assumed that of Aretino. While still young he came to Rome and found favor with Pope Leo X and Cardinal Giulio de Medici, but lost it through writing some licentious sonnets. For a while he frequented the Medicean court, where he attached himself closely to Giovanni de Medici, but after the death of the latter withdrew to Venice, where he soon acquired powerful friends and where he remained almost continually till his death. Aretino has best been summed up as a systematic blackmailer. His letters are an astonishing record of audacity; they show him to have been equally adept in the art of threats and of successful flattery and extorted from many of the greatest figures of the time—even from Francis I and Charles V—rich gifts of jewelry, large sums of money, and in some cases even annuities, which enabled him to lead at Venice a life of lavish opulence. Letters written to him by kings and princes abound in terms of adulation and flattery. He was a remarkably prolific writer in various fields of literature, and he has left dialogues, biographies, sonnets and other poems, comedies, one tragedy, and six volumes of letters. Aside from the tragedy *Orazia*, which was good, judged by contemporary standards, the comedies, of which the principal ones are the *Cortigiana* and *Talanta*, are alone of any merit, and their interest is due mainly to their vivid portrayal of life; but, in the words of Symonds, it is life seen "from the standpoint of the servants' hall." Aretino's greatest strength lay in his satire. There is an edition of *Le commedie e L'Orazia tragedia di Pietro Aretino* (Milan, 1876). Consult: Graf, *Attraverso il Cinquecento* (Turin, 1888); Van Dyke, *Renascence Portraits* (New York, 1905); De Sanctis, *Storia della Letteratura italiana*, ed. by Benedetto Croce (Bari, 1912); Landoni, *Lettere scritte a Pietro Aretino* (Bologna, 1873–74).

ARETINO, Spinello. See Spinello Aretino.

AREZZO, ȧ-rĕt'sō (ancient Lat. *Arretium*). An episcopal city of Italy, the capital of the province of Arezzo, Tuscany (Map: Italy, F 4). It is beautifully situated on the slope of a hill, 54 miles southeast of Florence and 6 miles from the confluence of the Chiana and the Arno. It has broad streets, impressive buildings, a famous academy of science, a museum and picture gallery, a library, many convents, and excellent mineral springs. Externally, the cathedral, which was begun in the thirteenth century, is unattractive; but the proportions of the interior are pleasing, and the decorations are elaborate and by master hands of several centuries. The church of San Francisco contains some fine fifteenth-century frescoes. The Pieve, begun in the eleventh century on the site of a heathen temple, also contains art treasures. The ancient Arretium was one of the 12 richest and most populous cities in Etruria and excelled in pottery and in copper work. It was a vigorous opponent of Rome in the fourth and third centuries B.C., but later sought aid from Rome against the Gauls. In the Hannibalic War it supported Rome. In the Social War, Sulla sacked it, banished its citizens, and replaced them with his own followers. The fame of the pottery works of Arretium (Arretine Ware: see Archæology) endured throughout Roman times; much ancient pottery has been found there, bearing often reliefs of high artistic value. It was also sacked by the Goths under Totila and restored under Justinian. During the contest of the Guelphs and the Ghibellines in a later age, it became subject to Florence, being defeated in the battle of Campaldino, in which Dante took part. Among celebrated men born here were Mæcenas, the famous patron of letters in the time of the Emperor Augustus; Petrarch; Carlo Aretino (see Aretino, Carlo); Pietro Aretino (see Aretino, Pietro); Guido Aretino (see Guido d' Arezzo); Leonardo Aretino, the historian (see Bruni); Cesalpino, the botanist; Redi, the physician; Pope Julius II; the notorious Marshal d'Ancre (see Ancre); and Vascari, author of *Lives of the Painters*. (See also Spinello Aretino.) The principal manufactures are cloth, silk fabrics, and leather. The country is unusually fertile, and produces grain, wine, oil, and fruit. Pop., 1881, 39,000; 1901 (commune), 44,027; 1911, 47,504.

ARGÆ'US, är-jē'ŭs, Mount. See Arjish.

AR'GALI (Mongolian name). A mountain sheep, specifically *Ovis ammon*, formerly common to all the mountain ranges of northeastern Asia, but lately killed off in Siberia and restricted to the heights of Mongolia, where it is found near timber line. Its size is that of a large donkey, and it is covered by short, coarse, gray-brown hair, with the short mane and a stripe down the fore legs dark and the rump and under surface of the body white. The massive horns of the ram coil like those of the bighorn (sometimes called American argali) and measure 40 to 48 inches along the curve and 16 or more around the base; the horns of the ewes reach about half of these dimensions. A closely allied species is the nyan, or Tibetan argali (*Ovis hodgsoni*), which is distinguished by a white ruff upon the throat. It frequents the barren and desolate regions of high Tibet. Sportsmen regard these sheep as among the most difficult game to stalk, and good specimens are rare in collections. See Bighorn; and Plate accompanying Sheep.

AR'GALL, Sir Samuel (c.1580–1626). An English navigator, and Deputy Governor of the Virginia Colony. In 1609 he was sent to Virginia in charge of a vessel with orders to find a more direct route than that previously followed, and he succeeded in considerably shortening the time ordinarily occupied by the passage. After his arrival, in 1609, he was employed in surveying Chesapeake Bay and a large part of the coast northward to Cape Cod. Returning to Virginia, he took part in the fighting with the Indians, and in 1612 he conducted the negotiations with the chief of a Potomac tribe to whose care the women of the Powhatan tribe had been intrusted during hostilities, by which the English secured possession of Pocahontas, a favorite daughter of the chief, Powhatan, in exchange for a copper kettle. Her marriage to John Rolfe followed soon after, and the troubles with the natives were settled, leaving Argall free to go to sea again. In 1613 he was given command of a powerful war vessel and instructed to keep all intruders out of the territory claimed for England. He sailed to Mount Desert Island, where he found a French Jesuit settlement, which he destroyed, carrying off the settlers to Jamestown as prisoners. French establishments at Port Royal and St. Croix received the same treatment. In 1617 Argall was promoted to be Deputy Governor and Admiral of Virginia. He

conducted affairs in a high-handed fashion, and was accused of engaging in illegal trade, especially with the Spanish settlements in the West Indies. He ignored several peremptory orders to return to England to answer the charges against him, but eventually went back to stand trial. No serious action, however, was taken, probably because of the protection afforded him by the Earl of Warwick, who is supposed to have participated in the profits of Argall's ventures. In 1620 Argall was captain in a fleet which attacked the Algerine pirates in the Mediterranean. A year later he was knighted. In 1625 he was appointed admiral of an Anglo-Dutch fleet of 28 vessels, which took Spanish prizes valued at over £100,000, and later in the same year he commanded the flagship in Cecil's expedition against the Spaniards.

AR'GAN (Ar. *arjan*), *Argania sideroxylon*, a species of the family Sapotaceæ. It is a low, spiny evergreen tree, native of the southern parts of Morocco, and bears an ovate drupe the size of a plum, dotted with white, and full of a white milky juice. The Moors extract from the fruit an oil known as "argan oil," which they use with their food.

ARGAN, är'gän'. The hypochondriac in Molière's *Le malade imaginaire*, who allows himself to be cozened by apothecaries even to the extent of forcing his daughter to receive the addresses of one of them. He is finally effectively disillusioned and cured by his brother-in-law.

ARGAND, är'gand, *Fr. pron.* är'gän', Aimé (1755–1803). A Swiss mathematician, the inventor of the well-known Argand burner. The chief difficulty that attended the use of lamps as a source of light before Argand introduced his invention consisted in procuring complete combustion of the oil, so as to keep the flame from smoking. Argand's improvement consisted in making the wick ring-shaped. The flame procured by means of a circular wick has naturally the form of a hollow cylinder, with a current of air ascending through the inside, so that the burning surface is doubled. Argand's younger brother accidentally discovered the effect of the glass chimney, by which the flame is steadied, a draught created, and thus the greatest possible amount of light produced. The Argand burner has been extensively used in gas lighting.

ARGAND, Jean Robert (1768–1822). One of the inventors of the geometric representation of complex numbers. His *Essai sur une manière de représenter les quantités imaginaires dans les constructions géométriques* was published at Paris in 1806, but lay forgotten for 60 years. Meanwhile Gauss (1831) had made the complex numbers and their geometric representation familiar to mathematicians. It is now known that Argand was anticipated by Wessel (1797) and Kühn (1750). See Complex Numbers.

ARGANTE, är'gänt'. 1. A witty portrait in Molière's gallery of dupes—the father who, in *Les fourberies de Scapin*, is trickily persuaded by Scapin to give up his own plans in favor of those of his son and daughter. 2. A giantess typifying Licentiousness in the *Faerie Queene*, by Spenser.

ARGANTES, är-gän'tēz. A fierce Circassian, the bravest of the infidel warriors, in Tasso's *Jerusalem Delivered*.

ARGAO, är-gä'ō. A seaport on the southeast coast of the island of Cebu, Philippines, situated about 33 miles southwest of the city of Cebu. Pop., 1903, 35,448.

ARGEI. See Roman Festivals.

ARGEL, är'gēl, or **ARGHEL** (Syrian), *Solenostemma argel*. A plant of the family Asclepiadaceæ, a native of Arabia and of the north of Africa, deserving of notice because of the frequent use of its leaves for the adulteration of senna. They are lanceolate and leathery and may be readily distinguished from genuine senna leaves by their texture, their being downy, their greater heaviness, the comparative absence of veins, and the symmetry of their sides, the sides of the true senna leaves being unequal. They are acrid and cause sickness and griping; but a difference of opinion prevails as to their possessing purgative properties.

ARGELANDER, är'ge-län'dēr, Friedrich Wilhelm August (1799–1875). One of the most eminent German astronomers of the nineteenth century. He was born at Memel, Prussia. He studied at Königsberg, where the political sciences first attracted him; but he was subsequently drawn away to astronomy by the lectures of Bessel, by whom he was employed to make calculations and observations. In 1820 he was appointed assistant to Bessel in the Königsberg Observatory, and in 1823 succeeded Walbeck as astronomer at the observatory of Åbo, in Finland. Here he began a series of observations on the fixed stars which have a perceptible "proper motion." His studies were unfortunately interrupted by a fire which destroyed the observatory; but after a time he resumed them in a new observatory at Helsingfors and published a catalogue of not less than 560 stars having "proper motions." This contained the results of his observations at Åbo and received from the Academy of St. Petersburg the Demidoff Prize. In 1837 he was invited to fill the chair of astronomy at the University of Bonn. Argelander was long engaged in a series of observations on the changes of light in variable stars, and he also added to our knowledge of the progressive motion of the solar system in space. Argelander's works include: *Observationes Astronomicæ in Speculæ Universitatis Fennico Factæ* (3 vols., Helsingfors, 1830–32); *Neue Uranometrie* (Berlin, 1843), containing 18 celestial charts of fixed stars seen with the naked eye; *Mittlere Oerter von 33,811 Sternen* (Bonn, 1867); and a few others of considerable importance. His greatest work, however, is the *Atlas des nördlichen gestirnten Himmels* (Bonn, 1857), with a *Sternverzeichnis* (Bonn, 1859–62, vols. iii–v of the *Astronomische Beobachtungen auf der Sternwarte zu Bonn*). This work contains an enormous number of observations carried out by Argelander and his assistants during the nine years from 1852 to 1861.

AR'GEMO'NE (Lat. an herb, Gk. *ἀργεμώνη, argemōnē*, a kind of poppy). A genus of plants of about 10 species belonging to the family Papaveraceæ distinguished by four to six petals, three to seven radiating concave stigmas, and an oblong capsule, opening by valves at the apex. *Argemone mexicana*, sometimes called Mexican poppy and prickly poppy, is an annual herbaceous plant one to two feet high, with large yellow flowers, and sessile, waved and sinuated, spiny leaves, variegated with white. It is a native of Mexico and of the southern parts of the United States and is now also common in many tropical and sub-tropical coun-

tries, in which it has been naturalized. In parts of Australia it has become a troublesome weed. Its seeds are narcotic, purgative, and diuretic, exhibiting in a strong degree those qualities of the family of which the seeds of the poppy are devoid. They are used in the West Indies as a substitute for ipecacuanha, also instead of opium; and the juice of the plant is employed as a remedy for ophthalmia. This plant is not infrequently to be seen in flower borders in Great Britain and elsewhere; but in the northern parts, at least, the seed is generally sown in a hotbed. *Argemone intermedia*, a similar species with white petals and a capsule armed with stout spines, is common from Kansas and Nebraska southward and westward. *Argemone grandiflora*, a Mexican species, has large white flowers, and the plant is almost devoid of prickles. All these plants are occasionally met with in gardens.

AR'GENIS. An allegorical romance in Latin by John Barclay published in 1621. It purports to narrate the history of a war waged by Lycogenes, a Sicilian rebel, and Poliarchus, a prince of Gaul, for the hand of the daughter of Meliander, King of Sicily. But under this thin, figurative veneer one can easily trace a history of contemporary happenings. Poliarchus represents Henry IV, Hyanisbe, Queen Elizabeth, and Radirobanes, Philip II. The book has exerted not a little literary influence. Fénelon's *Télémaque* is modeled after it. It was also the favorite work of Cardinal Richelieu, suggesting to him some of his political moves. Cowper said of it that it was "the most amusing romance that ever was written."

ARGENS, är'zhäN', Jean Baptiste de Boyer, Marquis d' (1704–71). A French philosophical writer, born at Aix, in Provence. His *Lettres chinoises* (1739–42), *Lettres cabalistiques* (1741), and widely read *Lettres juives* (1738–42) attracted the notice of Frederick II, and their author was invited to Potsdam. In 1744 he was made director of fine arts in the Academy of Berlin with a large salary. Soon he was the friend and daily companion of the King, who liked exceedingly his frank and vivacious character. Frederick's poems were edited by Argens in 1760. When almost 60, he married an actress, without Frederick's permission. Deprived of his pension, he returned to Provence and died at Toulon. Among his other numerous writings should be mentioned *Mémoires secrets de la république de lettres* (1744), *Histoire de l'esprit humain* (14 vols., 1765–68), and *Réflections critiques sur les écoles de peinture* (1752). In 1763 his principal works were published together in 24 volumes. *Philosophical Dissertations on the Uncertainty of Human Knowledge*, a London edition, appeared in 1753.

ARGENSOLA, är'hĕn-sō'lȧ, Lupercio Leonardo de (1559–1613) and Bartolomé Leonardo de (1562–1631). Two Spanish poets, sometimes called, and not entirely without reason, the "Spanish Horaces." They were born at Barbastro, in Aragon, the elder brother Dec. 14, 1559, the younger Aug. 26, 1562. Both studied at the University of Huesca, and both later enjoyed the patronage of Maria of Austria, widow of the Emperor Maximilian II, who made Lupercio her secretary and Bartolomé her chaplain. The former was subsequently appointed, by Philip III, historiographer of Aragon. Bartolomé was commissioned by the Conde de Lemos, then president of the Indian Council, to write the *Conquista de las Islas Molucas* (1609); and when that nobleman became Viceroy of Naples, both brothers, who had meanwhile acquired fame as poets, were included in his suite, thereby arousing the anger of Cervantes, who had hoped to obtain a like honor. Lupercio died in Naples, in 1613, while filling the office of Secretary of State. Bartolomé succeeded his brother as historiographer of Aragon. He returned to Spain and busied himself till his death in 1631 with Lupercio's unfinished work, a continuation of Zurita's *Annals of Aragon*. Only the first part, which deals with the years 1516–20, was completed, every detail being treated with wearisome minuteness. The collected poems of the two brothers were first published posthumously by Lupercio's son, under the title of *Rimas* (Saragossa, 1634), and received from no less a personage than Lope de Vega the indorsement that the authors "had come from Aragon to reform among our poets the Castilian language." Although an overstatement, due to Lope's aversion to Gongorism in all its forms, this verdict indicates the real merit of their verse. They are both models of correct form and pure idiom, with the Horatian model and the classic standard ever before them, yet their influence on the literature of their country was, on the whole, small. Lupercio is also remembered as a dramatist whom Cervantes pronounced almost equal to himself; but of his three known plays, one, the *Filis*, is lost, while his *Isabela* and *Alejandra* show little to justify Cervantes's praise. The best edition of the *Obras sueltas* of both brothers is that edited by the Conde de la Viñaza (2 vols., Madrid, 1889, in the *Colección de escritores castellanos*), which includes the plays and shorter prose writings. Consult also J. P. W. Crawford, "Notes on the Tragedies of Lupercio Leonardo de Argensola," in the *Romanic Review*, vol. iv (1913).

ARGENSON, är'zhäN'sōN', Marc Antoine René de Voyer, Marquis de Paulmy (1722–87). A French diplomat and author, son of Louis XV's Minister of Foreign Affairs. He was Envoy to Poland, Switzerland, and Venice; a member of the Royal Academy, and gathered a library of about 100,000 volumes, which was purchased by the Comte d'Artois in 1785 and became the nucleus of the Bibliothèque de l'Arsenal. He was editor of 40 volumes of the *Universal Bibliography of Romance*, in which are some novels of his own.

ARGENSON, Marc Pierre de Voyer, Count d' (1696–1764). A celebrated French statesman, brother of René Louis de Voyer d'Argenson (q.v.). After holding a number of inferior offices, he succeeded M. de Breteuil in the War Office in 1742. On the death of Cardinal Fleury in the following year, the whole care of the war then raging devolved upon him. He found matters in the most deplorable condition. The French troops, decimated by sword and disease, were in full retreat across the Rhine; the Austrians already swarmed in Alsace and Lorraine, and the very political existence of France was imperiled; but Argenson, by his vigor and lucky choice of generals, changed the fortunes of war in the course of one year. After the victories of Fontenoy and Louffeld, and the capture of Bergen-op-Zoom, peace was secured by the famous Treaty of Aix-la-Chapelle, signed in 1748. Argenson, however, did not remain inactive; he introduced reforms in the army, established the

Ecole Militaire in 1751, and by various measures kept alive the military spirit of the nation. He was an illustrious patron of literature. Diderot and D'Alembert dedicated to him their great *Encyclopédie;* and to Voltaire, whose fellow-student he had been, he furnished materials for his *Siècle de Louis XIV.* In 1757 he was exiled to his estate, it is supposed by the machinations of Madame Pompadour. On her death he returned to Paris.

ARGENSON, Marc René, Marquis d' (1652–1721). A member of an ancient French family possessed of a domain in what is now the department of Indre-et-Loire. Passing through many minor offices, he was made Keeper of the Seal in 1718, and Minister of State in 1720. He resigned the same year owing to the friction caused by John Law's financial schemes. He was a member of the French Academy and honorary member of the Academy of Sciences.

ARGENSON, Marc René de Voyer d' (1771–1842). A grandson of Marc Pierre d'Argenson. A French soldier and statesman. Though he was an aristocrat by birth and possessed immense wealth, he embraced the cause of the Revolution and served as Lafayette's adjutant till the excesses of 1792 drove him from public life. In 1809, while prefect of Antwerp (then Deux-Nèthes), he took part in the expulsion of the English from Walcheren. In 1813 he resigned rather than unjustly confiscate the property of the mayor at the order of the French ministry. He was elected deputy for Belfort in the Hundred Days and reëlected after the second Restoration. In 1830 he appeared in the Chamber to represent Strassburg, joined the "Society of the Rights of Man," subsidized heavily the newspapers of the Opposition, and by voice and pen fought vigorously the July monarchy. He was brought to trial for publishing a radical tract; and, though acquitted, became discouraged, retired to his estates, and spent the remainder of his life in an endeavor to better rural conditions.

ARGENSON, René Louis de Voyer, Marquis d' (1694–1757). Minister of Foreign Affairs for Louis XV from 1744 to 1747, when he was forced to resign on account of the intrigues of Spain, whose policy he had frustrated in his negotiations with Italy. He was more of a student and idealist than a diplomat, and his ministry was not very successful. After his retirement he devoted himself to literature. He was a profound student of political science, and wrote, among other works, *Considérations sur le gouvernement ancien et présent de la France* (Amsterdam, 1764). His journal and memoirs, in nine volumes, were published at Paris, 1861–67, and at the same place in 1898, *La France au milieu du XVIII^e^ siècle.* Consult Ogle, *The Marquis d'Argenson* (Oxford, 1893).

AR'GENT (Fr. silver). An archaic or poetic term for silver or anything as white as silver; especially used in heraldry to designate the silver of a coat of arms or merely the white color of any part of one's armor.

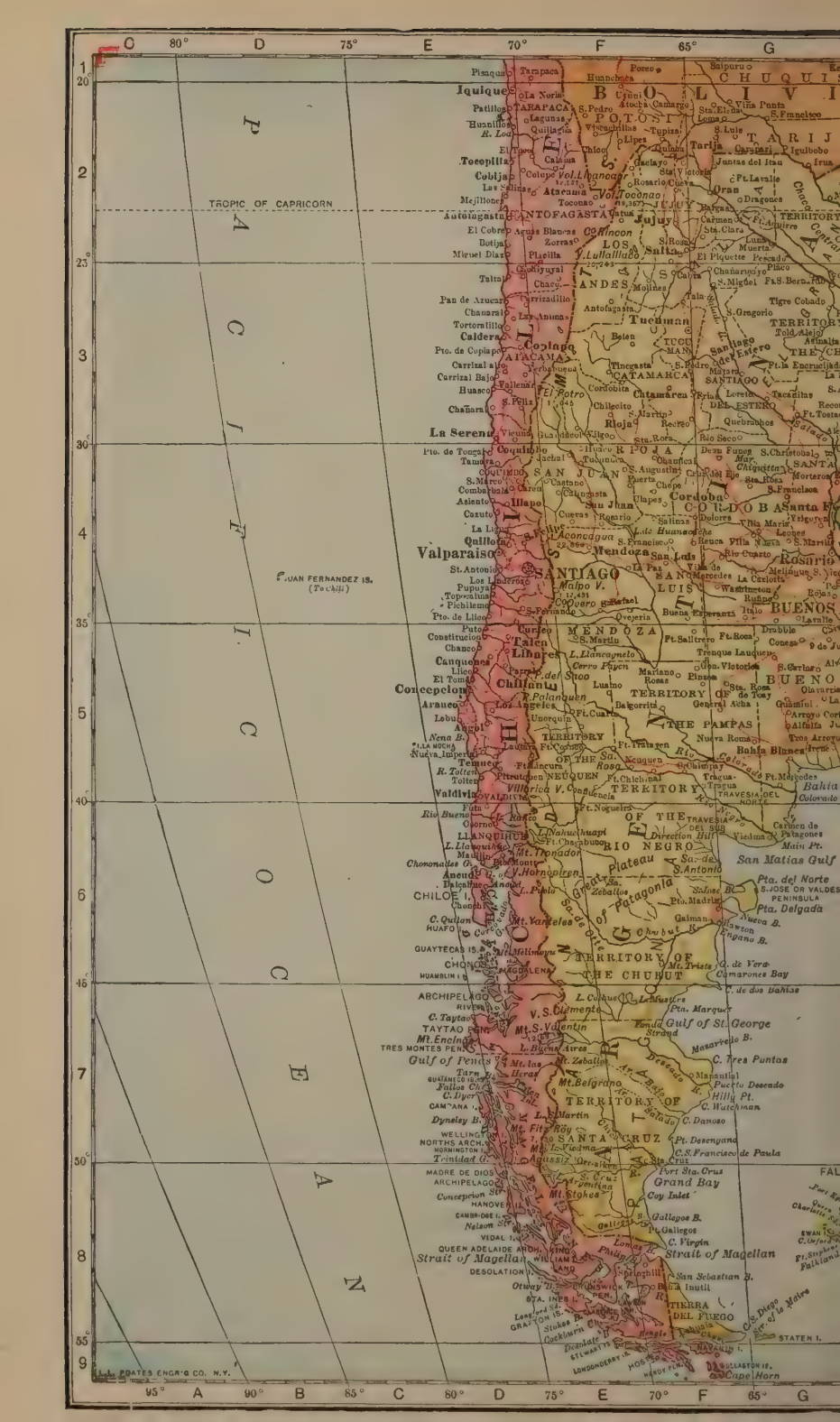
ARGEN'TA. A city in Pulaski Co., Ark., opposite Little Rock, on the Arkansas River, and on the St. Louis Southwestern, the St. Louis, Iron Mountain, and Southern, and the Chicago, Rock Island, and Pacific railroads (Map: Arkansas, C 3). The city has a railroad hospital, St. Joseph's Orphanage, Fort Logan H. Roots, and two parks. Its industries include extensive railroad shops, four cotton oil mills, four compresses, a stave factory, an excelsior plant, a cooperage, and boiler and iron works. Natural gas provides a low-priced fuel for manufacturing and domestic purposes. The surrounding region is agricultural and yields corn, rice, and all small grain. The electric light plant is owned by the municipality. Pop., 1900, about 4500; 1910, 11,138.

ARGENTEUIL, är'zhän'tē'y'. A town in the department of Seine-et-Oise, France, 7 miles northwest of Paris (Map: Paris and vicinity). The surrounding region is noted for producing excellent asparagus. The town has manufactures of files, pasteboards, watches, and alcohol. It was built up about a nunnery, now in ruins, which was founded by Charlemagne in the seventh century. His daughter, Theodada, and Héloïse, beloved of Abélard, were abbesses. Pop., 1901, 17,375; 1911, 24,282.

ARGEN'TEUS CO'DEX. See Ulfilas.

ARGENTINA, är'jĕn-tē'nà; *Sp. pron.* är'-hĕn-tē'nâ, or Argentine Republic (officially, República Argentina) (from Lat. *argentum,* silver; cf. the name Río de la Plata, Sp., River of Silver). A federal republic, next to Brazil the largest state in South America (Map: South America, C 6). In the beginning it was styled "the United Provinces of the Río de la Plata." It is included between lat. 21° 55′ and 55° 2′ 30″ south, long. 53° 40′ and 73° 17′ 30″ west, and is bounded on the north by Bolivia and Paraguay; on the east by Paraguay, Brazil, Uruguay, and the Atlantic Ocean; on the south by the Atlantic and Chile; and on the west by Chile, the watershed indicated by the highest summits of the Andes separating the two countries. It forms a blunted wedge-shaped area about 2200 miles long, with a width of nearly 1000 miles at the north and less than 200 miles near the Strait of Magellan. A number of islands are included; the Falkland Islands, off the Atlantic Coast, which were at one time claimed by the republic, are held by Great Britain. The total area is 1,083,596 square miles, divided between 14 organized provinces, 10 territories, and the Federal Capital district of 72 square miles. Pop., 1921 (est.), 8,698,516.

Topography. The surface is diversified by the Andean Cordilleras on the western border and by the interior highlands; but the greater part of the area is a flat plain sloping gently toward the Atlantic Ocean. The Andes system in the northwest is a broad plateau, broken into parallel or slightly diverging ridges which reach well to the east of the Chilean frontier, and occupy large areas in the provinces of Jujuy, Salta, Tucumán, Catamarca, Rioja, and San Juan. Above the plateau rise numerous crests to a height of over 17,000 feet, attaining extreme elevations in Aconcagua (23,393), Mercedario (21,982), Famatina (20,340), and Tupungato (22,329). In the western province of Mendoza the Andes contract laterally, and gradually fall off in height toward the south, where they end in the highlands of Tierra del Fuego. East of the Cordilleras, the most notable elevations are the north and south ridge of the Sierra de Córdoba, on the western boundary of the province of Córdoba; the Tandil and Ventana Highlands, in the province of Buenos Aires; and the continuation of the mountain range of Lower Brazil, in the territory of Misiones. These independent mountain ranges, however, are of no great areal or topographic importance; the entire region eastward from the base of the Andean plateau is generally flat or slightly undulating, and falls gradually from an elevation of about


TROPIC OF CAPRICORN
PACIFIC OCEAN
ATLANTIC OCEAN
Iquique
Pisagua
Tarapaca
Huanchaca
Porco
Saipuru
CHUQUISACA
BOLIVIA
LIVI
TARAPACA
POTOSI
Tarija
Toconpilla
Coblija
Vol. Ihanoar
Vol. Tocanao
Atacama
Antofagasta
Jujuy
Salta
LOS ANDES
Tucuman
Copiapo
ATACAMA
CATAMARCA
Chilecito
Rioja
La Serena
Coquimbo
SAN JUAN
Quillota
Valparaiso
SANTIAGO
Mendoza
SAN LUIS
Rosario
BUENOS
Talca
Chillan
Concepcion
MENDOZA
THE PAMPAS
Bahia Blanca
Temuco
Valdivia
NEUQUEN
TERRITORY OF THE RIO NEGRO
Great Plateau of Patagonia
CHILOE
TERRITORY OF THE CHUBUT
Gulf of Penas
Gulf of St. George
TERRITORY OF SANTA CRUZ
Strait of Magellan
TIERRA DEL FUEGO
Cape Horn
Juan Fernandez Is. (To Chili)
Falkland Is.
Buenos Aires
Montevideo
Rio de la Plata
Rio Colorado
Rio Negro
Rio Chubut
Rio Santa Cruz
Rio Gallegos
Rio Deseado
Rio Negro
Rio Salado
Rio Quinto
Rio Tercero
Rio Primero
Rio Dulce
Rio Grande
Rio Pilcomayo
Rio Bermejo
Rio Vermejo
Rio Paraguay
Rio Parana
Rio Uruguay
Rio Iguazu
Rio Negro
Rio Tunuyan
Rio Diamante
Rio Atuel
Rio Chadileuvu
Rio Colorado
Rio Desaguadero
Rio Jachal
Rio Bermejo
Rio Blanco
Rio Pilcomayo
Rio Grande

SOUTH AMERICA
SOUTHERN PART
SCALE OF STATUTE MILES
0 50 100 200 300 400 500 600
SCALE OF KILOMETERS
0 100 200 300 400 500 600 700 800
Important towns are shown in heavy face type
Railways shown thus
TROPIC OF CAPRICORN
ATLANTIC OCEAN
PACIFIC OCEAN
BRAZIL
PARAGUAY
URUGUAY
ARGENTINA
MINAS GERAES
SÃO PAULO
RIO DE JANEIRO
ESPIRITO SANTO
SANTA CATHARINA
RIO GRANDE DO SUL
São Paulo
Santos
Victoria
Ouro Preto
Curitiba
Blumenau
Desterro
Porto Alegre
Pelotas
Rio Grande do Sul
Campinas
MONTEVIDEO
Maldonado
C. San Antonio
Pt. Nor
Rio de Janeiro
Petropolis
Nictheroy
Campos
Macahe
C. Frio
Cabo Frio
Victoria
Guarapariu
Itapemirim
Caravellas
Ilheos
Bahia
Cachoeira
Nazareth
Jequitinhonha
Minas Novas
Diamantina
Serro Frio
Sabara
Caethé
Rio das Velhas
Rio Doce
Rio Grande
Rio Parana
Rio Paraguay
Rio Uruguay
Rio Negro
Rio Colorado
Rio Salado
Rio Dulce
Rio Pilcomayo
Rio Bermejo
Rio Vermejo
Rio Pilcomayo
Rio Iguassu
Rio Tiete
Rio Paranahyba
Rio Grande
Rio Sapucahy
Rio Verde
Rio Pardo
Rio Jacuhy
Rio Taquary
Rio Caxias
Rio Negro
Rio Iguassu
Rio Uruguay
Rio Ibicuy
Rio Gualeguay
Rio Salado
Rio Colorado
Rio Negro
Rio Chubut
Rio Deseado
Rio Santa Cruz
Rio Gallegos
Rio Coig
Rio Chico
Rio Grande
Rio Negro
Rio Colorado
Rio Salado
Rio Dulce
Rio Pilcomayo
Rio Bermejo
Rio Vermej

2000 feet to, or nearly to, the level of the sea. That part of the plain north of the Río Salado (affluent of the Paraná) is called the "Gran Chaco" (great hunting ground), and the northern part contains extensive forests. North of the Río Negro, in Central Argentina, are the extensive characteristic pampas, monotonous treeless stretches of apparently level ground covered with grass during the wet season. Northward the pampas graduate into more forested country, and are also marked by a large interior drainage system and by saline swamps, while to the south they merge into the desolate, dry steppes of Patagonia, which are disposed at an elevation ranging from 200 feet at the base of the Andes to 500 feet or less on the coast. Between the Río Paraná and the Río Uruguay are the provinces of Corrientes and Entre Ríos, which are generally low, the latter province, however, containing a small area of hills in the west.

Hydrography. Aside from a few inclosed basins in the interior, the entire area is drained by easterly flowing rivers into the Atlantic. The great system of the Río de la Plata, formed by the confluence of the Uruguay and the Paraná, belongs only partly to Argentina, as both its branches rise in the interior of Brazil and for a large part of their course flow along the frontiers of Brazil, Paraguay, and Uruguay. The Paraná is of great importance to Argentina as a commercial highway. With the Paraguay it drains the Gran Chaco, through the channels of the Pilcomayo, Bermejo, and Salado, and also the northern pampas, where in past times there were several important tributaries that are now represented by smaller streams with intermittent flow. The Paraná is navigable by steamers for a distance of about 1200 miles and by light-draught boats for nearly its whole length. From the confluence of the Paraguay to the sea the fall amounts only to about 225 feet, so that a slight depression would separate the system of the Río de la Plata into three independent branches—the Paraná, the Paraguay, and the Uruguay. In the central provinces of Argentina, between the Río Salado on the north and the Río Colorado on the south, there is an area of inclosed drainage, with extensive saline marshes, which deposit alkaline salts during the dry season. South Argentina is drained by the Colorado and Negro, both rising on the slopes of the Andes. The drainage basin of the Colorado formerly covered a much larger territory, as the provinces of San Juan, San Luis, and Mendoza were drained by a northern tributary that now ends in a swampy reservoir. Patagonia has several large streams, including the Chubut, Deseado, Salado, and Chico, which receive their water supplies from the slopes of the Andes, where there are numerous glacial lakes. See PLATA, RÍO DE LA; PARANÁ; PÁRAGUAY RIVER; COLORADO, RÍO; SALADO, RÍO.

Climate. The northern part of Argentina projects well within the equatorial hot belt, while the central and southern parts extend through the south temperate zone. The peculiar location of Argentina, with oceanic conditions on the east and high mountains on the west, makes its climatic details very dependent on the direction of the winds. The northern section lies within the region of prevailing east winds, which convey inland the warm, moist air from the Atlantic Ocean, and cause a very uniform temperature, with heavy precipitation on the coast, but decreasing in amount with progress inland. South of the Río de la Plata the west and northwest winds of middle latitudes prevail, and these convey across the narrow territory the air from the Pacific Ocean, which has been deprived of most of its moisture on the windward slopes of the Chilean Andes. Thus the air becomes drier, and the precipitation decreases with approach toward the Atlantic coast. The monsoon effects considerably modify these general conditions, so that for the northern and more important half of Argentina, in winter, northerly winds are very common.

The temperature decreases with increase of latitude, and varies in the annual average from 70° F. at the north to less than 45° F. at the south. In the north the temperatures range from a maximum of 105° F. to a minimum of 30° F.; the hottest month averages about 80° F., and the coldest month about 55° F. Toward the middle of Argentina the hottest month averages only 75° F. and the coldest a little less than 50° F., and at the extreme south, in Tierra del Fuego, the temperatures are continuously low, snow falling at all times. There is in general a great difference between the day and night temperatures; but the intense cold waves of the middle latitudes of the continents of the northern hemisphere are entirely lacking. In general, the rainy season is in summer, with a winter season that is dry, even to the utter lack of rain in the interior. Three rain belts lying nearly parallel to the Andes are noticeable; in the extreme northeast the rainfall is moderately heavy, from 50 to 70 inches. To the west of this there is a zone of moderately light rainfall, extending as far south as the mouth of the Río de la Plata, where the annual average is about 30 inches. Still farther west there is a rapid decrease to the Andean slopes, some areas having no more than two inches. On the pampas the weather is variable, changes from the cool, dry south winds to the moist, hot north winds frequently occurring with great suddenness. The former winds, which sometimes blow with stormy violence, are called "pamperos." They come with little warning and are sometimes of day-long continuance. The moist, hot wind from the north, called "zonda" (somewhat similar to the sirocco), causes intense discomfort to the inhabitants. The dry zonda of the east side of the Andes region is of Föhn character.

Flora. There is great variation in the abundance and character of the vegetation, corresponding to the great variation in latitude, altitude and topographic conditions. In the north and northeast are found tropical woodlands, to the south and west of which are scattered forests containing most of the species usual in warm temperate zones. The slopes of the Andes are well wooded, especially with thorny and shrubby plants, as are the banks of the Paraná and the rivers flowing from the west into the Paraguay, although the trees do not attain great size. Palms are a distinctive feature of the base of the Sierra de Córdoba and of the northwestern foothills. The pampas, in the wet season, are covered with clover and thistles, or with tall grass and flowers, gay verbenas, geraniums, etc.; but here, as well as on the Gran Chaco, there is little to form thickets, except mimosas and cacti. The algarroba, a shrub resembling a honey locust, is widely distributed; it is used for fence posts; from the pulp of the pod are made a kind of flour, and, by fermentation, an intoxicating liquor called chica. Patagonia has herbs,

shrubs, cacti, some tufty grass, brambles, and copse; but it is almost treeless, except in the south, and even there but four species of trees are found, two of them being beeches. Among the indigenous trees and plants are the quince, aloe, coca, cinchona, maté (or Paraguay tea), manioc; the prickly pear, with edible fruit; the *Cactus foliosus*, on which the cochineal insect feeds, and a shrub harboring an insect yielding a handsome green dye. The apple tree, introduced from Chile by the Indians, flourishes in the southwestern provinces; the grape is extensively grown in the western province of Rioja, San Juan, and Mendoza; the province of Salta is famed for its bananas and coffee; and the peach, fig, orange, and walnut are grown in many parts. The scarcity of wood in some provinces compels the use of dry thistles and peach-tree cuttings for fuel.

Fauna. The larger wild animals, found mainly in the northern forests, are the jaguar, puma, ocelot, ant-eater, tapir, sloth, monkey, and peccary. The pampas and plains are inhabited by deer, wildcats, wild dogs, pumas, skunks, armadillos, the red wolves, foxes, and several burrowing quadrupeds, notably the viscacha. The guanaco, vicuña, and llama range from the mountains to the plains; the capybara and coypu frequent the rivers; the condor, vulture, the *Rhea americana* (ostrich) range north of the Río Negro, and the *Rhea Darwinia*, south of it. Several species of game birds, and birds of prey, flamingos, and water fowl of many kinds, parrots, humming birds, and other birds of gay plumage are seen in the forested regions or on the open plains, where bird life greatly flourishes. There are several varieties of reptiles in Argentina; boas and rattlesnakes occur in the north, together with iguanas, alligators, and turtles. Spiders also and mosquitos of great size, destructive locusts and ants, and chigoes abound. Fish are very numerous in the coast and inland waters. Seals, sea lions, and sea elephants are captured along the coast, and the rivers supply many edible fish. Most interesting fossil remains are found in different parts of the republic, a large number of species having been obtained, among them the megatherium, toxodon, glyptodon, and gigantic ratite birds.

Geology and Mineral Resources. The interior highlands have usually a granitic core, overlaid by Paleozoic formations, while the Andean system is largely composed of Mesozoic strata, broken through by igneous rocks and covered by extensive volcanic sheets. The pampas are made up of Tertiary sandstone and limestone with sandy or clayey material on the surface. In Patagonia the northwest and southeast ridges are denuded remnants of former mountain ranges and rise out of layers of coarse gravel that cover the region to a depth of 50 feet or more. The gravel consists of granite, gneiss, and schist, and has been derived by disintegration and glacial action from the underlying formations. Large areas are also occupied by sand dunes that shift their position with the winds. The region of the Andes was once the scene of enormous volcanic development, when streams of lava flowed down the slopes and spread out over the adjacent plains in the form of thick and extensive sheets. The lower stretches of the rivers in Argentina are bordered by recent deposits of alluvium. The mineral resources of the country have received but little attention as yet, although they are extensive and include a large variety of ores and minerals. Gold is found in the Andes and in the mountains of San Luis, coal in Mendoza and Tierra del Fuego, marble in the Sierra de Córdoba, while copper, lead, silver, iron ores, and sodium salts occur at numerous localities. The output of silver annually exceeds $200,000 in value. The annual gold product amounts to about $10,000. Mica is mined in the mountainous part of Córdoba, and the product is shipped to European countries. Some petroleum is obtained in Neuquén territory.

Agriculture. This is naturally the most important industry in a country so rich in land and so sparsely settled as Argentina. The estimated area under cultivation in 1910 was 20,367,082 hectares (1 hectare=2.47 acres), or about 6.8 per cent of the total area of the country. In 1895 the cultivated area was 4,892,004 hectares; in 1888, 2,459,120; and in 1872, 580,008, the latter figure representing about one thirty-fifth of the agricultural area of 1910; and the 1910 area shows an increase of 316 per cent over that of 1895. During the first decade of the twentieth century Argentina took her place among the world's greatest grain-producing countries.

In 1895, at the time of the last census, there were more than 180,000 farms in Argentina, of which 60 per cent were cultivated by their owners, 30 per cent by tenants paying rent, and 8 per cent by persons working for a share of the crop. Although there are no statistics to show the growth of each of these groups, it is a matter of common observation that the number of farmers owning their land is increasing, as free land is abundant and its acquisition extremely easy. Renting for a share of the crop is the first step on the part of the agricultural laborer toward becoming a landowner. Land being abundant and population sparse, labor is naturally well rewarded; so that a laborer often receives from one-fourth to one-half of the crop, the proprietor furnishing land, implements, and seeds, as well as a house and food for the laborer and his family. Under these conditions it takes the laborer only a few years to acquire land of his own. In 15 out of the 23 provinces and territories for which there are figures in the two censuses of the country, the number of farms increased from 43,746 in 1888 to 107,274 in 1895. The average size of farms is about 125 acres, the number of larger plantations and of farms of smaller area being inconsiderable.

The rapid increase in the cultivated area is to a great extent due to European immigration, the newcomers settling in colonies, living in accordance with their own customs, and using their own methods of cultivation. The first colony thus founded consisted of Swiss peasants, who came to Argentina in 1856; in 1874 there were 32 colonies, tilling 12,900 acres; in 1884 the number of colonies increased to 85, the area under cultivation to 86,000 acres; in 1895 the total area under cultivation was 12,083,000 acres. Various nationalities are represented in these colonies, including Italians, Russian and Rumanian Jews, and Boers. The wonderfully rapid growth of colonies is explained by the very liberal immigration laws of the republic, alluring inducements being held out to immigrants, who receive in some provinces large tracts of land and provisions and implements.

The most important crop in Argentina, from a commercial point of view, is wheat, maize and

flax ranking next. Barley, oats, potatoes, tobacco, and other European crops are also extensively raised. Sugar cane is cultivated in the northeast with considerable success, and the cultivation of cotton has been introduced with fairly satisfactory results; the Louisiana variety seems to thrive best, the average return being one ton per acre. The fruits raised are oranges, olives, figs, grapes, and dates, as well as apples, pears, and plums. Silk-worm culture, for which the climate seems to be splendidly adapted, also receives considerable attention. The following figures illustrate the growth of the agricultural industry in Argentina: In 1888 the area devoted to the cultivation of wheat was 815,438 hectares; in 1895 it was 2,049,683; in 1910, 6,253,180. The area devoted to the cultivation of corn in the corresponding years was 801,588, 1,244,184, and 3,215,350 hectares, respectively. The area under linseed increased from 387,324 hectares in 1895 to 1,503,820 in 1910. In the two latter years oats increased from 38,624 hectares to 801,370 and alfalfa from 713,091 to 5,400,580. Notable as these increases are, they indicate only the early stages of the expansive movement of Argentine agriculture. The harvest of 1910 (planted in 1909) showed 3,565,556 metric tons of wheat from 5,354,067 hectares, 716,615 tons of linseed from 1,276,355 hectares, and 529,306 tons of oats from 503,306 hectares. The following is the estimated yield in 1912: Wheat, 4,523,000 metric tons; linseed, 572,000; oats, 1,004,000; corn, 7,515,000; alfalfa, 4,038,000.

The following are the chief wheat-raising provinces, with their production in metric tons in 1910 and 1912 and the estimated value in pesos gold of the crop in the latter year:

	1910	1912	1912
	Tons	Tons	Pesos
Buenos Aires	1,340,299	1,803,000	66,711,000
Córdoba	1,240,528	1,200,000	44,400,000
Santa Fé	470,007	600,000	24,420,000
Pampa Territory	300,214	560,000	20,720,000
Entre Ríos	154,508	215,000	7,955,000

The estimated value of the total agricultural (and forest) production in 1912 was 672,912,190 pesos gold, of which 230,320,367 pesos was credited to the province of Buenos Aires, 138,187,150 to Santa Fé, 100,324,570 to Córdoba, 33,438,940 to Entre Ríos, and 28,841,620 to Pampa territory. There is a continually increasing area planted to sugar cane, tobacco, and the vine.

Stock raising is only less important than agriculture. The following table shows the number of various kinds of animals reported at the first and second censuses and the live-stock census of 1908:

	1888	1895	1908
Cattle	21,961,657	21,701,526	29,116,625
Horses	4,234,032	4,446,859	7,531,376
Asses and Mules	417,494	483,369	750,125
Sheep	66,706,097	74,379,562	67,211,754
Swine	393,758	652,766	1,403,591
Goats	1,894,386	2,748,860	3,945,086

As compared with the United States, Argentina has about half as many cattle and about 15,000,000 more sheep; in the United States the 1910 census showed 61,803,866 cattle and 52,447,861 sheep. The estimated value of the total stock-raising products in 1912 was 394,917,922 pesos gold; of this sum the share of Buenos Aires province was 183,319,391 pesos, Entre Ríos 46,961,095, Córdoba 35,875,753, Santa Fé 35,034,437, Corrientes 19,371,037, and Pampa territory 8,104,931. The wool clip may be fairly judged from the export, which amounted in 1885 to 128,393 metric tons; in 1895, 201,353 tons; in 1905, 191,007 tons, and in 1910, 150,599 tons. Meat exports are shown in the section *Commerce*. The production of butter fell from 8,835,039 kilos in 1903 to 7,151,647 kilos in 1909, while the cheese output advanced from 1,187,998 kilos to 3,084,261 kilos. The greater part of the butter is produced in the province and city, and most of the cheese in the province, of Buenos Aires.

Manufactures. The manufacturing industry of Argentina has increased rapidly during recent years. Much foreign capital is invested in the more important industries, such as electric light and power plants, flour and lumber mills, boot and shoe factories, etc., and many foreigners are employed in the operation of the factories. The census of 1895 reported 24,124 manufacturing establishments, with 219,548 employees and an investment of capital amounting to 217,390,507 pesos gold. In 1910 the number of industrial establishments was 31,988, with 329,490 employees, capital amounting to 320,139,099 pesos and a total annual output of 540,121,646 pesos.

The manufacture of food products is foremost among the industries. In 1910 the number of establishments of the principal industries and their capital was as follows: 330 flour mills, capital 17,891,148 pesos; 8 meat packing establishments, 13,700,268 pesos; 38 sugar mills, 34,341,650 pesos; 3409 wineries, 28,764,872 pesos; 2403 boot and shoe factories, 7,920,903 pesos; 24 breweries, 13,103,082 pesos; 3891 woodworking establishments, 13,968,527 pesos. In 1912, 322 flour mills (270 in operation) produced 840,118 tons of flour and 360,990 tons of subproducts; 8 meat packing houses manufactured for export products valued at 49,491,107 pesos; 43 sugar mills (37 working) had an output of 147,248 tons of sugar, valued at over 19,000,000 pesos; 24 breweries produced 123,100,000 litres of beer. In 1913, 3653 wineries (7283 working) elaborated 732,178,245 kilos of grapes into 500,011,042 litres of wine, valued at 42,504,000 pesos.

The development of Argentine industry has been in those branches of manufacture in which the natural products of the country can be converted into more valuable finished or half-finished products. As a consequence, the country is being gradually relieved of the necessity of paying a tribute to foreign nations for articles of prime necessity, and employment is provided in the country for a large and steadily increasing number of people. The growth of the sugar-refining industry is a case in point. Previous to 1870 the country imported annually some 22,000 tons of sugar and hardly produced 1000 tons at home; in 1905 the home product rose to 137,095 tons and over 14,000 tons were exported. After falling to 127,322 tons in 1908, the output rose to about 160,000 tons in 1911. Among industries carried on on a large scale, the manufacture of gas should be mentioned. It is almost exclusively in foreign hands (largely English), and in 1910 there was invested in it a capital of 20,376,598 pesos. Electric lighting and power plants have been greatly developed recently and represented an investment of 21,445,094 pesos in 1910. The more distinctive native manufactures are those of baskets from the willows

of the Paraná Islands; the homespun cotton and woolen cloths, blankets, rugs, laces, and embroideries of the northwestern highland provinces; the tanned leather, wooden ware, laces, blankets, etc., of Córdoba; and the harness, belts, ponchos, horse blankets, ropes, etc., of the Indians. The growth and diversification of Argentine industries are best brought out by the following table, showing the absolute and relative values of the products of the various branches of industry exported from the country at three different periods:

Value in gold pesos (96.5 cents)

Products	1895 Pesos	per ct.	1905 Pesos	per ct.	1911 Pesos	per ct.
1 The animal industry	74,630,000	62.1	141,043,000	43.7	162,697,537	48.9
2 Agriculture	41,450,000	34.5	170,235,000	52.6	154,285,547	46.5
3 All other industries	3,990,000	3.4	11,566,000	3.7	15,051,483	4.6
Total	120,070,000	100.0	322,844,000	100.0	332,034,567	100.0

The small export of manufactured products does not indicate lack of industrial progress, since the manufactures go mainly to satisfy the home market. It should also be borne in mind that quite a considerable part of animal and agricultural products are exported in a finished state, e.g., flour and packed meats. The industrial establishments in 1910, aside from those of sugar and wine, numbered 28,661; of these 10,349 were in the city of Buenos Aires, 8647 in the province of Buenos Aires, 2951 in Santa Fé, 1319 in Entre Ríos, and 902 in Córdoba.

Commerce. Being an agricultural country, with the manufacturing industry still in its infancy, Argentina must, on the one hand, import most of the manufactured products needed by its people, and, on the other hand, seek to dispose of its enormous agricultural surplus to the nations of Europe. Of the total imports brought into the country, manufactured articles of all kinds constitute more than 86 per cent, while vegetable and animal substances constitute less than 13 per cent; and even these include many manufactured products, such as refined sugar, cigars and cigarettes, dried fruit, and manufactures of rubber. Making allowance for such articles, the value of really crude products of the farm barely exceeds 1 per cent of the total imports; on the other hand, the only manufactured articles exported from Argentina consist of products of the farm and mine, such as refrigerated meat, washed wool, hides and furs, lard, animal oil, linseed oil, flour, copper bars, etc. The imports into Argentina, in the order of importance, are textiles and apparel, iron and iron manufactures, food substances, building material, railway material, and all vehicles, coal and coke, oils, drink, chemicals, lumber and timber, paper and paper manufactures, etc. The trade with Europe has been facilitated by the establishment of branches of foreign mercantile houses in Argentina.

Since British capital has contributed more to the development of the material resources and the industries of Argentina than the investments of any other nation, Great Britain naturally gets the lion's share of Argentina's trade. The principal countries sharing in the import trade of Argentina are: Great Britain, Italy, Germany, the United States, France, Belgium, and Brazil. Of those taking Argentine products, the most important are : Great Britain, Germany, France, Belgium, the United States, and Brazil. The growth of Argentine trade is shown by the following figures (values in millions of gold pesos of 96.5 cents):

	Imports	Exports		Imports	Exports
1870	38.50	29.6	1885	92.25	83.9
1880	43.10	54.9	1890	142.25	100.8

Early in 1890 a severe commercial and financial crisis struck the country, from the effects of which it took her several years to recover. The following figures in pesos gold show the downward movement of the trade within the few years following 1890, marked especially by a sudden shrinkage of imports, and the gradual recovery:

	Imports	Exports		Imports	Exports
1891	67,207,000	96,703,000	1904	187,305,969	264,157,525
1892	97,899,000	114,667,000	1905	205,154,420	322,843,841
1893	100,913,000	94,906,000	1909	302,756,095	397,350,528
1894	92,789,000	101,250,000	1910	351,770,656	372,626,055
1896	112,164,000	116,802,000	1911	375,127,176	332,034,567
1900	113,485,000	154,600,000	1912	384,853,469	480,391,256

In the decade from 1903 to 1912 Argentina's total foreign trade increased 145 per cent. For 1912 the exports were classified as follows: Agricultural products, 278,186,572 pesos gold (of which 264,495,250 raw material); live-stock products, 188,215,956; forest products, 8,938,112; products of the chase, 2,008,212; mineral products, 285,272; other, 2,712,132; total, 480,391,256. The 1912 exports included corn valued at 108,908,193 pesos gold; wheat, 97,835,174; wool, 58,148,664; frozen beef, 34,285,076; and linseed, 34,213,565.

The growth of the trade with the United States during the last half-century is shown by the following figures taken from reports of the U. S. Bureau of Commerce and Navigation:

	Exports to Argentina	Imports from Argentina
1850	$1,064,000	$2,653,000
1860	999,000	4,020,000
1870	2,281,000	6,414,000
1880	1,779,000	6,214,000
1890	8,320,000	5,400,000

The crisis of 1890 had a similar effect on the trade with the United States as it had on the general trade of Argentina, the decline continuing for several years. Since 1896, however, the trade has again been increasing as follows:

	Exports to Argentina	Imports from Argentina
1896	$6,000,000	$9,300,000
1900	11,600,000	8,100,000
1904	16,900,000	9,800,000
1905	28,920,000	15,717,000
1912	53,158,179	29,847,016

The trade with the United States increased, not only absolutely, but also relatively. In 1896 the imports from the United States constituted 9.9 per cent of the total import; in 1900, 11.9 per cent; in 1904, 12.8 per cent; and in 1905, 14.1

per cent. The exports from Argentina to the United States were 8.0 per cent in 1896, 5.2 per cent in 1900, and 4.8 per cent in 1905. The chief articles of import from the United States are machinery and all kinds of tools and implements. The American export of agricultural implements to Argentina in 1912 amounted to nearly $7,500,000. The chief articles of export to the United States are wool and hides and skins. Argentine returns show that imports from and exports to the United Kingdom in 1912 were valued at 118,669,226 and 121,373,358 pesos gold, respectively; Germany, 63,941,503 and 53,995,175; United States, 59,126,951 and 32,391,148; France, 37,618,578 and 36,052,069. These figures are exclusive of exports "for orders," which at the point of shipment are not assigned to any country; such exports in 1912 aggregated 114,903,510 pesos.

Transportation and Communication. *Shipping.*—The foreign trade of Argentina is carried on chiefly in foreign vessels, mostly British and German. In 1912, 4333 vessels (exclusive of the coasting trade) with a total tonnage of 10,541,697 entered at the ports of the republic, and 4290 of 10,598,838 tons cleared. Of entrances and clearances combined 4450 vessels of 11,770,699 tons were credited to the port of Buenos Aires. The merchant shipping bearing the Argentine flag consisted in 1911 of 161 steamers with a net tonnage of 80,447, and 185 sail of 57,350 tons net; vessels with a tonnage less than 50 are not included in this enumeration.

In September, 1905, the Chamber of Deputies passed a bill looking to the establishment of a direct line of fast steamers between Argentina and European ports.

Railways.—Perhaps in no other field has the economic progress of Argentina been so well exemplified as in its railway development. Argentina has a larger railway mileage than any country in America south of the United States, although it has only half the area and about one-fourth the population of Brazil and less than half the population of Mexico.

In 1912 there were 32,853 km. (20,414 miles) of railway. From Buenos Aires the extension in the north is as far as the Bolivian and Paraguayan frontiers; in the west, via Mendoza, to the Chilean frontier, whence the line continues to Santiago and Valparaiso; in the south, via Bahía Blanca to Neuquén. The first railway in Argentina was inaugurated Aug. 30, 1857, and extended 10 km., or a little more than 6 miles, west from Buenos Aires. In 1865 there were 249 km. (155 miles); in 1870, 732 km. (455 miles), including the Central Argentine Railway, extending from Rosario on the Paraná River to Córdoba. The trunk line leading north from Córdoba to Tucumán was built between 1870 and 1880, when the total extension reached 2516 km. (1563 miles). In the following decade the railways increased in length nearly fourfold, reaching 9432 km. (5861 miles) in 1890. By that year the country was covered with a network of railways branching out from the three great industrial centres on the Paraná River—Buenos Aires, Santa Fé, and Rosario. On the south the railway reached the sea at Bahía Blanca; on the west it extended to Mendoza at the foot of the Andes and not far from the Chilean boundary; on the north to Salta, also close to Chile. In 1900 the railways aggregated 16,563 km. (10,292 miles), and in 1910, 27,989 km. (17,392 miles). In April, 1910, was opened the tunnel through the Andes, effecting rail communication between Buenos Aires and the Pacific.

On the economic side Argentina did not escape the experience which has been the lot of all countries where railway building has been allowed to go unchecked under private management. Excessive issue of capital stock, over-speculation, and kindred abuses accompanying the great railway "boom" of the eighties had their day of reckoning, and contributed in no small share to the great commercial panic of 1890, when the government found it impossible to pay interest on railway securities guaranteed by it. It was that experience that led to the gradual withdrawal of guarantees to railways, and the radical reform in railway management which culminated in the creation of a special Ministry of Railways, a sharp supervision of railway management, and a strong tendency toward government ownership and management. The 32,853 km. in operation in 1912 represented a capital of 1,120,210,000 pesos gold; passengers, 73,212,084; freight, 38,869,804; receipts, 129,700,178, and expenditures, 813,488,088 pesos gold. At the beginning of 1912 the railway extension was 31,574 km. (19,619 miles), of which 9831 were narrow gauge (1 meter), 2490 mean gauge (1.435 meters), and 19,253 broad gauge (1.676 meters). State lines, owned partly by the federal government and partly by the provinces, especially Buenos Aires, Santa Fé, and Entre Ríos, aggregated 5360 km. (3331 miles), and private lines 26,214 km. (16,289 miles). The cost of the state lines is reported to have been about 28,650 pesos per kilometer and that of the private lines 35,320 pesos per kilometer.

Telegraphs.—In 1910 the telegraph lines aggregated 59,950 km. (37,251 miles), of which 25,602 km. (15,908 miles) were government lines, 27,713 km. (17,220 miles) private lines, 5558 km. (3454 miles) Buenos Aires provincial lines, and 1077 km. (669 miles) Entre Ríos provincial lines. The length of wire was about 161,000 km. (100,040 miles), of which about 62,000 km. (38,525 miles) belonged to the federal government. There is telegraph communication with Valparaiso, whence a submarine cable connects with San Francisco, Cal. Buenos Aires is connected with Montevideo by submarine cable, and also with Europe by way of Rio de Janeiro and the Cape Verde Islands; and in this indirect way with the United States also. There is, besides, a cable between Buenos Aires and Lisbon.

Banking. The first bank established in Argentina was the Banco de la Provincia Buenos Aires, opened in 1822. It was followed by a number of other banks, but none of them managed to exist long, as the insignificant commerce of the country was not sufficient to maintain such institutions. The real banking history of the country dates from 1872, when the Banco Nacional, with a capital of 50,000,000 pesos, was founded. In 1882 the first foreign bank, the Banco Italiano del Río de la Plata, was established, and the growing commerce of the country soon led to the establishment of French, German, and Spanish banks, which the respective nations established in the interests of their own commerce. By a law of Nov. 3, 1887, national banks, resembling those of the United States, were established. The creation of these banks without proper safeguards thrown around them, followed by great abuse of the inadequate law by government officials, soon resulted in flooding the

country with worthless paper money. Speculation on a scale that left far behind the worst features of the German *Gründer* fever in the early seventies, and resembling much the excesses of the days of John Law (q.v.) in France, gave the country for a time the appearance of genuine prosperity; the "boom" was skillfully utilized through the medium of the Paris Exposition of 1889 to attract still more foreign capital, and the scramble for wealth went on until it culminated in financial panic. The panic swept away the numerous national banks, most of which had nothing but paper and a political "pull" with the directors of the National Bank at Buenos Aires as their chief assets. The National Bank itself, robbed of its capital by its directors and by politicians, was declared insolvent, and was reorganized in 1891, under the name of the Banco de la Nación Argentina, with a capital of 50,000,000 pesos paper; its capital in October, 1912, amounted to 120,999,950 pesos paper. In addition, there are 14 provincial banks and many commercial and agricultural banks. In 1899 the paper peso was fixed by the Congress of Argentina at .44 of the gold peso, thus contributing to the stability of the currency. At the end of 1912 the gold held by the Banco de la Nación Argentina and the Conversion Office amounted to 239,259,062 pesos.

Government. The constitution of Argentina, adopted in 1853 and modified in 1860 and in 1898, is modeled closely upon that of the United States; and the entire system of government, both federal and provincial, is almost identical in its chief features with our own. The legislative power is vested in a Congress consisting of a Senate and a House of Representatives. The Senate is composed of 30 members, elected 2 each by the legislatures of the 14 provinces, and 2 by the Federal District. They serve for nine years, but the terms of one-third of them expire every three years. The lower house consisted in 1912 of 120 members, elected directly by the people for a term of four years, one-half of the House being renewed every two years. To the House of Representatives is reserved the right of initiating bills dealing with taxation and military conscription and of impeaching the national executive and judiciary. The executive power is vested in a president, elected for a period of six years by the same method as that pursued in the United States, except that the number of electors chosen by each province is twice the number of its representatives in Congress. The president acts through his ministers, eight in number, who preside over the departments of the Interior, Foreign Affairs and Worship, Finance (Hacienda), Justice and Public Instruction, War, Navy, Agriculture, and Public Works. The ministers may appear and speak in Congress, though they have no vote, and are responsible for the acts of the chief executive, whose decrees they must countersign separately or jointly. Through the ministers the president may initiate legislation in either house. The Supreme Court of the republic consists of five judges and an attorney-general, appointed by the president, with the approval of the Senate. It exercises similar jurisdiction to that of the United States Supreme Court.

The provinces, 14 in number, have each their own constitution and exercise complete control over their own affairs. They possess even greater power than the States of our Union, in that they may conclude treaties (with the consent of Congress) for the fostering of industry, immigration, colonization, railways, and canals. The governor is elected directly by the people for a period of three or four years. The national domain is divided into 10 territories, controlled by Congress and ruled by governors appointed by the president. When a territory acquires a population of 30,000, it is granted the power of choosing a legislature, and when its inhabitants number 60,000, it must of right be admitted as a province with boundaries determined by Congress. For purposes of administration and police, the republic is divided into 425 departments and 1750 districts. The national capital is Buenos Aires.

Local Government.—Every community of more than 1000 inhabitants may be erected into a municipal corporation. In the provinces of Buenos Aires, Santa Fé, Entre Ríos, San Juan, and Corrientes, the municipalities are supreme in the sphere of local government. The municipal presidents and councils are elected by the people, except the *intendente* ('governor') of Buenos Aires, which comprises the Federal District, who is appointed by the president of the republic. In the other provinces the municipalities are subject to inspection and regulation by the government officials and judicial authorities. Foreigners are eligible to any municipal office.

Immigration and Emigration. From 1857, when immigration statistics were first recorded, to 1911, the immigrants by sea numbered 3,924,952; in the same period emigrants numbered 1,156,871. Of the immigrants, 2,053,242 were Italian, 1,132,230 Spanish, 201,732 French, 115,827 Russian, 89,442 Syrian, 68,525 Austro-Hungarian, 50,731 German, 48,526 British, 30,619 Swiss, 21,781 Belgian, and 16,419 Portuguese. Immigration from 1857 to 1860 was 20,000; thereafter by decades it has been as follows: 1861–70, 159,570; 1871–80, 260,613; 1881–90, 846,568; 1891–1900, 648,326; 1901–10, 1,764,103. The financial panic of 1890 caused a great decrease, the immigration in 1889 being 261,000 and in 1901 only 52,000. Immigration and emigration have been as follows: 1906, 302,249 and 103,853; 1907, 257,924 and 138,063; 1908, 303,112 and 127,032; 1909, 278,148 and 137,508; 1910, 289,640 and 97,854. Immigrants in 1910 included 131,466 Spaniards, 102,019 Italians, 15,478 Syrians, and 12,765 Russians.

The Argentinians have long understood the value of immigration to a naturally rich and fertile, but sparsely settled country like their own, and have accordingly made great efforts to attract foreign labor, as well as foreign capital, to their country. In addition to liberal immigration laws, and generous distribution of land to colonists, large sums of public and private money have been spent in bringing over and aiding immigrants. While encouraging white immigration to the agricultural and grazing lands, the government does not favor any further increase of unskilled laborers in Buenos Aires and other cities.

Education. The public-school system of Argentina was admirably organized by President Sarmiento (1868–74), but on the whole it has not been kept up to the standard he set for it. Primary education is free and obligatory for all children between the ages of 6 and 14. The elementary schools are supported by the individual provinces, although subsidized by the federal government. They are under the general control of provincial boards of education, while the

details of administration are left to district school boards. The schools in the territories and the Federal District are managed by a National Board of Education under the supervision of the Minister of Justice and Public Instruction. Besides the regular elementary schools, there are kindergartens, schools for adults, and, in sparsely settled districts, ambulatory schools. In some of the provinces, and in the federal schools, religious instruction of any kind may be imparted outside of school hours; in others only the Catholic faith may be taught; in one, Entre Ríos, no religious instruction is permitted. The population of school age in 1911 was reported at 1,025,570, of whom about 45 per cent attended school, and of the latter only about 13 per cent could read and write. Slightly more than half of the total population was reported illiterate. Primary schools, public and private, numbered, in 1911, 7183, with 746,725 pupils and 22,456 teachers. Secondary education is controlled by the federal government, which maintains 27 national colleges (10,227 students and 1533 teachers) and 62 normal schools. Higher education is provided by the national universities at Buenos Aires, Córdoba, and La Plata, and by the provincial universities at Paraná and Santa Fé; the university teachers number about 450 and the students over 7300, of whom more than half are credited to the University of Buenos Aires. The federal expenditure on education in 1911 was over 19,200,000 pesos paper.

Religion. The constitution guarantees freedom of religion to all, but makes the Roman Catholic faith that of the State. The country is divided into five dioceses and one archiepiscopate. The government builds churches and supports the Catholic priesthood, but it controls all ecclesiastical appointments, and sanctions or rejects the decrees of the papal see. Marriage was made the subject of a civil contract in 1884. The native Argentinians are nearly all Roman Catholics. Of the 3,954,911 people returned by the census of 1895, 3,921,136 were Catholics, 26,750 Protestants, 6085 Jews, and 940 belonged to other denominations.

Finance. The economic progress of Argentina has been accompanied throughout its course by extremely unfavorable financial conditions. The chief cause of the unsatisfactory state of public finance has been the large increase of expenditure incurred without reference to the financial strength of the people. Students of Argentine affairs unite in the opinion that the politicians of the country embarked with too light hearts on all kinds of undertakings—some productive, others wasteful and useless; moreover, the administration of the budget was until recently extremely loose. In 1870 the total budget of the government was 12,635,000 pesos; in 1880 it was 16,815,000 pesos, or an increase of 33 per cent in one decade; in 1890 it was 71,508,000 pesos, or a further increase of 325 per cent; and in 1900 it was 95,000,000 pesos paper and 33,000,000 pesos gold, or, reducing it all to a paper basis, 194,000,000 pesos, or a further increase of 171 per cent. Dr. Alberto B. Martínez, formerly Assistant Minister of Finance, ascribes the great increase in public expenditure to the following principal causes: (*a*) Increase of administrative functions, due to rapid growth of population; (*b*) increase of public debt; (*c*) depreciation of paper money; (*d*) wars, foreign and civil; (*e*) guarantee by the State of the payment of interest on costly public works; (*f*) imperfect administrative machinery; (*g*) defective control of public expenses, etc. In 1890, on the eve of the great financial crisis, the revenues of the republic amounted to 73,408,000 pesos paper, as against an expenditure of 92,854,000 pesos. The enormous deficit, together with the general unsettled financial condition of the country, forced the government to suspend payment on the national debt, and during the following years the revenue continued to decline. Although since 1895 the revenue has been steadily increasing, the expenditure has often been in excess, as is shown by the following figures (in pesos):

Year	Revenue		Expenditure	
	Gold	Paper	Gold	Paper
1895	29,800,000*	29,000,000*	24,200,000*	83,900,800*
1900	46,000,000*	67,100,000*	32,900,000*	95,400,000*
1901	38,185,343	62,318,816	29,216,218	94,658,119
1902	40,238,779	59,531,150	41,629,990	104,035,062
1903	46,615,856	65,466,010	37,149,031	98,441,878
1904	52,254,429	69,961,835	32,087,241	122,031,533
1905	53,076,067	84,778,282	82,345,819	134,906,626
1906	61,616,089	88,835,790	51,413,656	153,403,724
1907	64,527,983	97,153,871	29,521,411	186,107,108
1908	68,197,676	99,237,264	25,756,809	193,845,362
1909	74,165,574	106,607,826	68,768,368	235,969,955
1910	84,809,876	112,407,150	41,598,523	260,273,231

* Estimated.

The budget of 1912 showed revenues of 89,281,681 pesos gold, and 128,751,718 pesos paper, and expenditures of 29,909,343 gold, and 248,764,942, paper.

Of the total revenue, import duties furnish about three-sevenths, the remainder being derived from excise taxes on spirits, wines, and tobacco (one-fifth), land and stamp taxes (about 7 per cent of total revenue), proceeds from railways, telegraphs, and posts (about 6 per cent of revenue), and a number of other taxes. The increase of internal taxation took place in the early nineties to put a stop to the growing deficits and to put the country in a position to resume payments on the debt. The growth of the Argentine debt during the last three decades of the century was in round figures as follows: 1870, $47,000,000; 1880, $85,000,000; 1890, $353,000,000; 1900, $440,000,000. At the end of 1911 the external debt amounted to 303,719,786 pesos gold, and the internal debt to 161,367,000 pesos gold and 139,656,940 pesos paper; the floating debt was 34,064,123 pesos paper, and there was outstanding paper money amounting to 685,150,000 pesos. The annual interest of the debt requires about 28,000,000 pesos gold.

National Defense. Military service is compulsory upon male citizens between 20 and 45 years of age—nominally for a period of 25 years, of which from 3 months to one year are spent in continuous service. The country is divided into five military districts, each providing a complete division of the first line. The active strength of the army is 21,680 officers and men, and a total peace footing of about 170,000. The infantry is equipped with the Mauser magazine rifle, and the cavalry with a carbine of the same type, while the artillery use the Krupp 7.5 cc. gun. See NAVIES.

Weights, Measures, and Money. The metric system was officially adopted in 1887. Gold is

the standard of value. A gold peso ($) equals 96.5 cents in United States money. A peso has 100 centavos. The paper peso is equal to 44 centavos gold money.

Population. The table below shows by provinces the area of Argentina and the population according to the census of 1895 and the official estimate of Dec. 31, 1910. The figure given for total area should be regarded only as an approximation. Different areas are stated even in the Argentine reports, one being 2,987,353 square kilometers (1,153,417 square miles) and another 2,952,551 square kilometers (1,139,980 square miles); while a recent planimetric calculation gives 2,806,400 square kilometers (1,083,551 square miles).

Provinces	Population 1895	Est. pop. Dec. 31, 1910	Area in square miles
1. Eastern Littoral			
Federal District	663,854	1,314,163	72
Buenos Aires	921,168	1,921,183	117,809
Santa Fé	397,188	879,935	50,929
Entre Ríos	292,019	382,794	28,792
Corrientes	239,618	336,218	32,586
Total 1	2,513,847	4,834,293	230,188
2. Central			
Córdoba	351,223	610,475	62,176
San Luis	81,450	120,634	28,542
Santiago del Estero	161,502	221,683	39,774
Total 2	594,175	952,792	130,492
3. Western Andes			
Mendoza	116,136	238,316	56,517
San Juan	84,251	121,143	33,724
Rioja	69,502	91,365	34,555
Catamarca	90,161	113,264	47,544
Total 3	360,050	564,088	172,340
4. Northern			
Tucumán	215,742	314,234	8,928
Salta	118,015	153,192	62,200
Jujuy	49,713	63,311	18,981
Total 4	383,470	530,737	90,109
5. Territories			
Northern			
Misiones	33,163	44,950	11,282
Formosa	4,829	16,200	41,402
Chaco	10,422	33,500	52,741
Los Andes	.....	3,100	24,985
Total	48,414	97,750	130,410
Central			
Pampa	25,914	90,250	56,320
Western			
Neuquén	14,517	29,000	42,345
Southern			
Río Negro	9,241	34,000	75,924
Chubut	3,748	30,000	93,427
Santa Cruz	1,058	6,500	109,142
Tierra del Fuego	477	2,500	8,299
	14,524	73,000	286,792
Total 5	103,369	290,000	515,867
Total population	3,954,911	.....	.....
Population not returned by census	60,000	.....	.....
Indians	30,000	.....	.....
Grand Total	4,044,911	7,171,910	1,138,996

The calculated or enumerated population of Argentina in 1869 is stated at 1,821,211; in 1872, 2,231,049; in 1888, 3,158,434; in 1895, 3,951,911; at the end of 1910, 7,171,910. The increase from 1869 to 1895 was about 120 per cent. The urban population constituted 34.6 per cent of the total population of the country in 1869, and 42.8 per cent in 1895, thus keeping pace with the industrial development of the country. In the United States the urban population constituted 36.1 per cent of the total in 1890, 40.5 per cent in 1900, and 46.3 in 1910.

Of the 3,954,911 persons reported by the 1895 census, 2,088,919 were males and 1,865,992 females, the great excess of males being a common phenomenon in young countries attracting large numbers of immigrants. There were 2,950,384 natives, as against 1,004,527 foreigners, or, in other words, more than one-third of the population consisted of immigrants, among whom the proportion of males to females was about 7 to 4. The best represented nationalities among the foreign population were: Italians, 492,636; Spaniards, 198,685; Frenchmen, 94,098; and South Americans (Brazilians, Chileans, etc.), 117,000. The Indians seem to be fast dying out, their number having decreased from more than 93,000 in 1869 to 30,000 in 1895. The density of population increased from 1.6 per square mile in 1869 to 3.7 per square mile in 1895, ranging in the latter year from 0.16 per square mile in the territory of Neuquén to 11.1 in the province of Buenos Aires.

History. The Río de la Plata was entered in 1515 by Juan Díaz de Solís, who was searching for a southwest passage to the East Indies, and in 1527–28 Sebastian Cabot ascended the Paraná to its confluence with the Paraguay, giving the name La Plata (silver) to the latter stream, from the stories of hoards of silver which he heard from the Indians, who told him that the metal came from the head waters of the river in the west, i.e., Bolivia. At the junction of the Carcarañal and the Paraná, above the present site of Rosario, he built a fort. In 1535 Don Pedro de Mendoza visited the new country and founded Buenos Aires, which was abandoned by the colonists in 1536 and was not permanently established until 1580. Meanwhile Asunción (1536), Santa Fé (1573), and other places had been settled, and horses and cattle had been introduced. Spanish colonists from Peru had founded cities in the northwest, Tucumán (1565) and Córdoba (1573), and down to 1776 the basin of the Río de la Plata was a dependency of the viceroyalty of Peru. In that year the viceroyalty of Buenos Aires was formed, including Bolivia, Paraguay, and Uruguay, and the country was governed by viceroys until 1806, when, during the war of France and Spain against England, Buenos Aires and Montevideo were occupied by the English. Buenos Aires, however, was recaptured by the inhabitants, who, forced to defend themselves, saw the need and advisability of independence of the mother country. Accordingly, they refused in 1808 to acknowledge Joseph Bonaparte as King of Spain, and on May 25, 1810, the people deposed the Spanish viceroy, and the struggle for independence began. A provisional government was instituted under a *junta gubernativa*, which was replaced early in 1814 by a "Supreme Board of the United Provinces," under the virtual control of one man, Antonio de Posados. Civil strife followed, and on July 9, 1816, a general congress at Tucumán declared the independence of the "United Provinces of the Río de la Plata," though this was not substantially attained without war (1817–24) and was not recognized by Spain until 1842. During 1826–28 there was war with Brazil for the possession of the Banda Oriental (Uruguay), which in 1828 was finally recognized by both as an independent state, and from 1827 to 1831 the Plata provinces were practically isolated from each other. In 1831 Buenos Aires, Entre Ríos, Corrientes, and Santa Fé formed a federal compact, and invited the

others to join them; but anarchy resulted till 1835, when Gen. Manuel de Rozas was installed as dictator. His tyrannical efforts to make Buenos Aires supreme led to his downfall in 1852. In 1853 a constitution, still in force, was adopted for the "Argentine Republic," but Buenos Aires refused to accept the document, and in 1854 declared itself independent, but was defeated in 1859 and obliged to reënter the Confederation. Hostilities were soon renewed (1861), however, and though the province did not again become independent, it increased greatly in relative importance, and the city of Buenos Aires supplanted Paraná as the capital of the Confederation. During 1865–70, under the presidency of Gen. Bartolomé Mitre and of Gen. Domingo Faustino Sarmiento, a war was waged against Paraguay by the Argentine Republic, Brazil, and Uruguay, with little benefit to the republic. In 1881 a treaty was made with Chile by which Argentina acquired all the country east of the Andes, comprising Patagonia and the eastern part of Tierra del Fuego. In July, 1890, a revolution broke out, aided by the army and navy—the result of the political and financial corruption of the cabinet officers and the stagnation in business produced by debasement of the currency. President Miguel Juárez Celmán was forced to resign, and was succeeded by Dr. Carlos Pellegrini, who held office until October, 1892, when Dr. Luis Sáenz-Peña was inaugurated. Sáenz-Peña made a vigorous effort to put the country on a proper financial basis, conditions having continued very bad since the failure of the Barings, which was largely brought about by their extensive dealings in unproductive Argentine securities. Repeated political disturbances at the various provincial capitals, however, prevented any successful financial reorganization or sufficient commercial improvement, and in January, 1895, Sáenz-Peña resigned, and the vice-president, Dr. José Evaristo Uriburú, took the executive chair. He held office until 1898, when Lieut.-Gen. Julio A. Roca, who had occupied the place between 1880 and 1886, was again elected president. The dispute with Chile over the boundary in the Atacama region was submitted for arbitration to the United States minister at Buenos Aires, whose decision, rendered in March, 1899, gave to Argentina about 25,000 square miles of territory. The question of the Patagonian boundary was settled in November, 1902, after years of controversy, by the decision of a commission appointed by the King of Great Britain, to whom the two countries submitted their claims. Of the disputed area Argentina received about 15,600 square miles and Chile a little over 21,000 square miles. The delimitation of the boundary was concluded in March, 1903. In May, 1902, the two governments entered into an agreement providing for a cessation in the increase of naval armaments and the ultimate establishment of an equilibrium between the two fleets. Dr. Manual Quintana, who assumed the presidency Oct. 12, 1904, was active in advocating measures looking to the improvement of the finances and the industrial life of the nation. In July, 1905, Congress passed a law providing for the conversion of the internal debt and a measure providing for the conversion of the foreign debt was adopted by the Chamber in August. A military insurrection in the provinces of Buenos Aires, Santa Fé, and Córdoba, early in February, was suppressed in the course of a few days. An abortive uprising occurred in Santiago del Estero in June. In August an anarchist attempt was made on the life of the president. Strikes among the harbor and railroad employees led to the proclamation of a state of siege in October. President Quintana died in March, 1906, and was succeeded by the vice-president, Dr. Figueroa Alcorta. The latter finished his term and in 1910 was succeeded by Dr. Roque Sáenz-Peña. See NAVIES.

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ARGENTINE, är'jen-tēn. Formerly a city in Wyandotte Co., Kans., but annexed to Kansas City in 1910; on the Atchison, Topeka, and Santa Fe Railroad (Map: Kansas, H 2). It has a structural steel company, zinc and chemical works, an ice plant, grain elevators, and extensive railroad repair shops. Pop., when annexed, about 6300. See KANSAS CITY.

ARGENTINE (Fr. *argentin*, silvery, from Lat. *argentum*, silver). A small deep-sea smelt, most abundant on the southern coasts of Europe, where it is seined in schools, with anchovies and sardines. These fishes are chiefly remarkable and valuable for the resplendent silvery lustre of their sides and the abundance of nacre, the substance used in making artificial pearls, with which their air bladder is externally loaded. It consists of a coat of silvery fibres. Representatives of the genus (*Argentina*) are found on both shores of America. See Plate of WHITEFISH, SMELT, ETC.

ARGENTINE REP'UBLIC. See ARGENTINA.

AR'GENTITE, or SILVER GLANCE. A gray sulphide of silver occurring massive or in isometric crystals. It is a rich ore of silver.

ARGENTON, är'zhäN'tôN'. A town in the department of Indre, France, 72 miles from Poitiers (Map: France, N., G 6). It is on the Creuse River, and many old houses and remains of castles give it a quaint appearance. The principal industry is the manufacture of boots and shoes, and there are several tanneries. Argen-

ton lies just south of the Roman Argentomagus. Pop., 1911, 6122.

AR'GENTORA'TUM. The Latin name for Strassburg, derived from an old Celtic term signifying 'the Stone of Argantos.'

ARGHOOL, är-gōōl'. A wood wind instrument of the Arabs, invented in post-Mohammedan times. It consists of two tubes, made of common cane, with a reed mouthpiece. One tube is always, the other usually, perforated.

ARGILE PLASTIQUE, är'zhēl' plȧ'stēk' (Fr. plastic clay). A series of beds at the base of the Tertiary system in France, which consist of extensive deposits of sand, with occasional beds of plastic clays, used for pottery. See TERTIARY SYSTEM.

AR'GILLA'CEOUS ROCKS (Lat. *argillaceus*, clayey, from *argilla*, Gk. ἄργιλλος, *argillos*, white clay, potter's earth; cf. ἀργός, *argos*, shining, white). Rocks consisting of or containing more or less clay. Pure clay, or kaolinite, a hydrated silicate of aluminum, is always an alteration product of other minerals, particularly of feldspars. However, the term "clay" is applied to practically all plastic or sticky masses of earth or shale, which may include, besides kaolinite, a variety of minerals, such as quartz, feldspar, limonite, hematite, magnetite, etc. Clay deposits may be either residual or transported—i.e., formed in place, or carried to the point of deposition by water, wind, or glaciers. They are derived from the alteration of igneous rocks, limestone, sandstone, or shale. When consolidated without deformation, so that they have partings or capacity to part along planes of deposition, clay deposits form shale. When consolidated and so metamorphosed that new planes of cleavage are developed at angles to the deposition planes, the clay is known as a slate or clay slate. When still more metamorphosed, the clay may be known as a phyllite. Argillaceous rocks may be readily identified by the peculiar odor which they emit when breathed upon. These rocks grade by admixture of lime into calcareous rocks or limestones. See ARENACEOUS ROCKS; ROCK; GEOLOGY; CLAY.

AR'GILLITE. See SHALE.

AR'GINU'SÆ. Three islets off the south coast of the island of Mytilene (Lesbos), Asiatic Turkey. Near their shores the Spartan fleet under Callicratides was defeated by the Athenian fleet under Conon, September, 406 B.C.

ARGIVES, är'jīvz, or ARGIVI (Lat. *Argivi*, Gk. Ἀργεῖοι, *Argeioi*). (See ARGOLIS.) The inhabitants of Argos. In Homer, the name is applied to all the Greeks.

AR'GO. See ARGONAUTS.

ARGO. A large southern constellation in which is commemorated the mythical ship of the expedition of the Argonauts (q.v.). On account of its great extent, modern uranographers have subdivided Argo into three smaller constellations, *Puppis* (the Poop), *Vela* (the Sails), and *Carina* (the Keel). Canopus, a star of the first magnitude, is its chief ornament. Its declination (52° 38' S.) renders it invisible in the northern and central United States. The star η Argus, or η Carinæ, as it is now generally called, has undergone greater changes in brightness than any other variable star of its class. Apparently unknown to Ptolemy, who catalogued other bright stars culminating at the same altitude at Alexandria, it was first observed by Halley at St. Helena in 1677 when it showed as a star of the fourth magnitude. During the greater part of the eighteenth century it was classed as a second magnitude star, but in 1811 it was again of the fourth magnitude. With several minor variations, it reached its maximum splendor in 1843, when it was only slightly inferior to Sirius in brightness. Sinking slowly in brilliancy, it brightened again for a short time in 1856, and then faded, rapidly at first and later more slowly, until 1886, when it assumed its present condition. It has been invisible to the naked eye since 1868, and now shows as a telescopic star of the seventh magnitude. It is situated in a remarkable nebula, named by Sir John Herschel the "keyhole" nebula, on account of its shape. Photographic observations made at the Cape of Good Hope Observatory in 1899 leave little room to doubt the existence of some connection between η Carinæ and the nebula.

AR'GOB. A district in Bashan, which, according to Deut. iii. 4, contained threescore walled cities, "the kingdom of Og." Its exact location is uncertain. The Targums translate Argob by Trakona—i.e., Trachonitis, the modern El Leja—which, indeed, abounds in deserted towns and villages. Some of these are cave dwellings or subterranean chambers; others are built above ground, of massive blocks of black basalt, with heavy doors moving on pivots, staircases and roofs of the same material. The latter belong to the period from the first to the seventh century A.D., according to De Vogüé, Barton and Drake, Wetzstein and Waddington; though it is possible that the Greek cities may have been built on the sites of earlier towns, as Driver suggests. In Deut. iii. 14, Jair, son of Manasseh, is said to have conquered the region of Argob as far as Geshur and Maacha. But the Hawoth Jair were tent villages in Gilead, not walled cities in Bashan. Argob may have been situated on the western slopes of Jebel Hauran, north of Salchil, but this is far from certain. A most careful description of the region is given by J. G. Wetzstein, *Reisebericht über Hauran und die Trachonen* (Berlin, 1860); cf. also the excellent plates in De Vogüé's *Syrie Centrale* (Paris, 1869). Porter, *Five Years in Damascus* (London, 1870), and *Giant Cities of Bashan* (London, 1869), are interesting but somewhat unreliable.

AR'GOL (of uncertain origin, perhaps from Gk. ἀργός, *argos*, white). The crude potassium bi-tartrate which is found as a crust in wine vats. It exists originally in the juice of the grape, but is deposited during fermentation, as it is sparingly soluble in an alcoholic liquid. Accordingly as it is deposited from the red or white grape, it is called *red argol* or *white argol*. In addition to the potassium bi-tartrate it usually contains small quantities of calcium tartrate with coloring and extractive matters. Crude argol is purified by dissolving in water and heating for several days; on cooling, the clear liquor is run off, the deposited crystals constituting the commercial cream of tartar. In the crude state argol is used in metallurgy as a reducing agent in fire assaying; the organic matter combines with the oxygen of the lead oxide, and the potash-lime elements combine with the silica of the ore forming a slag.

AR'GOLIS (Gk. Ἀργολίς). A division of ancient Greece. In its wider sense it is the northeast portion of the Peloponnesus, bounded on the west by Achæa, Arcadia, and Laconia; on the north bordering on the Corinthian and Saronic gulfs; and penetrated on the south by

the Argolic Gulf, which separates the portion bordering on Laconia, the Kynuria, from the eastern peninsula. This district, containing about 1700 square miles, is filled with mountains, and never in historical times formed one kingdom; the northern states—Sicyon, Corinth, and Phlius—were often considered outside of Argolis proper. The chief towns of the eastern peninsula were Epidaurus, Troezen, and Hermione. The plain of Argos, in the middle portion, was famed for its fertility, and contained the cities of Mycenæ, Tiryns, and Argos, and was called Argeia. The edge of this plain is now swampy; the southeast portion contained, even in ancient times, the swamp of Lerna, home of the Hydra (q.v.), slain by Hercules. In the legends Argolis plays an important part. Mycenæ was the home of Agamemnon and the capital of Argolis, though other chiefs ruled at Argos, Midea, and Tiryns. Here, also, was placed the birth of Hercules (q.v.), and his contests with the Nemean lion and the Lernean hydra. Still earlier the plain was the scene of the story of Inachus and his daughter, Io; of Danaus and his daughters; and of the rule of Perseus and Pelops.

In historic times the chief city was Argos, which held possession of the Argive plain and was at the head of a somewhat loosely organized league of several of the Argolic states, which under King Pheidon (c.670 B.C.) became a great power in the Peloponnesus. Later the growing power of Sparta greatly lessened the influence of Argos, which, however, always remained a jealous rival, and during the fifth and fourth centuries B.C. usually appears in alliance with Athens.

The principal divinity of Argos was Hera, who had a very ancient sanctuary to the east of the city, the Heræum, where was a celebrated gold and ivory statue of the goddess, the work of Polycletus. This sanctuary was excavated by the American School of Classical Studies at Athens, from 1892 to 1895; the excavators discovered a large number of buildings, including earlier and later temples, much interesting sculpture, and a great mass of pottery, showing that this had been a place of worship from the earliest times. Argos was the seat of a celebrated school of artists in bronze and was also famed for its musicians. The modern town is a flourishing place on the site of the ancient city, of which few traces remain in sight. Argolis is one of the nomes of the kingdom of Greece. The capital is Nauplia. Consult Waldstein, *Excavations at the Heraion of Argos* (1892). See EPIDAURUS; HERÆUM; MYCENÆ; TIRYNS; TROEZEN.

AR'GON (Gk. *ἀργόν*, neut. of *ἀργός*, *argos*, inactive, inert, alluding to its incapacity for entering into chemical combination). A gaseous element discovered in 1895 by Lord Rayleigh and Sir William Ramsay, although Cavendish had undoubtedly obtained a minute quantity of it from atmospheric air in 1785. Argon is contained in the atmosphere to the extent of nearly 1 per cent. It was obtained by its discoverers by passing air through a combustion tube packed with metallic copper, which absorbed the oxygen, after which the gas was passed through an iron tube packed with magnesium turnings and heated in a combustion furnace. The magnesium absorbed the nitrogen, and the argon, in its gaseous form, was then collected in a holder. It was also obtained by adding oxygen to air, subjecting the mixture to the action of an electric current in the presence of an alkali, and removing all oxygen by means of pyrogallic acid. The density of the argon made by means of magnesium was 19.94 (the density of oxygen being taken as 16). The elementary nature of argon has been demonstrated by a comparison of its specific heats at constant pressure and at constant volume, which showed that a molecule of argon is made up by a single atom and hence is not compound. But if this is true, then the molecular weight (i.e., twice the density) of argon is identical with its atomic weight, and hence the latter is concluded to be about 40. Sir William Crookes found in the spectrum of argon two characteristic lines near the red end that could not be mistaken for the lines of nitrogen or of any other element. However, the spectrum of argon has been found to change greatly with the means employed in producing it. Argon cannot be liquefied unless its temperature is reduced to at least 121° below zero C. At that point a pressure of 50.6 atmospheres (759 pounds per square inch) is sufficient to produce liquefaction. Under ordinary atmospheric pressure liquid argon boils at —187° C. At the temperature of —189.6° C. it freezes. No well-defined chemical compound of argon with other substances is as yet known. Its discoverers received the first Hodgkins Medal and the grand prize of the Smithsonian Institution at Washington. Consult Lord Rayleigh and Sir W. Ramsay, "Argon, a New Constituent of the Atmosphere," *Smithsonian Contributions to Knowledge* (Washington, 1896).

AR'GONAUT. A small pelagic octopod cuttlefish of the genus *Argonauta;* specifically, the paper sailor or paper nautilus (*Argonauta argo*). The female is many times longer than the male and secretes a thin, iridescent, crenelated, and somewhat boat-shaped shell, which serves as a brood pouch. In calm weather the animal rises to the surface and seems to voyage about, whence the fanciful name and sundry fables. For fuller description, see OCTOPUS.

AR'GONAU'TICA. The name of various epic poems narrating the deeds of the Argonauts, especially one written by Apollonius of Rhodes and one by Valerius Flaccus, a Roman of the first century A.D. Flaccus's work is a free imitation of that of Apollonius.

AR'GONAUTS (Gk. *Ἀργοναῦται*, *Argonautai*, i.e., the sailors on the ship *Argo*). A name given to those who, under command of Jason, undertook a voyage famous in Greek legend. The *Argo* is mentioned in the *Odyssey*, and incidents of the story appear in the Hesiodic poems. Allusions to the story, often contradictory and influenced by local legends, are scattered through the fragments of lyric poetry, and single episodes of it were used by the tragedians, though only the Medea of Euripides (q.v.) has survived. These fragments, and the somewhat more satisfactory scraps from the prose writers, are the chief sources for the earlier versions; but our most complete and valuable account is contained in the poem, in four books, by the Alexandrian poet and scholar, Apollonius of Rhodes, who tried to combine the mass of material with which his studies had made him familiar into a connected and consistent narrative. A brief narrative is also found in the mythological handbook which goes under the name of *Apollodorus.* (For Roman versions of the story see APOLLONIUS RHODIUS.) In its

main outlines the story is as follows: Pelias, King of Iolcus, in Thessaly, having reason to fear his nephew, Jason, commanded him to fetch from King Æetes, in Colchis, the golden fleece of the ram which had borne away Phrixus and Helle (q.v.). With the help of Hera and Athena, Jason and Argos, son of Phrixus, built a wonderful ship, strong and swift, but light, and, since it bore a piece of the oracular oak from Dodona in its keel, capable of delivering prophecies. About him Jason gathered a band of heroes, whose names and number vary greatly, though the party is usually estimated to have comprised about 50. The earlier versions seem to have placed the land of Æetes in the far east, but the later writers placed it in Colchis, on the Black Sea. On the voyage the most notable adventures were: 1. The landing on Lemnos, where the Argonauts found a state of women only, under Queen Hypsipyle, all the men having been murdered shortly before. Here they remained some time, and two sons were born to Jason and Hypsipyle. 2. Near the Bosporus Pollux conquered Amycus, King of the Bebryces, in a boxing match, and so secured for his companions access to a spring. 3. In these same Thracian regions they found the blind prophet Phineus, tormented by the Harpies (q.v.), whom the sons of Boreas, Calaïs, and Zetes, put to flight; in return Phineus showed the Argonauts how to pass the ever-clashing rocks of the Symplegades. 4. This adventure they accomplished by hard rowing, after they had been encouraged by the sight of a dove, which flew through the passage with only the loss of her tail feathers. When they arrived at Colchis, Æetes demanded that Jason should yoke fire-breathing bulls with brazen hoofs, plow with them a field, sow the dragon's teeth given him by Cadmus, and then destroy the crop of giants which would spring from such seed. All this Jason accomplished, with the help of Æetes's daughter, Medea, who had fallen in love with the hero. With her help, also, he foiled further plots of the King, and, securing the fleece by stealth, fled with Medea and her young brother, Absyrtus. Pursued by Æetes, Medea saved the Argonauts from capture by killing her brother and strewing the fragments of his body into the sea, thus delaying her father, who piously collected his son's remains for burial. The return of the Argonauts was very diversely narrated. Some brought them by way of the Tanaïs into the Northern Sea, while others led them eastward to the ocean and back across Africa, carrying their ship through the Libyan desert on their shoulders. After many adventures they at length reached Iolcus and delivered the fleece to Pelias. (For the further legends see articles MEDEA; PELIAS.) There are indications that both Jason and Medea were originally worshiped as gods at Corinth and elsewhere, but later sank to the rank of heroes and became connected with the common folk tale of the lover who must perform impossible tasks to win his mistress, but who overcomes all obstacles by magic help. Whatever the origin of the story, there can be no doubt that it was developed under the influence of the voyages that marked the great period of Greek colonization in the eighth and seventh centuries B.C. The wonders and adventures encountered by the first explorers of the Black Sea and the west were thrown back into the mythical past, and told of gods and heroes—Hercules, Jason, and Odysseus.

ARGONAUTS OF '49. A name applied to the fortune seekers who emigrated to California in the years immediately following the discovery of gold there in 1848, the largest number of whom went out in 1849. See FORTY-NINERS.

ARGONNE, är'gŭn'. A rocky plateau in northeast France, extending along the border of Lorraine and Champagne and forming parts of the departments of Ardennes and Meuse. The Argonne forest proper, or west Argonne, has a length of over 30 miles and a width of from one to eight miles. The forest of east Argonne includes the forest of Apremont. Argonne has been the scene of several stirring historical events, notably in connection with Dumouriez's "Argonne campaign" of 1792 and with the Franco-Prussian War.

AR'GOS. See ARGOLIS.

ARGOSTOLI, är'gŏs-tō'lē. An episcopal city, capital of the island of Cephalonia, on the east shore of the Gulf of Argostoli, an inlet of Livada Bay (Map: Greece, B 3). The town is famous for its mills, which are driven by a current of sea water, flowing through an artificial channel about 150 feet long, then disappearing through fissures in the rocks. It has an excellent harbor, and it finds considerable trade in exporting wine, oil, melons, and currants. A long bridge connects the north shore of the bay with the Koutavŏs Lagoon, which lies to the south. There is a naval school here. Pop., about 14,000.

ARGOT, är'gō'. The French term for what in English is called "slang," especially the dialect of thieves and vagabonds. Like all such dialects, argot is often sparkling with wit and remarkable for aptness and comprehensiveness of expression. Many specimens of it are to be found in Victor Hugo's *Les Misérables*, in Zola's *Assommoir*, and in the lower grade of Parisian journals. Consult: Barrère, *Argot and Slang* (London, 1887); Knoblanch, *Dictionary of Argot* (French-English) (New York, 1912); Sainéan, *Les Sources de l'argot ancien* (Paris, 1912); La Grasserie, *Etude scientifique sur l'argot et le parler populaire* (Paris, 1907); Villatte, *Parisismen* (Berlin, 1906); Yve-Plessis, *Bibliographie raisonné de l'argot et de la langue verte* (Paris, 1901); Delvau, *Dictionnaire de la langue verte* (Paris, no date). See SLANG.

ARGOUT, är'gōō', ANTOINE MAURICE APOLLINAIRE, COUNT D' (1782–1858). A French financier. He was born in Isère, and after acting as auditor to the Council of State (1810), became prefect of Gard (1817) and a peer of France (1819). As mediator between Charles X and the popular leaders, during July, 1830, he obtained concessions from Charles, but not until it was too late. He was appointed Minister of the Marine in 1830, and acted as Minister of Commerce (1831) and Minister of the Interior (1833). He was governor of the Bank of France from 1834 until his death, except for a short while in 1836 when he was Minister of Finance. In 1852 he entered the Senate.

ARGÜELLES, är-gwā'lyās, AGUSTÍN (1776–1844). A Spanish politician of the Liberal school. He was born at Rivadisella, in Asturias. On the breaking out of the War of Independence in 1808, he went to Cadiz, where he agitated for the organization of a regency with a free constitution. In 1812 he was sent as representative of his native province to the Cortes, where he was appointed one of the members of a committee to draft a constitution. His splendid talents as a public speaker soon won him the admiration

of the Liberal party, who used to call him the Spanish Cicero. But on the return of Ferdinand VII Argüelles fell a victim to the reactionary spirit which ensued. On May 10, 1814, he was arrested, and after a trial that was a mockery of justice, condemned by the King to 10 years' imprisonment in the galleys at Ceuta. The revolution of 1820 restored him to freedom. Argüelles became Minister of the Interior, but soon resigned, provoked beyond measure by the narrow bigotry of the court. He continued a constitutional Liberal always. In the Cortes held at Seville, in 1823, he voted for the suspension of the royal power; but after the violation of the constitution he fled to England, where he remained till the amnesty of 1832. On his return to Spain he was repeatedly made President and Vice President of the Chamber of Deputies, and always showed himself a moderate but unwavering reformer. In July, 1841, in the discussion of the law regarding the sale of Church property, he spoke strongly against all concordats with the Pope. During the regency of Espartero he was guardian to the young Queen Isabella. In his old age he still exhibited the fiery eloquence that marked his youth. Consult Evaristo San Miguel, *Vida de D. A. Argüelles* (Madrid, 1851).

AR'GUMENT. In law, the address by counsel to the court or jury, in which he argues upon the merits of his client's case in order to affect the decision or verdict to be rendered. Arguments to the jury are based upon the facts established or disputed in evidence at the trial of a cause, and upon matter of common knowledge of which the court or jury may take judicial cognizance. It is not strictly limited to the facts, however, counsel having the right to instruct the jury as to the law applicable to the facts presented by him. Arguments addressed to the court may be based either upon the facts before it or upon the law. The time to be devoted to the argument, its scope, and order are subject to the discretionary control of the court. It is the usual practice to permit the attorney for a plaintiff or appellant both to open and close the argument. If in the argument the attorney goes beyond proper comment upon the evidence, or indulges in abuse of a party or attorney in the case, or comments upon failure of a privileged witness to testify, or otherwise so conducts himself as unwarrantably to inflame or prejudice the minds of the jury, it may be ground for setting aside the verdict. See JURY and the authorities referred to under PRACTICE.

ARGUMENT (Lat. *argumentum*). In logic, either the ground or premise on which a conclusion is rested, and, more specifically, the minor premise (see LOGIC), or a whole syllogism. Popularly, it is applied to a series of arguments, or to a controversy. *Argumentum ad hominem* is an appeal to the known prepossessions or admissions of the persons addressed. For instance, an attempt may be made to silence an opponent, who has recently changed his mind, by saying: "Your well-known speech last winter leaves you the single course open of admitting that so-and-so is the case." *Argumentum ad rem* is an argument pertinent to the issue. *Argumentum e consensu gentium*, or *ad judicium*, is an appeal to the common belief of mankind. *Argumentum a tuto* rests upon the supposed safety or prudence of adopting a certain conclusion. *Argumentum ad populum* is an appeal to popular passions or prejudices. *Argumentum ad ignorantiam* is an artful attempt to establish a statement by showing that we do not know the truth of its opposite. *Argumentum ad verecundiam* is an appeal to a reverend authority. Lastly, the *argumentum a baculo* is the use of the cudgel or of a browbeating manner to settle a dispute. This form of argument is concise in its style and has quickly adjusted many controversies.

ARGUN, är-gōōn'. A river of Asia, which unites with the Shilka at Ust-Strielka, on the borders of Siberia and Manchuria, to form the Amur. It rises on the northern borders of Mongolia and has a generally easterly course of about 1100 miles, in the lower half of which it forms the boundary between Trans-Baikalia and Manchuria. Not far from the middle point of its course it flows through a considerable lake called Dalai-Nor. In its upper course it bears the name of Kerulen.

ARGUN KHAN, är-gōōn' kän. See MONGOL DYNASTIES.

AR'GUS (Lat. for Gk. Ἄργος, *Argos*). 1. The son of Zeus and Niobe. He was the mythical ancestor of the Argives, and founder of Argos, and was worshiped at his grave, near that city. He was said to have introduced agriculture from Libya. 2. Argus, surnamed Panoptes ('all-seeing'), had 100 eyes, some of which were always awake. For his watchfulness Hera chose him to guard Io (q.v.), who had been transformed into a cow. Hermes, sent by Zeus to steal the cow, killed Argus by stoning him, or, in the later version, charmed all his eyes to sleep and struck off his head. Hera used the eyes of Argus to decorate the peacock's tail. 3. Argus, the builder of the ship *Argo*. (See ARGONAUTS.) 4. Argus (Argos) is also the name of several Greek cities, of which the most celebrated was the historic capital of the Argolic plain. (See ARGOLIS.) In Homer, Argos denoted the kingdom of Agamemnon, the entire Peloponnesus, and even the whole of Greece. 5. Argus, the dog of Odysseus, who after 20 years recognized his master on his return, in spite of his disguise, and died of joy.

ARGUS, THE. See ALLEN, WILLIAM HENRY.

ARGUS PHEASANT, fĕz'ant. See PHEASANT.

ARGYLL, är-gīl', ARCHIBALD CAMPBELL, MARQUIS OF (1598–1661). A prominent Scottish nobleman. In his sixteenth year he saw service under his father, whom he succeeded, as eighth Earl, in 1638. Already he had given proofs of that strength of religious principle which marked his whole life, and of a perilous union of attachment to Charles I, and of faith in the principles against which the King made war. In the General Assembly at Glasgow, in November, 1638, he openly took the side of the Covenanters and thenceforth became recognized as their political head. In 1640 he commanded a military expedition through Badenoch, Athole, Mar, and Angus, for the purpose of enforcing subjection to the Scottish Parliament. The King, on his visit to Scotland in 1641, found it convenient to show peculiar favor to Argyll and created him a Marquis. On the breaking out of hostilities Argyll was still desirous for negotiation, but was finally compelled to take the field. In April, 1644, he dispersed the Royalist forces under the Marquis of Huntly in Aberdeenshire. He was less successful in withstanding the genius of Montrose, who, on Feb. 2, 1645, almost annihilated his army at Inverlochy. His estates had

suffered so much in the preceding year from the ravages of the brilliant Cavalier that a sum of public money was voted for his support. In August, 1646, he went to London, with Loudon and Dunfermline, to treat with the Parliament for a mitigation of the articles presented to the King. He was at the same time the bearer of a secret commission from the King to treat with the Duke of Richmond and the Marquis of Hertford on the propriety of a Scottish demonstration in favor of Charles. On the defeat of the "engagement" plan, to which he had been decidedly opposed, the government of Scotland devolved on Argyll and the other Presbyterian leaders. In the Parliament of February, 1649, Charles II was proclaimed King, and at Scone, on Jan. 1, 1651, Argyll put the crown on his head. At this time it was even said that the complaisant monarch intended to marry one of his daughters. As head of the committee of estates Argyll took vigorous measures to oppose Cromwell's invasion of Scotland, and still adhered to the King after the subjugation of the country. After the battle of Worcester he retired to Inverary, where he held out for a year against Cromwell's troops. Falling ill, he was taken prisoner by General Dean. He refused submission to the Protector, but made an engagement to live peaceably, which he strictly kept. On the Restoration he repaired to Whitehall, encouraged by a flattering letter from the King to his son. By order of Charles II he was committed to the Tower, and on Feb. 13, 1661, was brought before the Scottish Parliament on the charge of treason. He defended himself with spirit, but in vain; on the 27th of May he was executed at Edinburgh. Conflicting estimates of Argyll's character have been written; cowardice in the field has been proved against him, and Scott places him in an unfavorable light in his *Legend of Montrose*.

ARGYLL, Archibald Campbell, ninth Earl of (?–1685). Eldest son of the preceding. He was early distinguished by personal accomplishments and exhibited great bravery on the disastrous day of Dunbar, where he commanded a regiment on the Royalist side. After Worcester, he continued, like his father, in arms, and made himself so obnoxious to the Parliamentary leaders that he was specially excepted by Cromwell from the Act of Grace in 1654. After much harassing persecution he submitted to the Parliament but continued to be closely watched. On the restoration of Charles II he was received into high favor (as a balance to the execution of his father), and, unfortunately for his own fame, participated in some of the iniquitous acts of the Scottish Legislature. He had, however, numerous and active enemies; and, on the ground of an intercepted letter, in which he had complained of neglect, he was tried and condemned to death by the Scottish Parliament for the imaginary crime of *læsa majestas*. The influence of Clarendon restored him to liberty and favor; even the King himself was prejudiced in his favor, but in taking the test oath framed by the Scottish Parliament in 1681, his added reservation, "So far as consistent with the Protestant faith," was declared treasonable, and he was again condemned to death. The devotion of his wife enabled him to escape from Edinburgh Castle in the disguise of a page, and, after remaining concealed some time, he fled to Holland. On the accession of James II he landed in the north of Scotland, in May, 1685, with an armed force, to coöperate in the revolt of Monmouth, but after a series of misfortunes, was taken prisoner, hastily condemned, and beheaded, June 30, 1685. His son Archibald, one of the deputation sent by the Scottish Convention to present the crown to the Prince of Orange, was in 1701 created Duke of Argyll. Consult John Willcock, *A Scots Earl in Covenanting Times; Being the Life and Times of Archibald Campbell, Ninth Earl of Argyll* (Edinburgh, 1908).

ARGYLL, George John Douglas Campbell, eighth Duke of (1823–1900). He succeeded his father in 1847. At the age of 19, while Marquis of Lorne, he wrote a pamphlet entitled *A Letter to the Peers from a Peer's Son*, on the struggle which ended in the disruption of the Scottish Church. In 1848 he published an essay on presbytery, which contains an historical vindication of the Presbyterian system. On the formation of the coalition ministry by Lord Aberdeen he was invested with the office of Lord Privy Seal, which he continued to hold in Lord Palmerston's administration. In 1855 he relinquished his office and became Postmaster-General. In 1859, on Palmerston's return, he again accepted office. He was Secretary of State for India under Mr. Gladstone in 1868–74, and Lord Privy Seal in 1880–81; he resigned office in 1881, disapproving of the Irish Land Bill. In 1874 he had supported the abolition of patronage in the Church of Scotland. In 1854 he was chosen Lord Rector of the University of Glasgow; in 1855 presided at a meeting of the British Association in that city, and in 1861 was elected president of the Royal Society of Edinburgh. He was hereditary master of the Queen's household in Scotland, Chancellor of the University of St. Andrews, a trustee of the British Museum, also hereditary sheriff and Lord Lieutenant of Argyllshire. Besides numerous papers on zoölogy, geology, etc., he wrote *The Reign of Law* (1866); *Primeval Man* (1869); *A History of the Antiquities of Iona* (1871); *The Unity of Nature* (1884); a volume of poems, *The Burdens of Belief* (1894); and *Organic Evolution* (1898). Though Argyll is best known by *The Reign of Law*, which has become a classic in the defense of theism, all his work shows very great ability. He was also one of the most finished orators of his time. His autobiography has been edited by his widow (2 vols., London and New York, 1906).

ARGYLL, John Campbell, second Duke of (1678–1743). A Scottish general and statesman. He was the son of the first duke, and took an important part in the political and military affairs of his time. As royal commissioner in 1705, he had a principal share in bringing about the union of England and Scotland. As a soldier he distinguished himself under Marlborough at Ramillies, Oudenarde, Lille, Ghent, and Malplaquet. Previous to the change of ministry in 1710, Argyll had been a strong Whig. He now joined the Tories in opposing the Duke of Marlborough. As a reward he was appointed by the Tories generalissimo of the British army in Spain; but, considering himself to have been slighted by the ministry, he soon after returned, and finding his influence greatly diminished, he again became a Whig. His career up to the rebellion of 1715 was tortuous, and seriously detracts from his meritorious services during that critical period. He was, however, placed in command of the King's forces in Scotland and was completely successful in quelling the Jaco-

bite rising. His services were rewarded in 1718 with an English peerage and the title of Duke of Greenwich. In 1721 he again played into the hands of the Tories, for the purpose of securing the entire patronage of Scotland. He was made a field marshal in 1735. In 1737 he rose into immense popularity in his own country by his spirited defense before Parliament of the city of Edinburgh in regard to the Porteous mob. Pride and passion rather than ambition were the motives which chiefly controlled him. He was endowed with remarkable oratorical gifts, but the shiftiness of his policy prevented him from ever attaining a place commensurate with his seeming abilities. He was noted for his kindness and courtesy in private life. The benevolence of his disposition procured him the title of "the Good Duke of Argyll." Compare the flattering description of him in Scott's *Heart of Midlothian*. Consult also his *Life*, by Robert Campbell (1745).

ARGYLL, John Douglas Sutherland Campbell, ninth Duke of (1845–1914). An English statesman and author. He was born in London, and was educated at Eton, St. Andrews University, and Trinity College, Cambridge. He was returned to Parliament as a Liberal from Argyllshire, which he represented from 1868 to 1878. In 1871 he married Louise, fourth daughter of Queen Victoria. From 1878 to 1883, as Marquis of Lorne, he was Governor-General of Canada, his administration being markedly popular and successful. In 1895 he was returned to Parliament from South Manchester. He succeeded to the dukedom of Argyll in 1900. He published *A Trip to the Tropics* (1867); *Guido and Lita* (1875); *The Psalms Literally Rendered in Verse* (1877); *Imperial Federation* (1885); *Canadian Pictures* (1885); *Queen Victoria, Her Life and Empire* (2d ed., 1909); *Passages from the Past* (1908); *Yesterday and Today in Canada* (1910).

ARGYLL AND THE ISLES, James Robert Alexander Chinnery-Haldane, Lord Bishop of (1842–1906). A Scottish prelate. He was educated at Trinity College, Cambridge, took orders in 1866, and was curate of All Saints, Edinburgh, from 1869 to 1876. From 1876 to 1895 he was rector of Nether Lochaber, and in 1881–83 was Dean of Argyll and the Isles. In 1883 he became bishop. Among his publications may be mentioned *The Scottish Communicant; The Communicant's Guide; Charges on the Holy Eucharist and Kindred Subjects* (1883–87).

ARGYLL/SHIRE (*Argyle*, Gael. *Airer-Gaedhel*, district of the Gaels). A county in the west midland division of Scotland, bounded on the north by Inverness-shire; on the east by Perthshire, Dumbartonshire, and the Firth of Clyde; on the south by the Irish Sea; and on the west by the Atlantic Ocean (Map: Scotland, C 3). Its greatest length is about 115 miles; greatest breadth, about 55 miles; its extent of coast line is very great, amounting to 2289 miles, owing to the indentation of the coast by the numerous lochs. It is second only to Inverness in size, with an area of 3232 square miles, of which 616 are occupied by numerous islands. The chief of these are Jura, Mull, Islay, Tyree, Gigha, Coll, and Colonsay. The general aspect is wild and picturesque, marked by rugged and lofty mountains and deep inland bays. Some fertile valleys exist. Sheep raising is one of the chief industries. More sheep are pastured in Argyll than in any other county in Scotland, and nearly 1,000,000 acres are available for this purpose. Forests once partly covered the shire and abounded in game, and some of the lakes are famous for excellent fish. Quarrying and mining are also carried on. The chief towns and villages are Inverary, the capital, Campbelton, Oban, Dunoon, Lochgilphead, and Tarbert. Pop., 1801, 81,300; 1851, 89,300; 1891, 75,000; 1901, 73,642; 1911, 70,902, the decrease being due chiefly to emigration. Consult Campbell, *Records of Argyll* (Edinburgh, 1885).

ARGYRO-CASTRON, är'yē-rō'kȧs-trŏn. A town of Albania, in the vilayet of Janinà, on an affluent of the Viosa River, 90 miles southwest of Monastir. It has several mosques. Its population in the eighteenth century was above 20,000. A plague in 1814 was disastrous, and the inhabitants now number about 10,000.

ARGYROPULOS, är'gē-rō-pōō'lŏs, Johannes (c.1416–86). A Greek humanist, who contributed largely to the revival of Greek learning in the West. He was born at Constantinople, but went to Italy at an early age, by 1441, and in 1456 was called by Cosmo de' Medici to the chair of Greek and the Aristotelian philosophy at Florence. There his pupils included Lorenzo and Pietro de' Medici, Politianus, Reuchlin, and Acciaioli. In 1471 he removed to Rome, where he died. His chief works were Latin translations of the *Ethics*, *Politics*, *Œconomics*, *De Anima*, and *De Cœlo* of Aristotle, and a commentary on the *Ethics* of that philosopher.

ARIA, ä'rē-ȧ *or* ā'rĭ-a, or **AIR** (It. from Lat. *aer*, Eng. *air*, in the meaning style, manner; for similar development of meaning, cf. *modus*, mode, musical mode). An elaborate lyrical composition for a solo voice with accompaniment of the orchestra. Usually it is a number from an opera or an oratorio, but there exist also independent arias written for concert performance. Such are called *concert arias*. The difference between an aria and a ballad (q.v.) is that the former is always lyric, the singer expressing his emotions in the first person, whereas the latter is epic, the singer narrating in the third person. Broadly speaking, the aria differs from the song (lied) by the fact that it has orchestral accompaniment, while the song is written with accompaniment for a single instrument, usually the piano. In view of the enormous development of the modern song it can no longer be maintained that the aria is conceived along grander lines. Richard Strauss's *Cäcilie* is a "song" because it has piano accompaniment; but in grandeur of conception and intensity of utterance it surpasses many arias. In fact, the composer subsequently orchestrated it, and in this form it is one of the finest arias in the range of musical literature.

The form of the aria originated in Italy, and its development goes hand in hand with the evolution of the monodic style (see Monody) of the Italian opera. The earliest example of the so-called *aria grande* or *aria da capo* is found in the opera *Gerusalemme liberata* (1686) by Pallavicini (q.v.). The form is binary; a first theme is followed by a second theme, after which the first theme is repeated; whence the term *aria da capo*. The whole is preceded by an orchestral introduction, called *ritornello*, which consists of the first theme. Alessandro Scarlatti (q.v.), to whom for a long time has been erroneously ascribed the invention of this form, uses it for the first time in his *Teodora* (1693). For the sake of contrast and better effect, how-

ever, he wrote the first theme as an allegro and the second as a slow movement, in which form the aria has become typical. In the course of the eighteenth century the last portions, especially the repetition, became more and more overloaded with meaningless ornamentation, the object of which was only to gratify the vanity of the singers in the exhibition of vocal feats. Before long the sole interest in opera was centred upon the aria, and both composers and audience lost all sense of dramatic truth. Thus the aria was the prime factor that caused the decadence and final disappearance of the operatic school known as that of the *bel canto*. From the middle of the eighteenth century on this form of the aria was designated as *aria di bravura*, or *aria di oloratura*. The true instinct of such masters as Gluck, Mozart, and Weber led them to reject all useless cadenzas, and especially the literal repetition of the first theme, as undramatic. Wagner rejected the entire form.

Aria da chiesa is an aria on a sacred text. It bears the same relation to the sacred song as the concert aria to the secular song. In the *aria parlante* the flowing melody is mingled with a more declamatory style approaching the recitative. An *arietta* is an aria on a smaller scale, often without a contrasting second theme, even with only piano accompaniment. An *arioso* is a recitative occasionally interrupted by real melodic outbursts. It is frequently synonymous with *aria parlante*.

A'RIAD'NE (Gk. 'Αριάδνη). A daughter of Minos, King of Crete, by Pasiphaë. In the earliest form of the story Ariadne, while on her way to Athens with Theseus, was killed by Artemis (*Odyssey*, xi, 321 ff.). The more common version told how, when Theseus landed in Crete with the offerings for the Minotaur, Ariadne loved the youthful stranger and enabled him to slay the monster and escape from the labyrinth. Theseus secretly carried her with him from Crete, but abandoned her on the island of Naxos. The earlier writers seem to have attributed this desertion to the will of Dionysus, while later the faithlessness of Theseus was made prominent. Dionysus found the deserted Ariadne and made her his bride, placing her crown among the stars. Ariadne, as left forsaken by Theseus, and as found and married by Dionysus, has been a favorite subject with artists.

A'RIAL'DUS. A deacon of the Church of Milan, who flourished during the eleventh century and was called the Patarene, an opprobrious epithet, meaning 'the ragpicker,' because his followers assembled in the slum quarter of Milan, where the ragpickers lived. He led them in vigorous protest, even insurrections, against the marriages and incontinence of the clergy and in support of the strict enforcement of clerical celibacy. Although successively sanctioned by Popes Stephen IX (1057–58), Nicholas II (1059–61), and Alexander II (1061–73), he found little sympathy among his brethren, and used to complain that he could get only laymen to assist him in his agitation. Having at length succeeded in obtaining a papal bull of excommunication against the Archbishop of Milan (1065), a fierce tumult ensued in the city, whose inhabitants declared against Arialdus and his coadjutors, not because they opposed clerical marriages, but because they seemed to be bent on subjugating the Church of Milan to Rome. Arialdus now fled to the country, but, his hiding place being betrayed, he was conveyed captive to a desert isle in Lake Maggiore, where he was murdered by the emissaries of the Archbishop, and his remains thrown into the lake, June 28, 1065. He was afterward canonized by Pope Alexander II.

ARIANE, ä'rē-än'. One of Corneille's less excellent tragedies, composed in his period of decline, in 1672, and founded on Ariane's (Ariadne's) adventures after her unhappy marriage with Theseus.

A'RIANISM. See Arius.

ARIANO, ä'rē-ä'nō (anciently, Lat. *Arianum*). An episcopal city in the province of Avellino, south Italy, built on a rocky height of the Apennines, 17 miles east of Benevento (Map: Italy, K 6). In the limestone of the surrounding mountains caves have been hollowed out, in which many of the poorer people dwell. The region is fertile, and the chief manufacture is earthenware. Pop., 1881, 14,398; 1901, 17,650; 1911, 17,625.

A'RIANS. See Arius; Heresy; Heretics.

ARIAS, ä'rī-as, Benedictus, surnamed Montanus (1527–98). A Roman Catholic divine noted for his great linguistic attainments. He was born at Fregenal de la Sierra, Spain. He studied first at Seville and afterward at Alcalá de Henares, where he distinguished himself by the ardor he manifested in the acquisition of the Semitic Oriental languages. He next proceeded on a tour through Italy, France, Germany, England, and the Netherlands, in the course of which he obtained a knowledge of various modern tongues. He joined the knightly Order of St. James as a priest, and as theologue of Bishop Martin Perez Azala, of Segovia, attended the Council of Trent; but on his return home he resolved to retire into seclusion at Aracena and dedicate his whole time to literature. In 1568, however, Philip II persuaded him to repair to Antwerp and superintend the publication of the famous edition of the Polyglot Bible, executed in that city at the suggestion of the printer, Christopher Plantin. After four years' labor the work was issued under the title *Biblia Sacra, Hebraice, Chaldaice, Græce et Latine, Philippi II Regis Catholici Pietate et Studio ad Sacrisanctæ Ecclesiæ Usum. Chph. Plantinus excudebat* (8 vols., folio, Antwerp, 1569–73). Only 500 sets were printed, and the greater part of them were lost at sea, on their way to Spain. It was received with universal applause. The Jesuits, to whom Arias was sincerely and strenuously opposed, alone attempted to fasten the charge of heresy on the author because he had included so much rabbinical matter, and he made several journeys to Rome to clear himself of the accusation. Philip II rewarded him with a pension of 2000 ducats, besides bestowing on him various other emoluments—as court chaplain and librarian at the Escurial. He died at Seville in 1598. His literary works are very numerous. They relate principally to the Bible and to Jewish antiquities; but he also wrote numerous Latin poems and a history of nature. For his biography and portrait, consult *Memorias de la real Academia de la Historia*, vol. vii (Madrid, 1832), and Gorris, *Vie d'Arias Montano*, (Brussels, 1842).

ARICA, ä-rē'kä. A seaport town of north Chile, situated in the province of Tacna, about 40 miles by rail from Tacna, the capital of the province, and near the mouth of the Lluta (Map: Peru, C 7). It has a safe roadstead and is 2100 miles from Panama. This port is connected by

road and rail with the interior and is an outlet for Bolivian trade. It exports gold, copper, silver, tin, alpaca, wool, sulphur, saltpetre, and guano. The population, estimated at the time of the Spanish régime at 30,000, was, at the census of 1903, only 2877. An enumeration in 1909 returned 4300. Arica was discovered in 1579 by Sir Francis Drake. It has suffered considerably from earthquakes, that of 1868 being most destructive. During the war between Chile and Peru the town was bombarded by the Chilean forces and was transferred to Chile in 1883 along with the province of Tacna (q.v.). Consult Paz Soldan, *Historia de la guerra entre Perú y Chile.*

ARICHAT, ă'rĭ-shăt'. A seaport on Madame Island, Nova Scotia, the capital of Richmond County, on the Cape Breton Railroad. The town is the see of a Roman Catholic episcopate and, with West Arichat, numbers about 2500 inhabitants, engaged in fishing and canning and in commerce in agricultural products. The harbor accommodates the largest vessels. The United States is represented by a consular agent.

ARICI, ä-rē'chē, CESARE (1782–1836). An Italian poet born at Brescia. He studied at Milan and was secretary of the departmental court at Brescia under Bonaparte. He was appointed professor of eloquence in the lyceum at Brescia in 1810, subsequently professor of history and literature and in 1824 professor of the Latin language. His principal work is the didactic poem *La coltivazione degli olivi* (1808), which won for him an important place in Italian literature. He also wrote another didactic poem, *La pastorizia* (1814), and some shorter poems, such as *Il campo santo di Brescia*, and made a translation of the *Bucolics* and *Æneid* of Vergil.

ARI'CIA. One of the oldest towns of Latium in Italy on the Appia Via (q.v.), at the foot of the Alban Mount, 16 miles from Rome, known now as Ariccia. As early as the time of the kings the city was of importance. In 338 B.C. it was conquered by C. Mænius and became a *civitas sine suffragio;* later, it became a *municipium* (q.v.). Near the town was a steep hill, often mentioned in Latin writers as the gathering place of beggars, who bothered the occupants of the carriages as they crawled up the hill. Near the town lay Lake Nemi.

ARICINI. The people of Aricia.

AR'ID RE'GIONS. See DESERT.

ARIEGE, ä'rē-ăzh'. A border department of France lying along the northern slopes of the Pyrenees (Map: France, S., F 5). In the south several peaks rise to a height of nearly two miles, and their summits are perpetually snow-clad, but the northern part of the department is a low fertile plain. The chief industries are grazing, agriculture, iron, copper, and lead mining, and the manufacture of woolens, linens, and pottery. Capital, Foix. Area, 1893 square miles. Pop., 1896, 219,641; 1911, 198,725. Consult H. L. Duclos, *Histoire des Ariégeois* (7 vols., Paris, 1881–87).

ARIEGE (anciently, Lat. *Aurigera,* gold-bearing). A tributary of the Garonne (q.v.) which rises in the Pyrenees, in southern France, and flows northward to join the Garonne above Toulouse. It is 95 miles long and of little commercial importance.

A'RIEL. 1. An Arabian antelope. (See GAZELLE.) 2. A toucan. See TOUCAN.

ARIEL. 1. The name given in the Revised Version of the Bible to the father of two Moabitish youths slain by Benaiah, one of David's "mighty men" (2 Sam. xxiii. 20). 2. One of a delegation sent by Ezra (Ezra viii. 16). 3. Jerusalem (Isa. xxix. 1, 2, 7). 4. In later Jewish angelology, the name of a water spirit. 5. A guardian of the waters in mediæval black art, several times introduced into English poetry. The character first appears in Shakespeare's *Tempest,* where he is described as an "ayrie sprite," Prospero's servant. In Milton's *Paradise Lost* he assumes the more grandiose proportions of a fallen angel. In Pope's *Rape of the Lock* he is a minute and invisible guardian of Belinda's head-dress.

ARIES, ā'rī-ēz. See BATTERING RAM.

ARIES (Lat. the Ram). One of the signs of the zodiac, including the first 30° of the ecliptic measured from the vernal equinox, or that point where the vernal passage of the sun across the equator takes place; its conventional symbol is ♈, representing the head of a ram. The vernal equinox, or, as it is also called, the first point of Aries, is constantly changing its position among the fixed stars, in consequence of the precession of the equinoxes, moving westward at the rate of 50".2 annually. It is from this circumstance that the sign Aries no longer corresponds with the constellation Aries, or the Ram, which was the case about 2000 years ago, when the ecliptic was divided into 12 equal parts called signs, each named after the group of stars through which it passed. The present sign Aries is in the constellation Pisces, about 30° west of the original sign; and although the sun when passing the vernal equinox will always be at the first point of the sign Aries, yet nearly 24,000 years will elapse before that point will again coincide with the beginning of the constellation Aries. See ECLIPTIC; PRECESSION; ZODIAC.

A'RIET'TA. See ARIA.

ARIKARA, ă-rē'kă-rā. A tribe of Caddoan stock now confederated with the Mandans and Hidatsa on the Fort Berthold Reservation in North Dakota and numbering about 400. They are a northern offshoot from the Pawnee (q.v.), of whose language their own is practically a dialect. About the year 1780 they occupied several villages some 500 miles lower down the Missouri River, but were driven out by the Sioux, since which time they have rapidly declined. Their tribal name, often abbreviated to Ree, seems to be from the same root as *Pawnee.* Consult Dorsey, *Traditions of the Arikara* (Washington, 1904).

AR'IL (LL. nom. pl. *arilli,* dry grapes; from Lat, *aridus,* dry). An extra investment of the seed, outside the ordinary testa. It may be a more or less complete investment and is often fleshy. For example, the aril of the yew (*Taxus*) is a beautiful, scarlet, fleshy cup, which gives the seed the appearance of a berry. See SEED.

AR'IMATHÆ'A (Gk. *'Αριμαθαία, Arimathaia*). The home of Joseph, the Jewish councilor who favored Jesus (Matt. xxvii. 57; Mark xv. 43; Luke xxiii. 51; John xix. 38). Its situation is not certainly known, but was probably the same as that of Ramathaim-zophim, or Ramah, the home of the prophet Samuel in the hill country of Ephraim (1 Sam. i. 1, with 19), the modern *er Râm,* about 19 miles northwest of Jerusalem.

ARI'MINUM. See RIMINI.

AR'INO'RI MO'RI. See MORI, ARINORI.

AR'IOBARZA'NES (Gk. *'Αριοβαρζάνης*). The name of satraps or kings of ancient Pontus. 1. Father of Mithradates I, who betrayed him to the Persian King about 400 B.C. 2. Son of Mithradates I, who reigned 363–337 B.C. In 362 he rebelled against Artaxerxes and became the founder of the kingdom of Pontus. 3. Son of Mithradates III, King of Pontus 266–240 B.C. He helped to call the Gauls into Asia. See GALATIA.

The name "Ariobarzanes" was borne also by rulers or kings of Cappadocia. 1. King from 93 to 63 B.C., though he was thrice expelled during that period by Mithradates the Great. He was finally restored by Pompey in 63. He was known as *Philoromœus*. 2. Son of the preceding, who abdicated in his favor shortly after his final restoration by Pompey. 3. Son and successor of the preceding, from 51 B.C. He assisted Pompey against Cæsar, but Cæsar pardoned him and enlarged his domain. He was put to death by Cassius in 41 B.C. He too was known as *Philoromœus* and as *Eusebes*.

ARIOCH, ā'rĭ-ŏk. King of Ellasar, according to Gen. xiv. He may be identical with Rim Sin, King of Larsa, a son of Kudur Mabuk, King of Elam at the time of Hammurabi (c.2124–2081 B.C.). As in the case of Chedor Laomer (q.v.), the name is compounded with that of an Elamitish divinity. According to an inscription (British Museum, 11,680) (ilu) Aku is identical with (Ilu) Sin, the moon-god. *Rim* may have been pronounced *riw*, and an *a* is often prefixed. Rim Sin was a younger brother of Arad Sin. The latter reigned as vassal king in Larsa under his father, Kudur Mabuk. It has been conjectured that Kudur Mabuk was succeeded by a king named Kudur Lagamar. But this king has not yet been found in any inscription. In Dan. ii. 14 Nebuchadnezzar's captain of the guard is named Arioch, which shows that in 165 B.C. the story in Gen. xiv. was already known. Arioch is an Elamitish king in league with Nebuchadnezzar in the story of Judith (i. 6). See Dhorme in *Revue Biblique*, 205 ff. (1908).

ARI'ON (Gk. *'Αρίων, Ariōn*). A celebrated lute player of Methymna, in Lesbos, who lived at the time of Periander, tyrant of Corinth. According to Herodotus (i, 23 ff.; see also Aulus Gellius, *Noctes Atticæ* xvi, 9), Arion, while dwelling at the court of Periander, paid a visit to Sicily and lower Italy. When on his way back by sea, the sailors of the vessel on which he had taken passage plotted to slay him and seize his possessions. Arion begged permission to try once more his skill in music and, having been allowed to do so, threw himself at the close of his strain into the sea. Several dolphins, charmed with the music, had assembled around the vessel, and on the back of one of these he was carried in safety to Greece. The sailors, on their return, were confronted with Arion and paid the penalty of their intended crime. Another account makes the rescue take place while Arion was on his way from Corinth to Methymna. In the days of Herodotus and Pausanias there existed at Tænarum, where Arion was said to have landed, a bronze monument, representing Arion riding on a dolphin, which was supposed to be a thank offering made by Arion to Poseidon. The lute and the dolphin were put among the constellations. Arion was regarded as the inventor of the dithyramb. He may have given it its artistic form, but even so much is doubtful. See DITHYRAMBUS.

ARION (Gk. *'Αρείων, Areiōn*). A marvelous horse, the offspring of Poseidon by either Demeter, Gæa, or a harpy, the mother having futilely changed herself into a mare to escape the sea god's addresses. Driven, at different times, by Copreus, Oncus, Hercules, and Adrastus, it yet possessed astounding evidences of its divine origin. It had full power of speech, and its right feet were those of a man.

ARIO'SO. See ARIA.

ARIOSTO, ăr-yōs'tō, LODOVICO (1474–1533). One of the most celebrated of Italian poets, the author of the *Orlando Furioso*, and, with Boiardo and Tasso, one of the trio who showed Italy how the material of the old chivalric romances might be remodeled and endowed with classic form and epic dignity. He was born Sept. 8, 1474, at Reggio, where his father was then military governor. Like Petrarch and Boccaccio before him, he was destined by his father for the law, but abandoned it after five years of half-hearted study. His father's early death (1500) transferred to Ariosto's shoulders the burden of a large family, with but a scanty inheritance; and in 1503 he was glad of the chance offered him to enter the service of Ippolito, the Cardinal d'Este, brother of the Duke of Ferrara. By this time he had already acquired a reputation for his verses, in both Latin and Italian; but his new position was far from favorable to poetic inspiration. The Cardinal, a rough, coarse-natured man, quite destitute of poetic feeling, kept Ariosto actively employed upon diplomatic errands to Rome or upon distant embassies, and on one occasion at least, sent him into active service against the Venetians. It was, however, during the 10 years that Ariosto spent in his service that the *Orlando Furioso* was written, and it was finished in the latter part of 1515 and published at Ferrara, 1516, in 40 cantos. Ostensibly it was a continuation of Boiardo's *Orlando Innamorato;* practically, it was a glorification of the House of Este, having for its real hero Ruggiero, the mythical founder of that house. In payment for this rather obvious flattery, the Cardinal is said to have rewarded him with a golden chain and the query, "Where had he got that rubbish?" and the following year, having incurred his patron's displeasure by a refusal to accompany him to Hungary, Ariosto passed into the service of his brother, the Duke of Ferrara. The Duke, scarcely more munificent than the Cardinal, bestowed upon him the governorship of the wild mountain district of Garfagnana (1522), overrun with bandits, which, with all his endeavors, he could not succeed in reducing to order. He was finally recalled by the Duke in 1525 and spent his remaining years in Ferrara, nominally in his patron's service, but in reality enjoying what he prized most highly—abundant leisure for prosecuting his studies, in the modest home which the Latin inscription over the door proudly states was bought from his own savings. This house is still carefully preserved by the authorities of Ferrara. He died in that city, June 6, 1533, and was buried there in the church of San Benedetto.

The manner in which the *Orlando Furioso* is engrafted upon Boiardo's earlier poem has been aptly compared to the connection between the *Iliad* of Homer and the *Æneid* of Vergil. Boiardo's poem was based upon the chivalric cycle which dealt with the wars between Charlemagne and the Saracens, confounded with those of

Charles Martel, in which Orlando, or Roland, stood forward as champion of Christendom. Orlando is Boiardo's hero, and falls in love with Angelica, a clever and beautiful Oriental princess sent by the Paynim to sow discord among the Christian knights. The story, left unfinished by Boiardo, is taken up by Ariosto, who makes Angelica fall in love with an obscure young squire, whereupon Orlando becomes insane. It is difficult, however, to disentangle the central argument of this poem from the mass of irrevelant episodes in which it is involved. The *Orlando Furioso* has long been numbered among the world's greatest epics, but it is utterly lacking in epic unity, and probably its nearest parallel is that pointed out by Richard Garnett—Ovid's *Metamorphoses*. In so far as it has a central theme at all, it is not the adventures of the knight who has given it his name, but Ruggiero's conversion from paganism, his union with Bradamant, and the incidental exaltation of the House of Este. Ariosto also left comedies, satires, sonnets, and a number of Latin poems. There are also extensive fragments of another epic, *Rinaldo Ardito*, which are attributed to him; but it is a question whether they are not rather the work of his son Virginio.

The first edition of the *Orlando Furioso*, in its present dimensions of 46 cantos, was published at Ferrara in 1532. Recent editions are those edited by Casella (Florence, 1877), and Papini (Florence, 1903), and an *édition de luxe*, with introduction by Carducci and illustrations by Doré (Milan, 1880). The latest edition of his lesser works, *Opere minori in verso e in prosa*, is that of Polidori (2 vols., Florence, 1894). The latest and most complete biographies are by A. Cappelli, in his collection of Ariosto's *Letters* (Milan, 1887); Giosuè Carducci, *Studi su Ludovico Ariosto e Torquato Tasso* (Bologna, 1905); and Gardner, *The King of Court Poets: Ludovico Ariosto* (New York, 1906). Of translations the following into English may be mentioned: by Sir John Harrington (London, 1591); John Hoole (London, 1783); and the much more spirited version of W. Stewart Rose (London, 1823). Consult De Sanctis, *Storia della Letteratura Italiana*, ed. by Benedetto Croce, vol. ii (Bari, 1912).

ARIOSTO OF THE NORTH. A title given to Sir Walter Scott, suggested by the legendary subject-matter and the romantic manner of treatment which the English and the Italian poet are alike in employing.

A'RIOVIS'TUS (OHG. *heri, hari*, Ger. *Heer*, army, and *furist*, Ger. *Fürst*, chief). A German chief. He was the leader of the Suevi and other German tribes, and was requested by the Sequani, a Gallic people, to assist them in a contest against the Ædui. Having gained a victory for the Sequani, Ariovistus was so well pleased with their country (now Burgundy) that he determined to abide there with his followers. Many other Germans followed him into Gaul, where he soon collected an army of 120,000 men. The Gallic people now turned for help to the Romans, and Cæsar demanded an interview with Ariovistus, who proudly replied that "he did not see what Cæsar had to do with Gaul." After another message from Cæsar had been treated in the same scornful manner, the Roman forces under Cæsar advanced and occupied Vesontio (now Besançon), the chief city of the Sequani. A furious engagement took place 58 B.C., in which Roman discipline prevailed over the German forces, which were utterly routed. Ariovistus, with only a few followers, escaped over the Rhine into his own country. His subsequent history is unknown. Consult Cæsar, *De Bello Gallico*, book i; T. Rice Holmes, *Cæsar's Conquest of Gaul* (2d ed., Oxford, 1911).

ARIPA, ä-rē'pa. A division of the Kalinga tribe which formerly lived near Tubang, Cagayan Province, Luzon. They have now lost their identity. See PHILIPPINES.

ARIS'TA. See GRAMINEÆ.

ARISTA, å-rēs'tå, MARIANO (1802–55). A Mexican general. He was in command of the Mexican Army of the North in 1846 and was badly defeated by General Taylor at Palo Alto (May 8) and Resaca de la Palma (May 9). He was Minister of War in 1848 and was elected President of Mexico in 1851, but resigned in 1853 to avert an impending revolution and was banished soon afterward. He died in Europe.

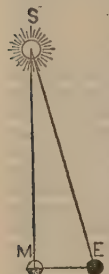
AR'ISTÆN'ETUS (Gk. *'Αριστaίνετος, Aristainetos*) (?–c.484 A.D.). A Greek epistolary writer. He is thought to be the author of two books of love stories in the form of letters (*'Επιστολαὶ 'Ερωτικαί, epistolai erōtikai*), imitations of Alciphron, and taken almost entirely from Plato, Lucian, Philostratus, and Plutarch. They have been edited by Boissonade (1822), and the text and a Latin version are contained in the Didot collection of the *Epistolographi Græci* (1873). Among English translations is that of Thomas Brown (1715). Aristænetus should not be confused with Aristænetus of Nicæa.

AR'ISTÆ'US (Gk. *'Αριστaῖος, Aristaios*). An ancient divinity whose worship in the earliest times seems to have been widely diffused throughout Greece, but who is known only in scattered and fragmentary traditions. According to the common tradition, he was the son of Apollo and Cyrene, the latter the granddaughter of Peneus, a river god of Thessaly. She is said to have given birth to Aristæus on the coast of Libya, in Africa, whence the region is alleged to have derived its name of Cyrenaica. Hermes placed the child in the care of the Horæ and Gæa (earth). Another version placed his birth in Thessaly and made him a pupil of Chiron the centaur. He appears at Thebes in Bœotia as son-in-law of Cadmus and father of Actæon (q.v.). Still another story brings him from Arcadia to the island of Ceos, where he was honored as having freed the island from the heat of the dog star by erecting an altar to Zeus Icmæus, the rainmaker, who rewarded this piety by sending the Etesian winds. Aristæus also appears in Corcyra, Eubœa, Sicily, and even Thrace, where he is one of a band of Dionysus. These stories are obviously not fragments of a connected narrative, but rather a number of local traditions connected with a divinity known as "the Good," whose very transparent name prevented his attaining the rank of a great god, though many of his activities are those attributed to Zeus and Apollo. He is connected with the life and interests of hunters and herdsmen, taught bee keeping, the care of the olive tree, and the spinning of wool, and introduced to Cyrene its valuable plant, silphium (asafœtida). In the fourth book of the *Georgics* Vergil describes how, when Aristæus lost all his bees, at the bidding of his mother he consulted Proteus (q.v.), to learn how he might replenish his stock. Proteus told him that Orpheus was angry with him, because

Eurydice had been slain by a snake while she was fleeing from Aristæus; he must therefore appease the nymphs by a sacrifice of cattle. He did so, and from the carcasses came forth bees. The telling of the Aristæus tale involves the recital by Vergil of the story of Orpheus and Eurydice. Ancient authorities say that, originally, his part of the *Georgics* contained the praises of Cornelius Gallus; but that when the latter lost the favor of Augustus, Vergil substituted the Aristæus story.

AR'ISTAG'ORAS (Gk. *Ἀρισταγόρας*) (?–497 B.C.). A tyrant of Miletus and brother-in-law of Histiæus. During the stay of Histiæus at the Persian court Aristagoras was made governor of Miletus, and in 500 B.C. made an unsuccessful attack on Naxos, which he had promised to subdue for the Persians. Fearful of the consequences of his failure, he induced the Ionian cities to revolt from Persia, and, after vainly applying to Sparta for aid, obtained troops and 20 ships from the Athenians. The allies captured and burned Sardis (499 B.C.), but were finally driven to the coast by the Persians, and Aristagoras, in despair, fled to Thrace, where he was slain by the Edonians. Consult G. B. Grundy, *Great Persian War* (London, 1901).

AR'ISTAR'CHUS (Gk. *Ἀρίσταρχος, Aristarchos*) OF SAMOS. A celebrated ancient astronomer of the Alexandrian school, who made his observations about 280–264 B.C. All his writings have perished, excepting a short essay on the sizes and distances of the sun and the moon. In this he shows the method of estimating the relative distances of the sun and moon from the earth, from the angle formed by the two bodies at the observer's eye when the moon's phase reaches exactly the first or third quarter, i.e., when we see a half moon. Remembering that the moon's light is simply reflected solar light, it is easy to see from the annexed figure that the three bodies must then form a right-angled triangle, with the moon at the right angle. The angle *MES* being then observed, we can readily calculate the ratio *EM* to *ES*. This is quite correct in theory; but the impossibility of determining when the moon is exactly half illuminated renders the method inaccurate in practice. Besides, in the days of Aristarchus there were no instruments for measuring angles with anything like accuracy. Aristarchus estimated the angle at *E* at 83° and determined *EM* to be one-twentieth of *ES*, the truth being that the angle at *E* differs only by a fraction of a minute from a right angle, and that *EM*, the distance of the moon from the earth, is about 1-400 of *ES*, the distance of the sun. According to some accounts, Aristarchus held, with the Pythagorean school, that the earth moves around the sun. Vitruvius speaks of Aristarchus as the inventor of a kind of concave sundial. His essay was first published in Latin by Valla (Venice, 1498), then in Greek and Latin by Wallis (Oxford, 1688), and it has since been republished. Consult Heath, *Aristarchus of Samos, the ancient Copernicus* (Oxford, 1913).



ARISTARCHUS OF SAMOTHRACE (c.220–145 B.C.). A Greek scholar. He was the pupil of Aristophanes of Byzantium, became tutor to the son of Ptolemy Philometor, and succeeded his master as head of the Alexandrian Library. He died in Cyprus. Aristarchus represents the highest attainments of philological criticism in antiquity, and his influence dominated all later workers. He put the study of grammar on a sound basis; he was one of the first to recognize definitely eight parts of speech. In grammar he was an analogist. (See ANOMALISTS AND ANALOGISTS.) He gave his attention chiefly to exegesis of the poets, particularly of the Homeric poems; his recension is the basis of our common text of Homer to-day. He wrote an enormous number of exegetical works—according to Suidas over 800—and many special treatises besides. Fragments of his comments are preserved, e.g., in the Venetian scholia to the *Iliad*. He founded a school of *Aristarcheans* at Alexandria, which continued to work on classical texts until after the beginning of the Empire. For an account of Aristarchus's Homeric studies, consult Lehrs, *De Aristarchi Studiis Homericis* (Königsberg, 1882). Consult also Sandys, *A History of Classical Scholarship*, i, 131–136 (Cambridge, 1906); Susemihl, *Geschichte der griechischen Litteratur in der Alexandrinerzeit* (Leipzig, 1891–92).

ARISTE, à'rēst'. A male character in Molière's *Les femmes savantes*, the common-sense brother of Chrysale. He befriends the lovers and, through his pardonable falsehood concerning Chrysale's financial loss, exposes the knavery of Trissotin.

ARIS'TEAS (Gk. *Ἀριστέας*). An officer at the court of Ptolemy Philadelphus. He is said to have been sent by the latter to Jerusalem in 273 B.C., where he obtained from the high priest Eleazar a genuine copy of the Pentateuch and a body of 72 elders who translated it into Greek in 72 days. All this is narrated in a letter by an Aristeas to his brother Philadelphus, but the writer probably belongs to a later time (200 B.C.). Consult: Hody, *De Bibliorum Textu Originali* (Oxford, 1705); Dale, *Dissertatio super Aristea* (Amsterdam, 1705); Schürer, *Geschichte des jüdischen Volkes*, ii, 819–824 (1886). See BIBLE, IV (A).

ARIS'TEAS (Gk. *Ἀριστέας*). A magician of antiquity who rose after his death, and whose soul left and reëntered his body according to its pleasure. (Consult especially Herodotus, iv, 13–15.) His earliest appearance is as the teacher of Homer. We also hear of him as having been born, at a period later than Homer, at Proconnesus, an island in the Propontis. He is said to have traveled through the countries north and east of the Euxine and to have visited the Arimaspi, the Cimmerii, the Hyperborei, and other mythical nations, and after his return and subsequent disappearance to have written an epic poem in three books, called *Arimaspia*, a composition belonging probably to the sixth century B.C. Aristeas is fabled to have entered a fuller's shop at Proconnesus and to have died there. Later a traveler appeared who said that he had met him on the road between Cyzicus and Artace. When the fuller's shop was entered, no body was found. It was seven years after this strange disappearance that he reappeared at Proconnesus and wrote the *Arimaspia*. He then vanished once more, to reappear for the second time 240 years later at Metapontum, in Italy. He advised the people of Metapontum to build an altar to Apollo, and by its side a statue of himself, saying that he

had been present, in the form of a raven, when the god founded the city. Herodotus declares that in his day there was in the Forum of Metapontum a statue of Aristeas beside an altar of Apollo. Later accounts tell other wonderful stories of Aristeas. Consult E. Rohde, *Der griechische Roman* (Leipzig, 1900).

ARISTIDES, ăr'ĭs-tī'dēz (Gk. *Ἀριστείδης, Aristeidēs*), called THE JUST (c.550–467 B.C.). An Athenian statesman. He was the son of Lysimachus and was descended from one of the best families in Athens. At the battle of Marathon (490 B.C.) he was one of the 10 Athenian generals who held command successively, each for a single day. In the following year he was chief archon. His policy in state politics was opposed to that of the other great statesman of his time, Themistocles, and the rivalry between these two became so pronounced that the Athenians, in order to obtain quiet, finally resorted to ostracism (q.v.). Aristides was banished, and retired to Ægina, Athens's bitter enemy, apparently in 484. The story is told that on the day of voting an ignorant citizen, personally unknown to the statesman, requested Aristides himself to write the name "Aristides" on the ostrakon. When Aristides asked him why he was voting so, he answered: "Because I am tired of hearing him always called *The Just.*" Four years later, when Xerxes invaded Greece, a general amnesty for all exiles was declared by Athens, and in consequence Aristides joined the Athenian fleet at Salamis and took a prominent part in the battle that followed. Being thus restored to favor, he was appointed commander of the Athenian troops that fought at Platæa in 479. In 477 he was joint commander with Cimon of the Athenian contingent in the combined Greek fleet which was engaged in driving the Persians from the Greek cities on the coast of the Ægean Sea. After the fall of Pausanias, he took the chief part in organizing the Delian League (see DELOS). It is said that after the battle of Platæa he carried through a law opening the archonship to the whole body of Athenian citizens. He died poor, in 467, leaving a son and two daughters. His body was carried from Pontus to Athens and buried at Phalerum, at the cost of the state. His life, by Plutarch, was well translated by B. Perrin, *Plutarch's Themistocles and Aristides* (New York, 1901).

ARISTIDES, ÆLIUS (129–189). A Greek rhetorician, surnamed Theodorus, son of Eudemon, a priest of Zeus, born at Hadrianoi in Mysia. He enjoyed the teaching of the most famous rhetoricians of his day, Aristocles in Pergamus and Herodes Atticus in Athens; in grammar and literature he was trained by Alexander of Cotyæum, whom he honored with a eulogy still extant. He traveled extensively in Egypt, Asia, Greece, and Italy, exhibiting his art as a speaker. While in Rome in 156 he was attacked by a severe illness, which troubled him 17 years with slight interruptions; yet he seems to have continued his vocation in spite of it. He stood in such favor with the Emperor Marcus Aurelius that he secured the rebuilding of Smyrna at the imperial expense after its destruction by an earthquake in 178. Ascribed to him we have two rhetorical treatises and 55 speeches, but it is not entirely certain that the treatises are from his hand. Of these some are eulogies on deities and cities (e.g., Rome and Smyrna), others declamations like his *Panathenaicus*, modeled on Isocrates's oration with the same title. Interesting also are the six *Sacred Speeches* (*Ἱεροὶ Λόγοι*) which report the suggestions made by Æsculapius through his priests for the rhetorician's recovery. All these writings were edited by Dindorf (3 vols., Leipzig, 1829). In style he was a strict Atticist, imitating successfully the best Attic writers. Consult Sandys, *A History of Classical Scholarship*, vol. i (Cambridge, 1906).

ARISTIDES OF THEBES. A Greek painter of the time of Apelles, about the middle of the fourth century B.C. He was a son and pupil of Nicomachus. He was noted for power of expression in his work, one of his finest pictures being that of a babe approaching the breast of its mother, who had been mortally wounded at the capture of a city, and whose face showed her fear lest the child should find blood instead of milk. His works were bought at enormous prices, and one of them was the first foreign painting ever exhibited to the public in Rome. He left two sons, Nicerus and Ariston, to whom he taught his art. See GREEK ART.

ARISTIDES, SAINT. A Greek Christian apologist, of the second century, who also taught rhetoric and philosophy. He dedicated to Antoninus Pius (138–61) an Apology for the Christian faith, which was highly esteemed by the early Church. This work was long lost, with the exception of a fragment discovered and published at Venice in 1878. Dr. J. R. Harris, however, found the complete Apology in 1889 in a Syriac version on Mount Sinai. It was inscribed to the Emperor Titus Hadrianus Antoninus Augustus Pius. For both Syrian text and translation, consult J. R. Harris, "The Apology of Aristides," in his *Text and Studies* (1891); R. Seeberg, "Die Apologie des Aristides undersucht und wiederhergestellt," in Zahn's *Forschungen zur Geschichte des neutestamentlichen Kanons*, v, 161–437 (1893).

ARISTIDES QUIN'TILIA'NUS (Gk. *Ἀριστείδης Κοϊντιλιανός, Aristeidēs Koïntilianos*). A Greek grammarian of about the third century A.D., and author of a treatise on music which is one of the most valuable of all ancient discussions of that subject. In the first part it treats of the principles of harmonics and rhythm, as laid down by Aristoxenus (q.v.), but later introduces the Neo-Platonic ideas of the moral effects of music and the connection between musical intervals and the harmony of the universe. It was originally edited by Meibomius (Amsterdam, 1652), and in 1882 by Jahn. Consult Cäsar, *Die Grundzüge der griechischen Rythmik im Anschluss an Aristeides* (Marburg, 1861), and T. D. Goodell, *Chapters on Greek Metric* (New York, 1902).

AR'ISTIP'PUS (Gk. *Ἀρίστιππος, Aristippos*). The founder of the Cyrenaic or Hedonistic school of philosophy. He was the son of Aristades of Cyrene, in Africa, and was born probably not long before 435 B.C. He was drawn to Athens by the fame of Socrates, whose pupil he remained until his master's condemnation and death, without, however, adopting fully his philosophy. After Socrates's death he lived in various cities, avoiding all hindering connections by becoming a citizen of no state, but having guest friends in many. We know that he sojourned some time in Ægina, in Corinth, where he was intimate with the famous courtesan Laïs, and especially at the Syracusan court. He must have spent considerable time also in his native Cyrene,

where he possessed property, for his philosophic school was there established. His master, Socrates, had taught that virtue and felicity together formed the highest aim of man; the latter Aristippus emphasized as a principle in itself, and declared that pleasure (*ἡδονή, hēdonē*) was the supreme good. To know how to select one's pleasures and to subordinate them to reason is to master the art of life. According to him, our sensations alone are the real bases of knowledge, and all that gives pleasant sensations must be good; virtue and all so-called moral obligations and limitations have no validity so far as they limit pleasure. In holding that our sensations are the only real bases of knowledge he agreed with Protagoras, who, perhaps, was one of his teachers. Yet Aristippus shows the influence of Socratic doctrine when he teaches that the wise man will wish to preserve the enjoyment he may secure by practicing self-control, judgment, and moderation, and for the same end will resist the mastery of the passions. Further, the greatest pleasure is to be found in the cultivation of the mind. For this teaching he has been not inaptly named a pseudo-Socratic.

Many anecdotes about Aristippus have come down from antiquity. They show him to have been a skillful man of the world, capable of adapting himself to the changes of fortune. Plato is reported to have said that Aristippus was the only man he knew who could wear with equal grace both fine clothes and rags. Diogenes Laërtius has preserved to us many of his *bonmots* and repartees. He apparently did not formulate a philosophy himself; the Cyrenaic system was probably worked out by Arete, his daughter, and by her son, Aristippus the younger. (See HEDONISM.) Aristippus's works have been lost; the five letters to which his name is attached are unquestionably spurious. Consult Zeller, *Geschichte der griechischen Philosophie* (Leipzig, 1893), and Ueberweg, *History of Philosophy*, Eng. trans. (New York, 1877).

ARISTIPPUS THE YOUNGER. A Greek philosopher, son of Arete, daughter of Aristippus. He was inducted by Arete into his grandfather's philosophy, and hence was known as Μητροδίδακτος, 'Mother-Taught.'

ARISTO, ȧ-rēs'tō. Sganarelle's brother in Molière's *Ecole des maris*.

AR'ISTOBU'LUS (Gk. Ἀριστόβουλος, *Aristoboulos*). An Alexandrian Jew who lived under Ptolemy VII, Philometor (181–145 B.C.). He was the author of a work on the Pentateuch, of which only fragments are preserved in Clement of Alexandria and in Eusebius. It was intended to show that Greek philosophers and poets had borrowed their views from the Pentateuch; and to support this theory numerous quotations were taken from works ascribed to Linus, Hesiod, Homer, and Orpheus, of which also Christian apologists made abundant use. Many scholars have questioned the genuineness of the work of Aristobulus. Among them are such men as Richard Simon, Humphrey Hody, Eichhorn, Grätz, Renan, Kuenen, Elter, Wendland, and Bousset. Their arguments have been based on the assumed familiarity with the Letter of Aristeas, the peculiar form of the quotations from Orpheus and others, and the supposed claim of Aristobulus to be the teacher of Ptolemy. The genuineness has been defended by Valckenaer, Gfrörer, Freudenthal, Clemen, Friedländer, Schlatter, and Schürer. It has been pointed out that Demetrius of Phalerum may have made suggestions to Ptolemy II during his coregency with his father, before the plot to place Eurydice's son on the throne led to the removal of Demetrius; that Aristobulus may have adopted in good faith the Orphic poems from some older work of a Jewish writer; that his address to Philometor resembles that of many a Christian apologist and does not imply a claim to be the King's teacher; and that there is no motive for a forgery, the author never concealing his Jewish character. The question is discussed at length and a full bibliography is given by Schürer, *Geschichte des jüdischen Volkes*, iii, pp. 512 ff. (4th ed., 1909).

ARISTOBULUS OF CASSANDREIA. A Greek historian, born in a city of Chalcidice, but afterward—later than 316 B.C.—a citizen of Cassandria. When 84, after 285 B.C., he wrote an historical work of unknown title on Alexander the Great, whom he accompanied on his Asiatic campaigns. This work was freely used by later authors, especially Arrian, Strabo, and Plutarch.

ARISTOBULUS I. A prince of Judæa, who succeeded his father, John Hyrcanus, as high priest in 104 B.C. His mother (or step-mother) had been given the royal office by the will of Hyrcanus, but the son deposed her and put her in prison, where she died of hunger, while he took the title of king, according to Josephus, in addition to the title of high priest which appears on his coins. Aristobulus had a decided leaning toward Hellenism, though, despite this fact, he remained Jewish in his feelings. He was disliked by the people for imprisoning his mother, and all his brothers, except Antigonus, whom he also, at a later period, is said to have murdered at the instigation of Queen Salome. Josephus declares that he conquered a large part of the Iturean country and compelled the inhabitants to accept Judaism. This would seem to imply that he also held possession of Galilee. He died in 103 B.C. of a malignant disease. Consult Wellhausen, *Israelitische und jüdische Geschichte*, pp. 274 f. (6th ed., 1907), and Schürer, *Geschichte des jüdischen Volkes*, pp. 256 ff. (3d ed., 1901). See MACCABEES.

ARISTOBULUS II (?–49 B.C.). A Jewish ruler and ecclesiastic, son of Alexander Jannæus (brother of Aristobulus I) and Salome Alexandra (widow of Aristobulus I), who succeeded in grasping the high-priestship and the royal authority from his elder brother, Hyrcanus II, to whom both belonged. Aristobulus maintained himself from 69 to 63 B.C., when Hyrcanus appealed to Pompey. After many intrigues and changes of front, Pompey finally took sides against Aristobulus, and, after reducing the extent of the Jewish possessions, placed Hyrcanus in charge as high priest, without the title of king. Aristobulus was taken as a prisoner of war to Rome. In 56 he escaped to Judæa and fought the Romans again. He was, however, defeated and again taken to Rome. He was released by Cæsar in 49, and sent by him with troops to Judæa, to agitate against Pompey, but in the same year he was poisoned by adherents of Pompey.

AR'ISTOC'RACY (Gk. ἀριστοκρατία, *aristokratia*, from ἄριστος, *aristos*, best + κράτος, *kratos*, power). A form of government in which the sovereign power is vested in a small number of citizens, as opposed to monarchy, in which

the supreme authority rests with one man, and to democracy, where the ultimate authority is exercised by the entire body of freemen. Etymologically, the term denotes the rule of the "best," used, however, in the sense of the Greek *aristos*, which connoted high birth and the possession of wealth, as well as personal excellence. In an aristocracy, however, though the power of government was wielded by a few, theoretically the administration of government was carried on for the welfare of the many. Whenever the interests of the commonwealth were made subservient to the interests of the rulers, aristocracy degenerated into *oligarchy*. To the Greek mind aristocracy appealed as the most acceptable form of government, in that it was free alike from the dangers of despotism and mob rule. Athens, before the period of the Persian wars, and Sparta, practically during the entire course of its history, were aristocracies in fact, since in both places the chief power was exercised by senates which represented only the noblest and wealthiest families of the state. The same was true of Rome for at least 250 years before the establishment of the Empire. As preëminence in rank became less closely associated with the ownership of land, there arose aristocracies of wealth as well as of birth, typified by ancient Carthage and modern Venice. In the Middle Ages there was no aristocracy, strictly speaking, for though political power reposed in the hands of a very small portion of the people, each feudal lord in his own domain was sole master. It was only with the rise of the modern state that an aristocracy again became possible. It appeared, however, in quite a different form from the ancient aristocracy and partook rather of the nature of a privileged social class. Where the sovereign power was vested in the king, as was the theory of monarchical government in early modern times, aristocracy referred rather to a monopoly of titles and offices than of actual political power. Still, the rule of powerful families was not rare in the history of Europe, especially at times when weak kings occupied the throne, as was the case with the Guises of France and the rulers of the house of Valois. In England the government, from the accession of the house of Hanover down through the eighteenth century, though parliamentary in form, was in fact an aristocracy, since king and Parliament alike were under the control of a few great Whig families. At present, however, though the aristocratic element is still strong in Great Britain and Germany so far as the enjoyment of public office is concerned, the term "aristocracy" has become almost entirely social in meaning, and is used loosely and in a great variety of combinations to denote a select few —as aristocracy of birth, of wealth, or of brains. See GOVERNMENT.

AR'ISTOGI'TON. See HARMODIUS AND ARISTOGITON.

AR'ISTOL. A light-brown, amorphous powder formed by the union of iodine and thymol. It contains 45.8 per cent of iodine. Chemically it is dithymol-diiodide. Insoluble in water and glycerin, it is freely soluble in ether and fatty oils, and slightly so in alcohol. Its action is similar to that of iodoform (q.v.), but it possesses the advantage of being odorless. Being an unstable compound, it cannot be mixed with substances which have a tendency to combine with iodine and so is best used alone. It is used as a substitute for iodoform, as a mild antiseptic, dusting powder or ointment in dressing wounds, and in various skin diseases.

ARISTOLOCHIA, ă-rĭs'tō-lō-kĭ'ă (Lat. from Gk. ἀριστολόχεια, *aristolocheia*, an herb promoting childbirth, like birth-wort, from ἄριστος, *aristos*, best + λοχεία, *locheia*, childbirth, childbed). A genus of plants of the family Aristolochiaceæ. This family consists of herbaceous plants or shrubs, often climbing shrubs, and includes more than 200 known species, chiefly natives of warm climates, and particularly abundant in the tropical regions of South America. Our wild gingers (*Asarum*) are herbs, but most of the representatives of the family are shrubby, some of them climbing to the summits of the loftiest trees. Several are found in the south of Europe; one only, the common birthwort (*Aristolochia clematitis*), occurs upon the Continent as far north as about lat. 50°, and is a doubtful native of England. It is a perennial plant, with erect, naked, striated stem, heart-shaped dark-green leaves on long stalks, the flowers stalked, and growing to the number of sometimes seven together, the tube of the perianth about one inch long, and of a greenish color. It grows chiefly in vineyards, hedges, about the borders of fields, among rubbish, and in waste places. It has a long branching root, with an unpleasant taste and smell, which, with the roots of *Aristolochia rotunda* and *Aristolochia longa*, two herbaceous species, natives of the south of Europe, was formerly much used in medicine, being regarded as of great service in cases of difficult parturition, whence the English name. These roots possess powerful stimulating properties, and those of the southern species are still used as emmenagogues. The root of *Aristolochia indica* is used in the same way by the Hindus. *Aristolochia serpentaria*, Virginia snakeroot, is a native of most parts of the United States, growing in woods. It has a flexuous stem, 8 to 15 inches high, bearing heart-shaped, very acute leaves. The flowers are on stalks, which rise from near the root; the orifice of the perianth is triangular. The root has a penetrating, resinous smell and a pungent, bitter taste. It has long been a fancied remedy for the bite of a rattlesnake. It possesses stimulant, tonic, and diaphoretic properties. It forms an article of export from the United States to Europe, being highly esteemed as a medicine in certain kinds of fever. Its reputation as a cure for serpent bites is shared by other species, natives of the warmer parts of America. Several South American species seem also to possess medicinal properties analogous to those of the Virginia snakeroot. *Aristolochia sipho* or *Aristolochia macrophylla*, a climbing shrub of 15 to 20 feet in height, a native of the southern parts of the Alleghany Mountains, is frequently planted in the United States, in Great Britain, and on the Continent of Europe, to form shady bowers. It has very large round or somewhat heart-shaped leaves (a foot in breadth), of a beautiful green. The flowers hang singly, or in pairs, on long stalks; the tube of the perianth is crooked in its upper part, inflated at the base, and lined with reddish-brown veins, having a sort of resemblance to the bowl of a tobacco pipe, for which reason the shrub is sometimes called pipe-shrub, pipe-vine, or Dutchman's pipe. *Aristolochia tomentosa* resembles *Aristolochia sipho*, except in being smaller, very hairy, and in having yellow flowers. The tropical species are distinguished for their beauty and the peculiar

forms of their flowers. Some of them are much-prized ornaments of our hothouses, *Aristolochia grandiflora* (*Aristolochia gigas* of Lindley), the goose flower or pelican flower of the West Indies, being one of the most important. Its name is derived from the fancied resemblance to the bird.

ARISTOMENES, ăr'ĭs-tŏm'ē-nēz (Gk. *Ἀριστομένης*). A Messenian general who commanded the army of his country against Sparta in the Second Messenian War, in the seventh century B.C. He upheld with success the Messenian cause for about 17 years, but was finally defeated and went, according to one story, to Rhodes, where his son-in-law was one of the reigning princes. Many heroic deeds are related of Aristomenes.

ARIS'TON. A Greek painter. See ARISTIDES OF THEBES.

ARISTON (Gk. *Ἀρίστων*), or **ARIS'TO OF CHIOS** (?–c.250 B.C.). A disciple of Zeno and afterward, according to Diogenes Laërtius, of the Platonist Polemo. He taught philosophy at Athens with great influence and distinction. Though a professed Stoic, he differed from Zeno in that he rejected all branches of philosophy except ethics and held that the moral improvement of men was the sole purpose of philosophy. He maintained that the supreme good consisted in *ἀδιαφορία, adiaphoria,* or entire indifference to everything except virtue and vice, and recognized only one virtue, which he called *ὑγίεια, hygicia,* or health of soul, and doubted the existence of God. Ariston was called Siren, from his eloquence, and Phalanthus, from his baldness. See Zeller, *The Stoics, Epicureans, and Sceptics* (Eng. trans., London, 1892).

ARISTOPHANES, ăr'ĭs-tŏf'a-nēz (Gk. *Ἀριστοφάνης*) (c.445–c.385 B.C.). The only writer of the old Greek comedy of whose plays any survives entire. He was the son of one Philippus and was born possibly in the deme of Cydathene. Tradition says he also had property in the island of Ægina, and was therefore sometimes called an Æginetan. That his education was of the best is shown by his intimate knowledge of Æschylus, Stesichorus, and Pindar. His genius was of the highest order, so that he maintained himself for over a generation as more than peer among the brilliant writers of comedy of his day. In politics he favored, with all the force of his impetuous nature, the aristocratic peace party; and in his hands, comedy, which had been given a political turn by his older contemporary, Cratinus, became in the first period of the Peloponnesian War a most effective weapon against the demagogues and their faction. In all his plays Aristophanes is a conservative, opposing all things that are new. His sharp wit and biting humor on at least two occasions stirred Cleon to bring suits against him.

Aristophanes' literary activity covered 40 years (427–388 B.C.), and his plays mirror the political and the social changes of the state. We can distinguish three periods: the first ends with 421, the second with 405, and the third with 388. In all we have 44 titles of plays ascribed to Aristophanes, of which four are considered spurious; from the 40 genuine plays 11 are preserved, of which five belong to the first period. Aristophanes' earliest play was *The Banqueters,* produced in 427, a satire on the new-fangled teachings of the Sophists as compared with the simple education of the fathers. *The Babylonians* (426) contained a sharp attack on the demagogue Cleon. Both these plays are lost. *The Acharnians* (425) won the first prize. It is a satire on the headstrong jingoes at Athens who are typified in the play by Lamachus, an Athenian general, one of the war party. The blessings of peace are exhibited by the good fortune of an old countryman, Dicæopolis, 'Righteous City' or 'Honest Policy,' who makes a private treaty with the Lacedæmonians for 30 years and thereby enjoys all blessings, in contrast with Lamachus, who comes to grief with his campaigning. *The Knights* (424) also won the first prize. This is the first play which Aristophanes brought out in his own name; of the three previous plays, *The Babylonians* and *The Acharnians* were produced under the name of Callistratus, *The Banqueters* under that of an actor, Philonides. In *The Knights* Aristophanes fulfills the promise which he made, in *The Acharnians* the year before, to cut Cleon into pieces. The demagogue is here represented as a vulgar, insolent charlatan; the people are represented in the person of a credulous and fickle old Demos, and the poet is thus able to show the weaknesses of the credulous and fickle mob that governed Athens. At the end Cleon is discomfited and old Demos has his youth renewed so that he clearly sees how he has been tricked. It is said that Aristophanes himself was obliged to take the part of Cleon, as no actor was willing to incur the enmity of the influential demagogue. *The Clouds* (423) was not so successful as the two previous plays. Its present form is a revision of the original. This comedy is a satire on the pretensions of the new Sophistical school and an attempt to point out its dangerous tendencies. Hence in this play Aristophanes returned to the theme he had handled in his first play, *The Banqueters.* Socrates is taken as the representative of the Sophistical school, whether because Aristophanes did not understand his teachings, or because he was a convenient butt, is uncertain. It represents a young Athenian, Phidippides, who is ruining his father by his spendthrift habits. So the old man sends him to the "thinking-shop" of Socrates, where he can learn to make the worse appear the better cause and so save his father by enabling him to escape the payment of his debts. The son, after some hesitation, reluctantly enters the school and learns his lesson all too well. A famous scene of *The Clouds* represents a dialogue between the Just and the Unjust Argument, in which the latter wins and obtains the mastery over the pupil. The youth returns to his home thoroughly trained in the new sophistic and, at a festival made by his father for his return, sings an immoral passage from Euripides, thrashes his father, and then justifies what he has done by the art he has just learned. His old father's eyes are now opened, and he takes vengeance on Socrates by setting his "thinking-shop" on fire. It is said that the reckless young Phidippides was intended to represent Alcibiades. *The Wasps* (q.v.) (422) is a ridicule of the regular courts of justice. *The Peace* (421) is a play in the interests of the truce between the Athenians and the Spartans consummated in this year. Peace is brought down from heaven and restored to earth. This play renews the discussion begun in *The Archarnians.*

Seven years passed before Aristophanes produced another play. In the meantime public measures had been taken to check political

satire, and *The Birds* (414) ridicules the Athenians' fondness for litigation and their flighty character. Two old men leave Athens in disgust and with the aid of the birds establish the city Cloud-cuckoo-town, in mid-air, shut off the gods from enjoying sacrifice, and win back the sceptre from Zeus. The whole play is very brilliant and clever; it contains some exceptionally beautiful lyrical passages. Some have wished to see in it a caricature of the Athenians' hopes of founding a great western empire in Sicily, and a satire on Alcibiades, an ardent imperialist. The *Lysistrata* (411) represents a woman's conspiracy to bring about peace; the play thus belongs with *The Acharnians* and *The Peace*. War between Athens and Sparta had been renewed three years after the Peace of Nicias. Lysistrata, 'Disbander of Armies,' persuades the matrons of Athens to desert their husbands and to refuse to return home till peace is again established. The *Thesmophoriazusæ*, produced three months after the preceding comedy, contains an attack on Euripides, whom the women, who are celebrating the Thesmophoria (see GREEK FESTIVALS), propose to punish for his hatred of them. *The Frogs* (405) is devoted to literary criticism. In the opening scenes Dionysus is on his way to Hades in search of a good poet, for Sophocles and Euripides have just died. The remainder of the play is given to the adventures of Dionysus in Hades, and the contest between Æschylus and Euripides for the seat of honor there, which Æschylus wins. The real subject is the decay of tragic art, for which Euripides is blamed. The *Ecclesiazusæ* (392 or 389 B.C.), or *The Women in Parliament*, is a satire on communistic ideas current at this time. The women disguised as men occupy the Pnyx (see ATHENS), and adopt a new thoroughgoing communistic constitution, in which the government of Athens is handed over to the women. In the *Plutus* (which failed in 408, but was revived in 388) the god of wealth has his sight restored to him, and thereafter confers his blessings only on the deserving. The play "is an allegory, a picture of society turned upside down by the redistribution of wealth."

It will be seen that in the extant plays there is a gradual change from political and personal satire to caricature of social conditions; furthermore, the local character of the earlier plays gives way in the later to a certain cosmopolitanism. These, therefore, form the transition to the middle and new comedy. Aristophanes, in the opinion of the ancients, held a middle place between his older contemporaries, Cratinus and Eupolis, combining the severe character of the one with the grace of the other. In wit, rollicking humor, invention, skill in the use of language and rhythm, he has never been surpassed. The text is best edited by Meineke (Leipzig, 1860), Blaydes (Halle, 1886), and Hall and Geldart (Oxford). The Scholia were published by G. Dindorf (Oxford, 1835), and by Dübner (Paris, 1842); those from the Ravenna MS. were edited by Rutherford (London, 1896). There are numerous commentated editions of single plays; J. Van Leeuwen has published an annotated edition of all the plays (Leyden, 1893–1905). English translations have been made by Mitchell, Frere, Rogers, Kennedy, Tyrrell, Murray, and Starkie. Consult J. Van Leeuwen, *Prolegomena ad Aristophanem* (Leyden, 1908), for a discussion of the life and writings of Aristophanes; M. Croiset, *Aristophanes and the Political Parties at Athens*, trans. by James Loeb (London, 1909); W. Süss, *Aristophanes und die Nachwelt* (Leipzig, 1911).

ARISTOPHANES OF BYZANTIUM (c.260–180 B.C.). A learned Greek grammarian, one of the foremost scholars of the ancient world. He was a pupil of Zenodotus at Alexandria, where he was subsequently instructor of the famous critic Aristarchus of Samothrace and director of the great library. He was the first to attempt a critical edition of the Homeric poems and made extensive study of Hesiod, Plato, Aristotle, Alcæus, Anacreon, Pindar, and the comic and the tragic poets. In his edition of Homer he differed much from Zenodotus, and showed scientific spirit by faithfully recording manuscript evidence, even where he rejected it. He introduced into the Greek language the use of accents, reduced punctuation to a system, and invented several new symbols for use in textual criticism. He wrote also an important lexicographical work, which showed a wide knowledge of dialects. Consult Sandys, *A History of Classical Scholarship*, i, 126–131 (Cambridge, 1906).

ARISTOPHANES' APOL'OGY. The sequel to Browning's *Balaustion's Adventure*, published in 1875. It is a long poem in blank verse, supposed to commemorate the defense made by Aristophanes for his comic art, on learning from the venerable Sophocles of the death of the tragedian Euripides.

AR'ISTOTE'LIA. See MAQUI.

AR'ISTOTLE (Gk. *'Αριστοτέλης, Aristotelēs*) (384–322 B.C.). A Greek philosopher, born at Stagira, a Greek town of the Chalcidice, on the Strymonic Gulf, the present Stavro. He came of a family in which the practice of medicine was hereditary, and his father, Nicomachus, was physician-in-ordinary to the Macedonian King, Amyntas II. From his father Aristotle undoubtedly inherited his love for natural science and through him came into relation with the royal house of Macedonia. Nicomachus died while Aristotle was still young; the son was brought up in Stagira by a family friend, Proxenus, of Atarneus in Mysia, whose memory he held so dear that in after life he erected a statue to him at Delphi and after his death educated and adopted his son Nicanor. Aristotle doubtless received the usual education enjoyed by the son of a well-to-do family and probably was trained also for his ancestral profession. When 17 years old, he went to Athens and associated himself with the Academy. But its head, Plato, was then absent on his second journey to Syracuse, where he acted as adviser to two despots in succession, Dionysius the elder and Dionysius the younger. Aristotle for a time devoted himself to rhetoric, under Isocrates, but, on Plato's return from Sicily, he forsook rhetoric and devoted himself to philosophy. For nearly 20 years he enjoyed the teaching of Plato and association with him; in spite of the different natures of master and pupil, the relation between the two was close. Plato is said to have called him the leader and the intellect of his school, and, because of his zeal, to have likened him to a colt that needs the bit more than the spur. During this period of discipleship Aristotle seems to have begun to lecture to small circles of listeners, chiefly on the subject of rhetoric; at the same time he trained himself to a high degree of perfection in the practice of

oratory. His superior genius was so well recognized by his contemporaries that his elders, like Heraclides Ponticus, who was Plato's representative in 361 B.C., were ready to yield to him, and younger men like Theophrastus were glad to be his followers. At Plato's death in 348–347 B.C., Speusippus became head of the Academy, and Aristotle had no longer any bonds to bind him to the school. He was now in his thirty-eighth year, had enjoyed long intimacy with the best thinkers in Greece, and had undoubtedly already developed to a considerable degree an independent philosophical position. With Xenocrates of Chalcedon, who likewise withdrew from his old associates, Aristotle went to Mysia, and presently accepted an invitation from a former fellow-pupil in the Academy, Hermeas, headman of Atarneus, to take up his residence with him. Here he remained three years, until Hermeas was, through treachery, captured by the Persians, and put to death by Artaxerxes III. Aristotle sought refuge in Mytilene, taking with him the niece and sister of Hermeas; he afterward married the latter, who died somewhat more than ten years later in Macedonia. On the basis of certain allusions in the opening of Isocrates' *Panathenaïcus* it has been conjectured that the following two years Aristotle spent again in Athens, teaching in company with others in the Lyceum; this conjecture, however, has a very uncertain basis.

During the many years spent at Athens and in Asia Minor Aristotle's hereditary relation with the Macedonian court seems to have been unbroken; for in 343–342 B.C., in response to a call from Philip to educate his son Alexander, then 14 years old, he removed with his family and Theophrastus to Pella, the Macedonian capital. He acted as tutor to Alexander for three years. The plan of the education attempted by him is unknown to us; but it is most probable that the philosopher added to the ordinary education of the day in rhetoric and philosophy some instruction in at least history, geography, and politics suited to a future ruler. How far his pupil absorbed teaching is also uncertain, although we know that his later plans for conquest were in opposition to Aristotle's views. Yet Aristotle was held in high esteem by both Philip and Alexander; during his residence at court he was able to obtain the restoration, at the public expense, of his native city, which had suffered severely in 348 B.C. when Philip conquered the district about the Strymon; later he was able to secure from Alexander protection for Eresus, in Lesbos, the home of his friend Theophrastus. The greatest favors he received, however, were in the way of support and material for his scientific investigations; and his years of residence at the Macedonian court, where he could observe at close range the rule of an aggressive monarch, must have been of the greatest importance in developing his political ideas.

After Alexander mounted the throne and undertook his Eastern conquests, Aristotle returned to Athens in his fiftieth year, to carry out a plan, no doubt long cherished, of opening a school of his own. This he established in the Lyceum, in a building called "The Walk" (*περίπατος*), where he lectured. We have a tradition, doubted by some, that he gave two kinds of instruction: in the morning to a narrow circle of advanced pupils (his esoteric doctrine), and, in the evening, more popular lectures (exoteric teaching) to a larger body of listeners. The name "Peripatetic," applied to the school and its philosophy, cannot be traced back of 200 B.C. Of the equipment of the school, in books and material, we know nothing. Aristotle continued to teach for 12 years, until Alexander's death, in 323 B.C., which led to a reaction at Athens against Macedonia, made his position in Athens dangerous. He was charged with impiety, but fled to Chalcis, as he said, to save the Athenians from a second sin against philosophy. Here he died. Theophrastus and Eudemus were his immediate successors in the leadership of the school.

Aristotle left behind him an enormous number of writings. Diogenes Laërtius, of uncertain date, gives us a list of 46 works. This probably represents the works bearing Aristotle's name in the Alexandrian Library. A list dating from the time of Cicero makes the total much larger. An ancient tradition, given by Strabo (xiii, 1), says that Theophrastus, at his death, bequeathed his library, including of course the works of Aristotle, to a certain Neleus of Scepsis. His descendants buried the books to save them from the rapacity of the Attalids, who were eager to enrich the Pergamene Library by every possible means. About 100 B.C. the buried collection, naturally much injured by damp and worms, was discovered by Apellicon of Teos, a learned bibliophile, who brought it to Athens. When Sulla captured the city, 86 B.C., he took the books to Rome, where their value was recognized by the grammarian Tyrannion, who had a catalogue prepared by the Peripatetic Andronicus—the longer list mentioned above—and about 50 B.C. published the works thus recovered. Our present recension undoubtedly goes back to this edition, although it is more immediately related to a recension prepared toward the end of antiquity which embraced a number of spurious writings. The later Peripatetics divided the complete works of their master into two classes; exoteric dialogues intended for the public, and acroamatic pieces meant for the small circle of pupils. To these may be added as a third class certain writings not intended for publication, the hypomnematic works consisting of memoranda and collections on various topics. The exoteric dialogues were well known and much admired in antiquity, but only bare fragments have come down to us. These dialogues did not possess the dramatic character of Plato's works; in place of question and answer they had long discourses, such as we find in the philosophical writings of Cicero, who chose Aristotle as his model. Among the titles of the exoteric dialogues known to us are *On the Immortality of the Soul, On Philosophy, On the Good, On Justice, On Friendship.* Certain titles, e.g., *Menexenus, Gryllus, Nerinthus, The Sophist,* remind us of Plato's dialogues. Aristotle carefully prepared these for publication and must have exhibited in them that perfection of style which caused Cicero to speak of the philosopher's language as a golden stream. The extant works show but little of this quality. These were never completely prepared and in many cases probably were never intended for publication by Aristotle, but were edited by Theophrastus, Eudemus, and the philosopher's son, Nicomachus. Many have the character of lecture notes, possibly those taken by pupils, and most have suffered from interpolations. A considerable number of the works to which his name is now attached are

spurious. The extant writings may be classed, according to their contents, under Logic, Metaphysics, Natural Science, Ethics and Politics, Rhetoric and Poetics.

The works on Logic were called by the later Peripatetics the *Organon*, 'The Instrument,' as they deal with the instrument and the method of investigation and discussion. They include the *Categories*, on the ten classes of predicates—substance, quantity, quality, etc.; *On Interpretation*, dealing with the proposition and its parts; *Analytica Priora*, in two books, on the syllogism; *Analytica Posteriora*, in two books, on the theory of knowledge and the scientific method; *Topica*, in eight books, on dialectics and reasoning from probabilities; and *Sophisms*, on the fallacies of the Sophists and their correction. Aristotle's claim that he was the first to work out a method of reasoning is sound, and formal logic has made little advance since his day; it has only added to his categorical syllogism (discussed in the *Analytica Priora*) the hypothetical and disjunctive forms, and has supplemented his three figures by a fourth.

The *Metaphysics*, in 13 books, was so called by later students, because in the ancient editions of Aristotle it followed the works on physics. The philosopher himself called it "First Philosophy" (*πρώτη φιλοσοφία*). It is in an unsatisfactory condition, consisting of one finished treatise and a number of shorter sketches hardly connected or fully worked out. It begins with a criticism of previous philosophical systems—the earliest history of philosophy—and then, after stating the philosophical questions preliminary to the examination, discusses the doctrine and the ultimate grounds of Being.

The works on Natural Science comprise the *Physics*, in eight books, treating of the general principles and relations of nature; four books *On the Heavens*, and two *On Beginning and Perishing*. The last treatise is important for a knowledge of Aristotelian philosophy. The *Meteorology* discusses the phenomena of the heavens. Natural History is handled in 10 books; with it are associated the following treatises: *Parts of Animals*, in four books; *Generation*, in five, and *Mode of Progression*, in one. To these must be added certain works of doubtful authenticity: *On Plants*, in two books, a retranslation from the Latin and probably the work of Nicolaüs of Damascus, who composed, under Augustus, a compendium of Aristotle's philosophy; *On the Cosmos*, certainly belonging to the Roman period; *On the Motion of Animals*, *On Breathing*, *On Colors of Plants and Animals*, all later than Aristotle. The treatise on *Physiognomy*, which was composed certainly as late as Hadrian's time, is based apparently on two lost works named in the ancient catalogues of the Aristotelian writings. The *Problems*, discussions chiefly of physical questions, is also drawn in part from the philosopher's work. The *Mechanics*, *Mirabiles Auscultationes*, and some other minor monographs falling within the same field are certainly spurious.

According to Aristotle's own view, psychology was inseparably connected with natural science. Under this head we possess his work *On the Soul*, in three books, and a large number of smaller treatises which are known as the *Parva Naturalia*.

Next must be named the works on Ethics and Politics, which Aristotle regarded as parts of the same subject. Under the former division there are extant three works: The *Nicomachean Ethics*, in 10 books, which takes its name from the philosopher's son, Nicomachus, to whom the work is dedicated and by whom it probably was edited. This is Aristotle's work. The *Eudemean Ethics*, in seven books, was prepared by Aristotle's pupil Eudemus on the basis of his master's lectures and the *Nicomachean Ethics*, with which it coincides in parts (in books iv–vi). The *Magna Moralia*, in two books, is a late work of the Peripatetic school, and nothing more than an abstract of the other works. In the *Nicomachean Ethics* Aristotle held that every action, every art and science, has some good as its aim; the chief aim of human action is happiness. The happy man is he whose activity is in harmony with virtue and who is adequately provided with external goods through all his life. Virtue is in all cases a mean between extremes. An essay *On Virtues and Vices* is also spurious. The *Politics*, in eight books, is closely connected with the *Ethics*. The work is incomplete but masterly, discussing the elements and the aims of the state, the forms of government, and the ideal state. The loss of the *Constitutions*, which treated of 158 states, is greatly to be regretted; but fortunately the greater part of the *Constitution of Athens*, which belonged to the larger work, was recovered, almost in its entirety, in 1885 from four papyrus rolls of the first century A.D., first published by Kenyon in 1891. This document is one of the most valuable for the history of Athens, and has at many points corrected and enlarged our previous knowledge. Aristotle's ideal was the small, autonomous, aristocratic city-state. The *Economics*, in three books, is the work of the later school.

In the field of Rhetoric and Poetics, Aristotle also made contributions of the highest value and permanence. His *Rhetoric*, in three books, treats of the relations of rhetoric to dialectic, the nature of the proof the orator may employ, the use of examples, and language and style. In this work also appear beginnings of formal grammar and its technical terms. The *Rhetoric* addressed to Alexander, which is catalogued with Aristotle's works, was written by Anaximenes. Of the *Poetics*, only the first book on tragedy and epic poetry is preserved, but this is of inestimable value for its analyses of the various kinds of poetry and its full treatment of tragedy.

From this enumeration of the most important extant writings of Aristotle, the universality of his studies is evident; and in every field enumerated his influence has been enormous. By him Logic, Grammar, Rhetoric, Literary Criticism, Politics, Psychology, Ethics, Natural History, Physiology, were raised to independent disciplines; he was the first to attempt a history of Philosophy and Government. This many-sided literary activity was the natural result of his method of working, proceeding from the individual to the general; and this method, which collects facts, compares, sifts, and groups them according to their relations, and thus obtains systematic knowledge of the subject in hand, has been most fruitful in the history of investigation of every sort, especially in the nineteenth century.

Aristotle's service lies in his analysis and clear distinction of ideas and in his studies in particular fields, rather than in the full development of a philosophy. Yet here he made important advances that have been influential down to the present day. According to him,

Being has four universal elements: Matter, form or essence, the efficient cause, and the final cause. These principles enter into the constitution of everything. Matter is mere potentiality, which through the supervention of Form becomes the Actual. By Form, Aristotle wished to replace the Platonic idea, which, he pointed out, cannot exist apart from the individual. Every change from potentiality to actuality is accomplished by an efficient cause which is working toward an end, the Final Cause. In the field of Ethics this final cause is man's *summum bonum*, happiness, which is defined to be the activity of the soul in accordance with virtue, but under favorable conditions. The problem of free-will Aristotle met by the statement that man has a potentiality in two opposite directions—for good or evil—which can be freely chosen; by consistently choosing one a man forms the habit of virtue or vice, and thus becomes either virtuous or vicious, as his choice determines. Virtue itself lies between the extremes of self-indulgence and asceticism.

The influence of Aristotle on human thought has continued unbroken to the present day. In the early centuries of our era his writings stimulated scientific inquiry; during the Middle Ages Latin translations from the Arabic versions guided the philosophy of the Western church, although the real nature of Aristotelianism was little understood. Arabian philosophy in the West during the eleventh and twelfth centuries was a combination of Aristotelianism with certain Neo-Platonic elements. With the revival of learning the originals of Aristotle's works became gradually known, and from them were drawn the means to combat the errors of scholasticism.

Learned comment on Aristotle began with the first century B.C., and during antiquity and the early mediæval period the amount of comment grew to be enormous. The standard edition of the works is still that by Bekker (5 vols., 1831–40). Vols. i and ii contain the Greek text; iii, the Latin translations; iv, scholia, edited by Brandis; v, the fragments, edited by Rose, and Bonitz's index. A new and complete edition of the ancient commentaries is being published by the Prussian Academy. Twenty-five volumes have already appeared. Of editions of single works, the following are valuable: Trendelenburg's *Psychology* (1877); Schwegler-Bonitz's *Metaphysics* (1848); Ramsauer's *Nicomachean Ethics* (1878); Stewart's *Notes on the Nicomachean Ethics* (Oxford, 1892); Susemihl's *Politics* (1879); Spengel's *Rhetoric* (1867); Vahlen's *Poetics* (1884); Butcher's *Poetics* (3d ed., London, 1902); Bywater's *Poetics* (Oxford, 1909); Cope and Sandys's *Rhetoric* (Cambridge, 1877); Sandys's *Constitution of Athens* (London, 1893); Wilamowitz's *Constitution of Athens* (Berlin, 1891). Useful English works of general import are Grote's *Aristotle* (1872); Grant's *Ethics of Aristotle* (London and Edinburgh, 1877); Bywater, *Ethics* (1890); Jowett, *Politics* (1885); Newman, *Politics* (1887); Wallace, *Psychology* (1884); Hammond, *Psychology* (1902); Zeller's *Aristotle and the Earlier Peripatetics* (London, 1897); Wallace, *Outlines of the Philosophy of Aristotle*. (Oxford, 1883); Navarre, *Essai sur la rhétorique grecque avant Aristote* (Paris, 1900). General bibliography by Schwab (Paris, 1896). For influence of Aristotle upon Arabic philosophy, see ARABIC LANGUAGE; AVERROËS.

AR'ISTOX'ENUS (Gk. *'Αριστόξενος, Aristoxenos*) (fourth century B.C.). The greatest student in Greek antiquity of the science of rhythm and music. He was a son of Spintharus and a native of Tarentum. He received his first instruction from his father, who had himself been a pupil of Socrates and was well versed in musical matters. He later studied music under Lamprus of Erythræ, and music and philosophy under the Pythagorean, Xenophilus of Chalcidice. He finally went to Athens and became the pupil of Aristotle. It is said that he expected, upon the death of Aristotle, to be appointed his successor, and was deeply chagrined when Theophrastus was made head of the school instead. He remained at Athens, however, and is said in the course of his life to have written 453 treatises on various subjects—musical, philosophical, and moral. His method was that of Aristotle: he based his conclusions on close observation of facts. One of his tenets was that the notes of the scale were to be judged entirely by the ear, and not, as the Pythagoreans held, by mathematical properties. He carried his musical theories into his inquiries into the nature of the soul, for he held that the soul was a sort of tuning of the body, and that from the nature and configuration of the body as a whole varied movements, i.e., life, resulted, much as harmony results in music. Only one of his works is extant—and this incomplete—*Elements of Harmony* (*'Αρμονικὰ Στοιχεῖα, Harmonika Stoicheia*) (Eng. trans. by Macran, Oxford, 1902). The best edition is by Marquard (Berlin, 1868). Consult: Westphal, *Melik und Rhythmik* (Leipzig, 1883, 1893); Laloy, *Aristoxène de Tarente et la musique l'antiquité* (Paris, 1904); T. D. Goodell, *Chapters on Greek Metric* (New York, 1902); Williams, *The Aristoxenian Theory of Musical Rhythm* (Cambridge, 1911).

ARISUGAWA, ä'rē-sōō-gä'wä. The name of a noble family in Japan whose members, besides showing marked ability, have been prominent in the rejuvenation of that ancient Empire. The house was founded by the seventh son of the Mikado Go-Yozei, who reigned from 1587 to 1611 and died in 1638. When in January, 1868, the Shogunate was abolished and the Emperor Mutsuhito was restored to undivided power, ARISUGAWA TARUHITO (1835–95), uncle of the Mikado by adoption and heir presumptive to the throne, became administrator and commander-in-chief of the army. He led the imperial troops against the rebels, saved Yeddo from destruction, and then directed the military operations in the north which brought the civil war to a happy conclusion (1869). In 1875 he was made President of the Senate, and in 1877 received supreme command of the forces, which suppressed the Satsuma rebellion led by Saigo Takamori, for which Arisugawa was decorated with the Order of the Chrysanthemum and made field marshal and junior Prime Minister. He devoted himself to the development of the military and naval forces of the Empire and was chief of the army staff in the war with China, in the course of which he died.—ARISUGAWA TAKEHITO (1862—), brother of the above, was adopted by him as his heir and was heir presumptive to the throne till the birth of a son to the Emperor in 1879. From that year to 1882 he was in the British navy. He commanded a cruiser in the war with China and became subsequently admiral superintendent of the naval base at Yokosuka. Before the outbreak of the

Russo-Japanese War he was made guardian of the person of the Crown Prince. As representative of the Emperor he was present at the marriage of the German Crown Prince at Berlin in 1905 and was subsequently received with marked honors in England, where he was entertained as a guest of Edward VII.

ARITA, ä'rē-tä. A town of Japan situated in the western part of Kiushiu, about 58 miles north of Nagasaki, with which it is connected by rail (Map: Japan, A 7). Kaolin is found in large quantities near Arita, and it is famous chiefly for its pottery works, established at the end of the sixteenth century. The porcelain of Arita used to be exported in large quantities to the Netherlands and is very highly valued. Pop., about 6000.

ARITH'METIC (Gk. *ἀριθμητική*, sc. *τέχνη*, *arithmētikē technē*, the art of reckoning, from *ἀριθμός*, *arithmos*, number). This primitive mathematical science involves three phases: the conception of number, the representation of numbers by symbols, and the principles and methods of computation. To these may be added the rules of ordinary business accounting, which have come to be considered part of the elements of the subject.

The Conception of Number. Kant advanced the idea that the number concept is derived from sequence in time, and accordingly Sir William Hamilton speaks of "the science of pure time." In recent years the Kantian idea has led to a revival, in teaching arithmetic, of the older methods, based on the cultivation of a sense for rhythmic repetition, i.e., on counting —number being regarded as a product of reflection, of an activity of the mind. On the contrary, the Pestalozzian method, which was generally employed until some years ago, followed the idea that perception alone forms the basis of all number work, and that the origin of the number concept is to be sought not in time, but in space. This principle has often been overworked. Some teachers have presented a variety of objects so systematically that the pupil learned to think of nine horses, nine feet, nine dollars, and was unable to think of the number nine without the aid of a group of objects. The reaction against the Pestalozzian plan has led teachers to lay greater emphasis on phenomena taking place successively in time; thus, to distinguish nine from six, the pupil is made to hear the clock strike the hours.

Representation of Numbers by Symbols. Aside from primitive number-pictures, such as the Egyptian hieroglyphics and the Babylonian cuneiform symbols, the ancients commonly used the letters of their alphabets to represent numbers—e.g., the α, β, γ, δ of the Greeks. Somewhat more refined is the system of the Romans, who used only a limited set of letters, combining these according to simple additive and subtractive principles. But even in the Roman notation no extended calculations were possible without the aid of some registering instrument; hence the early and extensive use of the abacus. (See CALCULATING MACHINES.) The notation in use at present, which consists in combining 10 digits according to a simple position-system, originated with the Hindus, was transmitted to the Arabs, and came to the knowledge of Europeans chiefly through the labors of Leonardo of Pisa, about 1200 A.D. This powerful system freed arithmetic from the reign of the abacus.

As to fractional numbers, the Ahmes papyrus, which is at least 36 centuries old, shows that the Egyptians had a knowledge of fractions at a very remote date. But while the concept and symbolism of the common fraction are thus very old, the decimal fraction, the decimal point, and other improvements in notation are comparatively recent, dating from the sixteenth and seventeenth centuries.

Besides the decimal scale, fractions have also been written on various other scales, such as the binary (scale of two), ternary (scale of three), . . . duodenary (scale of 12), and notably the sexagesimal (scale of 60) by the Egyptians and Babylonians. At present, the scale of 10 is generally recognized as the most convenient. The scale of 12, however, has the advantage of producing simpler fractional forms; e.g., on the scale of 10 the fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{8}$, are written, respectively, 0.333..., 0.25, 0.125; on the scale of 12 they are written, 0.4, 0.3, 0.16.

Arithmetic Computation. The methods of carrying out the basal operations of arithmetic have been considerably improved since the fifteenth century. The old "galley" method of division was replaced by the "Italian" method, the superiority of which may be seen from the following examples:

Galley.

97535399 ÷ 9876, carried for one figure only:

86
975
1620
97535399 | 9
9876

Italian.

32.92 ÷ 3.1416

3.1416) 32.9200 (10.48
31416
150400
125664
247360

Logarithms, the greatest arithmetical achievement of the seventeenth century, were introduced by Napier (q.v.) in 1614. Many changes for the better have also been made in the operations for finding the square root and in the algorisms of applied arithmetic.

As to improvements that may be expected to be introduced in the future, the "Italian" method of division seems destined to yield to the so-called "Austrian" algorism, which is represented by the following example:

Austrian.

32.92 ÷ 3.1416

10.48
31416) 329200
3142
150
126
24
24

Further, proportion, or the old "rule of three," will probably be replaced by the equation as such, and the same may be expected for unitary analysis.

Regarding the teaching of arithmetic, the student of pedagogy will look for information to the writers of the nineteenth century. The following may be recommended as valuable works on the history and pedagogy of the subject: Unger, *Die Methodik der praktischen Arithmetik*

in historischer Entwickelung (Leipzig, 1888); Kehr, *Geschichte der Methodik*, vol. iii (Gotha, 1888); W. Rein, A. Pickel, and E. Scheller, *Theorie und Praxis des Volksschulunterrichts nach Herbartischen Grundsätzen* (Leipzig, 1898); J. A. McLellan and J. Dewey, *Psychology of Number* (New York, 1895); D. E. Smith, *Teaching of Elementary Mathematics* (New York, 1900). Notable among higher arithmetics are: Tannery, *Leçons d'arithmétique théorique et pratique* (Paris, 1894), and W. W. Beman and D. E. Smith's *Higher Arithmetic* (Boston, 1897).

ARITHMET'ICAL PROGRES'SION. See SERIES.

AR'ITHMET'IC AND GE'OMET'RIC SIGNS. Arbitrary symbols used to indicate: (1) the nature of a magnitude, as $+ a$, a positive quantity, and $- a$, a negative quantity; (2) operations to be performed upon magnitudes, as $a \cdot b$, i.e., b multiplied by a; (3) relations between magnitudes, as $a > b$, i.e., a is greater than b. The following are a few signs in common use:

0, 1, 2, 3, 4, 5, 6, 7, 8, 9, are the Hindu numerals.

I, II, III, IV, V, VI, etc., are Roman numerals.

$+$ (plus); $-$ (minus); $\pm$ (plus or minus); $\times$ or (times or multiplied by); $\div$, / or the fraction bar (divided by); $=$ (equal to); $a \equiv b$ (a is identical with b); $a \equiv b \pmod{m}$ (a is congruent to b, modulo m); $a > b$ (a is greater than b); $a < b$ (a is less than b); $a \backsim b$ (a is similar to b); $a \propto b$ (a varies as b); ∞ (infinity); $a \doteq b$ (a approaches b as a limit); $\therefore$ (therefore); $\because$ (since); $|-a|$ (absolute value of $-a$); $\angle A$ (angle A); $\perp$ (perpendicular to); $\cong$ (congruent to, i.e., similar and equal); $\sqrt{\ }$ (root of); π (ratio of the circumference of a circle to its diameter); e (base of the hyperbolic logarithms).

ARITHMETIC COM'PLEMENT. The difference between a number and the next larger number representing a power of 10. Thus, the arithmetic complement of 7 is $10 - 7$, or 3; the arithmetic complement of 85 is $100 - 85$, or 15; that of 125 is $1000 - 125$, or 875. The arithmetic complement is much used in numerical calculations where differences are to be found. Since $a - b = a + (10^n - b) - 10^n$, it follows that instead of subtracting a number its arithmetic complement may be added, the corresponding power of 10 being then deducted. Thus, $456 - 273 = 456 + 727 - 1000 = 183$. The advantage consists in this, that since the arithmetic complement of a number is easily found by subtracting each digit from 9, except the unit's (which is taken from 10), it is often easier to add the arithmetic complement than to subtract the number. In working with logarithms arithmetic complements are often used instead of their numbers, under the name of co-logarithms. See LOGARITHM.

ARITHMETIC MEAN. See MEAN.

ARITHMETIC TRI'ANGLE. See PASCAL.

ARITH'MOGRAPH. See CALCULATING MACHINES.

ARITHMOM'ETER. See CALCULATING MACHINES.

ARI THORGILSSON, ä'rē thōr'gēl-sōn (1067–1148). The father of Icelandic literature. Little is known of his life. His *Islendingabók*, the first literary work of the island, was finished between 1134 and 1138, has now perished as a whole, but was apparently an account of the history of Iceland from its settlement, about 870, till 1120. See ICELANDIC LITERATURE.

ARI'US (c.256–336). The founder of Arianism, the doctrine that Christ was not of the same essence as God the Father, but was a creature, though the first and highest of creation. He was born in Libya, in north Africa, about 256. He went to Alexandria and there was made deacon and presbyter and was the highly esteemed pastor of a church called, from its shape, the Baucalis (the Greek name of a kind of vase). In 318 he denied the statement which Alexander of Alexandria made upon the Trinity: viz., that there was only a single essence. This he declared was Sabellianism. Defining his own position, he affirmed that if the Son were truly a son, there must have been a time when he was not. For this statement he was applauded by many, but Alexander called a council of 100 Egyptian and Libyan bishops, which condemned Arius and his allies and deposed them (321). The fight had now begun. Arius had numerous supporters, chief of whom was Eusebius, Bishop of Nicomedia. Alexander also rallied a large contingent and wrote numerous letters (two of which are still extant) exhorting the bishops not to receive the heretic. Notwithstanding this active canvass by Alexander, Eusebius of Nicomedia absolved Arius, who had retired to Palestine and then to Nicomedia, from the Alexandrian's condemnation, and had Arius's position approved by a synod held in 323, probably in Nicomedia. Arius wrote *The Banquet*, a work in prose and verse, of which fragments remain. It set forth his view of the person of Christ and put it in a form so that it could be sung to popular tunes. This is said to have aided his cause greatly. The strife attracted the attention of the Emperor Constantine, as it was troubling the peace of the Church. Constantine did not appreciate the importance of the doctrine involved and thought the controversy could be healed by mutual concessions. He empowered Hosius, Bishop of Cordova, who was his ecclesiastical adviser, to represent him in an effort at Alexandria to smooth matters over; but when Hosius reported failure, he took more active measures, and called a general Church council at Nicæa, in Bithynia (325), the first Œcumenical Council, at which the point raised by Arius was settled against him. This result was effected by the champion of Christ's divinity who then appeared—Athanasius, a young deacon of Alexandria, and spokesman for his bishop, Alexander. Three hundred and eighteen bishops, besides numerous other clergy of all grades, were present. Four parties were formed—the strict Arians, led by Arius himself (who was present), who contended that Christ was of different essence (*heteroousios*) from the Father; the strict Athanasians, who contended that he was of the same essence (*homoousios*); the party of Eusebius of Nicomedia; and that of Eusebius of Cæsarea. The creed of the Nicomedian Eusebians was essentially Arian and was rejected by the Council without debate; in fact, the document containing it was torn to shreds. The creed of the Cæsarean Eusebians, which was designed to be a compromise, was respectfully received, as it was an old Church one; but the steady persistence of the Athanasian party forced the Council to reject it and make a new deliverance, in which Arianism was unequivocally condemned. The upshot was that

Arius and his episcopal supporters were banished to Illyria, and his writings publicly burned and interdicted. This action did not, however, end Arianism; and as for Arius, the great influence of Eusebius of Nicomedia and of Constantia, the sister of Constantine, secured his recall in 331, and in a personal interview with the Emperor, Arius convinced him that his views were in substantial agreement with those of Athanasius.

In the confession of faith which he presented, he declared his belief that the Son was born of the Father before all ages, and that, as the "Word," he had made all things both in heaven and earth. The Emperor was satisfied, and sent orders to Athanasius, now Bishop of Alexandria, to receive Arius into the communion of the Church. This Athanasius refused to do, and a series of tumults was the consequence. Eusebius of Nicomedia was greatly incensed. He called a synod of bishops at Tyre, in 335, which proceeded to depose Athanasius. The Emperor was even prevailed on to remove the latter to Gaul, though he alleged as his reason that he wished to deliver him from the machinations of his enemies. In the same year another synod met at Jerusalem, which revoked the sentence of excommunication uttered against Arius and his friends. Still, the majority of the Christians of Alexandria clung to the doctrines of Athanasius, and resolutely resisted every effort to establish the new opinions among them. Disappointed in his expectations, Arius, in 336, proceeded to Constantinople, where he presented the Emperor with another apparently orthodox confession of faith; whereupon orders were issued to Alexander, Bishop of Constantinople, to administer to Arius the holy communion on the Sunday following. This was naturally considered a grand triumph by Eusebius and his friends; but on the Saturday preceding the day appointed for his restoration, Arius suddenly died of hemorrhage of the bowels.

Arius was exceedingly handsome; but the harassing cares of a life spent in a continual struggle with his adversaries are said to have given him a worn and haggard look. His manners were graceful and modest; he was noted for even an ascetic abstinence, and the purity of his moral character was never challenged by a single enemy.

After the death of Arius his followers rallied round Eusebius of Nicomedia, now Bishop of Constantinople (339), from whom they were styled Eusebians. The reconciliatory middle party of Eusebius of Cæsarea (d.340 A.D.), who wished to end the great controversy by abstaining from all strict dogmatic assertions on the matter, soon dwindled into insignificance between the two contending parties. Constans, who ruled the West after the death of Constantine (337), and Constantius, who ruled the East, made an essay toward reconciliation, but it failed at the Synod of Sardis (347), where the Occidental bishops gathered themselves round Athanasius in support of the *homoousian* doctrine (*identity* or *sameness of substance*), while in a separate council at Philippopolis, the Oriental bishops asserted the *homoiousian* doctrine (implying merely *similarity of substance*). Slight as might appear the verbal difference between the two parties, the bitterness of the controversy was intense and pervaded almost all departments of public and private life. Constantius having, by the death of Constans (350) and his victory over Magnentius (353), gained dominion over the West, the Arian cause, which he favored, triumphed at the Synod of Arelate or Arles (353) and at that of Milan (355). These victories, however, were more apparent than real. The Nicene doctrine had still strong support on its side and was strictly maintained by the banished Athanasius and his friends, while the Antinicæans, soon after their triumph, were divided into at least three parties. The old Arians, also styled Anomœoi, or Heterousians, asserted, in the boldest style, their doctrine of "distinct substances." The semi-Arians (a large majority in the Eastern church) maintained the *homoiousian* doctrine of similar substances. A third party held the same doctrine with some qualification. Morally, the victory was leaning to the side of the Nicæans. Julian the Apostate (361–363), in his hatred of the Christian religion, left all parties at liberty to contend as they pleased with one another, provided they did not interfere with his plans. Jovian and his successors in the West, Valentinian I and Gratian, extended full toleration to both parties. Arianism, at last, was virtually abolished in the Roman Empire, under Theodosius in the East (379–395), and Valentinian II in the West. Among the German nations, however, it continued to spread through missionary efforts. Bishop Ulfilas, the translator of the Bible into the Mœso-Gothic language, had been the means of converting the West Goths to Arian Christianity as early as 348, and they adhered to it until the Synod of Toledo in 589. The East Goths, Vandals, Burgundians, the Suevi in Spain, and the Longobards also adopted Arianism; but in all these instances the Nicene doctrine ultimately prevailed, most slowly among the Longobards, who retained the Arian creed until 662. The Arian controversy has never excited any great interest in modern times; yet among Englishmen John Milton was at least a semi-Arian, and it was revived for a time by the writings of the learned Dr. Samuel Clarke (1675–1729) and also by William Whiston (1667–1752). More recently, a part of the Arian doctrine, the denial of "the eternal sonship," was broached in the Wesleyan Methodist church by Dr. Adam Clarke (1762–1832) and a few followers; but it was soon suppressed by the conference. Pure Arianism has gradually lapsed into Unitarianism. Consult: H. Kölling, *Geschichte der arianischen Häresie von Nikäta* [325] *bis Konstantinopel* [381] (Gütersloh, 1875–83); J. Gummerus, *Die homöusianische Partei bis zum Tode des Konstantius* (Leipzig, 1900); Gwatkin, *Studies in Arianism* (Cambridge, 2d ed., 1900); Harnack, *History of Dogma* (Boston, 1895–97). See Athanasius; Christology.

AR'IZO'NA (probably from the Spanish words *arida zona*, arid zone, or, according to Mowry, from *arizuma*, meaning silver bearing). A State of the southwestern United States, bounded on the north by Utah, on the south by Mexico, on the east by New Mexico, and on the west by California and Nevada (Map: United States, west half, C 4). It lies between lat. 31° 20′ and 37° N. and long. 109° 3′ and 114° 54′ W. It is nearly 350 miles square and contains 113,956 square miles, only 116 of which are under water. Not considering the Territory of Alaska, it ranks fifth in area and forty-fifth in population, forty-sixth if the District of Columbia be taken into account.

Topography. The extension northwestward of the Mexican Cordilleras, which rises beyond

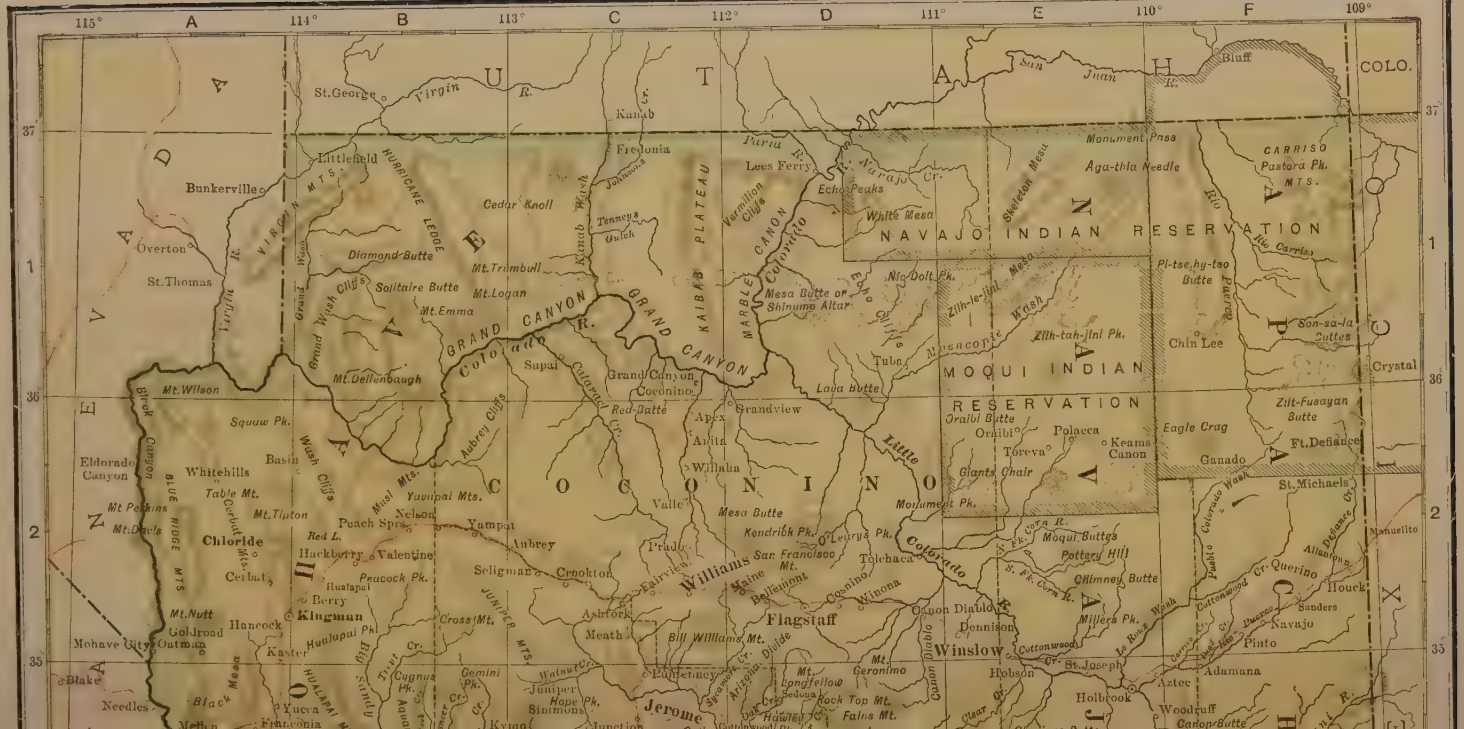
the Colorado River in the Sierra Nevada, divides Arizona diagonally into two regions—a southwestern part of low elevation and a northeastern part consisting of an elevated plateau. The whole State, however, is mountainous in the form of short, isolated ranges having a general northwest-southeast trend, which are abrupt sterile, and gashed by deep canyons and dry watercourses. In the south these mountains rarely reach 3000 feet in height, but in the central and northwestern elevations they are more continuous and lofty, many summits approaching 10,000 feet (Thomas Peak, 11,496; Ord Peak, 10,266; Bill Williams Mountain, 9264; Mount Logan, 7700; Mount Tipton, 7364; Mount Dellenbaugh, 6756, etc.). The highest mountains in the State are in the isolated San Francisco Range, of volcanic origin, in the northern central part, the apex of which reaches 12,794 feet. From these central elevations the State slopes rapidly away nearly to sea level in the Gila valley. The northern part of the State consists of a broken, canyon-cut, hill-studded, arid tableland, the average altitude of which is over 5000 feet above the sea, with many large areas from 6500 to 8000 feet. The few, and often intermittent rivers, which drain this arid region, serving more as the conduits of sudden rain storms than as living watercourses, run in narrow canyons, in some cases a mile or more deep. Evidences of volcanic activity are abundant. The Rio Colorado (see COLORADO RIVER) traversed the northwest corner of the State in such a canyon, and then, turning to the south, becomes the western boundary of Arizona to near its mouth. Its few tributaries, of which the Little Colorado in the north alone is important, reach the river through similar canyons. The whole scenery of this northwestern part of the State is that of a rough, rocky, dry region, interrupted by steep-sided gorges and scarp-fronted mesas and barren mountains, more or less covered with bunchgrass and scattered, stunted trees, and extensive lava flows near the Colorado Canyon. The southern part of the State is, on the whole, even more desert-like in appearance, and all the watercourses (most of which are dry except for a short time after rains) lead downward to the Gila, a broad, shallow river flowing into the Colorado near its mouth. The mountains here are mainly of volcanic origin. The only other rivers in Arizona worth mentioning are the Rio Santa Maria and Sandy, which unite in the central western region to form Bill Williams Fork, which enters the Rio Colorado near lat. 34° N., and the Virgin, in the extreme northwest corner of the State.

Climate and Soil. The climate of Arizona is, on the whole, dry and healthful, and it has the largest number of clear days of any part of the Union. The northern plateau region has a mean annual temperature of about 45° F., which is almost the same as that of many of the northern States, but without their extremes; the rainfall here is approximately 20 inches per annum among the mountains but much less on the plateau surface. In the lower lands of the southern half of the State the mean temperature is about that of New Orleans (69° F.) and the hottest weather occurs in the lower Gila valley where the mean temperature in July is 98° F. The rainfall, however, is much less than that in the northern section, scarcely exceeding an average of five inches per annum—the heaviest fall (about 13 inches) being in the district of Tucson. The soil varies from light loam to heavy, dense adobe. In many places along the rivers it is very productive when supplied with water. Elsewhere it is alkaline and lacking in nitrogen and humus matter. The flora and fauna are those of the region extending from southern California around to southwestern Texas. See ROCKY MOUNTAINS.

Geology. Northern Arizona consists of a vast series of Carboniferous and Mesozoic marine strata covered by a series of Tertiary lacustrine and terrestrial formations; in all, originally some 15,000 feet thick. A great uplift occurred during Eocene time, and subsequent erosion has carved the land surface into mesas and valleys. A second uplift with much volcanic action occurred about the close of Miocene time. In southern Arizona the changes were not so marked. The State has abundant deposits of valuable minerals, which are described in the paragraph on *Mining*. In Apache County, south of Adamana on the Santa Fe Railroad, are four fossil forests. Trunks of trees to the thickness of four feet are found completely silicified and cracked into blocks of beautiful coloring which are of great value for ornamental purposes. See FOSSIL FOREST.

Mining. The natural mineral resources of Arizona are probably surpassed by those of no other State of the Union. Until within a comparatively recent period, however, the difficulty of access and the lack of proper transportation facilities, combined with local causes, have hindered the development of this wealth. The rapid growth of the mining industry in the State indicates that these difficulties are being overcome.

As far back as the time of the Spanish explorers, it was known that copper existed in the region now included within the boundaries of Arizona, but the mining of this metal on a large scale dates only from the early eighties. Production has steadily increased, and in 1910 Arizona took from Montana the first place as a producer of copper ore. The growth of copper production is shown by the following figures: 1883, 23,874,963 pounds; 1899, 133,054,860 pounds; 1904, 191,602,958 pounds; 1910, 297,250,538 pounds; 1911, 303,202,532 pounds; and 1913, 414,593,000 pounds. The value of the product in the last-named year was about $64,000,000. Remarkable increase since 1909 is shown by the fact that the figures of the thirteenth census, which are for that year, show a value of the product of $34,614,116, or hardly more than half the value of the product of 1913. The larger part of the copper is mined in Cochise, Greenlee, Yavapai, Gila, and Pinal counties. The mines in Pinal, Gila, and Greenlee counties produced nearly 49 per cent of the total output in 1912, the output of Pinal County alone increasing 21,449,418 pounds in that year. In Cochise County is the Warren or Bisbee district. Greenlee County embraces the Copper Mountain and Greenlee districts of the Clifton-Morenci region. Yavapai County includes the Verde district with the famous United Verde mines, and Gila County includes the Globe district. In Gila and Pinal counties the low-grade, so called "porphyry" ores, which include deposits in schists, produced 76,748,299 pounds in 1912, compared with 30,636,515 pounds in 1911. There are about 10 copper-smelting plants in regular operation in the State. In 1909 there were 11,394 wage-earners in the copper mines.


115° A 114° B 113° C 112° D 111° E 110° F 109°
37
36
35
2
1
NEVADA
UTAH
COLO.
ARIZONA
St.George
Virgin R.
Littlefield
Bunkerville
Overton
St.Thomas
Virgin R.
Virgin Mts.
Hurricane Ledge
Grand Wash
Grand Wash Cliffs
Kanab
Fredonia
Johnsons
Cedar Knoll
Kanab Wash
Tanners Cutoff
Diamond Butte
Solitaire Butte
Mt.Trumbull
Mt.Logan
Mt.Emma
Mt.Dellenbaugh
Mt.Wilson
Squaw Pk.
Kaibab Plateau
Paria R.
Lees Ferry
Vermilion Cliffs
Marble Canon
Colorado R.
Echo Peaks
White Mesa
Navajo Cr.
Skeleton Mesa
Monument Pass
Aga-thla Needle
Carriso Pastora Pk. Mts.
Rio Carriso
Navajo Indian Reservation
Nit Dolt Pk.
Mesa Butte or Shinumo Altar
Maricopa Point
Zith-le-jinl Mesa
Pi-tse,hy-tso Butte
Moencopie Wash
Zith-tah-jinl Pk.
Chin Lee
Son-sa-la Buttes
Crystal
Moqui Indian Reservation
Oraibi Butte
Oraibi
Polacca
Keams Canon
Toreva
Giants Chair
Eagle Crag
Zilt-Fusayan Butte
Ft.Defiance
Ganado
St.Michaels
Grand Canyon R.
Grand Canyon
Coconino
Supai
Cataract Cr.
Red Butte
Lava Butte
Apex
Anita
Grandview
Aubrey Cliffs
Little Colorado R.
Coconino
Willaha
Valle
Mesa Butte
Kendrick Pk.
O'Leary Pk.
Moqui Buttes
Pottery Hill
Chimney Butte
Tolchaco
San Francisco Mt.
Maine Mt.
Bellemont
Flagstaff
Canon Diablo
Dennison
Winslow
Cottonwood
Hobson
St.Joseph
Adamana
Aztec
Holbrook
Woodruff
Canon Butte
Pinto
Navajo
Houck
Sanders
Querino Cr.
Chevelon Cr.
Pueblo Colorado Wash
Manuelito
Allantown
Defiance
Moencopie Wash
Colorado R.
Little Colorado R.
Monument Pk.
Painted Desert
Petrified Forest
Navajo Mts.
Yavapai Mts.
Peach Spgs.
Nelson
Yampai
Aubrey
Prado
Crookton
Seligman
Hackberry
Valentine
Red L.
Chloride
Cerbat Mts.
Cerbat
Table Mt.
Mt.Tipton
Mt.Perkins
Mt.Davis
Blue Ridge Mts.
Whitehills
Basin
Eldorado Canyon
Black Canon
Wash
Cataract Cr.
Aubrey Cliffs
Misi Mts.
Williams
Fairview
Junipine Mts.
Peacock Pk.
Hualapai
Hualapai Pk.
Berry
Klugman
Cross Mt.
Ashfork
Meath
Bill Williams Mt.
Mt.Nutt
Goldroad
Oatman
Mohave City
Hancock
Kaster
Hualapai Mts.
Trout Cr.
Cugnus Pk.
Gemini Pk.
Juniper
Hope Pk.
Simmons
Kyune
Jerome
Junction
Mingus Mt.
Cottonwood
Walnut Cr.
Squaw Cr.
Arizona Divide
Mt. Longfellow
Sedona
Rock Top Mt.
Palms Mt.
Mt. Geronimo
Canon Diablo
Clear Cr.
Blake
Needles
Black Mesa
Yucca
Francona
Mellen
Kingman Wash
Hualapai Mts.
Sitgreaves Pk.
Miller's Pk.
Le Bunn Wash
Cottonwood Cr.
Querino Cr.
Chevelon Cr.
Pueblo Colorado Wash
Allantown
Defiance
Manuelito
Houck
Sanders
Navajo
Pinto
Adamana
Aztec
Holbrook
Woodruff
Canon Butte
Petrified Forest
Painted Desert
Navajo Mts.
Carriso Pastora Pk. Mts.
Rio Carriso
Monument Pass
Aga-thla Needle
Skeleton Mesa
Echo Peaks
White Mesa
Navajo Cr.
Paria R.
Lees Ferry
Vermilion Cliffs
Marble Canon
Colorado R.
Kaibab Plateau
Grand Canyon
Grand Canyon R.
Colorado R.
Virgin R.
Virgin Mts.
Hurricane Ledge
Grand Wash
Grand Wash Cliffs
Kanab
Kanab Wash
Johnsons
Tanners Cutoff
Cedar Knoll
Diamond Butte
Solitaire Butte
Mt.Trumbull
Mt.Logan
Mt.Emma
Mt.Dellenbaugh
Mt.Wilson
Squaw Pk.
Black Canon
Wash
Aubrey Cliffs
Misi Mts.
Yavapai Mts.
Peach Spgs.
Nelson
Yampai
Aubrey
Prado
Crookton
Seligman
Hackberry
Valentine
Red L.
Chloride
Cerbat Mts.
Cerbat
Table Mt.
Mt.Tipton
Mt.Perkins
Mt.Davis
Blue Ridge Mts.
Whitehills
Basin
Eldorado Canyon

ARIZONA
SCALE OF STATUTE MILES
0 10 20 30 40 50 60 70 80
SCALE OF KILOMETERS
0 20 40 60 80 100 120 140
County Towns
Railroads
L.L. POATES, ENGR'G CO., N.Y.
A 114° B 113° C Longitude 112° West D from 111° Greenwich E 110° F 109°
34 33 32 31
CALIFORNIA
NEW MEXICO
YUMA
MARICOPA
PINAL
GILA
GRAHAM
GREENLEE
COCHISE
SANTA CRUZ
PIMA
MEXICO
Colorado R.
Gila R.
Salt R.
Williams Ft.
Parker
Riverside Mt.
COLORADO RIVER INDIAN RESERVATION
Ehrenberg
Quartzsite
Cibola
Yuma
Somerton
Adonde
Wellton
Dome
Gila R.
Agua Caliente
Palomas
Sentinel
Stanwix
Aztec
Mohawk
Mohawk Mt.
Painted Rock
Gila Bend
Bosque
Estrella
Picacho
Chimney Ph.
Ogilby
Castle Dome Mts.
Dome Rock Mts.
Chocolate Mts.
Eagle Tail Mts.
Big Cathedral Pk.
Castle Dome Pk.
Sentinel Mt.
Gila Bend Mts.
Gila Bend Res.
Maricopa Mts.
Sierra de la Cabeza Prieta
Mesa de Malpais
Sierra del Ajo
Quijotoa
Ben Nevis
Brownell
Silverbell
Vekol
Navisla
Toltec
Casa Grande
Picacho Pk.
Picacho
Desert Pk.
Wymola
Redrock
Oracle
Mammoth
Kelvin
Winkelman
Dudleyville
Florence
Sacaton
Maricopa
Montezuma
Arlington
Buckeye
Liberty
Tolleson
Tempe
Mesa
PHOENIX
Scottsdale
Alhambra
Glendale
Peoria
Litchfield
McDowell
Cavecreek
Hot Spr. Mt.
Bufford
Morristown
Wickenburg
Vulture Mts.
Harrisburg
Salome
Wenden
Hassayampa R.
Whitlock Mts.
Date Cr.
Congress
Martinez
Octave
Constellation
Wagoner
Minnehaha
Cave Kins
Dundee
Bee
Canon
Turret Pk.
Rye
Oxbow
Gisela
Young
Ellison
Pinetop
Show Low
Springerville
Greer
Nutrioso
Alpine
Whiteriver
Fort Apache
Kelly's Butte
Silver Bell
Ord Pk.
Thomas Pk.
White Mts.
Escudilla Pk.
Four Peaks
Rose Pk.
Bentes
Boyles
Clifton
McMullen Pk.
Morenci
Metcalf
Fort Thomas
Guthrie
Solomonville
Safford
Thatcher
Pima
Central
Hubbard
Duncan
Franklin
Mt. Graham
Fort Grant
Bonita
Bailey's Wells
Orange Butte
Willcox
Dos Cabezos
San Simon
Cochise
Johnson
Dragoon
Pearce
Paradise
Portal
Rucker
Tombstone
Bisbee
Douglas
Nogales
Patagonia
Sonoita
Sasabe
Tubac
Calabasas
Old Glory
Old Bldg. Pk.
Fairbank
Helvetia
Rosemont
Greaterville
Buboquivari Pk.
Vulcan Hills
Tucson
Vail
Pantano
Benson
Redington
Langhorne
Teviston
Pool
Mowry
Patagonia
Ft. Huachuca
Red Rock Pk.
Lowell
Fort Luis
Hereford
Palmerlee
Naco
Aqua Prieta
Encina
Agua Zarca
Cumarion
Cos
Fronteras
Tres Alamos
Sierra Blanca
Mt. Turnbull
Dewey
Geronimo
Christmas
Riverside
Aravaipa
Santa Cruz
Gila Range
Tortilla Mts.
Superstition Mts.
Mt. McDowell
Salt River
Chrome Butte
Natanes Butte
Sombrero Pk.
Cline's
Roosevelt
Livingstone
Globe
Hutton Pk.
Rice
San Carlos
Juniper Pk.
Parkers Pk.
Troy
Cochran
Superior
Queen
Silverking
Kyrene
Gila River Indian Res.
Gila Bend Indian Res.
Mesa
Tempe
Papago Res.
Whitetank Mts.
Vulture Mts.
Hassayampa R.
Date Cr.
Harquahala Mts.
Harquahala Mts.
Granite Wash Mts.
Plomas Mts.
Mesa
Pinal Mts.
Pinaleno Mts.
Peloncillo Range
Chiricahua
Dragoon Mts.
Whetstone Mts.
Huachuca Mts.
Santa Rita Mts.
Patagonia Mts.
Santa Catalina Mts.
Rincon Mts.
Tucson Range
Comobabi Mts.
Baboquivari Mts.
Ajo Mts.
Growler Mts.
Cabeza Prieta
Negras
Lumas
Mohawk Mts.
Castle Dome Mts.
Eagle Tail Mts.
Big Horn Mts.
Maricopa
Divide
Gila Range
Sierra de la Cabeza Prieta
Mesa de Malpais
Sierra del Ajo
Comobabi Mts.
Vulcan Hills
Tucson Range
Santa Rita Mts.
Patagonia Mts.
Santa Catalina Mts.
Rincon Mts.
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Patagonia Mts.
Santa Catalina Mts.
Rincon Mts.
Tortilla Mts.

Gold mining has not been greatly developed. The production in 1913 was 191,000 ounces, valued at $3,948,000, an increase in value of $175,792 over the product of 1912. Of the output, about 42 per cent came from dry or silicious ore, and most of the remainder from copper ores. The largest production of gold is made in Mohave County, whose mines in 1912 yielded 91,870 ounces. The silver production in 1913 was about 3,773,000 ounces, valued at $2,263,000, an increase of about 8 per cent over the production of 1912. The increase was due largely to increased shipments of lead ore. The greater part of the silver is found in Cochise and Yavapai counties. Over two-thirds of the total output came from copper ore, the remainder from silicious ore and lead ore. Lead is mined in the State in considerable quantities, and the production in 1913 showed a large increase over that of 1912. In the latter year nearly 14,000,000 pounds, valued at $612,000, were produced, compared with 6,806,443 pounds, valued at $306,390, in 1912. About 55 per cent of the lead output comes from Cochise County. The production of zinc (spelter) amounted in 1913 to 9,100,000 pounds, valued at $510,000, which was an increase of 341,758 pounds in quantity, and an advance of about $170 in value over the production in 1912. Nearly 95 per cent of the production came from Mohave County. The total value of the gold, silver, copper, lead, and zinc in 1913 was over $71,000,000, compared with the value of $67,050,785 in 1912. The difference was caused chiefly by the increased copper production. In 1912 there were 445 producing mines, and, in 1911, 397. Other minerals, including mercury, tungsten, vanadium, clays, salt, and precious stones, are also found in the State, but not in sufficient quantities to make them of great importance. In 1913 a deposit of alunite was found in the Nogales region in southern Arizona. The mineral is seldom found pure in nature, but its deposits are important as a possible source of both potash and aluminium.

Agriculture. Although Arizona ranks fifth among the States in land area, climatic and soil conditions prevent its being among the important agricultural States. The northern and northeastern portions of the State form a high plateau, rising from 4000 to 8000 feet above sea level with an average elevation of 4100 feet. The southern and southwestern parts of the State, lying within the extremely arid southwestern portion of the United States, consist of broad desert plains, interspersed with parallel ranges of mountains. In the eastern half of the State precipitation ranges from 1 to 10 inches annually, and in the eastern half from 10 to 25 inches.

Of the entire land area, only 1.7 per cent was in farms in 1910. In the same year the farms numbered 9227, compared with 5809 in 1900. In these tabulations ranges and ranches belonging to the public domain and used for grazing purposes are counted as farms. The land in farms in 1910 was 1,246,613 acres and in 1900 1,935,327 acres, a decline of 35.6 per cent in the decade. The improved farm land, however, increased from 250,521 acres in 1900 to 350,173 in 1910. That farming in the State tends to become more intensive is shown by the fact that the average acres per farm in 1900 was 333.2, while in 1910 it was 135.1.

The value of all farm property in 1910 was $75,123,970. In 1900 it was $29,993,847. This includes land, buildings, and live stock. The average value of property per farm in the two census years was $8142 and $5163, while the average value of land per acre was $33.97 and $5.90.

Of the 9227 farms in the State in 1910, 8366 were operated by owners or managers and 861 by tenants. Of the owned farms, 7038 were free from mortgage. More than one-half averaged from 100 to 174 acres. Native white farmers numbered 5218, and the foreign-born white, 806. The non-whites numbered 3203, of whom 3159 were Indians.

The acreage, value, and production of the principal crops in 1912 and 1909 are shown in the table below. The figures for 1912 were compiled by the United States Department of Agriculture, while those for 1909 are those of the thirteenth census.

		Acreage	Production bushels	Value
Wheat,	1912	16,000	528,000	$528,000
	1909	15,605	298,664	293,847
Corn,	1912	23,000	707,000	778,000
	1909	20,028	362,875	410,214
Oats,	1912	6,000	268,000	188,000
	1909	5,867	189,312	130,384
Potatoes,	1912	1,000	125,000	156,000
	1909	1,151	97,141	98,567
Hay,	1912	113,000	384,000*	4,608,000
	1909	102,490	259,750	2,553,228

* Tons.

Hay, including forage of all kinds, constitutes by far the most valuable crop of the State. The chief forage crop is alfalfa, which yields from three to five crops a season.

In 1910, according to the thirteenth census, the cattle in the State numbered 824,929. By far the greater number of these were cattle on grazing ranges, which were being grown for the market. The value of all cattle in 1910 was $4,209,726. Figures of the United States Department of Agriculture for Jan. 1, 1913, show 812,000 cattle on that date. The following figures for other live stock are from these respective sources. Horses, 1910, 99,578; value, $4,209,726; 1913, 108,000; mules, 1910, 3962; value, $399,449; 1913, 5200; sheep, 1910, 1,226,733; value, $4,400,514, 1913, 1,570,000; swine, 1910, 17,208; value, $113,714; 1913, 23,000; poultry of all kinds, 1910, 268,762; value $1,545,966.

The total value of all crops in 1910 was $5,497,000. This was an increase of 122.3 per cent over the value of the preceding year, but this is partly accounted for by higher market prices which prevailed in 1909. In addition to the crops mentioned in the table above, there are other agricultural and horticultural products of considerable value. Orchard fruits are grown in limited areas. The value of these in 1909 was $241,110. Apples, peaches, and pears are the most important. Small fruits are grown in limited areas. The value of these in 1909 was $12,987. Strawberries made up the most of this total. The growing of sugar beets is becoming an industry of importance. In 1900 there was no reported production, but in 1910 the product was valued at $237,000.

Irrigation. The successful cultivation of practically all farm land in the State is possible only by irrigation. In 1909, 4,841 farms containing 320,051 acres, or 91.4 per cent, of all the improved farm land were irrigated. In the

following year, existing irrigating enterprises were ready to supply water to 387,655 acres. There were in the latter year 1267 independent irrigating enterprises, with 2597 miles of ditches; 402 reservoirs, with a capacity of 1,349,938 acre feet of water, and the cost of the enterprises to July 1, 1910, was $17,677,966. On March 18, 1911, the Roosevelt storage dam was opened. This dam, which is 283 feet high, creates a great artificial lake, whose waters will reclaim more than 200,000 acres of arid land. The immense Yuma irrigation project, which is partly in California, was approaching completion in 1913. See IRRIGATION; RECLAMATION; DAMS.

Stock Raising. The raising of cattle for market on the grazing lands of the State has always been its most important agricultural industry. Although stock raising will probably maintain its relative importance for many years, similar conditions to those which have affected the industry in other Far Western States promise to bring about radical changes. The government has taken over for national forests large areas which were heretofore free for grazing. Other portions have been taken for cultivation, and, as the irrigation projects continue to be completed and put in operation, still larger tracts of land which have hitherto been adapted only for grazing purposes will be available for cultivation. The pasture lands of the State are confined chiefly to the northern plateau. Rainfall in the southern portion is insufficient for the growth of grasses, except under a few mountain slopes.

Of the total number (824,929) of cattle in the State in 1909, only 28,862 were classified as dairy cows which were kept for milk. Practically all other cattle were being raised for market. All classes of cattle except calves increased during the decade 1900–10. The total value of cattle was in 1909 $14,624,708. Of this amount $1,273,076 was the value of dairy cows. In 1906 the beef cattle on the ranges numbered 590,000, as compared to 384,091 in 1910.

As in the other Far Western States where cattle raising has been a leading industry, changing conditions have made the raising of sheep more profitable. In 1906 the sheep on the ranges numbered 734,000, while in 1910 they numbered 1,226,733, and in 1913, according to United States Department of Agriculture, 1,570,000.

Manufactures. Manufacturing industries are, as is to be expected, little developed. They are chiefly connected with the smelting and refining of copper. That there has been a healthy growth in manufacturing, however, is shown by the relative figures for 1904 and 1909. In the former year there were 169 manufacturing establishments in the State, while in the latter year these had increased to 311. The industries, as a whole, showed a much greater development during the five-year period, 1904–09, than during the period 1899–1904. While the number of establishments increased 84 per cent and the value of the products 79 per cent, from 1904 to 1909, the average number of wage-earners increased only 34.4 per cent, and the value added by manufacture 23.5 per cent. The comparatively low percentage of increase in value on all manufactures is due largely to figures reported for the copper-smelting and refining industry. Manufacturing operations in this industry frequently are so closely related to those of mining that it is not always possible to separate mining and manufacturing expenses. Increased volume of manufactures during the period 1904–09 can be attributed to some extent to the increase in the price of commodities that took place during that period. The essential facts in regard to manufactures in the State in 1909 and 1904 are shown in the following table:

COMPARATIVE SUMMARY FOR 1909 AND 1904

INDUSTRY	Census	Number of establishments	PERSONS ENGAGED IN INDUSTRY				Capital	Salaries	Wages	Value of products
			Total	Proprietors and firm members	Salaried employees	Wage-earners (average number)	Expressed in thousands			
All industries	1909	311	7,202	261	500	6,441	$32,873	$798	$5,505	$50,257
	1904	169	5,217	133	291	4,793	14,396	472	3,969	28,083
Bread and other bakery products	1909	40	164	45	7	112	133	6	96	478
	1904	16	91	24	1	66	85		53	245
Butter, cheese, and condensed milk	1909	11	75	1	16	58	240	22	51	538
	1904	5	39	2	7	30	180	7	22	267
Cars and general shop construction and repairs by steam railroad companies	1909	10	1,141	....	52	1,089	677	77	976	2,394
	1904	7	1,198	....	39	1,159	523	54	961	1,329
Flour-mill and gristmill products	1909	10	75	4	17	54	674	26	42	1,317
	1904	9	50	....	14	36	404	18	24	743
Ice, manufactured	1909	23	152	9	26	117	1,080	28	112	501
	1904	13	97	12	13	72	420	12	55	256
Lumber and timber products	1909	23	911	30	42	839	2,342	106	639	1,419
	1904	9	576	8	26	542	1,469	56	413	1,037
Printing and publishing	1909	64	408	51	89	268	680	104	232	784
	1904	50	269	37	43	189	397	51	161	470
Smelting and refining, copper	1909	8	3,268	....	139	3,129	21,487	310	2,776	41,059
	1904	7	2,456	....	107	2,349	9,341	218	2,050	22,762
All other industries	1909	122	1,008	121	112	775	5,560	119	581	1,767
	1904	53	441	50	41	350	1,577	56	230	971

It will be seen from this table that the average number of wage-earners in Arizona in 1909 was 6441, and of these 3129 were engaged in indus-

tries connected with the smelting and refining of copper. Of the wage-earners in 1909 only 38 were females. There were but 37 persons under 16 years of age employed in the manufacturing industries. In addition to the industries mentioned in the table above are the Portland cement mines at Roosevelt, which are operated in connection with the Salt River irrigation project. This is one of the largest industries in the State, and the value of this product in 1909 was $214,132. Unlike conditions in most other States, manufacturing industries in Arizona are not centred chiefly in the largest towns. Phœnix and Tucson are the only incorporated places having a population of 10,000 or over. In these two cities are included only 92 manufacturing establishments, while in the outside districts there are 219. The value of the products of the industries in the two cities in 1909 was $3,503,762, while for the outside districts it was $46,752,932.

Transportation. The lower course of the Colorado constitutes the only navigable waters of the State. The Southern Pacific, running across the southern end of the State, the Santa Fe Pacific across the northern end, and the Santa Fe, Prescott, and Phœnix connecting the two, are the principal railroads. The mileage has increased from 349 miles in 1880 to 1094 miles in 1890, to 1465 miles in 1899, and to 2135 in 1913. There were 54.19 miles of electric railways in 1913.

Banks. In 1912 there were 51 banks, whose deposits totaled $22,014,683. In the number were included 13 national banks with deposits of $7,156,621, 25 State banks with deposits of $8,919,935, and 1 savings bank with deposits of $429,709.

Finance. The State constitution provided for a State board of equalization, to consist of the chairman of the Board of Supervisors of the various counties, and the State Auditor. A board of equalization was provided for each county, consisting of the board of supervisors in these counties. An amendment to the constitution, ratified in November, 1912, allowed the Legislature to prescribe a method of assessment, equalization, and levy of taxes. The State Tax Commission was created by the same Legislature, and a graduated collateral inheritance tax law was passed. The constitution exempts from taxation all Federal, county, State, and municipal property. The property of educational, charitable, and religious associations or institutions not used or held for profit may also be exempted from taxation. The receipts for the fiscal year ending June 30, 1913, were $3,825,367, and the disbursements $3,193,352. At the beginning of the year there was a balance on hand of $411,441, leaving, at the end of the fiscal year 1913, a balance of $1,073,456. The chief revenue was from taxes, and the total amount collected by county taxation in 1913 was $1,252,573. The chief expenditures were for the support of State institutions for education and for the administration of the State government. The bonded indebtedness of the State at the end of the fiscal year 1913 was $2,098,302.

Education. The State constitution provided for passage by the Legislature of laws for the establishment and maintenance of a general and uniform school system, including kindergarten, common, high, normal, and industrial schools, a University which should include an agricultural college, a school of mines, and other technical schools. In accordance with this provision, the Legislature of 1912 passed an educational code. The general conduct and supervision of the public school system of the State is vested in a State Board of Education, a State Superintendent of Public Instruction, and County School Superintendents. The Board of Education is composed of the Governor, the Superintendent of Public Instruction, the president of the university, and principals of State normal schools. A permanent school fund for the use of the common schools is derived from the sale of public school lands or other public lands and from other sources. The income derived from this fund is apportioned annually to the various counties of the State, in proportion to the various number of pupils of school age residing therein. The revenue for the maintenance of the State educational institutions is derived from the investment of the proceeds of the sale and from the rental of certain lands set aside for the use of the respective institutions. In addition to this income the Legislature is authorized to make appropriations to be met by taxation, to insure the proper maintenance of all State educational institutions, and is empowered to make such special appropriations. Laws passed by the Legislature of 1912 provide for free text-books in public schools, for county scholarships in the State university, and for the retirement on a pension of $600 a year of any teacher who has served in the public schools for 25 years or more. In the school year 1912–13 the school population of the State was 46,681. Of these 35,160 were enrolled, and the average attendance in the schools was 25,003. The average length of the school year was eight months. Total revenue for educational purposes for the year was $1,876,647, and expenditures $1,321,595. The proportion of illiterates is comparatively large. Of the total population of 10 years and over in 1910, 20.9 per cent were illiterate, as compared with 29 per cent in 1900. The large proportion of illiterates is accounted for chiefly by the large number of Mexicans. The census taken in 1910 showed a school population from 6 to 20 years inclusive of 56,897. Of this number 29,496 were males and 27,401 females. Total school attendance in that year was 30,355: 15,472 males and 14,883 females. The attendance of the urban schools was 7512; rural schools, 16,179.

Charitable and Correctional Institutions. These include the State prison at Florence, the State Industrial School, the State Insane Asylum at Phœnix, the Home for Aged and Infirm Arizona Pioneers at Prescott, and the Florence Crittenden Home at Phœnix; and The Arizona Children's Home at Phœnix. A new building for the State prison was erected in 1912–13. The United States government donated to the State the site of Fort Grant near Willcox, and to this place the State Industrial School, formerly at Benson, was removed. The Legislature of 1912 passed a child-labor law and a parole law. The latter provided for an indeterminate sentence for prisoners and for a Board of Commissioners of paroled prisoners. An act was passed, making it a felony for a parent to fail to provide his or her minor child with necessaries and making it a felony for a husband to abandon his wife or fail to provide for her. Another measure provided for the commitment of destitute, homeless, and depraved women, and neglected, abandoned, and homeless children, to the Florence Crittenden Home at Phœnix. An-

other act provided for the care, maintenance, and instruction of blind children under school age.

Religion. The Catholics were first in the field. As early as 1687 the Jesuits had established missions and schools in the State and have been always active in the propagation of their faith. This sect still constitutes a large percentage of the church membership of the State. In recent years the State has been colonized by Mormons, who now rank next to the Catholics in numbers.

Population. The population of Arizona by decades is as follows: 1870, 9658; 1880, 40,440; 1890, 88,243; 1900, 122,931; 1910, 204,354; 1920, 333,903. Of the total population in 1910, 171,468 were white, 29,201 were Indians, 2009 were negroes, 1305 were Chinese, and 371 were Japanese. Native whites numbered 124,744; those of native parentage, 82,478; foreign parentage, 26,170; mixed parentage, 16,260; and rural, 141,094. Of foreign-born whites, by far the larger number were Mexicans; these numbered 51,102, or over half the total foreign-born population. The population was divided by sexes as follows: Males, 118,574; females, 85,780, or 138.2 males to every 100 females. The males of voting age numbered 74,051. The nine incorporated cities in the State, with their population in 1910, are: Phœnix, the capital, 11,134; Tucson, 13,193; Bisbee, 9019; Clifton, 4874; Douglas, 4437; Globe, 7083; Nogales, 3514; Prescott, 5092; Yuma, 2914.

Indians. The Indians in the State in 1910 numbered 29,201, compared with 26,480 in 1900. Of the total in 1910, only 773 were in incorporated towns, the remainder living on reservations. By far the greater number belonged to the Navajo tribe. They are nearly all engaged in agricultural pursuits, and their condition has greatly improved in recent years.

Militia. The total number available for military duty in 1910 was, according to the thirteenth census, 58,962. The organized militia is comprised in a regiment of infantry called the First Infantry, and a troop of cavalry, Troop A. The combined strength of these in 1912 was 663. The official designation of the militia is the National Guard of Arizona.

Government. The constitutional convention which was in session at Phœnix from Oct. 15 to Dec. 9, 1910, adopted a constitution which was ratified by the people at a special election held Feb. 9, 1911. Certain features, chiefly the provision for the "recall" of judges, led to President Taft's refusal to give his approval until the objectionable features were eliminated. (See *History* below.) Congress thereupon passed a resolution which required the people to adopt an amendment omitting judicial officers from the clause providing for recall. This amendment was adopted at a general election held on Dec. 12, 1911. The action of President Taft was rendered null and void by the adoption of an amendment on Nov. 5, 1912, which restored the original clause by which the recall is applicable to all elective officers.

Legislative.—Legislative authority is vested in a Senate and House of Representatives. To the people is reserved the power of proposing laws and amendments to the constitution, and to enact or reject laws or amendments at the polls, independent of the Legislature; and to them is also reserved, for use at their own option, the power to approve or reject at the polls any act or item, section, or part of any act, of the Legislature. These reserved powers constitute the initiative and referendum. Under the initiative 10 per cent of the qualified electors have the right to propose any measure, and 15 per cent have the right to propose any amendment to the constitution. Under the referendum the Legislature, or 5 per cent of the qualified electors, may order the submission to the people at the polls of any measure or item, section, or part of any measure, enacted by the Legislature, except laws immediately necessary for the preservation of the public peace, health, or safety, or for the support and maintenance of the departments of the State government and State institutions. Any measure or amendment to the constitution proposed under the initiative, and any measure to which the referendum is applicable, is referred to a vote of the qualified electors, and becomes a law when approved by a majority of the votes cast thereon and upon proclamation of the Governor and not otherwise. The veto power of the Governor does not extend to initiative or referendum measures approved by a majority of the qualified electors.

The Senate consists of 19 members, and the House of Representatives of 35 members. Members of the Legislature must be citizens of the United States at the time of election, and be at least 25 years of age, and residents of Arizona at least three years, and of the county of which they are elected at least one year before election. Regular sessions of the Legislature are held biennially, the Governor having power to call special sessions whenever advisable.

Executive.—The executive department consists of the Governor, Secretary of State, State Auditor, State Treasurer, Attorney-General, and Superintendent of Public Instruction, and all hold office for two years. No person is eligible to succeed himself in the office of State Treasurer for two years after the expiration of the term for which he shall have been elected. The salaries of the executive officers are as follows: Governor, $4000; Secretary of State, $3500; State Auditor, $3000; State Treasurer, $3000; Attorney-General, $2500; Superintendent of Public Instruction, $2500.

Judiciary.—Judicial power is vested in supreme courts, superior courts, justices of the peace, and such courts inferior to the superior court as may be provided by law. The supreme court consists of three judges, a majority of whom constitutes a quorum, which is necessary for decision. Judges of the supreme court are elected at a general election, and their term of office is coterminous with that of the Governor of the State elected at the same time; and the one receiving the highest number of votes is chief justice.

Suffrage and Elections.—The constitution, as originally adopted, provided that no person should be entitled to vote at a general election upon any question submitted to a vote of the people (except school elections), unless such person was a male citizen of the United States of the age of 21 years or over. An amendment to the constitution adopted Nov. 5, 1912, extended full suffrage to women. Nominations for candidates for all elective, State, county, and city offices, including representatives for Congress, are made under a direct primary election law. Up to the time of the adoption by the States of the constitutional amendment providing for the direct election of Senators, the nomination of United States Senators was also controlled by the direct primary election law. There are

stringent measures to provide for purity of elections and to guard against abuses of the elective franchise. There is a law providing for general publicity before and after election of all campaign contributions to, and expenditures of, campaign committees and candidates for public office.

Every public officer in the State holding an office, either by election or appointment, is subject to recall from such office by the qualified electors of the district from which candidates are chosen. Twenty-five per cent of those who voted at the last preceding general election for all of the candidates for the office held by such officer may by petition, which shall be known as a recall petition, demand his recall. Every recall petition must contain a general statement of not more than 200 words of the grounds of such demand. No petition shall be circulated against any officer until he shall have held his office for a period of six months, except that it may be filed against a member of the Legislature at any time after five days from the beginning of the first session after his election.

Local and Municipal Government.—Any city with a population of over 3500 has the power to frame a charter for its own government. Municipal governments are forbidden to grant, extend, or renew a franchise without the approval of a majority of the qualified electors residing within their corporate limits, who shall vote thereon at a general or special election; and no franchise must be granted, extended, or renewed for a longer time than 25 years. By an amendment to the constitution adopted Nov. 25, 1912, no county, city, town, school district, or other municipal corporation may for any purpose become indebted in any manner to an amount exceeding 4 per cent of the taxable property without the consent of a majority of the property taxpayers, who must also be qualified electors. Exceptions to this law are made in the matter of indebtedness for water, artificial light, or sewer need, and controlled by the municipality.

Miscellaneous. The constitution prohibits plural or polygamous marriages, and the sale or gift of intoxicating liquors to Indians. Public service corporations are supervised by a State Corporation Commission. The Legislature of 1912 passed an elaborate public-service corporation act. The lawful day's work in all employment by the State is eight hours. The employment of children under 14 during school hours, and of children under 16 in mines, is forbidden. It also passed an employers' liability act applying to dangerous occupations. Columbus Day was made a legal holiday, and a State laboratory for the analysis of food and drugs was established. A pure food law was enacted in 1913.

History. Long before its discovery by white men, Arizona was inhabited by a powerful race, whose ruined cities, aqueducts, and fortifications dot the valleys and canyons of the State. In 1539 Fray Marcos de Niza, with a companion, left the City of Mexico to explore the country now included in Arizona and New Mexico, being stimulated by rumors of its mineral wealth, and of its populous Seven Cities of Cibola. The report brought back was so favorable that in 1540 Vasquez de Coronado led an expedition thither, visiting the Moqui villages and New Mexican pueblos. What is now Arizona was very sparsely settled before the beginning of the nineteenth century. In 1772 there were only two missions, with three *visitas*, and two incipient towns, Tucson and Tubac. The hostility of the Apaches and other tribes prevented all advance, and outbreaks in 1802 and 1827, added to the disorder attending the Mexican Revolution, led to the abandonment of the mines and ranches and of all settlements, excepting Tucson and Tubac. By the Treaty of Guadalupe-Hidalgo, Feb. 2, 1848, Arizona, then included in New Mexico, became the property of the United States, except the tract south of the Gila, which was a part of the Mexican State of Sonora and was not acquired till Dec. 30, 1853. (See GADSDEN PURCHASE.) On Feb. 24, 1863, Arizona was separated from New Mexico and made a Territory. Indian troubles broke out as late as 1896, and tended in some degree to hinder the development of the country, but the population of the State has steadily increased as larger tracts of desert land have been reclaimed by irrigation and the mineral resources of the region have been utilized. On Dec. 1, 1891, a constitution was adopted by the people in anticipation of admission to the Union as a State, but Congress refused to grant the application.

In 1904–05, and again in 1905–06, Congress passed bills providing for the admission of Arizona and New Mexico as one State. This proposal met with strong objections in Arizona, and in 1906 the voters of the State rejected it. President Roosevelt thereupon declared that he would make no further effort to have the two Territories admitted as a single State. In 1908 a bill providing for the admission of Arizona separately was passed in the House of Representatives, but on account of charges of corruption and bribery on the part of leading officials in the Territories, it met such strong opposition in the Senate that it was dropped. Agitation for the admission of the Territories continued, both within Congress and outside, until on Jan. 20, 1910, an Enabling Act was passed and signed by President Taft. This act authorized the Governor of Arizona to call for the election of delegates for a constitutional convention, to prepare a constitution for the new State. This election was held on Sept. 12, 1910, and resulted in the election of 44 Democrats and 8 Republicans as delegates. The constitutional convention was in session from Oct. 15 to Dec. 9, 1910. The constitution prepared by this body was probably the most radical instrument ever formulated for the administration of a State. Among other provisions was included one for the recall of judges. The constitution was ratified on Feb. 7, 1911, by vote of 12,000 in its favor to 7500 against it. At the first session of the Sixty-second Congress, a joint resolution was passed which provided for the admission of the State and tacitly admitted the right of the people to pass as radical a constitution as they wished. This resolution was vetoed by President Taft in a message in which he severely criticised the provision for the recall of judges, and declared that he would never give his assent to a constitution which contained this provision. Congress thereupon passed another joint resolution, providing for the admission of Arizona as a State on condition that the provision for the recall of judges should be eliminated. The objectionable section was eliminated on Dec. 12, 1911, by a vote that was practically unanimous. The proclamation for-

mally admitting Arizona to the Union as a State was signed on Feb. 14, 1912. At the election held on Dec. 12, 1911, officers and a member of Congress for the new State were elected. An advisory vote for United States Senators was also taken. State officers had been nominated at a primary election held in March, 1911. The Democrats elected the entire State ticket, headed by George W. P. Hunt for Governor. The candidates for the United States Senator receiving the highest votes were Marcus A. Smith and Henry F. Ashurst. The Legislature elected included 15 Democrats and 4 Republicans in the Senate, and 30 Democrats and 5 Republicans in the House. Governor Hunt was inaugurated on Dec. 31, 1911. On March 27, 1912, the Legislature elected Marcus A. Smith and Henry F. Ashurst United States Senators. The result for the vote for President in Nov. 5, 1912, was: Wilson, 10,324; Roosevelt, 6949; Taft, 3021. As noted above, an amendment provided for woman's suffrage was carried at this election, as well as an amendment to the constitution restoring the provision for the recall of judges. The Legislature which met in 1913 passed measures restricting the ownership of land by aliens, intended to eliminate the ownership of land in the State by Japanese. These provisions were similar to but more severe than those passed by the Legislature of California in 1913. (See CALIFORNIA, *History.*) In spite of the protest by the Japanese government the bill was signed by Governor Hunt.

Following is the list of governors:

TERRITORIAL

John N. Goodwin	Republican	1863–65
Richard C. McCormick	"	1865–69
A. P. K. Safford	"	1869–77
John P. Hoyt	"	1877–78
John C. Frémont	"	1878–81
John J. Gosper	"	1881–82
Frederick A. Tritle	"	1882–85
C. Meyer Zulick	Democrat	1885–89
Lewis Wolfley	Republican	1889–90
John N. Irwin	"	1890–92
Nathan B. Murphy	"	1892–93
Louis C. Hughes	Democrat	1893–96
Benjamin J. Franklin	Republican	1896 97
Myron H. McCord	"	1897–99
Nathan B. Murphy	"	1899–1902
Alexander O. Brodie	"	1902 05
Joseph H. Kibbey	"	1905 09
Richard E. Sloan	"	1909–11

STATE

G. W. P. Hunt	Democrat	1911–17
Thomas Campbell	Republican	1917–

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ARIZONA, UNIVERSITY OF. A State university at Tucson, Ariz., established by act of the Legislature in 1885 and opened in 1891. It had in 1913 buildings and grounds valued at $450,000; a library of 20,000 volumes and 15,000 pamphlets; a faculty of 42; and 180 collegiate, 71 sub-collegiate, and 77 non-collegiate students. It receives $50,000 annually from the United States government and $120,000 (approximately) from the State. It maintains departments of liberal arts, agriculture, civil, electrical, mechanical, and mining engineering, commerce, and home economics. President, A. H. Wilde, Ph.D.

ARJISH, är-jēsh'. See ERJISH DAGH.

ARJISH, or AKHLAT. A small town of Turkish Armenia, vilayet of Erzerum, on the north shore of Lake Van (Map: Turkey in Asia, K 3). Pop., about 4000. The modern Arjish consists of three parts. The fortress, with near-by mosques and houses, is on the shore of the lake. The old city, at a little distance from the present town, in a ravine, was the residence of the kings of Armenia and was the scene of many conflicts between Greeks, Armenians, and Persians. It was taken and devastated in 1229 by Jelal-ed-Din and completely destroyed by an earthquake in 1246. The residential portion, containing the gardens, is on an upper level. Arjish is the seat of an Armenian bishop.

AR'JUNA, *Hind. pron.* ûr'jōō-nä. The grandson of Indra, and the hero of episodes in the *Mâhabhârata*, one of the two national epic poems of India. Next to Krishna, he is the chief personage in the Bhagavad-gita, the poetic episode of the *Mâhabhârata* in which the religious and philosophical beliefs of India have found their most popular expression.

ARK. In the English version of the Bible the word is applied to three different objects: 1. To the craft which Noah built and in which he preserved himself, his family, and numerous animals alive during the flood. It is described in Gen. vi. It was of "gopher wood," which is perhaps conifer cypress, of which the Phœnicians built ships, and the "pitch" used was asphalt. Its dimensions were, in English measure: Length, 525 feet; breadth, 87½ feet; height, 52½ feet. It was not built for speed and merely floated about until the waters subsided. 2. To the basket of bulrushes (papyrus reed) daubed with slime, prepared by the mother of Moses, in which Moses floated on the Nile until Pharaoh's daughter rescued him (Ex. ii. 3 et seq.). 3. To the Ark of the Covenant (q.v.).

AR'KADEL'PHIA. A city and the county-seat of Clark Co., Ark., 65 miles southwest of Little Rock, on the St. Louis, Iron Mountain, and Southern Railroad and on the Ouachita River (Map: Arkansas, C 3). Arkadelphia, 300 feet above sea level, has good natural drainage and water power. Its manufactures comprise the products of lumber, stove, roller, and cotton mills, and foundry and machine shops. It is the site of Ouachita College (Baptist) and Henderson College (Methodist), founded 1886 and 1890, respectively, and has Baptist and Presbyterian schools for colored pupils, and a public library.

The charter of Arkadelphia, in effect since 1873, provides for a biennially elected mayor and a city council. Pop., 1890, 2455; 1900, 2739; 1910, 2745.

ARKANSAS, är'kan-są (popularly known as the "Bear State"). A south central State of the United States, bounded by Missouri on the north, the Mississippi River (which separates it from Tennessee and Mississippi) on the east, Louisiana on the south, and Oklahoma and Texas on the west, with Texas touching the southwest corner. Nearly a square, each side measures about 250 miles. Its area is 53,335 square miles, of which 810 square miles are water. Among the States of the Union it ranks twenty-sixth in area and twenty-fifth in population.

Topography and Drainage. Excepting a few high ridges and the Grand Prairie of Lonoke, Prairie, and Arkansas counties, the eastern margin of the State is subject to inundation from the Mississippi River. But the region to the westward attains a higher elevation, and the surface is broken by numerous ranges of hills and low mountains, which have a general trend from east to west. These highlands cover almost half of the State. The mountains in the northwest are a part of the Ozark uplift, being continuous with the elevations in Oklahoma to the west and Missouri to the north. The highest points in the State do not exceed 2800 feet. The lowlands in the east and southeast have an average elevation of a little over 200 feet. The Arkansas River bisects the State from northwest to southeast and joins the Mississippi. The White River enters the State from southwestern Missouri, flows toward the southeast, receives the Black and Caché rivers from the north, and joins the Arkansas near its mouth. The Ouachita, Saline, and Bartholomew, tributaries of the Red River, drain the southern part. The Arkansas is navigable for boats of light draught throughout its course within the State; the White for 260 miles; the Ouachita and Bartholomew each for 150 miles; the Saline, Red, and Black each for 100 miles, making a total of some 3000 miles of waterways. The upper courses of some of the streams furnish water power.

Climate. Comparatively mild, the climate is pleasant and healthful. The snowfall is light, and prolonged droughts are unknown. The mean rainfall for the State is 40 inches; at Fort Smith, 46.5 inches. The heaviest annual rainfall is 54 inches in the region of the Ouachita Mountains. Mean temperatures for January and July respectively are as follows: At Little Rock (central), 40.8 and 80.3°; at Fort Smith (northwest), 36.1 and 80.0°.

Soils. The hill country of the northwestern part of the State has little land of agricultural value, the soil being sandy and thin; but the bottom lands are very productive. In the limestone regions are found much red clay and loam, the residual materials from the decomposition of the limestone. The higher lands of the Arkansas valley, from Fort Smith to Little Rock, are composed of a dark sandy loam. Below Little Rock a sandy, sometimes clayey, soil borders the river, and this grades toward the south into black, sandy, and "buckshot" soils, which are the richest in the State and which yield from 2000 to 3000 pounds of seed cotton to the acre. The bottom lands of the Red River valley contain a black sandy loam or a red sticky clay called "gumbo." A yellow loam is characteristic of some of the southern counties, which are underlain by deposits of the Tertiary Age.

Geology and Mineral Resources. A line drawn from a little north of Texarkana in the southwestern corner, through Little Rock to Pocahontas in the northeast, divides the State into two approximately equal parts; the northwestern portion is underlain by Paleozoic rocks, with a small area of Cretaceous in its southernmost corner; the southeastern portion is occupied by the less consolidated strata of Tertiary and Post-Tertiary ages. The Paleozoic area is essentially the "hill country"; the Tertiary district is a part of the coastal plain. The oldest rocks known in the State are of the Ordovician or Lower Silurian Age. They extend over the line from Missouri and lie on the southern flanks of the Ozark uplift, and consist of sandstones, quartzites, and limestones, the latter in the upper part of the series. They furnish good building stones, quartz sand for glass making, and lime. Along the southern boundary of the Ordovician formations, in the vicinity of Batesville and Cushman in Independence and Izard counties, are deposits of manganese ore which have been worked to some extent. Another area of Ordovician rocks is found in the Ouachita Mountains west of Little Rock. In these mountains are large masses of a silicious rock, novaculite, from which are made the finest known whetstones, called in the markets "Arkansas" and "Ouachita" stones.

These whetstones are obtained in Garland, Howard, Hot Springs, Montgomery, Polk, Pulaski, and Saline counties, and their quarrying constitutes an important industry. In connection with the Ordovician rocks of the Ouachita uplift are found some deposits of manganese ore, but these are of little importance compared with those of the Batesville region. Around the edges of the Ordovician area of the northern part of the State is a narrow strip of Silurian limestone, the St. Clair limestone, that furnishes a fine quality of pink marble useful for ornamental purposes. The Devonian formation is poorly developed. It is known as the Eureka shale and the Sylamore sandstone, but is of importance for the reason that in connection with it are found phosphate deposits which give promise of yielding valuable returns. Despite reports, the State geologist says that there is little gold or silver in the Ouachita Mountains. Deposits of zinc blende have been discovered in Sevier County, and other occurrences of this ore, as well as of galena, are known in the northwestern part of the State. Aluminum ore in the form of bauxite occurs near Little Rock and farther west at Bryant in Saline County. Iron ores are of little importance, though they are found, at many places, in the form of limonite. Nickel is also known, but sparingly, in Saline County. The coal measures cover large areas and furnish a good quality of bituminous coal in abundance. Oil and gas have been found only in small amount. In the Cretaceous and Tertiary areas no metals have been found, but there are deposits of lignite and greensand.

Igneous rocks of great geologic interest are found at Magnet Cove and Fourche Mountain, in the eastern end of the novaculite region near Hot Springs. Mineral springs are common especially so in the Ouachita Mountains. Those at Hot Springs are famous for their medicinal

qualities and have led to the foundation there of a renowned health resort. Another hot spring has been discovered in Montgomery County. Mammoth Spring, in Fulton County, is one of the largest in the world and is reported to discharge 9000 barrels of water a minute.

Mining. For various reasons, such as lack of interior transportation facilities, mining in Arkansas has not progressed to an extent which its mineral resources warrant. It has, however, shown continual development in some directions. Coal is the chief mineral product. In 1912 coal production in the State was 2,120,000 short tons, compared with 1,950,000 short tons in 1911 and 2,220,000 in 1906. That the coal-mining industry has shown no marked increase in recent years is shown by the fact that the production in 1906 was 2,220,000 tons. Zinc is produced in considerable quantities. The value of the product of this mineral in 1912 was $105,222. Lead is produced in small quantities. The product of 1912 was valued at $2792. The State is a large producer of bauxite. Of this mineral there were mined, in 1912, 126,105 long tons, valued at $768,932, compared with 125,448 tons, valued at $750,649, in 1911. This figure included a small percentage mined in Tennessee. Arkansas is the only State in which diamonds have been found in any considerable quantity. The first discovery was made Aug. 1, 1906, near the mouth of Prairie Creek in the vicinity of Murfreesboro, Pike County, and since that time, approximately 1655 stones aggregating 550 carats have been found in this locality. Further search has resulted in the finding of three new areas in the same neighborhood. In 1913 a plant to wash the diamond-bearing earth was being erected near the mouth of the Prairie Creek. Among other minerals found are phosphate rock, oilstones, granite, limestone, slate, and building clay. Mineral waters are bottled at eight springs, and the yearly value of the product is in excess of $100,000.

Forest and Forest Products. About three-fourths of the area of Arkansas is estimated to be still covered with forests, which are made up of about 125 species of trees. The bulk of the forest consists of two species of pine (on uplands), one of cypress (in the southeastern lowlands), several of oak and hickory, and the red or sweet gum, tupelo gum (in swamps), cottonwood (along rivers), yellow poplar ("tulip trees"), ash, maple, and elm. The hard woods predominate in most parts of the State, but most of the lumber cut at present is pine, because that is easier to handle in almost every way.

The thirteenth census reports 2060 saw mills in the State, with the following production of lumber, laths, and shingles for the year 1909: Pine, 1,313,668,000 feet; oak, 358,556,000; red gum, 200,953,000; cypress, 55,012,000; cottonwood, 55,507,000; hickory, 45,133,000; ash, 33,212,000; maple, 18,500,000; elm, 13,056,000; tupelo, 6,084,000; sycamore, 5,406,000; poplar, 4,484,000; all others, 2,729,000. Total, 2,111,300,000 feet, valued at $31,839,283, which is about 4½ per cent of the total lumber production of the United States.

These figures do not include fuel, cross-ties, poles, posts, staves, veneers, etc., which of course are turned out in large quantities, or whole logs shipped to St. Louis, Memphis, New Orleans, etc. About 75 per cent of the pine lumber and 40 per cent of that from deciduous trees was dressed or still further manufactured within the State.

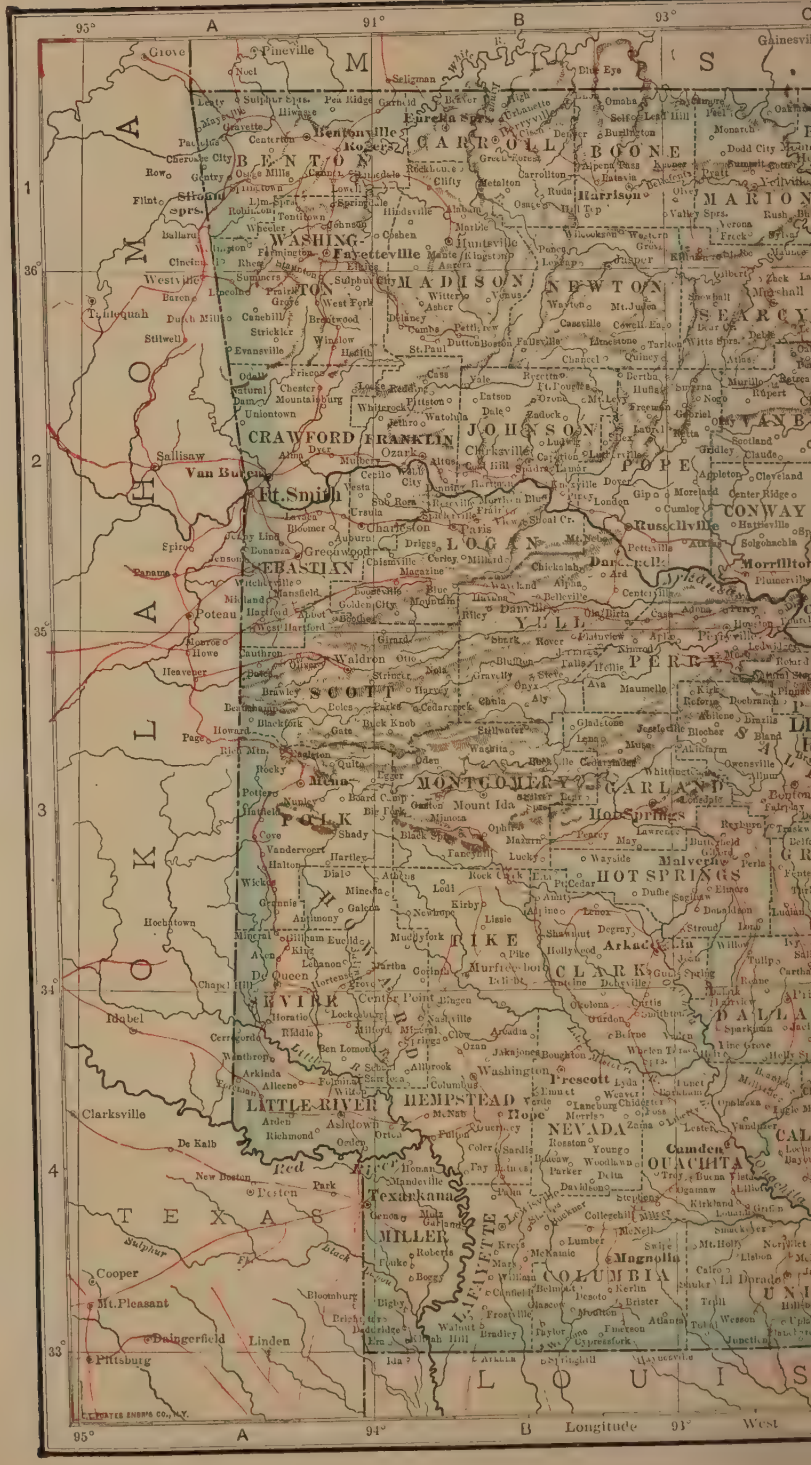
Agriculture. Arkansas is one of the most distinctively agricultural States in the Union. Its soils are varied and are adapted to many forms of cultivation. Rainfall over the whole of the State is ample for all ordinary crops. The State is divided naturally into two agricultural sections. A line drawn through Little Rock from the northeastern to the southwestern point of the State would divide it about equally into a southeastern lowland division and a northwestern highland division. The Mississippi River and its principal tributaries are bordered by broad alluvial bottoms of low elevation and nearly level surface, above which rise the more rolling and elevated parts of the Coastal Plain. Within the Coastal Plain division are several flat interstream prairies and more rolling forested uplands. The valley of the Arkansas River lies in the northern and west central parts of the State.

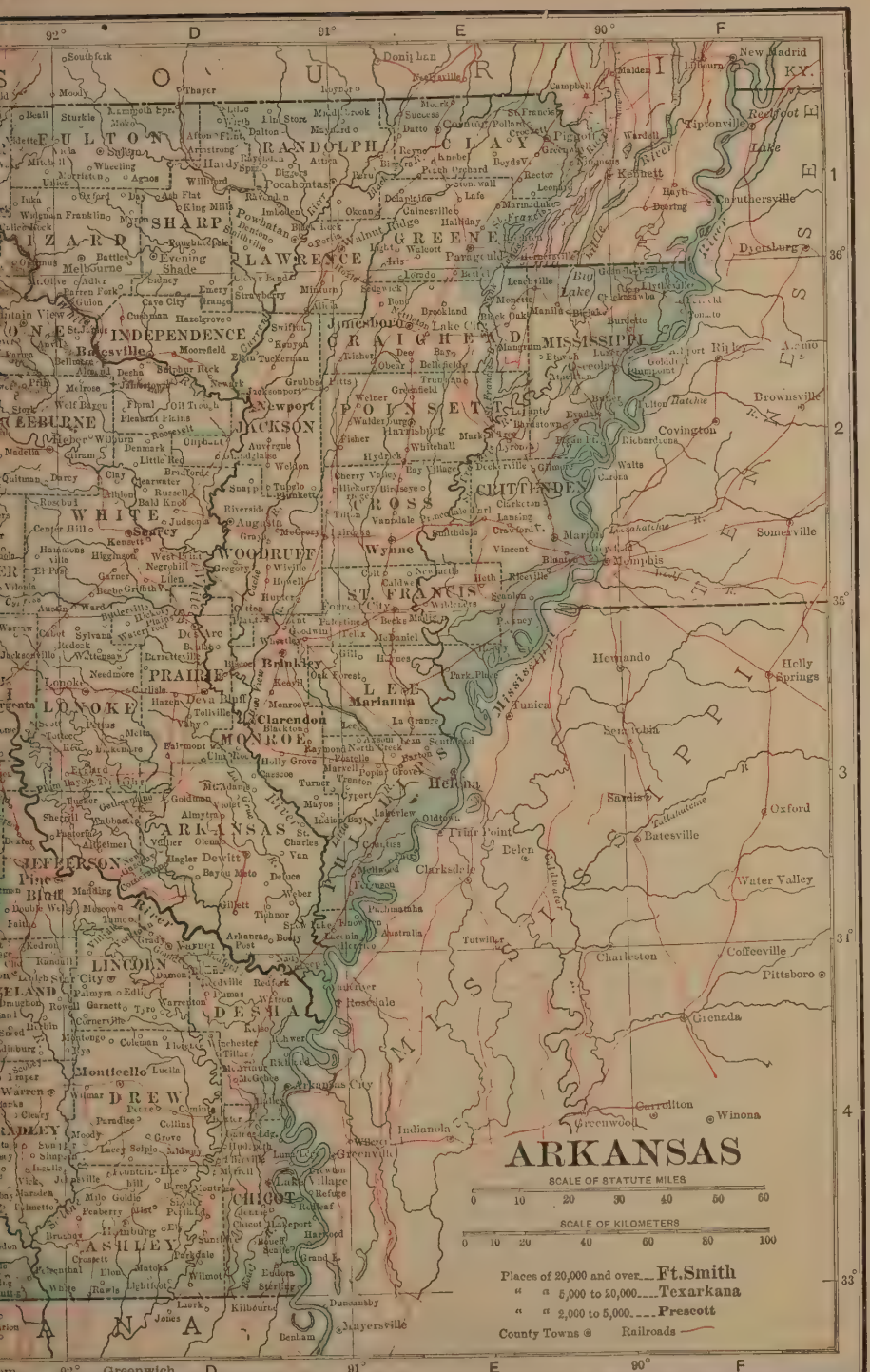
The total number of farms in 1910 was 214,678, compared with 178,694 in 1900, or a gain of over 20 per cent. Out of the land area of 33,668,000 acres, 17,416,075 were in farms in 1910. The improved land in farms was 8,076,254, compared with 6,953,735 in 1900. The average number of acres per farm was 81.1 in 1910, compared with 93.1 in 1900. In 1910 the land, buildings, and live stock were valued at $400,089,303, while in 1900 they had the value of $181,416,001, a gain of 120.5 per cent. The average value of all property per farm in 1910 was $1864, compared with $1015 in 1900, while the average land was valued at $14.38 per acre in 1910, and $6.32 in 1900. Of the total number of farms, 214,678 in 1910, 107,412 were operated by owners and managers, and 107,266 by tenants. While the total number of farm operators increased 127.3 in the decade 1900–10, the number of tenants increased 267.5. Of 106,649 owned farms in 1910, 82,321 were free from mortgage, 22,374 were under mortgage. The native white farmers in 1900 numbered 148,627. There were 2458 foreign-born whites and 63,593 non-white farmers. Of the non-white farmers, nearly all were negroes, only 15 being Indians.

The most important agricultural product of Arkansas is cotton. In 1909 the acreage devoted to cotton was 26.7 per cent of the entire improved farm land in the State, and the value of the cotton crop was more than half the combined value of all other crops. Acreage value and production of the principal crops in 1909 and in 1912 are shown in the following table:

		Acreage	Production bushels	Value
Corn	1912	2,475,000	50,490,000	$33,828,000
	1909	2,277,116	37,609,544	27,910,044
Wheat	1912	94,000	940,000	884,000
	1909	60,426	526,414	532,712
Oats	1912	175,000	3,482,000	1,741,000
	1909	197,449	3,212,891	1,641,752
Rye	1912	1,000	10,000	10,000
	1909	1,080	7,354	6,834
Rice	1912	90,800	3,405,000	3,201,000
	1909	27,419	1,282,830	1,158,103
Potatoes	1912	25,000	1,750,000	1,610,000
	1909	....	....	....
Hay	1912	286,000	352,000*	4,224,000
	1909	435,915	461,817	4,487,139
Tobacco	1912	800	520,000†	94,000
	1909	758	316,418	40,489
Cotton	1912	1,191,000	1,021,000‡	55,246,000
	1909	2,153,222	776,879	54,559,503

* Tons. † Pounds. ‡ Bales of 500 pounds each.


95°
A
91°
B
93°
Grove
Pineville
Noel
Seligman
Eureka Springs
Bentonville
Rogers
BENTON
CARROLL
BOONE
Harrison
MARION
Flint
Strong
Springfield
Hindsville
Huntsville
WASHING-
TON
Fayetteville
MADISON
NEWTON
SEARCY
Prairie Grove
West Fork
Winslow
Evansville
Hazen
Oden
Natural Dam
Mountainburg
Unionvale
Watolula
Pettigrew
Delaney
Dutton
Boston
Fallsville
Limestone
Witts Springs
Clarksville
Russellville
Dardanelle
Morrilton
CRAWFORD
FRANKLIN
JOHNSON
POPE
CONWAY
Van Buren
Ozark
Altus
Lamar
Appleton
Cleveland
Ft. Smith
Booneville
Paris
Logan
Petteville
Atkins
Solgohachia
Greenwood
Charleston
SEBASTIAN
Chickalah
Poteau
Mansfield
Waldron
Scott
Perry
Howard
Page
Blackfork
Buck Knob
Gladstone
Jessieville
Bluffton
Stewart
Ava
Maumelle
Pleasant Ridge
Reform
Dreamland
Abilene
Bland
Rocky
Cedarville
Mena
MONTGOMERY
GARLAND
Hot Springs
Potter
Board Camp
Mount Ida
Ouachita
Polk
Shady
Vandervoort
Hartley
Tazewell
Lucky
Wayside
Malvern
Halton
Diaz
Athens
Rock Creek
Pt. Cedar
HOT SPRINGS
Hochatown
Galena
Kirby
Amity
Lenox
Dumas
Glenwood
Arkadelphia
Mid-
dle
Fork
Little
Missouri
Cossatot
Cove Creek
Cherry Hill
Eagle
Mine Creek
Newhope
Lisbon
Shawnee
Degray
Lake
Caddo
Muddy Fork
PIKE
Arkadelphia
Prescott
Okolona
Curtis
Gurdon
Antoine
Delaware
Dalark
Pike
Hollywood
CLARK
Gum Spring
Rabel
Center Point
Ingen
Nashville
Arcadia
Bonner
Sparkman
Horatio
Lockesburg
Milford
Mineral Springs
Clow
Ozan
Jaknonga
Boughton
Whelen
Lime Grove
Cerro Gordo
Riddle
Ben Lomond
Wanthrop
Allbrook
Washington
Prescott
Lydia
Tokio
Arkinda
Allene
Columbus
Weaver
Chidester
Clarksville
LITTLE RIVER
HEMPSTEAD
Nope
NEVADA
Camden
OUACHITA
De Kalb
Arden
Ashdown
Richmond
Ortes
Fulton
Saratoga
Roseston
Youngo
Zama
Lester
Vandner
New Boston
Foreman
Mandeville
Texarkana
Genoa
Garland
MILLER
Lewisville
Magnolia
Cooper
Mt. Pleasant
Bloomburg
Bigby
Fouke
Boggy
Williamsburg
Calhoun
Berlin
Brister
Thrift
Pittsburg
Daingerfield
Linden
Walnut Hill
Bradley
Taylor
Junction
Ida
Athelia
Springhill
Louisiana
Longitude
West
Gates Engrg Co., N.Y.


ARKANSAS
SCALE OF STATUTE MILES
0 10 20 30 40 50 60
SCALE OF KILOMETERS
0 10 20 40 60 80 100
Places of 20,000 and over.—Ft.Smith
" " 5,000 to 20,000.—Texarkana
" " 2,000 to 5,000.—Prescott
County Towns ◎ Railroads
92° D 91° E 90° F
Greenwich
1 2 3 4
36° 35° 33°
Southfork
Donihan
New Madrid
Malden
Lilbourn
Tiptonville
Reelfoot L.
Lake
Kenfield
Hayti
Caruthersville
Dyersburg
Big Lake
Leachville
Manila
Burdette
Blytheville
Gosnell
Rivervale
Buffalo Island
Brownsville
Hatchie R.
Covington
Richardson
Walls
Coreva
Somerville
Memphis
Hernando
Holly Springs
Senatobia
Sardis
Oxford
Batesville
Delen
Water Valley
Clarksdale
Coffeeville
Pittsboro
Charleston
Tutwiler
Grenada
Carrollton
Greenwood
Winona
Indianola
Greenville
Arkansas City
Rosedale
Dumas
Wilson
Lake City
Jonesboro
Craighead
Mississippi
Poinsett
Cross
Crittenden
St. Francis
Lee
Phillips
Monroe
Prairie
Woodruff
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Independence
Lawrence
Randolph
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Sharp
Izard
Fulton
Marianna
Brinkley
Clarendon
Helena
Lonoke
Pulaski
Arkansas
Jefferson
Lincoln
Desha
Drew
Chicot
Ashley
Monticello
Hazen
Searcy
Batesville
Newport
Augusta
Judsonia
Beebe
Bald Knob
Russell
Pleasant Plains
Melbourne
Evening Shade
Hardy
Pocahontas
Powhatan
Imboden
Paragould
Marmaduke
Gilkeson
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Evening Shade
Hardy
Pocahontas
Powhatan
Imboden
Paragould
Marmaduke
Gilkeson

The acreage devoted to cotton, cereal crops, and potatoes has shown a steady increase from 1879 to 1909. Orchard and small fruits are of considerable importance, value of the former in 1909 being $3,011,377. Of these peaches and nectarines were the most important and were valued at $1,502,996. The value of the apples produced in that year was $1,322,785. Other orchard fruits grown are plums, pears, cherries, and apricots. Of small fruits, strawberries are by far the most important, and the value of this fruit in 1909 was $549,041. The raising of flowers and plants and of nursery products is also of some importance. In 1909, 554 acres were devoted to these products, and the output was valued at $352,000. Sugar beets are grown on a small scale. In 1909 they were valued at $3945. Sorghum cane and sugar cane are grown in considerable quantities. The value of sorghum cane in 1909 was $658,075; of sugar cane, $152,298.

Irrigation. Irrigation has made rice culture an important activity in the State since 1900. The rice growers almost universally provide their own water supply, only one enterprise furnishing water under contract in 1909. The total acreage irrigated for rice growing in 1909 was 27,753. The quantity raised in 1910 was 1,282,830 bushels, valued at $1,158,103. There were 232 farms reporting irrigation for rice growing in 1910. According to reports of the United States Department of Agriculture, the acreage in 1912 was 90,800, the product being 4,405,000 bushels and the value $3,201,000.

Manufactures. The industries of Arkansas have shown marked increase in recent years. While in 1849, 261 manufacturing establishments then reporting gave employment to an average of 842 wage-earners, representing .4 of one per cent of the total population of the State, in 1909 an average of 44,982 wage-earners were employed, representing 2.9 per cent of the total population. During this period of sixty years, the gross value of products per capita of the entire population increased from $2.56 to $47.58. The following table gives a comparative summary of 1909 and 1904 of the most important facts relating to the manufactures valued at $1,000,000 or over:—

COMPARATIVE SUMMARY FOR 1909 AND 1904

INDUSTRY	Census	Number of establishments	PERSONS ENGAGED IN INDUSTRY				Capital	Salaries	Wages	Value of products
			Total	Proprietors and firm members	Salaried employees	Wage-earners (average number)	Expressed in thousands			
State — All industries	1909	2,925	51,730	3,455	3,293	44,982	$70,174	$3,461	$19,113	$74,916
	1904	1,907	37,557	2,140	2,328	33,089	46,306	2,310	14,544	53,864
Bread and other bakery products	1909	133	491	161	20	310	421	12	161	1,177
	1904	63	257	68	18	171	180	18	85	....
Carriages and wagons and materials	1909	58	1,126	63	90	973	1,823	92	405	1,664
	1904	33	541	31	50	460	747	39	174	....
Cars and general shop construction and repairs by steam railroad companies	1909	16	3,464	....	215	3,249	1,561	261	2,061	4,154
	1904	13	2,643	...	135	2,508	561	152	1,545	3,078
Flour-mill and grist-mill products	1909	113	549	133	104	312	1,599	97	122	5,615
	1904	91	434	11	55	263	1,353	45	104	3,702
Foundry and machine-shop products	1909	42	563	42	74	447	1,418	90	304	1,051
	1904	33	418	27	28	363	762	31	200	....
Lumber and timber products	1909	1,697	36,662	2,135	1,595	32,932	42,346	1,793	13,060	40,640
	1904	929	26,348	1,079	1,360	23,909	29,619	1,415	10,265	31,993
Oil, cottonseed, and cake	1909	44	1,350	3	261	1,086	5,239	281	441	7,789
	1904	42	1,135	3	210	922	4,106	197	329	4,940
Printing and publishing	1909	295	1,672	417	274	981	1,910	212	538	2,082
	1904	277	1,360	361	104	895	1,315	93	438	1,443

According to the thirteenth census the total value of live stock on farms in the State was $71,794,486 in 1910. Of this, cattle numbered 1,028,071, valued at $15,460,666; horses, 254,716, valued at $23,152,209; mules, 222,200, valued at $5,170,924; sheep, 144,189, valued at $327,984. The United States Department of Agriculture reports for Jan. 1, 1913, 270,000 horses, 233,000 mules, 892,000 cattle, 130,000 sheep, and 1,529,000 swine. The total value of poultry on farms in 1910 was $2,063,432.

This table shows that the manufacture of lumber and timber products is by far the most important. The total number of wage-earners engaged in manufacturing industries in 1909 was 44,982. Of this number, all but 750 were males. Wage-earners under 16 years of age numbered 525, and of these 469 were males. There are only five cities in the State which are important as manufacturing centres. These are Little Rock, Argenta (a suburb of Little Rock), Fort Smith, Pine Bluff, and Hot Springs. There were in 1909 2157 wage-earners in Argenta, 2017 in Little Rock, 1455 in Fort Smith, 1118 in Pine Bluff, and 335 in Hot Springs. The value of the product of the manufactures of Little Rock, the leading manufacturing city, in 1909 was $6,881,662.

Transportation and Commerce. The chief waterway is the Mississippi River, which gives an outlet to the Atlantic Ocean and water

communication with other States of the Mississippi valley. In addition to this there are many smaller streams which afford navigable waterways. Railroad facilities are good, except in the mountainous regions of the north central and west central sections. The railroad mileage on Jan. 1, 1913, was 6162.26 miles, compared with 4357 miles in 1906. There were, in 1913, 95.15 miles of electric railways in the State. The State Railroad Commission has general charge of fixing rates. Railways and other public service corporations are assessed for their franchises as well as for their property. An act passed by the Legislature of 1911 regulates the liability of common carriers for injuries to their employees. Contributory negligence does not bar recovery if the employer's disregard of the law has contributed to the injury. A law provides full train crews. Foreign commerce, much of which passes through New Orleans, consists chiefly of cotton and lumber.

Banks. The total number of banks in Arkansas in 1912 was 376, and their deposits totaled $48,856,407. National banks numbered 49 with deposits of $16,464,452; savings banks 5, with deposits of $331,063; and State banks 310, with deposits of $25,266,613.

Finance. Receipts of the treasury for the fiscal year 1911–12 were $6,899,247, and the expenditures $6,734,915. The balance on hand at the close of the fiscal year was $800,880. The State debt in 1913 was $1,250,500 in 3 per cent 30-year bonds to mature in 1929. These bonds are held by the permanent school fund and by the University of Arkansas endowment funds. The chief source of revenue is a direct tax on all property.

Education. Arkansas, like other southern States, labors under difficulties disadvantageous to the improvement of educational conditions. However, it has shown in recent years commendable zeal in attempting to better the situation. In 1907 the tax laws were amended allowing for an increase of the school tax from 1 to 3 mills on the dollar. A compulsory education law became effective the beginning of the school year 1909–10, and the Legislature of 1909 passed measures providing for the consolidation of school districts and made provision for four agricultural schools.

The thirteenth census showed 142,954 illiterates, a percentage of 12.6 per cent of the entire population. In 1900 the percentage was 20.4. The percentage of white illiterates of native parentage in 1910 was 7.1; of foreign or mixed parentage 2.8, and of negroes 26.4. The percentage of illiteracy among negroes in 1900 was 43. The school population of persons from 6 to 20 years was 551,672. Of these 324,035, or 58.7 per cent, were in attendance in school. Statistics of the State Department of Education showed a school population on June 30, 1913, of 617,265. Of these 435,575 were white, and 181,790 colored. There were enrolled in 1912 in the public schools 409,756 children, of whom 300,015 were white and 109,731 were colored. Average daily attendance was 261,747. Teachers employed numbered 10,175, and of these 8227 were white and 1948 were colored. Expenditures for the maintenance of schools in 1913 were $4,279,478. There were 93 State high schools in 1911–12, and 60 unaided high schools. In 1912 school property was valued at approximately $10,000,000, while in 1900 its value was only $2,500,000. The Legislature of 1911 provided liberal appropriations for the maintenance of the State University, State normal school, the four agricultural schools, and the deaf, mute, and blind schools. This Legislature passed a provision making the Medical Department of Arkansas Industrial University a part of the State University. A constitutional amendment providing for uniform text-books was defeated at the election held in September, 1912, by a small majority. A commission of 20, appointed by the Governor, with the State Superintendent of Public Instruction as chairman, carries on work with funds provided by the Southern Educational Board. The first report of this commission was made in 1911. In 1912–13 an educational building was erected at the State University; for this the Peabody Board gave $40,000. The four district agricultural schools referred to above, which were opened in 1912, are at Jonesboro, Russellville, Magnolia, and Monticello. Universities in the State include the University of Arkansas, at Fayetteville; Philander Smith College, at Little Rock; Ouachita College and Henderson College, at Arkadelphia, and Hendrix and Central Baptist College, at Conway.

Charitable and Penal Institutions. These include a lunatic asylum, schools for the blind, the deaf and mute institute, and a State penitentiary, all located at Little Rock. The Legislature of 1911 provided for juvenile courts in the counties of the State, and the Legislature of 1909 made provision for tuberculosis sanitariums. Convicts are leased to contractors, and the system has led to abuses similar to those which have marked its use in other States. Governor Donaghey recommended to the special session called in 1911 the adoption of provisions for the proper management and control of the State Penitentiary and the abolition of the convict labor system. These recommendations were disregarded, and on December 16 the Governor paroled 360 State convicts. As the result of this action, three county convict camps in which convicts were leased to contractors were wiped out of existence. Governor Donaghey claimed that his fight against this system received little or no support in the Legislature. He recommended that the Legislature of 1913 abolish the system.

Religion. As is common in the southern States, the Baptist and Methodist churches contain the bulk of the church membership. Of the other churches represented, the Presbyterian and the Christian are the only ones that have obtained any considerable following.

Population. The population of the State by decades is as follows: 1820, 14,273; 1830, 30,388; 1840, 97,574; 1850, 209,897; 1860, 435,450; 1870, 484,471; 1880, 802,525; 1890, 1,128,179; 1900, 1,311,564; 1910, 1,574,449; 1920, 1,752,204. The density of population in 1910 was 30 per square mile, compared with 24.7 in 1900. Of the total population in 1910, 1,131,026 were white and 442,891 colored, of 71.8 per cent white and 28.1 per cent colored. In 14 of the 75 counties of the State, more than half the population were negroes, but in 26 counties negroes form less than five per cent of the total. Negroes are most numerous in the southwest. The native whites of native parentage constitute 68.4 of the total population, and 95.3 of the white population. The native whites of foreign or mixed parentage constitute only 2.3 per cent of the total population, and foreign-born whites 1.1 per cent. Arkansas is

notable for the large percentage of its rural population. In 1910 the 28 incorporated places having each 2500 or more inhabitants contained only 12.9 per cent of the total population. The strictly rural population, not in cities and towns, however, decreased from 82.9 per cent in 1900 to 76.1 in 1910. Males of voting age in 1910 numbered 395,824, compared with 313,836 in 1900. The total number of foreign-born whites, which represents the number added by immigration, was, in 1910, 53,517. Of these, only 16,909 were foreign born. The largest percentage of immigrants came from Germany. The largest cities in 1910 were Little Rock, the capital, 45,941; Fort Smith, 23,975; Pine Bluff, 15,102; Hot Springs, 14,434; Argenta, 11,138; Helena, 8772; Jonesboro, 7123; Texarkana, 5655, and Paragould, 5248. For further details on these towns see separate articles under each.

Government. The present constitution, which is the third for the State, was adopted by a vote of the people in 1874. Either house may propose an amendment to the constitution, which, if approved by a majority of both houses and by a majority of the voters at the next general election, is adopted. To enjoy the right of suffrage one must have resided in the State one year, in the county six months, and in the precinct or ward one month, while an amendment passed in 1893 further restricts the suffrage to those who have paid a poll tax. State elections are held every two years, on the second Monday in September. Some further provisions of the constitution are: "No person who denies the being of a God shall hold any office in the civil departments of this State, nor be competent to testify as a witness in any court." Six per cent is the legal rate of interest; all contracts for a greater rate than 10 per cent are void. Arkansas has nine electoral votes.

As will be noted in the paragraphs on *History* below, a constitutional amendment providing for the initiative and referendum was carried by vote of the people in 1910. The Legislature of 1911 formulated laws to carry this amendment into effect. In the main, these measures are similar to those enacted in other States. Five per cent of the legal voters of the State may, 90 days after the adjournment of the Legislature, by petition, order a referendum upon any law of general character passed by the Legislature; and five per cent of the voters in the cities and towns may order, by similar petition, a referendum on measures perfecting these municipalities. A majority of the votes cast in such referendum makes a law effective.

Eight per cent of the legal voters may, at any time more than four months before the regular session of the Legislature, propose any amendment to the constitution or measure of general legislation, except measures pertaining to the regulation of liquor. If such laws or amendments receive a majority of the legal votes cast, they become laws or amendments of the State.

Legislative.—The representatives to the State Legislature are elected for a term of two years, and cannot exceed 100 in number, each county being entitled to one member, while the extra members are distributed among the more populous counties. Thirty and 35 are respectively the minimum and maximum limits to the number of Senators, who are elected from districts of contiguous counties for four years. Legislative sessions are limited to 60 days, unless extended by a two-thirds vote of each house.

Executive.—The Governor, Secretary of State, Treasurer, Auditor, and Attorney-General are each elected for a term of two years. The salary of the Governor is $4000 per annum. His veto may be overridden by a majority vote of each house. If the office of Governor becomes vacant 12 months before the expiration of the term, a new election is held to fill the vacancy—if the vacancy occurs within that period, the President of the Senate completes the term.

Judiciary.—There is a supreme court of five members, each elected for eight years; a number of circuit courts, each member of which is elected for four years; a probate and county court for each county; and at least two justices of the peace for each township, the justices of the peace and county judges being elected for terms of two years. The General Assembly also vests such jurisdiction as may be deemed necessary in municipal corporation courts, courts of common pleas, where established, and when deemed expedient, and establishes separate courts of chancery.

Elections.—The Legislature of 1909 passed an act regulating primary elections of the State. This law legalized all primaries, held for State or national offices. The law makes it a misdemeanor to solicit gifts for candidates and provides that the latter must file itemized accounts of the expenses and expenditures during the campaign.

Local Government.—Each county has a sheriff, assessor, coroner, treasurer, and surveyor, each elected for two years. Each township has a constable, who is elected for two years. The Legislature may create other local offices. The county court, together with a majority of the justices of the peace, levies road taxes when the people have voted in favor of such a measure. The Legislature provides, by general laws, for the organization of cities (which may be classified) and incorporated towns and can place certain restrictions upon them.

Militia.—The total number of males of militia age in the State in 1910, according to the thirteenth census, was 311,792. According to the report of the Adjutant-General in 1912, there were in that year 326,565 males available for military duty. The organized militia is composed of two regiments of infantry, of 12 companies each. These are combined into a brigade called the First Brigade. The total number of enlisted men in these regiments in 1912 was 1328 with 139 officers. The designation of the organized militia is the Arkansas National Guard.

History. The name "Arkansas" was that of an Indian tribe found by the first explorers within the limits of the present State. About 1685 Frenchmen settled at Arkansas Post. Arkansas formed a part of Louisiana Territory till 1812, and of Missouri Territory till 1819, when it was organized as Arkansas Territory, including the land within the boundaries of what was formerly Indian Territory. On June 15, 1836, it became a State. Though settled chiefly from the South, it was fairly divided between Unionists and Secessionists in the early part of 1861; but President Lincoln's call for troops led to the passing of an ordinance of secession on May 6, 1861. The Confederates were defeated at Pea Ridge, March 7–8, 1862, and at Prairie Grove, December 7. Helena was occupied by Union forces, and Arkansas Post was captured on Jan. 11, 1863. With the fall of Little Rock, Sept. 10, 1863, the Confederate power in the State collapsed. In October and November Union delegates from

20 counties met at Fort Smith to take steps to reorganize the State government, and in January, 1864, a convention met at Little Rock and framed a constitution, which was accepted by the people, but rejected by Congress. Under the Reconstruction Act of 1867, a constitutional convention met, Jan. 7, 1868, at Little Rock, and framed a constitution, which was ratified March 13, by a small majority. On June 22 the State was readmitted to the Union. In April, 1874, an armed collision occurred between the adherents of two rival claimants for the governorship. Federal aid was invoked, and President Grant formally recognized Baxter, Republican, as the lawful Governor. In 1874 a new constitution was adopted. It marked a radical change in the existing law and was in the main a return to ante-bellum conditions. The prosperity of the State has increased with the development of its rich mineral resources.

The Legislature of 1907 passed a number of severe laws aimed at the regulation and control of railways passing through the State. Their attempted enforcement brought the authorities into conflict with the Federal government. (See STATE RIGHTS.) In the election of Nov. 3, 1908, Bryan received 87,015 votes; Taft, 56,624. George W. Donaghey, Democrat, was elected Governor, receiving 111,478 votes, to 45,400 cast for the Republican candidate. The Legislature of 1909 voted to submit to the people amendments to the constitution providing for the initiative and referendum, and for the exemption from taxation for a period of years of capital invested in cotton manufacture. Election on the amendments was held in September, 1910. The amendment providing for the initiative and referendum was carried by a majority of 52,303 votes. The amendment relating to cotton manufacture failed. At this election Governor Donaghey was reëlected for a second term. At the session of 1911 the Legislature made a provision for a vote on an amendment to the constitution carrying into effect the so-called "Grandfather Clause," for the purpose of eliminating the negro vote. At a special session held in the same year measures were passed carrying into effect the initiative and referendum law, adopted in 1910. The State campaign in 1912 was on the issue of State-wide prohibition of the sale of intoxicating liquors. Governor Donaghey, who was a candidate at the primaries for renomination, favored prohibition, while his opponent for the nomination, Joseph T. Robinson, favored local option. Governor Donaghey was defeated, and Mr. Robinson became therefore the Democratic candidate for Governor. At the State election held on Sept. 9, 1912, four acts and five amendments to the constitution were voted upon. The acts provided for the reduction of rate of taxation, for State-wide prohibition, for amendments to the election laws of the State, and for the creation of a text-book commission. The amendments provided for the "Grandfather Clause" referred to above, the amendment previously adopted providing for the exemption from taxation of capital invested in cotton mills and for the recall of State officers. Other amendments provided for the changes in the State laws for taxation. Of these nine acts and amendments, only the amendment providing for the limitation of the pay of legislators for 60 days was accepted. The amendment providing for the recall of State officers received a majority of the votes cast, but not a majority of the votes of the candidate who received the highest vote. The courts therefore ruled that this amendment was not adopted, and furthermore that it was illegally proposed, having been the fifth amendment submitted, whereas by law only three amendments may be submitted at a time. At this election Joseph T. Robinson was elected Governor, receiving 109,826 votes, against 46,240 votes cast for his Republican opponent. The Progressive party had no candidate for Governor. The vote for President in the election held on Nov. 5, 1912, was, for Wilson, 67,838; for Taft, 24,297; for Roosevelt, 22,673. The death of Senator Jeff Davis on Jan. 3, 1913, made it necessary for the Legislature to choose his successor. Governor Robinson, inaugurated on January 14, was elected Senator on January 29. On March 8 he resigned and was succeeded by W. K. Oldham, President of the Senate, who served until March 23, and was succeeded by J. M. Futrell, who had been elected President of the Senate to succeed him. George W. Hays was elected Governor in July, and took office August 6.

Since 1876 the Democrats have been victorious in State and national elections. The electoral vote has been cast as follows: in 1836 and 1840, for Van Buren and Johnson, 3; 1844, Polk and Dallas, 3; 1848, Cass and Butler, 3; 1852, Pierce and King, 4; 1856, Buchanan and Breckenridge, 4; 1860, Breckenridge and Lane, 4; 1864, no vote; 1868, Grant and Colfax, 5; 1872, 6 votes not counted; 1876, Tilden and Hendricks, 6; 1880, Hancock and English, 6; 1884, Cleveland and Hendricks, 7; 1888, Cleveland and Thurman, 7; 1892, Cleveland and Stevenson, 8; 1896, Bryan and Sewall, 8; 1900, Bryan and Stevenson, 9; 1904, Parker and Davis, 9; 1908, Bryan and Kern, 9; 1912, Wilson and Marshall, 9.

The following is a list of the Governors:

TERRITORIAL

James Miller	1819–25
George Izard	1825–29
John Pope	1829–35
William S. Fulton	1835–36

STATE

James S. Conway	Democrat	1836–40
Archibald Yell	"	1840–44
Samuel Adams	"	1844
Thomas S. Drew	"	1844–48
John S. Roane	"	1848–52
Elias N. Conway	"	1852–60
Henry M. Rector	"	1860–62
Harris Flanagan	"	1862–64
Isaac Murphy	Republican	1864–68
Powell Clayton	"	1868–71
Ozro A. Hadley	"	1871–72
Elisha Baxter	"	1872–74
Augustus H. Garland	Democrat	1874–77
Wm. R. Miller	"	1877–81
Thomas J. Churchill	"	1881–83
James H. Berry	"	1883–85
Simon P. Hughes	"	1885–89
James P. Eagle	"	1889–93
William M. Fishback	"	1893–95
James P. Clarke	"	1895–97
Daniel W. Jones	"	1897–01
Jeff Davis	"	1901–07
John S. Little	"	1907–09
George W. Donaghey	"	1909–13
Joseph T. Robinson	"	1913
W. K. Oldham	"	Mar. 8–23
J. M. Futrell	"	Mar. 23–Aug. 6
George W. Hays	"	1913–17
C. H. Brough	"	1917–21
Thomas C. McRae	"	1921–

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ARKANSAS, UNIVERSITY OF. A State institution at Fayetteville, Ark., founded in 1871. It has a medical and a law school at Little Rock and a branch normal college for negroes at Pine Bluff. The main divisions of the university, situated at Fayetteville, comprise a College of Liberal Arts and Sciences, a College of Engineering, a College of Agriculture, a Department of Education, and an Agricultural Experiment Station. These divisions are supported by the aid of Federal and State endowments and appropriation and have an income of about $240,000; grounds, buildings, and equipments valued at more than $1,000,000; and a library of about 35,000 volumes. In 1913 there were 80 professors and instructors and 800 students in the divisions at Fayetteville. The Medical School at Little Rock receives from the State an annual appropriation of about $20,000 in addition to the fees paid by students. The Law School has only a nominal connection with the university and is entirely supported by students' fees. The Branch Normal College at Pine Bluff receives support from both the Federal and State governments. Tuition is free in all the divisions of the university except in the professional schools. Acting president, John C. Futrall, M.A.

ARKANSAS CITY. A city in Cowley Co., Kan., 51 miles south by east of Wichita, on the Atchison, Topeka, and Santa Fe, the Missouri Pacific, the Kansas Southwestern, the Midland Valley, and the St. Louis and San Francisco railroads (Map: Kansas, E 8). The principal features of interest are the United States Indian School, a Manual Training College, a Carnegie library, a high school, an opera house, two parks, and several bridges. The city is near the confluence of the Arkansas and Walnut rivers, which are connected by a canal that furnishes water power for manufacturing. It is the centre of a highly productive agricultural and stock-raising country; manufactures flour, lumber, windmills, mattresses, ice, yeast, carriages, and creamery products; contains railroad repair shops and planing mills; and from its location near the southern boundary of Kansas, has an important trade with the Indian agencies and military posts in Oklahoma. It is the centre of the new Western oil fields. Settled in 1870, Arkansas City was incorporated the following year, and in 1912 adopted the commission form of government. The water works are owned and operated by the municipality. Pop., 1890, 8347; 1900, 6140; 1910, 7518; 1920, 11,253.

ARKANSAS RIVER. Next to the Missouri, the largest affluent of the Mississippi River (Map: United States, Eastern Part, G 3). It rises in central Colorado, flows east into Kansas, and out again east of the middle of the south boundary of the same State, southeast across Oklahoma and diagonally across Arkansas, bisecting it into nearly equal parts and emptying into the Mississippi. The river is about 2000 miles long, navigable for small steamboats to Wichita, Kan., 650 miles, and drains an area of 188,000 square miles. Much of the water in its upper course is used for irrigation purposes. In Fremont County, central Colorado, it flows through the Royal Gorge, one of the deepest cañons in the United States. In its upper course the current is very rapid, but in its lower portion it is slow, and the tortuous river bed is sandy and broad. It receives the Salt Fork, Cimarron, and the Canadian from the west in Oklahoma, and the Verdigris and Grand rivers from the north.

ARKANSAS STONE. See NOVACULITE.

ARKANSAS TRAVELER, THE, är'kan-sa. A comic dialogue or rustic drama, with musical accompaniment, in which the two parts represented are an Arkansas squatter (a fiddler) and the Arkansas Traveler. It was a great favorite in the taverns and hotels of the West and Middle West when there were but few railroads. The person who took the part of the squatter was usually seated on a broken-backed chair or a box on the table in the centre of the room, where he attempted to play on a violin the first part of the tune "The Arkansas Traveler," which he was supposed to have heard at a theatre in New Orleans. During the attempt, which was unsuccessful, he was subjected to a running fire of teasing questions by a person who approached him, and who proved to be the Traveler himself. The latter, after more dialogue, took the violin and played the second part, but refused to play the first. Consult *Ohio Archæological and Historical Society Publications*, vol. viii, pp. 296–307 (Columbus, 1900).

ARKLOW. A small seaport town of county Wicklow, Ireland, about 50 miles south of Dublin (Map: Ireland, E 4). Powder is manufactured, and fishing is carried on to a large extent. Lead and copper are exported. Near the town is Shelton Abbey, the seat of the Earl of Wicklow. In the uprising of 1798 the Irish were defeated here by the British. Pop., 1891, 4172; 1901, 4944; 1911, 5042.

ARK OF THE COVENANT, ARK OF THE TESTIMONY, ARK OF YAHWE, or ARK OF GOD. According to the data furnished in the Bible, this was one of the most important parts of the furniture of the tabernacle constructed in the Wilderness, and afterward of the temple built by Solomon at Jerusalem. We have two descriptions of it in the Pentateuch, Ex. xxv. 10–22 and xxvii. 1–9.

From these descriptions it appears that the ark was a chest of shittim-wood (very generally supposed to be the wood of a species of acacia, but by some regarded as that of the wild olive), overlaid with gold within and without, two cubits and a half in length, one cubit and a half in breadth and in height, with a crown or raised border of gold round about. Within the ark was deposited the "testimony," consisting of "the two tables of the Law"—i.e., the stone tablets upon which the Ten Commandments were inscribed (Ex. xl. 20). The golden lid of the ark was called the *mercy-seat* or *propitiatory;* above it were the *cherubim* (see CHERUB),

made of the same piece of gold with it, and between them the place of the *Shechinah*, or manifestation of the Divine Presence. It should, however, be mentioned that neither in Deuteronomy nor in the Books of Kings are these figures of the cherubim mentioned. The ark had golden rings, through which passed staves of shittim-wood, overlaid with gold, for carrying it in the journeyings of the Israelites, concerning which very particular rules were laid down (Num. iv.). While being carried from one place to another, it was covered first with a "covering of badgers' skins," and above this with a "cloth wholly of blue"; and when reposing in the tabernacle and temple it was put into the "most holy place," into which the high priest alone was to enter upon the Day of Atonement. After the tabernacle had been set up at Shiloh, the ark was deposited there (Josh. xviii. 1). When Israel sustained defeat at the hands of the Philistines at Eben-ezer, they sent to Shiloh for the ark (1 Sam. iv. 3–5). In the battle which followed, the Philistines captured the ark; they carried it about to several places in their land, but in each place misfortune followed its arrival, and at the advice of their diviners the Philistines returned the ark to Israel at Beth-Shemesh, whence it was removed to Kirjath-Jearim (1 Sam. iv. 11–viii. 2); hence David removed it to Jerusalem (2 Sam. vi. 1), and Solomon assigned it a place in the temple (1 Kings viii. 6). What finally became of the ark is unknown; perhaps it was captured in Nebuchadnezzar's siege of Jerusalem. At any rate, there was no ark in the second temple (Josephus, *B. J.*, 5, 5). In Jer. iii. 16, 17, an oracle is preserved foretelling that in the prosperous time to come the ark shall not be remembered or thought of or made again, but Jerusalem is to be the throne of Yahwe. There apparently was a plan of building a new ark. According to 2 Maccabees ii. 1, Jeremiah hid the ark on Mount Nebo, and Syriac Baruch vi. 5–10 relates that during the siege of Jerusalem by the Chaldæans the temple mountain opened itself, at the command of an angel, and swallowed up the ark and other sacred vessels to be kept there until the time of the restoration.

It is not easy, from the various accounts of, and references to, the ark in the Old Testament to obtain a clear idea of what the ark actually was, or what was its age. Egyptians, Babylonians, and other ancient nations carried the images of their gods about in portable shrines, and arks containing sacred symbols were brought in solemn procession from one sanctuary to another or into the battle. The ark of Yahwe seems to have been regarded as his abode. Its cover was his throne. Hence his name: "Yahwe Zebaoth who sits upon the cherubs" (1 Sam. iv. 4). When the ark was brought with the army to the battle, it was said, "Rise, O Yahwe, thine enemies be scattered! Let those who hate thee flee before thy face!" After the battle the anxiety that his presence in the midst of his people should insure continued prosperity expressed itself in the cry, "To Israel's thousands, O Yahwe, return!" (Num. x. 35, 36). The account of the capture of the ark by the Philistines shows that where it rested, there Yahwe himself was supposed to have his abode for the time being. It should be borne in mind, however, that a stone, a chest, or a building may be thought of as the place where a divine being chooses by preference to dwell or to manifest himself without excluding on this account the idea that his power may be independent of it and extend far and wide beyond its boundary. In fact, the glory of Yahwe, sitting on this throne, suggests a celestial being whose home may also be said to be in heaven. Our account of the ark is supposed by some scholars to be a description of this ancient palladium as it appeared in the days of Solomon. As to the original contents of the ark, it has been assumed by some that it once consisted of a stone symbolizing the deity, but there is no evidence for this assumption. The name it had at the time when Deuteronomy was written (see PENTATEUCH) shows that it was then at least regarded as containing the tables of stone engraved with commandments. Consult: Dibelius, *Die Lade Jahves* (1906); Budde, "War die Lade Jahves ein leerer Thron?" in *Theologische Studien und Kritiken* (1906); Gressmann in *Die Religion in Geschichte und Gegenwart*, vol. ii (1910); Schmidt, *The Messages of the Poets*, pp. 321 ff. (1911).

ARKO'NA. The most northern point of the Wittow Peninsula, on the Prussian island of Rügen, in the Baltic (Map: Prussia, E 1). It rises about 145 feet above the sea, and has a lighthouse, erected in 1826.

ARKOSE, är-kōs'. See SANDSTONE.

ARK SHELL, or NOAH'S ARK. A marine bivalve mollusk, common along the eastern coast of the United States and representing the cosmopolitan family Arcadæ. The shells do not exceed 3 inches in length, are ventricose, hairy, and have the hinge margin long and perfectly straight. As the umbones are wide apart, this leaves a sort of flat "deck," which probably led Linnæus to the rather fanciful designation. They dwell near shore, especially where weedy rocks abound, but one species is known in the inland fresh waters of India. The commonest American species is *Arca pexata* (called "bloody clam," on account of its red gills and exudations), which is covered with coarse hairs. See Plate of ABALONE, ETC.

The genus *Arca* has existed for a great length of time, its ancestors being found in the rocks of all geological periods since the Ordovician, but in special abundance in the Tertiary deposits of all countries.

ARK'WRIGHT, SIR RICHARD (1732–92). Celebrated for his invention of cotton-spinning machinery, was born at Preston, in Lancashire, England. Of humble origin, the youngest of 13 children, and bred to the trade of a barber, his early opportunities of cultivation were exceedingly limited. In 1761 he gave up his business as a barber in Bolton, to become a traveling dealer in hair, and the profits of his trade were increased considerably by a secret process for dyeing hair which he had acquired. His residence in the midst of a cotton-spinning population naturally led him to take an interest in the processes used in that manufacture, and his mind was soon turned toward improved methods. Having no practical skill in mechanics, he secured the services of a watchmaker, named Kay, to assist him in the construction of his apparatus. About 1767 he seems to have given himself wholly up to inventions in cotton-spinning machinery. In the following year he removed to Preston, where he set up his first machine, the celebrated *spinning-frame*, consisting chiefly of two pairs of rollers, the first pair, which were in contact, revolving with a slow

motion, and passing the cotton to the other pair, which revolved with such increased velocity as to draw out the thread to the required degree of fineness. A subsequent operation was to spin the yarn from these threads. No previously invented machinery had been able to produce cotton thread of sufficient tenuity and strength to be used as warp. An invention, indeed, by Charles Wyatt of Birmingham, which was patented in 1738, but never succeeded, deprives Arkwright of the honor of having been the first to use rollers in spinning; but there is no reason to believe that he owed anything to this previous attempt. The first suggestion of the idea, he said, was derived from seeing a red-hot iron bar elongated by being made to pass between rollers. At this time Arkwright was so poor that he needed to be furnished with a suit of clothes before he could appear to vote at an election as a burgess of Preston. Soon after, he removed to Nottingham, to escape the popular rage, which had already driven Hargreaves, the inventor of the *spinning-jenny*, out of Lancashire. Here he fortunately fell in with Jedediah Strutt of Derby, the celebrated improver of the *stocking-frame*, who entered into partnership with him, in conjunction with his partner, Mr. Reed. In 1769 Arkwright set up his first mill, driven by horses, and took out a patent for his invention. In 1771 he set up a larger factory, with water power, at Cromford, in Derbyshire. Not only was his labor-saving machinery well arranged and ingeniously devised, but he effected such a division of labor and organization of his employees that the greatest efficiency of production was secured. From these mills of Arkwright the modern factory system takes its origin. He was one of the first to introduce the steam-engine into his factories, and the mill at Nottingham was supplied with a Boulton and Watts steam-engine of 1790. The remarkable capabilities of his mind were strikingly evinced in the management of the great business. In 1775 he took out a fresh patent for various additional improvements in machinery. The success attending these undertakings stimulated rivals to invade his patent; and to such an extent did other cotton-spinners use his designs that he was obliged, in 1781, to prosecute at once nine different manufacturers. The first action against Colonel Mordaunt, backed by a strong combination of Lancashire manufacturers, was lost, solely on the ground that the description in his specification was not sufficiently clear and distinct. The other actions were abandoned; and in the following year Arkwright published a pamphlet containing a statement of his case. In a new trial, in 1785, he obtained a favorable verdict. The whole question, however, was brought finally before the Court of King's Bench, a few months after, when Arkwright's claim to the inventions patented was for the first time called in question. On the doubtful evidence of a person named Highs, or Hayes, combined with that of Arkwright's old assistant, Kay, the jury decided against him, and his patent was annulled. This was but the formal outcome of an opposition which had from the beginning marked out Arkwright as an object of hostility. The manufacturers at first combined to discountenance the use of his yarn. When the yarn was made into calicoes, and Parliament was petitioned to lessen the duty on that cloth, they strenuously opposed the measure, but in vain. Popular animosity was also excited against the man who apparently displaced labor but in reality increased its sphere; and on one occasion a large factory belonging to Arkwright was destroyed in the presence of a powerful military and police force, without a word of interference from the magistrates. The energy and good sense of Arkwright triumphed over all opposition, and at the time of his death, in 1792, the value of his property amounted to about $500,000. In 1786 he was appointed high sheriff of Derbyshire and was also knighted by George III. Consult Baines, *History of the Cotton Manufacture* (London, 1861), and Ure, *The Cotton Manufacture of Great Britain* (London, n.d.). See SPINNING.

ARLBERG, ärl'bĕrk. A famous mountain pass between the Rhætian and the Lech Alps, connecting Tyrol with Vorarlberg (Map: Austria, B 3). It lies at an altitude of 5840 feet, along the watershed between the Danube and the Rhine. In 1786 a road was laid across the pass which in those times formed the only means of communication between Vorarlberg and the rest of Austria. The construction of the Arlberg Railway from Innsbruck to Bludenz, begun in 1880, necessitated the cutting of a tunnel through the pass. The tunnel, situated between St. Anton and Langen, with a length of 6.5 miles, completed the most direct route between Vienna and Paris. The highest point of the tunnel is 4260 feet, and the difference between the altitudes of the eastern and western ends is 280 feet. The tunnel was completed in 3½ years, at a cost of over $7,500,000, and was opened to traffic in September, 1884.

ARLES, *Fr. pron.* ärl; *Eng. pron.* ärlz (anciently, Lat. *Arelate*, or *Arelas*, from Celt. *Arlaeth*, on the marshy land). One of the oldest towns in France, in the department of Bouches-du-Rhône, situated on the left bank of the principal branch of the Rhône, after it has divided into a delta (Map: France, S., J 5). Although 27 miles from the mouth of the river, Arles carries on considerable trade. It has manufactures of silk, hats, flour, etc., and forms a market for the productions of the surrounding country. It possesses a college, a naval school, a public library, and several museums, one of which occupies the old church of St. Anne. The most interesting of these is located in the Tribunal de Commerce and was patronized by Mistral. A canal has been cut which connects Arles with the Mediterranean. Railways bring it into easy communication with Marseilles, Avignon, Nîmes, Montpellier, etc. Under the Romans it was the seat of a prefecture; afterward, for some time, the residence of the Gothic King Euric, and from 879 the metropolis of the kingdom of Arles, or of Cisjurane Burgundy (see BURGUNDY). This kingdom was united in 933 with that of Transjurane Burgundy, and this larger Arletan realm was ruled by native kings until 1032. On the extinction of this line the Arletan territories were taken possession of by the German Emperor Conrad II. In the early Christian times several important councils were convened here (in 314, 353, 452, and 475). At the famous council (synod) of 353 the cause of Arianism gained a temporary triumph. Among the antiquities of Arles are an amphitheatre (Les Arènes), which accommodated between 20,000 and 30,000 spectators; the ruins of a theatre; also of a palace of Constantine the Great; an obelisk of granite dug up from the mud of the Rhône in 1389; a burial-place (the Elysian

Fields) used by the Romans; and a Romanesque cathedral dedicated to St. Trophimus, the western portal of which is a unique example of Gallo-Byzantine art. Pop., 1896, 12,755; 1901, 15,506; 1906, 16,363; 1911, 16,746.

ARLES, THE KINGDOM OF. See BURGUNDY.

ARLINCOURT, är'lăN'kōōr', CHARLES VICTOR PRÉVOT, VICOMTE D' (1789–1856). A French poet and novelist, born near Versailles. He commended himself to the favor of Napoleon by the publication of the flattering allegory *Une matinée de Charlemagne* (1810), for which he was rewarded with offices at court. Under Louis XVIII he was appointed *maître-des-requêtes*, but after the Hundred Days was obliged to resign. He wrote several novels, including *Le solitaire* (1821), *Le rénégat* (1822), and *L'étrangère* (1825), of which the first named was extensively read and many times translated. His tragedy *Le siège de Paris*, played at the Théâtre Français, in 1827, was greeted with outbursts of derisive laughter.

AR'LINGTON. A residential town of Middlesex Co., Mass., on the Boston and Maine Railroad, 6 miles northwest of Boston. Market gardening, ice cutting, and the manufacture of piano cases, picture frames, and machines are leading industries (Map: Massachusetts, E 3). Arlington has a fine public library, a hospital, and its water supply is furnished under the metropolitan system. Town meetings are held in March and November and at special times on all matters of appropriation. Settled about 1650, Arlington was separated from Cambridge and incorporated as West Cambridge in 1807 and received its present name in 1867. Pop., 1900, 8603; 1910, 11,187; 1920, 18,665. Consult Cutter, *History of the Town of Arlington* (Boston, 1880) and Parker, *Town of Arlington, Past and Present* (Arlington, 1907).

ARLINGTON. A village in Alexandria Co., Va., opposite Washington, D. C. It was formerly the home of Robert E. Lee, but his property was seized by the government during the Civil War and is now the site of a national cemetery, in which some of the most prominent officers of the United States army are buried. The cemetery is one of the largest and most beautiful in the United States. There are 18,151 graves, 4608 of which contain unknown dead. The old Lee mansion, with its stately portico, is one of the finest specimens of Colonial architecture. Pop. (district), 1890, 2013; 1900, 3200; 1910, 5850.

ARLINGTON, HENRY BENNETT, EARL OF (1618–85). An English statesman of the period of Charles II. He was born at Arlington, studied at Oxford, and for a long period fought in the Civil War. He soon left England, however, for France, where he became in 1654 secretary of James Stuart. In 1658 he was sent to Madrid, and there he remained until after the Restoration. In 1662 he returned and was made Secretary of State, in which position his knowledge of foreign affairs made him an influential counselor. He joined the party opposed to Clarendon and after his fall became a member of the famous Cabal. He had assisted in the formation of the Triple Alliance of England, Holland, and Sweden to oppose Louis XIV, but in 1670 turned directly about and joined with the rest of the Cabal in the negotiation of the Treaty of Dover, by which Charles promised to assist Louis against Holland. Together with this open treaty was a secret one by which Charles promised to declare himself a Catholic and to work for the restoration of Catholicism in England. To this secret Arlington, as a reputed Catholic, was admitted, and he assisted with great success in the work of deceiving the other members of the Cabal. The Dutch War and the Declaration of Indulgence, which Arlington supported, destroyed the Cabal ministry, and Arlington fell with them. An attempt was made to impeach him in Commons for furthering Popery, embezzlement, and betrayal of trust, but the attempt failed. However, his influence was gone, though he tried desperately to retain it by throwing himself into the popular party. In 1678, after a disastrous break with Denby, he retired to private life and died in comparative obscurity, July 26, 1685. Arlington, though no great statesman, at times showed gleams of brilliancy, especially in his handling of the secret Treaty of Dover. He was reputed a Catholic, and the charge was probably true, though religion sat as lightly on him as it did on his royal master. Consult *The Arlington Letters* (London, 1710). See TORY.

ARLON, är'lôN' (anciently, Lat. *Orolaunum*). The capital of the Belgian province of Luxemburg, situated 16½ miles, by rail, northwest of Luxemburg, on an elevated plateau of the Ardennes (Map: Belgium, D 5). It contains a museum with a collection of Roman antiquities found in the neighborhood. The town has frequently suffered the ravages of war and was occupied by the French from 1684 to 1697. It came into the possession of Belgium in 1831. Pop., 1900, 10,466; 1910, 12,012.

ARLT, ärlt, FERDINAND, RITTER VON (1812–87). An Austrian oculist, born near Teplitz. He studied medicine at Prague and was professor of diseases of the eye there from 1849 to 1856, when he was appointed to a similar chair at the University of Vienna. Arlt was the author of a number of works on the eye and its diseases including *Die Pflege der Augen im gesunden und kranken Zustand* (1846); *Ueber die Ursachen und die Entstehung der Kurzsichtigkeit* (1876), a number of memoirs in the *Archiv für Ophthalmologie*, which he founded in 1854 and edited for many years. His best-known work is *Die Krankheiten des Auges für praktische Aerzte geschildert* (3 vols., 1851–56), which passed through several editions. Consult his autobiography (Wiesbaden, 1887).

ARM (Lat. neut. pl. *arma*, arms, weapons). A weapon of any kind; also used to designate a branch of the military service; as, the cavalry arm, the infantry arm, etc. It has, in addition, a wide application in naval and military terminology to express the end, or branch, of anything, particularly of articles or objects that have two similar ends, as yard arms, axle-tree arms (gun carriage), anchor arms, etc. See ARTILLERY; ORDNANCE; SMALL ARMS; SWORDS, and other weapons.

ARM (Ger., Dan., Swed., and Dutch *arm*, AS. *earm*, Icel. *armr*, Goth. *arms*, Lat. *armus*, the shoulder, Gk. *ἀρμός*, *harmos*, shoulder joint, all from the Indo-European root *ar*, to fit, join). The upper extremity of the human body. It consists of two portions—the arm, strictly so called, and the forearm; the former having one bone, the humerus, which moves freely by a globular head upon the scapula, forming the shoulder joint; and the latter having two bones, the radius and ulna, which move on the lower end of the humerus, forming the elbow joint, and below, with the carpus, forming the wrist joint.

The humerus is attached by a loose capsular ligament to the scapula, allowing great freedom of motion, and were it not for the muscles would be frequently dislocated, but it is supported by muscles on all sides except underneath or opposite the armpit, in which direction the head of the bone is often driven by violence. The roundness of the shoulder is due to the head of the humerus, so that any displacement is accompanied by a flattening, which at once suggests the nature of the accident. On the shoulder there is a large triangular muscle, the deltoid, which lifts the arm from the side. At the back is the triceps, which extends the forearm; in front are two muscles which flex or bend it—the biceps and the brachialis anticus; and on each side below are muscles passing to the forearm and hand; while above, the great muscle of the back (latissimus dorsi) and that of the chest (the pectoralis major) are inserted on each side of a groove, wherein lies one of the tendons of the biceps (q.v.). The ulna is flexed by the biceps, and extended by the brachialis anticus and the triceps. The movements of the hand are principally due to the radius, the head of which rotates upon the ulna, thereby turning the palm downward (pronation), or upward (supination), these movements being effected by muscles, which, taking their fixed points from the humerus and ulna, pull the radius round on the latter. The elbow joint is ginglymoid or hinge-like, and therefore has strong lateral ligaments; but it is liable to dislocation and fracture. The accident being often followed by severe inflammation, the joint is very apt to stiffen (see ANKYLOSIS), thereby seriously impairing the usefulness of the limb; it is, therefore, inadvisable to keep the limb too long in any one position after such an injury. (See JOINTS, DISEASES OF.) The upper extremity is supplied with blood by the brachial artery, the continuation of the axillary trunk. The veins collect into large superficial trunks, which unite at the bend of the elbow and then pass on to the axillary, on the outside by the cephalic vein, on the inner side by the basilic. These veins, being superficial and easily accessible, are generally selected for venesection, transfusion, or the injection of medicinal substances. Deep veins also accompany the arteries and pass upward to join the axillary at its commencement.

The nerves of the arm are the musculo-spiral, which winds around the upper part of the humerus to become the radial and posterior interosseous nerves; the ulnar running behind the internal condyle, for which it has obtained the term "funny bone," from the electric-like thrill which passes along the arm when the nerve is struck. The median nerve, as its name implies, keeps a middle course with the artery.

In wounds of the forearm, bleeding may be at once controlled by pressure on the brachial artery, on the inner side of the biceps.

ARMADA, är-mä'dȧ *or* är-mä'dȧ (Sp. an armed force), THE. A name especially applied to the powerful Spanish fleet equipped by Philip II in 1588 for the conquest of England. By permitting the execution of Mary, Queen of Scots, Elizabeth had awakened the indignation of all Catholics; and Scotch, French, and papal leaders forgot their differences and urged Philip to undertake the invasion of England. Santa Cruz, the ablest seaman in Spain, prepared elaborate plans for the fleet which was to subdue England. All his specifications (as to vessels, men, and equipment) had to be considerably reduced, but the King raised enormous supplies in utter disregard of the already almost intolerable burdens of the nation. No attempt was made to disguise the purpose of the unusual activities which took place in the Spanish docks between 1586 and 1588. In consequence, the English were on the alert, the crisis was prepared for, so far as the parsimony of Elizabeth would permit; and in the spring of 1587 Drake raided the Spanish coast and burned all the equipment and supplies of the fleet, causing a delay which gave the English another full year in which to prepare for the attack. Early in 1588 Santa Cruz and his vice-admiral, Paliano, died, and the expedition was intrusted to the Duke of Medina Sidonia, who was wholly unfit for the command. Similar want of judgment was shown in the appointment of the other officers, destined to meet in battle such English seamen as Howard, Drake, Frobisher, and Hawkins. The Spanish counted the victory already won and named the fleet the "Invincible Armada." The English, on the other hand, were anxious but determined. The Spaniards blundered at the very outset. Alessandro Farnese, Duke of Parma, was in Flanders with a large army intended for the invasion of England, but failed to coöperate with Medina Sidonia. The fleet itself, which consisted of 131 vessels with 8000 sailors and 19,000 soldiers, left Lisbon on May 29, 1588. On account of delays due to storms and mismanagement, it was the 30th of July before the English Channel was reached. The fleet now numbered only about 120 ships, of which 70 could not be used in an engagement. The main English fleet, under the chief command of Lord Howard of Effingham, consisted of about 80 ships, all of them available for action; considerably smaller than the Spanish vessels, but much more easily handled and with superior fighting equipment. The English commanders took advantage of this fact and avoided a close contest, such as the Spanish hoped for. Hardly a battle occurred, but for a whole week the light English vessels hung on the rear and flanks of the Armada as it lumbered up the Channel, raking the galleons with rapid shot and escaping almost unharmed from the Spaniards' slow delivery. On August 7 the Armada was driven close to the port of Gravelines, where on the following day Drake made a spirited onslaught upon the Spanish ships. Many of the galleons of the invaders were riddled by the English guns. After a hasty council of war it was recognized that Parma's army could not be transported to England, and Medina Sidonia turned toward Spain. The English gave chase for a short distance, but soon retired, not being provisioned for a long pursuit. It was necessary for the Armada first to sail around the Orkneys, on account of the direction of the wind. A fearful voyage followed, ship after ship being wrecked on the rocky coasts of Scotland and Ireland, and only about 50 vessels returned home. Both Philip and Elizabeth seem to have ascribed the failure of the expedition to the storms, which in fact did very largely influence the result; but the English fleet had almost every advantage that counts in a naval engagement, so that the result under any circumstances could hardly have been otherwise. The destruction of the Armada was the collapse of Spain's naval power.

For a detailed account, consult: Froude, *History of England* (London, 1856–70), and *The*

Spanish Story of the Armada (London, 1892); Creasy, *Fifteen Decisive Battles* (New York, 1858); Hakluyt, *Principall Navigations* (London, 1589); Corbett, *Drake and the Tudor Navy* (London, 1898); Gardiner, *Historical Biographies*, "Drake" (London, 1894); Hale, *The Story of the Great Armada* (London, 1913).

AR'MADIL'LO (Sp. dim. of *armado*, armed, referring to its bony shell). 1. An edentate mammal of the South American family Dasypodidæ, especially characterized by its bony armor. The term "edentate" is singularly inapplicable to these creatures, as all are provided with true teeth, and indeed from 40 to as many as 90. These are weak, destitute of true roots, and set well apart. The muzzle is elongated, and the tongue is smooth and slender, with a glutinous saliva, adapted to the capture of ants and other insects, after the manner of the ant-eaters, but not long and extensile, like theirs. The limbs are short and strong, as are also the claws, and the animals have a great aptitude for digging and burrowing, by means of which they seek to shelter themselves from enemies—burrowing in sand or soft earth with such rapidity that it is almost impossible to dig them out, and indeed it can only be done by persevering till they are exhausted.

The feature which peculiarly distinguishes the *armadillo*, and in which the animal differs from all the other mammalia, is the bony armor with which the body is covered, and which consists of polygonal plates not articulated, united on the head to form a solid covering, and similarly to form solid bucklers over the shoulders and the haunches; and between these, disposed in transverse bands, which allow of freedom of motion to the body, similar bands in most species protecting also the tail. When alarmed or exposed to danger, armadillos, which have the middle portion of the armor divided into several bands, protect themselves by rolling up into a ball, which exposes only the hard, armored surface. The three-banded armadillo, or apar, of the Argentine pampas (*Tolypeutes tricinctus*) is famous for this and for walking on the tips of its foreclaws.

Armadillos feed not only on insects, but on vegetable and animal food of almost every kind, which by decomposition or otherwise has acquired a sufficient softness. Some of them prefer vegetable food, others delight chiefly in carrion. They are all natives of the warm and temperate parts of South America, in the woods and pampas of which they were formerly found in immense numbers; but all except the omnivorous and adaptable hairy one (*Dasypus villosus*) disappear quickly from the plains wherever a settlement is made. They are timid and inoffensive, although, when they are incautiously assailed, injury may be received from their claws. Their flesh is esteemed a delicacy, particularly that of the species which feeds chiefly on vegetable food. The largest species is fully 3 feet long, exclusive of the tail; the smallest not above 10 inches. The species are numerous, and they are divided among half a dozen or more genera, representing probably three families. The nine-banded armadillo (*Dasypus novemcinctus texanus*) occurs as far north as Texas. This armadillo may be killed by a dog biting through the outer shell, and it is probable that the hard outer covering is of more value in protecting the animal from thorns as it pushes through the tangles of cacti and other plants. The armor also reduces surface evaporation, an important factor in these semi-arid regions. Many thousand are killed annually for the sake of their armor, which is shaped into baskets. (Consult Newman, *The American Naturalist*, September, 1913.) The name "peba" is wrongly applied to the above species and properly belongs to certain South American species of the genus *Dasypus*, to which the non-burrowing peludos, common in the pampas, belong. One of the rarest and most interesting of these animals is the little pichiciago (*Chlamydophorus truncatus*), 5 or 6 inches long, a native of the Argentine Republic, living underground like the mole, which it much resembles in its habits, and feeding on the same kind of food. Its fore feet are adapted for digging, although in a different manner from those of the mole.

The skull is destitute of sutures; there are resemblances to the osteology of birds in the ribs and their union to the sternum; the hinder part of the body is altogether unlike that of any other known animal, in its terminating quite abruptly, as if cut off almost where its thickness is greatest, or as if the back were suddenly bent down at right angles, the tail not springing from where the line of the back appears to terminate, but far below. The whole upper and hinder parts of the body are covered with a coat of mail, made up of a series of square plates; the under parts and legs are covered with long silky hair. See Colored Plate of MAMMALIA; and Plate of ANT-EATERS AND ARMADILLOS.

Fossil remains of gigantic extinct armadillos have been found in the Pleistocene strata of South America, forming the genus *Glyptodon* of Owen.—In *Entomology*, armadillo is a name for wood-lice. See WOOD-LOUSE.

ARMADO, är-mä'dō. A bragging Spanish knight in Shakespeare's *Love's Labour's Lost*, evidently conceived in mockery of the euphuists.

ARMAGEDDON, är'mȧ-gĕd'dŏn. The name used in Rev. xvi. 16 to describe the place where the last battle is to be fought on the day of judgment. Some scholars regard it as a transliteration of the Hebrew *har megiddo*, 'mountain of Megiddo,' and quote in support the Argarizim, 'mountain of Garizim,' of Eupolemus in Eusebius, ix. 17, and the references to the plain of Megiddo as a battlefield. Others think that some myth is referred to. The name "Ysemmigadon" ('Υσεμμιγάδων) is found on a tablet of lead discovered in Alexandria and published in *Rheinisches Museum*, xviii, 563 (1863), and also in a magical formula in a Greek papyrus published by Kuhnert in *Rheinisches Museum*, xlix, 49 (1894), as that of a chthonic deity, the consort of Ereshkigal, the goddess of the nether world. Ysemmigadon may be a Sumerian epithet of Nergal, or Migado may be the name of another consort. The Mountain of Migado would then be the place where the battle occurred in primeval times between Migado and Ereshkigal and was expected to occur again at the end of time. Hence the phrase has come to be used for any great slaughter or final conflict.

ARMAGH, är-mä' (anciently, Gael. *Ard-macha*, Macha's Height, from *ard*, height, high). A small inland county in the province of Ulster, Ireland (Map: Ireland, E 2). Its area is about 500 square miles, of which about one-twentieth is bog and waste land. Oats, wheat, potatoes, fruit, turnips, and flax are grown, and the making of linen is an important occupation. Large

numbers of cattle, sheep, and hogs are raised. The chief towns are Armagh, Lurgan, Portadown, and Camlough. Pop., 1841, 233,024; 1891, 137,877; 1901, 125,238; 1911, 120,291.

ARMAGH. The capital of the county of Armagh, Ireland, near the Ulster Canal, 34 miles southwest of Belfast (Map: Ireland, E 2). It is situated on rising ground and is built largely of limestone quarried in the neighborhood. There are two cathedrals, a Protestant and a Roman Catholic. The former, a cruciform structure dating from the twelfth century, is built of red sandstone and is supposed to occupy the site of one erected in the fifth century by St. Patrick, the traditional founder of the city. The other is a modern building. Armagh is the seat of the archiepiscopal see of the Primate and Metropolitan of All Ireland, in the Catholic and Anglican churches, and has two archiepiscopal palaces. This city has a barracks, a college, a large library founded by Primate Robinson, and a famous observatory. Its benevolent institutions include an infirmary, a fever hospital, and a lunatic asylum. Its chief industries are linen weaving and the manufacture of yarns. Pop., 1901, 7588; 1911, 7356. Armagh, from the year 495 to the ninth century, was the metropolis of Ireland, the native kings living at Emania, 2 miles to the west of the city. It was then renowned for its school of theology and literature. Between 839 and 1092 the town was sacked five times by the Danes. After the Reformation it suffered severely in the conflicts between the English and Irish. It contained only three slated houses in 1765, but since then, owing to the exertions of Lord Rokeby and his successors to the primacy, it has been largely rebuilt. Consult J. Stuart, *Historical Memoirs of Armagh* (Dublin, 1900).

ARMAGNAC, ȧr'mȧ'nyȧk' (anciently, Lat. *Ager Aremonicus*, Aremonian territory). The name of an old district in Gascony, France, now mainly included within the department of Gers. Its capitals were Auch and Lectoure. It is a fertile, hilly country, chiefly devoted to the growing of grapes, from which the famous Armagnac brandy is made. The Counts of Armagnac played an important part in French history from the tenth century to the sixteenth. The most celebrated of the line was Bernard VII. During the Hundred Years' War they were leaders of the Nationalist party, opposed to the Burgundians and English. When peace was declared their followers turned to ravaging the country until Charles VII sent them to fight with the Emperor Frederick III against the Swiss.

ARMAGNAC, Bernard VII, Count d' (?–1418). The leader of the Orleanist party, in the reign of Charles VI of France, which, from him, took the name *Armagnacs*. The rise of this party was due to the feud between the dukes of Burgundy and Orleans over the possession of the royal power during the incapacity of Charles VI. In the struggle the Duke of Orleans was assassinated and the Burgundians gained the upper hand. Bernard, father-in-law of the Duke of Orleans, assumed the leadership, and in 1413 got possession of Paris. After the battle of Agincourt, in 1415, he became Constable of France. He ruled Paris so oppressively that the populace rose, June 12, 1418, and killed him and all of his party they could find.

ARMAGNAC, Jean V, Count d' (c.1420–1473). A grandson of Bernard; a notoriously passionate and wicked man. He secretly married his own sister, fraudulently securing a papal dispensation. Charles VII took away his possessions, but they were restored by Louis XI. Armagnac later joined the "League for the Public Good," and in consequence was driven into Aragon by the King, and his estates were forfeited. At the intercession of the King's brother the estates were returned, but Armagnac remained a fugitive and was put to death by the King's soldiers.

AR'MAMENT (Lat. nom. pl. *armamenta*, implements or utensils for any purpose; tackle of a ship). The guns and other weapons of offense supplied to a ship or fortification for use against an enemy. It includes ammunition and gun mountings, torpedoes, torpedo tubes, etc. In a broader sense, it is used to designate the whole or a part of the military and naval equipments or forces of a nation.

ARMAND, ȧr'mäN', Charles Teffin, Marquis de la Rouarie (1756–93). A French soldier in the American Revolution. Dismissed from the French service for fighting a duel about an actress, he came to America and (in May, 1777) entered the Continental army as a colonel. In October, 1779, he succeeded Pulaski in command of the "Pulaski Legion" (soon renamed "Armand's Partisan Corps") and in 1783 became a brigadier-general. He returned to France in 1783 and took an active part, on the Royalist side, in the French Revolution. Consult a *Memoir* by Townshend Ward in vol. ii, *Pennsylvania Magazine of History and Biography* (Philadelphia, 1878).

ARMANDE, ȧr'mäNd'. The elder sister of Henriette, in Molière's *Les femmes savantes*.

ARMANSPERG, ȧr'mȧns-pĕrk, Joseph Ludwig, Count von (1787–1853). A German statesman, born in Lower Bavaria. In 1826 he was appointed Bavarian Minister of Foreign Affairs, and soon after exchanged that office for the portfolios of the Interior and the Finances. He drew upon himself the hatred of the Camarilla by his strenuous opposition to the claims of Rome, as well as by his attempts to identify himself with the Liberal party, and the Roman Catholic clergy brought about his dismissal. He accompanied the young King Otho to Greece in 1833, where for four years he acted as regent or chancellor. Greece derived many benefits from his administration.

ARMATOLES, ȧr'mȧ-tōlz. A body of Greek militia, first formed under the reign of Sultan Selim I about the beginning of the sixteenth century. They were organized to preserve the fertile plains from the ravages of the *klephts*, Christian mountain robbers of Thessaly, Epirus, and Macedonia (from Gk. κλέπτης, *kleptēs*, robber), who had never been entirely conquered by the Turks. The Armatoles themselves were originally klephts, but received their more honorable designation when the Porte had transformed them into a sort of military police. The safety of the public roads was intrusted to their care. The whole of northern Greece was divided into 14 districts, each placed under the supervision of a chief of these militia, who, however, had himself to receive orders from a Turkish pasha or Greek bishop. But although the Armatoles frequently suppressed the brigandage of the klephts, they still regarded them in the light of brothers, inasmuch as they had a common origin and faith; both detested the oppressors of their country, and the sentiment of patriotism overruled every other consideration.

This sympathy at last appeared to the Turks so dangerous that they grew alarmed, and desired to substitute for the Armatoles, the Mohammedan Albanians, who were the implacable enemies of the Greeks, which resolution did not a little to hasten the insurrection which the Porte ever dreaded. The moment it broke out, the Armatoles pronounced themselves in favor of the national cause, and in the war of independence that ensued, distinguished themselves by their brilliant exploits. Marco Bozzaris (q.v.), leader of the Suliotes, was a good type of the Armatole leader.

AR'MATURE (Lat. *armatura*, armor; Ger. *Anker*). The mass of iron or other magnetizable substance upon which is exerted the power of attraction possessed by a magnet, or which is placed in contact with its pole or poles. In the case of a permanent magnet of the horseshoe pattern, the armature may be of soft iron and is known as the *keeper*, as it helps to retain and preserve the magnetism by completing the magnetic circuit through the two poles. The armature of an electro-magnet is placed near its poles, and whenever a current of electricity is sent through the coils of the latter the armature is attracted. If the armature is a piece of soft iron, attraction always takes place, and on this principle is based the action of the electric bell, the telegraph sounder, and other forms of electrical apparatus. Such an armature, as soon as the flow of the current ceases, returns to its normal position under the action of gravity or of a spring. If the armature is a permanent steel magnet or another electro-magnet, it may move either toward or away from the main electro-magnet, depending on its polarity, and in that case is known as a polarized armature. In dynamo-electric machinery, the term "armature" is used to designate that portion of the machine comprised where an active conductor is moved across the magnetic lines of force of the field magnets and in which the differences of electric potential producing the current are generated. The term is generally employed to describe the part which is revolved between the poles of the field magnets of a dynamo or electric motor, though in alternators the armature may be stationary and the field coils revolve. The iron cores on which the coils comprising the armature are wound afford a magnetic connection between the poles. Consult Cramp and Cramp, *Armature Windings of the Closed Circuit Type* (London, 1906); Kinzbrunner, *Continuous Current Armatures* (New York, 1906). See MAGNETISM; DYNAMO-ELECTRIC MACHINERY, and the authorities there cited.

ARMBRUSTER, ärm'brōōs-tĕr, CARL (1846—). An anglicized German orchestral conductor. He was born at Andernach and studied with private teachers at Cologne, where he began his career as a pianist. In 1863 he settled in London. Here he soon became prominent as an ardent advocate of Wagner, whose works he conducted after 1881 at the Royal, Haymarket, Covent Garden, and Drury Lane theatres. During the London Wagner Festivals of 1882 and 1884 he acted as Hans Richter's assistant and from 1884 to 1894 he was one of the conductors at Bayreuth. In 1901 he became musical adviser to the London County Council. His most effective means of propaganda in behalf of Wagner, and some other modern composers also, was the illustrated lecture. In his capacity as lecturer he made a successful tour of the United States in 1900–01.

ARME BLANCHE, ärm' blänsh'. A term of French origin, meaning 'white arm.' It has special application to the dueling foil or rapier (see FENCING), but is often applied to all weapons other than firearms, such as foil, rapier, sword, lance, and dagger.

ARMED NEUTRAL'ITY, THE. An association of European powers which, under the leadership of Russia, first gave international validity to the doctrine, proclaimed by Prussia in 1752 and by France in 1778, that "free ships make free goods." Because England insisted on her right to search neutral ships for her enemies' goods in the early years of her war with America, France, and Spain (1775–83), and in consequence crippled the commerce of non-combatant powers, Catharine of Russia, on March 8, 1780, issued her famous proclamation laying down the principles: (1) That neutral ships may freely sail from port to port and along the coasts of belligerents; (2) that a blockade, to be recognized, must be effectual and real; and (3) that, except in the case of contraband, free ships make free goods. These principles were immediately indorsed and adopted by the United States, France, and Spain; and an association, ultimately composed of Russia, Denmark, Sweden, the Netherlands, Prussia, the Empire, Portugal, Austria, and the Two Sicilies, was organized for the purpose of enforcing them upon the belligerent powers. The immediate effect was greatly to embarrass England by placing her in diplomatic hostility to the rest of Europe, by increasing the probability of an extended war, and by lessening the advantage which her naval preponderance gave her. The enunciation of the doctrine of "free ships, free goods," at that time marked an epoch in the history of international maritime law. See the article NEUTRALITY.

ARMED SHIP. A ship carrying an armament in contradistinction to one without armament. The term is generally used to designate merchant vessels taken into the service of the government and supplied with a battery; but it was formerly used with reference to private vessels fitted out, by permission of a government, to operate against an enemy's commerce; that is, a privateer. The term has acquired additional importance in recent years, as certain unarmed vessels of the enemy, such as cartels and hospital ships, are exempt from capture; and the tendency of the usages of maritime war, in respect to private unarmed ships, is toward increased exemption from capture.

ARMENGAUD, är'mäN'gō', JACQUES EUGÈNE, called ARMENGAUD THE ELDER (1810–91). A French inventor and draughtsman. He was born at Ostend and was educated at the Ecole des Arts et Métiers at Châlons. He was professor of mechanical drawing at the Conservatoire des Arts et Métiers at Paris, where, in collaboration with his brother, he published a monthly review entitled *Le Génie Industriel*. His works on engineering include: *Traité théorique et pratique des moteurs hydrauliques et à vapeur* (1858); *Nouveau cours raisonné de dessin industriel appliqué à la mécanique et à l'architecture* (with his brother Charles, 1848–60). He was decorated with the Legion of Honor in 1863 and his work has been recognized by many scientific associations.

ARME'NIA (Assyrian *Urartu*, OPers. *Ar-*

maniya, Pers. *Armina*). A tableland in western Asia, about 6000 feet high, situated to the southwest of the Caucasus Range, stretching southward toward the lowlands of Mesopotamia, and extending from the highlands of Asia Minor on the west to the vicinity of the Caspian Sea. Armenia, in the widest sense of the name, is included between the parallels of 37° 30′ and 41° 45′ N. lat., and the meridians of 37° and 49° E. long. It embraces the northeast corner of Asiatic Turkey, the southern part of Transcaucasia (Asiatic Russia), and the northwest corner of Persia. The principal portion, having an area in round numbers of about 70,000 square miles, belongs to Turkey (Map: Turkey in Asia, J 2), and is included in the vilayets of Erzerum, Van, Bitlis, Mamuret-ül-Aziz, and Diarbekr. The Russian portion (acquired in part from Persia in 1828 and in part from Turkey in 1878) is included in the governments of Erivan, Yelisavetpol, and Tiflis, and the Territory of Kars. Persian Armenia forms part of the province of Azerbaijan. A great part of the region called Kurdistan is included in southern Armenia. In antiquity Armenia was divided into Greater and Lesser Armenia, the latter (a small fraction of the whole) being separated from the former by the western head stream of the Euphrates. The plateau surface is covered with a series of mountain ranges, mostly of volcanic origin, inclosing elevated plateaus of archaic and Palæozoic origin in the north, with sedimentary rocks in the south, the surface of which consists in part of pasture land. Of the mountain peaks, Mount Ararat, situated where the frontiers of Russia, Turkey, and Persia meet, has an altitude of nearly 17,000 feet. Armenia is watered chiefly by the Euphrates, Tigris, Churuk Su, and Aras. It contains two extensive salt lakes—Van, in Turkish Armenia (elevation 5100 feet), Urmia, in Persian Armenia (elevation 4000 feet). Lake Gokcha, in Russian Armenia, sends its waters to the Aras.

The climate of Armenia is generally healthful, but the temperature has great variations, in some places ranging from —20° to 85° F. Long and severe winters are followed by very short springs, beginning in April. The summers are hot, and grains and fruit ripen very early. The rainfall is generally scant, and artificial irrigation has been resorted to for centuries. The flora varies considerably, in accordance with the elevation of the surface. Trees are found at an altitude of nearly 9000 feet, and even higher on the southern slopes. Wheat grows freely as high as 7000 feet above the sea. Southern fruits, such as olives and figs, are cultivated successfully in the warmer regions, while the common fruits are found everywhere. Tobacco, cotton, and rice are cultivated in the warmer valleys. The domestic animals, especially horses and sheep, are well known; while the wild animals, such as the bear, wolf, tiger, hyena, leopard, etc., are still found in the forests. The soil is generally fertile and well adapted for agricultural purposes.

The turbulent state of the country under the despotic rule of Turkey had always been a serious obstacle to natural development, and as a result agriculture was very much neglected. Armenia has considerable mineral wealth. The chief minerals are marble, saltpetre, iron, copper, quicksilver, lead, and gold. The population of former Turkish Armenia (chief city Erzerum) was estimated at about 2,470,000. Of this number, about 650,000 were Armenians, the bulk of the population consisting of Turks and Kurds. The Armenians in Transcaucasia numbered 1,118,094 by the Russian census of 1911. The number of Armenians in former European Turkey was placed at 500,000, and in the former limits of Asiatic Turkey outside Armenia at 576,000. Smaller numbers are in Persia, Ciscaucasia, Hungary, Transylvania, Galicia, India, and Africa, and after 1900 many emigrated to the United States. Changes of population on account of Turkish massacres, deportations, etc. during and after the war were the subject of contradictory estimates. See WAR IN EUROPE.

Ethnology. By language the Armenians, or, as they call themselves, Haik, are entitled to rank as a very old branch of the Aryan stock, in some respects intermediate between the Aryans of Europe and the Aryan peoples of Greater Asia. Physically also they are of a primitive type, short and thickset, dark-skinned, and of exaggerated brachycephalism, in part artificially induced. They are thought to be related, on the one hand, to the "Alpine" stock in Europe, and, on the other, to the Galtchas, etc., of central Asia. Their physical type is probably less pure than is assumed by Ripley (1899), but not so mixed as Deniker (1900) supposes. They inhabited in early prehistoric times a considerable portion of Asia Minor and have contributed to, or borrowed from, Aryans of other types, Semites, Caucasic peoples, and later intruding Europeans and Turks. Prof. F. von Luschan (1911) is of opinion that the modern Armenians are the descendants of the pre-Semitic population of the region, whom he identifies with the old Hittites. He also believes that from this same Armenoid race came the so-called "Alpine race" of Europe. Their racial, social, and religious solidarity, and their position in a land that has seen so much of the beginnings of the civilizations of the white race, make them one of the most interesting peoples of Asia. They are conspicuous by their industry, intelligence, and aptitude for commercial pursuits, and in many cities of the East they are the principal merchants and money lenders. The bulk of them belong to the so-called Armenian church. Consult Chantre, *Recherches anthropologiques dans l'Asie occidentale* (Lyon, 1895), and Von Luschan, "The Early Inhabitants of Western Asia," in the *Journal of the Royal Anthropological Institute* (London, 1911).

Archæology. Cities abounding in superb palaces and temples existed in Armenia from remote antiquity. Armais, grandson of Haig, the conqueror of Nimrod, is said to have built the town of Armavir, long the capital of Armenia, on the banks of the Araxes. When, according to the tradition, Semiramis conquered the country, Semiramocerte, now Van, was built, where important excavations and discoveries have been made in recent years. Christianity, introduced by Gregory the Illuminator, and adopted by his royal convert, Tiridates, c.312, resulted in the demolition of the pagan temples throughout the kingdom and the endowment and building of Christian churches. Among the most interesting examples of Armenian architecture dating from this period are the remains of fortifications, the castle, cathedral, and chapel at Ani, the ruins at Akhlat and at Talin, the troglodyte city of Vardzia, the mediæval castle of Khertvis, the church at Saba, built by

Atabeg Sargis (1306–34), and the one at Etchmiadzin, the cathedral of St. Gregory, the monastery and the churches of St. Gaina, St. Ripsima, and of Shoghakath, with its finely sculptured stones.

History. The Armenians trace their descent from Haig, or Haik, the grandson of Japhet. His descendant, Aram, is the eponymous hero of the land, which was called Armina by the Persians, and Haik, or Haiastan, by the Armenians themselves. Though possessed of an old civilization, the Armenians first appear in history about the middle of the sixth century B.C., when Dikran, or Tigranes, of the Haig dynasty, freed his nation from its subjection to the Assyrians and the Medes. Subdued by Alexander the Great, the country was ruled by the representatives of the Seleucid kings until 190 B.C., when the satraps Artaxias and Zariadres revolted against Antiochus the Great and divided the province between them, the former taking the country east of the Euphrates, or Armenia Major, the latter the western portion, or Armenia Minor. Armenia Major was subdued by the Parthians about 150 B.C., and ruled, except for a brief period of Persian domination, (232–260 A.D.), till 428 A.D. by the family of the Arsacidæ (q.v.). The most celebrated prince of the line was Tigranes the Great, who, drawn by his father-in-law, Mithridates, into a quarrel with Rome, was completely overthrown at Tigranocerta (69 B.C.) by Lucullus, but was left in power as a client king of the Romans. Armenia thus became a buffer state between the Roman Empire and the Parthians and was controlled in rapid alternation by the two powers. In 387 A.D. the Byzantines and the Persians definitely partitioned the country, the line of the Arsacidæ continuing to rule in Persarmenia 40 years longer.

About the year 285 Christianity was introduced into Armenia by Gregory the Illuminator, who succeeded in converting the King, Tiridates III. Zoroastrianism, the old religion of the country, collapsed, the people imitated the example of their monarch, and the earliest national Christian Church in the world arose. The Sassanid rulers of Persia vainly endeavored to extirpate Christianity and succeeded only in plunging the country into anarchy. The first 250 years of Arab rule (636–885) were marked by bitter conflicts between Mohammedans and Byzantines, but in 885 Ashod I, a descendant of the ancient Jewish family of the Bagratids, or Pagratids, was made King, under the suzerainty of the Caliph, and for more than 100 years the land enjoyed peace. Then ruin came upon it in the shape of Byzantine and Mongol invasions. The Seljuk Turks and after them Timur devastated the land and occupied a portion of it, while the Byzantines seized the rest. The land was subjugated by the Persians in 1472, but part of it was wrested from them by the Ottomans 50 years later and permanently incorporated into their Empire. The northeastern portion of Armenia Major was taken from the Persians by Russia in 1828, who added to her possessions in 1878 the Turkish country of Kars and Batum.

Armenia Minor for a long time had a history of its own. It was made a Roman province in 70 A.D.; was conquered from the Byzantines by the Arabs about 633, and recovered by the Byzantines 120 years later. In 1080 Rhupen, a descendant of the Bagratids, made himself independent in Armenia Minor; his successors extended their power over Cilicia and Cappadocia and aided the Crusaders against the Saracens. The house of Rhupen fell in 1393, and the land, after passing through the hands of the Egyptians and the Persians, came into the possession of the Turks in 1541.

Armenia, therefore, at the present is merely an historical conception. The ancient land is divided among the Turks, the Russians, and the Persians, and the Armenian people have been scattered over Asia Minor and a considerable territory in Europe. Aspirations toward national unity have not been wanting among the Armenians, especially those dwelling in Asiatic Turkey. After 1885 a revolutionary movement, inspired by the Russian Nihilist propaganda, attained formidable dimensions. The Porte intrusted the pacification of the country to the Kurds, who constitute the national police. Sanguinary conflicts, marked by outrageous cruelty on both sides, occurred between the revolutionists and the police in the provinces of Trebizond, Bitlis, and Erzerum, and it was the news of the atrocities, committed by Kurds, acting in their official capacity, that stirred Europe and America to horror in the years 1895 and 1896. Signs of anti-Armenian feeling had appeared throughout Asiatic Turkey as early as the spring of 1894. In August of that year a massacre of Armenians was perpetrated at Sassun, and the fever of murder spread all over Asiatic Turkey. All through the spring and summer of 1895 the slaughter of Armenian men, women, and children continued, until the representatives of England, France, and Russia, backed up by their assembled warships, wrested from the Sultan the promise of reparation and reforms. A commission was sent to the scene of conflict to investigate conditions there, and the Armenian Patriarch was summoned to Constantinople to state the demands of the Armenians, which included a share in the making of laws and the administration, and proportional representation in the national police. The Sultan's *irade* went forth, the commission labored, and the massacres continued. During the months of October and November Armenians were butchered at Trebizond, Erzerum, Akhissar, Bitlis, Zeitun, Swas, Kurun, and Marash. At Diarbekr a pitched battle was fought betweeen Turks and Armenians, in which 5000 men perished. In the provinces of Erzerum and Trebizond entire villages were devastated, famine and plague attacked the survivors of the massacres, and the Turkish government was forced, only after the greatest reluctance, into permitting the work of relief organized by Clara Barton and the Red Cross Society to be carried on. The outrages subsided in 1896, but in August occurred a fearful carnage of Armenians in the streets of Constantinople, perpetrated by a mob at the instigation of the government, in retaliation for the attack on the Ottoman Bank made by Armenian patriots, August 26–28. At least 4000 Armenians were beaten to death by the clubs of hired ruffians. (For the revolutionary movement and disturbances of 1905–06 in Russian Armenia, see RUSSIA.) Nor could reparation be demanded of the Turkish government, inasmuch as the Armenian revolutionists, by their riotous action, had put themselves and their innocent countrymen outside of the law. Since 1896 the sporadic slaughter of Armenians on a minor scale has continued to the present day; and no real guarantees for the safety of the

unhappy people have been exacted from the Turkish government.

Religion. See ARMENIAN CHURCH.

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ARMENIAN ART. This art and that of Georgia are so closely related as to form but a single style, which might be called the art of the Caucasus. Its early antiquities are not very well known: they are related to those of the Sarmathians and Scythians of Turkestan and Siberia and of the cities of Crimea and the Bosporus. In northern Armenia there are thousands of graves in the form of large mounds, and especially near Kaaban there are many dolmens. It is from these tombs (e.g., Koban and Kamunta) that the objects have come which show us the condition of the arts here just before and after the Christian era began. It was rather late when both Persian and Roman influences penetrated simultaneously. Building had been almost entirely in wood, except in the case of the numerous fortresses. The only ruins yet studied of the Roman period are those of Karni. This region seems to have become an important centre for the propagation of that most interesting form of barbaric art which we associate with Goths, Celts, Scandinavians, Anglo-Saxons, Lombards, and other early Germanic tribes, and of which the treasury of Guerrazar is the most brilliant example. Its main characteristics are the technique of cloisonné enamel, the setting of colored glass in metal bands soldered to a metal ground, and the use of geometric ornamentation. Beginning in central Asia, it passed westward, apparently with the emigration of the Goths, by whom it was presumably imparted to the other tribes. Shortly after, when the country had become christianized, the history of architecture and monumental sculpture in this region began. The churches built between the seventh and sixteenth centuries are not large, but have considerable character.

The Caucasus felt the influence of Byzantine art at all times, but added to it, and to its own inherited traits, something from Syria, whose missionaries had converted it and formed its literature. At one time Armenia became, in fact, a province of the Empire politically as well as artistically. Then, during the Middle Ages, the crusaders gave a western tinge, and still later came the influence of Russian art. The earliest known church of Armenia, St. Ripsima's at Vagashabad (618), is thoroughly Byzantine, a Greek cross with its four arms ending in apses and a central dome raised on a drum, circular inside and polygonal outside. As in so many Byzantine churches, the cruciform plan does not appear on the outside, as chapels fill in the spaces between the arms. The church at Usunlar, with its peristyle colonnade, dates from 718 to 729. Both are still without ornament. It is possible that the church at Dighbur, from its similarities to buildings in central Syria of the sixth century, may be even earlier. Pitzeuda (c. fifteenth century), with its high dome and tunnel vaults, is very Byzantine. The culmination of a new style appears in the cathedral of Ani (1010 A.D.), the most interesting church of Armenia. The exterior, with its central dome raised on a high square drum, its exterior decorated with colonnettes, its internal clustered piers and pointed arches, as well as its vaulting system, reminds us in many ways of the European architecture. At the same date a church was built at Mokwi, Byzantine in every particular, and with the greatest similarity to the early Russian church of St. Sophia at Novgorod. The contemporary cathedral of Kiutas in Imerethia is of equal importance, but its plan is basilical instead of a Greek cross. This century was most prolific. In Abkhasia, the church of Mowki, with a charming dome and five naves with slender stone piers and cornices of great delicacy; that of Martvili, in Mingrelia, with exquisite decorative details, are samples of a numerous class of which others are at Manglis, Kaben, Sion, Zarzma, etc. Later, in the twelfth century, are others at Bethania, Vardzia, Ghelathi. The purely architectural moldings are very simple; a cornice of a simple cove, sometimes decorated with painted or carved palmettes or foliage; a rude, ball-shaped capital; a torus molding woven into patterns and often carried out so as to join the windows and decorative plaques in one scheme of ornament covering the whole façade. The climax is reached in the fifteenth century in the church of Mtzkhet in Georgia, Armenian in its dome and plan, Byzantine in its proportions, Georgian in its rich interlaced decorative patterns with the addition of Byzantine floral designs. Statuary and figures in relief appear to have been systematically avoided, and when used were crude and provincial. In some churches the king, bishop, or architect is represented holding the model of the building; or Christ is blessing. But the animal and decorative sculpture is much more artistic. The fighting animals are a reminiscence of Persian art; the peacocks, doves, griffins, and dragons, heraldically arrayed or intertwined with vines, are derived from Byzantine models.

The most successful use of decorative sculp-

ture is in the broad bands surrounding the church windows and in the panels let into the walls. These are in very flat and low relief, and are often highly original, differing from Byzantine work and bearing a most remarkable resemblance to the patterns in Celtic-Irish, Anglo-Saxon, and Frankish illuminated manuscripts. This is especially the case in churches of the eleventh to the fifteenth centuries. It is interesting that inscriptions were turned to extremely decorative purposes, just as they were in Mohammedan art. The most decorative class of smaller works are the sepulchral slabs usually erected like antique stiles on pedestals in the open air. Their design is graceful in outline and delicate in the detail of their arabesque and lace-work patterns around a central cross or rosette. One cannot help seeing in such as these the originals of the famous Irish, Welsh, and Saxon stone crosses, which are far less exquisite in design and execution. Wood carving and ivory carving were practiced, as is shown by some church doors and a multitude of images, book covers, crosiers, crosses, and other bits of handiwork. But the highest efforts of Georgian and Armenian decoration, with its amalgamation of Sassanian-Persian, of Byzantine and Mohammedan design, are shown in the goldsmith's work, where the metals are combined with enamels and set stones. The treasuries of monasteries and churches in Suanetia, Mingrelia, and other provinces are still extremely rich in such works; especially Etchmiadzin, the national sanctuary of Armenia, Ghelathi, Khopi, Tchukul, etc. None of them are earlier than the tenth century. In most cases the ornamentation surrounds some sacred image. The elaborate geometric design, so difficult to follow and yet so thoroughly scientific, winds over the entire gold surface inclosing the enamels surrounded by pearls, the precious stones framed in golden *cloisons*. The cloisonné enamel employed is another link both with Byzantium and with the primitive jewelry of the Goths and their imitators, the Germanic tribes. It is probable that the process originated in this very region. The local style of figured enamels, of great originality in the ninth to twelfth centuries, and independent of Byzantium, is brilliantly shown in those of the Khakul image at Ghelathi and others at Sion, Djumati, Khopi, etc. In jewelry, figured compositions were not avoided, as in large sculpture, especially where the art came strongly under Byzantine influence, and the figures in their crude realism and exaggerated movement again connect with Carlovingian and other branches of the north European art of early mediæval times rather than with Byzantium. Religieuses, gold images, triptychs, crosses, chalices, book covers, are among the forms taken by this jewelry. They are found in dozens of church treasuries. Wall painting was very general during the entire period, and here again considerable independence of Byzantium was shown. The only example of the mosaic work so universal among the Greeks is at Ghelathi and was a present to King David from Emperor Alexis Comnenus. Caucasian painting was far less stiff and classic than Byzantine. It admitted historic scenes more frequently, and the desire of the artists to glorify events of national interest is shown vividly in frequent portraits of the sovereigns of Georgia and Armenia. Such frescoes are at Sion (eleventh century), Nekresi (eleventh century), and especially Ghelathi and Bethania. On the other hand, in the numerous illuminated MSS. of the same period (eleventh to fifteenth centuries), Byzantine influence predominated. The Georgian are the earliest, and attained perfection in the eleventh century. More numerous, but later, are the Armenian. The largest collections of such MSS. are in the Armenian Library in Venice, and in that of the monastery of Etchmiadzin. The thirteenth century marks for this, as well as for most other branches of art, the highest point of perfection. In the seventeenth century foreign influences—especially Italian and Persian—began to predominate. See ARCHITECTURE; ART, HISTORY OF; BYZANTINE ART.

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ARMENIAN CHURCH. Christianity appears to have been introduced in Armenia as early as the second century. It was for the first time firmly established, however, when Bishop Gregory the Illuminator baptized Tiridates, the King (301), and a great party of the people became immediately baptized Christians. (See ARMENIA.) The Bible was translated into the Armenian language in the fifth century by Mesrob and Sahak. After this period great activity prevailed in the Armenian church. Numbers flocked to the colleges at Athens and Constantinople. In the ecclesiastical controversy concerning the twofold nature of Christ the Armenian Christians held with the Monophysites, refused to acknowledge the authority of the Council of Chalcedon, and constituted themselves a separate Church, which took the title of Gregorian from Gregory himself. For several centuries a spirit of scientific inquiry, especially in theology, manifested itself among them to a far wider extent than in the other Eastern churches. Their greatest divine is Nerses IV, Patriarch of Armenia, and Catholicos, from 1166 to 1173, whose works have been repeatedly published (Lat. trans., 2 vols., Venice, 1833); his *Prayers* in 36 languages (1882). The Gregorians have continued to entertain a deeply rooted aversion to the Orthodox church. The Roman Catholic Popes at various times, especially (1145, 1341, 1440) when the Armenians accepted the help of the West against the Mohammedans, tried to persuade them to recognize the papal supremacy; but for the most part only the nobles consented to do so, while the mass of the people clung to their ancient opinions, as we see from the complaint of Pope Benedict VII, who accuses the Armenian church of 117 errors of doctrine. There is a sect of United or Roman Catholic Armenians in Italy, Galicia, Persia, Russia, and Marseilles, who accept the papal supremacy. It dates from 1439. Seventeen dioceses are now subject to their patriarch, but he has no authority over Armenians in Russia and Austria. The attempt of Pius IX, in 1867, to Romanize the sect still further, led to a split, and the rebellious fraternized with the Old Catholics in 1872. The congregation of the Mechitarists, founded by the Abbot Mechitar in 1701 at Venice, have done much to

spread the Roman faith among their people. In theology the Orthodox Armenian church attributes only *one* nature to Christ, and holds that the Spirit proceeds from the Father alone, this doctrine, however, being held by it in common with the Orthodox Greek church, although contrary to the theology of the Western churches. With respect to the "seven sacraments," it holds that at baptism one must be sprinkled three times and as often dipped; that confirmation is to be conjoined with baptism; that the Lord's Supper must be celebrated with wine and leavened bread; that the bread, before being given, must be dipped in the wine; and that extreme unction is to be administered to ecclesiastics alone, and immediately after (and not before) their death. It believes in the worship of saints, but not in purgatory. It exceeds the Greek church in the number of its fasts, but has fewer religious festivals. These, however, are more enthusiastically kept. Divine service is held in Turkey chiefly by night. Mass is celebrated in the old Armenian language; preaching is carried on in the new. The sacerdotal constitution differs little from the Greek. The head of the Armenian church is called the Catholicos. He resides at Etchmiadzin, in Russian Armenia. Under him are bishops. The Russian government claims the right of appointing him. But of more consequence are the patriarchs of Jerusalem and Constantinople, who are nominally under the Catholicos. The monks of this church follow the rule of St. Basil. The wartabieds (vartabeds) form a peculiar class of ecclesiastics; they live like monks, but are devoted exclusively to learning and preaching. Secular priests must marry once, but none is at liberty to take a second wife. Since 1830 very successful Protestant missions have been carried on among the Armenians. Consult Malan, *Divine Liturgy of the Armenian Church* (London, 1870), and Adenev, *Greek and Eastern Churches* (New York, 1908).

ARMENIAN LAN'GUAGE AND LIT'ERATURE. The Armenian language forms one of the eight main divisions of the Indo-Germanic group. Owing to the presence of many loan words from the Iranian languages, Armenian was for a long time supposed to be an Iranian dialect, and this theory was defended especially by Paul de Lagarde and Friedrich Müller. A more scientific investigation of the language, however, has overthrown this view, and the independence of the Armenian has been conclusively shown. For this great contribution to philology we are indebted most of all to Heinrich Hübschmann. Valuable studies on the Armenian language and literature have also been made by Meillet, Bartholomæ, Bugge, and others. The Armenian language is divided into two parts: The Old, or Classical (*grabar*) Armenian and the Modern Armenian. The Classical Armenian language shows no dialectic variations, but the Modern Armenian has many dialects, whose study is most important for a correct philological knowledge of this Indo-Germanic tongue. The Classical Armenian is a fully inflected language, possessing seven declensions with six cases (nom., gen., dat., acc., abl., and instr.), and two supplementary cases (narrative and circumlocutory). There is also, as in all Indo-Germanic languages, a special mode of declension for the pronouns. There is no gender in Armenian, and but two numbers, singular and plural. Comparison of adjectives, which are often uninflected, is chiefly by auxiliary adverbs or by repetition of the adjectives to be compared. There are four conjugations, of which the fourth is generally passive in force, with present, imperfect, first and second aorist, and first and second future, present and future participle, and infinitive tenses. As in Greek, but one of the futures and aorists is commonly found in the same verb. The moods are the indicative, subjunctive, imperative (or more properly, prohibitive). The Modern Armenian differs from the *grabar* chiefly in the decay of its inflectional system, in the development of postpositions, in the influx of loan words from the Turkish, and in the interchange of pronunciation of the old *tenues* and *mediæ* with the new (Classical Armenian *b, g, d, k, p,* etc., pronounced *p, k, t, g, b,* etc., in Modern Armenian). The Armenian is fond of harsh combinations of consonants, and it is particularly rich in affricative sounds. The accent is usually on the last syllable. The Armenian alphabet consists of 36 letters, to which two others, *ō* and *f*, were added in the twelfth century. This alphabet was introduced by Mesrop, a bishop of the Armenian church, early in the fifth century, and was probably based upon the Greek letters, with additions from other sources to provide characters for sounds not represented in the Greek alphabet. In addition to the sounds familiar to our ears, Armenian possesses characters for the indefinite *e* in *the man*, for *zh* (French *j*), *h* (as in German, Greek *χ*), *sh, ts, ds, tch, dsh, thsh, tsh,* rolled *r*, for the aspirates *th, ph, kh,* and for a deep glottal catch corresponding somewhat in pronunciation to the Arabic *ghain*. As for its relation with the other Aryan languages, it is generally placed about half-way between the Indo-Iranian and the Letto-Slavic groups.

Armenian literature, properly speaking, begins only with the fifth century, when Mesrop devised the alphabet, and the entire Bible was rendered into Armenian by 410. Before the time of Mesrop there had been no Armenian literature (although a few Armenian songs are preserved by Moses of Chorene) despite the claims made for Agathangelos (ed. Venice, 1862, Tiflis, 1883) and Faustus of Byzantium (ed. Venice, 1889), who probably wrote in Greek, and was translated into Armenian later. Armenian literature is especially strong in history and in theology; but in poetry and belles-lettres it is very weak, and the drama does not exist. The principal Armenian writers (exclusive of translators) are as follows: Fifth century, Eznik of Golp, *Refutation of Heresies*, especially valuable for its account of the Zoroastrian and Manichæan religions (ed. Venice, 1850); Moses of Chorene, *History of Armenia*, a good source of material, though not always reliable (ed. Amsterdam, 1695, London, 1736, Venice, 1752, 1827, 1865, 1881, trans. by Le Vaillant de Florival, Venice, 1841, and by Lauer, Regensburg, 1869), and a geography often attributed to him (ed. and tr. Venice, 1881); *David the Philosopher* (ed. Venice, 1823); Elisæus, *History of Vardan and of the Battles of the Armenians* (ed. Constantinople, 1764, 1823, Venice, 1828, 1852, 1859, 1893, tr. Neumann, London, 1830); eighth century, John of Ozim, a theological writer (ed. Venice, 1834); tenth century, Thomas of Ardsruni, an important historian; Gregor Narek, religious writer (ed. Venice, 1827–40); eleventh century, Gregor Magistros, theologian, grammarian, and poet; twelfth century, Nerses

Klayensis, poet, theologian, historian (ed. of his poetry, Venice, 1830), and his nephew, Nerses of Lampron, theologian, poet, and translator; Mechitar Gosh, fable writer (ed. Venice, 1854) and lawyer (ed. Etchmiadzin, 1880); thirteenth century, Vardan, who composed an important history of Armenia (ed. Venice, 1862), a book of beast fables (ed. in selection, Paris, 1825), and theological works; Vahram of Edessa, historian (ed. Madras, 1810); Johannes Erzingensis, historian, grammarian, theologian, and astronomer fourteenth century, Gregor Datheriensis, theologian. The last great author who wrote in Classical Armenian was Tschamtschean (died 1823), whose most important work was a history of Armenia from the earliest times to 1784 (ed. Venice, 1784–86). The golden ages of Armenian literature are the fifth century and the twelfth century, and the fourteenth century marks the beginning of a steady decline. The first book printed in Armenian was the Psalms (Venice, 1565), and during the seventeenth and eighteenth centuries printing houses were established in many cities in Europe, as well as in Asia—at Julfa, Smyrna, and Madras. A special impetus toward the preservation of Armenian literature was given by the establishment of a college and convent by Mechitar on the island of San Lazaro near Venice in 1717. The *Zeitschrift für armenische Philologie* was founded at Marburg in 1901.

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ARMENTIERES, är'mäN'tyâr'. A town of the department Nord, France, on the Lys, 8 miles from Lille. The town manufactures table linen, cotton goods, and hemp, and has a considerable trade in grain. Pop., 1901, 29,401; 1906, 28,613; 1911, 28,625.

ARM'FELT, Charles Gustavus (1666–1736). A Swedish general, born in Ingermannland. After serving with distinction in the French armies he returned, in 1700, to his native country, and as commander of the Swedish troops in Finland fought valiantly against the Russians, whose superior strength, however, forced Armfelt to abandon the province in 1714. In 1718 he led a Swedish expedition into Norway, met with ill success, and on the retreat lost almost his entire army through starvation and disease. Subsequently he received his old post of commanding officer of Finland.

ARMFELT, Gustav Mauritz (1757–1814). A Swedish courtier whose public life was characterized by striking vicissitudes of fortune. He was born in the government of Åbo. His loyalty to Gustavus III gained him the favor and friendship of that monarch. Armfelt distinguished himself in the war between Sweden and Russia and, as military representative of Gustavus, had the honor of concluding a peace at Wärelä in August, 1790. By the will of Gustavus, who was assassinated in 1792, Armfelt was made Governor of Stockholm and a member of the council assigned to the regent, Charles, Duke of Sudermania. The Duke, however, could not brook the idea of a check being placed upon his liberty of action, and found means to destroy the will, the conditions of which he never intended to observe. Armfelt soon became conscious that his influence was rapidly disappearing. He was rarely permitted to see the young King; and at last, after a secret interview with the Crown Prince Gustavus, departed as Ambassador to Naples in July, 1792. While in Italy he entered into correspondence with certain parties in Sweden for the purpose of overthrowing the regency and inducing the states to proclaim Gustavus IV of age. The correspondence was discovered. Armfelt fled to Poland and afterward to Russia. He was condemned during his absence for high treason and stripped of his goods and titles, while many of his friends were visited with torture and exile. In 1799 Gustavus IV received the crown at the age of 18, and Armfelt was restored to all his honors. In 1805 he was appointed Governor-General of Finland, in 1806 he commanded the Swedes in Pomerania, and in 1808 he commanded the Swedish army raised for the invasion of Norway; but his plans were so completely frustrated that he was compelled to witness the invasion of Sweden by the successful Norwegians and was in consequence recalled and dismissed by the King. In the following year a revolution took place, Gustavus was deposed, the Duke of Sudermania elected in his place, and Armfelt was appointed President of the Military Council. But shortly after he resigned and retired to Russia, where he lived during the remainder of his life in high honor. The title of Count was conferred on him; he was made chancellor of the University of Åbo, President of the Board of Finnish Affairs, and member of the Russian Senate. He died at Tsarskoye-Selo. Consult Tegnér, *Gustav Mauritz Armfelt* (Stockholm, 1887).

ARM'GART. A dramatic poem by George Eliot, published in *Macmillan's Magazine* in July, 1871, and containing a female character of singular strength and fortitude, of the same name.

ARMIDA, är-mē'dà. A beautiful sorceress in Tasso's *Jerusalem Delivered*. She was employed by Satan to seduce Rinaldo and other crusaders upon their arrival before the Holy City. Lured away by Armida to her pleasure palace, Rinaldo for a time forgets his vows, but is released from the spell by a powerful talisman. He returns to the war, but is followed by the sorceress, who at last rushes into battle against him. She is defeated by Rinaldo, who then declares his love for her, converts her to Christianity, and vows to be her faithful knight. The story of Armida has been made the subject of operas by Lully (1686), Gluck (1777), Cherubini (1784), Zingarelli (1786), and Rossini (1817). Consult Belloni, *Gli epigoni della Gerusalemme liberata* (Padova, 1893).

ARMIES (Fr. *armée*, through ML. *armata*, an armed force, seen in Sp. *armada*, properly fem. of Lat. p.p. *armatus*, from *armare*, to arm). Armed forces, organized under a regular system, for purposes of defense. The term "army" may describe the military strength of the nation of which the force is a part or by which it is employed; but it may also be used to describe an army which is only a part of the military forces of the country to which it belongs; as, for instance, the United States army in the Philippine Islands. The fundamental principle of combat is the same, whether between two individuals or two nations, and out of that principle has developed the art and science of war. From the earliest times when men first joined with one another for warlike purposes, there have been changes and developments in methods of association, discoveries in the realm of strategy and the application of tactics, as well as a constantly increasing number of inventions of weapons, mechanical devices, and other engines of destruction. In a primitive state of society the army as such does not exist, and the fighting force is coequal with the group, the tribe, or the nation. Military service is not only a duty but a privilege, and the right of carrying arms is one of the great distinctions between the freeman and the slave. Citizenship and warriorship as a rule go together; and among the early Germans the attainment of a youth's majority and his admission to a share of political rights was marked by an elaborate ceremony of assumption of arms, which with time passed into the chivalric ritual of admission to knighthood. The closest identification of army and nation is perhaps to be found among nomad tribes, where from time to time the shifting of the entire population is necessitated by failing of pasture. Such a migration, peaceful when unresisted, assumes the character of a hostile invasion when the desired territory is in the possession of a tribe strong enough to attempt resistance. Thus, too, in the great migrations preceding and succeeding the fall of the West Roman Empire, the Germanic warriors, marching from their old homes in the north to the conquest of a new home within the Empire, and accompanied by their wives, their children, and their household goods, offered a complete example of army and nation as one. With the establishment of permanent states the differentiation between citizen and warrior begins, and this development is greatly hastened by the growth of industry; for if the farmer finds it a hardship to be summoned from the plow to the field of battle, the burden falls still heavier on the industrial laborer, with whom the conditions of production are such as to require constant application. The process thus begun continues until, in countries like Great Britain or the United States, where military service is on a contractual basis, the total separation of warrior and citizen is attained. These considerations must be borne in mind in discussing the history of the evolution of the army.

ANCIENT ARMIES

Egyptian. Under the Old and Middle empires (down to about 1900 B.C.) the wars of Egypt were comparatively unimportant. During this period a sort of feudal system prevailed, and the main strength of the army was furnished by the militia of the nomes, commanded by the nomarchs or their deputies, together with the contingents of the great temple estates and of the royal domains. In addition, a certain number of mercenary troops were drawn from the tribes of northern Nubia. Under the twelfth dynasty, and perhaps earlier, there was also a permanent corps, the "Retainers of the King," which seems to have filled the place of a standing army. No cavalry or chariot force existed, as the horse does not appear to have been introduced into Egypt until about 1600 B.C.

The Hyksos wars, which swept away the old feudal system, aroused the military spirit of Egypt, and under the New Empire (from about 1580 B.C.) a standing army was a necessity. It was composed chiefly of barbarian mercenaries, the native troops playing a rather unimportant part. Under the Saïtic dynasty (645–525 B.C.), Greek mercenaries were largely employed. The bulk of the army under the New Empire was formed by the infantry, armed with spear and heavy shield or with light buckler and bow. The chariot force constituted the flower of the army. Each chariot contained two soldiers, of whom one fought with his bow and other weapons, while his comrade drove the horses. Great attention was paid to organization and discipline. The troops were divided into regiments and companies, and, in time of war at least, the regiments were formed into brigades or divisions. A special force, called the Mazay, was organized as a gendarmerie, or armed constabulary, but was sometimes employed in war. Consult Erman, *Life in Ancient Egypt*, chap. xx (London and New York, 1894).

Indian. Quite extensive descriptions of armies, battle arrays, and warfare among the ancient Hindus are preserved in the *Mahābhārata* or *Iliad* of India, and in the seventh book of the great legal code of Manu. The information which these sources furnish with reference to the constitution of the military force of early India serves to supplement such allusions to armed equipments and fighting as may be gathered from the earlier times represented by the Veda. Among the organizations of an army early recognized in India was a distribution of the forces into nine subdivisions, on the ascending scale, ranging from a squad (Sanskrit *patti*), composed of 1 chariot, 1 elephant, 5 foot soldiers, and 3 horsemen, up to an army corps (Skt. *akṣāuhiṇī*), comprising 21,870 chariots, 21,870 elephants, 109,350 foot soldiers, and 65,610 cavalry. The code of Manu likewise provides for various arrangements for drawing up of the forces in manœuvring, fighting, and encamping. These are interesting for students of military tactics to look up. On the march and in action the King was naturally stationed in the centre for safety; the commander was in the vanguard, unless, through the exigency of the situation, his presence was demanded elsewhere. Details may also be gathered from the sources mentioned with reference to the armor and accoutrement of the soldiers and all matters appertaining to military forces and warfare. The best work on the subject is Hopkins, "Ruling Caste in Ancient India," published in the *Journal of the American Oriental Society*, vol. xiii (New Haven, 1889).

Persia. The organization of the Persian army in ancient days appears to have corresponded largely with the divisions introduced into the forces of Media at an earlier date by

King Cyaxares (q.v.), as mentioned by Herodotus (c.103). This general distribution into infantry, composed of spearmen, bowmen, and others, and into cavalry, supplemented by warriors mounted on chariots, prevailed throughout the history of the Persian Empire. The cavalry was the flower of the army, as Persia was ever famous for her horses and her excellence in horsemanship. These mounted forces occupied the wings of the main body. This latter mass was composed of the people and was often little better than an armed mob. The scythe-bearing chariots were drawn up as a division in front of the army, and they seem to have inspired terror into the foe, but were often less effective than the other forces. The use of elephants is found as early as in the campaigns to oppose the invading Alexander. From Herodotus (vii, 61, 84) and other sources we learn that the characteristic equipments of the Persian soldiers were a short straight sword, a long spear, a bow, quiver, battle-axe, mace, or club, and a sling, according to the special district or province from which the levies came. A large wicker shield and a close-fitting leather tunic and trousers, a coat of mail, or a quilted corselet, completed the outfit. The horses as well as the riders were protected by mailed trappings—at least if we can judge from the caparison of the war horses on the sculptures in Sassanian times. A division of the army on the decimal scale of tens, hundreds, thousands, and tens of thousands may be gathered from Herodotus (xii, 81), and seems to be as old as the Avesta. The Persian hosts have ever been proverbial for numbers, and even allowing for exaggeration, the figures must have been enormous. The army which Xerxes led against Greece has been estimated at hardly less than 2,000,000, and Darius is reputed to have opposed the world-conquering Alexander with a force of between 750,000 and 1,000,000 men. The development and history of the Persian army during the Parthian and Sassanian periods, down to the overthrow of the Persian dominion by the Arab conquest and its subsequent results, may be obtained from a study of those times. On Persian armies and armor consult: Jackson, *Classical Studies in Honour of Henry Drisler* (New York, 1894); *Zoroaster the Prophet*, chap. vii (New York, 1899); Spiegel, *Erânische Alterthumskunde*, vol. iii, pp. 638 ff. (Leipzig, 1878); Kelsey, *Xenophon's Anabasis, Introduction* (Boston, 1895); G. Rawlinson, *Story of Parthia*, pp. 397 ff. (New York, 1893).

Greece. In the Homeric poems the mass of the infantry is of little account, at least to the poet. The fighting is chiefly carried on by the individual heroes, armed with lance and sword, and defended by helmet and shield and sometimes corselet. These heroes go to and from the battlefield in chariots, but in general fight on foot. When the historic period opens, we find that the war chariots have disappeared, and even cavalry, though the arm of the nobles, is not of decisive value. The army is composed of the hoplites, or heavy infantry, armed with helmet, breastplate, greaves, and shield, and carrying a short sword and long spear. These men fought in close formation, usually eight deep, supported at times by cavalry on the wings, and with light troops, armed with javelins, bows, or slings, to skirmish in front and cover the rear. *Lacedæmonian.*—Through the early days of Greek history the Spartan hoplites were regarded as model troops. Their success seems to have been due in part to their rigorous gymnastic training; but still more to a severity of drill such as the other Grecian states seldom required. From the age of 20 to 60 every Spartan could be called upon to serve, though the older men were not called out except in emergencies. This discipline enabled them to change front in the presence of the enemy and held them steady in defeat or victory. *Athenian.*—The Athenian army was a militia. Every man was supposed to receive training and to serve when called upon—the richer as hoplites, the poorer as light-armed troops, while the cavalry was made up from young men of the wealthy families. As the Athenians never spent so much time in drill as the Spartans, they do not seem to have reached their combination of firmness and mobility, though Athenian bravery and skill were shown in many hard battles.

The general formation of the Greek armies remained but little changed for over a century. Marathon, Platæa, and Mycale were fought by the phalanx of hoplites against light-armed Orientals, and the same tactics and the same results are seen in 401 B.C., at the battle of Cunaxa, when the 10,000 Greeks overthrew the Persians opposed to them. *Thebans.*—These had long enjoyed high repute as hoplites; but their contribution to the Greek art of war was rather in the development of a formation in deep column (50 deep at Leuctra, 371 B.C.). This heavy mass was hurled against one wing of the enemy, while the rest of the line, in ordinary formation, was held back to prevent any flank movement upon the attacking column. This innovation contributed largely to the success of Epaminondas and the establishment of Theban supremacy in Greece. *Macedonian.*—Upon these tactics of the Thebans, Philip of Macedon and Alexander the Great developed their armies. The central principle was personal duty to the King on the part of noble and peasant. "Companions" and "Foot-Companions" were the names of the heavy cavalry and infantry. The former wore metal cuirasses and carried lances; the latter had a small shield and a pike about 18 feet in length for the rear ranks. They were drawn up in very close order. In general, Alexander seems to have preferred the old depth of eight men; but under his successors the phalanx was deepened to 16 men, and became an unwieldy mass, formidable on level ground, but easily broken if a rough surface opened up the close ranks. This was shown again and again in the battles between the Romans and the Greeks. An important change in the art of war was the introduction by Philip and Alexander of a charge by heavy cavalry as the decisive feature of the attack, instead of the column of infantry used by Epaminondas. The Macedonians also developed the use of military engines hurling huge stones and arrows, both for siege purposes and also to some extent like modern artillery in actual battle.

Rome. While to the Greek belongs the credit of developing warfare into a science, it was left to the Roman legionary, with his perfect discipline and still more perfect organization, to make it effective. The leading characteristic of the Roman soldier was discipline rather than individual prowess. Great national characters like Camillus, Cincinnatus, Papirius Cursor, and Fabius Maximus were not so much heroes or strategists as commanders and disciplinarians.

The fact that the Roman soldier was never the military equal of the Greek hoplite at his best, and that he had no great advantage, man to man, in a pitched battle even with savages, was demonstrated over and over again during his career of world conquest.

In the earliest period of Roman military history all able-bodied citizens, under the King as commander-in-chief, were compelled to serve in the army in time of war. It was under Servius Tullius, however (according to Roman legends, the sixth King of Rome, 578–534 B.C.), that the first real organization took place. On the basis of a property qualification, citizens were divided into classes or grades (*centuriæ*); and each class subdivided into *seniores*, or elderly men, assigned only to light garrison duty, and *juniores*, or effective warriors; with the addition of two *centuriæ* of *fabri* (pioneers), two of *cornicines* (military musicians), and one of *proletarii*. The armies were made up by tribal levies, made in a general public assembly, usually on the Campus Martius, and each tribe was called upon to furnish an equal number of men. Out of a total of 25,000 men there would be 8000 *seniores* and 17,000 *juniores*. The soldiers thus chosen were formed into four legions and a cavalry corps of about 1800 horsemen. The legion (q.v.) on service consisted normally of about 3000 men, not including the *velites*, or lightly armed skirmishers, and a squadron of cavalry. In regular formation the *hastati* (heavily armed infantry), about 1200 strong, and arranged in 10 files, constituted the advance guard; following, was a similar body of *principes*, and a reserve or rear guard of *triarii*, usually arranged in five files.

The equipment of all three divisions was practically identical, and consisted of a short cutting and thrusting sword worn on the right thigh; two javelins, one light and one heavy; metal breastplate, large shield, and brazen helmet and greaves. The Roman attack differed from that of the Greek phalanx, in that, instead of fighting shoulder to shoulder and closing in together as gaps were made, they adopted a loose formation, which permitted the soldiers in the rear to fill up gaps caused by casualties and thus maintained their front intact. In combat the *triarii* used the *pilum*, a short, heavy spear which they threw into the ranks of the enemy before engaging them with the sword. The three divisions of the legion (*hastati*, *principes*, and *triarii*) were each arranged in 10 companies (*manipuli*), to each of which was assigned a detachment of *velites*. The *manipulus* was under the command of a centurion (*centurio*), whose lieutenant was a junior centurion. In the event of the disablement or absence of the officer commanding the legion, command would devolve on the senior centurion of the first company of the reserve (*triarii*). Normally, the chief command was taken two months at a time by each of the six military tribunes (*tribuni militum*). With the first civil war, however, arose the necessity of a single permanent chief, which arrangement was eventually adopted; a single officer (*legatus*) commanding each legion, assisted by a staff composed of the former military tribunes. The year 276 B.C. witnessed the advent of the professional or paid soldier. The long and heavy wars with Pyrrhus and Carthage led to the formation of a regular army; so that dating from the time of Marius (or from the beginning of the first century B.C.) the enlisted man served for a period of 20 years. The legion, as now arranged, was composed of 6000 men, divided into 10 cohorts of 600 men each, all armed with the *pilum*. The *velites* were replaced by foreign mercenaries, of whom the most famous were *sagittarii* (bowmen) from Crete; *iaculatores* (javelin men) from Mauretania; and *funditores* (slingers) from the Baleares. With the exception of a few Roman *equites*, who held the more important positions, the cavalry also was entirely foreign. Organized into cohorts were auxiliary troops of infantry and cavalry. The next reorganization took place toward the close of the first century B.C. under Augustus, who, besides confirming the period of service as 20 years, also introduced the pensioning of veterans. Twenty-five legions were now established and distributed in different parts of the Empire. Subsequently great changes took place in the army. The typical Roman soldier was no longer the invincible legionary, who, covered by his shield, had fought his way through the most stubborn pikemen, beaten back great hordes of Eastern horsemen, and resisted the wild rushes of impetuous Celts and Germans.

At the beginning of the third century A.D. the work of Augustus and others was beginning to fall to pieces; in the fourth, it was scarcely anywhere in evidence, and by the end of the fifth it had become a thing of the past. The exigencies of border warfare, with the extended system of permanent camps connected by patrols, had developed cavalry and light infantry at the expense of the older legion. In the third century A.D. the elaborate system of frontier defense and interior garrisons broke down, and the Empire was subjected to both civil war and foreign invasion. While the legions were engaged in civil strife, the opportunity of the enemy arrived. The frontiers were simultaneously attacked, and the Empire reeled under the shock. The Persians were rising to power in the East (226 A.D.); the German tribes were confederating and becoming correspondingly formidable; and the Franks, Alemanni, and Goths appeared along the Rhine and the Danube. Diocletian, however, with the reconquest of Britain in 297 A.D., restored the Empire to a semblance of its former power and unity. With the aid of wholesale taxation he replenished the exchequer and regarrisoned the military frontier. The changes and additions brought about by Diocletian are remarkable for the value he placed on the troops of mixed nationality and for the growing neglect of the ancient Roman legion. He also enlisted many new bodies of horsemen; *cunei*, *alæ*, *vexillationes*, etc., being raised alike for the limitary, the comitatensian, and the Palatine armies, among whom Germans, Moors, and Persians were more numerous than the born subjects of the Empire. Under Constantine, the old legionary cavalry disappeared altogether, and cavalry and infantry became separate commands; yet under him and his successors, though cavalry grew considerably in relative importance, the infantry still remained the more important arm. The decadence in physique and *morale* of the Roman army at this time was largely due to the fact that the corps were less homogeneous, and the substitutes and recruits bought by the land-holding classes were often of bad material. The increasing boldness of their foes and the constant civil and internal dissensions had a baleful effect on the old-time

esprit-de-corps of the rank and file, and, together with the growing luxury and increasingly enervating vice of the times, soon brought about the disintegration and decay of the magnificent Empire. It is interesting to note that in many instances modern conditions have compelled the adoption of units of military command and forms of military procedure strikingly similar to those of the Romans; while the legionaries' sword, after passing through the radical forms and changes of the Middle Ages, has again appeared in the shape of the modern infantry sword-bayonet, which in shape and size closely resembles the Roman sword.

MODERN ARMIES

The evolution of the modern army has been along the lines of national and mechanical development; national needs and aspirations dictating its origin, organization, and strength, and the progress of mechanical invention its tactics and equipment. Mediæval armies, whose organization and characteristics will be found discussed under FEUDALISM, were made up chiefly of the retainers, dependents, and followers of the nobility, and were usually employed in the petty struggles of their leaders, or in assisting the King to make war on a larger scale. The success of the King invariably meant gifts of land to the victorious nobles fighting under his banner; who, in turn, rewarded their knights and squires by smaller gifts of land, or land privileges, thus building up the feudal system. The holding of lands implied service due to the giver, and as a consequence many of the nobility vied with their King in power and prestige. The crusades did much to develop the idea of coöperation; but at the best the different armies participating were practically independent of each other. It was an age when science was unknown, and the want of intellectual occupation made war the favorite occupation of the higher classes. Individual prowess and bravery were the standards by which battles were fought and won, the fate of a battle frequently depending on a personal combat between two knights. Under such circumstances, the science of war could never attain a high degree of efficiency; nor could any general organization be effected.

It was not until the reign of Charles VII. of France that any regular attempt at organizing a standing army was made, although the Turkish janizaries (q.v.) had been in existence for almost a century before. The Swiss mercenaries, bodies of professional soldiery, were in great demand during the Middle Ages, their military qualities often successfully deciding the issue of a battle. The employment of mercenaries consequently soon became general; so much so, that voluntary patriotic service ceased altogether. Widespread dissatisfaction, however, soon developed, owing to the heavy expense involved, and the danger of intrusting the safety of the State to hired foreigners, who, recruited from the very dregs of society, had to be kept under the strictest discipline and surveillance. It followed as a natural result that organization and the consequent sinking of the individual in the mass eradicated the older forms of knighthood, with their attendant feats of arms and examples of personal skill and daring.

In the reaction from the burden and expense of mercenary armies the present European Continental military system had its inception. The use of firearms by this time had become more general; the proportion of musketeers in the various armies between the beginning of the sixteenth and the end of the eighteenth centuries had considerably increased, and the pike was superseded by the bayonet. Changes of weapons naturally influenced and brought about a change in tactics. In the Thirty Years' War (1618–48), Gustavus Adolphus and Wallenstein employed directly opposite infantry formations. (See INFANTRY.) The former arranged his men six ranks in depth and gained corresponding length of line. Wallenstein, on the other hand, used a narrower front by placing his men in from 20 to 30 ranks. The gradual thinning down to the famous "thin red line" made historic by the English, who have always used the line in preference to the mass of columns of their opponents, and from that to the widely extended front rendered necessary by modern rapid and long-range firearms, is a matter of comparatively recent military history. In the reign of Louis XIV of France (1643–1715) the grouping of brigades and divisions was first introduced, and in the next century Frederick the Great of Prussia (1740–86) reduced his infantry formation to three ranks and introduced a most rigid and exact system of drill and discipline. He was also the originator of horse artillery (1759). (See ARTILLERY.) The contest waged by France against Europe from 1792 to 1797, together with her terrible internal warfare, had largely exhausted the tremendous levies which had hitherto supplied her armies, and in 1798 a law was passed establishing compulsory military service. (See CONSCRIPTION.) This compelled all continental Europe to follow Napoleon's example, so that to-day voluntary enlistment in Europe survives in England alone. Not only conscription, but the development of modern systems of national finance whereby large sums of money could be raised by loans had its effect on European armies. The placing of the entire credit of a State for the support of its military forces enabled armies of greater size to be maintained for a threatened emergency, and these too could be increased far more rapidly and to a much greater degree than was possible when merely the actual wealth of the treasury itself was concerned. In other words, by conscription and loans large armies could be raised speedily and maintained so that the commander-in-chief was relieved of the necessity of thinking of the strength of his forces and the means and methods for their supply and support. This made the European army of the nineteenth century a far more mobile force, for it was relieved from the necessity of subsisting on an enemy's country, by an elaborate system of supply from a home base which the additional funds provided. With this increased mobility naturally followed more elaborate organization and perfection of methods, so that to an extent never before logistics shared with strategy and tactics in the planning of military operations. Furthermore, with the later development of railways even greater ability to mobilize the army rapidly was presented, and this, too, had its effect on the strategy and organization so that the forces were arranged to be placed at the theatre of war much earlier and in much greater strength than in former days. Accordingly, in the nineteenth century the organization and operation of an army were

governed by more vigorous strategy and tactics. The employment of larger forces under the control of an individual took the place of the wider distribution that had previously ruled, and the large army, in turn, was made possible by the new system of conscription or universal service in place of the systems of recruiting which had hitherto prevailed, where desertion and the necessity of maintaining smaller units more closely controlled were factors. Furthermore, the composition of European armies became changed under the new conditions of the nineteenth century, for with conscription and universal service the well-drilled veteran of the eighteenth century, often a professional soldier for life, whose presence in the ranks made possible the older line tactics, disappeared and his place was taken by the young man serving for the stated time. Experience now counted for little with the rank and file, but experience and study of contemporary problems were everything for the officers. In case of war, the standing army was augmented by men of previous military experience obtained from the reserve or militia. More truly than ever, the armies of Europe were now national forces, and while the recruits lacked experience, there was a corresponding increase in patriotism and loyalty, as the hired foreigner of the previous century was eliminated in favor of the young peasant serving with the colors, often with the companions of his home district, for army corps arrayed on a territorial basis. These larger armies and their changed composition also had their effect on the tactics of the day, which were further influenced by the development of high-power arms and other technological advances. The line of battle had given place to the formation of the army in column, and now this was changed by the distribution of part of the forces in the form of skirmishers. The older rules of strategy and tactics governing military operations became disregarded, and the lesson of Napoleon that the main object was the destruction of the enemy's army and that the battle is the end to be sought, governed in the organization and training as well as the actual use of armies. The increase in the national feeling manifested throughout Europe led to the formation of standing armies, not merely for the aggression of a monarch, but for purposes of defense, and the desire for national strength had the support or, at least, the consent of the people. Accordingly, a field army was maintained organized for immediate use, but it was followed by a land militia with retired soldiers as drill masters and leaders of recruits. Such a militia, while requiring a small amount of time from the ordinary occupations of the citizens, made possible a military force of large dimensions in times of war. Again, reserve forces were organized so that the losses in the field could be made up and the commander-in-chief no longer had the worry of seeing his forces depleted. Thus, in the Franco-Prussian war of 1870, drafts of 2000 officers and 220,000 men were sent out to make good the loss suffered by the Prussian army in one way or another as the campaign progressed.

Such conditions as the foregoing were reflected both in the composition and use of armies and in their organization. Napoleon stated that tactics should be altered every ten years with the change of conditions, and the same consideration applies in a large degree to all schemes of national defense which are reflected in the organization of the army. This will be found discussed under ARMY ORGANIZATION, while the present composition of the forces of the great powers is treated under the section *Army* of the articles on the foreign countries. As to the employment of an army, the reader is recommended particularly to the articles on STRATEGY and TACTICS, MILITARY.

Bibliography. Authorities and statistical reports from which much valuable information on armies may be obtained are: Oman, *Art of War in the Middle Ages* (London, 1885); Jerram, *Armies of the World* (London and New York, 1900); and the *Reports of the Military Information Division* of the War Department, issued by the Government Printing Office at Washington, D. C. The annual issue of the *Statesman's Year Book* (London and New York) contains the latest reliable statistics regarding the armies of the world. Other sources of information are the regular service magazines, and the *Journal of the Military Service Institution* (Governor's Island, N. Y.). For a further treatment of the subject of armies and detailed information as to their organization and principal characteristics, the reader is referred to the articles, ARMY ORGANIZATION; ARTILLERY; CAVALRY; INFANTRY; FRONTIER, MILITARY; LANDWEHR; MILITIA; MILITARY EDUCATION; MOBILIZATION; TACTICS, MILITARY; VOLUNTEER, MILITARY. Detailed information on military technical subjects will be found under AMMUNITION; BALLISTICS; ENGINEERING, MILITARY; COAST DEFENSE; FORTIFICATION; FIELD ARTILLERY; ORDNANCE; SIGNALING AND TELEGRAPHING, MILITARY; SMALL ARMS; and also under numerous titles relating to military matters in general. In addition to the special article on TACTICS, MILITARY, such specific operations as ADVANCE GUARD; ATTACK; BATTLE; ENGAGEMENT, MILITARY; INSPECTION; PATROL; MARCHING; REAR GUARD; OUTPOST, will be found under their respective titles.

AR'MILLARY SPHERE (Lat. *armilla*, a ring). An instrument intended to give a just conception of the constitution of the heavens and of the motions of the heavenly bodies, as seen by an observer on the earth. It consists of a number of rings fixed together so as to represent the principal imaginary circles of the celestial sphere, and these are movable round the polar axis within a meridian and horizon, as in the ordinary celestial globe. It was by means of such rings furnished with sights that Hipparchus, Ptolemy, and other ancient astronomers made many of their observations, and we find even Tycho Brahe making most of his planetary observations with the help of such an instrument. The armillary sphere can now be used only for instruction in astronomy, and even in this respect it is altogether supplanted by the celestial globe.

AR'MIN, ROBERT. An English actor and writer. He is spoken of in *Pierce's Supererogation* as one of the "common pamphleteers of London," but he is chiefly remarkable as having been one of the original actors in Jonson's *Alchemist*. He created the part of Dogberry. He is the author of *A Nest of Ninnies*, published in 1608.

ARMIN'IAN, or GENERAL, BAP'TISTS. See BAPTISTS.

ARMIN'IANISM. The name given to a school of Protestant theology which arose in the Netherlands toward the close of the sixteenth

century, taking the name of the leading early representative, Jacob Arminius (q.v.). It consisted at first of a protest against the strict predestinarian doctrine of Calvin and Beza (see CALVINISM), but developed gradually into an increasing liberal theology. The accepted teachers of the Reformed church, at the time the Arminian movement began, emphasized the importance of unconditional election and a limited atonement. Against these views objection was raised in 1578, when Koornheert, a *secretarius* of Haarlem, began his agitation to secure a simpler doctrinal system. Arminius, who was the most influential preacher in Amsterdam from the year 1588 on, was called upon to refute Koornheert's alleged errors; but while studying the question became himself infected by them. Thus gradually he adopted views at variance with the Calvinistic doctrines named above, and began to teach that God, who knows beforehand how all men will act, decrees their salvation or condemnation accordingly; in other words, that election is conditional. He further taught the universality of the atonement—that is, that Christ offered a sufficient sacrifice for all mankind, although it becomes efficient only for such as have faith and believe in Him. (This should be distinguished from modern Universalism, q.v.)

After the death of Arminius (1609), his followers, to the number of 46, presented to the Estates of Holland and West Friesland a "Remonstrance," drawn up by one Uytenbogaert, embodying a moderate statement of their views under five articles, which they declared to be "agreeable to the Word of God" and "sufficient for salvation." These articles were substantially as follows: 1. Predestination depends upon God's foreknowledge. 2. The atonement is universal in the sense that all men are salvable. 3. No one can exercise saving faith until regenerated by the Holy Spirit. 4. It is possible to resist the operation of divine grace. 5. It is not certain that all who seem to be called will persevere unto the end. The publication of this remonstrance was met by a "Counter-Remonstrance" from the Orthodox side, setting forth in five articles the high Calvinism which most of the Dutch churches agreed in maintaining. From these two documents the progressive and conservative parties came to be known as "Remonstrants" and "Counter-Remonstrants," respectively, and from the number of articles in dispute, the struggle is sometimes called the "Quinquarticular" controversy. In the vain hope of reconciliation, conferences were arranged at The Hague (1611) and at Delft (1613), but without result. The toleration law, issued by the States-General in 1614, was no more successful. It had become clear by this time that the theological question was inextricably interwoven with politics. Hugo Grotius, scholar and diplomatist, and John van Olden Barneveldt, Advocate-General of Holland, sided with the Arminians, who supported their republican policy; while the Stadtholder, Prince Maurice, favored the Calvinists, who in turn gave their support to his party of political centralization. No decision upon the doctrinal questions at issue was reached before the meeting of the national synod at Dordrecht (Dort) in 1618.

The Synod of Dort (November, 1618, to May, 1619) is one of the most important councils in the history of the Reformed church. It bears an international stamp, having been attended by delegates sent from England, Switzerland, the German States of the Palatinate, Hesse, and Bremen. King James, of England, was personally represented by John Hales, "the ever-memorable," and an interesting incident of the synod was this man's change of view, when he "forever bade John Calvin good-night." The two opposing parties were led by Gomarus, a Calvinist, and Simon Episcopius, an Arminian. The Orthodox members were largely in the majority, and it soon appeared that the Liberals were there merely to be tried, not to deliberate and consult in equal debate. Episcopius and 13 other Remonstrants were condemned as heretics and excluded from the synod, which then proceeded to formulate the true faith in a series of decrees, afterwards confirmed by the States-General. Episcopius himself was banished, and some 200 Arminian pastors were deposed. Proceedings were begun by the civil government against the political leaders who sided with the Remonstrants. Barneveldt had already been executed before the adjournment of the synod. Grotius was condemned to life imprisonment, but escaped after about two years' confinement. The doctrinal decrees of Dort were accepted by the churches in Holland and in France, but they met with some opposition elsewhere. They are still the official standard of the Reformed Dutch church in America.

After the death of Maurice (1625) the severity of the laws against Arminianism was relaxed, and Episcopius was allowed to return from his exile. The closing years of his life were spent in teaching theology at the new Remonstrant college in Amsterdam (founded in 1630). His successor here was a French theologian, Courcelles, who died in 1659. There followed in turn three eminent Arminian scholars, Limborch (d.1712), Le Clerc (d.1736), and Wetstein (d.1754). Wetstein is noted for his contribution to the cause of biblical criticism, especially for his work upon the text of the New Testament. Arminianism has continued in Holland down to our time, though without any large numerical following. There are Remonstrant churches in Rotterdam and Amsterdam. The movement put forth its best energy in the period of controversy, upon which, as has frequently been remarked, it seems to have thriven better than upon peace. In this respect it shares the fate of most movements that are based upon protests against some real or fancied grievance. During the eighteenth century not a few Arminians went over to the Socinian or Arian position, discarding more and more of the Reformed system of belief. But, aside from this radicalism, the Arminian influence has been widespread. It passed over into England, and, from the time of Archbishop Laud, controlled the theology of the Established church, leaving Calvinism to the non-Conformists. It took on new life in the time of Wesley, and, with some modifications, became the theology of Methodism. It is substantially the faith of many Protestants, of other names, who suppose themselves to be Calvinistic. Indeed, it would be a mistake to think of Arminianism as an isolated phenomenon, for it is akin to the teaching of some of the early Greek theologians, to the semi-Pelagianism of the fifth century, and to some views imputed to Erasmus. Protestants in general shared in the controversy on the doctrines of Arminianism, and all opponents of Calvinism are still often characterized as Arminians.

Consult: *The Works of Arminius*, Eng. trans., reprinted from the Eng. ed., 2 vols. (Buffalo, 1853); Calder, *Memoirs of Episcopius* (New York, 1837); Scott, *The Synod of Dort* (Philadelphia, 1841); Schaff, *Creeds of Christendom*, especially vol. i, pp. 508–23, and vol. iii, pp. 545–97 (New York, 1877); Motley, *John of Barneveld* (New York, 1874); Blok, *History of the People of the Netherlands*, part iii, Eng. trans. by Putnam (New York, 1900); Dresbach, *Die protestantischen Sekten der Gegenwart* (Barmen, 1888). See also DORT, SYNOD OF.

ARMIN'IUS (17 B.C.–c.21 A.D.). A chief of the Cherusci, a German tribe inhabiting parts of what is now Hanover and Brunswick. In his early years he served in the Roman army. The period of Arminius's youth was a time of great peril for Germany. To secure the frontiers of the Empire against the attacks of the Teutonic tribes, the Romans had advanced into the more turbulent districts and erected a series of strong fortresses. Between 9 B.C. and 4 A.D. Drusus and Tiberius penetrated into the northwest of Germany as far as the Elbe and reduced the various tribes to virtual subjection. With so much prudence and caution, however, had Tiberius proceeded, that the Germans continued to all appearance on the best terms with the Romans, gradually adopted Roman habits, and frequently took service in the Roman armies. Arminius and his brother Flavius enrolled themselves under the Roman standards, and as leaders of Cheruscan auxiliaries not only obtained Roman citizenship and the rank of knighthood, but likewise acquired a knowledge of the Latin language, and an insight into the arts of war and policy, as practiced by the Romans. On returning home, about 7 A.D., Arminius found his people oppressed by the Roman Viceroy, Quinctilius Varus, and conceived the plan of delivering his country from the Romans. All the tribes and leaders as far as the Elbe were secretly united; Varus was lulled into security and induced to scatter most of his forces, and with the remaining portion, over three legions, which was just on the point of leaving the territory of the Cherusci for the Rhine, to quit the highway for a shorter route across the country. He was thus lured into the impassable districts of the Teutoburg Forest, perhaps between the towns of Detmold and Wiederbruck, near the sources of the Ems and the Weser. Arminius, who commanded the rear guard of the Roman army, fell upon the legions unexpectedly, and annihilated the entire force, 9 A.D. When intelligence of the disaster reached Rome, it excited the greatest consternation; but the Germans carried their victory no farther, and for a few years both parties refrained from hostilities. In 15 A.D., however, the Romans pressed once more into Germany. In two successive campaigns, 15 and 16 A.D., Germanicus reduced Arminius to great straits and took his wife, Thusnelda, captive, but was recalled to Rome by the Emperor Tiberius, 17 A.D., and the results of his victories were lost. (See GERMANICUS CÆSAR.) From this time no Roman army ever ventured to penetrate into the interior of Germany. After the expulsion of the Romans internal feuds broke out with great violence among the Teutonic tribes. In the course of these Arminius was slain by his own relatives about 21 A.D. Tacitus says of him (*Annals*, ii, 88): "Arminius fought with vicissitudes of fortune, and fell at last by the treachery of his own relations; a man of warlike genius, and beyond all question the deliverer of Germany." A colossal statue of Arminius by Bandel was erected on a hill near the town of Detmold in 1875.

Consult: Meyer, *Untersuchungen über die Schlacht im Teutoburger Walde* (1893), Kemmer, *Arminius* (Leipzig, 1893), and Fischer, *Armin und die Römer* (Halle, 1893).

ARMINIUS, JACOBUS OR JACOB HARMENSEN, commonly called ARMINIUS (1560–1609). One of the most influential of the Dutch theologians of the Reformed church, and founder of the theological system which bears his name. He was born in Oudewater-an-der-Yssel, Oct. 10, 1560, and died in Leyden, Oct. 19, 1609. His father, a cutler by trade, died when Jacob was a child, and the boy was brought up by friends in Utrecht and Marburg. He spent several years (1575–82) at the newly founded University of Leyden, where he imbibed a distaste for the Aristotelian philosophy, which still had great power. Proceeding to Geneva, the Mecca of the Reformed church, Arminius studied for nearly six years under Beza (1582–87), with the interruption of a few months' stay in Basel (1583), where he heard Grynæus, who became very fond of his gifted pupil. In Basel Arminius delivered some lectures on his own account, as was the custom with especially promising students, and he would have been rewarded with the degree of doctor had he not modestly declared himself too young to receive this distinction. At the close of his period of study Arminius made a trip to Italy, visiting Padua and Rome (1587). During most of his student life he had been supported by the city of Amsterdam, which recognized his promise and, knowing him to be dependent, had extended to him a sort of municipal patronage.

In 1588 Arminius became preacher of the Reformed church in Amsterdam, where he remained for 15 years, with growing fame and influence. His orthodoxy was as unquestioned as his ability, and we find that appeal was several times made to him to defend the Calvinistic system against attacks. In its influence upon Arminius himself the most important of these controversies was with one Koornheert, of Haarlem, who had attacked Calvin's doctrine of predestination. While studying the question, Arminius began to incline toward similar views himself, and this tendency appeared in his public sermons on St. Paul's Epistle to the Romans, especially chaps. vii.–ix. Yet he always maintained that his opinions were not inconsistent with the doctrinal standards of his church, the Belgic Confession, and the Heidelberg Catechism. In spite of some opposition on the part of the conservatives, Arminius, in 1603, was appointed professor at the University of Leyden, the great training school for ministers of the Reformed church in Holland. His colleague, Gomarus (q.v.), was a stanch Calvinist, and controversy soon broke out between them, which continued throughout the remainder of Arminius's life. This was by no means a mere academic dispute, but rather one in which the whole of Dutch Protestantism was engaged. The chief points on which Arminius differed from the orthodox majority were the doctrines of divine grace and of election. Arminius taught that grace was universal and election conditional. Gomarus taught that grace was confined to the elect, and that their election was not dependent upon God's foreknowledge of their

faith or good works, but was merely from God's good pleasure. Disputations were held, but without result. Arminius was charged with holding Pelagian and Socinian views, which latter charge he denied with especial vigor. His position at the university remained secure, for the authorities declined to permit clerical interference. Nevertheless, he was constantly under fire, and repeated attempts were made to bring him to trial before a synod. The struggle was still going on when Arminius died, worn out by the strain of theological strife. His influence, however, was never greater than after his death, and his followers under the leadership of his pupil Episcopius (q.v.), prolonged the struggle, even through temporary defeat at the Synod of Dort, until religious toleration was secured under Prince Frederick Henry. The details may be found under ARMINIANISM.

The works of Arminius are accessible in Latin and English. Consult: *J. Arminii Opera Theologica* (Leyden, 1629); *The Works of Arminius*, Eng. trans., reprinted from the London ed. (Buffalo, 1853). There is a life by Nichols (London, 1843).

AR'MISTEAD, GEORGE (c.1780–1818). An American soldier, born at New Market, Va. He entered the United States army as second lieutenant in 1799, became a captain in November, 1806, and a major in March, 1813. He was conspicuous for gallantry at the capture of Fort George (Canada), on May 27, 1813, and subsequently distinguished himself and earned the brevet rank of lieutenant-colonel by his defense of Fort McHenry (near Baltimore) against the attack of Admiral Cochrane's fleet, on Sept. 13, 1814.

AR'MISTICE (Fr. *armistice*, from Lat. *arma*, arms + *statum*, supine of *stare*, to stand; for the form *stice*, cf. sol-*stice*). A cessation of hostilities for any period of time that may be mutually agreed upon by the combatants. An armistice is sometimes called after a severe action, to enable both sides to search for and bury their dead; or it may be called as a prelude to overtures for peace. A local armistice may be entered into or arranged between any part of the opposing forces which will only affect the respective commands. A general armistice, affecting all the troops in the field and all operations, can only be entered into by the commanders-in-chief, or their home governments. The term "armistice" is also applied to an opportunity given to rebellious citizens or subjects of a state to present themselves, surrendering their arms and renewing professions of loyalty to the state, immunity from punishment for acts against the state done while in rebellion being guaranteed all who accept the terms of the armistice. See INTERNATIONAL LAW; WAR.

AR'MITAGE, EDWARD (1817–96). An English historical painter. He was born in London; was educated in Germany and France and was a pupil, in 1837, of Delaroche, whom he assisted in painting the famous Hémicycle in the Ecole des Beaux-Arts. His more noteworthy frescoes are in St. John's (Roman Catholic) Church, Islington, London, and in the Houses of Parliament. He was appointed professor of painting in the Royal Academy in 1875, of which he had become a member three years earlier. His *Lectures on Painting*, delivered to the students of the Royal Academy, were published in 1883. His influence contributed not a little to the revival of fresco painting in England and was always directed in favor of a grand and lofty, if somewhat cold and severe, style. A volume of his *Pictures and Drawings* appeared in 1898.

ARMITAGE, THOMAS (1819–96). An American Baptist clergyman who was born in Yorkshire, England, and came to America in 1838. At 16 years of age he entered the ministry of the Methodist Episcopal church, but in 1848 became a Baptist, and was pastor of the Fifth Avenue Baptist Church, New York, retiring in 1889. He was active in the organization of the American Bible Union, and was its president from 1856 to 1875. He was a strong advocate of the revision of the Bible, with a view to bringing out what he thought the correct interpretation of the words which relate to baptism. He published *Preaching: Its Ideal and Inner Life* (1880)—lectures which he had delivered before Baptist theological seminaries—and *A History of the Baptists* (1886).

AR'MOR (through OF. *armure*, *armeüre*, from Lat. *armatura*, armor). In common usage, clothing or coverings worn to protect the body against weapons. (In the English statutes it includes offensive weapons as well.) Among primitive nations the armor ordinarily consisted of the shield alone. Before gunpowder was commonly used, each nation, as it gained greater skill in warfare, adopted other means of defense, in addition to the shield. Skins, leathers, various materials like cloth, metals in many forms, were adopted as protections. The Greeks of the Homeric Age had helmets, cuirasses, greaves, and shields of bronze. The later Greeks used the same pieces of bronze armor, but developed them so as to protect the whole body more thoroughly, and frequently used a corselet of quilted linen, of Oriental origin, in place of the metal cuirass. The shield was smaller than the Homeric shields. The Romans used practically the same armor, but endeavored to develop it along the lines of superior protection and less weight. For part of the body armor they substituted iron in place of bronze. For the cuirass they used frequently leather, on which iron rings were sewed. The shield was of wood, covered with leather, and had a metal rim.

The early Germans had no armor except the shield. From contact with Roman weapons, they learned the necessity for more, and accordingly adopted some of the Roman armor. But for a long period armor was rare and costly. Charles the Great enacted laws repeatedly forbidding the sale of byrnies (q.v.) outside his realm. If any merchant disobeyed, he was to forfeit all his property. Every large landowner had to own a byrnie; and if he appeared without it, he forfeited his benefice. As, in place of national levies, feudal armies became the rule, more stress was laid upon a knight's having a complete suit of armor. The foot soldiers and attendants were protected mainly by gambesons, but the knight strove to cover every portion of his body with metal armor.

The period beginning with the twelfth century, when the use of the crossbow became common and when the crusaders came into conflict with the armies of the East, is the time in which armor developed most rapidly and became most perfect. For the byrnie was substituted, first, the grand hauberk, and later, in the fourteenth century, plate armor. The small, conical-shaped helmet of the eleventh century was discarded for a much larger one, cylindrical in form, which

ARMOR

SPECIMENS OF EUROPEAN ARMOR FROM THE COLLECTION OF THE METROPOLITAN MUSEUM OF ART, NEW YORK CITY

1. SPANISH ARMOR, END OF SIXTEENTH CENTURY
2. ITALIAN ARMOR, ABOUT 1460
3. GERMAN ARMOR, 1600
4. ENGLISH ARMOR, SIXTEENTH CENTURY

covered both head and face. When the visor was down, only a few openings were left for seeing and for getting air. The body also was entirely covered with plate armor. When thus clad a knight was unrecognizable, and this necessitated armorial bearings as a means of identification. The shields were still made of wood, and elm seems to have been preferred. In thoroughly equipped bands of mounted men the horses were also partially protected by plates of armor.

Armor, by its development, had been able to keep pace with the improved forms of the crossbow and the longbow. But when gunpowder came into use, armor was of little service. Consequently it was discarded for the most part, except among the very wealthy, who continued to wear coats of mail as late as the close of the seventeenth century, and in certain troops of cuirassiers, some of which still retain in their uniforms traces of armor. Even now some of the helmets worn by cavalry may be classed as armor. After coats of mail were discarded because they were ineffective and cumbrous, buff coats and jerkins were much used for defense.

For this whole subject consult Demmin, *Die Kriegswaffen* (4th ed., Leipzig, 1898), which contains thousands of illustrations, and Ashdown, *Arms and Armor* (New York, 1909). For the separate pieces of armor see AILETTES; BARD; BRASSARTS; BREASTPLATE; BRIGANTINE; BYRNIE; CHAMFRON; CHAUSSES; COAT OF MAIL; COIF; GAMBESON; ETC. See also CHAIN MAIL.

AR'MORER. Formerly a maker of, or an expert in, armor; hence one who had the care of the arms and armor of a knight or man-at-arms and equipped him for action. In modern use an armorer is a manufacturer of military arms, or one who has the supervision of any collection or equipment of arms. In the British Army an armorer is attached to each troop of cavalry and to each company of infantry to clean the arms. Aboard a man-of-war the armorer and armorer's mate did the blacksmith work of the vessel, but of late years the armorer is a petty officer and one of the gunner's gang, his duties being the care of the arms used by the ship's company. Aboard ship each man is not responsible for the care of his weapon, as is the case with soldiers.

ARMOR'ICA, corrupted from **AREMORICA** (Celt. *ar*, on or near + *mor*, sea, Lat. *mare*, Slav. *more;* cf. *Pomerania*, Slav., coastland, and *Paramaribo*, the dwelling near the sea). The country of the Aremorici, the name by which the people occupying the coast of Gaul between the Seine and the Loire were known to Cæsar. At a later period the name Armorica was confined to the country afterward styled Britannia Minor, or Bretagne.

ARMOR'IC LAN'GUAGE. See CELTIC LANGUAGE.

AR'MOR PLATE. The protection of vessels of war by metallic plating began soon after the introduction of heavy guns on board ship, but was a matter of little importance until the introduction of shell fire and the increased power of guns made the protection afforded by thick wooden sides wholly inadequate. The demand for armor became more imperative as time went on, owing to the greater use of machinery and apparatus which needed protection, even against comparatively small guns; and, in recent years, its use has been further stimulated by the increased speed of fire of guns of all calibres. The first important use of armor plate was made in the operations against Gibraltar in 1782. The Chevalier d'Arçon had caused to be constructed 10 floating batteries of 600 to 1200 tons, armed with 10 to 20 guns each. The hulls were of wood, protected with bars of iron laid on at short intervals, with an outer covering of cork. Sand was placed in the spaces between the bars, and it was to be kept wet to avoid danger of fire from red-hot shot. The deck over the guns was of very solid construction and covered with thick green hides. At the attack on Gibraltar of Sept. 13, 1782, one of the vessels took fire, and, as they were moored very close together, the conflagration spread to the others, and they were all destroyed. No provision had been made for extinguishing fire, as it was thought the means to prevent it were ample. Boats, even, were not supplied, so that of the 5260 men who formed the crews, only 487 were saved. Subsequent to this were many suggestions as to the employment of armor plating. About 1812 Col. John Stevens, of New Jersey, prepared plans for an armored steam vessel for harbor defense. Explosive shells, which had hitherto been used only in mortars, were in 1824 prepared for service in the ordinary smoothbore guns of the French ships; and at that time General Paixhans, in an official letter to the French government, predicted that this new departure would force the creation of armored ships. About 1830 the French government began experiments (the first were carried out at Metz) to determine the resistance of earth, wood, and different types of masonry to the penetration of spherical projectiles. These experiments were continued at intervals for several years, and the results obtained are still considered of some value.

In 1841 General Paixhans, who invented the shell for low-angle fire, recommended the application of armor plate to the sides of vessels as a protection against his own missiles. His plans were rejected, but they attracted much attention. In 1841, also, the sons of Col. John Stevens proposed to the United States Navy Department to build an ironclad steamer of high speed, in which all of the machinery, including the propellers, was to be below the water-line. The proposal was accepted, and the act of Congress, approved April 14, 1842, authorized the Secretary of the Navy to "contract for the construction of a war steamer, shot and shell proof, to be built principally of iron, upon the plan of the said Stevens." The Stevens brothers had been carrying on armor experiments of their own, and as a result of them had decided that a thickness of 4.5 inches would be sufficient to render the new vessel invulnerable. Just as the Stevens ship was about to be constructed the performances of John Ericsson's large wrought-iron gun showed that 4.5 inches of laminated armor was insufficient for the purpose in view, so that when the Stevens battery was finally begun in 1854—two months before any armored craft in Europe had been laid down—it was as a larger vessel than that originally designed, in order to carry armor of 6.75 inches. The Stevens battery was never completed, largely because general interest in the project subsided, but specifically because Congress refused further appropriations.

In 1841 Theodore R. Timby submitted to the United States War Department plans for a revolving armor-plated battery, and in 1843 he

filed a caveat for "a metallic revolving fort, to be used on land or water, and to be revolved by propelling engines located within the same and acting upon suitable machinery." In 1845 M. Dupuy de Lôme submitted the plans of an iron-hulled armor-plated frigate. He believed that by substituting iron for wood he could reduce the weight of the hull from 42 per cent of the displacement to 23, and this saving would be sufficient to give the ship an armor belt 8 feet wide and 6.5 inches thick. The plans were rejected on the ground that he had overestimated the weight which would be saved; that, even if the proposals were feasible, a 6.5-inch belt was not invulnerable, and that, moreover, the battery was left without protection. In 1846 the French constructors were called upon for plans of an armored floating battery for coast defense. One of these provided for an iron hull and was at first accepted, as the light hull permitted an increased thickness of armor, but it was finally rejected on account of the anticipated deterioration and loss of speed from the fouling of the bottom. No steps were taken to build any of the batteries at this time; but at the outbreak of the Crimean War the plans of the batteries were again taken up and experiments with armor were begun at Vincennes to determine what the proper kind should be. These tests resulted in showing the inferiority of laminated plating as compared with solid plates of the same thickness. Solid plates 4 inches thick were broken, but not pierced, by both 32-pounder solid shot and 8-inch and 9-inch hollow shot. It was therefore decided to armor the batteries with 4.5-inch plates. About 1846 or 1847 Lieutenant Hunter, of the United States navy, brought out a plan of an armor-deck for the protection of the machinery of vessels, and it very closely resembled, in all its features, the protective deck of 30 years later. In September, 1854, the French government began the construction of several of the armored floating batteries fitted with weak auxiliary steam power, for which designs had been prepared some years before. Three of them took part—the principal part—in the attack upon the Russian batteries at Kinburn, Oct. 17, 1855. While practically uninjured themselves, they were able to lie so close to the enemy's works, 800 yards away only, that they dismounted nearly half his guns and compelled him to surrender after four hours' firing, though these batteries had held at bay the combined wooden fleets of France and England for months. The plans of these armored vessels were sent to England by the French Emperor. After considerable opposition and delay the Admiralty began the construction of similar vessels, but they were completed too late to join in the attack on the Kinburn forts, as they did not reach the Crimea until October 24, seven days afterward. The success of the French armor-clads was followed at once by renewed and widespread interest in the armoring of ships. The French Conseil des Travaux de la Marine then determined to construct some sea-going armor-clads. Before elaborating a design, further experiments were made with armor plates, which resulted in the adoption of armor five inches thick. The thickness of plating and the general features of the design having been decided upon, plans were invited. Those of Constructor Audenet were accepted, and were carried into effect by the building of the *Couronne*. In the meantime M. Dupuy de Lôme had been studying the results of the recent armor trials. In November, 1857, he laid his plans and proposals before the government, and in March, 1858, was begun the conversion of the 13-knot, 5000-ton wooden line-of-battle ship *Napoléon* into an armor-clad. On this ship, which was renamed the *Gloire*, the armor was applied very liberally, extending from well below water to the deck above the battery; the water-line belt being 4.75 inches thick, backed by 26 inches of oak, and the armor of the battery 4.5 inches thick with 24 inches of backing.

With the armor trials for the plating of the batteries used at Kinburn, in which the superiority of the solid plate was shown, the steady development of armor commenced. Before the application of armor to sea-going ships, which began with the *Couronne* and *Gloire*, the investigation of its qualities naturally lacked impetus, but henceforward its improvement was steadily sought, and its manufacture soon became a separate industry. The quality of the early plates was very poor, showing lack of facilities for manufacture and experience in producing pure and homogeneous metal and in working it. This condition of affairs was speedily altered; heavy hammers and rolls were rapidly brought into use, and by 1862 the manufacture of homogeneous wrought-plate was brought to the highest state of perfection, both in England and France. In the meantime gun and projectile makers had not been idle. The 32-pounder and 68-pounder smoothbores using solid cast-iron projectiles were the standards for armor testing; the 8-inch, 9-inch, and 10-inch shell guns were brought out long before the application of armor to seagoing ships, but shells from these guns were too light, and the shot of too low velocity, to render them superior to the longer pieces mentioned.

Rifled guns began to be used commonly about 1860; France, Prussia, and Russia adopted them in 1858, the two latter deciding upon the breech-loader. France retained the muzzle-loading system until 1864; the *Gloire* was armed with a battery of muzzle-loading rifles in 1859, though her designed armament consisted of smoothbores. In 1855 Armstrong brought out a breech-loading piece of small calibre, and Whitworth submitted to the government in 1856 designs for breech-loading and muzzle-loading guns of all calibres. The Armstrong system was adopted for use in the British navy, but repeated accidents led to an outcry against the breech-loading system, and in 1863 the Committee on Designs for Artillery conducted experiments with muzzle-loading guns which led to the adoption of the Woolwich type of muzzle-loader. But whether breech-loading or muzzle-loading, the guns were all *rifles*, and the increased penetrative power rendered all armor so far produced easily vulnerable. The armor makers endeavored to meet the new situation in various ways. The thickness of the plate was increased; steel plates of various kinds were tried, as were plates made up of layers of steel and iron. The steel plates resisted perforation better than wrought iron, but were so easily cracked and destroyed that they failed to gain favor. Whitworth, always in the van in the development of ordnance, made and used forged steel projectiles in 1862, but their value was not generally realized, because the soft iron armor then in vogue was equally penetrable by the cast-iron shot. As the thick-

ness of the wrought-iron plate increased, the difficulties of its manufacture grew rapidly. Neither rolls nor hammer could successfully handle the thickness demanded by ship designers. Resort was had to welding, but this was not satisfactory, first, because it could not be effectively done except by machining the faces to be joined, which added greatly to the expense, and, secondly, because even then the weld was usually imperfect. The next step was to "sandwich" several plates with a layer of wood between them. The result was found to be inferior to that obtained from a single plate, but the plan was for a time accepted as the best available one. In 1866 Gruson in Germany and Palliser in England brought out cast-iron shell with hard, chilled points. These further increased the penetrative power of the gun.

The question of the backing of armor received attention from time to time, and the results obtained are interesting even now. With the low velocities in use up to 1880, wood backing played a very important part, but its importance has diminished in recent years; all thick armor is still backed with wood, but its thickness is about a quarter of that considered desirable in the days of wrought-iron plate. The backing of the *Warrior's* 4.5-inch armor was of teak, 20 inches thick, in two layers of 10 inches each. A less thickness of backing and 5 inches of armor gave inferior resistance to penetration. As projectiles improved in quality and acquired greater velocity, the advantage of thick backing was less apparent; indeed, except for the purpose of reducing the shock to a ship's framing, it is now regarded as disadvantageous, for the same weight added to the plate to increase its thickness will give greater resistance to penetration.

Notwithstanding the confessed weakness of homogeneous wrought-iron plate, a successful competitor was long in coming, though both compound and steel plates early appeared in the competition, as has already been stated. In 1859 the Mersey Works in England submitted 2.5-inch plates made up of three layers, the outer ones of wrought iron welded to a middle one of steel; the welding was imperfect and the brittleness of the steel affected the outer layers; moreover, they were constructed on a wrong principle, as will be seen presently in connection with capped projectiles. In 1861 compound and steel plates were tested in England; while a long series of tests with steel was carried on in France from 1857 to 1861. The theoretical advantages of steel and compound armor were thoroughly understood at this time, but brittleness defeated one and imperfect welding combined with brittleness precluded the use of the other. The preëminence of wrought-iron plate continued practically undisputed until 1876. In 1875 the Italian government called for test plates of 22-inch solid armor from all the principal manufacturers in the world. Four responded—Brown & Co. submitted two solid iron plates; Cammell & Co. one solid plate and one sandwich target; Marrell et Cie. presented the same; and Schneider et Cie. presented for test two solid steel plates. The trials took place at Spezia in 1876, and the result was overwhelmingly in favor of the steel plates; though these cracked more than the others, the difference in resistance to penetration was great. As a result of the Spezia test, wrought-iron plates were fully discredited. In England, where the prejudice against steel was fostered to some extent by national jealousy of a French manufacturer's success, compound armor was rapidly developed. This consisted of a hard steel face welded to a wrought-iron back.

In the Wilson process (Cammell & Co.) molten steel was poured on a white-hot iron plate, thus adding one-third to the thickness of the plate, which was afterward rolled. In the Ellis process (Brown & Co.) a wrought-iron and a rather thin, hard steel plate were separately made. The lower plate was placed in the furnace; iron bars were placed around the edge, forming a berm, and the steel plate laid on the bars. After they were raised to a welding heat, molten steel was poured into the space between the plates, welding all together. There were other systems of compound plate manufacture, but these attained the greatest eminence, if extent of use is a criterion, and they exemplify the type. The first really successful compound plates appeared in 1877, and from that date they competed with steel plates on apparently equal terms until 1889, when Schneider brought out his first nickel-steel plate. The trial of this plate took place in July, but it was not until the next year that attention was fully drawn to the importance of the new metal. The United States naval authorities, having purchased in Europe a compound plate from Cammell & Co., a steel plate and also one of nickel steel from Schneider et Cie., held a competitive test at the naval proving ground, Annapolis, in September, 1890. The compound plate was ignominiously defeated, both by the steel plate and by that of nickel steel. Indeed, the defeat was so complete and convincing that it stopped the manufacture of compound plates at once. The Navy Department had already committed itself to the manufacture of steel armor, and large contracts for it had been given out some years before. The wisdom of the decision in favor of steel had been questioned in Congress and in the public press, and the trial was instituted to convince the doubters; the occasion also served to effect a trial of a nickel-steel plate which had been acquired on account of the promising results obtained by Messrs. Schneider et Cie. the year before. The important results of this trial had hardly appeared when a second trial of like revolutionary character took place. A year or two before, Mr. Harvey, a manufacturer of fine-grade tool steel, was at the Washington gun factory. In a conversation with him, Captain Folger, the superintendent of the naval gun factory, suggested the attempt to adapt the Harvey system of hardening tool steel to armor plate. After considering the matter Mr. Harvey decided to make some experiments looking to surface hardening armor; and the result was the Harvey process of surface carburization and hardening. In this process the plate is placed on the floor of a suitable furnace in a bed of refractory material, leaving the surface to be hardened uppermost. This is covered with carbonaceous material, which is rammed down upon it; over the carbon is put a layer of sand covered in with fire brick. The temperature of the furnace is then raised to about the temperature of melting cast iron and kept so for several days, until the required additional carburization—usually about 1 per cent—is effected. The plate is then removed, and, when cooled to a dull cherry red, is hardened

by a water jet or immersion in running water. The trial of the first plate made by the Harvey process took place Feb. 14, 1891, and was very successful. The popularity of the new armor was immediate, and the cause is not far to seek, for in its construction it embodied the combined views of armor theorists.

Supporters of compound armor accepted the defeat of the year before with reservations. They still adhered to the idea of a hard face and soft back; and they were right in so doing. The advocates of a single, practically homogeneous plate were also satisfied; they held, very properly, that the strength of armor plate must not lie solely in defeating the projectile by breaking it up, but in keeping it out by the toughness of the plate. A third class of critics—more or less in sympathy with the compound armor people, but not completely so, and declaring that no armor is fit to put on a ship which breaks up under attack and leaves the side bare afterward, even if it stops that particular projectile—were also satisfied. In England the Harvey system was adopted almost at once, but notions of misplaced economy and the difficulty of working the resulting metal caused the rejection of nickel in steel. But this view was held only a few years. The next improvement, in 1895, was effected by the Carnegie Company, which found that a reforging of plates after carburizing considerably improved the quality. Soon after the appearance of Harveyized armor, Krupp, Schneider, the Terni Works, and several other European makers began experiments along the same lines. The ones mentioned alone produced any noteworthy results, and it is to be remarked that all three adopted the method of carburization by means of gas rich in carbon. Of these three kinds, the product of Krupp is generally regarded as the best. Krupp armor differs from that previously made, not only in the process of manufacture, but in its chemical constitution. Its exact character is a jealously guarded trade secret, which has been sold at a high price to nearly all the great armor manufacturers of the world, but that it contains a small amount of chromium as well as carbon is now generally understood. Previous attempts to produce chrome steel armor had not been successful, though the trials had been numerous and persistent. Nearly all of the armor now applied to ships, except very thin plates is made by some modification of the Krupp process. The Terni Works in Italy, and Schneider in France, have continued the development of their own processes, which give nearly equal results. In the United States the principal armor makers are the Carnegie Works (United States Steel Corporation), near Pittsburgh; the Bethlehem Steel Company, and the Midvale Steel Company. The armor made by them is considered equal to any made in Europe.

The object of having a hard face to armor is to break up projectiles by shock, or so to strain or deform them as to reduce their penetration. It is particularly effective on oblique impact. To combine hardness with toughness was the aim of armor makers for a quarter of a century, and success was not obtained until the advent of nickel steel. The use of chromium, tungsten, and other substances has further improved these qualities. Had not the improvement of projectiles and guns kept pace with the development of armor, ships could now be made invulnerable; but both have improved so that the relation of guns and armor is now less favorable to the latter than at almost any time in its history. Nevertheless, armor is absolutely indispensable to the protection of ships and their crews against all classes of gun fire. The power of good Harvey nickel-steel armor to resist penetration is about equal to that of double the thickness of wrought iron, and the resisting power of the best modern armor is 20 to 30 per cent greater. These figures are for attack by ordinary armor-piercing projectiles. Projectiles of this type which are fitted with soft caps (see PROJECTILES) penetrate almost as deeply in Krupp as in Harvey armor, and the gain by the use of caps is equal to a reduction in thickness of 8 to 10 per cent in Harvey armor and 15 to 20 in Krupp, i.e., a capped projectile will perforate a Harvey plate 8 to 10 per cent thicker, or a Krupp plate 15 to 20 per cent thicker, than will a projectile not provided with a cap. The penetration in armor of recent United States guns is seen in the accompanying table:

Gun: Calibre and mark	Length of gun in calibres	Weight of gun	Weight of projectile	Muzzle velocity	Muzzle energy of projectile	Penetration of capped projectiles in armor of recent type			
						At muzzle In.	At 3000 yards In.	At 6000 yards In.	At 9000 yards In.
		Tons	Lbs.	Ft. sec.	Ft. tons				
3-inch, Mark VI	50	1.0	13	2,700	658	3.3	1.2	0.8	....
4-inch, Mark VIII	50	2.9	33	2,800	1,794	5.3	2.6	1.5	1.2
5-inch, Mark VII	51	5.0	50	3,150	3,439	6.8	3.4	1.8	1.4
6-inch, Mark VIII	50	8.6	105	2,800	5,707	11.3	5.2	3.2	2.3
7-inch, Mark II	45	12.7	165	2,700	8,338	12.0	9.0	7.0	5.0
8-inch, Mark VI	45	18.7	260	2,750	13,360	14.5	12.0	9.5	7.5
10-inch, Mark III	40	34.6	510	2,700	25,772	19.4	15.5	12.0	9.0
12-inch, Mark VII	50	56.1	870	2,950	52,483	25.7	22.0	18.5	15.5
14-inch, Mark II	45	70.3	1,400	2,600	65,606	28.3	24.8	22.0	19.7

Thin armor of hardened steel plate, but not surface-hardened, is very extensively used in the interior of recent ships to localize the effects of shell explosions and to resist the explosions of torpedoes.

Another form of armor, not used for ships, but only for fortifications, is made of chilled cast iron, and was developed by Gruson, whose works were located at Magdeburg-Buckau. Herr Gruson died in 1895, and his establishment was then purchased by Krupp. The metal was a specially excellent low carbon cast iron, chilled in the casting on its outer surface, without apparently weakening its tenacity. It is designed and shaped to be used in cupolas of special dome-like form covering one or more guns. Where weight is of no importance it is a very effective defense. Works for its manufacture in the United States were established near Philadelphia.

A full account of the early development of armor by Lieut. E. W. Very, U. S. N., is found in the *United States Naval Institute*, vol. ix, no. 3 (1883). Numerous other papers of less length, but of much value, appear in later numbers of the *Proceedings*, in every number of which there is a brief account of the latest advances in armor development. For additional information consult C. Orde Brown, *Armor and its Attack by Artillery* (London, 1887); also the *Annual of the Office of Naval Intelligence*, United States Navy, especially for the years 1891 and 1892; and *Text-Book on Ordnance and Gunnery for Use at the Naval Academy*, which is revised at frequent intervals. From time to time important articles on armor appear in Brassey's *Naval Annual*.

For further information in regard to armor, see BALLISTICS, *Ballistics of Penetration;* SHIPS, ARMORED; PROJECTILES; GUNS, NAVAL.

AR'MORY (from *armor*, ultimately from Lat. *arma*, arms). A military depot or building set apart for the use of troops, storage of arms and equipment, or purposes of defense. In the United States the term "armory" is generally applied to local headquarters for parts of the national guard or militia, which are used for purposes of drill, organization, regimental or departmental offices, and the storage of all stores and equipment pertaining to the troops occupying them. In many instances they are magnificent examples of military architecture, from both the interior and exterior points of view. Equipped with every modern convenience and many luxuries, they afford many of the characteristics and advantages of a first-class gymnasium or social club. Such features, however, are secured generally by the officers and men themselves, and contribute largely to the success and good standing of the organization in its particular community. In case of local disturbances, the buildings are admirably adapted for defense, or use as a basis of operations. In England and Continental Europe the name "armory" is sometimes applied to a museum of military antiquities, as the armory at Warwick Castle, England, or at the Tower of London, which, however, contains a store of modern as well as ancient and mediæval arms and armor; it also, and more generally, applies to that part of an arsenal, barracks, camp, cantonment, or fort where are situated the offices and workshops of the armorer and his assistants, or are stored supplies of arms and accoutrements. Examples of the latter may be found in every European military post or station.

AR'MOUR, HERMAN OSSIAN (1837–1901). An American merchant. He was born at Stockbridge, N. Y., was in business at Milwaukee, Wis., from 1855 to 1862, and as a grain commission merchant at Chicago from 1862 to 1865. He became the New York representative of the Milwaukee packing firm of Armour, Plankinton & Co. in 1865. The firm name of H. O. Armour & Co. was retained at Chicago until 1870, when it was altered to Armour & Co., now controlling the largest provision industry in the world.

ARMOUR, JONATHAN OGDEN (1863—). An American capitalist and packer, born in Milwaukee, Wis. He entered Yale, but did not graduate, entering instead the business house of Armour & Co., then conducted by his father, Philip Danforth Armour (q.v.). Upon the death of the latter he succeeded him and became one of the most successful merchants of the country. In later life he became director of important banks and commercial corporations and in 1906 wrote *The Packers, the Private Car Lines, and the People.*

ARMOUR, PHILIP DANFORTH (1832–1901). An American merchant and philanthropist, born and educated in Stockbridge, N. Y. In Milwaukee, in 1863, he became the head of the firm of Armour, Plankinton & Co., pork packers, whose main office was transferred to Chicago in 1870, where a reorganization was soon afterward effected under the name Armour & Co. The business increased with great rapidity and sent exports to every civilized country. The firm also invested heavily in collateral enterprises such as the refrigerator car service on the railways and the storage and handling of grain. At the time of Armour's death the firm owned more grain elevators than any other house in the world. Armour was noted no less for his philanthropy than for his business acumen and executive ability. He endowed the Armour Institute of Technology (q.v.) and the Armour Mission, in Chicago, giving them a total of over $2,500,000.

ARMOUR IN'STITUTE OF TECHNOL'OGY. An institution in Chicago for the advancement of technical and practical education. It was founded in 1892 by Philip D. Armour for the purpose of giving young men an opportunity to secure at moderate expense a broad and thorough knowledge of applied science. The College of Engineering offers four-year courses in mechanical, electrical, civil, chemical, and fire-protection engineering, architecture, and industrial arts. The four-year courses in mechanical and electrical engineering were first established and later the course of architecture was included by union with the Art Institute of Chicago. The course in civil engineering was established in 1899, in chemical engineering in 1901, in fire-protection engineering in 1903, and in general science in 1905. In 1912–13 the college faculty numbered 62 and the students 1338. The total value of the institute's property was $5,000,000. President, Frank Wakeley Gunsaulus, D.D.

ARMS, ARMORIAL BEARINGS, or ENSIGNS. Names given to such devices as, when painted on a shield, form a coat. These terms in popular speech include all the accompaniments of a shield—viz., the crest, helmet, and, where such exist, the supporters, etc. See HERALDRY.

ARMS, ASSUMPTIVE. See HERALDRY.

ARMS, SERGEANT AT. See SERGEANT AT ARMS.

ARMS, STAND OF. A general title for one or more rifles or other military weapons. It is generally used to describe a complete set of arms for one soldier, including rifle, bayonet, and cartridge box and belt. The term has become almost obsolete in modern military parlance.

ARMSBY, HENRY PRENTISS (1853—). An American agricultural chemist, born at Northbridge, Mass. He received the degree of B.S. from the Worcester Polytechnic Institute in 1871 and that of Ph.D. from Yale in 1879. He taught chemistry successively at the Worcester Polytechnic Institute (1871–72), the Fitchburg, Mass., high school (1874–75), and at Rutgers College (1876). After three years as chemist to the Connecticut Agricultural Experiment Station, he was appointed, in 1881, vice-president of the Storrs Agricultural School, two years later professor of agricultural chemistry at the University of Wisconsin, and in 1887 director of

the Pennsylvania Agricultural Experiment Station. This last position he relinquished only after 20 years of service, in order to accept the directorship of the Institute of Animal Nutrition at the Pennsylvania State College. In 1893 he was chairman of the committee on the exhibit of the experiment stations at the Chicago Exposition, and at the Paris Exposition in 1900. In 1898 he began a long service as expert in animal nutrition in the United States Department of Agriculture. Within the same year the Association of American Agricultural Colleges and Experiment Stations elected him their president. He wrote *Manual of Cattle Feeding* (1880); *Principles of Animal Nutrition* (1903); *The Maintenance of the Rations of Farm Animals* (1912).

ARM'STEAD, HENRY HUGH (1828–1905). An English sculptor, known also as a worker in metals. He was born in London and studied at the School of Design, Somerset House, and later in the Royal Academy schools. Influenced at first by the superficial elegance of his early instructor, E. H. Baily, he later gained greater insight and strength, and from the time when he was employed by Sir Gilbert Scott to execute parts of the Albert Memorial, his position was assured. He became an associate of the Royal Academy in 1875 and a full member in 1879. Among his portrait statues that of Bishop Wilberforce in Winchester Cathedral is noteworthy; among the few imaginative works, "Remorse," now in the Tate Gallery. Consult his biography by his daughter (1906).

ARM'STRONG, ANDREW CAMPBELL (1860—). An American scholar and educator, born in New York City. He graduated from Princeton in 1881, was a fellow of that university for two years, and then entered Princeton Theological Seminary. His course finished in 1885, he went abroad for a period of study at the University of Berlin, but returned to Princeton to become associate professor of ecclesiastical history at the seminary. After two years in this position, and one year as instructor in history at Princeton College, he was called to begin what proved many years of service at Wesleyan University (Middletown, Conn.). In 1887–88 he was associate editor of the *New Princeton Review*, and in 1904–09 was coöperating editor of the *Psychological Review*. He made contributions to several psychological and philosophical encyclopædias, translated Falckenberg's *History of Modern Philosophy* (1903), and wrote *Transitional Eras* (1904).

ARMSTRONG, DAVID MAITLAND (1836–1918). An American decorative artist and genre painter. He was born at Newburgh, N. Y., graduated in 1858 at Trinity College, and studied art at Paris and Rome. He served for four years as Consul-General for Italy and at the Paris Exposition of 1878 he was director of the American art department. His activity he confined to decorative art, principally to mural decorations and stained glasses. Among the latter are memorial windows in the Ascension, St. Michael's, Holy Communion, and Holy Trinity churches in New York, and 15 memorial windows in All Souls' Church, Biltmore, N. C. He was made an associate of the National Academy, a member of the Architectural League, and a member of the Legion of Honor.

ARMSTRONG, EDWARD (1846—). An English historian and educator, born at Grahamstown, South Africa, and educated at Exeter College, Oxford. He took his final examinations in 1869, became a fellow at Queen's College the same year, and a tutor the year following. After serving as assistant master at Rugby School in 1871–73, he returned to Oxford, where he became prominently identified with Queen's and the university. At the college he served as bursar (1878–1911) and was made lecturer on modern history; by the university he was chosen lecturer on foreign history and a member of the board of finance. He also became curator of the Taylor Institution and of the Botanic Garden, and warden of Bradfield College. Besides contributions to the *Cambridge Modern History* and to leading English reviews, his writings include: *Elisabeth Farnese* (1892); *Lorenzo de' Medici* (1897); *The Emperor Charles V* (2 vols., 1902); *The French Wars of Religion* (2d ed., 1904).

ARMSTRONG, EDWARD COOKE (1871—). An American scholar and educator, born at Winchester, Va. He graduated from Randolph-Macon College in 1890 and after advanced work at Johns Hopkins received the degree of Ph.D. from that university in 1897. Additional graduate studies he took at the universities of Berlin and Paris. He was appointed professor of the French language (1897) and chairman of the Romance department (1910) at Johns Hopkins University. He was made a member of several American and foreign learned societies.

ARMSTRONG, GEORGE FRANCIS SAVAGE (1845–1907). A British writer, called "The Poet of Wicklow." He was born in County Dublin, Ireland, and was educated in Dublin. In 1871 he became professor of English literature in Queen's University and in 1871–1905 was professor at Queen's College, Cork. His works include: *Poems* (1869); *A Tragedy of Israel*, a trilogy (1872–76); *Stories from Wicklow* (1886); *Ballads of Down* (1901), and *The Crowning of the King* (1902). An edition of his poems in 10 volumes was published in 1892. In later life he used the hyphenated surname, Savage-Armstrong.

ARMSTRONG, GEORGE FREDERICK (1842–1900). An English engineer. He was educated at King's College, London, and at Cambridge. Developing a strong taste for mechanics, he studied engineering, and was professor of engineering in the School of Applied Science at McGill University in Montreal during 1871–76. He was then called to a similar chair in the Yorkshire College of Science, Leeds, and in 1885 became regius professor of engineering in the University of Edinburgh. He is a member of many learned societies and the author of numerous papers and addresses.

ARMSTRONG, HENRY EDWARD. An English chemist, professor of chemistry at the City and Guilds College, South Kensington. He was awarded the Davy Medal by the Royal Society in 1911. His publications include: *Introduction to the Study of Organic Chemistry: the Chemistry of Carbon and its Compounds* (5th ed., 1886); *Marine Hygiene* (1893); *The Teaching of Scientific Method* (1903; 2d ed., 1910); *Low-Temperature Research* (1909).

ARMSTRONG, JOHN (1709–79). A Scottish poet, born in the parish at Castleton, Roxburghshire. He took the degree of M.D. at Edinburgh University in 1732; in 1746 was appointed physician to the London Hospital for Lame, Maimed, and Sick Soldiers, and in 1760 physician in the German army. He gained a wide popularity by

a didactic poem called the *Art of Preserving Health* (1744), containing some of the very best blank verse written in the eighteenth century; and was also a master of terse prose. Particularly brilliant is *Sketches or Essays on Various Subjects*, published under the pseudonym of Launcelot Temple (1758). He was a friend of many wits and authors of his day, among them Thomson, who is believed to refer to him in canto I, stanza lx of the *Castle of Indolence;* and Wilkes, who probably obtained for him the post in the army. He wrote also *An Essay for Abridging the Study of Physic* (1735) and *Economy of Love* (1737). Consult Ward, *English Poets*, vol. iii (New York, 1894–1903).

ARMSTRONG, John (1725–95). An American soldier, born in the north of Ireland. He led a successful expedition in 1756 against the Indians at Kittanning, Pa. He became a brigadier-general in the Continental army in March, 1776, but resigned in April, 1777, to take the same rank in the Pennsylvania militia, which he commanded at Brandywine (September 11) and at Germantown (October 4), becoming a major-general in January, 1778. He served twice in the Continental Congress (1778–80 and 1787–88). He died at Carlisle, Pa.

ARMSTRONG, John (1758–1843). An American soldier and diplomat, son of John Armstrong, the soldier. While a student at Princeton he enlisted in the army and was soon made aid-de-camp to General Mercer, with the rank of major, which rank he retained until the close of the war. He wrote and published anonymously the famous *Newburgh Addresses* in 1783, in an effort to force Congress to pay certain amounts due army officers, and in 1784 conducted a campaign against the Connecticut settlers in the Wyoming valley. (See Wyoming Valley.) At the close of the war he served as Secretary of State and Attorney-General of Pennsylvania and in 1787 was elected a member of Congress from that State. In 1789 he married the sister of Chancellor Livingston, of New York, and, removing to that State, was in 1800 elected United States Senator and served in the Senate until 1804. From then until 1810 he was Minister to France, being also Minister to Spain (1806–10). He was appointed brigadier-general in July, 1812. In January, 1813, he was made Secretary of War, but in consequence of the failure of the Canada expedition and the capture of Washington he became very unpopular and resigned in September, 1814. He published *Notices of the War of 1812* (1836), memoirs of Generals Montgomery and Wayne in Sparks's *American Biographies*, and partially prepared a history of the American Revolution. Consult Henry Adams, *History of the United States, 1801–1817* (New York, 1889–90).

ARMSTRONG, John (1784–1829). An English physician and medical writer. He was born at Ayres Quay, near Bishop Wearmouth. He studied medicine at the University of Edinburgh and in 1811 was chosen physician to the infirmary at Sunderland. In 1816 he published a work on *Typhus*, which greatly increased his reputation. Two years later he removed to London, where his practice became extensive, and he was elected physician to the Fever Hospital. He was instrumental in establishing two medical schools in London. His lectures were published after his death. Consult *Memoirs of the Life of J. Armstrong*, by F. Boott (London, 1834).

ARMSTRONG, Johnnie. The hero of several old Scottish songs and ballads, among which are "Armstrong's Goodnight," and two others, both called after his name. A border freebooter, who lived with his lawless followers in the early part of the sixteenth century, he was finally hanged with 36 of his retainers, by James V in a forest near Hawick.

ARMSTRONG, Paul (1869–1915). An American playwright, born at Kidder, Mo. He was for five years, from 1890 to 1895, a licensed master of steamships plying on the Great Lakes, but in 1904 began the writing of plays, and produced many successful dramas. These include: *The Heir to the Hoorah* (1904); *St. Ann* (1904); *Salomy Jane* (1905); *In a Blaze of Glory* (1906); *Via Wireless* (in collaboration with Winchell Smith, 1909); *Going Some* (with Rex Beach, 1909); *Alias Jimmy Valentine* (1909); *The Deep Purple* and *The Greyhound* (with Wilson Mizner, in 1910 and 1911, respectively); *A Romance of the Under World* (1911); *The Escape*, played in New York in 1913.

ARMSTRONG, Robert (1790–1854). An American soldier, born in Tennessee. In the Creek War of 1813–14 he commanded an artillery company, and was severely wounded at Talladega, Jan. 24, 1814. He commanded the artillery at the battle of New Orleans (Jan. 8, 1815) and was a brigadier-general of volunteers in the second Seminole War (1835–37). From 1845 to 1852 he was Consul at Liverpool. Later he became proprietor and editor of the *Washington Union*, at which time he acted as confidential adviser of President Polk.

ARMSTRONG, Robert Allen (1860—). An American scholar and educator, born at Frenchton, Va. (now a part of West Virginia). He graduated from West Virginia University in 1886 and then took advanced work at the University of Chicago, Columbian (now George Washington) University, and at Harvard University. While acting as principal of the West Liberty State Normal School he studied law and in 1890 was admitted to the bar. Appointed professor of English at West Virginia University in 1893, he was 10 years later made head of the English department. In addition to his regular academic duties, he spoke much before institutes in a number of States (after 1886), was secretary of the West Virginia Board of School Examiners (1899–1909), and undertook in 1904 the editing of the *School Journal* of the same State. In 1909 he received the degree of L.H.D. from Allegheny College. His publications include, beside articles contributed to educational journals: *Geography of West Virginia —Supplement to the Natural Geography* (1899); *Life out of Death* (1906); *The Law of Service* (1907); *Historical and Literary Outlines of the Bible* (1907); *Dramatic Interpretation of Shakespeare's Tragedies* (1907); an edition of Stevenson's *Inland Voyage* (1913).

ARMSTRONG, Samuel Chapman (1839–93). An American soldier and educator. He was born in Hawaii, where his father was a missionary of the American Board and Minister of Public Instruction. He began his collegiate course at Oahu College, Hawaii, and completed it in 1862 at Williams College. He was for a short time chief clerk of the Department of Public Instruction in Hawaii and editor of *Hae Hawaii*. He then entered the Union army, and in 1863–65 was colonel of the Eighth United

States colored regiment. At the close of the war he was brevetted brigadier-general of volunteers. He was superintendent of a district of 10 counties in Virginia in the Freedman's Bureau, 1866–68. In the latter year he founded and became principal of the Hampton Normal and Agricultural Institute. His constant endeavor was to show the best methods of educating the negro and Indian races in this country, adopting to that end a system of combined labor and study, to give them the means of self-support, develop manual skill, and promote manliness and self-reliance. His work for the neglected races produced most beneficial results. Several published papers give his views on the education of negroes and Indians. Consult R. C. Ogden's *Sketch of Armstrong* (New York, 1894).

ARMSTRONG, Sir Walter (1850—). An English writer and art critic. He was born in Roxburghshire, Scotland, and was educated at Harrow and at Exeter College, Oxford. After serving as an art critic on the staff of the *Pall Mall Gazette* and *St. James's Gazette*, he was in 1892 appointed director of the National Art Gallery, Dublin, and was knighted in 1899. Although a very prolific writer upon art subjects, he is at the same time considered one of the soundest and most critical scholars in this line that the United Kingdom has produced, combining a knowledge of the technique of art with a profound appreciation of its historic significance. His principal works are: The "Art of Velazquez" and the "Life of Velazquez" (1896) written for the *Portfolio; Scottish Painters* (1888); *Art in Great Britain and Ireland* (1909); and excellent biographies of Gainsborough (1898), Sir Joshua Reynolds (1900), J. M. W. Turner (1901), Sir Henry Raeburn (1901), and Sir Thomas Lawrence (1913).

ARMSTRONG, William George, Baron (1810–1900). An English engineer, scientist, and inventor of hydraulic machinery and ordnance. He was born at Newcastle-upon-Tyne and received his early education at Whickam and Bishop Auckland. Yielding to his father's wishes, he determined to follow the profession of law and spent several years in a solicitor's office, but was diverted from this calling by a taste for scientific research and mechanics. His first important discovery was the hydro-electric machine, which consisted of an insulated boiler from which steam at high pressure, escaping through nozzles of peculiar design, produced frictional electricity. In recognition of this discovery, Armstrong was made a fellow of the Royal Society in 1846. Soon afterward he invented the hydraulic crane, and for the construction of hydraulic machinery he founded the Elswick Engine Works, in the suburbs of his native town. In 1854, at these works, were made the rifled cannon with which his name is associated as inventor, although previous unsuccessful attempts had been made to develop the rifled cannon. So successful was he in his construction of ordnance that he was appointed engineer of rifled ordnance at Woolwich, and was knighted in 1859. Some 3500 cannon were constructed under Sir William Armstrong's direction between 1859 and 1863, when he resigned his official position to resume his active connection with the Elswick Works. In 1863 he was president of the British Association, and delivered an address in which he called attention to the decrease in the coal supply of Great Britain and the exhaustion of the deposits. In 1882 he was president of the Institution of Civil Engineers and served in a similar capacity for several terms in the Institute of Mechanical Engineers. A member of the Iron and Steel Institute of Great Britain, he received from that organization the Bessemer Medal in 1891, and was honored with the degree of LL.D. from Cambridge in 1862 and that of D.C.L. from Oxford in 1870. In 1887 he was raised to the peerage. The Elswick Works, which at first were concerned with the construction of hydraulic cranes, engines, accumulators, and bridges, were greatly expanded and became celebrated for the production of ships of war as well as ordnance and machinery. Lord Armstrong played an important part in the development of the breech-loading cannon and armor plate, and his improvements will be found discussed in the articles Ordnance and Armor Plate.

AR'MY. See Armies and Army Organization.

ARMY ADMIN'ISTRA'TION. See Army Organization.

ARMY CORPS, kōr. See Army Organization.

ARMY ES'TIMATES, United States Army. The estimates furnished annually by the heads of the various branches of the War Department, giving a statement of their requirements and the amount of money necessary for the same. The estimates are addressed to the Secretary of War, who, in his report to the President, submits the same, together with his comments thereon. The President, in his turn, sends the estimates to Congress, upon which the House of Representatives draws up the Army Appropriation Bill, which is then sent to the Senate for final action. The appropriations are expended by the heads of departments, under the general direction of the Secretary of War, after which the final accounts are audited by the auditor for the War Department of the Treasury. The same general procedure obtains in all other civilized countries, varying only in details due to the various governmental constitutions.

ARMY OR'GANIZA'TION. The power of an army rests on two elements: its *material* strength and its *moral* strength; the former depending on the character of its commanders and soldiers and its organization, the latter being determined by its discipline, the system of military education, and the national spirit. *Organization*, in a military sense, comprises, in general, all the measures taken to insure to the army a regular and normal working of all its parts, to provide it with all the necessary machinery, to obtain for it regularly all that it requires, to insure its proper instruction, to protect the rights and prescribe the duties of each individual by suitable regulations, to supply the personnel and material which it needs, and, finally, to provide all the means whereby nothing may be wanting to enable it to fight under the most favorable conditions. In a limited sense the word "organization" is also used to designate the composition or formation of any body of troops; but this is only a particular application of the general meaning of the word.

The entire theory of organization rests upon the principle of individual responsibility and subordination, so that, no matter how small or how great the number of individuals gathered together, some *one* is responsible, to whom the others must be subordinate. This responsibility

and subordination are the great factors in the control of an army, and tactical organization may be defined as the arrangement of an army in such wise as to enable it, in whole or part, to respond at all times to the will of the commander promptly and efficiently. One of the first elements of strength in an army is the skillful organization of its *command*, and in this all nations are agreed as to the necessity for *unity*—i.e., for a *commander-in-chief* of the forces. Next in importance are the assistants to the commander-in-chief, viz., the staff and the entire corps of officers. Finally, arises the question of the number of men to be assembled under one leader, into bodies of various strength, their most advantageous subdivision, and the proportion of accessories of all kinds to be joined to the combatant forces. The army, then, is made up of a collection of units, differing according to the purpose of the organization. Thus *tactical* units are the basis of organization for the tactical handling of troops in the field, while *administrative* units are the basis for administration and supply. A *tactical* unit is the largest body of men which can be directly commanded by the voice of a single commander. An *administrative unit* is the smallest organized subdivision having a complete administration of its own.

Combined Arms. If we define the *strategical unit* as the smallest body composed permanently of two or more arms and capable of acting independently, then the *division* must be regarded as that unit, as it includes in addition to infantry, artillery and enough special troops to make it independent. Ordinarily the brigade (infantry or artillery) is the largest unmixed unit. The cavalry division which figured but little in the World War on the western front, is composed essentially of two brigades and two or three horse batteries, besides special troops. The infantry division (the smallest unit in which the various arms are combined) consists in general of two infantry brigades, one field-artillery regiment, and other special troops differing in the different countries. In the older days and especially in the United States Army there was also a cavalry regiment.

The highest definite unit of organization is the *Army Corps*, and its strength is determined by the fact that in its most unfavorable formation it must be capable of being assembled or any portion of itself in a single day. It is composed of two or more divisions and the necessary auxiliary troops. Armies are simply aggregations of army corps. With changes in weapons, transportation and aircraft, the proportion of cavalry has been gradually made smaller since the days of Frederick, while that of the artillery has been gradually increased, and this was amply shown in the World War; as its place in large measure was taken by the airplane or some form of motor vehicle. The proportion of artillery in flat, heavily wooded country, or in difficult mountainous country, or in country where the roads are bad, is usually decreased, because the full proportion cannot be used advantageously, and a smaller proportion would diminish the length of the column, which is always desirable. The late war also showed that aircraft must be considered as weapons of offense as well as for observation.

Thus far only the line of the army, in its most restricted sense, has been considered, but the efficient working of an army also requires a number of special troops, such as engineers, pioneers, railroad engineers, pontoniers, sappers and miners, signalers, telegraphers, balloonists, and the medical corps. In European armies all the special troops, excepting the medical corps, were designated by the general term *technical troops*.

Any plans or tables of army organization must necessarily be more or less theoretical until they are submitted to the test of practice, and likewise with the changing conditions of modern warfare due to industrial, mechanical and scientific developments, it is inevitable that new schemes of organization must be developed to meet new conditions of personnel and matériel. Combat conditions as developed on the battlefield may alter the strength and composition of tactical units, while the scene of conflict and its distance from bases may bring about unexpected conditions in administration and supply, requiring a modification of previous schemes and tables.

In the early days of mobilization for the World War the organization of the various European armies functioned with reasonable success, but when combat conditions developed, then changes were found necessary. The German army had an inflexible organization that had been under development for years; on the other hand the American Expeditionary Forces inevitably, as well as specifically, under the broad powers of the Commander-in-chief was free to develop its own organization, and to disregard precedents or even attempted or partially developed plans of the War Department at the seat of government. Furthermore, as regards its administration, unlike the armies of the Allies, the United States forces were distant not only from their bases but from seats of government control, so that many functions exercised were those properly belonging to a war office. For the combat units the experience and advice of the Allies were available making it possible to take the best elements of each, and modify them as required for special conditions. In the main, however, the organization of the American Expeditionary Forces and of the units in training in the United States clearly represented the best that the critical experience of French and British staff experts could develop. So that any discussion of the American Army organization in the World War reflects not merely the national military characteristics but the best practice of European schools and battlefields, and it must be further understood that the general organization of the British differed but little from that of the French on which the American scheme was frankly based.

The General Staff of the American Expeditionary Forces, organized at the outset by General Pershing had problems quite unlike those of the Allies, for the army organization had to be united to the war administration proper. The French army was at home and in close touch with the civil government, while the British, though organized on an overseas basis with difficult problems of supply and replacement, nevertheless were not so far from their bases. The Americans had to send their troops at first on irregular schedules and then arrange for their supply so that transportation and supply from the distant bases were factors felt in the scheme of organization.

The combination of the various arms into a tactical unit presents a problem in organization which may be solved on a permanent basis, or

it may be developed in the light of circumstance and experience, as was the case in the organization of the fighting units of the American Expeditionary Forces. Here a leading consideration was the great distance of the combatants from their original base so General Pershing and his staff decided on a form of organization where the front-line units would be strong enough both in troops and material to maintain themselves for a considerable time without calling for fresh supplies and reinforcements. As a result the American organization was less flexible than the French, and the units about double in numerical size especially when the depletions of four years of conflict were considered. While General Pershing's army corps varied in composition, nominally it was formed on the basis of six divisions, four of which were to be employed in active service, one for replacement, and one for depot. In addition to the regular divisions there were a number of corps or non-divisional troops so that a normal American corps, commanded by a major-general during the war, would have amounted to some 6050 officers and 170,000 men. In the scheme of organization developed five army corps would constitute an army operating under one independent command, though here again in actual practice there was variation in the American Expeditionary Forces as there was in the European armies. To the army and to the army corps there were certain troops assigned not included in the division; these were such organizations as army traffic police, pioneer infantry, army artillery, signal troops, aviation troops, sanitary troops, and train, to the army, and for the corps, corps artillery (heavy), trench artillery, anti-aircraft artillery, anti-aircraft machine guns, cavalry, infantry pioneers, engineers, 1 field signal battalion, 1 telegraph battalion, pontoniers, train and aviation units. The non-divisional troops in an army corps included about 500 officers and 16,000 enlisted men.

The American division as stated was larger than the French or British and normally included 979 officers and 27,080 men. It comprised 2 infantry brigades, 1 brigade of field artillery, 1 battery of trench mortars, 1 engineer regiment of 2 battalions, 1 field signal battalion, and the appropriate train and service troops. The division was commanded by a major-general with a staff of 40 officers and 200 men. The chief of staff was a colonel and with him were 3 field officers respectively in charge of supply (G–1), information (G–2), and operation (G–3); as well as 3 aërial observers, an inspector-general, an adjutant-general, a judge-advocate, a gas officer, a signal officer, 1 machine gun officer, and 1 division chief of engineers.

Infantry. The tactical unit of infantry in the great armies of the world is the battalion, composed of about 1000 men, and divided into four companies of about 250 men each. In the United States army the battalion previously had been of very variable strength in time of war, but was usually considerably smaller than the European battalion.

During the World War the American battalion comprised 26 officers and 1000 men, being divided into 4 companies, each of which comprised 6 officers and 250 men. There were 4 platoons of 58 men each, and a small headquarters detachment of 18 men. The battalion is commanded by a major and each company by a captain. For administrative purposes 3 battalions are formed into a regiment commanded by a colonel assisted by a lieutenant-colonel. In addition to the three battalions there was also a machine-gun company of 6 officers and 172 men, a headquarters company of 3 officers and 336 men divided into five platoons; one headquarters platoon including the band, one platoon of telephonists and signalers, one platoon of sappers-bombardiers, one platoon of pioneers, and one platoon of three 37-mm. guns. During the World War the American Expeditionary Forces followed the prevailing European practice of forming two regiments into an infantry brigade the largest unit composed exclusively of infantry and commanded by a brigadier-general. Such an infantry brigade was composed of 246 officers and 8169 men and included in addition to the two regiments a staff of 4 officers and 20 men and a machine-gun battalion of 4 companies.

Mounted Infantry. Mindful of conditions prevailing in South Africa, 1899–1902, Great Britain organized and developed mounted infantry, as this arm had proved so effective on both sides. This body of troops was not carried in an organized form in England in time of peace, but it was provided that a certain number of men, selected and detailed from the forces, should be trained for this service. In time of war each battalion was to receive one of the four sections of a company, and a cavalry division a battalion of 8 companies. Little opportunity was found in the World War for the use of mounted infantry owing to changed circumstances and the more static conditions of many of the operations. When infantry or troops generally required to be moved they were transported by any or all agencies that the motor transport, railway or other organizations could bring to bear, but in general the considerations influencing the use of cavalry applied to mounted infantry.

Machine-Gun Companies. In the World War the tactical organization of the machine-gun units varied very much not only on account of combat conditions, but with the diversity and development of material ranging from the light automatic rifle fired from hip or shoulder and weighing about 16 lbs. to the heavy machine gun transported on wheels or a motor car. As was stated in connection with the infantry, a machine-gun company was included in each regiment, while a machine-gun battalion of 4 companies was assigned to each infantry brigade and a motorized machine-gun battalion of 2 companies to each combat division. The tendency during the war was to increase the number and efficiency of the machine guns used and the organization was arranged to that end.

Artillery. The tactical unit of field artillery is the battery, composed in the United States army usually of 4 guns, and the appropriate caissons, forge and battery wagon, and supply and store wagons. The battery may be motor-drawn or horse-drawn and tractors may be used for both guns and supply wagons, with motor trucks for the personnel. A battalion is composed of from two to four batteries, and constitutes an important organization on the battlefield. The tactical unit of coast arillery is also the battery, composed in this case, however, of a variable number of guns, usually from one to four. The administrative unit of artillery is the regiment, composed of from two to five battalions. The coast artillery, which composes a

separate corps in the United States army is distributed in coast-defense commands (the entire defense of harbor or post), regiments of coast artillery (motorized, railway, etc.), anti-aircraft battalions, several ranging companies, and trench mortar companies.

In the World War the divisional artillery comprised one brigade of three regiments of two or three battalions each, the battalion being made up of two or three batteries, the 75-mm. guns being usually grouped three batteries to a battalion, and the heavier guns and howitzers two batteries to a battalion, 24 pieces forming a regiment. Each division also had a trench mortar battery composed of 5 officers and men with varying equipment. In command of the artillery brigade was a brigadier-general with a staff composed of 9 officers and 54 men. Ordinarily the brigade effective in the war amounted to 208 officers and 4769 men along with 3883 horses, but in respect to the last item there was a tendency to employ motor transport to an ever increasing extent. The divisional artillery, of course, was designed to operate in connection with the infantry. With the corps, however, was grouped a considerable amount of the heavier guns formed into a brigade of corps artillery, which was usually that of the depot division comprising one regiment of 155-mm. heavy guns and one regiment of 4.7-inch guns or else two regiments of 155-mm. guns. Along with this was a battalion of trench artillery comprising four batteries of 240-mm. trench mortars and a battalion of four batteries of auto cannon for anti-aircraft defense as well as a machine-gun battalion for the same purpose. For the army a number of artillery brigades and separate units comprising the heavier guns and mortars as well as the equipment for their repair and maintenance.

Cavalry. The tactical unit of cavalry is the squadron. In the United States service the squadron is composed of four troops, the strength varying in peace and war and in different plans of organization. The administrative unit is the regiment, composed of three squadrons in the United States. The brigade, in Europe, consists normally of two regiments; in the United States service, of three. The plan of organization adopted during the World War did not provide for the use of cavalry with the division as European experience had found but slight occasion for their employment, and where they were included they were dismounted or used for headquarters guards and service.

Engineers. The engineer troops of all armies are usually organized like infantry, though on account of the wide range and character of service in the World War there was considerable difference in different units. With the combat division there was one regiment of engineers divided into two battalions of three companies each, with the appropriate engineer train. In the corps were included also a regiment of engineers, as well as a detachment of pontoniers. For the army and the service of supply in addition there were required large numbers of trained construction troops and transportation units so that there was often involved an adjustment between military and industrial organization, though the former was never lost sight of and the responsibility of rank and command always prevailed irrespective of the size or organization of the component units.

Signal Troops. The Signal Corps of the United States army has charge of the field and military telegraph, and telephone, radio communication, and ordinary signaling or communication of intelligence by flag, torch, heliograph or other means, and meteorological and photographic service. (See SIGNALING AND TELEGRAPHING, MILITARY.) In the field a division will have attached to it one field signal battalion formed of a headquarters and supply section, 1 wire company, 1 radio company, and 1 outpost company; in the World War a total of 14 officers and 495 non-commissioned officers and men. The headquarters and supply section carried on the administrative services of the field signal battalion and distributed accumulators and carrier pigeons. Military telegraphers are organized in a different way in almost every existing army. In the United States and Great Britain the Signal Corps, in time of war, is augmented by telegraphers from civil life.

Air Service. The air service in each of the great armies required a systematic organization though this varied from time to time and in different services, influenced in no small degree by the increased rôle of aviation especially in taking its place as a combat arm. In the American Expeditionary Forces there were observation squadrons, pursuit squadrons, day bombardment, night bombardment squadrons, army and corps squadrons, and instruction squadrons. In addition there were service and repair parks and stations as well as acceptance and test parks and depots. In addition there are balloon companies which operate the balloons available for observation and the dirigibles. The observers it may be said are usually trained artillery officers.

Medical Department. The organization of the Medical Department of the American Expeditionary Forces in the World War was divisional, the sanitary personnel of each division being under the direction of a lieutenant-colonel of the Medical Corps. The divisional sanitary train consisted of 4 ambulance companies, 3 automobile and 1 horse-drawn ambulance and 4 field hospitals of 3 automobile and 1 horse-drawn ambulance, 1 medical supply unit and 1 mobile laboratory. Each ambulance company consisted of 12 ambulances and 3 trucks, while the field hospitals, each of which could accommodate 216 patients, were equipped with tents which with the other material was transported on trucks or wagons. There were 50 officers and 901 enlisted men in the divisional sanitary train. For each regiment there was a medical detachment composed of 7 officers and 481 enlisted men. The sanitary train of the army corps consisted of 3 field hospitals and 3 ambulance companies while the army sanitary train in addition included 4 field hospitals and 4 ambulance companies. For each division in the army 2 evacuation hospitals and 1 mobile hospital is under the direction of the chief surgeon of the army. In addition to the medical activities in the army zone there were elaborate organizations in the zone of the seas.

Military Police. *Provost Marshal General's Department.* In the American Expeditionary Forces the Provost Marshal's Department was divided into four main sections: the Military Police Corps which served with divisions, corps and armies and in the sections of the services of supply; the Prisoner of War Escort Companies; the Criminal Investigation Department;

and the Circulation Department. The Military Police control traffic in the battle zone and in towns and cities occupied by troops through which traffic flowed they maintain order in camps and billets. The strength of the American Military Police was placed at 1 per cent of the strength of the American Expeditionary Forces and provost marshals were provided for armies, corps, and divisions.

Train. The term *train* is applied not only to the wagons and motor vehicles of an army, but also to the troops who drive them. In the larger armies in times of peace and in practically all armies in time of war these troops are specially organized and trained for the purpose. In addition to the transport of the individual units each division had its own train for ammunition, supply, engineer and medical department arranged on a basis sufficient to take care of a command of this size. In addition the corps and army had their respective trains, the arrangement in all respects being a flexible one. During the World War the American Expeditionary Forces developed constantly this division of service, there being a special Motor Transport Department.

An important feature of the organization of the army is the STAFF (q.v.), which may be either military or administrative. This branch, together with the subjects of RANK AND COMMAND, RECRUITMENT, and DISCIPLINE, will be found discussed under the appropriate heads; while the actual use and operation of an army and its component parts are treated under TACTICS, MILITARY; COAST DEFENSE. See ARTILLERY, CAVALRY, INFANTRY, and MOUNTED INFANTRY for the historical development of these arms in which the changes in organization are discussed. Ancient and modern armies will be found treated under ARMIES and ARMY under name of country. Under each of these articles will be found a bibliography. Reference also should be made to SUPPLEMENT, dealing in full with the World War, and to the various tables of organization developed during and after the World War for the various arms of the U. S. Army. General Pershing's *Final Report* (Washington, 1919) has full charts of the organization of the American Expeditionary Forces.

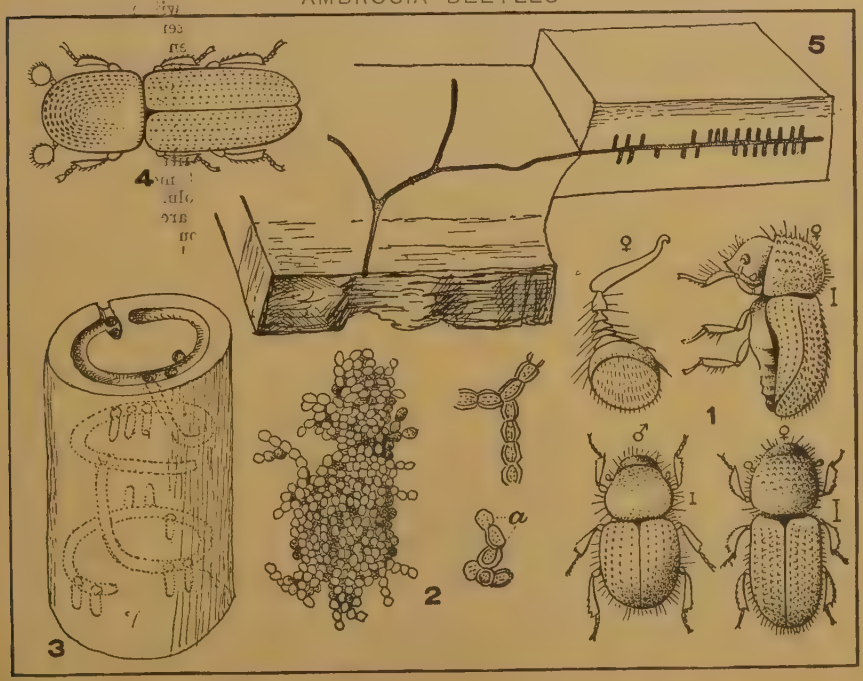
ARMY REGISTER, UNITED STATES. The official publication issued each year from the Adjutant-General's office, by the Secretary of War. It contains a list of the officers of the army, giving the department, regiment, or corps to which they belong or are assigned; together with information regarding their place of birth, the State from which appointed, whether entered from civil life or the Military Academy, date of entry, and rank held at the time; also the dates of commissions held in the permanent establishment and in the volunteer service, together with the highest brevet rank. It also contains a list of retired officers and aids to general officers; the officers and professors of the Military Academy, and the first five cadets of each class. The lineal rank and the relative rank of officers are given, as well as the officers who have been commissioned for distinguished services, who have received the thanks of Congress, and who have held staff appointments other than under commission, and on whom brevet rank has been conferred. Recipients of congressional medals of honor and certificates of merit are also listed. The casualties during the year are given, as well as military commands and posts, armories, arsenals, and recruiting, engineer, and ordnance dépôts, and the organizations or detachments of the army stationed there. There are included statements regarding the pay of the army and militia forces of the United States; the students at universities, colleges, etc. The data concerning officers also show those who have graduated from the service schools or from the war college at Washington. A table is appended showing in detail the complete organization of the United States army. All foreign nations issue similar lists; in Great Britain it is known as the *Army List* and is issued quarterly and in abridged form monthly. This is necessary owing to the constant changes of stations and assignments incidental to the itineration of the army.

ARMY SCHOOLS. Schools for the education of non-commissioned officers and men and their children. In the United States they are known as Post Schools. The most important factor in the making of a thoroughly efficient soldier is a good education. Modern war tactics place more and more responsibility on the individual soldier, and the comparative distance which the private often is, in action, from those from whom he usually takes his orders, makes it absolutely essential that he be trained in the proper use of every faculty. Non-commissioned officers are the backbone of the modern army, so that what is strongly encouraged in the private is an imperative necessity in their case. In all the armies of to-day the most exacting and rigid examinations are compulsory for all soldiers desirous of promotion. In the British and most of the Continental armies the education of the soldier is compulsory up to a certain point and is strongly encouraged beyond that. The educational test always precedes the military or purely professional examination, without the successful passing of which the latter is impossible. To such a high degree of efficiency, in fact, have these nations brought this branch that it is possible for a soldier to enlist, absolutely illiterate, and at the conclusion of his service leave with the equivalent of a civil college education, if he has applied himself assiduously and has taken full advantage of all opportunities. In Germany opportunities for technical and mechanical education are also available. School masters are a part of their army system and are classified for purposes of pay and promotion. In the United States the post school is required to be established and is the direct concern of the officer commanding the post. Efficient officers supervise the work, and enlisted men possessing the required qualifications are detailed as instructors, in the proportion of not exceeding 1 to every 15 men attending school. If there is a chaplain stationed at the post, he is usually placed in charge. The general supervision of army schools is directed from the headquarters of the respective department commanders, but their official inspection is performed by officers of the inspector-general's department. Post schools for the children of officers, soldiers, and civilian employees of the government are also maintained where the number needing such instruction is sufficient, and where schools outside the post are not available; at these schools the attendance for the children of officers is optional, and for the children of non-commissioned officers and men compulsory. The government supplies all the books necessary. There is also a post school for officers, systematic intruction now being an important feature of an officer's training. See MILITARY EDUCATION.

ARMY WORM

MOTH, LARVA AND PUPA; with caterpillar in various stages of development.

AMBROSIA BEETLES



1. BEETLES (Xyleborus dispar): Male and female, enlarged, and antenna of female more enlarged.
2. AMBROSIA of Corthylus punctatissimus: *a*, detached dumb-bell shaped pairs of cells greatly enlarged.
3. GALLERIES of Corthylus punctatissimus in huckleberry roots; enlarged.
4. GNATHOTRICHUS MATERIARIUS.
5. GALLERIES of Monarthrum mali in maple, showing brood cells (at the right).

AR'MY-WORM' (so named from traveling in great numbers). In the northern United States the yellow-striped lava or caterpillar of a dark-gray moth (*Leucania unipuncta*), a species closely related to the cutworms. (See Plate of ARMY-WORM.) The army-worm is always present in the United States, but only occasionally becomes numerous enough to do much damage. During an early dry spring it may increase in numbers so that it is obliged to march—i.e., to go in search of food. It usually feeds on grass, but may destroy fields of grain and Indian corn. The term is frequently applied to other caterpillars of occasional prevalence and harm in fields, especially the so-called "fall" army-worm (*Laphygma frugiperda*), elsewhere described as GRASS-WORM. Consult *Third Report United States Entomological Commission* (Washington, 1883).

ARNA, är'nȧ (Hind. fem. *arnī*). The Indian buffalo. See BUFFALO.

ARNABOLDI, är'nȧ-bōl'dē, ALESSANDRO (1827–98). An Italian lyric poet. He was much admired for his *Versi* (1872), his *Poeti d' azione*, and his *Nuovi versi* (1888), remarkable for the æsthetic quality of the descriptive passages, especially in the long series of poems, in the manner of Carducci, devoted to Greece and Sicily. For translations, see E. Lee Hamilton's *Poems and Transcripts* (Edinburgh and London, 1878), and G. A. Greene, *Italian Lyrists of To-day* (New York, 1893). Consult *Quarterly Review*, October 1877. There is a Czech translation by Vrchlicky.

ARNASON, är'nȧ-son, JON (1819–88). An Icelandic writer, born at Reykjavik, Iceland. He is called the Grimm of Iceland because of his collection of *Popular Legends and Tales of Iceland* (2 vols., 1862–64), and other folklore of his country, of which he was for many years the national librarian. The collection of popular tales is extensive and faithful to oral tradition. It is one of the most valuable in any literature and has become a classic handbook to students of comparative folklore. Stories from his collection have been translated into Danish, Norwegian, German, English, and French.

ARNAUD, är'nō', EMILE (1864—). A French economist and for many years an ardent advocate of peace. He was born at La Chapelle, France. As editor of *Les Etats-Unis d'Europe* over a long period, and as a delegate to all the international peace congresses, which began in 1889, he became so important a figure as to be chosen in 1891 president of the Ligue Internationale de la Paix et de la Liberté and in 1903 president of the Twelfth Peace Congress. He was also tendered the vice-presidency of the Bureau international permanent de la Paix, de Berne. Arnaud's reputation was largely increased by his writings and lectures in behalf of international peace.

ARNAUD, FRANÇOIS THOMAS DE BACULARD D' (1718–1805). A French author. While a student at the College of Harcourt he dedicated a play to Voltaire, who thenceforth took a lively interest in his welfare. For two years (1748–50) he was the literary correspondent of Frederick the Great in Paris. He went to Berlin in 1750, and afterward to Dresden, where he became counselor of the French legation. On his return to France he published a series of novels and romances entitled *Epreuves de sentiment* (12 vols., 1772–81). These works were very popular in their day and were highly praised by Rousseau, who declared that "other writers employed their head and their hands, but Arnaud worked from the heart." A complete edition of Arnaud's novels, romances, dramas, and other writings appeared at Paris in 1803.

ARNAUD, HENRI (1641–1721). The historian of the Vaudois, pastor, and soldier. Born in France, his family returned to Piedmont, while he was still a youth. Encouraged by the English Revolution and the enthronement of William III and probably with pecuniary assistance from England, Arnaud undertook to bring back to their native valleys the Vaudois expatriated by Victor Amadeus of Savoy. In September, 1689, he led about 1000 of the exiles into the valley of the San Martino and overcame a superior force; but being in danger of attack by French troops, he retired to the high tableland of the Balsille, making such fortifications as he could. Here he was assaulted, May 2, 1690, by the allied armies of France and Savoy under Marshal Catinat, numbering, as he says, 22,000 men, although Catinat's actual force was probably much smaller. The attack was heroically repulsed without loss to the Protestants, while the allied troops lost heavily. Arnaud did not risk another fight, but withdrew to Angrogna, and, just when final capture seemed assured, he learned that war had begun between France and Piedmont, and that the Piedmontese King had suddenly become a friend of the exiles, ready to receive them. The Vaudois were at peace in their valleys for a brief space only. In the latter part of the War of the League of Augsburg, from 1689 to 1697, Arnaud and his men did good service against France; but when that was over, the King of Piedmont again leagued with France against them, and 3000 Vaudois were expelled, finding an asylum in Württemberg. Arnaud was invited to England by William III, but preferred to remain pastor among his exiled countrymen at Schönberg, where he wrote his *Histoire de la glorieuse rentrée des Vaudois dans leurs vallées* (1710), dedicated to Queen Anne. Consult Mason, *History of the Waldenses* (London, 1875).

ARNAULD, är'nō', ANGÉLIQUE (DE SAINT-JEAN) (1624–84). A daughter of Robert Arnauld d'Andilly, born in Paris, Nov. 24, 1624. She became a nun at Port-Royal-des-Champs in Paris, where she had been educated by her aunt, Jacqueline Marie Angélique Arnauld, sister of the great Arnauld. She was made sub-prioress (1653), and on removing some years later to Port-Royal-de-Paris she held the same office. During the persecution of the Port Royalists, because they were strong Jansenists (see JANSENISM), Angélique Arnauld, by her piety and courage, sustained the spirit of the sisterhood. They were scattered, and when reunited they were watched by soldiers, lest they should hold communication with persons outside of the convent. In 1669, however, was issued the edict of Clement IX for the peace of the Church, which was a kind of compromise on this vexed question of Jansenism and Jesuitism. The nuns received back the privileges of which they had been stripped and constituted their society anew. Angélique Arnauld was again elected prioress. In 1678 she was made abbess. The next year her protectress, the Duchesse de Longueville, died, and the persecution recommenced by the prohibition to receive any more novices. Still Angélique did not despair. She consoled the nuns and exerted all her influence with persons in power, but with little effect. She died on Jan. 29, 1684, leaving behind her a bright and beautiful memory. She

was learned without being pedantic, pious without bigotry, and gentle to others in proportion as she was severe to herself. Angélique Arnauld wrote several works, the most valuable of which is *Mémoirs pour servir à la vie de la Mère Marie Angélique Arnauld de Sainte Madeleine, réformatrice de Port Royal* (Paris, 1742). For her life, consult Martin (London, 1876), and R. Monlaw (Paris, 1901).

ARNAULD, ANTOINE (1560–1619). An eloquent French advocate, born at Paris. His zealous defense of the University of Paris against the Jesuits, in 1594, won for him a wide celebrity and secured their temporary banishment. The Jesuits accused him of being a Huguenot, but the accusation seems to have been unfounded, for he displayed no personal predilection in favor of Protestantism as a distinct religious system. He had 20 children, some of whom formed the nucleus of the Jansenists and Port Royalists. He published *Le franc et véritable discours au roi sur la rétablissement qui lui est demandé des Jésuites* (1602).

ARNAULD, ANTOINE (1612–94). A French theologian and polemical writer, known as the great Arnauld. He was born at Paris, Feb. 6, 1612, and was the son of Antoine Arnauld, the celebrated jurist, from whom the younger Antoine seems to have inherited his vigorous intellect and that animosity for the Jesuits which characterized almost his entire life. After a thorough training in the liberal arts Arnauld began the study of law, but, in compliance with his mother's wishes, he abandoned his legal studies for theology. He became a priest in 1641 and in 1643 was made a member of the Society of the Sorbonne. He had previously made a thorough study of the works of St. Augustine, whose doctrine of sin and grace especially recommended itself to him. In 1643 he published a work entitled *De la fréquente communion*, which at once drew upon him the hostility of the Jesuits and plunged him into a controversy with that society which lasted for nearly 40 years. Arnauld was by nature a controversialist. He was iron-willed, passionate, narrow, erudite, and firmly convinced of his own infallibility. The defense of truth, as he conceived it, was the sole object of life, and in the defense of truth he spared neither himself nor his friends, nor, it must be confessed, truth itself at times. Within the Church he carried on a fierce polemic against the Jesuits; without, he wrote against the Calvinists and Freethinkers. His indefatigable ardor is illustrated by a characteristic reply made in his old age to his friend Nicole, who urged that, after many years of conflict and exile, the aged man should seek some rest. "Rest!" he retorted, "have I not all Eternity to rest in?" The controversy which began with *De la fréquente communion*, in 1643, was continued in the *Théologie morale des Jésuites*. Upon the outbreak of the Jansenist controversy (see JANSENISM), Arnauld took the field against his hereditary enemies. In 1641 he published a series of tractates against them, and these were followed, after intervals of peace, by new attacks in 1649 and 1656. In the last year the Jesuits succeeded in bringing about his expulsion from the Sorbonne. Since 1648 he had been living at Port-Royal-des-Champs, in friendship with Nicole, and with the great Pascal, the material for whose *Provincial Letters* Arnauld is said to have supplied. After the Jansenist controversy had been set at rest by the Peace of Clement IX, in 1668, Arnauld came into conflict with the Calvinists, whom he attacked in his *La perpétuité de la foi de l'église catholique défendue* (1669), written in collaboration with Nicole and followed by *Le renversement de la morale de Jésus-Christ par la doctrine des Calvinistes* (1672), and *L'impiété de la morale des Calvinistes* (1675). Although he enjoyed for a time the protection of Louis XIV, and seems to have been in close touch with the powers at Rome, Arnauld, in 1679, was forced to flee to Belgium owing to the unrelenting hostility of the Jesuits. In exile the old man continued his feverish activity. After 1680 he plunged into a bitter controversy with his old friend Malebranche, concerning the latter's theory of grace. In 1681, too, he published a defense of the English Catholics in reply to the accusations brought against them in connection with the Titus Oates episode, in which Arnauld strangely enough took up the cause of his ancient enemies, the Jesuits. He also wrote a book directed against William of Orange, calling him "a new Absalom, a new Herod, a new Cromwell" (1689). He died Aug. 8, 1694, near Liége, shortly after he had written a work entitled *Réflexions sur l'éloquence des prédicateurs*. The title of the "great Arnauld" was given him by the Jansenists, one of whose foremost champions he was. His voluminous writings, comprising over 100 volumes in their original editions, were published in 48 volumes at Lausanne (1775–83), the last volume being a biography of Arnauld.

ARNAULD, JACQUELINE MARIE (1591–1661). A French abbess, usually called by her conventual name, Marie Angélique de Sainte Madeleine. She was the daughter of the celebrated advocate, Antoine Arnauld. In her ninth year she assumed the dress of a novice; and concealing her age, her father induced the Pope to nominate her abbess of Port-Royal-des-Champs when she was a little over 11 years old. At first she longed for the freedom of the world. But in 1608 a sermon fully converted her. She then established discipline of especial severity and became famous for her piety. Like the rest of her family, she was a Jansenist. She was afterward superior of a new religious community in Paris; then prioress at Port-Royal, where her sister Agnes was abbess. She died in the convent of Port-Royal, Paris. Consult her life by Frances Martin (London, 1873).

ARNAULD D'ANDILLY, ROBERT (1588–1674). A French writer, born in Paris. He was the eldest son of Antoine Arnauld, the advocate, and brother of the great Arnauld, and was a person of considerable consequence at the French court, where his influence was beneficial, owing to his great power in controlling the licentious Anne of Austria. At the age of 55 he retired to the solitude of Port-Royal-des-Champs, where he devoted himself to religious history and biography. His chief works are translations, such as those of the *Confessions de Saint Augustin*, written in cameo-like French, and his *Vies des Saints Pères du désert* (1668), translated into English as *Lives of the Fathers of the Desert* (1757). He also wrote some religious verse.

ARNAULT, är'nō', ANTOINE VINCENT (1766–1834). A French poet and dramatist. He was born in Paris, Jan. 1, 1766, and died at Goderville, Sept. 16, 1834. He is remembered for his satirical fables, for his *Souvenirs d'un sexagénaire* (4 vols., 1833), which contain many interesting facts concerning the inner history of

France up to 1804; and, most of all, for several graceful poems, one of which, "La Feuille," is known to every French school-child. He first obtained celebrity through his tragedies, *Marius à Minturnes* (1791) and *Lucrèce* (1792), and he wrote the libretti to Méhul's operas, *Horatius Coclès* and *Phrosine et Mélidore*. His tragedy, *Les Vénétiens*, was produced at the Théâtre Français, in Paris, Sept. 12, 1798, and was very successful. Upon the second restoration of the Bourbon dynasty Arnault was officially included in the proscription of 1816 and fled to Belgium, where he wrote his two books of fables. These books, together with six others of a similar nature, written in 1813, were published in 1826 under the title of *Fables et poésies*. Arnauld was a representative of classicism and a pronounced opponent of the Romantic school. (See ROMANTICISM.) In 1819 he collaborated with Jay, Jouy, and De Norvins in the publication of the once famous *Biographie nouvelle des contemporains* (8 vols., 1820–25). In recognition of his celebrated biography, *Vie politique et militaire de Napoléon* (2 vols., 1822–26), a work full of curious facts and piquant revelations, Napoleon, while at Elba, settled upon the author a legacy of 100,000 francs. The works of Arnault were edited by himself in 1818, 1823, and 1827. All of these editions are somewhat incomplete.

ARNDT, ärnt, ERNST MORITZ (1769–1860). A distinguished German poet and patriot. He was born at Schoritz, which was then in Sweden, Dec. 26, 1769. His father had been a serf, but achieved a sturdy peasant independence, and designed Arndt for the ministry. He has described his early years delightfully in *Märchen und Jugenderinnerungen* (1818). He studied at Greifswald and Jena and was influenced especially by Goethe, Fichte, Klopstock, Bürger, and Voss. After he left the university he made journeys in Austria, Hungary, France, and Italy, and published an account of these travels in 1802. The first of his many political services was rendered in his book, *Versuch einer Geschichte der Leibeigenschaft in Pommern und Rügen* (1803), which contributed greatly to the mitigation and partial abolition of serfdom. He became privatdocent at Greifswald in 1880, and was made professor there in 1806. After the battle of Jena he fled to Sweden, whence he continued stirring appeals against Napoleon, under the title *Der Geist der Zeit*. He returned after three years to his professorial work. In 1812 he sought refuge in Russia, called thither by Baron von Stein, the great German statesman, who was there organizing the agitation against Napoleon. Arndt's finest poems—among them "Was ist des Deutschen Vaterland," and "Der Gott der Eisen wachsen liess"—belong to this period; also stirring appeals in prose, such as *Deutscher Volkskatechismus* (1812); *Was bedeutet Landwehr und Landsturm?* (1813); *Der Rhein, Deutschlands Strom aber nicht Deutschlands Grenze* (1813); collated in *Schriften für und an meine lieben Deutschen* (3 vols., 1845). After the French disaster in Russia (1812), he returned to Prussia, in which his hopes of German unity centred, and gave himself up to the agitation that resulted in the War of Liberation, which culminated in the battle of Leipzig (1813). In 1817 he married a sister of the great liberal preacher and philosophic theologian, Schleiermacher, and in 1818 was made professor of history in the newly established university at Bonn. As his liberal views were at variance with the government's reactionary policy, he was soon suspended (1820) and passed the next 20 years in honorable and honored retirement, writing historical essays of minor value, and his interesting *Erinnerungen aus meinem äussern Leben* (Leipzig, 1840). On his accession to the Prussian throne, Frederick William IV restored Arndt to his professorship (1840). German unity was still his dream. He took a lively interest in the events of 1848 and was one of the deputation to offer to the Prussian King the Imperial Crown of Germany. The ninetieth birthday of Father Arndt, as he had come to be called, was celebrated throughout his still disunited country; a month later he died at Bonn, Jan. 29, 1860. Eleven years later the ideal of his life was realized by the proclamation of the German Empire at Versailles. Arndt was neither a great scholar nor a great poet, but he was a noble character and a manly patriot. Editions of his war songs are numberless. His *Erinnerungen* form the basis of E. M. Seeley's *Life and Adventures of E. M. Arndt* (1879). There are German *Lives* by Schenkel (2d ed., Elberfeld, 1869); Langenberg (Bonn, 1869); and Baur (Hamburg, 1882); R. Thiele (Gütersloh, 1894); G. Lange, *Der Dichter Arndt* (Berlin, 1910); P. Meinhold, *Arndt* (Berlin, 1910); and a volume of Arndt's *Letters to a Friend* (*Briefe en eine Freundin*), edited by Langenberg (Berlin, 1878). The publication of his *Works* was begun in 1892 by H. Rösch and H. Meisner.

ARNDT, or **ARND,** JOHANN (1555–1621). A German Lutheran divine. He was born at Ballenstedt, Anhalt, Dec. 27, 1555, and was educated at Helmstedt, Wittenberg, Strassburg, and Basel. He became pastor at Badeborn, Anhalt, in 1583, but was deposed in 1590 because he resisted the order of Duke John George to remove the pictures from his church and cease the use of exorcism in baptism. Later that year he was appointed to a place at Quedlinburg, but was glad to leave it in 1599 and go to Brunswick, because he had fallen into disfavor with the townspeople. His ardent piety was an offense to the dead orthodoxy of his associates, and he welcomed the call to Eisleben (1608), but only stayed until 1611, when he became general superintendent at Celle, Hanover, and there died, May 11, 1621. His enduring fame rests upon his *True Christianity* (Magdeburg, 1610) and his *Garden of Paradise* (Magdeburg, 1612); new editions of both, with biographical sketch by F. W. Krummacher (2d ed., Leipzig, 1850); best English translation of the former is that edited by Charles F. Schaeffer (Philadelphia, 1868); of the latter there is an English translation by A. W. Boehm (London, 1716). Arndt nourished his soul upon the Scriptures and the mystics, and his works develop that spirit which afterward was called pietistic. (See PIETISM.) For his biography consult F. Arndt (Berlin, 1838), and the Krummacher sketch quoted above.

ARNDT, WILHELM (1838–95). A German historian. He was born at Lobsens, province of Posen, Prussia, and after studying history at the University of Göttingen became established at the University of Leipzig. He published, in addition to other writings, *Kleine Denkmäler aus der Merowingerzeit* (1874), and *Schrifttafeln zur Erlernung der lateinischen Paläographie* (1874; 3d ed., 1897–98). He was for many years collaborator on the *Monumenta Germaniæ Historica*, and in 1881 published at Leipzig a

second edition of *Goethes Briefe an die Gräfin Auguste zu Stolberg*.

ARNDTS VON ARNESBERG, ärnts fŏn är'nĕs-bĕrK, Ludwig (1803–78). A German jurist, who did much to develop the science of jurisprudence. He was born in Arnsberg, Prussia, and was successively professor of jurisprudence in Bonn, Breslau, Munich, and Vienna universities, being at the last institution from 1855 until his death. He favored warmly Austria's claims for admission to the German Empire and used his influence to that end in 1848, when in the National Assembly of Frankfort. He was knighted by Austria in 1871. His best known works are the *Lehrbuch der Pandekten* (14th ed., 1889); the *Juristische Encyclopädie und Methodologie* (9th ed., 1895); *Die Lehre von den Vermächtnissen* (3 vols., 1869–75); *Gesammelte zivilistische Schriften* (3 vols., 1874). He collaborated with Bluntschli and Pözl on an eight-volume work called *Kritische Uberschau der deutschen Gesetzgebung und Rechtswissenschaft* (1854).

ARNE, ärn, Thomas Augustine (1710–78). An eminent English composer. He was born in London, and received his early education at Eton. His father, who was an upholsterer, intended to educate him for the bar, but the love of music was too strong to be restrained. Young Arne became skillful as a violin player, forming his style chiefly on the model of Corelli; and his zeal in the study of music induced his sister (afterward celebrated as Mrs. Cibber) to cultivate her excellent voice. He wrote for her a part in his first opera *Rosamond,* which was first performed with great success in 1733. Next followed his comic operetta, *Tom Thumb, or the Opera of Operas;* and afterward his *Comus* (1738), which displayed greater cultivation of style. He married a singer, Cecilia Young (1736), and after a successful visit to Ireland was engaged as composer to Drury Lane Theatre and wrote many vocal pieces for the Vauxhall concerts. The national air "Rule Britannia," which was originally given in a popular performance, the masque of *Alfred,* is of his composition. He composed also two oratorios, *Abel* and *Judith,* a number of operas, including *Artaxerxes,* in the Italian style (1762). His genius was better adapted to simple pastoral melody than to great dramatic compositions, and he wrote many glees, catches, canons, and songs, and the music to Garrick's "Ode to Shakespeare" for the Jubilee at Stratford-on-Avon in 1769. His son, Michael (1741–86), was also a composer. He died in London. Consult W. A. Barrett, *English Glee and Part Songs* (London, 1886); Horner, *Life and Works of Dr. Arne* (London, 1893).

ARNETH, är'nĕt, Alfred, Ritter von (1819–97). An eminent Austrian historian. He was born in Vienna, and after completing a course of legal studies entered the Austrian government service as an employee in the Imperial archives at Vienna. In 1848 Arneth was sent to the Frankfort Parliament as a representative from the district of Neunkirchen, and in 1861 was elected to the Diet of lower Austria. In 1868 he was appointed director of the state archives and in 1869 he was nominated by the Emperor a life member of the Austrian Upper Chamber. In 1879 he was chosen president of the Imperial Academy of Sciences at Vienna. Arneth wrote a number of scholarly works on eighteenth-century Austrian history, especially the eventful reign of Maria Theresa. His chief works are: *Geschichte Maria Theresias* (10 vols., 1863–79); *Prinz Eugen von Savoyen* (3 vols., 1858–59); *Joseph II und Leopold von Toscana, ihr Briefwechsel* (2 vols., 1872); *Marie Antoinette: Correspondance secréte entre Marie Thérèse et le comte de Mercy-Argenteau* (3 vols., 1874). He also edited the correspondence between Joseph II and Catharine of Russia (1869); miscellaneous letters of Maria Theresa (1881), and wrote as well an interesting autobiography, *Aus meinem Leben* (Vienna, 1891).

ARNETH, Joseph Calasanza, Ritter von (1791–1863). An Austrian numismatist and archæologist, born at Leopoldschlag, upper Austria. He became custodian of the Cabinet of Coins and Antiques in Vienna, and director of that institution in 1840, in which capacity he rendered very valuable services to the department of numismatics. Among his more important works are: *Synopsis Numorum Græcorum* (1837); *Synopsis Numorum Romanorum* (1842); *Das k. k. Münz- und Antikenkabinett* (1845); *Die antiken Kameen des k. k. Münz- und Antikenkabinetts* (1849); *Die Cinque-Cento-Kameen und Arbeiten des Benvenuto Cellini und seiner Zeitgenossen* (1858).

ARNHEIM, ärn'hīm. See Arnhem.

ARNHEIM, Hans Georg. See Arnim, Hans Georg.

ARN'HEM (anciently, Lat. *Arenacum*), or Arnheim. The capital of the Dutch province of Gelderland, on the Rhine, 35 miles southeast of Utrecht (Map: Netherlands, D 3). It is a place of historic interest and is situated in one of the most picturesque districts of Holland. It has elegant promenades constructed on the ramparts of the old city. One of its notable edifices is the Groote-Kerk, or Dutch Reformed Church, which was begun in 1452 and restored from 1895 to 1902. This has a tower 305 feet high and contains the tomb of the Duke of Gelderland, the opponent of Charles V. The town hall, erected in the fifteenth century and restored in 1898, is popularly called the Duivelhuis, from its grotesque decorations. Arnhem has a normal school for women, an art museum, the Museum van Oudheden en Kunst, and a public library. The trade of the town is with Germany, chiefly in grain and tobacco, while it manufactures furniture, wagons, mirrors, and scientific instruments. Arnhem was formerly the residence of the Dukes of Gelderland. In the thirteenth century and during the Middle Ages it was a member of the Hanseatic League. It was taken by the French in 1672, and stormed by the Prussians in 1813. Pop., 1900, 56,812; 1910, 65,685.

AR'NICA (commonly given as corruption of *ptarmica;* doubtful). A genus of plants belonging to the family Compositæ. The species are few in number and are found only in the north temperate and Arctic regions. The root and flowers of the mountain arnica (*Arnica montana*), sometimes called mountain tobacco, were formerly much valued in medicine, and were administered in various forms as a stimulant in paralytic affections, typhoid fevers, and other diseases. The drug is now rarely given internally, but in small doses it stimulates the digestion. Externally in the form of the tincture, arnica is a favorite household remedy for bruises, to relieve soreness and promote the absorption of extravasated blood. It is also used in the form of a plaster. The plant contains a peculiar volatile oil, a resin, caprylic and capronic acids,

tannin, and a bitter principle called arnicin. The root is perennial and crooked, the stem about 2 feet high, simple or little branched, with few leaves, bearing on the summit a head of flowers of dark golden yellow, often 2 inches in breadth. It flowers from June to August, forms an ornament of mountain meadows in Germany and Switzerland, and is found, upon the continent of Europe, as far south as Portugal and as far north as Lapland. Other species have locally the same qualities attributed to them as *Arnica montana*. For illustration, see DICOTYLEDONS; FLOWER; ARNICA; ACACIA.

ARNIM, är'nĭm, COUNTESS VON (MARY ANTOINETTE BEAUCHAMP). An English writer. She married Count Henning August von Arnim, a German nobleman, who died in 1910. Her first book, *Elizabeth and her German Garden*, was published anonymously in 1898. The delightful picture which it gives of outdoor life in Germany and the charming vivacity of its style made it at once a great success in England and the United States. In similar vein is *The Solitary Summer*, brought out in 1899. Other volumes which followed, some novels, and some books of travel in the guise of fiction, include: *The Benefactress* (1902); *The Adventures of Elizabeth in Rügen* (1904); *The Princess Priscilla's Fortnight* (1906); *Fräulein Schmidt and Mr. Anstruther* (1907); *The Caravaners*, containing admirable characterization (1909); *Priscilla Runs Away* (1910).

ARNIM, är'nĭm, ELISABETH VON, better known as BETTINA (1785–1859). A sister of Clemens Brentano, and wife of Ludwig Joachim von Arnim, born at Frankfort-on-the-Main. She is noted chiefly for her friendship with Goethe (1807–11) and her pretended *Correspondence of Goethe with a Child* (*Goethes Briefwechsel mit einem Kinde*, 1835), which is in large part fictitious. Genuine sonnets of Goethe in it were addressed, not to her, but to Minna Herzlieb. As a work of fiction its merits are great. It is original, fresh, lively, and graphic, though with the usual romantic faults of construction and in its speculative pages it is unintelligible. A similar volume of correspondence with Caroline von Günderode (*Die Günderode*, 1840), is equally interesting as is also a collection of real *Letters* to and from her brother Clemens. In the *King's book* (*Dies Buch gehört dem Könige*, 1843) and its hardly intelligible continuation *Conversations with Demons* (*Gespräche mit Dämonen*, 1852), she advocated certain social reforms, such as the emancipation of the Jews. She was a true member of a brilliantly eccentric family, keen, witty, capricious, vain, untruthful. Her translation of her *Correspondence* with Goethe into English is one of the curiosities of literature. Her *Collected Works* were published in Berlin, 1853. Consult: M. Carrière, *B. v. Arnim* (Breslau, 1887); W. Oehlke, *B. v. Arnims Briefromane* (Berlin, 1904); M. Dege, *Bettina von Arnim* (Kiel, 1904).

ARNIM, är'nĭm, or **ARNHEIM**, ärn'hīm, HANS GEORG VON (1581–1641). A German general in the Thirty Years' War. He was born at Boitzenburg in Brandenburg. He fought under Gustavus Adolphus against Russia in 1613, served in the Polish forces, and in 1626 entered the Imperial service under Wallenstein and was appointed a field-marshal. Being a Protestant, he left the Imperial service on account of the Edict of Restitution, entered that of the Elector John George of Saxony, and was in command of the left wing of the army of Gustavus Adolphus at Breitenfeld (1631). He was one of the principal agents in the negotiations between John George and Wallenstein, which were terminated by the latter's death in 1634. After this he defeated the Imperialists at Liegnitz and operated in conjunction with Baner in Bohemia. In 1635 John George abandoned the Protestant cause, making peace with the Emperor Ferdinand II, and Arnim now left the Saxon service. He was seized by Oxenstierna in March, 1637, for alleged intrigues against Sweden, and was taken to Stockholm, but escaped to Hamburg in November, 1638, and thereafter devoted himself to freeing Germany from foreign domination. He was carrying on a campaign, as lieutenant-general of the Imperial and Saxon forces against the French and Swedes, when he died at Dresden, April 18, 1641. Consult: Helbig, *Wallenstein und Arnim* 1632–34 (Dresden, 1850); Irmer, "G. von Arnim als kaiserlicher Feldherr in Pommern und Polen," in *Forschungen zur deutschen Geschichte* (Göttingen, 1879), and *H. G. von Arnim, Lebensbild* (Leipzig, 1894). See THIRTY YEARS' WAR; WALLENSTEIN.

ARNIM, HARRY, COUNT VON (1824–81). A German diplomat, born at Moitzelfitz, Pomerania. He studied law and entered the diplomatic service; was appointed Ambassador to the Pope in 1864, and during the Vatican Council of 1869–70, as Ambassador of the North German Confederation, supported the German bishops who opposed the dogma of infallibility. He was made a Count in 1870, and during the next year took a prominent part in the negotiations preceding the Treaty of Frankfort. During 1872–74 he was Ambassador to France, but as he was opposed to the policy of Bismarck, the latter secured his transfer to Constantinople, and a little later caused him to be arrested on the charge of stealing and publishing State documents from the German Embassy in Paris. For this he was sentenced to nine months' imprisonment. But he escaped punishment by remaining outside of the Empire, chiefly in Austria, where he published *Der Munzio kommt* (1878), and *Quid Faciamus Nos?* (1879), two pamphlets on the German church situation. He also wrote two attacks on Bismarck entitled *Reichsglocke* and *Pro Nihilo*, attacking Bismarck. He died at Nice.

ARNIM, LUDWIG JOACHIM (ACHIM) VON (1781–1831). A German novelist and poet, born in Berlin. He is best known for a collection of folk songs made with Clemens Brentano, and published (1806–08) under the title of the initial song, *Des Knaben Wunderhorn*. He studied the natural sciences at Göttingen and Halle, and received the degree of M.D., but never practiced medicine. He married Brentano's sister, Bettina, in 1811. His first work, *Theorie der elektrischen Erscheinungen*, showed a leaning to the supernatural, common among the German romanticists, still more strongly marked in his *Hollins Liebeleben* (1802) and *Ariels Offenbarungen* (1804). *Der Wintergarten* (1809), a collection of romantic tales, was followed in 1810 by a striking novel, *Die Gräfin Dolores*. *Halle und Jerusalem* (1811) is a humorous romance, and *Isabelle von Ägypten* (1811) a mediocre novel. Two years later he collected his dramas. In 1817 he produced his last and best romance, *Die Kronenwächter*, a story of the days of Emperor Maximilian. His works are careless in form, incoherent in structure, and romantically whimsi-

cal, but they show a remarkable originality of invention. They were collected, with an introduction by Wilhelm Grimm, in 20 volumes (1839–48). There is a brilliant eulogy on Arnim in Heine's *Deutschland.* Consult R. Steig and H. Grimm, *Achim von Arnim* (Stuttgart, 1894), and M. Hartmann, *L. von Arnim als Dramatiker* (Breslau, 1910).

AR'NO (anciently, Lat. *Arnus*). One of the largest rivers in Italy, rising on Mount Falterona in the Apennines, at the eastern end of Tuscany, at an elevation of over 5000 feet (Map: Italy, E 4). Near Arezzo it is connected with the Tiber through the canalized portion of the Chiana, and near that place enters the Val d' Arno, one of the most fruitful and beautiful valleys of Italy. It passes Florence and enters the Mediterranean 6 miles west of Pisa. In former times that city was situated at its mouth. The entire length of the Arno is about 140 miles; its most important tributaries are the Chiana and the Sieve. It is navigable for barges as far as Florence. The Arno is subject to frequent rises and in some parts of its course the banks are protected by dykes.

ARNO'BIUS, called AFER. An early Christian writer sometimes called Arnobius the Elder. He lived about 300 A.D. and was a native of Numidia in Africa. He was a professor of rhetoric at Sicca and, although at first an opponent of the Christians, was early converted. His fame rests chiefly upon his treatise, in seven books, entitled *Adversus Nationes* (c.303 A.D.), which displays slight knowledge of Christianity, but is of interest as showing the arguments then employed in the conversion of heathendom. An English translation has been published under the title *The Seven Books of Arnobius against the Heathen* (New York, 1888). There is an edition of the original (Latin) text by Reifferscheid (Leipzig, 1875).

ARNOLD, är'nold, ABRAHAM KERNS (1837–1901). An American soldier. He was born in Bedford, Pa., graduated at West Point in 1859, was appointed a brevet second lieutenant in the same year, became a first lieutenant in 1861, and served with marked ability throughout the Civil War, being breveted captain in June, 1862, and major in May, 1864, "for gallant and meritorious services" at Gaines's Mill and Todd's Tavern, respectively. He received a regular major's commission in June, 1869, and became lieutenant-colonel in 1886 and colonel in 1891. Appointed brigadier-general in 1898, he commanded the second division of the Seventh Army Corps in Cuba during the war with Spain. He is the author of *Notes on Horses for Cavalry Service* (New York, 1869).

ARNOLD, BENEDICT (1615–78). A colonial governor of Rhode Island. He was born in England, but was brought by his father to America in 1636. He removed to Newport in 1653 and became first Governor of Rhode Island (under the new charter) in 1663 and was reëlected in 1664, 1669, 1677, and 1678. He seems to have built the celebrated windmill in Newport, whose erection was long ascribed to the Northmen. He was the great-grandfather of the better-known Benedict Arnold of Revolutionary days.

ARNOLD, BENEDICT (1741–1801). An American general known in the annals of the American Revolution as "The Traitor." He was descended from a prominent Rhode Island family and was born in Norwich, Conn., Jan. 14, 1741. He received a fair education, but, being ambitious and reckless, twice left his home and joined the Provincial troops on the northern frontier. In 1762 he established himself at New Haven, as bookseller and druggist, embarked in the West India trade, prospered, and in 1767 married Margaret Mansfield, a lady of good family, who died in 1775. On receipt (April 20, 1775) of the news of the battle of Lexington, Arnold led a military company to Cambridge and proposed an expedition to capture Ticonderoga and Crown Point, and was commissioned as colonel to raise troops in western Massachusetts, but was obliged to join as a volunteer the expedition under Ethan Allen, already on the way thither. Prevented by the Connecticut authorities from taking command of Ticonderoga after its capture, he armed a vessel and with a few troops took St. Johns, together with a royal sloop and several bateaux. Jealous persons in Connecticut prompted the Continental Congress to question his capacity and conduct, and, while planning the conquest of Canada, he was superseded, but was selected by Washington to head an expedition against Quebec. Late in 1775 he led 1100 men through the forests of Maine, enduring great hardships, and on December 3 was joined by General Montgomery. In the daring but unsuccessful assault, December 31, in which Montgomery fell, Arnold was wounded, but, recovering, took command at Montreal, Congress having made him brigadier-general. In June, 1776, he retreated by way of Lake Champlain and was immediately selected to construct and command a fleet to control that important body of water. On October 11, near Valcour Island, he attacked a British fleet twice the size of his own; held his position until night, and then, aided by the darkness, stole with his crippled flotilla between the enemy's lines and escaped.

In spite of Washington's confidence in Arnold, the latter's enemies influenced Congress, and in 1777 five of his inferiors in rank were made major-generals—a slight which his sensitive and ambitious nature could not forgive—yet at Washington's request he did not resign. The British having invaded Connecticut, he joined the militia raised to repel them, and at the battle of Ridgefield showed remarkable courage, barely escaping death. Congress now appointed him a major-general, but still denied him proper relative rank. He coöperated with Washington in opposing the advance of Howe toward Philadelphia, and was appointed to act with General Schuyler in checking the progress of Burgoyne through eastern New York. He raised the siege of Fort Schuyler (Stanwix), and at the battle of Bemis's Heights, Sept. 19, 1777, was recklessly prominent, but General Gates, who by intrigue had superseded Schuyler, became jealous of Arnold; a quarrel ensued, and Arnold was deprived of his command. Upon the earnest solicitation of his brother officers he remained with the army and, despite Gates's effort to keep him in the background at the second battle of Saratoga (October 7), he played a brilliant part in it and was severely wounded. Congress gave him a vote of thanks and at last his proper relative rank. In May, 1778, he joined the camp at Valley Forge, but, being incapacitated for active service, was placed in command of Philadelphia after the British retired. Here he married, April, 1779, Peggy (Margaret) Shippen, a beautiful and cultivated woman, youngest daughter of Edward Shippen, a loyalist, and afterward chief justice of the State. Moving in fashionable society

and living extravagantly, Arnold naturally incurred criticism, and to this the executive council of Pennsylvania added definite charges of arbitrary exercise of military authority and of favoritism to Tories. At his request a court-martial was appointed, but nearly a year elapsed before it was held (January, 1780), when he defended himself without counsel and was acquitted of intentional wrongdoing, but was sentenced to be reprimanded by Washington, who, while rebuking Arnold, urged him to regain the esteem of his countrymen; but this disgrace, added to the injustice of Congress and the feeling that his sacrifices of health and property were unappreciated, led Arnold to reconsider the overtures of treason made some months, if not years, before. In August, 1780, he took command of West Point, which through a correspondence with Major André (q.v.) he offered to surrender to the British; and to consummate the plan, Arnold and André met at midnight on the shore of the Hudson (September 21); but the capture of André, September 23, frustrated the scheme, and Arnold fled to the British sloop of war *Vulture*.

Having been made a brigadier-general in the British army, Arnold in December headed a naval expedition against Virginia, but did little besides destroying property along the James River and burning Richmond. In 1781 he led another expedition against Connecticut, which resulted in the burning of New London and the massacre of the surrendered garrison of Fort Griswold. In December, 1781, he sailed for England with his family, who were pensioned by the British government. He himself received £6315 (about $31,755) for his alleged losses in joining the British, was kindly treated by the royal family, and at the King's request prepared a plan for reconciling the colonies; but received either neglect or abuse from both political parties, and, failing to get a position in the army, was forced to take up his old trade of merchant. The years 1787–91 were chiefly spent at St. John, N. B., where he carried on trade with the West Indies, but he returned with his family to London in the summer of 1791. On the breaking out of the war between England and France he was exposed to great risks in prosecuting his West India trade, and on one occasion was captured by a French ship, but escaped with his customary daring. The government still refusing to give him active service in the army, he strove, by fitting out privateers against France, to recover his lost fortune, but being unsuccessful, weighed down by debt, and despised by two continents, he sank into a state of melancholy, and died June 14, 1801, regretting, tradition says, his treason.

His wife, who appears to have been guiltless of any complicity in his treason and who had great strength of character, died in 1804. By his first wife Arnold had three sons, and by his second wife, several other children. His eldest sons received commissions in the British army; and his second son by his second marriage, James Robertson, who inherited his father's daring and military ability, rose to be a lieutenant-general, was made aid-de-camp to King William IV and was created a knight. Others of Arnold's children held honorable positions, and one of his grandsons, Capt. William Traill Arnold, a brave fighter, was killed in the Crimean War. Consult: Sparks, *Life of Benedict Arnold* (Boston, 1838); Todd, *The Real Benedict Arnold* (New York, 1903); Arnold, *Life of Benedict Arnold* (Chicago, 1880). All the above must be used with caution.

ARNOLD, Bion Joseph (1861—). An American electrical engineer, born at Casnovia, Mich. He graduated from Hillsdale College in 1881 and took advanced work at Cornell and the University of Nebraska. After 1893, when he established himself as an independent consulting engineer, he became known throughout the country as a traction expert. Among numerous important undertakings where he was chief engineer or where his advisory services were employed, are the construction of subways in New York and Chicago, the rebuilding of the Chicago street railway system, and the electrification of the New York Central Railroad's approach to New York. In addition, he was employed at various times as consulting engineer by the Wisconsin State Railway Commission; by the cities of Pittsburgh, Providence, Los Angeles, San Francisco, and Detroit; and by numerous transportation systems. He invented various devices for use on electric railways and was a pioneer in the use of alternating current and single phase electric traction systems. In 1903–04 he was president of the American Institute of Electrical Engineers; and he also identified himself with other scientific societies, American and foreign.

ARNOLD, är'nôlt, Christoph (1650–95). A German peasant (born near Leipzig), who carried out interesting astronomical observations and wrote *Göttliche Gnadenzeichen, in einem Sonnenwunder vor Augen gestellt* (Leipzig, 1692). He constructed an observatory at his own house and devoted himself to astronomical studies. He was the first to observe the comets of 1682 and 1686 and observed the transit of Mercury in the fall of 1690. An account of the latter observation is given in the work before mentioned.

ARNOLD, är'nold, Sir Edwin (1832–1904). A popular English author, born at Gravesend, June 10, 1832. From King's School, Rochester, he went to King's College, London, and thence to University College, Oxford, where he won the Newdigate Prize for a poem in 1853. In 1854–56 he was master of King Edward's School, Birmingham; and in 1856 he became principal of the Government College at Poona, Bombay. Returning to England in 1861, he obtained a place on the editorial staff of the *Daily Telegraph*. At the death of Thornton Hunt he became chief editor of the paper. While at this exacting work he found time to translate a volume of Greek poems and to produce his best-known work, *The Light of Asia* (1879), a production notable for its lofty philosophy and the vividness and reality with which the scenery, climate, manners, and people of Hindustan, as they were 2000 years ago, are portrayed. Its full title is *The Light of Asia; or, The Great Renunciation; being the Life and Teachings of Gautama (as told in verse by an Indian Buddhist)*. He subsequently published *Pearls of the Faith* (1883); *The Gulistan* (1889); *Poems, National and Non-Oriental* (1888); *The Light of the World* (1891); *The Tenth Muse and other Poems* (1895); *East and West* (1896); *The Voyage of Ithobal* (1901), and numerous other works. He was made a Companion of the Order of the Star of India in 1877; a Knight Commander of the Order of the Indian Empire in 1888, and was decorated by the Sultan of Turkey and other Oriental rulers. He frequently visited the United States, reading there in 1891.

During the 10 years following the publication

of *The Light of Asia* Arnold attained his highest popularity. In the final estimate of his poetry it will be discovered that his immense vogue was due largely to the freshness of his subject. He, above all others, popularized the philosophy of India. He was excellent at translation and paraphrase, but lacked the creative genius of the greater poets.

ARNOLD, George (1834–65). An American poet and humorist, born in New York City. As a child, while living in Illinois, he showed talent for drawing and, on his return to the East, studied with a portrait painter in New York. He abandoned this career for literature, wrote several unimportant biographies, and contributed stories, poems, sketches, and critical essays to various periodicals, especially *Vanity Fair,* in which appeared the earlier of his once famous *McArone Papers* (begun in 1860). He served as a soldier in the Civil War. William Winter edited his *Poems* with a Memoir (Boston, 1870; new ed., 1889). Some of these are characterized by melodious sweetness and pathos, but recent anthologists pay slight attention to them.

ARNOLD, är'nôlt, Gottfried (1666–1714). A German theologian. He was born at Annaberg, Saxony, studied theology at Wittenberg, and in 1697 was appointed professor of history at Giessen. His chief work is his *Unparteiische Kirchen und Ketzerhistorie* (1699–1700), which, by reason of its spirit of toleration, may be said to have marked an epoch in church history. During his life he was constantly exposed to attacks from the orthodox party. His 53 other works include *Die erste Liebe* (1696; ed. by Lämmert, 1844), and *Die Verklärung Jesu Christi in der Seele* (1704). Consult Dibelius, *Gottfried Arnold* (Berlin, 1873).

ARNOLD, är'nold, Isaac Newton (1815–84). An American lawyer and politician. He was born in Hartwick, N. Y., taught school, studied law, was admitted to the bar in 1835, and in the following year removed to Chicago, where he soon became prominent as a politician. Beginning in 1843, he served several terms in the Legislature. He was elected to Congress in 1860 and served for two terms, part of the time as chairman of the important committee on manufactures. He was also conspicuous as an advocate of the immediate abolition of slavery. In 1865 he was Auditor of the United States. For many years he was an intimate friend of Abraham Lincoln, and he published an able *Biography of Lincoln* in 1866 (4th ed., 1887). He also wrote what is probably the best *Life of Benedict Arnold* (1880). Consult E. B. Washburne, *Isaac Newton Arnold,* an address delivered before the Chicago Historical Society, of which Arnold was for many years president (Chicago, 1884).

ARNOLD, är'nôlt, Johann. A miller of the Neumark (Brandenburg), who lived in the time of Frederick II of Prussia and became famous as the instigator of an extraordinary interference of that monarch with the ordinary processes of justice. Arnold complained to the King that his landlord, by making a pond, had taken away water from his mill; that he (Arnold) had therefore refused to pay rent for the mill, of which he held a lease, but had been condemned to pay by the unanimous decisions of two courts. The King, as the fountain of justice, took up the case and, regarding it as an oppression of the poor, arbitrarily reversed the decisions of the courts, dismissed his high chancellor, imprisoned several other officers of justice, and ordered that restitution should be made to the miller. Soon afterward the King died, and under Frederick William II the case was more coolly investigated, and the condemned officials were exonerated and recompensed for their losses by the State.

ARNOLD, Johann Georg Daniel (1780–1829). A jurist and poet of Alsace. He was born at Strassburg, studied there and at Göttingen and Paris and from 1806 to 1809 was instructor in French civil law in the law school at Coblenz. In the latter year he was appointed to the chair of history at Strassburg and in 1811 was transferred to that of Roman law. His great work in jurisprudence is the *Elementa Juris Civilis Justinianei cum Codice Napoleoneo et Reliquis Legum Codicibus Collata* (1812). He also wrote in High-German, "Blessigs Totenfeier," and numerous other lyrics, and in the Strassburg dialect, *Der Pfingstmontag* (1816), a comedy in rhymed Alexandrines, much praised by Goethe.

ARNOLD, är'nold, Lewis G. (1815–71). An American soldier. He was born in New Jersey, graduated from West Point in 1837, and served as second lieutenant in the second Seminole War (1837–38). During the Mexican War, as first lieutenant in an artillery company, he accompanied General Scott's army and participated (1847) in all the operations from Vera Cruz to Mexico City. He was brevetted captain for bravery (August 20) at Churubusco, and major for gallant conduct (September 13) at Chapultepec. During the Civil War he helped repel the Confederate attack upon Santa Rosa Island (Oct. 9, 1861) and distinguished himself, as executive officer, in the defense of Fort Pickens during the bombardments of November, 1861, January, 1862, and May, 1862. He was then appointed brigadier-general of volunteers and commanded successively the department of Florida and the Union forces at New Orleans and Algiers, La., but was disabled by a stroke of paralysis (November, 1862), and was retired from the service, as lieutenant-colonel of regulars, in August, 1864.

ARNOLD, Matthew (1822–88). An English poet and essayist. He was a son of Dr. Thomas Arnold, the famous head master of Rugby, and was born Dec. 24, 1822, at Laleham, a village near Staines, in the valley of the Thames. With the exception of a year (1836–37) at Winchester under Dr. Moberly, later Bishop of Salisbury, Arnold passed his school days at Rugby, where his "Alaric at Rome" won the prize for poetry (1840). He was elected a scholar of Balliol College, Oxford, in November, 1840, but did not begin residence till October of the next year. In 1843 he gained the Newdigate Prize with a poem entitled "Cromwell," and in March, 1845, was elected a fellow of Oriel. Among his colleagues at Oriel were Dean Church, John Earle, subsequently known as professor of Anglo-Saxon in the university, and Arthur Hugh Clough, to whom Arnold has paid tribute in "Thyrsis," justly ranked with "Lycidas" and "Adonaïs," as one of the finest elegies in the language. After a short period of teaching the classics in the fifth form at Rugby, he became, in 1847, private secretary to the Marquis of Lansdowne, Lord President of the Council, who in 1851 appointed him an inspector of schools. This inspectorship he held until November, 1886. He appears ever to have felt repugnance toward the details of the official routine—the hearing of recitations by

students of training colleges and the correction of endless examination papers. Yet even here his influence was felt by the English public, and his annual reports, appearing from 1852 to 1882, aroused an interest seldom accorded to such publications. From 1857 to 1867 he was successor to Wharton and Keble in the more congenial post of professor of poetry at Oxford. It was then, by his famous series of prelections *On Translating Homer* and *On the Study of Celtic Literature*, that he began a reform of English criticism so important in the history of nineteenth-century literature. Three times, in 1859, 1865, and 1885, he was commissioned to visit the Continent for study of the school discipline and methods of education there in vogue; and in 1883–84 he came to the United States as a lecturer. The visit to America was repeated in 1886. As a lecturer he was disappointing, both because of his awkward manner and the feebleness of his voice, which was inaudible to the greater part of his audience. He died April 15, 1888, and was buried in the churchyard of All Saints at Laleham.

Like Dryden and Coleridge, Arnold gained high distinction both as critic and as poet. Even his prize poems, though not foreshadowing his later work, display more talent than is usual with a poet's first efforts. In "Alaric at Rome" (Rugby, 1840; reprinted, 1893), a difficult stanza is managed with skill; and the heroic verse of "Cromwell" is smooth and agreeable. In 1849, under the initial "A," he published *The Strayed Reveller and Other Poems*, containing the beautiful "Mycerinus" and "The Forsaken Merman." This volume was followed, still under "A," by *Empedocles on Ætna and Other Poems* (1852), where first appeared the narrative "Tristram and Iseult," and several lovely lyrics, such as "A Summer Night," "The Youth of Nature," "The Youth of Man," and "Faded Leaves." In 1853 Arnold threw off the mask of anonymity. The *Poems* of that year (3d ed., 1857) include "Sohrab and Rustum," his popular poem, founded upon a story in Firdausi's *Shah-Nameh;* "Requiescat," "The Scholar-Gipsy," and many pieces from the earlier collections. "Empedocles," however, was omitted as structurally weak. Time now singles it out as one of Arnold's most attractive dramatic poems. The songs of Callicles, the harp-player, are among his choicest lyrics. The volume was prefaced with an admirable statement of the author's aim—an essay since famous not only for its brilliancy, but also as suggesting a different field in which Arnold was to become well known. Arnold's other volumes of verse comprise *Poems*, Second Series (1855), of which the chief new poem is the magnificent episode "Balder Dead," and in which four songs of Callicles are grouped as "The Harp-Player on Ætna"; *Merope*, a rather frigid tragedy (1858); *New Poems* (1867), memorable for "Thyrsis," and containing "Empedocles on Ætna" revived; *Poems* (the first collected edition, 1869; reissued, 1877), in which was included "Rugby Chapel," that noble elegy on the death of his father; and a fine edition complete in three volumes (1885), containing "Westminster Abbey," a splendid elegy on Dean Stanley. In this edition Arnold classified his poems as Early Poems, Narrative Poems, Sonnets, Lyric Poems, Elegiac Poems, Dramatic Poems, and Later Poems—a division since carefully observed by his editors.

It will be noted that the bulk of Arnold's verse is relatively small—a fact doubtless to be attributed to the preoccupation of official duties. It is equally noticeable that throughout his body of verse a level of excellence is maintained so nearly invariable that at most there are perhaps not more than a round dozen titles which one would not regret to see removed. Although it can no longer with accuracy be said that Arnold is not a popular poet, it is nevertheless true that he does not appeal to the wide audience of Tennyson and Browning. His poetical work will, it is certain, have always a peculiar grace for not a few. In its grave and noble music as in its stoic austerity, it will claim its own fit audience.

But it is a question whether Arnold will not in time take a place as the third great poet of the Victorian age. On this point Arnold himself wrote: "My poems represent, on the whole, the main movement of mind of the last quarter of a century; and thus they will probably have their day as people become conscious to themselves of what that movement of mind is, and interested in the literary productions that reflect it. It might be fairly urged that I have less poetical sentiment than Tennyson, and less intellectual vigor and abundance than Browning; yet because I have, perhaps, more of a fusion of the two than either of them, and have more regularly applied that fusion to the main line of modern development, I am likely enough to have my turn as they have had theirs."

Among Arnold's prose writings are: *On Translating Homer* (1861–62), and the *Study of Celtic Literature* (1867), both redactions of Oxford lectures; *Essays in Criticism* (1865); *Culture and Anarchy* (1869); *St. Paul and Protestantism* (1870); *Literature and Dogma* (1873); *Mixed Essays* (1879); *Irish Essays* (1882); *Discourses in America* (1885); *Essays in Criticism*, second series (1888). Two volumes of his letters were published in 1895 under the editorship of G. W. E. Russell. These, though they are likely to add little to his literary fame, do, as the editor hoped they might, "reveal aspects of his character . . . which could be only imperfectly apprehended through the more formal medium of his published works." Besides all these, there are other theological and social essays, and reports and books on education. He also edited selections from Dr. Johnson (1878), Wordsworth (1879), Byron (1881), and Burke (1881), with noteworthy prefaces. Arnold's work in prose is not altogether uniform in value. Naturally what pertains to schools is of interest primarily to educators; although students of Arnold's style will find *A French Eton* (1864) a valuable document. Likewise much that he wrote on politics and theology, though it served its purpose, now possesses chiefly an historical value. *Literature and Dogma* and *God and the Bible*, the former of which he himself considered his most significant work, were in his own time much misunderstood. Their purpose was to assert the natural truth of the Christian religion as against its dogma, to emphasize the literary aspect of the Bible, and in the words of Mr. Brownell, to make "each a theme, a topic of literature"—a part of that generous culture of which he was so persuasive an advocate. Arnold was among the earliest thus to apply to these subjects the methods of literary criticism—he wrote of them in a style quite new in treatises of the sort; but he failed at the time to satisfy either orthodox or radical. His permanent place as a critic is

made secure by such volumes as the first series of *Essays in Criticism*. Not only is the thought here of the first order, but the style is of the best, ranking with that of Newman, his master. The essays follow the sympathetic method of Sainte-Beuve. Especially brilliant is the essay on Heine, an author from whom Arnold derived many of his ideas and the sting with which he attacked Philistinism, a term which he introduced into English from the slang of the German universities. The essay on "Pagan and Mediæval Sentiment" is a charming contrast between Greek and mediæval ideals as represented by Theocritus and St. Francis of Assisi. The Oxford lectures above referred to are now classics. Of the discourses delivered in America, the one on "Literature and Science" is a strong plea for literature against the encroachments of science; and the one on "Emerson," though clearly inadequate as an estimate, contains passages of great eloquence. Arnold's influence is still paramount in English criticism. Many of his phrases, such as "sweetness and light," "the great goddess Lubricity," the "lyrical cry," the definition of poetry as "a criticism of life," the contention that criticism should be "a disinterested endeavor to learn and propagate the best that is known and thought in the world," the description of conduct as "three-fourths of life," the phrase "the not-ourselves that makes for righteousness," the division of the British public into "Barbarians, Philistines, and Populace," the infusion of new meaning into the terms "Hebraism" and "Hellenism"—all these have become common property; but more, his general manner of treating literary themes very widely prevails. Even during his lifetime his judgments in this field were received as *ex cathedra*. He did away with the pompous rhetoric and blustering animosities of the eighteenth-century school, and substituted therefor restraint, poise, taste—in short, the ethical element. It was thus that he introduced into English criticism a new era. What Principal Shairp has happily called "the sparkling banter" of his occasional manner (for example, in *Culture and Anarchy*), has led to the ascription to Arnold by the careless and the unperceptive of a flippancy which, it is hardly necessary to state, was not characteristic of his temper.

Bibliography. Arnold, like Thackeray, expressed a wish that he should not be the subject of a biography. In fact, it is not his somewhat humdrum life that interests those who most admire him; and for biographical details, the reader may consult the charming *Letters* cited above. One may also refer to V. Scudder, *Matthew Arnold* (Boston, 1898); Garnett, *Matthew Arnold* (London, 1900); and Dawson, *Matthew Arnold* (New York, 1904). For his influence on education see Fitch, *Thomas and Matthew Arnold* (New York, 1897); and for the social aspect of his work, Robertson, *Modern Humanists* (London, 1891). For Arnold as a poet, see V. Scudder, *Neo-Paganism: The Poetry of Doubt* (Boston, 1897); R. H. Hutton in his *Literary Essays* (London, 1892); and Hunt, *The Poetry of Matthew Arnold* (New York, 1898). Good appreciations of Matthew Arnold in general are to be found in Galton, *Two Essays on Matthew Arnold* (London, 1897); Aronstein (Berlin, 1904); Saintsbury, *Matthew Arnold* (London, 1899); Woodberry in *Makers of Literature* (New York, 1900); Brownell in his *Victorian Prose Masters* (New York, 1902); Paul, *Matthew Arnold* (London, 1902); Henry James, *Matthew Arnold's Essays* in his *Views and Reviews* (Boston, 1908); Chapman in his *English Literature*, pp. 423–459 (Boston, 1910); and Benson in *The Leaves of the Tree* (New York, 1911); Russell, *Matthew Arnold* (New York, 1904).

ARNOLD, Richard (1828–82). An American soldier. He was born at Providence, R. I., and graduated at West Point in 1850. He was made captain of an artillery company early in 1861, served with gallantry at Bull Run (July 21, 1861), at Savage's Station (June 29, 1862), at Port Hudson (May–July, 1863), and at Fort Morgan (August, 1864), and after various promotions was brevetted major-general of volunteers in August, 1865. On 1875 he became a major in the regular service, and in 1877 he was appointed acting assistant inspector-general of the Eastern Department. In 1882 he became a lieutenant-colonel.

ARNOLD, Richard (1845–1918). An American violinist. He was born in Eilenburg, Prussia, but received his first musical training in America where he had come as a child. His was a case of remarkable precocity. When only four years of age he received regular instruction on the violin, and entered upon the duties of leader of a theatre orchestra when a boy of 12. In 1864 he went to Leipzig, where he spent three years at the Conservatory and always stood at the head of the class. After his return to America he became a member of Theodore Thomas's orchestra. In 1877 he joined the New York Philharmonic Society, and three years later became the concert-master, which post he held without interruption until 1909. In 1878 he founded the New York Philharmonic Club, of which he was the director and solo violinist until 1891. He is also highly esteemed as a teacher.

ARNOLD, Samuel (1740–1802). An English composer. He was educated under Dr. Nares in the Chapel Royal, and when 23 years old was appointed to compose an opera for Covent Garden, and produced *The Maid of the Mill* (1765), which was successful. In 1776 he became composer for the Haymarket; in 1783 was appointed organist and composer to the Chapel Royal, and 10 years afterward organist in Westminster Abbey. He produced 43 dramatic compositions and his oratorios include *The Cure of Saul* (1767), *The Resurrection* (1773), and *The Prodigal Son* (1777). He edited an edition of Handel's works in 36 volumes, incomplete and faulty; but he is best remembered by his collection of *Cathedral Music* (1790).

ARNOLD, Samuel Greene (1821–80). An American historian. He was born at Providence, R. I., graduated at Brown University (1841) and at Harvard Law School, and was admitted to the bar in 1845. He was Lieutenant-Governor of his State in 1852, 1861, and 1862, and was in the United States Senate from December, 1862, to March, 1863. He published an excellent *History of Rhode Island and Providence Plantations* (New York, 1859) and several addresses, including *The Spirit of Rhode Island History* (1853).

ARNOLD, Sarah Louise (1859—). An American educator, born at North Abington, Mass., and educated at the Bridgewater (Mass.) State Normal School. For some years after her graduation in 1878 she taught in the schools of several States and later became successively principal of a training school at Saratoga, N. Y., supervisor of schools in Minneapolis and in Bos-

ton, and dean of Simmons College. To the last-named position she was chosen in 1902; in the same year Tufts College conferred upon her an honorary M.A. degree. All of her numerous writings on educational subjects bear the stamp of wide experience coupled with ripe scholarship. Besides various other texts for schools and aids for teachers, she published: *Waymarks for Teachers* (1894); *Stepping Stones to Literature*, a series of excellent readers widely used in graded schools (1897 et seq.); *Reading: How to Teach It* (1899); *The Mother Tongue*, with G. L. Kittredge (1900); *Plans for Busy Work* (1901). Many of her writings have been printed in Spanish and Portuguese, as, for example, *Primeiro livro de leiture*, with G. C. Benajah (1911). In 1913 there was published a *Manual for Teachers* of which she was joint author.

ARNOLD, Thomas (1795–1842). An English scholar and educator, best known as master of Rugby. He was born June 13, 1795, at West Cowes, Isle of Wight, where his father was collector of customs. Upon the death of his father in 1801, Arnold was put in charge of his aunt, Miss Delafield, with whom he remained for two years. At the age of eight he was sent to Warminster School in Wiltshire, whence, four years afterward, he was sent to Winchester. From this famous school at 16 he went up to Oxford as a scholar of Corpus Christi College, where he remained three years. Here he fell in with a small group of men, chief among whom were John Keble, the originator of the Tractarian movement and author of the *Christian Year*, and John Taylor Coleridge, afterward judge of the Queen's Bench, by whom he was greatly influenced. He took a first in classics in 1814 and in the following year was elected fellow of Oriel College, a position which he held for the next four years. In 1815 he took the Chancellor's Prize for a Latin essay and in 1817 the same prize for an English essay. It was during his residence at Oriel that he laid the foundation for his later work in the classics and history by wide reading along those lines, especially in Thucydides and Aristotle. Here, too, though at first reserved and shy, and later very disputatious in his maintenance of bold, if not very well-matured, opinions, he gained consideration and won distinction among the group of able men by whom he was surrounded.

He took deacon's orders in 1818 and in the following year left the university to settle at Laleham, near Staines, where he occupied himself chiefly in preparing pupils for the university and in the pursuit of his own studies. Here he spent eight quiet years, devoting himself particularly to the study of Thucydides and Roman history, in which he was profoundly influenced by the works of Niebuhr and other German historians whose influence was very apparent in his own writings. Here, too, he began his *History of Rome*. Besides these activities he devoted much attention to problems of the Church as well as to questions affecting the lower classes, and to practical work among the poor, all of which led to the maturing of ideas on Church and social problems that brought upon him fierce attacks in later years. His political opinions, affected by his life and work here, tended to crystallize into a form of advanced liberalism, which his opponents afterward characterized so bitterly as dangerous radicalism.

Any final estimate of Arnold must rest on his influence at Rugby. The head-mastership of Rugby fell vacant in 1827, and, though Arnold entered late in the contest and was not personally known to the electors, he was chosen for the position, largely, it would appear, on the recommendation of one of his friends, who predicted that if elected he would change the face of the public-school education throughout England. After being chosen in December, 1827, he took priestly orders and proceeded to the degrees of B.D. and D.D. He entered on his duties in August, 1828. The remaining 14 years of his life were spent at Rugby and at Fox How in Westmoreland, an estate which he bought in 1832, and his career was that of the school to which he devoted himself. Dr. Percival, successor of Arnold in 1887–95, afterward Bishop of Hereford, has said. "If I were called upon to express in a sentence or two my feeling in regard to Dr. Arnold's influence in school life, I should describe him as a great prophet among schoolmasters, rather than an instructor or educator in the ordinary sense of the term. . . . His influence was stimulative rather than formative, the secret of his power consisting not so much in the novelty of his ideas or methods, as in his commanding and magnetic personality and the intensity and earnestness with which he impressed his views and made them—as a prophet makes his message—a part of the living forces of the time."

Arnold was not the originator of any didactic system. In general, he accepted the system which he found, and infused into it a new meaning. Thus, without doing away with "fagging," he tempered it into a responsible supervision of the lower forms by the sixth form. He insisted upon the preëminence of classical studies, but enriched the ordinary school course of the day with mathematics, modern languages, and modern history. Above all, without its "accredited phraseology of piety," he emphasized the moral and spiritual interest. True scholarship he held to be associated with Christianity. He aimed, in the common lessons and in the weekly sermon, to mold the public opinion of the school. As the headmaster of Rugby, he looked as much to the development of manly character as to the training of students. His policy, in which he was eminently successful, was to send to the universities not a number of men trained to take firsts in the schools, but rather "thoughtful, manly-minded men, conscious of duty and obligation," who were almost certain to do uniformly well whatever they undertook. One immediate result was that, after the passage of the Reform Bill in 1832, Rugby men represented the best reform sentiment. His own character, his deep religious sense, his noble estimate of duty, of justice, of honesty, and of truth, were strongly impressed on the school. His great ability as an organizer and administrator of men and measures did much to work, at Rugby and elsewhere, the revolution which it had been predicted he would stir up in English education.

Profoundly religious, Arnold came naturally to take part in those theological discussions which attained prominence in the early decades of the last century. He wished to conserve the faith of the Church and also to liberalize its thought. The clergy of his time appeared to him negligent and apathetic; hence he welcomed the new life promised by the Oxford Movement and in 1829 published his pamphlets on *The Christian Duty of Conceding the Roman Catholic Claims*. But he soon perceived that for him dogma could not

be the sole basis of Christianity; and when, in 1836, the party in power at Oxford sought to keep Dr. Hampden from a professorship on a charge of heresy, he wrote for the *Edinburgh Review* an article of unsparing rebuke. For many years he was misunderstood by broad and by high churchmen alike. Because of the temper of his *Christian Duty*, the Archbishop of Canterbury refused to permit him to preach Bishop Stanley's consecration sermon. His *Edinburgh* article nearly cost him his Rugby post. But by 1840, with the passing of the first shock of the religious controversies of 1830–40 and with the lessening of his early strenuousness, as well as by the increasing recognition of his great work as master of Rugby, much of this friction passed away and his last years were full of honors. The honor most prized by him was his appointment by Lord Melbourne to the professorship of modern history at Oxford in 1841. His enjoyment of this was, however, very short. He died suddenly June 12, 1842.

His domestic relations were most happy. In 1820 he married Mary, youngest daughter of Rev. John Penrose, rector of Fledborough, Nottinghamshire, and sister of one of his school and college friends, Trevenen Penrose. The story of his relations with his family and friends forms one of the most tender and beautiful chapters in a life rich beyond that of most men in charm of personal associations. His four sons, who survived him, were Matthew; William Delafield (1828–59), director of public instruction in the Punjab and author of *Oakfield*, who is commemorated in Matthew Arnold's poem, *A Southern Night;* Thomas; and Edward Penrose (1826–78), a fellow of All Souls', Oxford, and an inspector of schools from 1866 to 1877.

Arnold endeavored to promote a better understanding between the poor and the well-to-do. He lectured before mechanics' institutes from May to July, 1831, published the *Englishman's Register* in aid of working people, and afterward, with similar purpose, contributed a series of articles to the Sheffield *Courant*. Some of the *Register* and *Courant* papers were reprinted by Stanley in a volume of *Miscellaneous Works* (1845). He was also a member of the senate of the University of London from 1836 to 1838, when he resigned because of disagreement with the majority of the members as to the requirements for degrees in Arts.

As a classical scholar, Arnold was deficient in the elegances of the eighteenth-century tradition. Regardless of style he viewed even the history of Livy with dislike. In the classroom his scholarship was most manifest in extemporaneous renderings. That he was well versed in the wider reaches of philological principle is shown by his three-volume edition of Thucydides (1830–35; 2d ed., 1840–42); although it is to be admitted that the value of that work lies chiefly in its exposition of those ideas respecting the essential continuity of history which, voiced in Arnold's Oxford inaugural, afterward determined the philosophy of Freeman. Dr. Arnold's literary fame rests finally upon his *History of Rome*, vols. i–iii (1838–42), which, as projected, was to terminate in the coronation of Charlemagne, but was not brought beyond the close of the Second Punic War. The history was based on the epochal *Römische Geschichte* (3 vols., 1811–22) of Niebuhr. It seems generally conceded that the representative portion of the work is that which offers what Archdeacon Hare has termed the first "adequate representation of the wonderful genius and noble character of Hannibal" (Stanley, chap. iv). Free from partisanship or paradox, dignified without being wearisome, the history is notable both for its finished style and its sound and extensive learning. That it attends closely upon the *ipse dixit* of the German authority has been regretted by many. His other works include a volume of lectures on the *Study of History* delivered at Oxford, six volumes of sermons, besides traveling journals and miscellany. His chief claim to remembrance must rest on his noble life and character. "His *Thucydides*, his history, his sermons, his miscellaneous writings, are all proofs of his ability and goodness. Yet the story of his life is worth them all." See the lines of his son, Matthew Arnold, in *Rugby Chapel*.

Consult: A. P. Stanley, *The Life and Correspondence of Thomas Arnold, D.D.* (Boston, 1860), the authoritative work on Arnold and one of the classics of English biography; Hughes, *Tom Brown's School Days* (London, 1857); Worboise, *Life of Dr. Thomas Arnold* (London, 1859); Fitch, *Thomas and Matthew Arnold and their influence on English Education*, "Great Educator Series" (New York, 1897); also, in German, Zinzow (Stettin, 1869) and Wittig (Hanover, 1884).

ARNOLD, Thomas (1823–1900). An English scholar. He was the son of Dr. Thomas Arnold of Rugby, brother of Matthew Arnold, and father of Mrs. Humphry Ward, the novelist. He was educated at Rugby and Oxford, taking his degree in 1845, and became a colonial school inspector in Tasmania. He embraced Roman Catholicism in 1856 and joined John Henry Newman at Dublin. He became professor in the Roman Catholic university there and followed Newman to the Oratory at Birmingham. In 1865 Dr. Arnold temporarily abandoned the Catholic church, and removed to Oxford, being a lecturer and examiner there and at the Royal University of Ireland. After the death of his wife in 1888 he was more closely associated with Cardinal Newman. He published a *Manual of English Literature*, which has been widely used; edited old English texts, including Wyclif and Beowulf, and with the Rev. William Addis, the *Catholic Dictionary*. A few months before his death he published *Passages in a Wandering Life*, containing much of interest concerning Cardinal Newman and other friends famous in the Tractarian Movement.

ARNOLD, Thomas Kerchever (1800–53). An English clergyman and author. He was born at Stamford, graduated in 1821 at Trinity College, Cambridge, and in 1830 was appointed rector of Lydon, Rutlandshire. He started and at different times edited the *Churchman's Quarterly Magazine*, the *Churchman's Monthly Companion*, and the *Theological Critic*, and published theological pamphlets and treatises, *Short Helps to Daily Devotion* (1847), and two volumes of sermons (vol. i, 1845; vol ii, posthumously, 1858). His reputation chiefly rests, however, on his large list of school books, including particularly an *English-Latin Lexicon* (with Rev. J. E. Riddle, 1847), based on a similar German work by C. E. Georges, and a *Practical Introduction to Greek Prose Composition* (1838), and a *Practical Introduction to Latin Prose Composition* (1839), both of which have in England been highly valued and have passed through numerous editions.

ARNOLD, William Rosenzweig (1872—). An American Orientalist, born at Beirut, Syria. He graduated from Ohio Wesleyan University in 1892 and from Union Theological Seminary in 1895. From 1896 to 1898 he was curator of the department of antiquities in the Metropolitan Museum of Art in New York. He became a lecturer on the Old Testament (1902) and professor of Hebrew language and literature (1903) at Andover Theological Seminary, and while continuing in the latter position took up in 1908 a similar work at Harvard. His publications include *Ancient Babylonian Temple Records* (1896); *The Rhythms of the Ancient Hebrews* (1907).

ARNOLD, är'nôlt, Yuriy von (1811–98). A Russian composer. He was born at St. Petersburg, was an army officer from 1831 to 1838, and subsequently a member of the secret service. In 1839 he won the prize of the St. Petersburg Philharmonic Society for the best cantata with his *Svyetlana*. Subsequently he lectured on musical topics at Moscow and St. Petersburg, was a musical critic on the *Signale* at Leipzig from 1863 to 1868, and was appointed professor of vocal music in the Moscow Conservatory in 1870. His works include, besides the above-mentioned, an opera entitled *The Gypsy*, an *Overture to Boris Godunoff*, and many songs. In 1888 he became professor of the history of musical art at the Moscow University. His most important contributions to the literature of music are a *Theory of the Ancient Russian Church and Folk-Singing*, and *Is it Possible in Musical Art to Establish a Characteristically National School of Singing, and on what Data must it be Based?* published in the *Bayan* (St. Petersburg, 1888–89).

ARNOLD-FORSTER, Hugh Oakeley (1855–1909). An English statesman and publicist. He was the son of William Delafield Arnold, the nephew of Matthew Arnold, and the grandson of Dr. Thomas Arnold. Educated at Rugby and at University College, Oxford, he studied law and was admitted to the bar, but after some years of practice relinquished it to enter the publishing house of Messrs. Cassell. In 1896 he was elected to Parliament from Belfast as a Liberal Unionist, and in 1900 he was made Parliamentary Secretary of the Admiralty. Soon after this he went to South Africa as chairman of the Small Land Settlement Commission. In 1903, immediately after accepting the portfolio of the War Office, he appointed a commission to report on a reorganization of the office; but his efforts to bring about a new army scheme were not supported by his colleagues, and before any practical steps could be taken the Unionist Parliament and government came to an end. Arnold-Forster was a profound student of military matters and a keen and efficient debater in Parliament. He wrote: *Things Old and New; Stories from English History* (7 vols., 1893–96); Our Home *Army* (1892); *A History of England* (1897); *Army Letters* (1898); *Our Great City* (1900); *The Army in 1906* (1906); *English Socialism of To-day* (1908); *Military Needs and Military Policy* (1909). Consult the *Memoir* by his wife (1910).

ARNOLDI, är-nôl'dē, Ernst Wilhelm (1778–1841). A German manufacturer and financier. He was born at Gotha, established a dye works there and an earthenware manufactory at Elgersburg, and did much to encourage export trade. He was the chief promoter of the so-called Mercantile Institute of Gotha (1817), founded the Mutual Fire-Insurance Bank at Gotha (1821), and the Mutual Life-Insurance Bank, the first institution of the sort in Germany (1829). The beet-sugar industry was greatly extended by him. For his biography, consult Hopf (Gotha, 1878) and Emminghaus (Weimer, 1878).

ARNOLDI, Wilhelm (1798–1864). A Bishop of Treves. He was born at Baden, Prussia, studied at the seminary of Treves, and was appointed pastor and capitulary of the cathedral church there in 1834. In 1839 he was elected bishop, but in consequence of governmental opposition, was not enthroned until 1842. It was his exhibition of the Holy Coat which, through the attacks of Ronge, gave the first impetus to the German-Catholic movement. He did much to promote Church art, and in matters of Church policy was a firm ultramontanist. For his biography, consult Kraft, *Wilhelm Arnoldi, Bischof von Trier* (Treves, 1865).

ARNOLD OF BRESCIA, brā'shâ (c.1100–55). An Italian cleric, born at Brescia, celebrated in connection with the movement for ecclesiastical reform in the twelfth century. He studied at Paris, probably under Abélard (q.v.), and attempted to apply the philosophical teachings of the latter to political conditions. Arnold of Brescia was possessed with the idea that he was destined to reform his age, and argued that the Church must revert to its apostolic poverty in order again to be virtuous. On returning to Brescia, he preached vigorously that the Church ought neither to own property nor to exercise temporal power. By his preaching the people of Brescia were exasperated against their bishop, and the revolutionary spirit spread widely. Consequently Arnold was banished from Italy. He retired to France, but, experiencing the bitter hostility of St. Bernard, who denounced him as an enemy to the Church, he took refuge in Switzerland. There he remained for about five years. In the meantime the people at Rome revolted, in 1143, against the papal rule and established a commune. Arnold proceeded thither and soon became leader of the populace. For 10 years the city was in a state of disorder and Eugenius III was obliged to flee from the city. These commotions were subdued by Adrian IV, who, feeling the weakness of his temporal authority, made use of the spiritual, and resorted to the extreme measure of laying the city under an interdict. The revolutionary party became discouraged and disintegrated. Arnold was obliged to take refuge with friends in Campania. On the arrival of the Emperor Frederick in 1155, Arnold was arrested and brought to Rome, hanged, his body burned, and the ashes thrown into the Tiber. Consult: Gregorovius, *History of the City of Rome in the Middle Ages*, vol. iv (London, 1896); Castro, *Arnoldo da Brescia e la rivoluzione del XII secolo* (Leghorn, 1875).

ARNOLD OF WINKELRIED. See Winkelried.

ARNOLDSON (FISCHOF), Sigrid (1864—), A Swedish opera singer. She was born at Stockholm, studied under Madame Artôt in Berlin and Maurice Strakosch in Paris, and made her first appearance at Moscow, Russia, as Rosina, in *Il Barbiere di Siviglia*. She has a finely cultivated soprano voice of extensive range, and has been very successful as Mignon, Rosina, and Carmen. She sings regularly in the Italian opera at St. Petersburg and was a member of the

Metropolitan Opera House troupe in New York City during the season of 1893–94.

ARNOLD VON LÜBECK, är'nôlt fŏn lụ̈bĕk (?–1212). A German abbot and chronicler of the Middle Ages. He was abbot of the cloister of St. John at Lübeck and continued the *Slavic Chronicle* of Helmold from 1171 to 1209. This continuation, published frequently, may be found in the *Monumenta Germaniæ Historica,* vol. xxi; separately in the *Scriptores in Usum Scholarum* (1868); or, translated by Laurent, in the *Geschichtschreiber der deutschen Vorzeit* (1853; 2d ed., 1896). Consult Damus, *Die Slawenschronik Arnolds von Lübeck* (Lübeck, 1872).

ARNOLFO DI CAMBIO, är-nôl'fô dē käm'byô (c.1232–1302). The most notable Florentine architect of the Gothic period, perhaps one of its greatest sculptors. He was born at Colle, in Tuscany, and, according to traditional view, he was a pupil of the sculptor Niccola Pisano; and also came under the influence of the Roman school. But his architecture is unlike that of Niccola's school, or what one would expect of a sculptor, in that it lacks sculptural decoration. His earliest known architectural masterpiece is the important church of Santa Croce (q.v.) in Florence (begun in 1295), which shows that he excelled rather in conception and construction than in elaboration of details. When the cathedral of Florence was rebuilt (1296), its construction was intrusted to him, and he built a complete wooden model, which was esteemed the wonder of the age. After his death his plans were not followed above the first story, owing to the adoption of a more extensive plan. (See FLORENCE.) The famous Palazzo Vecchio there has been attributed to him, probably wrongly.

ARNOLFO DA FIRENZE, är-nôl'fô dä fē-rĕn'tsâ. The preceding architect is usually identified with a very important sculptor, a pupil of Niccola Pisano, who assisted his master in the pulpit of Siena and elsewhere and appears in 1277 as sculptor to Charles of Anjou. His most important independent works are: the monument of Cardinal de Braye (d.1282), in San Domenico, Orvieto, which became typical for such monuments; the tabernacles of San Pietro fuori le mure, Rome (1285), the mosaic of which was probably by Pietro Cavallini, and St. Cecilia in Trastevere (1293); and the tomb of Boniface VIII in the Vatican grottoes. Venturi has attributed other works to him in Florence and elsewhere, the principal of which is the celebrated bronze statue of St. Peter with the Keys in St. Peter's, Rome, heretofore considered antique—a startling attribution, which lacks proof.

In the inscriptions of these works their sculptor is generally called Arnolfo da Firenze, whereas in Florentine documents the sculptor is called Arnolfo da Colle. For this, and for other reasons, Frey considers that the two cannot be identical, arguing also that the tomb of Pope Boniface VIII was executed at a time (1300) when the architect was occupied in Florence. But Venturi points out that the inscription on this tomb reads "Arnolphus architectus," and maintains the possibility of Arnolfo having kept up his Roman workshop until the tomb was completed. At all events, the sculptor in question was the most important of the older pupils of Niccola Pisano, and the principal representative of the classical tendencies of his school, as distinct from the more naturalistic represented by Giovanni Pisano. See PISANI. Consult "Arnolfo di Cambio," in Thieme and Becker, *Allgemeines Lexicon der bildenden Künstler,* vol. ii (Leipzig, 1908); Venturi, *Storia dell' arte italiana,* vol. iv (Rome, 1906).

ARNOLPHE, är'nôlf'. A character in Molière's *Ecole des femmes.* He believes that all women of the world will make inconstant wives, and thus tells a friend, in the first act of the play, that he has been rearing a spouse for himself in the seclusion of the country—a peasant's daughter, Agnes by name. The succeeding action of the play shows that Arnolphe's theory is more sound than the preventive is efficacious.

AR'NON. A river issuing into the Dead Sea, the modern Wady Mojib. The main stream is only 13 miles long. The banks are lined with limestone and basalt rocks, some reaching the height of 1700 feet. The Arnon once formed the boundary line between Reuben and Moab. In Num. xxi. 14, 15, Arnon is said to be Moab's border, probably against Sihon's kingdom, whose advance to Arnon is also described in xxi. 28. It is referred to in the Mesha inscription; its fords are mentioned in Isa. xvi. 2, and it is referred to as Arnona (Arnonas) by Jerome. Schmidt explains the name as derived from *ranan,* characterizing the river as a "roaring" stream, and al Mojib as an Arabic translation. This explanation was accepted by De Goeje. The stream, which is perennial, has cut its way through a deep gorge. The mouth of the river, as one approaches it from the Dead Sea, is of extraordinary beauty and impressiveness. Beyond the last bend there are two waterfalls of inconsiderable height which, however, occasion a tremendous volume of sound because of the reverberation from the steep mountain walls. Schmidt and his party in 1905 went farther up the stream than Lynch (1848), De Luynes (1863), Rothe (1874), Hill (1897), Cady (1898), or Abel (1909), the other visitors; but no explorer has been able to follow the entire course of the river, either from above or below. For description and photographs, see N. Schmidt, "The River Arnon," in *Journal of Biblical Literature* (1906); and on the songs in Num. xxi. his *Messages of the Poets,* pp. 323 ff. (New York, 1911).

AR'NOT, WILLIAM (1808–75). A Scottish clergyman. He was born in Scone, was educated at Glasgow, was appointed pastor there in 1838 and at Edinburgh in 1863. He joined the Free Church Movement (1843) and in 1873 was a delegate to the meeting of the Evangelical Alliance at New York. His works have been much read and include *Illustrations of the Book of Proverbs* (1869) and *The Parables of Our Lord* (1870). Consult *Autobiography with Memoir by his Daughter* (London, 1877).

AR'NOTT, NEIL (1788–1874). A Scottish physician and physicist. He was born at Arbroath, Scotland, and was educated at the Grammar School of Aberdeen and at Marischal College in the same city. After studying medicine at Aberdeen he went to London in 1806 and soon entered the East India Company's service in China. In 1811 he returned to London and engaged in general practice. In 1836 Dr. Arnott participated in the foundation of the University of London and was appointed a member of its senate. He was afterward elected a fellow of the Royal Society and of the Geological Society. In 1837 he was appointed a physician extraordinary to the Queen. In 1823–24 Dr. Arnott was induced to deliver a course of lectures at the

Philomathic Institute on natural philosophy in its applications to medicine. The substance of these lectures formed the basis of his *Elements of Physics, or Natural Philosophy, General and Medical*, published in 1827. It is in connection with improvements in the warming and ventilating of houses that the name of Dr. Arnott became best known. In 1838 he published a treatise on *Warming and Ventilating*, and in 1855 another on *The Smokeless Fireplace, Chimney-Valves*, etc. He was the inventor of the "Arnott Stove" and "Arnott Ventilator," for which he received the Rumford Medal of the Royal Society in 1854. In 1861 he published *A Survey of Human Progress*, full of interesting and enlightened views on improvement generally. In 1864 appeared part i of the revision of the *Physics;* this was followed by part ii, which contained the subjects of optics and astronomy for the first time, and also an interesting supplement entitled *Arithmetic Simplified*. Arnott's last publication was a small work on national education. He was a liberal benefactor to the University of London and the various Scottish universities. For memorial notice, consult *Proceedings of the Royal Society*, vol. xxv (London, 1877).

ARNOT'TO (probably the native name), or **ANNATTO** (also called ARNATTO and ANNOTTA; Ger. *Orleans;* Fr. *rocou*). A coloring matter of vegetable origin used to some extent in dyeing and calico printing; it is also used as a coloring ingredient in plasters, ointments, and in certain varnishes; farmers use it for coloring butter and cheese. It is made from the seed pellicle of an evergreen plant, the *Bixa orellana*, growing in Brazil, Cayenne, and several other places. To obtain it, the seeds of the fruit capsules are crushed and allowed to ferment in water; they are next rubbed upon a sieve, completely mashed, and the coloring matter washed away; after some time the water is decanted and the coloring matter allowed to dry in the shade. It is then broken up into cakes and wrapped in leaves. Urine is sometimes used to keep it from decomposing. Arnotto is insoluble in water; it dissolves with a red color in alcohol, in alkalies, and in fixed oils. It gives beautiful but fugitive shades; its employment in dyeing and calico printing is therefore limited. Indians prepare from it a paint for the body, used partly for the purpose of protecting themselves against mosquito bites; in South America it is largely used to improve the color and flavor of chocolate. The chief coloring principle of arnotto is a crystalline yellow substance called *bixin*.

ARNOULD, är'nōō', SOPHIE (1744–1802). A celebrated French actress and singer. She was born at Paris in the same room in the Rue de Bethisy in which Admiral Coligny was murdered. She made her début at the Grand Opera, Dec. 15, 1757, with splendid success. During a period of 21 years (1757–78) she was the most prominent and popular singer at the Royal Opera at Paris, one of her rôles being Iphigenia, in Gluck's *Iphigenia in Aulis*, which she was the first to interpret. Her voice was sweet and effective, her interpretation true to the intentions of the composer, her acting vivacious and graceful. She was not less remarkable for beauty and wit, and her home was frequented by such eminent scholars as D'Alembert, Helvetius, Diderot, and Rousseau. She has frequently been compared with Ninon de l'Enclos, and many of her epigrams and witticisms have been collected under the title of *Arnouldiana*.

ARNOULD-PLESSY, är'nōō'ple-sē', JEANNE SYLVANIE (1819–97). A French actress. She was born at Metz, and made her début at the Comédie Française as Emma in *La fille d'honneur*. Afterward she took prominent parts in *La passion secrète, Le verre d'eau, Julie*, and in many other successful plays. In 1845 she suddenly severed her contract and went to London, where she married J. F. Arnould, the dramatic author. Condemned by the French courts in the following year to pay damages to the amount of 100,000 francs (about $20,000), she went to St. Petersburg in 1846, where for nine years she was engaged at the Théâtre Français. She returned to Paris in 1855 and was again a member of the Comédie Française until 1876, her principal triumphs here being associated with the later dramas of Emile Augier. During her long histrionic career she is said to have created 53 distinct rôles.

ARNPRI'OR. A town of Renfrew Co., Ontario, Canada, on Chats Lake, at the junction of the Ottawa and Madawaska rivers, 38 miles by rail west of Ottawa, on the Canadian Pacific and the Grand Trunk railroads (Map: Ontario, G 2). It has large lumber and woolen mills, and marble works, and there are iron mines near by. The town owns its water works and sewerage system. The United States is represented by a consular agent. Pop., 1891, 3341; 1901, 4152; 1911, 4405.

ARNSBERG, ärns'bĕrk. The capital of the government district of the same name in the Prussian province of Westphalia (pop., 1910, 2,399,849), on the Ruhr, about 44 miles southeast of Münster (Map: German Empire, C 3). It has several churches, a gymnasium, a municipal hospital, a library, a public slaughterhouse, water works, and gas plant, and is the seat of the district government. Its principal article of manufacture is paper, and there are distilleries, breweries, and railroad repair shops. On a hill above the town stand the ruins of the ancient castle of the counts of Arnsberg. Near the castle is pointed out the spot where the chief tribunal of the Vehmgerichte (q.v.) was held. Between Arnsberg and Soest in the valleys of the Helve and the Möhne is a dam reputed to be the largest water-storage reservoir in Europe. (See DAMS AND RESERVOIRS; IRRIGATION.) Pop., 1895, 7786; 1900, 8448; 1910, 10,256.

ARNSTADT, ärn'stät. The capital of the German principality of Schwarzburg-Sondershausen, situated in a picturesque country on the banks of the Gera, 12 miles south of Erfurt (Map: German Empire, D 3). Among its noteworthy buildings are a castle, containing a picture gallery and valuable porcelain collection, the Rathaus, and the Liebfrauenkirche, with a richly decorated portal. Arnstadt possesses numerous schools and a municipal hospital. Formerly it was the chief emporium for the trade in fruit and timber between the fertile lowlands and the Thuringian Forest region, and is still an important market for grain and agricultural products. It is also a manufacturing town, the industries including weaving, shoe and glove making, brewing, the manufacture of pottery, etc. There are copper deposits in the neighborhood, and mines of rock salt. Warm brine baths have made Arnstadt an important watering place in summer. The composer, J. S. Bach, was for several years organist at the church of

St. Boniface. Pop., 1890, 12,800; 1910, 17,907. Arnstadt is one of the oldest of Thuringian cities, its existence being traceable as far back as A.D. 704.

AR'NULF (c.850–899). King of Germany and Roman Emperor. He was a natural son of the East Frankish King, Carloman, who was a great-grandson of Charles the Great. In 887 he led the revolt which forced Charles the Fat to abdicate and was elected King of the East Franks—i.e., of Germany. In 891, in the battle of Louvain, on the Dyle, he won a decisive victory over the Northmen who were invading his kingdom. He invaded Italy in 894, was crowned Emperor in 896, and died in 899.

ARNULF, SAINT (c.582–641). An ancestor of the Carlovingian emperors, who derived their name, Arnulfinger, from him. He was Bishop of Metz from about 612 to 627, when he resigned his position and retired to a hermitage in the Vosges Mountains. His body was afterward buried in the famous church bearing his name at Metz.

ARNUS. See ARNO.

AROA, ä-rō'ä. A town in the State of Falcon, Venezuela, on the Aroa River, 70 miles by rail from Tucacas (Map: Venezuela, D 1). It is famous for copper mines in the neighborhood.

AROER, ăr'ō-ēr *or* ā-rō'ēr. A city on the banks of the Arnon, mentioned in Deut. ii. 36 and iii. 12 as the southern limit of Reuben's territory. According to the Mesha inscription it belonged to Moab. In Num. xxi. 15, Arnon is said to fall where the city stands; this probably refers to Aroer. It is no doubt the modern 'Ara-îr, on the Wady Mojib, 11 miles from the Dead Sea, where there are ruins of the old city. Consult: Burckhardt, *Travels in Syria*, p. 372 (1822); Tristram, *Land of Moab*, pp. 129 ff. (2d ed., 1874); Musil, *Moab* (1906); Schmidt, *Messages of the Poets*, pp. 323 ff. (1911).

AROKSZALLAS, ŏr'ŏk-säl'äsh. A town of Hungary, about 44 miles northeast of Budapest (Map: Austria-Hungary, G 3). It contains a fine church and carries on a considerable trade in grain. Pop., 1890, 11,190; 1900, 12,067.

AROLAS, ä-rō'läs, JUAN DE (1805–49). A Spanish romantic poet. He was born at Barcelona, was a member of the Piarist Order, and was appointed an instructor in the school of the order at Valencia. His collected poems, which first appeared in three volumes in 1860, were published in 1890 as the forty-third volume of the *Biblioteca selecta* (Valencia, 1840 et seq.). For a study of this remarkable poet-friar and his works, consult Lomba y Pedraja, *El P. Arolas, su vida y versos* (1898).

AROLSEN, ä'rōl-sen. The capital of the German principality of Waldeck, on the Aar, about 22 miles west-northwest of Cassel (Map: German Empire, C 3). There are a gymnasium, a parish church, and a castle, the latter containing a valuable library, a picture gallery, a fine collection of engravings, antiquities, and weapons. Arolsen is the seat of a district court. The town is the birthplace of the sculptor Rauch and of the painters Wilhelm and Friedrich Kaulbach. Pop., 1895, 2768; 1905, 2811.

ARO'MA (Lat. Gk. *ἄρωμα, arōma*, spice, sweet herb). A term employed to designate a spicy or a pleasantly pungent odor. Thus we speak of the *aroma* of roast meat and of the aroma, or *aromatic* smell, of hyssop, mint, and other plants. Aromatic smells are very characteristic of some natural orders of plants, as Labiatæ (mint, etc.) and Compositæ (milfoil, etc.). They depend largely on the presence of volatile oils. See NOSE; SMELL; AROMATICS.

AROMATARI, ä-rō'mä-tä'rē, GIUSEPPE DEGLI (1586–1660). An Italian physician and naturalist, born at Assisi. He studied at Montpellier and Padua and practiced for many years at Venice. He became widely known and declined flattering invitations from the Duke of Mantua, Pope Urban VIII, and King James I of England. His "De Generatione Plantarum in Seminibus," a letter addressed to Nanti, and first published as part of the volume, *Disputatio de Rabie Contagiosa* (1625), was once very famous.

AR'OMATICS (Gk. *ἀρωματικός, arōmatikos*, aromatic). A class of medicines which owe their efficacy to oils obtained from them by distillation, and called volatile, distilled, or essential oils. They emit an agreeable, aromatic odor and usually have a warm, pungent, spicy taste. Aromatics include also certain other drugs and some animal substances. Among the families which yield the most important aromatics are the Labiatæ, Umbelliferæ, Lauraceæ, Myrtaceæ, Aurantiaceæ, Coniferæ, Scitamineæ, Orchidaceæ, etc. In some cases, the aromatic principle is diffused throughout all parts of the plant, but it is usually condensed in particular organs, such as the root, in ginger; or the bark, in cinnamon, canella, and cascarilla; or the flowers, as in cloves; or the fruit, as in anise and vanilla; or the wood, as in sandalwood and aloes-wood; or the leaves, as in the case of the Labiatæ, Umbelliferæ, etc.

Aromatics may be arranged in the following sub-classes: 1. Those in which the active principle is an essential oil, as the oil of thyme, lavender, cajeput, neroli, fennel, etc. 2. Those containing camphor, or an allied body, such as artificial camphor obtained from turpentine. 3. Bitter aromatics, in which there is a mixture of a bitter principle and an essential oil, as chamomile, tansy, wormwood, etc. 4. Those of which musk is the type, such as civet and amber; and certain plants with a musklike odor, such as *Malva moschata*, *Mimulus moschatus*, and *Hibiscus abelmoschus*. 5. Those containing a fragrant resin, as benzoin, myrrh, olibanum, storax, and the balsams of Peru and Tolu, which possess stimulant properties.

They are employed internally to disguise the taste of other drugs. Locally they are used as counter irritants, local anæsthetics, and antiseptics.

ARONA, ä-rō'nä. A town in north Italy, 42 miles northwest of Milan, near the southern end of Lake Maggiore. Steamers connect it in summer with Locarno in Switzerland. It has silk, cotton, and metal works and is commercially very active because of its transportation facilities. A noteworthy feature of the town is a metal statue, 70 feet high, erected in 1697 to the memory of Cardinal Carlo Borromeo, who was born here in 1538. Pop., 1881, 4182; 1901, 4700; 1911, 6271.

ARONHOLD, ä'ron-hōlt, SIEGFRIED HEINRICH (1819–84). One of the founders of the mathematical theory of invariants, to which he contributed in particular the symbolic notation afterward developed by Clebsch and Gordan. His name is also associated with the plane curves of the third and fourth orders. He was professor in the technical school at Berlin in 1863–83.

ARO'NIA. See CRATÆGUS.

AROO ISLANDS. See ARU ISLANDS.

AROOSTOOK, ȧ-rōōs′tuk. A river rising in Piscataquis Co., northern Maine, 1050 feet above the sea, flowing northeast through Aroostook County, and entering the St. John River, in New Brunswick (Map: Maine, H 2). It is the chief tributary of the St. John River, and along its valley lies some of the richest soil in the State. It is about 125 miles long, and drains an area of 2290 square miles, most of which is in Maine. It falls 705 feet from its source to the State line, a distance of 117 miles, thus affording extensive water power. It possesses historical interest from its connection with the long-agitated question of the northeastern boundary between British America and the United States.

AROOSTOOK, LADY OF THE. The title of a novel by W. D. Howells. The heroine of it takes passage across the Atlantic on a trading vessel, the *Aroostook,* no other woman being on board. The book is among the best of Howells's earlier period.

AROUET, ȧ′rōō′ȧ′. See VOLTAIRE.

ARPACHSHAD, är-pāk′shăd. In the list of eponyms of the nations in Gen. x., Arpachshad appears as the third son of Shem, ancestor of the Terahites and consequently of the Hebrews. The name is supposed by many scholars to represent Arrapachitis (q.v.). Recently discovered Babylonian inscriptions have added to the probability of this view by showing the great importance of the ancient Semitic kingdom of the Gutians, with its capital Arrapcha. That the first part of the word refers to Arrapachitis is now generally held. The ending *shad* is more difficult to explain. The absence of Babylonia in the list has caused some surprise. Josephus (*Ant.* i, 6, 4) declared that the Chaldæans were formerly called Arphaxadæans. Schlözer, Michaelis, and others gave up Arrapachitis to find Kesed-Chaldæa in the word; Cheyne secured both Arpach and Kesed by the insertion of a letter. Less plausible are the suggestions of Hommel that the word is composed of *Ur,* the Egyptian *pa,* and *Kesed,* and of Delitzsch that it was originally *Arba kishadi,* meaning 'the four sides.' Schmidt explains the word as made up of *Arpach* and *shadu,* 'mountain,' Arpachshadi meaning 'the Arrapcha of the mountain,' i.e., Kara Dagh. This theory can only be verified by a certain identification of the site.

AR′PAD (Assyrian *ar-pad-da*). An ancient city of Syria, the site of which is 13 miles northwest of Aleppo. It is mentioned in the time of Adadnirari IV (812–783 B.C.) and frequently afterward in the Assyrian inscriptions. In 740 B.C. it fell into the hands of Tiglath Pileser IV. Its importance may be judged from the fact that it becomes one of the eponym cities from whom *limmi,* or 'archonts,' are taken. It is mentioned in Isa. x. 9. The modern Tell Erfad represents its locality.

ARPÁD (?–907). The national hero of Hungary and a semi-mythical personage. He led the Magyars into Hungary, c.875, and by c.906 he had conquered much of the territory. He also made incursions into Italy about 900 and returned laden with booty. He died in 907. The first crowned King of the house of Arpád was St. Stephen, who became ruler in 997. The Arpád dynasty became extinct in the male line with Andrew III in 1301. Arpád lives in the popular songs of the country; his history, even in the oldest chronicles, is mixed up with the national legends.

ARPEGGIO, är-pĕd′jō (It. harping, from *arpa,* harp). In music, a chord of which the notes are sounded not simultaneously, but in succession, in a broken manner, as on a harp. In older music arpeggios are to be played twice: once beginning on the lowest note up to the highest, and then again down, ending on the lowest.

AR′PENT, *Fr. pron.* ar′paN′. The old French land measure, corresponding to our acre. The word is derived from *arepennis, arapennis,* the Latin form of the name of a Gallic land measure. It was identified by Columella with the Roman *actus,* or half *iugerum.* The measure varies with different localities. As used in lower Canada and Louisiana, it equals about five-sixths of an acre (.845) or a little over 34 ares (34.191).

ARPINO, är-pē′nō (anciently, Lat. *Arpinum*). A town in the province of Caserta, south Italy, 14 miles north of Roccasecca, and 94 miles northwest of Naples, near the river Garigliano (ancient Liris), situated high above the valley at an altitude of 1475 feet (Map: Italy, H 6). It was a very ancient town of the Volsci and was celebrated as the birthplace of Marius and Cicero. Extensive remains of Cyclopean masonry testify to the importance of the city in ancient days. The Romans wrested the town from the Samnites in 305 B.C.; in 188 B.C. its inhabitants became full citizens of Rome. By imperial times, however, it had lost its importance. Cicero often mentions it and lays his *De Legibus* there, on his ancestral estate, at the junction of the rivers Liris and Fibrenus. Near Arpino are a Trappist convent, called Casamari, and a bridge called Ponte di Cicerone. The public school bears the name Collegio Tulliano, and the local theatre is Teatro Tulliano. The local cloth manufacturers proudly proclaim that in the time of the Roman Republic Arpinum was famous for woolens, and that the father of the immortal orator was superintendent of a fulling mill. Arpino also manufactures parchment, paper, and leather, and quarries excellent marble. Pop., 1881, about 5000 (commune, 11,368); 1901 (commune), 10,607; 1911, 10,309. Consult Kelsall, *Classical Excursion to Arpino* (Geneva, 1820).

ARPINUM. See ARPINO.

ARQUA, är-kwä′. A village in north Italy 12 miles southwest of Padua. Here the last five years of Petrarch's life were passed (1569–74). His house has faded frescoes of scenes from his poems, and a few souvenirs, and his sarcophagus rests on red marble columns in front of the church. Pop., 1900, 1600.

ARQUEBUS, är′kwē-bŭs, or **HARQUEBUS,** (Fr. *arquebuse,* OF. *harquebuse,* from Dutch *haakbus,* from *haak,* hook + *bus,* gun barrel; cf. Eng. *hagbut,* and Ger. *Hakenbüchse,* a gun with a hook). A gun resembling the modern musket. Hand-guns are mentioned as early as 1414, but not until the second half of the fifteenth century do we find illustrations of them. The gun at this period consisted of a metal tube, fixed in a straight stock of wood, with a vent at the top of the barrel, where the match was applied. Some time between the close of the fifteenth century and the middle of the sixteenth the lock was added. Of locks there were two kinds: the first moved toward the gunner when the trigger was pressed; the second, like the modern lock, receded. It was not until toward the middle of the sixteenth century that firearms became important in war-

fare. The arquebus of the period is of two principal kinds, fired with a rest or without one. The arquebusiers were both footmen and cavalry, and in England many yeomen of the guard became arquebusiers. By the beginning of the seventeenth century the arquebus was being displaced by the musket.

ARQUES-LA-BATAILLE, ärk-lä-batīy. A French village in the department of Seine-Inférieure, which contains the remains of an old castle built by William the Conqueror's uncle. Here Henry IV defeated the Duke of Mayenne, 1589. Pop., 1911, 1598.

ARRACACHA, ăr'rà-kä'chà (Sp. from native name). A plant, *Arracacia xanthorrhiza,* of the family Umbelliferæ, a native of Jamaica and of the elevated tablelands in the neighborhood of the cities of Bogotá, Colombia, and Caracas, Venezuela, and of regions of similar climate in other parts of tropical South America. It is much cultivated in its native country for its roots, which are used as an esculent. The roots divide into a number of parts, which resemble cows' horns or large carrots. When boiled, they are firm and tender, with a flavor not so strong as that of a parsnip. The plant is much like hemlock and has a similar heavy smell. The flowers are in compound umbels and are of a dull purple color. The arracacha was at one time very strongly recommended as a substitute for potatoes. It was introduced into Great Britain by the Royal Horticultural Society, and its cultivation perseveringly attempted; but it was found unsuitable to the climate of England and of other parts of Europe, where it was tried, perishing on the approach of the frosts of winter without having perfected its roots. The dry weather of summer is also unfavorable to it. It seems to require a very regular temperature and constant moisture. In deep loose soils it yields a great produce. It is generally propagated by offshoots from the crown of the root. By rasping and washing the root a starch similar to arrowroot is obtained. There are five or six other species of *Arracacia,* most of them Mexican.

AR'RACK (Ar. *'araq,* sweat, juice, spirituous liquor, from *'araga,* to sweat), Rack, or Raki. A term applied to Oriental distilled liquors, especially to that distilled from fermented rice and the fermented sap (toddy) of the coconut (palmyra) and other palm trees. Other substances used in making arrack are combinations of rice and sugar, or rice and molasses, and berries, dates, figs, or grapes. It is usually a colorless liquid, but when stored in casks it takes on a slight yellowish or brownish tinge. It has an agreeable taste. It improves with age and the better varieties are not unwholesome. The best varieties are from Batavia, Java, where the materials used are as follows: Rice, 35 parts; molasses, 62 parts; toddy, 3 parts, the yield of pure arrack being 23½ parts. In Ceylon it is made entirely from palm-flower juice. The Indian arrack is made from the flowers of the Mahwa tree. Excellent qualities are made in Madras, China, and Siam. The intoxicating power of arrack is sometimes increased by the addition of hemp, poppy leaves, and the juice of stramonium. Arrack is now made commercially in Germany and Holland. *Saki* is the local name given to the Japanese variety of arrack. As an average analysis of arrack Blyth gives the following: Alcohol, 52.70, extract, 0.82, ash, 0.24, and water, 47.194 per cent. Besides the above constituents arrack contains various kinds of compound ethers (esters), aldehydes, etc., which give it its characteristic aroma and flavor.

AR'RAGONITE. Same as Aragonite.

ARRAH, ăr'rä. A town and railway station in the district of Shahabad in the presidency of Bengal, India, in lat. 25° 31′ N. and long. 84° 43′ E., 33 miles west of Patna (Map: India, D 3). It is situated in a fertile country and had a population, 1901, of 46,170. The various incidents in its history, the chief of which are connected with the Mutiny of 1857, constitute its chief claim to notice. The most thrilling was the siege sustained until deliverance after eight days by 12 Englishmen and 50 faithful Sikhs against a force of 2000 Sepoys.

ARRAH NA POGUE, ăr'rà nä pōg. A play by Dion Boucicault, and, next to *The Shaughraun* and *London Assurance,* probably his best; first played in 1865.

ARRAIGN'MENT (from OF. *aranier, araisnier,* Fr. *arraisonner,* Low Lat. *arrationare,* to call to court, from Lat. *ad,* to + *ratio,* reason, account). The bringing of a person who has been formally accused of crime before the court which is appointed to try him. The arraignment thus follows the indictment and may be regarded as the first stage in the trial of the accused. A prisoner is entitled to a speedy arraignment and may, in case of unnecessary delay, move to have the indictment dismissed. Its characteristic features are: 1. Calling the prisoner to the bar of the court by his name. 2. Reading the indictment to him, or furnishing him with a copy. 3. Asking him whether he pleads guilty or not guilty thereto. If the indictment is for a felony, the personal presence of the criminal is necessary to a valid arraignment at common law (changed in some States by statute); but in case of a misdemeanor he may appear by counsel. Having been arraigned, the accused may obtain from the court time in which to answer the indictment, or he may move to set aside the indictment, or he may demur or plead thereto. See Demurrer; Trial; Pleading, and the works there referred to.

ARRAIGNMENT OF PAR'IS, The. A piece by George Peele, half pageant, half masque, played, in 1581, by the chapel children before Queen Elizabeth, who is impersonated in it as Diana. The plot, so far as there is one, is based on the legendary trial of Paris by Diana for error in judgment in giving the apple to Venus. A personage called Colin in this play is thought to stand for Spenser and to have caused the subsequent writing of that poet's *Colin Clout's Come Home Again,* as a retort to Peele, who there figures, perhaps, as Palin.

ARRAN, ăr'an. An island in the Firth of Clyde, and county of Bute, Scotland, 5 miles southwest of Bute, separated from Kintyre by the Kilbrennan Sound (Map: Scotland, C 4). It is of oblong shape, 20 miles long, from 10 to 11 miles wide, with an area of 165 square miles. The surface is mountainous, in the north reaching an altitude of 2866 feet above the sea, and is traversed by small streams and lochs. Arran is remarkable geologically, and intrusive igneous rocks give the northern half of the island wild and beautiful scenery. It has quarries of limestone, coal mines, and some of the mountains contain jasper, agates, and rock-crystal. Only a small part of the area is under cultivation, the most important industries being cattle raising

and herring fishery. There are two harbors on the east side, Brodick and Lamlash, the latter sheltered by Holy Island. Off the southern coast lies the small island of Pladda, with a lighthouse. Numerous prehistoric and Danish relics exist, and the names of some of the caves bear evidence of Robert Bruce's sojourn. The greater part of Arran belongs to the Duke of Hamilton, whose seat is Brodick Castle. The population of the island was 5234 in 1871, 4824 in 1891, and 4819 in 1901. About half the people speak both English and Gaelic. Consult *The Book of Arran*, edited by J. A. Balfour (Glasgow, 1910).

ARRANGING (Fr. *arranger*, to put into rank, order, from *à*, Lat. *ad*, to + *rang*, rank, order). In music the working over of a composition for performance by musical agencies other than those originally designated by the composer. Thus, orchestral works, as, e.g., symphonies or overtures, are arranged for the piano, or compositions written for the piano for four hands are arranged for one piano; vocal compositions, as, e.g., operas or songs, may be arranged for some instrument, usually for the piano. When the arrangement is not a mere mechanical transcription of the notes written by the composer, but implies some creative work of the arranger, inspired by the original music, then it bears various names, as, e.g., *pot-pourri*, *fantasia*, *paraphrase*, or *transcription*. Liszt was one of the most famous of arrangers.

ARRAPACHITIS, ăr'ă-pă-kī'tĭs (Gk. Ἀρραπαχίτις). A country located by Ptolemy (vi, 1, 2) between Armenia and Adiabene, consequently on the upper Zab, while the Babylonian and Assyrian inscriptions seem to indicate a location farther south between the lower Zab and the Diyala, the Tigris and some point in the Sulaimania Mountains. It was manifestly in the latter region that Arrapcha, the capital of the Gutian kingdom, was situated, though it has not yet been identified with any modern site. Probably the name "Arrapachitis" attached itself to the northern district, which, after the conquest of the Lulubians, belonged to the territory of Gutium. This district was called in Old Armenian Albach, and is still designated by the Kurds as Albak. The city of Arrapcha is mentioned in the time of Hammurabi (2124–2081 B.C.). It was apparently taken by Assurnazirpal III (885–860), since it is one of the Assyrian cities rebelling against Shalmanezer III (860–825). Its importance may be judged from the fact that during the next century its governors often appear as *limmi*, or archons, for the year. After the fall of Nineveh, in 606, Arrapcha fell to the lot of the Chaldæan kingdom, and Nebuchadnezzar gave orders to the people of the city. As late as in the time of Cyrus the territory of Arrapachitis was also known as the land of the Gutians. It was from there that the Gutians, probably under the leadership of their mighty King Erridu-pizir, fell upon Babylonia and overthrew the second dynasty of Uruk in the thirty-fifth century, if we follow Nabunaid's chronology. (See BABYLONIA.) The Gutian kings wrote their inscriptions in a Semitic dialect, and it is not improbable that the Gutians, like the Lulubians and the Assyrians, were akin to the Akkadians. This seems to be suggested also by Gen. x. 22, where Arpachshad (q.v.) is represented as a son of Shem. The land of Arpaha is also mentioned as a separate country with Assyria by the Egyptians in the fifteenth century B.C. (Lepsius, *Denkmäler*, 89 g.). Consult: Delitzsch, *Wo lag das Paradies?* pp. 124 f. (Leipzig, 1881); W. Max Müller, *Asien und Europa*, p. 279 (1893); Scheil, in *Comptes rendus de l'Académie des Inscriptions*, pp. 318 ff. (1911).

ARRAS, à'räs' (from *Atrebates*, Lat. name of a Gallic tribe). Formerly a fortified town, now capital of the department of Pas-de-Calais, in France, about 35 miles north-northeast of Amiens (Map: France, N., H 2). It was at one time the capital of the county of Artois. It is situated on the banks of the Scarpe, partly on an eminence and partly on a plain, and consists of four divisions—the city, upper town, lower town, and citadel. It is a principal station on the French Northern Railway, distant from Paris by this route 134 miles and from Brussels 97 miles. The houses are of hewn stone, and in the lower town they are handsomely built and uniform; the streets are straight and wide, set off with several fine squares and many beautiful public buildings. Among the principal edifices are the cathedral of Notre Dame, built in a composite Italian style, between 1755 and 1833; the residence of the prefect, the town hall, the theatre, a girls' school in the Chapelle des Ursulines, and the public library. The fortifications of Arras were the first to be constructed by the celebrated Vauban, according to his own system. It has been the seat of a bishop since 390 A.D., and two ecclesiastical councils have been held here—one in 1025, the other in 1490. The grain market of Arras is the most important in the north of France. Its principal manufactures include beet sugar, agricultural implements, hosiery, petroleum products, and leather. It has considerable trade in grain and flour, and there is commerce in oil, wine, brandy, and the industrial products of the city. It appears from the writings of Jerome that Arras was remarkable for its woolen manufactures in his time; afterward, during the Middle Ages, it was famed for its tapestry; indeed, the name of the town was transferred to this article of manufacture, and *arras* was the name given in England to any richly figured hangings. Pop., 1901, 25,813; 1906, 24,921; 1911, 26,080. The ancient name of Arras was Nimetacum, and the town was the capital of the tribe of the Atrebates. With Artois it was ceded by the States of the Netherlands to Louis XI of France in 1482; but, the inhabitants having revolted, the King laid siege to the town, stormed it, and slew or expelled the people, whom he replaced by others brought from all parts of his dominions, ordering the city to be thenceforward called *Franchise*, to obliterate the very name of Arras. Soon afterward (1493) it was ceded to Maximilian of Austria, and was retained by the Spanish branch of the house of Hapsburg till 1640, when Louis XIII of France took it after a long siege. By the Treaty of the Pyrenees it was finally ceded to France. Arras suffered much in the time of the first French Revolution, especially in the year 1793. Robespierre and his brother were natives of the town.

ARRAS. A name for large tapestries used as wall hangings. They appear to have been first made in large numbers at Arras, at that time a city of Flanders, but now in France; hence their name, which in Italian is *arazzi*. The name was preserved even after Arras ceased to be the great centre of their manufacture, in the fifteenth century. Among the most famous

single series is that for which Raphael made designs.

ARRATE Y ACOSTA, ăr-rä'tâ ē â-kōs'tâ, José Martín Félix (1697–1766). A Cuban historian. He was born at Havana, studied law in Mexico and Havana, and was appointed alcalde of Havana in 1752. He wrote *La Habana Descripta* and a history of Cuba, under the title *Llave del Nuevo Mundo y antemural de las Indias Occidentales*, which was not published until 1830. A new edition appeared in 1876.

ARRAWAK, ăr'rà-wâk. See Arawak.

ARREBO, ăr're-bō', Anders Christensen (1587–1637). A Danish poet, born at Aroöskjöbing. He was appointed Bishop of Drontheim and was one of the promoters of the Renaissance poetry. He wrote some secular verse, but is best known for his *Hexaëmeron*, a description of the six days of the Creation, and a metrical translation of the Psalms of David. For his life, consult the biography by Rördam (Copenhagen, 1857).

ARREST' (Low Lat. *arrestare*, from Lat. *ad*, to + *restare*, to stop behind). The taking of a person into custody in order to compel his attendance before a court of justice or to enforce the discharge of a legal obligation. In primitive law the arrest and detention of a debtor either to enforce payment of his debt or to subject him to the mercy of his creditor as a satisfaction thereof is a common procedure, but it is seldom employed in civilized communities to-day except as an incident of criminal proceedings. 1. *Civil arrest.*—By a fiction of the common law of England a person who did not pay a judgment against him was deemed guilty of a breach of the peace, "subjecting his body to imprisonment," says Blackstone, "by the writ of *capias ad respondendum.*" The judges who established this fiction had no bowels of compassion for the insolvent debtor. Said Justice Hyde, in 1663: "If a man is taken in execution and lies in prison for debt, neither the plaintiff, at whose suit he is arrested, nor the sheriff who took him is bound to find him meat, drink, or clothes. He must live on his own, or on the charity of others, and if no man will relieve him, let him die in the name of God, says the law, and so say I." This inhuman policy worked badly; and a few years after Justice Hyde's declaration Parliament felt compelled to enter upon a course of mitigating legislation, which terminated during the last century in the abolition of imprisonment for debt, both in Britain and in this country. In some civil actions a party is still subject to arrest, either during its progress or upon its termination. As a rule these actions are of a quasi-criminal nature, e.g., to recover a fine or a penalty; or they are brought to redress wrongs to person or property. Ordinarily, a warrant of arrest in a civil suit will not justify the officer in breaking into a house to take the party; nor can it be lawfully executed on Sunday; nor are certain privileged persons, such as foreign representatives, members of Congress and Legislature in attendance upon their duties, and others liable to arrest in civil proceedings. 2. *Criminal arrest.*—Not only public officers, but private persons as well, may arrest an actual or suspected criminal. For a misdemeanor committed in his presence, or for a felony committed, although not in his presence, either a peace officer or a private person may arrest the offender without a warrant (q.v.), and a peace officer is authorized to arrest without a warrant, on reasonable suspicion that the arrested party has committed a felony. This subject is regulated by statute in each jurisdiction, as is the mode of obtaining a warrant. A criminal arrest may be made on any day; a peace officer may break into a building to execute a criminal warrant, as well as call upon any person to assist him; and, as a rule, only foreign representatives, with their families, are privileged from criminal arrest. The liberty of the individual against unlawful interference with his freedom, whether exercised under the forms of law or otherwise, by an officer of the peace or a private citizen, is guarded by the action for false imprisonment (q.v.). Consult: Hawley, *Law of Arrest on Criminal Charges* (2d ed., Chicago, 1891); Freeman, *A Treatise on the Law of Executions in Civil Cases* (3d ed., San Francisco, 1900); and the works mentioned under the articles referred to above.

ARREST, ăr-rĕst', Heinrich d'. See D'Arrest.

ARREST' OF JUDG'MENT. In the practice of the English common-law courts, an expedient on the part of an unsuccessful defendant, after verdict rendered against him, to have the judgment stayed or arrested, on the ground that there was some error which vitiated the proceedings. If the objection succeeded, it was fatal to the prosecution of the plaintiff's cause of action, there being no opportunity for amendment after trial. The severity of this rule has been somewhat modified by legislation, so that, under modern applications of the remedy, the action or prosecution may in a proper case be renewed. At the present day, in the United States as well as in England, a defendant may have the judgment against him arrested only for good and sufficient reason appearing on the record of the case, as where the pleadings are not a sufficient basis for the action, or if there be a fatal variance between the pleadings or indictment and the proof upon which the verdict was rendered. But the existence of facts not in the record, as the discovery of new evidence, or a verdict reached by the jury against the weight of evidence, will not justify an arrest of judgment. In the former case the court must proceed to judgment, notwithstanding the new facts alleged to exist, and in the latter case the court can only set aside the verdict and order a retrial of the case. This is a very different result from that which attends an arrest of judgment, the effect of which is to set aside all proceedings in the case and dismiss the complaint or indictment. This relief is usually obtained upon the defendant's motion, made after verdict and before judgment, but the court has the power to grant it even if it be not demanded. Judgment once rendered is conclusive and cannot be arrested. It may, however, under proper circumstances—as where taken by the excusable default of the defendant—be reopened by the court in which it was obtained, or its execution may, for good cause, be stayed on application to a higher court. See Judgment; Stay; and the works there referred to.

ARRETIUM, ăr-rē'shĭ-ŭm. An ancient Etruscan city, the modern Arezzo (q.v.).

AR'RHENAL. Soda methylarsenate. An arsenic derivative, intended to replace that drug, as a tonic and antiperiodic, especially in chronic malaria. Chemically it is disodic-methyl arsenate. See Arsenic; Cacodyl.

AR'RHENATHE'RUM (Gk. ἄρρην, *arrhēn*, male + ἀθήρ, *athēr*, the beard or spike of an ear

of corn). A genus of grasses embracing three species allied to Holcus (see SOFT GRASS) and Avena (see OAT GRASS). The species are tall perennial grasses, with flat leaf-blades and erect panicles, which are often one-sided. *Arrhenatherum elatior*, known also as *A. avenaceum*, *Avena elatior*, or *Holcus avenaceus*, is a common grass in Great Britain. It is sometimes called oat grass, from the resemblance to the coarser kinds of oats in the general appearance of the panicle. In France it is very much cultivated for fodder, and it is often called French rye grass. It has, however, no affinity to the true rye grass, *Lolium*. In the United States east of the Mississippi River this grass is grown to some extent as a hay grass. It does not form a good sward and consequently is not valuable for pastures except when mixed with other species. It is here known as tall meadow oat grass.

ARRHENIUS, ăr-rā′nĭ-us, SVANTE (1859—). A Swedish physical chemist. He was born near Upsala and studied physical science at the university of that city. After a brief period of teaching at his *alma mater* he spent several years abroad, carrying on original investigations in collaboration with some of the best European chemists and physicists of the day, and in 1891 was made professor in the University of Stockholm. Arrhenius' researches have resulted in one of the most important among the recent contributions to science. Confining his attention almost entirely to the relations between electrolytic phenomena and the chemical and physical properties of substances, he succeeded in establishing on a firm basis a general theory, which is now universally accepted by the scientific world, viz., the so-called theory of electrolytic dissociation. According to this theory, a substance whose aqueous solution is capable of conducting electricity is broken up in solution into parts charged, some with positive, others with negative electricity. Thus, ordinary brine contains, according to Arrhenius' theory, electro-positive "ions" of the metal sodium, and, separated from them, electro-negative ions of chlorine. The theory reminds one of the old dualistic view of the nature of chemical composition, advanced by Davy and Berzelius in the first part of the nineteenth century; and, in the opinion of many authorities, may lead to a revival of those views in some modified form. What is certain is that the theory of electrolytic dissociation furnishes an excellent explanation of a host of chemical phenomena which would otherwise remain entirely unintelligible, and that it correlates a number of different facts, between which no connection could otherwise be detected. Arrhenius' publications include *Sur la conductibilité galvanique des électrolytes* (1884), a work (in German) on electro-chemistry (1902), the *Lehrbuch der Kosmischen Physik* (1903), and a number of original monographs. In 1907 he published a series of lectures delivered at the University of California under the title of *Immuno-Chemistry: Applications of Methods of Physical Chemistry to the Theory of Toxins and Antitoxins*. In his *Worlds in the Making* (1908), he combats the theory that the universe is tending to destruction by loss of heat and motion. In 1903 he received a Nobel prize for achievements in the field of chemistry. For a fuller description of Arrhenius' theory and its value to the scientific world, see DISSOCIATION.

AR′RHIDÆ′US (Gk. *Ἀρριδαῖος, Arrhidaios*). An illegitimate son of Philip of Macedon by Philinna, a dancing girl of Larissa. He was at Babylon when Alexander died, in 323 B.C., and, though almost an imbecile, was elected King of Macedonia, under the name of Philip, with the understanding that, if a son were born to Roxana, the widow of Alexander, he should be associated with Arrhidæus in the government. The next year Arrhidæus married Adea, called Eurydice, the granddaughter of Perdiccas II. Two years later he and his wife were captured by Polysperchon, the leader of the cause of Alexander's son, born of Roxana, and both were put to death by the order of Olympias, the grandmother of the young King.

AR′RIA. The wife of the Roman Cæcina Pætus, who, for treason to the Emperor Claudius, was ordered to end his own life by suicide (in 42 A.D.). When Pætus hesitated, she seized the dagger, drove it to the hilt into her own breast, and then handed it to him, saying calmly, "Pætus, it does not pain me!" (*Non dolet, Pæte!*) She fell dead, and the husband at once dispatched himself with the same weapon. (See Pliny the Younger, *Epistles*, iii, 16; Martial, i, 13.) Arria was mother of the Arria who was married to P. Clodius Thrasea Pætus.

ARRIAGA, ăr′rē-ä′gȧ, MANOEL DE (1842–1917). First President of the Republic of Portugal. He was born at Horta, in the Azores, and was educated at the University of Coimbra. He studied law and became one of the most distinguished practitioners in Lisbon. During the reign of Louis I (1861–89) he was for many years a deputy from the Republican party to the Chamber of Representatives. In that body he became known as a fluent speaker who was strongly identified with Republican ideals and movements and a bitter enemy of monarchic institutions. In order to hush his vehement assaults upon the monarchy, King Louis offered him the position of tutor to his sons, but this he refused. He took an active part in the establishment of the republic in 1911, and on August 24 of that year was elected its first President under the new constitution. He was the candidate of a coalition of the Conservative Republicans, who were opposed by the radicals under the leadership of Dr. Alfonso Costa, the Provisional Minister of Justice. In May, 1915, Dr. Arriaga was succeeded as President by Theophilo Braga (q.v.). (See PORTUGAL, *History*.) Well known as a writer and scholar, Arriaga was given the degree of Doctor of Laws by the University of Coïmbra.

ARRIAGA, ăr′rē-ä′gȧ, PABLO JOSÉ D′ (1562–1622). A Spanish Jesuit and author. He was born at Vergara, was rector of the Jesuit college at Arequipa, and subsequently the first rector of that at Lima. He perished in a shipwreck in 1622. Among the many historical works that he left, the most important are *Directorio espiritual, Extirpacion de la idolatría de los indios del Perú*, and *Ejercicios espirituales*.

AR′RIA′NUS (Gk. *Ἀρριανός, Arrianos*) (?–c.180 A.D.). A distinguished historian and a native of Nicomedia, in Bithynia. He was born near the end of the first century A.D. of good family, and upon obtaining the Roman citizenship assumed the name Flavius. After completing his education he left home and lived for some time, in the reign of Trajan, at Nicopolis, where he was a devoted pupil of the Stoic philosopher Epictetus. He won early in life the friendship of Hadrian and was from time to time honored with marks of the Emperor's

favor. While in the public service he traveled much and became acquainted with a number of lands and peoples. In 130 A.D. he was *consul suffectus* and soon after was made *legatus Augusti pro prætore* of the province of Cappadocia, an office which he held for several years, successfully defending the province against an invasion of the Alani. Under Antoninus Pius he obtained the consulship. In 147–148 A.D. he appears at Athens, where he had obtained the citizenship, as Archon Eponymos. He was also at some period of his life priest of Demeter (Ceres) in his native town. During the latter half of his life he seems to have kept himself apart from public service and to have devoted himself to letters.

As a writer Arrianus was a close imitator, both in subject and in style, of Xenophon. His relation to Epictetus was, in his own regard, that of Xenophon to Socrates, and he was known at Athens as the "younger Xenophon." He wrote on philosophical, historical, and military subjects. His philosophical writings all related to Epictetus. *The Discourses of Epictetus* (Διατριβαὶ Ἐπικτήτου), in eight books, the first four of which have been preserved, comprised notes taken by Arrianus of his master's lectures and put in form for publication. So far as possible, the original words of the master were preserved. *A Manual of Ethics* (Ἐγχειρίδιον Ἐπικτήτου), together with the commentary of Simplicius on the same, has also come down to us. *The Conversations of Epictetus* (Ὁμιλίαι Ἐπικτήτου), in 12 books, is mentioned, though this work was possibly another form of the *Discourses*. The most important historical work of Arrianus is *The Anabasis of Alexander the Great*, in seven books, which, both in the number of its books and in its style, is a reminiscence of Xenophon. The *Anabasis* not only contains the campaigns of Alexander in Asia, but is a complete narrative of the life of the King from the beginning of his reign to the time of his death. It is an impartial and accurate narrative, based on the most trustworthy authorities and written in a plain and unadorned style. The two chief authorities used were Ptolemy, son of Lagus, and Aristobulus, both officers in Alexander's army. Besides these, the works of Eratosthenes, Megasthenes, Nearchus, and others, as well as the letters of Alexander, etc., were drawn upon. *The Indica* (Ἰνδική) is a geographical work, containing a description of India, together with an account of the voyage of Nearchus from the Indus to the Euphrates, and is written in the Ionic dialect. The sources were principally Nearchus, Eratosthenes, and Megasthenes. It was appended to the *Anabasis*, of which it may be regarded as a continuation. *The Events after Alexander*, in 10 books; *The Bithyniaca*, in eight books (containing a history of Bithynia from mythical times to the abdication of the last King, Nicomedes III, in 75 B.C., and *The Parthica*, in 17 books (containing an account of the Parthian War under Trajan), have been lost. Of *The Alanica*, a history of the Alani, only a small extract, called Ἔκταξις κατ' Ἀλανῶν, is preserved. *The Periplus of the Euxine Sea* is a description of a voyage around the Euxine Sea, undertaken by Arrianus in his official capacity as Governor of Cappadocia. It was a report made to the Emperor Hadrian, and dates from 130–131 A.D. A second *Periplus of the Euxine Sea* and a *Periplus of the Red Sea*, to which the name of Arrianus is attached, are later compositions. A work on tactics, preserved, was based on a work of the same name by Ælian, which, again, was taken in its main features from Asclepiodotus's work. The *Cynegeticus* is a short treatise on hunting, written as a supplement to Xenophon's work on the same subject. Other works, not preserved, were biographies of Timoleon of Corinth and Dion of Syracuse, and a *Life of Tilliborus*, a famous robber of Asia Minor. Editions of the *Anabasis* are by Krüger (Berlin, 1848), Sintenis (Berlin, 1867), and Abicht (Leipzig, 1876). There is a translation by Chinnock (New York, 1893). The philosophical works are to be found in Schweighaüser's *Epicteteæ Philosophiæ Monumenta* (3 vols., Leipzig, 1799). They have been translated by Elizabeth Carter (London, 1758) and by Thomas Wentworth Higginson (Boston, 1891). The best critical edition of Arrianus is that of Dübner and Müller (Paris, 1846).

ARRIAZA Y SUPERVIELA, är'rē-ä'thä ē sōō'pĕr-vyā'lä, JUAN BAUTISTA (1770–1837). A Spanish patriotic poet, born in Madrid. After serving for several years in the navy, he abandoned it for a diplomatic career and became Secretary of the Legation, first in London and afterward in Paris. Later he was transferred to an important post in the Department of State. He returned to Spain in 1807 and did important service for his country during the French occupation by kindling the national spirit with his stirring *Poesías patrióticas*, issued in 1810. Subsequently, having declared himself an unconditional supporter of absolute monarchy, he received an important appointment in Ferdinand VII's cabinet, in the Department of Foreign Affairs. His earliest poems, *Las primicias*, appeared in 1793; *Emilia*, a didactic poem on the influence of the fine arts, in 1803. Though a master of form, Arriaza lacked real depth of feeling, and his poems owed their temporary vogue to their adaptability as popular songs, his ode entitled *Profecía del Pireneo* rivaling even the *Marseillaise* in power and grandeur. A complete collection of his verse is to be found in the *Biblioteca de autores españoles*, vol. lxvii, and a selection in Wolf's *Floresta de rimas modernas castellanas* (Paris, 1837).

ARRIERE (ä'ryâr') **BAN.** See BAN.

AR'RINGTON, LILLIE. See BURROUGHS, MARIE.

ARRIOLA, är'rē-ō'lä, PEPITO (1896—). A pianist, and one of the most remarkable cases of precocious genius. He was born in La Coruña, Spain, Dec. 14, 1896. When only four years of age, the boy showed such unmistakable musical talent that he received regular instruction. His parents removed to Berlin, where he was placed under Alberto Jonás. In 1901, when only five years old, he began a tour of Germany, and in the following year he also visited England. Everywhere his astounding performance called forth unqualified praise. He came to America in 1909, where he was generally spoken of as "the second Mozart." From 1902 to 1904 he studied with Nikisch in Leipzig.

ARRIVABENE, är-rē'vä-bĕn'ā, GIOVANNI, COUNT (1787–1881). An Italian political economist, born in Mantua. He was arrested in 1820 as a revolutionary agitator, and was imprisoned for several months, but finally made his escape and took refuge in England. His political views had given the Austrian government such deep offense, however, that in 1824 he was sentenced to death *in contumaciam*, and his property was

appropriated by the State. While he was in London he devoted himself mainly to the study of political economy and published the work which first drew international attention to him, *Di varie società e istituzioni di beneficenza in Londra* (1828–32). He lived in Belgium from 1827 to 1859 and was one of the organizers and President of the Congress of Political Economy, held in Brussels in 1847. He was active in the founding of the Belgium Economic Society and subsequently became its President. In 1860 he returned to Italy, was appointed Senator, and became President of the Economic Society of Florence. He did much to improve economic conditions in Italy. Autobiographical are his *Intorno ad un' epoca della mia vita, 1820–22;* (1860; Ger. trans., 1861), and *Memorie della mia vita, 1795–1859* (2 vols., 1879). Arrivabene prepared also a translation in Italian of John Stuart Mill's *Principles of Political Economy* and of the more important writings of N. W. Senior. Under the title *Scritti morali ed economici*, his writings were collected in 1870.

ARRO'BA (Sp. and Portug. from Ar. *arrub*, a quarter, from *al*, the + *rub*, fourth part). A weight commonly used in Spain, Portugal, Brazil, and in the principal Spanish and Portuguese colonies, which varies with the locality. In Spain it is equivalent to the English quarter of a hundredweight, or 28 pounds. It is nearly the same in Portugal. In Spain, the arroba is also a measure of capacity, used for wine, brandy, etc., and contains four of our quarts.

ARROM, är-rōm', Cecilia de. See Caballero, Fernan.

ARRONDISSEMENT. See France, *Gov't.*

ARROW. See Archery.

ARROW, The. A small northern constellation, between Aquila and the bill of the Swan.

AR'ROWHEAD'. An aquatic plant of the genus *Sagittaria*, to which the name is sometimes applied. See Aquatic Plants.

AR'ROW-HEAD'ED CHAR'ACTERS. See Cuneiform Inscriptions.

AR'ROWPOINT', Catherine. A character in George Eliot's *Daniel Deronda*, a clever and very sensible young woman.

AR'ROWROOT'. A variety of starch extracted from the roots of certain plants growing in tropical countries. It is a fine, starchy farina, valued as a delicacy for use in preparing puddings, desserts, etc., and as a food for children and invalids easy to assimilate without digestive disturbance. It is obtained from the tuberous roots, or, more correctly, the rootstocks (rhizomes), of different species of the genus *Maranta*, belonging to the family Marantaceæ, and is characterized by solitary ovules, a fleshy style curved downward, branching stems, and white flowers. The species chiefly yielding it is *Maranta arundinacea*, a native of tropical America, cultivated in the West Indies and Florida, and growing about 2 feet high, with ovato-lanceolate, somewhat hairy leaves, clusters of small flowers on two-flowered stalks, and globular fruit about the size of currants. The roots (or rhizomes) contain a large proportion of starch. They are often more than a foot long, of the thickness of a finger, jointed, and almost white, covered with rather large paper-like scales. They are dug when a year old, washed, and carefully peeled. By rasping or otherwise the roots are reduced to a pulp and the starch removed by washing with water. Great care should be taken to prevent the starch souring and to insure cleanliness. The careful peeling of the roots is of great importance, as the skin contains a resinous matter, which imparts a disagreeable flavor to arrowroot, if allowed to mix with it. The West Indian arrowroot most esteemed in the market is grown in Bermuda; the next, and almost equal to it, in Jamaica. The East Indian arrowroot is not, in general, so highly valued, perhaps because substitutes for the genuine arrowroot more frequently receive that name. The *Maranta arundinacea* is now, however, cultivated both in the East Indies and in Africa. *Maranta indica*, which was supposed to be distinct from *Maranta arundinacea*, is now regarded as a mere variety of it, with perfectly smooth leaves. It is cultivated both in the East Indies and in Jamaica. Arrowroot is obtained also from *Calathea allouia* and *Clinogyne dichotoma*, plants closely related to *Maranta*.

The amount of starch present in the roots of the *Maranta* varies according to age, and runs from 8 per cent, in those of the young plant, to 26 per cent when full grown, at the age of 10 to 12 months. In Bermuda it is estimated that four barrels of peeled and cleaned rhizomes will yield in a good season 100 pounds of good arrowroot.

The prepared starch contains some 16 per cent water, 82 per cent nitrogen-free extract (mostly starch), 0.8 per cent protein, and very small amounts of fat and ash.

Arrowroot is a light, opaque, white powder, which, when rubbed between the fingers, produces a slight crackling noise. Through the microscope the particles are seen to be convex, elliptical or triangular. The dry starch is inodorous, but when dissolved in boiling water has a characteristic smell and swells up into a perfect jelly. Arrowroot is sometimes adulterated with rice starch, potato starch, sago starch, and with the common starch of wheat flour.

Large quantities of arrowroot are annually imported into the United States and Europe. As an article of diet, it is often prepared for invalids and children by merely dissolving it in boiling water and flavoring with sugar, lemon-juice, wine, etc. It is also often prepared with milk, made into puddings, etc. In the United States corn (maize) starch is very commonly used in general cookery for making puddings, etc., and arrowroot seems less common than was once the case.

A starch somewhat similar to arrowroot and partly known by the distinct name of *tous-les-mois*, is obtained from some species of the allied genus *Canna*. East Indian arrowroot is in part obtained from the tubers of *Curcuma augustifolia*. Other species of *Curcuma* (see Turmeric), as *Curcuma zedoaria*, *Curcuma leucorrhiza*, and *Curcuma rubescens*, also yield a similar starch; the same tubers which, when young, yield a beautiful and pure starch, yielding turmeric when old. In Travancore this starch is the principal part of the food of the inhabitants. The young tubers of the galangal, *Altinia galanga*, another plant of the same family (Scitamineæ), are another source of this starch. A starch somewhat resembling arrowroot, and often sold under that name, is obtained from different species of the family Cycadaceæ, as from the dwarf, fleshy trunks of *Zamia tenuis*, *Zamia furfuracea*, and *Zamia pumila* in the West Indies, and from the large seeds of *Dion edule*, in the lowlands of Mexico. The Chinese prepare a similar starch from the

tubers of species of *Sagittaria*. The starch of the cassava, manihot, or manioc (see CASSAVA) is sometimes marketed under the name of Brazilian arrowroot. In England the name "Farina" or "English arrowroot" is applied to starch prepared from maize or from potatoes. Starch obtained from the roots of the *Arum maculatum* (see ARUM) is known as Portland arrowroot. Otaheite arrowroot is the starch of *Tacca pinnatifida*. All these as well as cornstarch are so nearly allied to true arrowroot as not to be certainly distinguishable by chemical tests; but the forms of the granules differ, so that they can be distinguished by the microscope. When of good quality and known purity, these starches are all wholesome, useful food-stuffs of practically the same nutritive value.

The name arrowroot is commonly said to have had its origin from the use of the fresh roots by the South American Indians as an application to wounds to counteract the effects of poisoned arrows; and the expressed juice has been recommended as an antidote to poisons and a cure for the stings and bites of venomous insects and reptiles. But it is not improbable that the name is really another form of *ara*, an Indian word.

AR'ROWSMITH, AARON (1750–1823). An English cartographer, born at Winston, in Durham. He went to London at the age of 20. His publications include numerous topographic and hydrographic maps and charts, executed with the greatest care. His map of Scotland appeared in 1807, his *General Atlas* in 1817. His work on the *Geometrical Projection of Maps* was published posthumously (London, 1825). His son Aaron and his nephew John also published a number of cartographic works, and John (1790–1873) was one of the founders of the Royal Geographical Society.

ARROW WOOD. See VIBURNUM and Plate of TANSY, ETC.

ARRO'YO, är-rō'yō. A town in the department of Guayama, Porto Rico. It has a good harbor on the south coast of the island and is about 40 miles south by east of San Juan (Map: Porto Rico, E 4). The town is prettily situated, and, although somewhat isolated, has highway connection with important points. It is in a fertile region which produces much sugar, which, with rum and molasses, is widely exported. Some iron is mined in the district. The three caves of Aguas Buenas are here and are the principal noteworthy feature. A hurricane in 1899 wrought great havoc. Pop., 1899, 2137; 1910, 3220.

ARROYO MOLINOS, är-rō'yō mō-lē'nōs (Sp. Mill Creek). A village in Estremadura, Spain. It is noted as the scene of the complete defeat of General Girard, one of Marshal Soult's lieutenants, by Lord Hill, Oct. 28, 1811. General Girard had been sent out by Soult on a plundering foray with 5000 men, when he was surprised early in the morning by Hill, who had camped a league off at Alcuescar. The French colors, artillery, and 1300 prisoners were captured.

ARRU, arōō', **ISLANDS.** See ARU ISLANDS.

ARSACES, är'sā-sēz. See ARSACIDÆ.

ARSACIDÆ, är-sās'ī-dē, or **AR'SACIDS.** The name of the royal dynasty which ruled over the Parthian monarchy from its foundation in the middle of the third century B.C. until its destruction by the Persian Sassanidæ in 226 A.D. A branch of the dynasty was established on the throne of Armenia about 150 B.C., and outlived the Parthian Arsacidæ. The accounts concerning the Arsacidæ which have been transmitted to us by the ancient historians are exceedingly vague, confused, and contradictory, and modern criticism has found itself unable to reconcile or simplify the conflicting statements. The most important members of the dynasty of the Parthian Arsacidæ were Arsaces I and Arsaces VI.— ARSACES (Gk. *'Αρσάκης, Arsakēs*) I delivered Parthia from the dominion of the Seleucidæ, kings of Syria. He is said by some to have been a Scythian by blood. An atrocious insult offered to his brother Tiridates by Pherecles or Agathocles, the Macedonian satrap of the country, is said to have fired his spirit and driven him to rebel. The Macedonians were expelled in 256 B.C. Antiochus Theos, King of Syria, was at war with Egypt, and was unable to recover this portion of his dominions. Seleucus, the son of Antiochus, made two unsuccessful expeditions against Arsaces, in the last of which he was taken prisoner. Arsaces I now acquired regal power, built a city called Dara, on the mountain Zapaortenon, developed the internal resources of his new kingdom, and endeavored to organize it; and, after the conquest of several countries, died at a great age. Such, at least, is the account given by Posidonius and other writers. Arrian, however, states that Arsaces died after a reign of two years, and that his brother Tiridates succeeded him, under the name of Arsaces II, and ruled for 37 years. From this we should infer that many of the acts attributed to the founder of the Parthian kingdom were the work of his successor.— ARSACES VI, or MITHRIDATES I, flourished about the middle of the second century B.C. He enlarged the territories of the Parthians by the conquest of Bactria and is even supposed to have penetrated into India and subdued the nations between the Hydaspes and Indus. In the year 138 B.C. he defeated and took prisoner Demetrius Nicator, King of Syria, whom, however, he treated generously, bestowing on him his daughter in marriage. He was a just and merciful prince.

ARS AM'ATO'RIA, ARS AMAN'DI, or **ARS AMO'RIS.** A famous work of Ovid, giving humorously a set of rules for the conduct of love affairs, how to gain and how to retain affection. Of the three books, two are addressed to men; the third, to women. The work has been characterized as "one of the supreme parodies in all literature." Consult a paper by E. K. Rand, entitled "Ovid and Metamorphosis," in *Harvard Essays on Classical Subjects* (Boston, 1912).

AR'SENAL (Fr., Sp., Portug. arsenal, dockyard; It. *arsenale, arzana, arzanale*, arsenal, dockyard; cf. It. *darsena*, Sp. *dársena*, Portug. *taracena*, dock, and Sp. *atarazana (l)*, dock, all from Ar. *dār aççinā'ah*, workshop, factory, from *dār*, house + *al*, the + *çinā'ah*, art, mechanical industry). An establishment for the manufacture, repair, and storage of arms, ships, or munitions of war. In the United States the term is commonly applied to an establishment designed for the manufacture and storage of arms and munitions of war for the land forces; there are several naval arsenals, but these are merely storehouses for ammunition. In England the term has nearly the same signification. On the continent of Europe the original meaning of the term is preserved, and, while there are many arsenals designed solely for the supply of the

land forces, the great naval arsenals of Brest, Cherbourg, Toulon, Naples, Spezia, Venice, etc., are establishments in which ships are built, repaired, and fitted out, and in which equipments and naval stores are manufactured. The manufacture of guns is now generally carried on in gun factories and small-arms factories. (See ORDNANCE ESTABLISHMENTS.) Some of the non-explosive parts of ammunition are manufactured at the general arsenals, but the work of preparing explosives and of filling cartridges and explosive shells is commonly done at special arsenals or establishments at safe distances from centres of industry and population; and large quantities of ammunition are no longer stored in arsenals chiefly devoted to general military or naval industries. In the United States and in England the term *navy yard* (q.v.) corresponds almost exactly to that of *naval arsenal* on the Continent, the same class of work being carried on in each. A very large proportion of the munitions of war are now made in private works; and this, together with the desirability of specializing manufactures, has led to a reduction of the scope of work carried on in arsenals.

The first regular manufacture of war materials in the United States was in 1776, when gunpowder was made for the Continental forces; and in 1777 Springfield, Mass., was chosen by General Washington as a suitable place for an arsenal. The manufacture of small arms commenced there in 1787 and has since continued. Harper's Ferry Arsenal dates from 1795, from which time other arsenals were gradually built, until the list of arsenals, armories, and ordnance depots under the control of the United States War Department in 1913 comprised the following establishments: Allegheny Arsenal, Pittsburgh, Pa.; Augusta Arsenal, Augusta, Ga.; Benicia Arsenal, Benicia, Cal.; Columbia Arsenal, Columbia, Tenn.; Fort Monroe Arsenal, Fort Monroe, Va.; Frankford Arsenal, Philadelphia, Pa.; Indianapolis Arsenal, Indianapolis, Ind.; Kennebec Arsenal, Augusta, Me.; New York Arsenal, Governor's Island, New York City; Rock Island Arsenal, Rock Island, Ill.; St. Louis Powder Depot, Jefferson Barracks, Mo.; Sandy Hook Proving Ground, Sandy Hook, N. J.; San Antonio Arsenal, San Antonio, Tex.; Springfield Armory, Springfield, Mass.; United States Powder Depot, Dover, N. J.; Watertown Arsenal, Watertown, Mass.; Watervliet Arsenal, Watervliet, N. Y.

The naval gun factory is located in the Washington Navy Yard and forms the principal part of this yard's activities. The naval proving ground and powder factory is at Indian Head, Md. In naval magazines powder and explosives are stored, and ammunition is received, overhauled, loaded, and prepared for issue to ships. The naval magazines are located at Iona Island, N. Y., Dover, N. J., Fort Lafayette, N. Y., Hingham, Mass., Mare Island, Cal., St. Julien's Creek, Va., Fort Mifflin, Pa., Ostrich Bay, Puget Sound, Wash., Bellevue, Md., and Olongapo, P. I.

AR'SENIC (Gk. ἀρσενικόν, *arsenikon*, yellow orpiment from ἄρσην, *arsēn*, male, masculine; alluding to its strong properties). A widely distributed element that was known to the ancients, being distinctly referred to as early as 1694 by Schröder. It is often found in the form of mammillated or kidney-shaped masses, but occurs also in well-crystallized form. It is found chiefly associated with other metallic minerals in the older rocks or in schists. The principal European localities are: Andreasberg, in the Harz Mountains; Joachimsthal, in Bohemia, and Freiberg, in Saxony. It is also abundant in Chile, Mexico, and New Zealand. In the United States it is found in Haverhill and Jackson, N. H.; Greenwood, Me., and Leadville, Colo. In combination with sulphur, arsenic occurs as realgar and as orpiment, and with sulphur and iron as löllingite and as arsenopyrite or mispickel, called also arsenical pyrites. It is a common constituent of other minerals, but in small quantities only. The arsenopyrite is the usual commercial ore from which arsenic is obtained, and the process for its reduction is by heating the ore in earthenware retorts or tubes laid horizontally in a long furnace. As arsenic is quite volatile on heating, it condenses in the iron tube as a coherent crystalline mass, which may be still further purified by a second sublimation.

Arsenic (symbol As, at. wgt. 75.0) is a steel-gray, brittle metal, with a specific gravity of 5.23 to 5.76; it is a good conductor of electricity and is odorless and tasteless. It volatilizes above 100° C., with a garlic-like odor, and is rapidly vaporized at a dull-red heat. It is used as a constituent of alloys, as white alloy, as speculum metal, in bronzing brass, and in the manufacture of opal glass; also for hardening lead in the manufacture of shot. Arsenic and its soluble compounds are exceedingly poisonous.

Arsenic forms two oxides—the arsenic trioxide and the arsenic pentoxide. The former yields with basic radicals the salts called arsenites. It is commonly called *white arsenic*, arsenious acid, or flowers of arsenic, and is obtained in various metallurgical processes by roasting arsenic ores, during which the vapors of the oxide are volatilized and subsequently condensed in receptacles called poison chambers, or poison towers. The crude oxide is purified by one or more sublimations, yielding ultimately a white crystalline powder that is odorless, but has a weak, metallic, sweetish taste. This is the principal commercial compound of arsenic, and is used for the preparation of other arsenical compounds, in the production of green pigments, in the manufacture of glass, and as a poison for rats and vermin; also in medicine, in various compounds such as *Fowler's solution*, which is an arsenite of potassium. Arsenious oxide is used in medicine in treating many skin diseases, in anæmia, in chorea, in some forms of malarial fever, in cancer and other malignant growths, in neuralgia, in asthma, and in certain gastric conditions. It is an alterative and is frequently used in connection with other tissue builders or tonics during convalescence. Since small quantities produce poisoning, arsenic should be used only when prescribed by a physician. As this metal is much used in the arts, chronic poisoning by it is not infrequent, resulting in kidney disease and even paralysis. Yet it is asserted that in Styria the peasants consume arsenic daily—the women to improve their complexions, the men to increase their power of endurance. They are said to be strong and long-lived (see *Edinburgh Medical and Surgical Journal*, 1871, vol. xvi, p. 569). Freshly precipitated hydrated oxide of iron, and the freshly precipitated hydrated oxide of iron with magnesia, are regarded as the best and most efficient antidotes for arsenious acid; but immediate removal of the poison by vomiting or purging is desirable.

For the detection of arsenic, three methods are commonly employed. Of these, the first consists in the treatment of the material submitted for examination with a strong alkali, either potassium or sodium hydroxide, and passing through the filtered liquid a current of hydrogen disulphide, which, on acidulation if arsenic be present, produces a precipitate of the yellow sulphide. The precipitate may be further tested by dissolving in ammonia and evaporating until the residuary substance is reduced to metallic arsenic. Another method is the Reinsch process, in which, the preparation containing arsenic having been brought into solution, newly burnished pieces of copper foil are introduced into the liquid, and if arsenic be present it will at once be precipitated on the copper as a dark gray metallic film (Cu_3As_2). It is said that by this method one part of arsenic can be detected in 250,000 parts of solution. A third, and perhaps the most useful, method is that invented by Marsh, which consists in treating the material with dilute sulphuric acid and metallic zinc in a gas-generating apparatus. The arsenic combines with the hydrogen liberated by the zinc, and forms arsine (AsH_3) which is then passed through a glass tube; on heating, the gas decomposes, depositing metallic arsenic in the form of a "mirror" near the open end of the tube. In carrying out this operation, especially in criminal cases, the utmost precautions are necessary to insure the perfect freedom of the apparatus and reagents used from arsenic or similar substances capable of producing an arsenic-like "mirror." The nature of the mirror may be demonstrated by dissolving it and testing the solution obtained by one of the usual methods. With copper oxide, arsenious oxide forms a copper arsenite which is a pigment known as *Scheele's green*. With basic copper acetate it yields *Schweinfurth green*—called also emerald green, imperial green, and mitis green.

When acted upon by oxidizing agents, arsenious oxide yields arsenic oxide, which combines with basic radicals to form arsenates. Arsenic oxide, or arsenic acid, is sometimes used as an oxidizing agent in the preparation of aniline red.

Arsenic combines with sulphur, yielding an orange-yellow disulphide, which is found native as the mineral realgar and is used as a pigment and as a depilatory. A trisulphide also exists, which is found native as the mineral orpiment, used in pyrotechny and as a pigment for artists; also formerly in dyeing, and with quicklime as a depilatory under the name of *rusma*. Consult Valeur, *Chimie et toxicologie de l'arsenic et de ses composés* (Paris, 1904).

ARSE'NIOUS AC'ID. See ARSENIC.

AR'SENOBEN'ZOL. "606."—Ehrlich's specific for syphilis. See SALVARSAN; also SYPHILIS.

AR'SENOPY'RITE (from *arsenic* + *pyrite*), or MISPICKEL. An iron sulpharsenide that crystallizes in the orthorhombic system, has a metallic lustre, and is silver-white in color. It is readily recognized by its odor of garlic when struck a glancing blow with a hammer. Under an oxidizing blow-pipe flame it gives a white coat on charcoal and the characteristic garlic-like odor of arsenic. In Canada it occurs with sulphide of iron containing gold, forming large ore bodies, but no process has been developed for the commercial extraction of this gold. As a vein mineral it occurs associated with various ores of gold, lead, silver, and tin, in igneous crystalline rocks, and is recovered as a by-product, arsenious oxide, in the smelting of these ores.

ARSINOË, ăr-sĭn'ō-ē (Gk. Ἀρσινόη). A Greek feminine name which was especially popular in the Macedonian dynasty of Egypt, the family of the Ptolemies. The wife of Lagus and the mother of Ptolemy I was named Arsinoë. Other noteworthy princesses who bore the name were: 1. ARSINOË, who was the daughter of Lysimachus, the King of Thrace, and first wife of Ptolemy II Philadelphus. Her son Ptolemy, as Euergetes, later became King of Egypt. 2. ARSINOË II, born about 316 B.C., the daughter of Ptolemy I and Berenice. She was married in her sixteenth year to the aged Lysimachus, King of Thrace. The eldest son of this King, Agathocles, had previously married Lysandra, Arsinoë's half-sister. Arsinoë's brother, Ptolemy II Philadelphus, afterward wedded Arsinoë I (see above), the daughter of Lysimachus. Arsinoë II, wishing to secure the throne for her children, prevailed on her husband to put Agathocles to death. Lysandra, however, fled with her own children to Seleucus of Syria, and induced him to declare war against her father-in-law, who lost his life and kingdom. Arsinoë II sought refuge in Macedonia, which was also seized by Seleucus. After a few months Ptolemy Ceraunus, the half-brother of Arsinoë II, assassinated Seleucus; and in order to gain possession of Arsinoë's sons, whom he feared as rivals to his ambition, he offered marriage to his half-sister. She consented to the union and opened the gates of the town in which she had taken refuge, whereupon her suitor caused her sons to be killed before her eyes. Arsinoë fled to Egypt (279 B.C.). Her own brother, Ptolemy Philadelphus, banished his wife, Arsinoë I, to Coptos, and married Arsinoë II, beginning thus the series of sister-marriages which were in accordance with the Egyptian custom and exactly opposed to the Greek tradition. Arsinoë II had no children by her brother and adopted the three children of Arsinoë I. Her husband showed great affection for her. He named the capital of the Fayum (the Arsinoite nome) after her, and had a splendid tomb and memorial temple erected to her by the architect Dinochares, who is said to have roofed it with loadstones, so that her iron statue seemed to float in the air. She seems to have assisted Ptolemy in the government. 3. ARSINOË III was sister and wife of Ptolemy IV Philopator, who caused her to be murdered soon after the birth to her of an heir. 4. ARSINOË IV was daughter of Ptolemy XI, Auletes (80–51 B.C.). She fled from Alexandria when Julius Cæsar was besieged in it (48 B.C.) and was received as queen by the Egyptian troops so long as her brother, Ptolemy XII Dionysus, remained in the hands of Cæsar. Captured by the Romans, she was led in triumph through Rome; afterward she was liberated, and returned to Egypt. Her famous sister, Cleopatra VII, persuaded the Triumvir Antony to have her murdered at Ephesus (41 B.C.), although she had taken refuge in the temple of Diana.

AR'SIS and THE'SIS. See BEAT.

AR'SON (OF. from Lat. *ardere*, to burn, participle, *arsus*). In the laws of all civilized countries, a crime of the deepest atrocity. At common law, it consisted in the burning of the house of another, willfully and of malice aforethought, and was a felony punishable by death. In the long and painful history of the criminal

law it is said to have been the first offense in which the question of the *mens rea*, or criminal intent, of the act was taken into account. In essence the common law of arson remains substantially unchanged in the United States as well as in England, notwithstanding some statutory modifications and the general mitigation of the penalty incurred by the commission of the crime. Unless it results, directly or indirectly, in the death of some person—in which case it comes under modern definitions of the crime of murder—it is no longer punishable by death, but by imprisonment for periods varying with the degree or atrocity of the offense, sometimes for life. There must be an actual lighting and burning, in order to constitute the crime, and it must be deliberate, and not accidental, or the mere result of carelessness. The premises need not, however, be consumed, an actual blaze, ignition, or charring being enough. Generally speaking, it is not arson to burn one's own house, even with the intent to defraud an insurer, or to destroy the personal property of another on the premises; though this act, when done with such an illegal intent, was also a crime—usually a misdemeanor—at common law, and is now, in some of the United States, defined as a lower degree of the crime of arson. In New York it is arson, under the penal code, to set fire to any building, even though it be that of the accused, in which there is at the time a human being. For the particular treatment of this crime in this country, the reader is referred to the codes and statutes of the several States. Its early and later history has been fully told in Pollock and Maitland, *History of English Law* (Boston, 1899), and in Stephen, *History of the Criminal Law of England* (London, 1883). Consult also: Shephen, *Digest of the Criminal Law* (5th ed., London, 1894); Russell, *Treatise on Crimes and Misdemeanors* (6th ed., London, 1896); and the authorities referred to under CRIMINAL LAW.

ARS POETICA (The Poetic Art). A discussion of dramatic poetry by Horace, called also Epistle to the Pisos. In it Horace develops the laws of dramatic composition, and adds suggestions and comments from his own experience. See HORACE.

ART (Lat. *ars*). Broadly speaking, the word "art" stands for any object produced by the mind and hand of man; that which is not immediately a product of nature; that which is artificial, which is opposed to the natural, in the creation of which human skill has intervened. The shaft of a tree is natural; shaped as a ship's mast, and perhaps further ornamented, it has entered a low grade of art, the material grade, and has become useful. In the present discussion the word "art" is used in the sense of fine art, as opposed to the useful and industrial arts, and its end, unlike those, is to give pleasure. The kind of pleasure must, however, be somewhat closely defined, for its range and quality are not without certain limitations. For perhaps greater clearness it may be well to contrast the province of "fine art" with examples of other pleasure-giving activities of the human mind and of the lesser industrial arts. The appliances of science, light-producing, heat-producing, sound-transporting agencies, the results of mechanical or industrial arts, contribute to the pleasure, comfort, and sociability of life; but they are the result of applied and scientific principles and of the exact sciences, and for their appreciation do not call for that particular quality of pleasurable mental effort which the contemplation and knowledge and enjoyment of pure beauty exact and afford. There are many pleasures of which our human economy is susceptible that may not be ranked among the pleasures of art (see ÆSTHETICS); for the word "art" under this head is confined more strictly to its expression in painting and sculpture.

Art is perhaps entitled to be deemed the highest factor in civilized life, because it is the most unselfish. Sight is the sense it appeals to chiefly, but it is only that through this sense it may reach the mind; so it is a mistake to think that sculpture and painting end with visual enjoyment merely. There are higher and less high emotions to which art appeals, and it is the perceptible exercise of rare judgment and of taste that stamps a so-called work of art "fine." There are pictures existing, and examples even of musical composition, betraying a mind of such puerile character that the fact that they have been produced in obedience to the technical exactions of these respective arts in no way warrants them in being called "fine." Fine art consists not merely in technical address; and yet there is a certain perfection of *virtuosity* so intelligent, displaying such a rectitude of taste and such a refined instinct for the fitness of things that it is pleasure-giving to the degree of becoming æsthetic. Through "the happy and dexterous way in which a thing slight in itself is handled" it may become an object of "fine art." Material subjects also may serve as acceptable themes for the fine arts, if treated with such fitness that they do not offend the æsthetic sense. Veronese apotheosized the subject of feasting, not in itself a lofty theme. His, or any painter's, success in problems of this kind is a sign of the artist. True artists perceive the limitations of their art and never overstep them; and, indeed, fine art has to-day become synonymous with the exercise of fine taste in many departments of mental effort and individual handicraft.

It is very evident that the production of a work of high art which requires great abstraction of mind could never have occurred in the early and savage period of the human race. That was a period of self-preservation and a fight for mere existence. As time went on and life became more complex, there was leisure for the mind to employ itself in other matters; and with the complete emancipation of the human intellect, such as exists to-day, there has come an imperative demand for expression in a language that is as potent as that of uttered speech—the beautiful and universal language of art. In painting, its vocabulary is form and color; but these, in fine art, must be so used as to express the ideas and emotions excited in the artist by things seen. Imitation merely will not do this, so the artist must make use of seen things to denote certain attitudes of mind and emotions of the soul. A work of art must not so far stray from truthful representation as to irritate the mind of the beholder by its offenses against structural truth, but, on the other hand, art is not achieved through strict imitation. Art is many-sided—the æsthetic sensibilities are touched in such a variety of ways that it is somewhat difficult to fix definitely the channels through which painting and sculpture may legitimately reach the human mind and still rest within the limitations that these mediums exact on the part of the producer. It is certain, however, that the beholder of a

painting or statue should receive the impression of a mind employing the materials of a particular craft with perfect control and judgment, of a mind dominated by such taste that the language —that is to say, the medium used—is made to voice ideas that are better expressed by such means than by any other. Hence the objection to so-called "literary" art, or "story-telling" art, in pigment and in clay. Subjects which are more effectively rendered through verbal form, and which, to be understood pictorially, require a page of explanatory notes, are not so pleasure-giving, in the graphic arts, as those which immediately strike the mind, through the eye, by their elevation of sentiment and the opportunity they afford the artist for noble lines and charming qualities of paint. Both these arts are, as has been said, *imitative;* but the true artist recognizes in the exercise of his craft to what point his imitation of nature may legitimately carry him. This knowledge may be revealed to him by the consideration of the class of emotions it is his intention to excite.

Bibliography. Some of the best books are: Harris, *Theory of the Arts* (London, 1869); Frothingham, in *American Journal of Archæology*, vol. ix (1894); Taine, *Lectures on Art* (Eng. trans., New York, 1899); Leighton, *Addresses to the Students of the Royal Academy* (London, 1896); Conway, *The Domain of Art* (ib., 1901); Lange, *Das Wesen der Kunst* (Berlin, 1901); Von Kunowski, *Schöpferische Kunst* (Leipzig, 1902); Walter Crane, *Ideals in Art* (London, 1905); Clausen, *Aims and Ideals in Art* (New York, 1906); Delville, *The New Mission of Art* (London, 1910); Rodin, *L'Art* (Paris, 1911; Eng. trans., New York, 1912). Ruskin's works abound in art criticism, sometimes inspiring, often misleading. The most important passages have been collected by Street, *Ruskin's Principles of Art Criticism* (Chicago, 1901). See also the *Bibliography* under ÆSTHETICS.

History. The monuments produced by the artistic faculty represent in the most concrete form the different stages and kinds of human activity on its more ideal side, and are intimately connected with the two other main spheres of *science* and *industry*, to whose products art is often called upon to lend beauty and interest. Within the sphere of art itself the *social* arts of religion, philosophy, and government supply not only the *literary* arts, but also the *formative* arts of architecture, sculpture, and painting, with their themes and their inspiration, without which works of art would have little importance in the development of civilization. The fine arts, in order to attain a high standard, must therefore embody some higher idea. A Greek temple, a Gothic cathedral, a Mohammedan mosque, a Benedictine monastery, a triumphal arch, an amphitheatre, a Roman villa, a feudal castle, represent religious and social forces, above and beyond fine art, which mold these monuments so that they are part of the larger life. The form, arrangement, decoration, and purpose of such buildings are no part of "art for art's sake." So it is with works of sculpture and painting—with a Phidian Zeus, a Byzantine Christ, a Cimabue Madonna borne in triumphant procession, an Immaculate Conception by Murillo. Greek mythology and Christian dogma are as much embodied in art as in literature; art has been regarded for as many millenniums a means of teaching as it has been for centuries a means of pleasing. From the fact, therefore, that works of art, though produced under their own special organic laws, are governed by the general laws of the civilization to which they belong, it results that these works, like everything else in civilization, are a mixture of good and evil, true and false, and that the customary æsthetic opinion that beauty alone is the aim of art is contradicted by both theory and practice. Such a standard could not be applied to the novel or the drama in literature, as it would eliminate a majority of masterpieces; neither can it be applied in art. Any work with distinct significance and character is artistic, whether its theme is moral or immoral, its form beautiful or ugly, and whether it is inspired by a sentiment of the grotesque, the deformed, and the fearsome, or of the sublime and the beautiful.

A study of the history of art will show that through the 4000 or more years during which such works were produced before the fifth century B.C., the æsthetic pleasure they gave was practically independent of the human figure and was dependent on effects of color and material forms. Exquisite appreciation of color among the peoples of western Asia and grandiose combinations of architectural lines and masses among the Egyptians were the keynotes of this long period, of this lower and material stage, when the human figure was used as a higher species of hieroglyph, as a means, not an end. The long, painted processions in an Egyptian tomb; the friezes in relief of an Assyrian palace, were a part of ceremonial or contemporary history. In Greece of the sixth and fifth centuries, art enters upon a higher mission; this mission becomes both more definite and more ideal, centring around the human figure. It is the plastic stage of ancient art. Even in architecture questions of outline, proportion, and rhythm predominate, in place of the earlier material ideas of colossal mass. Color became subsidiary and remained crude, never attaining among the Greeks the harmony and subtlety of Asiatic art. The human form was for the first time idealized in plastic form and made to express types and thoughts besides mere external facts. The next change was heralded in the Alexandrine Age and fully embodied in Roman civilization. Art became pictorial and psychological; Greek simplicity became complex. Portraits replaced types; the variegated porphyries, serpentines, and other strong-colored marbles succeeded the white Parian; in place of the cameo-like Attic reliefs on a single plane without background we have first the picturesque scenery of the Alexandrine relief and then the two and three planes of the imperial Roman sculptures. Even architecture was fundamentally modified. The Hellenic Greeks had placed their buildings singly and with an unerring eye for beauty on the appropriate natural site; but each one was for itself. Under Rome, architectural composition is developed, and the grouping of coördinate structures, the planning of stupendous interiors, becomes a large part of the art, accompanied by wonderful richness of color in decoration. There is plastic loss and picturesque gain. In harmony with the new love of luxury, art is made to minister to private as well as to public life. Its bounds were thus immeasurably enlarged while its ideals were lowered. Philosophically speaking, the fit closing of an artistic era was now reached; all the changes had been rung.

When the Christian revolution set in, art was regenerated, as a consequence of the religious

and social regeneration. The second era began, of course, by a reconstruction in the higher spheres of religious and philosophic thought and the state; until their currents could reach and revivify the fine arts, until new artistic forms could be created to express suitably these new ideas, the result was necessarily inadequate, as it had been for example, in the centuries of Greek art before Phidias. As a natural reaction from the previous worship of beauty of form, Christian art went at first to the other extreme of caring merely for the content. The decay of skill went with a carelessness as to its acquisition. Like the Egyptians and Assyrians, the artists of the early Christian and Byzantine periods used figures largely as hieroglyphs, for purposes of instruction, but the things taught were fundamentally different; they were the things of the spirit. A true history of Christian sculpture and painting up to the Renaissance should deal but little with the technique and mainly with the theme, not with the æsthetic pleasure, but with the internal significance. Imperfection of form was regarded as immaterial. This point of view once secured, it becomes clear how we should study the frescoes of the Catacombs to reach the heart of Christianity before the stage of theological definitions; how the dogmas and beliefs of the Eastern church are set forth in illuminated Bibles and in the mosaics and frescoes of Byzantine churches, from St. Mark at Venice, and from Monreale to Mount Athos; how the encyclopædic learning and dominant thoughts of the Middle Ages can be grasped in the sculptures and glass windows of such French Gothic cathedrals as Chartres, Rheims, and Amiens. The intellectual quality of this art is shown in the supremacy of geometric law and constructive thought in an architecture which is the embodiment of the triumph of mind over matter—the antipodes of Egyptian architecture. During this pre-Renaissance period there was the greatest variety of stages; in the West the only time when the external expression was adequate to the ideas involved was the period of the Gothic cathedrals, which in many ways was the exact counterpart of the Hellenic development of the fifth and fourth centuries B.C. (Phidias to Lysippus), in the same way as the earlier Christian period had corresponded to the Oriental stage and the later Renaissance period was to mirror the Roman stage of ancient art. It is interesting to follow out this analogy; to see how portraiture, psychologic study, picturesqueness, and the supremacy of painting are characteristics of the Renaissance as of Roman art, but on another plane, in which the keynote was furnished, not by architecture, as with the Romans, but by sculpture.

The Renaissance is the last and pictorial stage of the second era in art history. Michelangelo was its supreme embodiment, the Sistine ceiling its clearest expression. Renaissance architecture was plastic, not constructive—a decorative system. The simple composition, the clear outlines of the painting of the fifteenth and sixteenth centuries have also a plastic underlying basis. At this moment we have hardly enough perspective to see clearly just where the Renaissance merges into modern art, but one thing is certain, modern art carries the standard of painting in the van. It has not yet created its own types of architecture or decorations; in these spheres it lives mainly on models of the past. We may, however, speak of a distinctly modern sculpture, and present-day painting is truly original.

Plan of Art Articles in the New International Encyclopædia. The details illustrating the historic development of the fine arts are given in both general and special articles. The present article, and those on ÆSTHETICS, PRIMITIVE ART, and ARCHÆOLOGY, are designed as a general introduction. There follow three general historic sketches on ARCHITECTURE, SCULPTURE, and PAINTING and two of lesser length on ENGRAVING and DECORATIVE ART. They are all designed as distributive articles for the more detailed sub-headings and special articles, and are supplemented by two classes of general articles; those on great historic styles broader than nationalities, and those on national styles. To the former belong Byzantine, Mohammedan, Romanesque, Renaissance, and Baroque art, which spread over several countries. Within such styles there are, of course, the national subdivisions; but these are subordinate to certain general laws or characteristics of the style. Thus French Gothic and Renaissance are very distinct from Italian and German; Armenian and Coptic Byzantine from Hellenic; Persian and Spanish Mohammedan from Egyptian. The second class, of national arts, is especially important in ancient times before the Greeks had drawn the East and West so close together. So, Egyptian art and Assyro-Babylonian art possess distinctly national styles. Minor nationalities like the Hittites and Phœnicians are, it is true, strongly influenced in their art by elements borrowed from these two great civilizations; but not sufficiently so as to cast national traits into the shade.

The next group of articles gives classes of general subheads: (1) of *style*—as, for instance, of Doric, Ionic, and Corinthian under ORDERS OF ARCHITECTURE; of early English Decorated and Perpendicular under DECORATED STYLE; PERPENDICULAR; (2) of *branches of art* from the point of view of material; for instance, CARPENTRY and MASONRY, as branches of architecture; BRONZE, CHRYSELEPHANTINE, TERRA-COTTA, IVORY, WOOD CARVING, and GOLDSMITH'S WORK, as branches of sculpture; FRESCO, TEMPERA, OIL PAINTING, WATER COLOR, PASTEL, ILLUMINATED MANUSCRIPTS, as branches of painting; LINE ENGRAVING, ETCHING, WOOD ENGRAVING, DRY POINT, AQUATINT, MEZZOTINT, as branches of engraving; MOSAIC, STAINED GLASS, POTTERY, VASES, ENAMEL, INLAY, JEWELRY, etc., as forms of decorative art; (3) of *classes of monuments* from the point of view of their use. Under ARCHITECTURE, the general headings of *religious*, *civil*, and *military*, where these themes are treated historically, are each subdivided: religious architecture into such heads as TEMPLE, CHURCH, CATHEDRAL, MONASTERY, BAPTISTERY; civil and domestic architecture into such as MUNICIPAL ARCHITECTURE, FORUM, PALACE, FOUNTAIN, VILLA, MAUSOLEUM, THEATRE, AMPHITHEATRE, CIRCUS, BATH, TOWN HALL, ARCH TRIUMPHAL, AQUEDUCT, BRIDGE; military architecture into such as ACROPOLIS, CITADEL, CAMP, CASTLE. Certain subtitles are somewhat more special than these; such as the names of structures confined to a certain style, like OBELISK, MASTABA, and PYRAMID in Egyptian art, or those confined to a religious sect and style, like ALCAZAR, CARAVANSERAI, KHAN, MINARET, and MOSQUE in Mohammedan art, or CATACOMBS, BASILICA in Early Christian art; such also are subordinate buildings or parts of buildings, like CLOISTER, CHAPTER-HOUSE, and DORMITORY, which

are parts of a monastery, or KEEP, BAILEY, TOWER, BASTION, and BARBICAN, which are parts of a castle; APSE, CHOIR, NAVE, TRANSEPT, CRYPT, CLEARSTORY, which are parts of a church. Similar classes of works obtain also under sculpture and painting. For example, in sculpture come PULPIT or AMBO, TOMB, RELIQUARY, CHALICE, CROSS, HERM, etc.; in painting are such terms as MURAL PAINTING, TRIPTYCH, etc. Of great importance for *painting* is the classification (4) in accordance with the *general subject* represented under such headings as PORTRAITURE, LANDSCAPE, and STILL-LIFE PAINTING. The next class (5) includes *works of sculpture and painting* classified according to subject, the general rules of which are laid down in two general articles, one on MYTHOLOGY IN ART, for the ancient world, and one on Christian ICONOGRAPHY, for the period beginning with the Christian era. The history of the artistic treatment of each such important theme is given under separate heads, which are enumerated in these two articles. Such are the myths and types of the Olympian gods, the chief exploits of personages like HERCULES, THESEUS, and PERSEUS, and the heroes of the *Iliad* and of Greek tragic poets, not to mention great historic personalities. Similarly, for Christian art, the types and events of the life of Christ, the Virgin and the Apostles are described in such general articles as CHRIST IN ART and MADONNA, and in themes like ANNUNCIATION, NATIVITY, ADORATION OF THE KINGS, CRUCIFIXION, LAST SUPPER, ASCENSION, and LAST JUDGMENT.

Class (6) *technique of the arts*, comprises the greatest number of separate heads. The processes of sculpture are explained under CARVING, FOUNDING, RELIEF SCULPTURE, and in the introduction to SCULPTURE; those of painting under DRAWING, PERSPECTIVE, ENCAUSTIC PAINTING, TEMPERA, FRESCO, OIL PAINTING, etc. Other technical terms referring to the painter's craft are CANVAS, EASEL, GROUND, PAINTERS' COLORS, etc. Of the architectural titles several of the articles are of some length, such as COLUMN, DOME, ARCH, VAULT, MOLDING, including both definition and history, but the majority consist of definitions, as in the case of such architectural members as ARCHITRAVE, FRIEZE, and CORNICE, composing the classic entablature, as well as DENTILS, FASCIA, CORONA, MUTULES, details of this entablature, and CABLE MOLDING, PALMETTE, and its other moldings and ornaments. Reference to the comprehensive articles will secure complete references to the smaller units. The great majority of such technical terms belong to the field of architecture, and include all the building implements under such heads as AXE, DRILL, HAMMER, CRANE, DERRICK, DRESSINGS, STAGING, QUARRY.

Class (7) is concerned with the *appreciation and enjoyment* of the fine arts under such general titles as ARCHITECTURE, APPRECIATION OF; PAINTING, do., SCULPTURE, do., and in special articles like LINE, COLOR, COMPOSITION, CHIAROSCURO, PERSPECTIVE, VALUES. Class (8) consists of articles illustrating *manners and customs* in which art and artistic forms of industry have at least an important part. Some are general, historic, and descriptive, as COSTUME, FURNITURE, BURIAL, BRICK, ARMOR, JEWELRY, and under such headings will be found references to the more specific headings; in this field especially it is impossible to distinguish between art and archæology. The next series, class (9), consists of a *topographical* treatment of monuments. In the case of every city or town containing monuments of unusual importance and significance in art history, the conventional guide-book information, which is sufficient in ordinary cases, is abandoned for a systematic, scholarly treatment. Such is the case in cities like VENICE, ROME, ATHENS, CAIRO, FLORENCE. It is the same with places like POMPEII, which illustrate any period with great fullness. Ancient sites that are now mere ruins —like BAALBEK, PALMYRA, BABYLON, SELINUS, CARNUNTUM—are described. Even single works are picked out for separate description; ancient monuments, such as the PARTHENON and the PANTHEON; the Egyptian temples at EDFU, KARNAK, and PHILÆ; the mediæval monasteries of MONTE CASSINO, CERTOSA, CLUNY, MELROSE; the chateaux of CHAMBORD, CHENONCEAUX; the villas MEDICI, LANTE, GIULIA; the palaces of the DOGES, the PITTI, STROZZI, LOUVRE, LUXEMBOURG, TUILERIES; the churches ST. PETER, ST. PAUL; the ALHAMBRA, and many more. Finally, class (10) comprises the *biographies* of the most prominent personalities in art history, not merely the men who are popularly known, but all those who have contributed original work. The most important are enumerated in the general articles ARCHITECTURE, PAINTING, SCULPTURE, etc.; and in those on the great historic styles, such as GREEK, GOTHIC, and RENAISSANCE ART. Details have been in each case reserved for the biographies.

To recapitulate, access to the mass of articles can be had by simply passing systematically from the more general to the more special in each branch, each article having a list of references, and the whole series being arranged so as to secure a complete mosaic picture, which can be supplemented by the use of the bibliographical lists at the close of the general articles.

TABLE OF ART HISTORY

ORIENTAL

Babylonian	(c.6000–500 B.C.)
Egyptian	(c.5000– 50 B.C.)
Assyrian	(c.1500–600 B.C.)
Hittite	(c.1500–700 B.C.)
Phœnician	(c.1500– 50 B.C.)
Jewish	(c.1000 B.C.– 70 A.D.)
Persian	(c. ? B.C.–600 A.D.)
Chinese	(c.2000 B.C.–1800 A.D.)
Japanese	(beg. c.600 A.D.)
Indian	(beg. c.500 B.C.)

WESTERN

Ægean	(c.2500–800 B.C.)
Greek	(c.1000–100 B.C.)
Etruscan	(c.1000–200 B.C.)
Roman	(c.300 B.C.–400 A.D.)

CHRISTIAN

Early Christian	(c.100– 800 A.D.)
Byzantine	(c.400–1450 A.D.)
Romanesque	(c.800–1200 A.D.)
Gothic	(c.1150–1450 A.D.)
Renaissance	(c.1400–1700 A.D.)
Modern	(c.1700–present.)

History of Art. The output of literature on this subject during recent years perhaps equals in volume all that has been heretofore done. The best brief manuals of a popular character are those by Goodyear (New York, 1889); Lübke (2 vols., Stuttgart, 1873; latest Eng. trans., New York, 1904); Turner (London, 1903); Rosenhagen (Bielefeld, 1908); and Reinach, *Apollo* (Paris, 1904; Eng. trans., New York, 1907), the clearest and most practical of all. More extensive and scholarly are the works by Schnasse, *Geschichte der bildenden Künste* (8 vols., Dusseldorf, 1866–79); Knackfuss

and Zimmermann, *Allgemeine Kunstgeschichte* (2 vols., Bielefeld, 1900); Carrotti, *History of Art* (2 vols., Eng. trans., London, 1908—). The best and most modern productions, each volume or section written by the highest authorities, are: Woermann, *Geschichte der Kunst aller Zeiten und aller Völker* (3 vols., Leipzig, 1900–11); Springer, *Handbuch der Kunstgeschichte* (5 vols., Leipzig, 1904–07); and André Michel, *Histoire de l'art*, thus far five volumes, each in two parts (Paris, 1905—). Histories of art based upon reproductions are those of Winter and Dehio (5 vols., Leipzig, 1900–02), Neuwirth (Munich, 1910—), and especially the series edited by Ludwig Justi (3 vols. thus far, Berlin, 1910—), with introduction and commentaries by specialists.

The history of art has also been treated in its principal divisions, as in the *College Histories of Art*, edited by J. C. Van Dyke; architecture, by Hamlin (New York, 1909); painting by Van Dyke (ib., 1904); sculpture by Marquand and Frothingham (ib., 1911). The titles of such works, as well as those composing the series of national arts, such as the *Geschichte der deutschen Kunst*, edited by Dohme, the *History of American Art*, edited by Van Dyke, will be found in the bibliographies of ARCHITECTURE, PAINTING, SCULPTURE, ENGRAVING, ETC. Works on the principal chronological divisions of art, ancient, mediæval, and modern, are those of Reber, *History of Ancient Art* and *History of Mediæval Art* (Eng. trans., New York, 1887) and (best) Perrot and Chipiez, *Histoire de l'art ancien* (7 vols., Paris, 1881—).

Artist Biographies. These may be best consulted in the dictionaries. The briefest for ready reference is Spelman, *Kunstlexicon* (Berlin, 1905); somewhat longer are Muller and Singer, *Allgemeines Künstlerlexicon* (6 vols. and supplement, Frankfort, 1895–1906), and Bénézit, *Dictionnaire des peintres, sculpteurs, dessinateurs et graveurs* (2 vols., Paris, 1911—). By far the most scholarly and comprehensive of such works is Thieme and Becker, *Allgemeines Lexicon der bildenden Künstler* (Leipzig, 1907—). The work as planned will have about 150,000 titles. Artist biographies are published in many separate volumes and usually popularly written; such as *Great Masters in Painting and Sculpture*, edited by Williamson (London, 1900—), *Les maitres d'art* (Paris); *Künstler Monographien*, ed. Knackfuss (Bielefeld, 1895—), and *Klassiker der Kunst* (Stuttgart), the last two having excellent reproductions. This is also the principal feature of the periodical publication, *Great Masters in Art* (Boston), the text of which is composed of selections from standard works. For biographical dictionaries of special divisions of art, such as Painting, Sculpture, Engraving, consult the bibliographies under these titles.

Art Periodicals. Besides giving all kinds of artistic news, these publications often contain important articles of research. The principal in English are: *Art Journal* (London, 1839—); *Studio* (London, 1893—), published also in New York as the *International Studio*, with important American additions; the *Connoisseur* (London, 1901); the *Burlington Magazine* (ib., 1903—), and *Art* (New York, 1913—). Among those in German are *Zeitschrift für bildende Kunst* (Leipzig, 1866—); *Repertorium für Kunstwissenschaft* (Stuttgart and Berlin, 1876—); *Jahrbuch der königlich preussischen Kunstsammlungen* (Berlin, 1880—); *Jahrbuch der Kunstsammlungen des allerhöchsten Kaiserhauses* (Vienna, 1883—). The French periodicals include *Gazette des Beaux-Arts* (Paris, 1859), with its supplement *Chronique des Arts* (ib., 1875) and the *Revue de l'Art* (ib., 1897). The chief Italian are *L'Arte* (Rome, 1898—), *Rassegna d'Arte* (Milan, 1901—), and *Bolletino d'Arte* (Rome, 1907—).

ART, PRIMITIVE. The motives which lead to the production of works or art and the capacity for æsthetic enjoyment seem to be common to men at all levels of culture. We cannot speak, then, of the origin of art in an absolute sense, but only of the first stages of development both in artistic production and in æsthetic appreciation. It is difficult to tell just what primitive peoples themselves regarded as beautiful. Even when we have laid before us articles which seem to involve appreciation of the beautiful—as, for example, carved figures on weapons and cooking utensils—and even when we read of the war-dance or the corroboree, or of the practices of tattooing or scarring, it is not easy to tell what emotions were aroused in the primitive mind by the contemplation of these things. A symmetrical spear was more useful than a crude asymmetrical one; a dance may have been intended to appease some god or to bring luck in hunting, as the buffalo dance of some Indian tribes; a series of figures on a bone knife may have been a kind of picture writing; it may have been a mark of individual or tribal ownership; or the figures on a bit of pottery may have simply copied the woven pattern of a more primitive utensil. So that we must distinguish what was done from utilitarian, or religious, or social motives, or for communication, or from simple habit, from what was the result of æsthetic impulses. As a matter of fact, it is highly probable that for a long time purely æsthetic impulses and purely æsthetic productions were rare—that a thing was at once useful and artistic, or religious and artistic, or social and artistic. It is, then, one of the chief problems which artistic origins furnish, to disentangle the æsthetic from the non-æsthetic. For this two things are required. The investigator must know the essential ingredients of the æsthetic consciousness, both on its productive and on its contemplative side, and he must know where the most primitive conditions are to be found. The first requirement is psychological. It takes into consideration the elementary æsthetic feelings (see ÆSTHETICS, EXPERIMENTAL), other feelings, emotions, and organic sensations, and the general and special associative factors (brought from the experiences of the individual and of the social group to which he belongs) in the more complex judgments of taste. The second requirement is anthropological. It asks: "What is a 'primitive people'? What is 'primitive culture'?"—assuming that the most primitive art is to be found on the lowest level of civilization. Perhaps the best guide to the primitiveness of a tribe or race is to be found in its means of livelihood. Hunting and fishing evidently take lower rank than agriculture or cattle raising. They imply simpler social conditions and a lower grade of mental development. Fortunately, some of the hunting tribes are still in existence and offer object-lessons in primitive culture. Among them there is almost no social organization, and life is reduced to extremely simple conditions. Even here, how-

ever, evidences of artistic appreciation are by no means rare.

The chief modes in which primitive man expressed his love for beauty are by ornament and in the dance. Painting, plastic art, literature, and music were not, however, entirely lacking. A passion for bodily adornment is characteristic of primitive man. He smeared his body with red, yellow, black, and white cosmetics, tattooed and scarred himself, loaded himself with nose, lip, and ear rings, necklaces of shell and bone, bracelets and anklets, and arranged his hair in the most fantastic fashions; clothing, even, was worn more for adornment than as a covering to the body. As civilization advanced, ornament migrated from the body to the implements and utensils and to the clothes, displaying itself in rich and variegated garments such as are to be seen to-day in the royal attire of Oriental monarchs and in the holiday dress of peasants. From clothing it passed to the decoration of the home, to places of worship, and to public buildings. This is a natural sequence of the widening of the individual's interests in the development of a highly organized society.

An expression of the primitive artistic impulses, which has a greater social significance than ornament, is to be seen in the dance, which was more truly a matter of æsthetics than it is in civilized communities. The essential element in it was energetic and rhythmic movement. It was either simply gymnastic, giving free play to muscular activities, or mimetic, reproducing the actions of beasts and birds and portraying the emotions of love and war. The paintings, drawings, and carvings of primitive tribes furnish a less important means of expression. They are represented by the rock pictures of the Australians, the bone carvings of the Eskimos, and the drawings of the Bushmen. They are remarkable for their careful and faithful representations of natural objects—largely animals—with which the artist was familiar. Their excellence is to be attributed to the careful observation and the manual dexterity which distinguishes the hunter from the agriculturist. Even the drama and the art of poetry are represented among primitive peoples. A limited number of poems have been collected which are real expressions of emotion and which attempt metrical form. Love and nature are seldom employed as themes. The poet sings, by preference, of himself. But the form, rather than the matter, seems to be the essential æsthetic element; since meaningless syllables, in many instances, take the place of words, while the rhythmical movement of the verse has been carefully preserved and retains its original emotive value. The drama grew naturally out of the dance and song. Pantomimic dramas came very early. They have been found among the Australians, the Eskimos, and the Tierra del Fuegians. With the drama comes the song, which is likewise related very intimately to the dance. It has even been said of some primitive peoples that they never dance without song and never sing except in the dance. Thus we see that music, too, has a prominent place in their lives. It is without doubt true that the voice was the first musical instrument, and that the cadences of emotional utterance, the sounds of nature, and the construction of crude musical instruments—the drum, the flute, and the trumpet—all conduced to the development of music. Primitive music is characterized by melody in which the rhythmic element (made precise by the dance) is far in advance of the harmonic element. The intervals are fewer in number than with us and not so sharply defined, while polyphony is practically unknown. See MUSIC.

Consult: Grosse, *The Beginnings of Art* (New York, 1897); Tylor, *Anthropology* (New York, 1889); Hirn, *The Origins of Art* (London, 1900); Wundt, *Die Kunst* (Leipzig, 1908).

ART, SCHOOLS OF. See DESIGN, SCHOOLS OF.

ARTA, är'tà (the ancient *Ambracia*). An episcopal city of upper Epirus (Map: Greece, C 2), situated 10 miles from the northern coast of the gulf to which it gives its name and 39 miles south of Janina. It stands on the left bank of the river Arta, the ancient *Arachthus*, whence the modern name, which was first used in the eleventh century. It is surrounded by groves of orange trees, gardens, and vineyards; has a considerable trade in wine, agricultural products, tobacco, and fruit, and manufactures cloths and leather. The ancient Ambracia (Ambrakia) was settled by the Corinthians about 640 B.C. and later became an independent republic. It was the capital of Epirus under Pyrrhus; its decline was begun by its seizure in 189 B.C. by the Romans, and its importance was utterly destroyed when Nicopolis was settled (31 B.C.). The city received a new lease of life under the Byzantine emperors, and in the thirteenth century was the capital of the Despot of Epirus. After various changes of rulers Arta became in 1449 a Turkish possession and remained such. It was ceded to Greece as a result of the Treaty of Berlin in 1878. Pop., 1896, 7582; 1907, 8000.

ARTA, GULF OF (anciently, Lat. *Sinus Ambracius*). An arm of the Ionian Sea, 25 miles long and 10 miles wide, penetrating into the western coast of Greece and nearly bisected by 39° N. lat. A bar at its entrance detracts from its usefulness. It is noted as the landing place of Philip V of Macedonia (218 B.C.), during the war with the Achæan League, and for the naval battle of Actium fought at its mouth 31 B.C.

AR'TABA'NUS (Gk. *Ἀρτάβανος, Artabanos*) (?–226 A.D.). The last King of Parthia. After his kingdom had been devastated by the army of Caracalla Artabanus gave battle to Macrinus, near Nisibis (217). After two days of desperate fighting the Romans were defeated and peace was concluded. During the war Artabanus lost his best troops, and the Persians seized the opportunity of recovering their independence. Led by Artaxerxes (Ardashir), the founder of the dynasty of the Sassanidæ, they defeated the Parthians in three great battles, in the last of which Artabanus was taken prisoner and killed (226). This ended the kingdom of the Aracidæ, which had existed about 475 years. Consult Gutschmid, *Geschichte Irans*.

AR'TABA'ZUS (Gk. *Ἀρτάβαζος, Artabazos*). The name of several distinguished Persians in the times of the Achæmenidæ. When Xerxes advanced against Greece, it was an Artabazus who led the Parthians and Chorasmians. He later warned Mardonius against engaging in battle at Platæa, and on the first indications of defeat he withdrew his own division, amounting to 40,000, from the field, and succeeded, though with great difficulty, in forcing his way through the wilds of Thessaly, Macedonia, and Thrace to Byzantium, where he crossed to Asia. Subsequently he acted as negotiator between the Spartan Pausanias and Xerxes. Another Ar-

tabazus was general under the Persian King, Artaxerxes Mnemon, and revolted against Artaxerxes Ochus in 356 B.C. For this offense he appears to have been forgiven, and subsequently we find him accompanying Darius Codomannus after the battle of Arbela. On the murder of the King Artabazus attached himself to Alexander, who rewarded his fidelity by appointing him satrap of Bactria.

ARTAGNAN, D', där'tȧ'nyäN'. The hero of Dumas's *Trois mousquetaires, Vingt ans après*, and *Le Vicomte de Bragelonne*. He is chiefly known in modern times as a well-drawn character in these novels; and the Gascon adventurer who goes to Paris to seek his fortune, winning his way by his sword, his genius for intrigue, and the aid of his three friends, Athos, Porthos, and Aramis, is among the most popular heroes of fiction, both on and off the stage. But he was also an actual historical personage of note. Charles de Baatz de Castelmore, Count d'Artagnan, was born in 1611 or 1612. By 1654 he had risen to be captain in the Guards. When the musketeers were reëstablished in 1657, he was made *sous-lieutenant;* but as the nominal head of the corps, the Duke de Nevers, paid no heed to his duties, he was practically its commander-in-chief, becoming actual *capitaine-lieutenant* in 1667. His most noteworthy official act was the arrest of the all-powerful minister, Fouquet, in 1661. He was made *maréchal-de-camp* (brigadier-general) in 1672, and fell in June of the following year at the siege of Maestricht.

ARTAN'THE. See MATICO.

AR'TAPHER'NES, or AR'TAPHRE'NES (Gk. *Ἀρταφέρνης, Ἀρταφρένης*). A Persian general, who, with Datis, commanded the Persian army that invaded Greece (490 B.C.) and was defeated at Marathon. He led the Lydians and the Mysians in the expedition of Xerxes against Greece in 480 B.C.

ARTAX'ATA (Gk. *Ἀρτάξατα*, Armen. *Artašat*). The ancient capital of Armenia, on the Araxes, where Hannibal took refuge when Antiochus could no longer protect him. The Carthaginian is said to have superintended the building of the city, which was named from the King Artaxais I about 180 B.C., on the site of an older city, Armavir. It was destroyed by the Romans (58 A.D.), rebuilt by Tiridates, and called Neronia, in honor of Nero, who had granted the kingdom to Tiridates. It was taken and partly destroyed by the Persians in 370, and in 450 it was the seat of an ecclesiastical council, over which Joseph, the patriarch, presided. The ruins of the city are now called Ardashir.

AR'TAXERX'ES (Gk. *Ἀρταξέρξης*, OPers. *Artaxšaθra*, 'whose kingdom (*xšaθra*) is right (arta)'). The name of three of the ancient Persian kings of the Achæmenian dynasty. (See ACHÆMENES.) The same title, under its later and changed form of Artakhshatar, or Ardashir, reappears as the name of three sovereigns of the Sassanian dynasty. (See SASSANIDÆ.)—The first of the ancient monarchs of the name is ARTAXERXES I, surnamed Longimanus, or *Μακρόχειρ*, from the Persian Dirāzdast, 'the long-handed.' Whether this designation referred to an actual physical peculiarity or to the extent of his empire is uncertain. He was the son of Xerxes I, and he ruled over Persia, 465–424 B.C. The Egyptian revolt which broke out in the first part of his reign was suppressed about 455. The hostilities which existed between Persia and Greece were checked by the victory which the Hellenic arms gained over the Persian forces in Cyprus (449), and a truce was arranged on the initiative of Artaxerxes. During his reign the Peloponnesian War in Greece broke out (431). Artaxerxes died at the close of the year 425, or in the beginning of the year 424, on the same day as his wife Damaspia. His name is preserved on a tablet which he caused to be inscribed in the palace at Persepolis, and it has been found also on a porphyry vase.—ARTAXERXES II, surnamed Mnemon, from his tenacious memory, was a grandson of the preceding, and son of Darius II, whom he succeeded as King of Persia 404–358 B.C. He is the most important of the three kings of the name; and he is best known to history because of the revolt of his brother, Cyrus the Younger, which resulted in the battle of Cunaxa (401) in which the latter was killed, as described by Xenophon in the *Anabasis*. Artaxerxes rebuilt the royal palace at Susa, and his inscriptions mention the Zoroastrian divinities Anāhitā (see ANAÏTIS) and Mithras, which fact is of interest in regard to the question of his faith. His life is included among Plutarch's biographies.—ARTAXERXES III, or Ochus (OPers. *Vahuka*), son of the preceding, and King of Persia 359–338 B.C. He was the contemporary of Philip of Macedon. Ochus was a weak and despotic ruler, enough proof of which was given by his behavior when he subdued Egypt, about 345. His policy throughout was largely guided by his shrewd and influential eunuch Bagoas, at whose hands, through poison, he ultimately lost his life.

ARTEDI, är-tā'dē, PETER (1705–35). A Swedish naturalist. He was born at Anund, Sweden, Feb. 22, 1705, and studied at Upsala, where he and Linnæus became youthful friends. Resolving to reform the existing systems of classification, Artedi gave his attention to fishes and Linnæus to plants. He was drowned at Leyden, Sept. 21, 1735. At the time of his death he left materials for his *Ichthyologica*, which Linnæus edited and published, together with a life of the author, in 1738. A new edition appeared in 1788, and a part of it was expanded and reissued, edited by Schneider, in 1789, under the title *Synonomia Piscium*. According to Cuvier, the great work of Artedi is the first named, which gave a truly scientific character to the study of fishes. The only error of any magnitude which occurs in it is the inclusion of the Cetacea among fishes. Artedi was also a distinguished botanist. He was the first to indicate, as a special characteristic, the presence or absence of involucra in the umbelliferous plants, whose species are so difficult to distinguish from each other. Linnæus named a genus of these, in memory of his friend, *Artedia*.

AR'TEGAL. The personification of justice in the *Faerie Queene*. The character is also supposed to represent Lord Grey, Spenser's patron.

ARTEL, är-tyĕl'. The Russian name for a *gang*. It refers especially to associations of independent laborers working collectively on a job and dividing the profits. It is a primitive form of coöperative production, which sometimes resembles the old trade guild and is still in existence among the fishermen of Archangel. Among the peasants in agricultural labor the artel has been largely displaced by the contract system, though they are still organized on the coöperative basis sometimes for the purchase of provisions. See GANGS, AGRICULTURAL.

AR'TEMIDO'RUS (Gk. *Ἀρτεμίδωρος, Artemidōros*). A geographer and native of Ephesus, who lived about 100 B.C. On one occasion he was sent to Rome to recover certain temple treasures which had been wrongfully appropriated by the Roman officials. In recognition of his success on this embassy, his townsmen erected a golden statue to him. His travels extended through the lands bordering on the Mediterranean Sea and the less distant parts of the Atlantic Ocean and the Red Sea. The *Γεωγραφούμενα, Geōgraphoumena*, in 11 books, was a comprehensive work on the geographical, physical, historical, and political features of the most important countries of Europe, Asia, and Africa, and was based on the author's own investigations and a study of the works of Timosthenes, Eratosthenes, Polybius, Agatharchides, and others. It was much used by later authors, but only fragments, fortunately numerous, have come down to us. An epitome of the work was made by Marcianus of Heraclea, which, too, has been lost. Artemidorus wrote another book called *Ἰωνικὰ Ὑπομνήματα, Ionika Hypomnēmata*. He seems to have been much influenced by Polybius.

AR'TEMIS. See DIANA.

ARTEMISA, är'tā-mē'sà, or **ARTAMISA,** är'tà-mē'sà. A town of Cuba, in the province of Pinar del Rio, situated about 45 miles by rail southwest by west of Havana (Map: Cuba, C 4). It carries on a considerable trade in sugar and tobacco. Pop. (latest report), 1899, 4179.

ARTEMISIA, är'tē-mish'i-à (Gk. *Ἀρτεμισία*). The name given to festivals of the Greek goddess Artemis (see DIANA), held in all quarters of the Greek world. One of the most important of such festivals was held at Ephesus. There the statue of the goddess, equipped with bow and arrows and draped with the skin of a wild beast, was carried in procession; young women, representing nymphs, danced, and contests of various sorts were held.

ARTEMISIA (Lat., Gk. *Ἀρτεμισία*, probably from being dedicated to Artemis). A genus of plants of the family Compositæ, in which the flowers of the disk have stamens and styles and are either fertile or abortive, those of the ray pistillate and fertile. The heads of the flowers are numerous and small; the leaves are generally much divided. There are many species, herbaceous plants and shrubs, natives chiefly of the more temperate regions of the Eastern Hemisphere and the western United States. They have generally an aromatic smell, more or less agreeable, and a warm, sometimes rather acrid and bitterish taste. To this genus belongs wormwood (*Artemisia absinthium*), the *apsinthion* of the ancient Greeks, to whom its medicinal properties were well known. It is a native of Great Britain, the continent of Europe, and the northern parts of Asia, growing in waste places, by waysides, etc. It is a perennial, 2 to 4 feet high; its leaves are bipinnatifid and clothed with a silky down, and its small, hemispherical drooping heads of flowers are of a dingy yellow color and are produced in axillary panicles. It is aromatic and bitter, containing a bitter principle and an essential oil, on account of which it was formerly used in medicine in various forms (oil, extract, tincture, etc.), as a stomachic and anthelmintic or vermifuge, and as a febrifuge. Sea wormwood (*Artemisia maritima*, including a variety which has been called *Artemisia gallica*), a native of salt-marshes in Great Britain and other parts of Europe, possesses similar properties; as also Roman wormwood (*Artemisia pontica*), a native of the middle and south of Europe, but not of Great Britain; Tartarian wormwood (*Artemisia santonica*), a native of Tartary, Persia, and other parts of the East; and Indian wormwood (*Artemisia vulgaris*), a native of the Himalayas, abounding at elevations of 2000 to 6000 feet. Indian wormwood grows to the height of 12 feet. It is considered in India a powerful deobstruent and antispasmodic. Tree wormwood (*Artemisia arborescens*), a native of the south of Europe and the Levant, is also larger and more shrubby than the common wormwood. The dried flower-buds of a number of species of artemisia are sold under the names of wormseed and have long been in much repute as anthelmintics. *Artemisia pauciflora*, known as Levant wormseed, contains the crystalline principle santonin employed in medicine as a vermifuge. *Artemisia absinthium*, from which the bitter aromatic liquor called *extrait, eau*, or *crême d'absinthe* is prepared, is a small, low-growing species, as are *Artemisia mutellina, Artemisia glacialis, Artemisia rupestris, Artemisia spicata*, etc., found on the Alps, and known to the inhabitants by the name of *génipi*. Mugwort (*Artemisia vulgaris*), a common native of Great Britain and of the continent of Europe, often found about ruins and in waste places, grows to the height of 3 or 4 feet, has pinnatifid leaves and panicles of small yellow flowers. It emits, when rubbed, an agreeable smell and has a bitter taste. In Germany the young shoots and leaves are used in cookery for seasoning. It is used also for the same medicinal purposes as wormwood, but is weaker. Its leaves, and those of some of the other species, are used as fomentations for cleansing and healing wounds. Southernwood (*Artemisia abrotanum*) is a shrubby plant with long, straight stems 3 to 4 feet high, the lower leaves bipinnate, upper leaves pinnate. It is a native of the south of Europe and middle parts of Asia and has long been a favorite plant in cottage gardens in Great Britain. It has an aromatic and pleasant odor. The leaves are used to drive away moths from linen, and in some parts of the Continent as an ingredient in the manufacture of beer. The smell of this plant appears to be peculiarly disagreeable to bees, which retreat from it; and a little branch of southernwood is sometimes used when they are swarming, to promote their ascent into the new hive. Tarragon (*Artemisia dracunculus*) is a perennial plant, a native of Siberia, and long cultivated in gardens in Great Britain. It has a branching stem 1 to 1½ feet high, with narrow leaves. It is fragrant and has an aromatic smell and taste. The leaves and tender tips are a favorite ingredient in pickles. An infusion of the plant in vinegar is used as a fish sauce. The leaves of *Artemisia maderaspatana* or *Grangea maderaspatana* are regarded in India as a valuable stomachic and are also used in anodyne fomentations. Moxa (q.v.) is prepared by the Chinese from the leaves of *Artemisia moxa* and other species. In the western United States many shrubby species exist and are known as sagebrush. One of the most common is *Artemisia tridentata*, with small, wedge-shaped leaves, 3- to 7-notched. *Artemisia cana*, silvery sage, *Artemisia mexicana*, white sage, and *Artemisia ludoviciana*, prairie sagebrush, are other important range species. Certain varieties of the

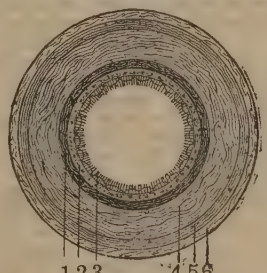
sagebrush are important winter forage for sheep, and are occasionally eaten by cattle under the spur of starvation. The so-called "black sage," which occasionally reaches 10 feet in height, is, in many of the more isolated portions of the western United States, the only fuel of the settlers. See Plate of Desert Plants.

ARTEMISIA (Gk. *Ἀρτεμισία*). 1. A queen of Halicarnassus in Caria, and a vassal of the Persian King, who joined the fleet of Xerxes in the expedition against Greece, and distinguished herself by bravery and skill at the battle of Salamis (480 B.C.). The Athenians, indignant that a woman should appear in arms against them, offered a reward of 10,000 drachmæ for her capture, but she escaped. According to a doubtful tradition, Artemisia afterward jumped from the Leucadian Rock, in consequence of a disappointment in love. 2. A daughter of Hecatomnos and wife of Mausolus, of Mylasa, her own brother. She followed Mausolus, in 353 B.C., as a ruler of the satrapy of Caria, and with energy and skill thwarted an effort of the Rhodians to free themselves and surprise Halicarnassus, the capital of the satrapy. She completed the famous Mausoleum, and died in 351, according to tradition, of grief at the death of her husband.

ARTEMISIUM, är'tê-mĭsh'ĭ-ŭm (Gk. *Ἀρτεμίσιον, Artemision*). 1. The stretch of coast at the northern extremity of Eubœa, opposite the Thessalian Magnesia. It belonged to the town of Histiæa, and was named from the temple of Artemis, which stood here. Off this point occurred the first naval conflict between the Greeks and the Persians at the time of the invasion of Xerxes. 2. A mountain 5400 feet high between Argolis and Arcadia, between Mantinea and Argos, now called Malewo. On the summit was a temple of Artemis. 3. A promontory and temple of Artemis in Caria. 4. A small city in Sicily, near Mylæ, in which was a famous temple of Artemis Phakelitis.

ARTE'RIOSCLERO'SIS (Gk. *ἀρτηρία, artēria,* artery + *σκλήρωσις, sklērōsis,* induration). A disease of the arteries beginning in the internal coat (*intima*) as a chronic inflammatory process and finally resulting in hardening of the muscular elastic coat. The connective tissue of the walls is increased in quantity. This produces a contraction, by pressure, on the blood vessels supplying the artery, which in turn causes weakening and degeneration of the walls of the vessel. It loses its elasticity, becomes hard and rigid, and is easily ruptured. If the degeneration takes place in spots or mainly involves one of the arterial coats, with the production of fatty degeneration and subsequent deposit of lime salts in the walls of the vessel, it is termed *atheromatous,* from atheroma (Greek *athērē,* meal), the name of the fatty or chalky substance. At times the increase in the amount of connective tissue is so great that the lumen of the blood vessels is obliterated. The causes of arteriosclerosis are chronic alcoholism, gout, lead poisoning, syphilis, deficient metabolism from habitual overeating, overwork of the heart, and kidney diseases. Vital statistics show a steadily increasing proportion of deaths from heart and kidney diseases, associated with arteriosclerosis, in modern city dwellers, a state of affairs believed to be dependent on sedentary existence, combined with overeating and drinking, and the worries incident to the complicated economic problems of modern life. Experimental injection of bacterial cultures and toxins into the wall of the aorta have resulted in the production of aortitis, the most marked changes being in the middle coat, where calcareous deposits occurred. The close resemblance of these results to natural pathologic conditions suggests infection as a possible cause. See Artery.

AR'TERY (Lat. *arteria,* Gk. *ἀρτηρία, artēria,* wind-pipe, artery). In anatomy any vessel through which the blood passes from the left side of the heart to the tissues, from the old idea that these tubes were air-carriers because they are empty after death. In its structure an artery may be roughly subdivided into three layers, called coats: an external, elastic and distensible, the *tunica adventitia;* a middle, muscular coat, the *tunica media:* an internal, smooth and transparent, lined with endothelium, the *tunica intima.* The tube is also enveloped in a layer of cellular tissue, termed the *sheath.* When an artery is wounded by a sharp instrument, the effect varies with the direction of the cut. If longitudinal, the edges may not separate, and the wound may heal without much bleeding; if oblique or transverse the edges gape, and a nearly circular orifice allows of a profuse hemorrhage. If the artery be completely divided, its walls do not collapse like those of a vein; the cut orifice contracts, and also retracts into its sheath; this checks the flow of blood, a clot of which shortly forms on the outer side; then another forms inside the vessel, and together they stem the flow till the cut edges of the artery have time to throw out lymph (see Adhesion), and heal as other wounded tissues. When an artery is compressed by a ligature, the brittle inner and middle coats crack, curl inward, and unite. See Bleeding.



SUBDIVISIONS OF ARTERIAL WALL.

1. Endothelial layer.
2. Fenestrated membrane.
3. Muscular layer.
4. Elastic layer.
5. Fibro-connective layer.
6. Areolar sheath.

The arteries of the human body are all offshoots of the aorta. As each main trunk passes into a portion of the body, it divides into superficial and deep branches which anastomose freely, so that the tissues are not dependent for their supply on a single arterial trunk.

Diseases of the Arteries. The diseased conditions affecting the arteries consist of (1) degeneration of the arterial walls (either fatty, calcareous, or hyaline); (2) arteriosclerosis; and (3) aneurism. *Fatty degeneration* of the *intima* (inner coat) is very common. It occurs as yellowish spots in the aorta and larger vessels. *Calcareous degeneration* succeeds the fatty change, and occurs as flakes or plates of chalky deposit in the *intima.* It is the terminal stage of arteriosclerosis. *Hyaline degeneration* is a

change usually found at the beginning of arteriosclerosis. It occurs as a smooth, homogeneous substance replacing the *tunica intima*, generally distributed throughout the smaller arteries and capillaries, especially in the kidney. The substance which replaces the normal tissue of the arterial coat is called *atheroma* (from Greek *athērē*, meal), whether hyaline, fatty, or calcareous; it consists of a pulpy or hardened mass of cholesterine, oil, albuminous and chalky material. In some arteries, such as those over the temples and at the wrists, chalky deposits or atheromatous thickening may be felt easily. Atheromatous deposit is at first attended with a narrowing of the calibre of the vessel, varying with the thickness of the deposit, and most marked at the points of bifurcation. Smaller arteries may be completely obliterated, while the larger arteries may be very much contracted. A later consequence is dilatation of the vessel, and this again may terminate in aneurism. The arteries sometimes become abnormally lengthened and consequently not only dilated but tortuous. Another condition involving much danger is this: a calcified artery loses the smoothness which the interior of the vessel ought to present, rough projections form, upon which the fibrin of the blood may be deposited in small clots; these, becoming detached, may be carried with the blood till they become arrested and plug up an artery, giving rise to embolism or thrombosis. A blow may crush a diseased artery, when a healthy elastic vessel might have escaped injury. A ligature applied to a calcified artery is apt to cause it to break, and the difficulty of securing such vessels is often very great. It is to this form of disease that most of the failures of operations for aneurism are due. The heart's action in pumping blood through stiff, unyielding arteries whose calibre is diminished causes a permanent rise in the blood pressure, resulting in hypertrophy of the heart, disease of the kidneys, cerebral hemorrhage, aneurism, gangrene, or sclerosis of the coronary arteries. *Arteritis*, or *inflammation of the arteries*, is no longer recognized as a distinct disease. See ARTERIOSCLEROSIS; HEART; KIDNEYS; APOPLEXY; ANEURISM; GANGRENE.

ARTESIAN (är-tē'zhan) **WELLS** (from the old county of *Artois*, Lat. *Artesia*, now part of France, where the oldest well in Europe was bored in 1126). Vertical borings into the ground, to a depth of 100 feet or more for the purpose of obtaining water from some deeply buried porous stratum, such as sandstone or gravel. In the true artesian well the water should flow to the surface, but at present the term "artesian" is applied to any deep well, even where the water is obtained by pumping.

The presence of an artesian water supply in any region depends upon the existence beneath that region of a tilted porous layer, inclosed between two impervious beds. The outcropping edge of the porous bed must, moreover, be of sufficiently open texture to soak up the rain which falls upon it, and furthermore there must be no escape of the contained water from the lower portions of the bed. It is therefore evident that when such a porous stratum is saturated with water, the latter will be under pressure, the pressure at any one point amounting to that of a column of water whose height is the difference between the altitude of that point and the altitude of the outcrop of the water-bearing layer. If now from a point on the surface, at a level lower than that of the outcrop of the porous stratum, a drill hole be sunk to the water-bearing bed, a flow of water will be obtained, but the water will seldom rise to the same level as the point of intake owing to the friction which has to be overcome in flowing through the porous bed. The most favorable conditions are when the rocks form a basin, or when the inclined porous layer passes into an impervious one. The collecting area, or region drained by the porous stratum may be in the immediate vicinity of the well (a common case in shallow wells) or it may be at a distance of several hundred miles. In boring for artesian water a knowledge of the geological structure of the region is of highest importance. The work of the United States Geological Survey, aided by data obtained from wells already bored, has demonstrated the existence of several extensive and well-marked artesian water-yielding areas. Thus a large part of Nebraska, South Dakota, eastern Colorado, and northwestern Kansas obtains its artesian water from the Dakota sandstone, the collecting area of which is around the base of the Black Hills in South Dakota and along the eastern foothills of the Rocky Mountains. The Iowa wells derive their water from the St. Peters sandstone, whose collecting area is in Wisconsin. Along the Atlantic coast many wells obtain a supply of pure water from the southeasterly dipping Tertiary and Cretaceous beds underlying that area.

Artesian wells in all parts of the country yield a supply of water for domestic use, which in many instances is much purer than surface water. In the arid regions of the West they also serve the purpose of supplying water for irrigation, thus rendering fertile the soil of many districts otherwise non-productive.

The Chinese were acquainted with artesian wells, and in Europe they have been used for centuries — in France, England, Austria, and Germany; indeed, the basin-shaped structure of the Paris and London areas, with their alternating beds of clay and sand, has yielded the type structures for artesian water supply. Portions of the Sahara Desert have been reclaimed by artesian water derived from wells sunk by the French government. The effect of these wells has been materially to benefit the country and also to change the character and habits of its nomadic Arab inhabitants. Several tribes are said to have settled down around these artificial springs, and to have constructed villages, planted palms, and entirely renounced their previous wandering existence.

Many artesian wells have been driven to a great depth, their diameters varying from 3 to 6 inches, several such deep borings having been made in the United States; e.g., at St. Louis, Mo. (3843.5 feet); Columbus, Ohio (2775⅛ feet); Louisville, Ky. (2086 feet); West Chicago, Ill. (3081 feet); Galveston, Tex. (3071 feet); Pittsburgh, Pa. (4625 feet). At Wheeling, W. Va., there is a dry well 4500 feet in depth, which has furnished valuable records of temperature changes in the earth's crust. Among the noted foreign wells is one at Passy, near Paris, 1923 feet deep; Sperenberg, near Berlin, 4194 feet; Schladenbach, near Leipzig, 5735 feet.

The temperature of artesian well waters is commonly about 40° to 50° F., except in the case of deeper wells, whose waters may reach a temperature of 70° to 80°. The water from a well at Charleston, S. C., registers 87°. In

some places these hot waters are used for heating buildings, as at Grenelle, Paris. The Grenelle well-water has a surface temperature of 81.70° F.

Cases are not infrequent where artesian waters are charged with gases such as carbon dioxide or hydrogen sulphide; or they may contain mineral substances in solution, thus at times serving as medicinal waters.

The methods adopted for boring artesian wells are similar to those employed in drilling oil wells. (See WELL SINKING.) The cost is commonly from $2 to $3 per foot for the first 1000 feet, and 50 cents greater per foot for each additional 500 feet. Artesian wells commonly show a gradual decrease in flow, due either to partial filling of the tube, or to reduction of pressure because of the boring of new wells in the same vicinity, or to exhaustion of the basin. More precise information regarding the distribution and characteristics of the artesian waters of different portions of the United States may be found in the bulletins and annual reports of the United States Geological Survey and of the geological surveys of various States, particularly those of Iowa, New Jersey, Mississippi, and Missouri.

ARTEVELDE, är'te-vĕl'de, JACOB or JAMES VAN (c.1290–1345). A popular leader of the Flemings. The war between England and France having threatened the cloth industry of Flanders, Artevelde was persuaded to lead the Flemings against the encroachments of Count Louis of Flanders, the vassal of the French King. In December, 1337, he assumed the leadership, and, with the aid of the men of Ghent, freed the town from the nobles and adherents of the Count. Afterward Artevelde was elected captain-general of the town of Ghent. In 1338 he made a commercial treaty with England, but maintained the policy of armed neutrality. Edward III of England, wishing to gain him as an ally, landed at Sluys, but was resisted. Edward's first campaign proving successful, Philip of Flanders refused to recognize the neutrality of the Flemings, thus forcing them to declare for the English. Artevelde now urged Edward to assume the title of "King of France," and the Flemings, in 1340, accepted Edward as their liege lord. The chief power remained in the hands of Artevelde. On July 24, 1345, he was slain in a popular tumult at Ghent, presumably because he intended to recognize the Black Prince as Count of Flanders.

ARTEVELDE, PHILIP VAN, son of Jacob, born about 1340, entered public life in January, 1382. Differences had again arisen between the Flemings and Count Louis. Under Yoens, the former burned the Count's favorite castle and set up the standard of revolt. Yoens dying the same year, Peter van den Bossche became leader; but, as affairs seemed to be going badly for the revolt, Artevelde was chosen chief captain. By severe discipline and skillful tactics he defeated the Count's forces and entered Bruges; but, in November, Charles VI brought a great army from France. Artevelde took his stand at Roosebeke, but was defeated and slain, Nov. 27, 1382.

Sir Henry Taylor published a drama entitled *Philip van Artevelde* (London, 1834). Consult Ashley, *James and Philip van Artevelde* (London, 1883), and Hutton, *James van Artevelde* (London, 1882).

ARTFUL DODGER, THE. The nickname of John Dawkins, one of the band of youthful pickpockets maintained by Fagin the Jew, in Dickens's *Oliver Twist.*

ARTHOIS, är'twä', JACQUES D' (1613–86). A Flemish landscape painter. He was born at Brussels and modeled his art upon that of the pupils of Rubens. His pictures, the subjects of which are derived principally from the forests and environs of Brussels, are characterized by great facility of execution, but lack fidelity to nature. The figures in his landscapes are often painted by such able artists as Teniers, Pierre Bout, and Van der Meulen. His paintings are numerous in the galleries at Madrid, Brussels, and Vienna, and in various French and German museums.

ARTHRI'TIS (Gk. *ἀρθρῖτις*, joint disease, gout, from *ἄρθρον, arthron*, joint). An inflammation of the joints, arising from wounds, bruises, or surgical operations, and sometimes without apparent cause. It frequently follows a bacterial infection. All, or a part, of the joint may be involved. The main symptoms are swelling, pain, heat, and redness. The diseases with which arthritis is commonly associated are gout, rheumatism, gonorrhœa, tuberculosis, syphilis, pyæmia, and typhoid fever. Acute and chronic forms are recognized. The usual treatment in acute cases is compression by cloths wet with cold water, rest, cooling diet, and sedatives. Counter-irritation by means of iodine, turpentine, or mustard, may be of service in chronic or subacute cases. Sometimes cupping or leeching may be indicated. See GOUT; SYNOVITIS.

ARTHROP'ODA (Gk. *ἄρθρον, arthron*, joint + *πούς, pous*, foot). One of the phyla of animals. They are bilaterally symmetrical, and the body is divided into segments, of which each typically carries a pair of jointed appendages. The brain lies dorsal to the food canal and is connected with a ventral chain of ganglia. The body is covered with a fine chitinous cuticle, periodically molted. The Arthropoda are descended from the Annulata, from which they differ chiefly in the jointed appendages, which are used largely as walking, instead of merely swimming, appendages, and they have advanced beyond the annelids in the specialization of the segments and appendages, so that in general, head, thorax, and abdomen may be distinguished. The head always bears a pair of jaws and at least one pair of antennæ, except when, as in spiders, these are rudimentary or altogether gone. The abdomen is usually devoid of developed appendages; when present, these have other functions than locomotion. Sense organs are usually well developed, except in the parasitic forms. The eyes are either simple and placed directly above the brain, or compound, and are sometimes placed on movable stalks. The mouth is usually provided with one or more pairs of appendages; the intestine may be coiled, and excretory organs occur chiefly either as specialized tracts or as diverticula of the midgut, or as tubular special glands. An incomplete blood system is present, but veins are often lacking, and the blood returns through the general body spaces. The dorsal vessel functions as a heart and may become very short and specialized. Reproduction is usually bisexual, but parthenogenesis occurs. During development repeated moltings (ecdyses) occur, often associated with profound changes in form; from molt to molt constitutes a larval "stage."

Classification. Class I. *Crustacea*, divided into *Entomostraca*, of small size and a variable number of segments, and *Malacostraca*, usually of large size, with 20 segments in the trunk (ex-

cepting one small and rare group, Nebalia). Orders of Entomostraca: Phyllopoda (fairy-shrimps), Trilobita (fossil), Ostracoda, Copepoda (water-fleas), Cirripedia (barnacles). Chief orders of Malacostraca: Isopoda (sow-bugs), Amphipoda (beach-fleas), Cumacea, Stomatopoda (mantis shrimps), Schizopoda (shrimps and prawns), Decapoda (lobsters, crayfish, crabs).

Class II. *Arachnida*—Orders: Scorpionida (scorpions); Pseudoscorpionida (book scorpions); Pedipalpida (scorpion spiders); Solpugida (Galeodes); Phalangida (harvestmen); Araneida (spiders); Acarida (ticks and mites); Xiphosura (king crab).

Class III. *Onychophora*, containing only Peripatus.

Class IV. *Myriapoda* (Centipeds, etc.).

Class V. *Insecta*—Orders: Aptera (springtails and silver-fish); Orthoptera (cockroaches, grass-hoppers, etc.); Neuroptera (dragon-flies, May-flies, caddis-flies, etc.); Hemiptera (bugs); Diptera (gnats and flies); Lepidoptera (butterflies and moths); Coleoptera (beetles); Hymenoptera (bees, wasps, etc.).

Bibliography. References to books will be found under various articles describing groups or species of Arthropoda. Consult, as general works, particularly the series "Cambridge Natural History," and Parker and Haswell, *Text-book of Zoölogy* (London and New York, 1897); Lankester, Hutton, and others, "Are the Arthropoda a Natural Group?" in *Natural Science*, vol. xi (London, 1897); Kingsley, "Classification of the Arthropoda," in *American Naturalist*, vol. xxviii (Philadelphia, 1894).

ARTHROSPORES (Gk. *ἄρθρον*, *arthron*, joint + *σπόρος*, seed). A name applied to the resting cells of certain of Blue-green Algæ. In *Nostoc* the ordinary working cells form a filament that resembles a string of beads. When the conditions for work begin to be unfavorable, certain cells enlarge, accumulate reserve food, and become thick-walled. These cells (the arthrospores) are able to endure cold or drought; and upon the return of favorable conditions the heavy wall is broken through, and work is resumed. These "arthrosphores," therefore, are not real spores, but are simply protected working cells.

ARTHUR. A half-legendary king of the Britons, supposed to have reigned in the sixth century. He was the great national hero of the British Celts and became the central figure of one of the principal cycles of mediæval romance. Nothing is absolutely known of his history, and his existence has sometimes been denied altogether. The more usual view, however, recognizes at least an historic starting point for the great body of tradition that centres in his name. In accordance with a favorite theory of modern mythologists, Arthur is often regarded as a combination of an actual British hero with one or more ancient Celtic gods. Thus, Professor Rhys, who connects Arthur's name with an Aryan root which means 'to plow,' thinks that some elements in his legend belonged originally to a culture-god described on Continental inscriptions as Mercurius Artaois, or Mercurius Cultor, while perhaps other elements were derived from an old sky-god, a kind of Celtic Zeus.

The usual account of Arthur, as given by Geoffrey of Monmouth, is briefly as follows: He was the son of Uther Pendragon, King of Britain, and Igerne, the wife of the Duke of Cornwall, whose union was effected by a device of Merlin the Wizard. After the death of the Duke, Uther made Igerne his queen, and in due time Arthur succeeded to the throne. Upon becoming King, Arthur at once took the lead of his people in their wars with the Saxons and defeated the invaders on every hand. Encouraged by victory, he extended his conquests to Ireland, the Orkneys, and even to Norway and Gaul. Meanwhile he established a great court at Caerleon-on-Usk, where, with his Queen Guinevere (or Guanhumara), he was surrounded by a grand assemblage of knights and kings. After a time a message came from the Emperor of Rome demanding tribute, and Arthur, ably supported by Gawain, conducted a successful expedition against the forces of the Empire. In the midst of his victories on the Continent Arthur was recalled to defend his kingdom and Queen from the traitorous Modred, who had seized upon both in his absence. Arthur undertook to put down the rebellion, and in the first battle his forces were victorious, but Gawain was slain. Then, in the battle at the river Camel, Modred was defeated and killed, but Arthur himself was grievously wounded and carried off to the island of Avalon to be healed. The hope was long cherished by the British people that Arthur would some day return and restore them to power.

Much of this narrative is obviously unhistoric, and very little of it can be traced with certainty to sources older than the ninth century. The first recorded mention of Arthur is in the *Historia Britonum* of Nennius, who lived about the year 800. He is there described as a *dux bellorum*, who, along with other leaders of the Britons, fought 12 battles against the Saxons. The *Annales Cambriæ* (contained in a MS. of the tenth century) also mention him, giving the year 537 as the date of his death. The *Vita Gildæ* (preserved in a twelfth century MS.) speaks of him as a king of all Britain. But not till we come to the *Historia Regum Britanniæ* of Geoffrey of Monmouth (which already existed, in some form, as early as 1139) do we find the more fully developed story of which an outline has just been given. The question with regard to Geoffrey's sources is very difficult and may never be fully settled. The later chroniclers —Wace, Layamon, Robert of Gloucester, and the rest—for the most part repeat the same account with minor modifications. Thus Wace (who wrote in 1155) first mentions the Round Table, an element which he surely did not invent, but must have derived from current Celtic traditions.

It was not in the chronicles, however, that the material about Arthur found its fullest and best expression. The fame of his court was most widely celebrated in the romances of chivalry. Of this class of literature one of the earliest and greatest representatives was the French poet, Chrestien de Troyes, who wrote in the latter half of the twelfth century. He had many followers in France, and the French romances were widely translated and imitated in the other European languages. The relation between the romances and the chronicles is not entirely clear, but the latter cannot be looked upon as the source of any considerable part of the material in the former. In the romances less attention is paid to Arthur and his conquests, and far more to the lives and exploits of his several knights; so that the King, while remaining the central figure of all the poems, is the hero of hardly any. Gawain, Ywain, Lancelot, and Perceval are cele-

brated in turn, until they, too, give place to new knights, the favorites of new poets. Most of the earlier romances (like those of Chrestien) were metrical; but the stories soon began to be worked over in prose, and finally great prose cycles were written, in which the scattered episodes were woven together with as much consistency as could be obtained. The great example in English of this stage of development is the *Morte d'Arthur* of Sir Thomas Malory, which has been the source of Arthurian lore most consulted by English readers and writers since the fifteenth century.

The origin of the material in the romances and the manner of its transmission have long been the subject of voluminous discussion. Some scholars have maintained that there is nothing distinctively Celtic in the cycle beyond the names, the geographical setting, and an occasional incident. Others, holding the stories to have been in large part the property of the Celtic races, have discussed whether they were transmitted to the French poets in England or on the Continent, whether through the Armoricans or through the Welsh. Each of these theories of transmission has at present its adherents among scholars; but in the course of recent investigations the Celtic character and origin of the great body of the material has been steadily made clearer. The "matter of Britain" has not been misnamed. Unfortunately the remains of early Welsh literature are scanty, and little or nothing can be learned from them of the direct sources of the Arthurian stories. But the national hero tales of the Irish have been preserved in large quantities from very early times, and a comparison of this saga material with the mediæval romances has developed many striking parallelisms which cannot be explained except by some theory of common origin. The pursuit of this line of investigation has yielded most important results in the last few years.

The story of Arthur and his Round Table has been less treated in modern than in early English literature. Still, it has engaged the attention of great poets. Spenser introduced Arthur into the *Faerie Queene*, but preserved very little of the substance of the old romances. Milton and Dryden both planned Arthurian epics and then gave them up for other subjects. The romantic revival of the nineteenth century brought the "matter of Britain," along with other mediæval subjects, once more to the front. A number of episodes from the cycle were treated by the lesser poets of the period, and Tennyson produced in the *Idylls of the King* what is now without doubt the best-known version of these ancient tales.

Bibliography. On the history and mythology: J. Rhys, *The Hibbert Lectures* (London, 1886); *Studies in the Arthurian Legend* (Oxford, 1891); H. Zimmer, *Nennius Vindicatus* (Berlin, 1893); Fletcher, *The Arthurian Material in the Chronicles* (Boston, 1906); Pokorny, *Die Ursprung der Arthursage* (Vienna, 1909); W. Lewis Jones, *King Arthur in History and Legend* (Cambridge, 1911). On the transmission of the material of the romances: Gaston Paris, *Histoire littéraire de la France*, vol. xxx (Paris, 1888); Zimmer, *Göttingische Gelehrte Anzeigen* (Göttingen, 1890); Engel, *Die Einflüsse der Arthur-romane auf die Chansons de Geste* (Halle, 1910); also a series of articles by Paris and others in *Romania*, vols. x (Paris, 1881) and following. The works of Chrestien were edited by W. Förster (Halle, 1884–99) and selections from his romances have been translated by W. W. Newell in *King Arthur and the Table Round* (Boston, 1897). On the romances consult also: Paris, *Les romans de la Table-Ronde* (Paris, 1868–77), Ward, *Catalogue of Romances in the Department of Manuscripts in the British Museum* (London, 1883), and Sommer, *The vulgate version of the Arthurian romances, ed. from MSS. of the British Museum*, vols. i–vi (Washington, 1908–13); for the early Welsh poetry, Skene, *The Four Ancient Books of Wales* (Edinburgh, 1868); Maclean, *The Literature of the Celts* (Glasgow, 1906); and for the bearing of Irish literature on the Arthurian question, A. C. L. Brown, *Ywain: A Study in the Origins of Arthurian Romance* (Boston, 1902); for a discussion of later Arthurian literature, MacCallum, *Tennyson's Idylls of the King and Arthurian Story from the Sixteenth Century* (Glasgow, 1894), and Maynadier, *The Arthur of the English Poets* (Boston, 1907). See Avalon; Mabinogion; Perceval; Tristram.

ARTHUR (1187–1203). Duke of Brittany, grandson of Henry II of England and nephew of Richard I, Cœur-de-Lion. In 1194 he was proclaimed Duke of Brittany. On Richard's death in 1199 the nobles of Anjou, Touraine, and Maine refused to recognize John and became the vassals of Arthur. He was knighted by Philip II of France and invested with Brittany and other French possessions appertaining to the English crown. In the same year John landed in Normandy. In support of Arthur Philip took the field against him. Soon, however, Philip's unscrupulous conduct gave offense to the Angevin friends of Arthur, and in 1200 a peace was concluded between John and Philip. In 1202 war again broke out. Poitou rose in insurrection against England, and Arthur, who had marched to besiege the castle of Mirabeau, was taken prisoner. He was removed in 1203 to Rouen, where he mysteriously disappeared—drowned, some said, by John's own hands. The story of Arthur appears in Holinshed. Shakespeare, in *King John*, used Holinshed as a basis, but supplemented the old chronicle with imaginative details of his own. See John.

ARTHUR, Chester Alan (1830–86). The twenty-first President of the United States. He was born at Fairfield, Vt., Oct. 5, 1830, of Scotch-Irish parentage. He graduated from Union College in 1848, began the practice of law in 1853 and soon became conspicuous at the bar of New York. In the decade before the Civil War his professional reputation was assured by his share in the famous Lemmon Case, involving the validity, under certain conditions, of the Fugitive Slave Law, and by his management of the case, which resulted in securing a verdict from the highest court of the State that a slave brought into New York while in transit from one slave State to another was, ipso facto, free. In the period of the war he served at different times as inspector-general and as quartermaster-general of the State of New York, and gained wide recognition for his particularly effective work in preparing the New York troops for the field. Having identified himself with the Republican party in its early days, he obtained from President Grant in 1871 the highly desirable office of Collector of the Port of New York, and four years later his administration of the office was indorsed by a reappointment. His relations with practical

politics and his attitude toward civil-service reform not tending long to maintain harmony between himself and the incoming administration, he was removed from office by President Hayes. The power of his friends, however, was such that in 1880, partly as a concession to the unsuccessful supporters of Grant, he was nominated for the vice-presidency, and upon his election to that office manifested an activity in senatorial politics quite unusual with vice presidents. In the factional fight for the control of the New York patronage, he continued in alliance with Roscoe Conkling, the leader of the "Stalwart" faction, against the "Half Breeds." This bitter controversy culminated in the resignations of Senators Conkling and Platt; but the situation seemed altered a few months later, when, upon the death of Garfield, Arthur succeeded to the presidency. His administration of that office, however, was marked by a realization of its responsibilities, and by principles of procedure different from those which had earlier controlled his actions as a politician.

Those who anticipated the introduction of partisan motives into the executive policy were shown clearly to be in error, and the administration, although not brilliant, was in many respects creditable. The tariff formed the chief object of party legislation, and important congressional action was taken with reference to the problems of polygamy in Utah, of the Chinese, of the development of the navy, and of civil-service reform. On the other hand, the "Star-Route" frauds had not disappeared from notice, and the prevalent dissatisfaction with the methods and accomplishments of the Republican party was typified in the defeat of Arthur's Secretary of the Treasury, Mr. Folger, by Grover Cleveland in the gubernatorial contest in New York. President Arthur was avowedly a candidate for the nomination in 1884, but was defeated by James G. Blaine. He died Nov. 18, 1886. Consult Smalley, *Life of C. A. Arthur* (New York, 1880); and see UNITED STATES, *Administration of Arthur*.

ARTHUR, SIR GEORGE (1784–1854). An English colonial governor, born at Plymouth. He entered the army in 1804, served with marked distinction in several campaigns, and in 1814 was appointed Lieutenant-Governor of British Honduras. From 1823 to 1837 he was Lieutenant-Governor of Tasmania, and in the latter year was appointed Lieutenant-Governor of Upper Canada. During part of 1841 he acted as Deputy-Governor. From 1842 to 1846 he was Governor of the Presidency of Bombay, India, in which capacity he carried on the Deccan survey, quelled the Kolapur insurrection, and did much firmly to establish British sovereignty.

ARTHUR, JOSEPH CHARLES (1850—). An American botanist. He was born at Lowville, N. Y., studied at the Iowa State College and Johns Hopkins, Harvard, and Bonn universities, served as instructor in the universities of Wisconsin and Minnesota from 1879 to 1882, and from 1884 to 1887 was botanist to the New York Agricultural Experiment Station. He was appointed professor of vegetable physiology and pathology at Purdue University and botanist of the Indiana Experiment Station in 1887. With Dr. Coulter and Dr. Barnes he edited a *Handbook of Plant Dissection* (1886) and (with D. J. McDougal) wrote *Living Plants and their Properties* (1898). In *North American Flora* (1907) the article on *Uredinales* is his. He was one of the editors of the *Botanical Gazette* from 1882 to 1900, and published numerous papers, including *History and Biology of Pear-Blight*.

ARTHUR, JULIA (1869—). The stage name of Ida Lewis, an American actress. She was born at Hamilton, Ont., May 3, 1869. At the age of 14 she appeared on the professional stage, and then, after three seasons, went to England to study music and drama. Having returned to New York, she met with success in *The Black Masque*, and in A. M. Palmer's company as Mercedes, etc. In 1895 she appeared in London with Irving at the Lyceum, playing Rosamund in *Becket*, and other parts. Next year she accompanied Irving and Terry to America. In 1897 she brought out in New York *A Lady of Quality* on an elaborate scale; the following season she appeared as Rosalind in *As You Like It*, at Wallack's Theatre. Oct. 24, 1899, she produced, at the Broadway Theatre, *More than Queen*, from the French of Emile Bergerat, taking the part of Josephine Bonaparte, which obtained a great success. In March, 1900, an illness in Philadelphia caused her to leave the stage temporarily. She is the wife of B. P. Cheney, Jr. Consult J. B. Clapp and E. F. Edgett, *Players of the Present* (New York, 1899), and L. C. Strang, *Famous Actresses of the Day in America* (Boston, 1899).

ARTHUR, PRINCE, DUKE OF CONNAUGHT. See CONNAUGHT, ARTHUR WILLIAM PATRICK ALBERT, DUKE OF.

ARTHUR, TIMOTHY SHAY (1809–85). An American story-writer, born near Newburgh, N. Y. He wrote a great number of moral and domestic tales and sketches which once had much popularity and was one of the authors of a series of histories of various States. One of the most popular of his stories was *Ten Nights in a Bar-Room*, especially as dramatized. He founded *Arthur's Home Magazine* in 1852. He died in Philadelphia.

ARTHUR, WILLIAM (1819–1901). A British author and clergyman, born in Ireland. He was in India for three years as a missionary; afterward secretary of Wesleyan Church Missionary Society, and president of the British Conference, and was principal of the Wesleyan College in Belfast from 1868 to 1871. He is the author of *Personal Reminiscences of a Mission to the Mysore* (London, 1847); *The Tongue of Fire, or True Power of Christianity* (1856; 40th ed. in 1885, and many reprints); *The People's Day* (1855; 11th ed., 1856); *Italy in Transition* (1860); *The Pope, the Kings, and the People* (1903).

ARTHUR'S SEAT. The hill 822 feet high in the immediate vicinity of Edinburgh, Scotland, supposed to have derived its name from the British King Arthur, who is reputed to have watched from its summit the defeat of the Picts by his army. It is a basaltic mass, analogous to those of the Palisades of the Hudson, though of less extent, which during Mesozoic time flowed out as lava from a fissure in Carboniferous rocks. Erosion through long time subsequent to the period of outflow has resulted in the present form of the hill, which presents on its western and southern sides steep precipices. The hill was selected in 1855 as a base for observations with a view to determining the density of the earth.

AR'TICHOKE (It. *arciciocco*, dial. *carciocco*,

carcioffo; Sp. *alca[r]chofa*, from Ar. *al-harshaf, al-kharshūf*). The true French or globe artichoke, *Cynara scolymus*, is a thistle-like perennial plant of the family Compositæ, now growing wild in the south of Europe, but probably a native of Asia. *Cynara scolymus* has the radical leaves 3 to 4 feet long and somewhat spiny. The stem is 2 or 3 feet high, branched, with large heads of violet-colored (sometimes white) thistle-like flowers at the summits of the branches. The globe artichoke is prized as a vegetable, especially in Europe. Though long known in the United States, it has not become common. It can be found in season in large city markets, fresh and canned, and its use is increasing. The thickened receptacle and fleshy bases of the scales of the involucre of the immature flower is the portion eaten. A favorite method of cooking is to boil in salted water and serve with melted butter or a white sauce. In Europe it is also eaten raw as a salad. Several varieties are in cultivation, differing in the more or less spiny leaves and the more or less globose form of the head. Artichokes are generally propagated by rooted slips or suckers in spring. These are planted in rows about 4 feet apart, and 2 feet apart in the row. The artichoke bed continues productive for several years. Seaweed is an excellent manure. Consult: "Bur or Globe Artichoke," *United States Department of Agriculture Year Book, 1899*; L. H. Bailey, *Cyclopædia of American Horticulture* (New York, 1900–02); G. Nicholson, *The Illustrated History of Gardening* (London, 1888). The Jerusalem artichoke is a different plant. See ARTICHOKE, JERUSALEM. For illustration, see ARAUCARIA.

ARTICHOKE, JERUSALEM (*Helianthus tuberosus*). A tuberous-rooted perennial sunflower, with annual stems 6 to 10 feet high, and closely resembling the common sunflower. The name Jerusalem is a corruption of the Italian *girasole*, sunflower; and the name "artichoke" comes from the supposed similarity of flavor of the tubers to the true globe artichoke. (See preceding article.) The tuber is the edible portion of the plant. The tubers are produced in clusters of 30 to 50, close about the thick, fleshy root. They are irregularly pear-shaped and similar to potatoes in appearance, but not so smooth. There are white, yellow, red, and purple varieties. The plant is propagated, as are potatoes, by means of tubers planted in rows 2½ to 3 feet apart, and 12 to 14 inches distant in the row. It grows on almost any well-drained soil and is oftentimes planted on gravelly knolls or mounds that would be too dry and poor for many other crops. The crop matures in about five months, and the tubers may be left in the ground over winter without harm; but if allowed to freeze out of the ground they spoil rapidly. Yields of 200 to 500 bushels per acre are common, and as high as 1000 or more bushels per acre have been recorded. The tubers of Jerusalem artichokes are frequently grown as a feeding stuff. Though useful for all kinds of stock, they are generally fed to pigs, which are turned in to gather the crop themselves. Like most roots, Jerusalem artichoke tubers are succulent, i.e., have a high water content—some 78 per cent on an average. In composition they resemble potatoes closely. Their principal nutrients are various sugars and inulin, these comprising some 17 per cent. The tubers are somewhat used as human food. A favorite method of cooking them is to boil in salted water until tender and serve with a white sauce. They are also eaten raw, pickled in vinegar. The flavor is mild and distinct. In Europe alcohol has been manufactured from the tubers. The leaves and stalks of the plant have been somewhat used as coarse fodder, especially for cattle. The dry stalks are useful as fuel.

AR'TICLE (Lat. *articulus*, a little joint). A word which signifies in general a component part of a whole, complete, however, in itself. Thus, we speak of the several articles of a confession; the articles of war; a leading article, etc.

The use of "article" as a grammatical term arose as follows: In such a sentence as, "He found *that* (or *the*) man *that* he was looking for," the Greeks considered the defining particle as connecting the two parts of the sentence and called it joint (Gk. *ἄρθρον, arthron*, Lat. *articulus*); the name was subsequently confined to the first of the two, the other being called the relative. By some grammarians the articles are included among the adjectives.

In English there are two articles—the definite *the*, and the indefinite *a* or *an;* and other modern languages have corresponding words. But articles are not essential to language. The Latin had no articles, and the Greek, as well as the oldest Germanic language, e.g., the Mœso-Gothic, had only the definite article. The Slavic languages have no article, with the exception of the Bulgarian.

The definite articles originate uniformly in demonstrative pronouns. Eng. *the* is only a weakened form of the Anglo-Saxon demonstrative *se*, neut. *thaet* (with the base *the* occurring in all the oblique forms). The same is the case with the Ger. *der;* and Fr. *le*, It. *il* and *lo*, and Sp. *el*, are all from the Lat. *ille*, 'that.' In like manner, *an* or *a* is from the old form of *one* (ān); Ger. *ein* means both *one* and *a;* and so are Fr. *un*, It. and Sp. *uno*, both from Lat. *unus* = *one*.

In the Scandinavian tongues the definite article is attached to the end of the word; the Danish, for example, writes *kong-en*, the king; *hus-et*, the house. It is likewise appended to the noun in the Rumanian, Bulgarian, and Albanian languages.

ARTICLES, THE SIX. Articles often mentioned in the ecclesiastical history of England in the sixteenth century, and imposed by act of Parliament in 1539, when, Henry VIII being displeased with some of the bishops most favorable to the Reformation, their opponents for a time regained the ascendency. These articles asserted the doctrine of transubstantiation, declared communion in both kinds not to be necessary, condemned the marriage of priests, enjoined the continued observance of vows of chastity, and sanctioned private masses and auricular confession. Severe penalties were appointed for writing or speaking against them, and for abstaining from confession or the sacrament at the accustomed times, for priests failing to put away their wives, and for persons writing or speaking against the doctrine of transubstantiation. Archbishop Cranmer vainly opposed the act in the House of Lords; the King was resolute to have it passed. Its severity was mitigated by a subsequent act of his reign (1544), and it was transgressed with impunity even by ecclesiastical dignitaries, until it was repealed in the first year of Edward VI. The text of The Six Articles Act is given in Gee, *Documents Illustrative of the History of the English Church* (London, 1896).

ARTICLES, THE THIRTY-NINE. The articles of religion agreed upon by the archbishops and bishops of both provinces and the whole clergy of the Church of England, in the convocation held at London in the fourth year of Elizabeth, 1562, under Archbishop Parker. To have a clear view of the history of these important articles, we must go back to the promulgation of the original ones, 42 in number, in the reign of Edward VI. The council appointed by the will of Henry VIII to conduct the government during the King's minority, was for the most part favorably disposed toward the reformed opinions, and the management of Church affairs devolved almost entirely upon Archbishop Cranmer. In the year 1549 an Act of Parliament was passed, empowering the King to appoint a commission of 32 persons to revise the ecclesiastical laws. Under this act a commission of 8 bishops, 8 divines, 8 civilians, and 8 lawyers (among whom were Cranmer, Ridley, Hooper, Coverdale, Scory, Peter Martyr, and Justice Hales) was appointed in 1551, and one of its first acts was to draw up a code of articles of faith. These were 42 in number and were set forth by the King's authority in 1553. Strype and Burnet make it appear that these 42 articles were agreed upon in the convocation that was sitting in 1552, but this was not the case. To these articles was prefixed the catechism, and there is no doubt of Cranmer having had the principal hand in their composition; for he owned before Queen Mary's commission that they were his doing. But immediately after their publication Edward died, and one of the first acts of the convocation summoned with the Parliament in the first year of Queen Mary was to declare that these 42 articles had not been set forth by the agreement of that house, and that they did not agree thereto. In 1558 Elizabeth succeeded her sister. In 1559 Parker was installed in the see of Canterbury, and immediately the other vacant sees were filled. And now came a fresh opportunity of drawing up some articles of faith which might serve as a test of orthodoxy in the Reformed church. Parker applied himself to this work, and, for the purpose, revised the 42 articles of King Edward, rejecting 4 of them entirely, and introducing 4 new ones, viz., the 5th, 12th, 29th, and 30th as they now stand, and altering more or less 17 others.

This draft Parker laid before the convocation which met in 1562, where further alterations were made; and the 39th, 40th, and 42d of King Edward's, which treated of the resurrection, the intermediate state, and the doctrine of the final salvation of all men, were finally rejected. The 41st of King Edward's, which condemned the Millenarians, was one of the four which Parker omitted. Thus the articles were reduced to 39. They were drawn up and ratified in Latin, but when they were printed, as was done both in Latin and English, the 29th was omitted, and so the number was further reduced to 38. From these 38 there was a further omission, viz., of the first half of the 20th article, which declares that "the Church hath power to decree rites and ceremonies, and hath authority in controversies of faith." As all the records of convocation perished in the great fire of 1666, it is very difficult to ascertain how these omissions arose. However, in 1571, the articles once more underwent revision. Archbishop Parker and Bishop Jewell made a few trifling alterations; and the 29th being restored, the convocation, which was then sitting, ratified them both in Latin and in English, and an Act of Parliament was passed in that year compelling the clergy to subscribe "such of them as only concern the confession of the true Christian faith, and the doctrine of the Sacraments." There still, however, remained some difficulty as to which was the authorized copy, some of the copies being printed with, and others without, the disputed clause of the 20th; but this was finally settled by the canons passed in the convocation of 1604, which left the articles as they now stand. "His Majesty's declaration," which precedes them, and directs that they shall be interpreted "in their literal and grammatical sense," was prefixed by Charles I in 1628.

It may be interesting to know from what other sources the Thirty-nine Articles are derived. Some of them, as the 1st, 2d, 25th, and 31st, agree not only in their doctrine, but in most of their wording with the Confession of Augsburg. The 9th and 16th are clearly due to the same source. And others, such as the 19th, 20th, 25th, and 34th, resemble, both in doctrine and verbally, certain articles drawn up by a commission appointed by Henry VIII and annotated by the King's own hand. The 11th article, on justification, is ascribed to Cranmer, but the latter part of it existed only in the articles of 1552. The 17th, on predestination, may be traced to the writings of Luther and Melanchthon. The fact is that they bear every mark of being a compromise, designed to be agreeable to the contending parties, Lutheran as well as Calvinist, in the Church of England at the time; and it is well to remember that they are not a creed, but a formula intended to test the sufficient loyalty of the clergy and other officeholders. Each party in the Church of England, even to the most advanced high churchmen of the present day, has been able to prove its agreement with the teaching of the articles—to its own satisfaction, at least. Controversy as to the sense in which subscription is made to them was vigorous all through the nineteenth century, the acute dialectic minds of Newman on one side and Jowett on the other having been exercised in proving that they might be signed in a sense other than the *animus imponentis*, or the mind of the authority which requires subscription. It was felt that subscription to a body of doctrinal statements was an excessive obligation, if it were meant to imply literal agreement with every sentence. To avoid further ambiguities, and to relieve clerical consciences on this point, the Clerical Subscription Act of 1866 did away with subscription in the case of the clergy, and substituted a declaration of assent to the articles and Prayer Book. The University Test Act of 1871 released members of Oxford, Cambridge, and Durham universities (except divinity students and holders of offices with clerical functions) from the obligation of signing them, and threw open the doors of these institutions to persons of varying religious beliefs.

They were adopted by the Convocation of the Irish church in 1635, and by the Scottish Episcopal church in 1804. After the organization of the American Episcopal church they were adopted by the General Convention of 1801, with a few slight changes covering references to civil affairs, to the Athanasian Creed, which that body dropped from the Prayer Book, and to the Book of Homilies. That they are not, in their

original form, satisfactory to extreme Protestants is shown by the fact that the Reformed Episcopal church modified a number of them into a more unmistakably anti-Roman sense in 1875, and that Wesley modified and shortened them into 25 for the Methodist Episcopal church in America in 1784. Consult: Browne, *Exposition of the Thirty-nine Articles* (London, 1850); Forbes, *An Explanation of the Thirty-nine Articles* (London, 1867); a comparative text is published in vol. iii and a discussion of its history in vol. i of Schaff, *Creeds of Christendom* (New York, 1884).

ARTICLES OF ASSO'CIA'TION. A written instrument, setting forth the purposes, terms, and conditions of the association of several persons for the prosecution of a joint enterprise. It is primarily a contract, binding the parties thereto, severally, to one another for its performance; but it may, when duly executed and filed, have by law the force and effect of a charter of incorporation. Such is the usual mode of incorporating companies under the general corporation laws of the United States. See COMPANY; CORPORATION; INCORPORATION.

In England the term is employed to describe the printed regulations for the conduct of the business of a joint-stock company, organized and registered under the Companies Act of 1862. See JOINT-STOCK COMPANY.

ARTICLES OF CONFED'ERA'TION. See UNITED STATES, *History*.

ARTICLES OF FAITH. The summarized statements of the views held and taught by a religious body as the essential doctrine of its system. They have been divided, by Protestant writers, into articles that are fundamental and those that are non-fundamental. The best-known articles of faith are the Apostles' Creed; the Nicene Creed, established by the Council of Nice (325 A.D.); the Athanasian Creed; the statements of faith promulgated by the Council of Constantinople (381 A.D.), and by the Council of Ephesus (431 A.D.); the Thirty-nine Articles (see ARTICLES, THE THIRTY-NINE) of the Church of England, drawn up by Cranmer and Ridley, the Augsburg Confession, the Helvetic Confession, the Thirty-seven Articles of the Church of the Netherlands, the Westminster Confession, and the Articles of the Methodist Episcopal Church. No definite articles of faith were drawn up by the primitive Church until the spread of Christianity, the geographical separation of its different branches, and the growth of heresy, made some brief formularies necessary as a basis of union. See CREEDS AND CONFESSIONS.

ARTICLES OF WAR, UNITED STATES. The discipline and disciplinary procedure code of the United States army. The articles, or rules, were originally copied from the English Mutiny Act, July 30, 1775, and then enlarged, Sept. 20, 1776. The present articles, which are substantially the same as the former, were enacted April 10, 1806, and form Section 1342, United States Revised Statutes, being printed in full in the United States Army Regulations. They commence by a statement declaring that the armies of the United States shall be governed by these rules and articles; that the word "officer," as used therein, shall be understood to designate commissioned officers; and the word "soldier"—all non-commissioned officers, musicians, artificers, privates, and other enlisted men; and the convictions mentioned therein shall be understood to be convictions by courts-martial. There are 125 articles altogether, to which all commissioned officers must subscribe on appointment. Under these articles expressions or conduct implying disrespect or disobedience toward the President, or those placed in authority, are prohibited; but provision is made for appeal against the decision or conduct of a superior. Mutiny, sedition, quarrels, frays, and other disorders; dueling, and all that pertains to it; drunkenness on duty; sleeping on duty; desertion; and neglect of duty, as well as all other forms of misconduct during war, come under distinct clauses. The sixty-second article, generally called "the general article," provides for the punishment of all crimes not capital and all disorders and neglects not mentioned in the other articles. It is the authority under which statutory and common-law crimes and misdemeanors are punished by military courts. The authority and order of procedure for every description of courts-martial or courts of inquiry is explicitly stated, as well as the law to be observed in the discharge or dismissal of officers; the disposal of the effects of deceased officers or men; and the treatment of spies. Subordination to civil authority is enjoined, attendance at divine service encouraged, and punishment ordered in instances of profanity or abuse. Soldiers are also forbidden to hire other soldiers to perform any of their duties. The concluding article ordains that the articles shall be read and published once in every six months to every garrison, regiment, troop, or company in the services of the United States, and shall be duly observed and obeyed by all officers and soldiers. See MILITARY LAW; COURTS, MILITARY.

ARTIC'ULA'TA (Lat. nom. neut. pl. of *articulatus*, jointed, from *articulus*, joint), or ARTICULATED ANIMALS. One of the primary divisions of the animal kingdom, according to the system of Cuvier, now divided into several. See ANNULATA; ARTHROPODA.

ARTIF'ICER (from Lat. *artifex*, a master in the liberal arts, an artist). A soldier who is a mechanic, blacksmith, farrier, wheelwright, carpenter, harness-maker, or machinist, and who is carried on the rolls as an artificer. In the United States army such a soldier is enlisted as a private and is appointed artificer by the company commander. He receives the pay of a corporal. In England he would be assigned to the ordnance store corps and work at his particular trade. Each regiment has also its corps of pioneers, who are mechanics and receive extra pay for their work. Similar branches are a part of the organization of all other European armies.

AR'TIFI'CIAL BUT'TER. See OLEOMARGARINE.

ARTIFICIAL COT'TON. See COTTON, ARTIFICIAL.

ARTIFICIAL FLOW'ERS. See FLOWERS, ARTIFICIAL.

ARTIFICIAL HORI'ZON. A reflecting surface, usually of mercury, used with the sextant (q.v.) or reflecting circle in measuring altitude when the natural horizon is indefinable, and in determining the zero for all instruments by which altitude is measured.

ARTIFICIAL LIMBS. The art of replacing lost limbs by artificial ones made of some appropriate material is very old. In the museum of the Royal College of Surgeons, in London, there is an artificial leg of bronze, wood, and iron, exhumed from a tomb at Capua, Italy, in which,

together with the skeleton of the wearer, were found three vases assigned to the year 300 B.C. Herodotus relates the tale of an Elean, captured by the Spartans and confined with one foot in the stocks, who secured his release by amputating his own foot, and who afterward wore a wooden foot. Pliny declares that M. Sergius, about 167 B.C., made and wore an artificial hand, with which he fought in battle. The celebrated artificial hand of the German knight, Götz von Berlichingen (1480–1562), "the Iron-handed," weighed three pounds and was so constructed as to grasp a sword or lance. It was invented by a mechanic of Nuremberg and is preserved at Jaxthausen, near Heilbronn, a duplicate being in the castle at Erbach, in the Odenwald. According to Scott's *Border Antiquities*, the family of Clephane, of Carslogie, "have been in possession from time immemorial of a hand made in the exact representation of that of a man, curiously formed of steel," and that it was given by one of the kings of Scotland to a laird of Carslogie, who had lost a hand in the service of his country. Ambroise Paré described, in 1564, an iron arm constructed for a Huguenot captain, with which he could hold his shield as well as his bridle-rein. Lorrain, a French locksmith, manufactured artificial limbs, under Paré's suggestions, with much success. Father Sebastian, a Carmelite monk, is credited with being the next to construct such limbs, with less success. Verduin, a surgeon of Holland, invented an artificial leg in 1696, which bore his name and which was amended in later years by Serré. It is claimed that, early in the nineteenth century, Baillif, of Berlin, constructed a hand which did not exceed a pound in weight, and in which the fingers, without the aid of the natural hand, not only exercised the movements of flexion and extension, but could be closed upon and retain light objects, such as a hat and even a pen. In 1790 and 1810 patents were taken out by Thomas Mann, and in 1800 by James Potts, both of England, for artificial legs of wood. Potts's leg was used by the Marquis of Anglesea (who lost a leg at Waterloo) and was hence called the "Anglesea Leg." In 1818 Von Gräfe invented a mechanical appliance for artificial legs, which is largely used with modifications, by European makers. William Selpho, who worked with Potts in England, introduced the "Anglesea Leg" in America. It was superseded by the "Palmer Leg," a lighter and more adaptable invention by B. F. Palmer, an American cripple. Palmer's leg was patented in 1846, 1849, and 1852. Other American makers have been George W. Yerger, W. C. Stone, J. Russell, O. D. Wilcox, J. S. Drake, and A. A. Marks. Marks was the first to suggest rubber feet and hands, and his artificial limbs are now the most commonly used of any in America. His first patents were issued in 1856 and 1860. In 1845 a Dutch mechanic, Van Peeterssen, invented a hand which could be used by an actor, M. Roger, to pick up a pen or hold a leaf of paper, draw a sword from the scabbard, etc. Van Peeterssen's conceptions were extended and improved by the Messrs. Charrière, the celebrated surgical mechanics of Paris, aided by M. Huguier, the well-known surgeon. A very ingenious arm was also constructed by M. Béchard. The utility of an artificial arm depends much on the nature of the stump. A stump above the elbow is best suited for an arm when it gradually tapers to its lowest end, and terminates in a rounded surface. When an arm is removed at the shoulder joint, and there is no stump, an artificial arm can still be fixed in its proper place by means of a corset. In amputation below the elbow joint, the best stump is one which includes about two-thirds of the forearm; while a stump formed by amputation at the wrist is very unsatisfactory. The simplest form of artificial arm intended to be attached to a stump terminating above the elbow "consists of a leathern sheath accurately fitted to the upper part of the stump. The lower end of the sheath is furnished with a wooden block and metal screw-plate, to which can be attached a fork for holding meat, a knife for cutting food, or a hook for carrying a weight" (Heather Bigg). The arm should be so carried as to represent the position of the natural arm when at rest. It is retained in its position by shoulder and breast straps, and forms a light, useful, and inexpensive substitute for the lost member. More complicated and therefore more expensive pieces of apparatus are made, in which motion is given to the fingers, a lateral action of the thumb is obtained, and the wrist movements are partially imitated; and a degree of natural softness is given to the hand by a covering of gutta-percha and india-rubber. Artificial rubber hands are now made in America that will write with a pen, manipulate the lever of a locomotive, row with an oar, cancel tickets, hold papers, work telegraphic keys, hold reins in driving, as well as use a pickaxe, carry a heavy weight, etc.

Artificial legs, having fewer requirements to perform than artificial arms, are comparatively simple in structure. A simple and inexpensive artificial leg which answers all ordinary purposes consists of a hollow sheath or bucket, accurately conformed to the shape of the stump, and having a "pin" placed at its lower end to insure connection between it and the ground. Artificial legs are made in America, provided with rubber feet so that the wearer can dance, skate, ride a bicycle, ride a horse, walk in pedestrian contests, climb ladders, and live the usual life of an active laborer or mechanic. There are many men in the service of railroads as conductors, brakemen, switchmen, etc., who wear an artificial leg, and are able completely to perform their duties. In cases of arrested development of the lower limbs, short-legged persons may be made of the ordinary height by the use of artificial feet placed below the true feet, and attached to the legs by means of metallic rods, jointed at the knee and ankle, or by long-topped shoes.

Other parts, not entitled to be called limbs, can also be replaced by mechanical art—such as the nose, lips, ears, palate, cheek, and eye. In the present advanced state of plastic surgery deficiencies of the nose, lips, and palate can usually be remedied by an operation; cases, however, may occur where an artificial organ is required. Artificial ears are molded of silver or of wax, painted the natural color, and fixed in place by a spring over the vertex of the head. Artificial eyes are made which are adapted to fit almost any socket left after enucleation, and which can be detected with difficulty. The color of the iris of the remaining eye is perfectly copied, and blood vessels traversing visible portions are imitated exactly.

ARTIFICIAL SILK. See SILK, ARTIFICIAL.

ARTIFICIAL STONE. See STONE, ARTIFICIAL.

ARTIGAS, är-tē'gȧs, Fernando José (1755–1851). A South American soldier and dictator, born at Montevideo. At an early age he became captain of a corps in the Spanish provincial service, in which he continued loyal for some time after the outbreak of the insurrection in Buenos Aires. In 1811, however, as a result of ill-treatment by his superior officers, he joined the Revolutionary forces and won a number of victories. He afterward joined the Republican army besieging the Portuguese troops from Brazil, and then occupying Montevideo, but he acted so independently that the commander-in-chief, Sarratea, outlawed him. He then organized an independent force of *gauchos* (cattle-drivers), defeated the troops sent against him, and forced the Junta at Buenos Aires to give him the whole of Uruguay (1814) and recognize him as an independent chief. He drove the Portuguese out of Montevideo, became dictator, and in 1815 made an unsuccessful effort to take Buenos Aires. Repeated efforts to effect a reconciliation between the parties were rendered futile by personal animosities, and eventually General Artigas was defeated and in 1820 fled to Paraguay; but the Dictator Francia sent him to Candelaria, where he passed the remainder of his life in peace as a political exile.

ARTILLERY ("from OF. *artiller*, Sp. *artillero*, It. *artigliero*, OF. *articulier*, explained in a Latin-French glossary as = *artifex*, a master in the liberal arts, an artist; as if from Lat. *articularius*, apparently from *articulum*, dimin. of *ars*, art"). For the development of the meaning, cf. Eng. *engine*, from Lat. *ingenium*, natural capacity, talent, genius.

HISTORY

Early Artillery Machines. Before the introduction of gunpowder, the word "artillery" referred to machines for throwing heavy missiles, in which the projecting force was obtained by a spring or weight suddenly released. These included the catapult, bow, crossbow, sling, ballista, onager, springal, etc. The ballista and onager projected their missiles, usually stones, from a bag or bucket, using the spring as a source of energy. The catapult is described as a machine for throwing stones and darts of great size, and the springal as resembling the ballista. There is much confusion attending the description of these old machines, and the various terms are used indiscriminately by different writers. It is reported in some ancient accounts that stones weighing several hundred pounds were thrown over half a mile. The projectiles used included large beams or logs, heavy arrows and stones, and also inflammable material which was projected over the walls of a town, castle, or other fortified place, to set fire to the interior. The machines above mentioned, having little mobility, were restricted almost entirely to use in the attack and defense of fortified places during the progress of a siege. In modern use the word "artillery" is applied, first, to all projectile arms using gas as a propelling force which are supported by carriages (excepting machine guns) in contradistinction to arms which are discharged from the hand or shoulder; second, to the troops serving such arms; third, to the science which treats of the service of the guns and the organization and administration of the personnel.

Earliest Records. Cannon made its appearance almost immediately following the discovery of the process of the granulation of gunpowder by the German, Schwartz, in 1320. There is no doubt that gunpowder was known before this date. The English friar, Roger Bacon, who died in 1292, wrote of it, and he is supposed to have obtained his knowledge from the Chinese, who are said to have been acquainted with this explosive for many centuries before that time. There is little doubt, however, that its use as a propelling force dates from the discovery of Schwartz, for shortly following that event artillery began to appear in the different armies of Europe. It is said that Edward III employed *crakeys of war*, by which name artillery was first known, in 1327, in his campaign against the Scots. Froissart (1337–1410) is authority for the statement that at the siege of Quesnoy (1340) the French were repulsed, "their horses being frightened by weapons which made a great noise and shot pieces of iron." This appears to be the most authentic account of the first use of firearms in warfare. Villani, a contemporaneous historian, mentions the appearance of three pieces of cannon at Crecy (1346). The development of this weapon was slow, for, a century later, at the siege of Constantinople, we see the old mechanical engines of war and the new cannon employed side by side. Here appeared the greatest park of artillery yet seen in warfare, gathered for Mohammed by the Hungarian engineer, Urban, who had lately left the service of the Greeks for the more remunerative employment of the Turkish monarch.

Probably the most famous piece of ordnance mentioned in history is the great gun of Mohammed II (1453). It was of brass, weighed 18¾ tons, was 17 feet long, and discharged a stone ball 25 inches in diameter, weighing approximately 600 pounds. No firing carriage was provided, the gun being laid by means of blocks and wedges, and sinking the breech end in the ground. Low charges and high elevations were used, the effect being secured largely from the steep angle of fall of the projectile. Its range according to Gibbon was one mile. A traveling carriage consisting of a train of trucks was provided, and the efforts of 200 men and 60 oxen were employed nearly two months in transporting this great gun about 100 miles. Even larger pieces of this class were to be seen at the Dardanelles only a few years ago.

The artillery of this period consisted generally of huge, cumbersome weapons mounted upon crude carriages (limbers had not yet appeared), which were moved by horses or oxen hitched in tandem, by man power, or sometimes by both. Animals and drivers were employed or impressed as required, and were often dismissed and replaced by others similarly obtained at different points along the line of march. Cannoneers were secured from some neighboring fortress, or maybe hired with the gun, often the personal property of the gun captain. Mobility was of the lowest order. The first employment of the new weapon was in siege warfare, and it was not until the end of the fifteenth century that guns began to be used as field artillery in the sense that we understand the term to-day. The earliest cannon were of the simplest construction, being merely tubes closed at one end, and were fired by means of a hot iron applied to a train of powder passing through the touch-hole to the charge within. These guns were known as "vases" and "bombards," and were bell-shaped rather than cylindrical. They were

supported on rough wooden horses or carrying platforms, the latter sometimes consisting of two wheels in front and a trail attached to the axle. At first the material used was iron bars held together with hoops, sometimes hammered iron or copper, laboriously fashioned by hand; later, guns were cast from bronze and other composition metals.

First Half of Sixteenth Century—Wars of Charles V (1521–44). In the wars of Francis I of France and the Emperor Charles V artillery began to establish a reputation as a weapon. The *matériel, personnel,* and draft were still very crude, but guns began to be used effectively on the field of battle. The conical-shaped bombards and vases gradually disappeared during this period and were replaced, in the siege-train, by culverins (18-pounders) drawn by oxen, and in field artillery by cannon (2-, 4-, 6-, and 8-pounders, from the weight of the projectiles thrown) called "falcons," "falconets," and "sakers." It took many years to devise a carriage which would serve both for transportation and for firing. This was gradually developed during the progress of the Franco-Spanish wars. The loss of guns in battle was common because of their immobility. A temporary retirement meant the capture of the guns, and an advance made them useless, as they were then masked by the infantry. The first battle in which artillery played an important part in the general result was at Marignano (1515), where the French had about 350 guns. The Swiss infantry, at that time considered the best in Europe, were unable to stand the fire of this artillery, which covered an important crossing and otherwise distinguished itself by its mobility and timely appearance at critical points. The result was a French victory. At Pavia (1525) the French would have probably won another victory, had their artillery not been masked by their own troops at a critical juncture of the battle.

Latter Half of Sixteenth Century—Religious Wars of France. In the religious wars of France the use of artillery was greatly developed and improved both by the Catholics and by the Huguenots. It was a period during which field artillery began to be used in accordance with the principles of tactics, i.e., it was massed or deployed with reference to the other arms of the service, to attain a common end; so that we may consider this an epoch in the general development of battle tactics for field artillery. It was about this time that the numerous kinds and calibres of field artillery were reduced to four (6-, 12-, 24-, and 48-pounders) in the Dutch artillery. This was another important step in the development and improvement of a system of field artillery. During these wars there was a proportion of one gun to about 1000 men of the other arms of the service. Some idea of the ordnance of this period is gained from the table below showing the artillery train sent to Flanders in 1588:

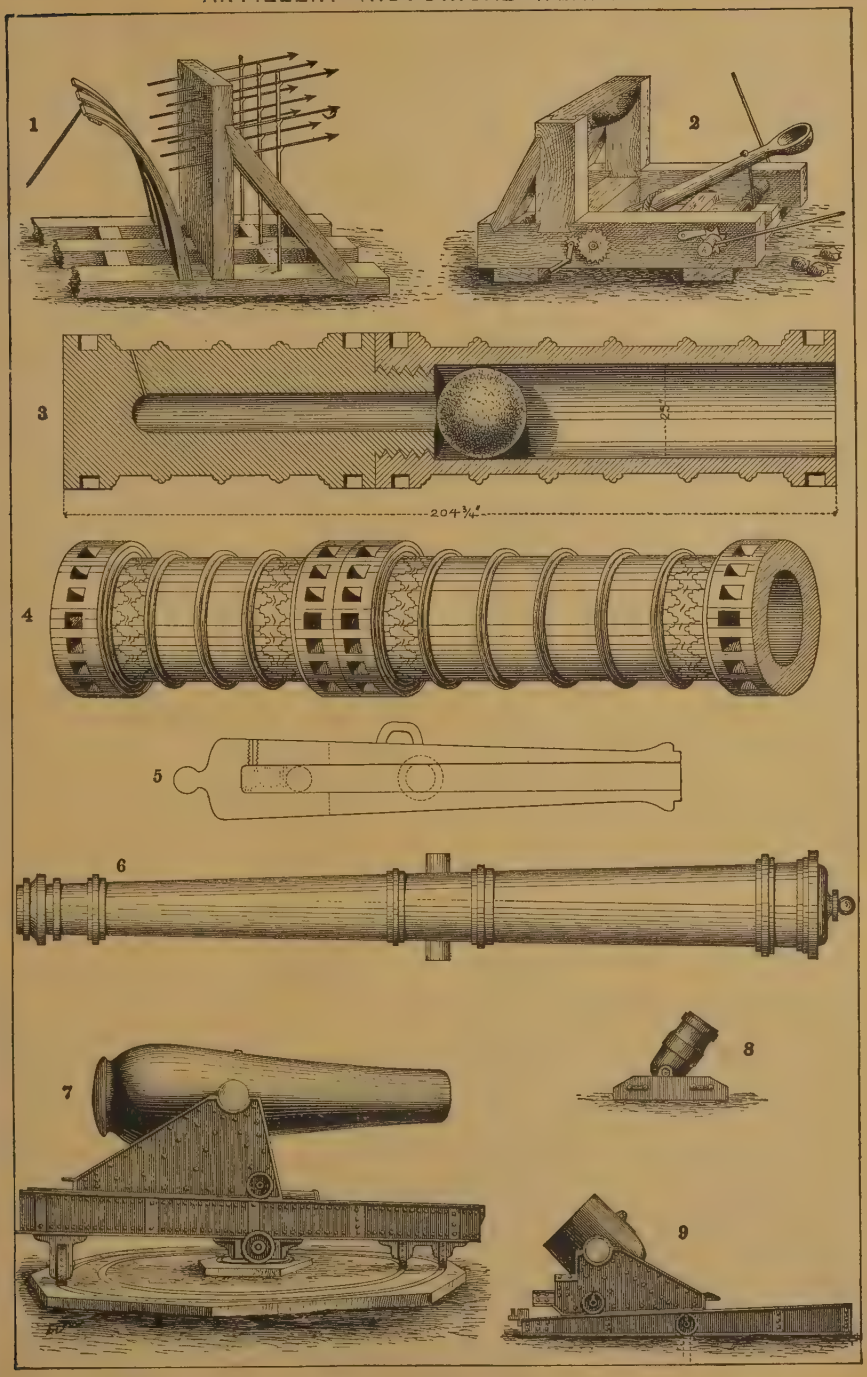
Classification	Weight*	Diameter of bore	Weight of shot
Demi-cannon	6000 lb.	6½″	30 lb.
Culverin	4000 "	5½″	18 "
Demi-culverin	3000 "	4½″	9 "
Saker	1500 "	3½″	5 "
Minion	1100 "	3¼″	4¼ "
Falcon	800 "	2½″	2½ "

* Exclusive of carriage.

The Thirty Years' War (1618–48). It is, however, to Gustavus Adolphus that we owe one of the most important improvements in field artillery, viz., mobility. He soon recognized the defects of artillery in this respect, and that the efficiency of artillery was in exact proportion to its accuracy, rapidity of fire, and quickness of movement on the battlefield. A curious field-piece, sometimes called the "Kalter," sometimes the "leather" gun, consisting essentially of a cylinder of beaten copper, strengthened with iron bands and tangentially supported by coiled rope, the whole being covered with leather, was introduced by him in the Polish War. It was drawn and served by two men only, but of course, had little power. Later it was replaced by iron 4-pounders, drawn by two horses. So many were the improvements made by this remarkable military genius, that his field guns could be fired three times as rapidly as the infantry musket. Gustavus Adolphus considered six field guns to 1000 men of other arms as the most efficient proportion, double that of any other nation of this period. He first introduced the "battalion" system of guns by attaching two to each regiment of infantry and placing them under the orders of the colonel; but he always kept a large number of guns in reserve for critical moments in a battle. He separated the field and garrison artillery, inaugurated the practice of loading the powder in cartridges instead of the old method of using a ladle, and adopted both solid shot and grape for his field guns. It may be said, in passing, that the result of many of the battles of Gustavus Adolphus might have been different but for his improvements in the construction and use of field artillery.

Latter Part of the Seventeenth Century—The Wars of Louis XIV. The French artillery was greatly improved during the time of Louis XIV. The material was both bronze and iron; calibres were limited to 4-, 6-, 8-, 12-, 18-, 24-, and 32-pounders; canvas cartridges and grape-shot were employed. Howitzers and mortars came into use, and explosive shells were introduced into the field artillery by the English and Dutch. Louis XIV was the first (1671) to establish a permanent organization for artillery, but it was not until 1732 that rank was conferred upon French artillery officers. The present Royal Regiment of Artillery of the British army was established in 1716. William III (1689–1702) reorganized the *personnel* and formed the first regimental establishment. Formerly men were detailed from other arms for duty with the artillery when needed. Louis XIV also established schools for the instruction of officers in the science of gunnery, introduced platform wagons, wrought-iron field and mortar carriages, and a new and efficient carriage for sea-coast guns. The English artillery at this time was considerably inferior, in mobility, at least. The largest gun used by them during this period was a demi-cannon, weighing about 6000 pounds, exclusive of the carriage. The famous laboratory at Woolwich, England, was established in 1672. In the War of the Spanish Succession the proportion was four guns to every 1000 men of other arms. The guns were used with great effect and skill. The mobility of the artillery increased in all the armies except the English, and it is in this respect that Marlborough differed most radically from Gustavus Adolphus, as the former never attempted to im-

ARTILLERY—HISTORICAL WEAPONS



1. CATAPULT.
2. BALLISTA.
3-4. GUN OF MAHOMET II.
5. NAPOLEON FIELD GUN.
6. CULVERIN.
7. RODMAN 10-INCH GUN.
8. COEHORN MORTAR.
9. CAST IRON 10-INCH MORTAR.

prove the *matériel* which the latter so efficiently used.

The Eighteenth Century—The Wars of Frederick the Great. It is remarkable that Frederick the Great should have neglected his artillery as he did in the early battles of his career. It was not until later that its true value as a weapon was learned by him; and, like most military lessons, it was learned by costly experience. The defect of Frederick's artillery was its immobility. The field artillery was divided into batteries of position and battalion guns. The former, consisting of heavy guns, were assembled in large batteries in front of the centre or in the wings; the battalion guns, which were 3- or 4-pounders, were assigned one pair to each battalion, each pair commanded by a corporal. Their instructions were always to precede the battalion by 50 paces, to unlimber at 500 paces, and not to fire grape until within 350 paces. Worst of all, when the battalion was beaten, the loss of the pieces was almost inevitable for want of time to limber up. After the battles of Rossbach, Leuthen, and Hochkirch, Frederick, appreciating at last the valuable service rendered by his artillery during these three important battles, improved and increased the number of guns to five for every 1000 men of other arms. He also created a horse artillery system of 10 light 6-pounders, which was able to accompany his cavalry. His field artillery was also improved as his infantry decreased in number, and consisted of 3-, 6-, and 12-pounder guns and 7-, 10-, and 25-pounder howitzers. The Austrian artillery opposed to Frederick's was much superior. The tactics of this period consisted in massing the guns, but the fire itself was not concentrated, the range of the guns being so inferior that it was impossible to concentrate the fire of separated batteries on the same distant object. The general result of these wars, so far as artillery is concerned, was the formation and organization of position gun batteries, which were assigned to brigades of infantry, thus establishing the brigade system, the formation of howitzer batteries, and the creation of horse artillery.

Gribeauval Epoch (commencing 1765). Gribeauval, sometimes called the "father of modern artillery," undertook to reconstruct the French system of artillery in 1765. He separated the arm into the four classes now generally recognized by artillerists—namely, field, siege, garrison, and seacoast, and provided for each a distinct *matériel*. He at once recognized the advantage of decreasing the number of calibres for each kind of service. The guns for field batteries were limited to 3 calibres (4-, 8-, and 12-pounders) and 6-inch howitzers. For siege and garrison artillery he adopted 12- and 16-pounders, 8-inch howitzers, and 10- and 12-inch mortars. By decreasing the length and weight of the pieces, omitting ornamentation and strengthening the carriage, decreasing the windage (clearance between projectile and bore), and the charge, he greatly improved the mobility of the system. Uniformity, lightness, and strength were the ends sought. The introduction of tangent sights and elevating screws greatly increased the accuracy and rapidity of fire. The organization was also improved. Two field guns were assigned to each battalion of infantry, and the men for the service of these pieces were drawn from the company of artillery assigns to each infantry brigade. In addition to this there were eight pieces assigned to the centre and each wing of the army. Eight pieces constituted a "division" to which a company of artillery was assigned. Gribeauval was the first to develop the use of the prolonge, the rope used to unite the trail with the limber, when retiring firing. Horses were hitched in pairs instead of in file. A new ammunition wagon was provided, and canister (a tin case containing a number of balls) was introduced as a projectile. In Gribeauval's system, however, drivers were still hired, as formerly, and the dispersion of the guns among battalions was a serious defect. Horse artillery was established in the French army in 1791 and in the British army in 1793. Gribeauval's improvements in garrison and seacoast carriages resulted in a type, similar in essential principles, to those used in England and America up to the middle of the nineteenth century.

Beginning of Nineteenth Century—Artillery under Napoleon. Napoleon created a divisional artillery by withdrawing the guns from the battalions, forming them into batteries, and assigning the batteries to infantry divisions. This added to their efficiency and relieved the infantry battalion of an impediment. He made many important improvements, both in organization (among others reducing the number of guns in the battery from 8 to 6), administration, and the tactical employment of artillery in the field. He reduced the calibres for the field batteries to 6-pounder guns and 24-pounder howitzers, and to 4-pounders for the horse batteries. He used military drivers for horse batteries, and did away with the general custom previous to this advance of hiring teamsters by contract. They now formed a part of the military establishment. Napoleon always held in reserve a large number of guns for use at the decisive moment of the battle, and effectually employed the modern system of concentration of fire from separated masses of guns. His artillery played a most important part at Friedland, Wagram, Borodino, Lützen, and Waterloo. As Napoleon lost his infantry, he increased the number of guns per 1000 men. At Austerlitz the proportion was 2½ guns, at Wagram nearly 4, to each 1000 men of other arms. A study of his campaigns is of the utmost importance, as it gives, perhaps as no other series of campaigns, a detailed account of the possibilities of field artillery.

British Artillery. Just before the English wars on the Continent, which began in 1793, the British artillery consisted of a train composed of both field and siege guns, organized in brigades of 12 pieces each. Two guns were assigned to each infantry battalion. Draft was by three horses in single file, the drivers being carters on foot. The necessity for reorganization and improvement was soon made apparent. The driver corps for the guns was established in 1794. The dispersion of the guns among the infantry battalions was abolished in 1802, the guns being formed into field batteries or brigades of 6 guns each. Prior to this time field and siege guns had been gathered, almost haphazard, into batteries of 12 pieces. Shrapnel was invented by Major Shrapnel in 1803, and Congreve rockets by Sir W. Congreve in 1806. Horses were harnessed in pairs. There were 6 horses to each gun and 4 to each caisson. The armament for each battery was 5 guns and 1 howitzer, uniform in each field battery, either 6-, 9-, or 12-pounders. The how-

itzers were 5½-inch brass pieces. At first the horse batteries contained two 9- and three 6-pounders, but later all five guns were 9-pounders. Congreve rockets were unique reversions to earlier artillery weapons, but seem to have been effective. The rocket consisted of a sheet-iron case inclosing the explosive and was fired from a tube. They were first used at Leipzig (1813) and with great success; also in the Peninsular War at the passage of the lower Adour (1814), and at Bladensburg, against American troops. Notwithstanding the above improvements, the British artillery still lacked mobility. Improvement in this direction was steady up to the time of the Crimean War.

First Half of Nineteenth Century. In 1822 the corps of drivers in the British Artillery was abolished, and men were enlisted to serve either as drivers or cannoneers. This practice was followed by the French in 1829. The field batteries consisted of 4 guns and 2 howitzers each, the guns being 8- and 12-pounders, and the howitzers 24- and 32-pounders. Weights were reduced, and the ammunition was carried in chests on the limber. Seats were provided for the cannoneers on the limber-chests and the caissons, and the 2 flasks in the trail were replaced by a single "stock." To Napoleon III is due the establishment of a field battery consisting of a single calibre. The gun was known as the 12-pounder Napoleon. The French artillery at this time was divided into horse artillery (the cannoneers being mounted), line artillery, commonly known as "field artillery" (the cannoneers on the chests), and reserve or siege artillery, in which all the men marched on foot. This was the organization at the time of the Crimean War. The British artillery was organized as "position, heavy field, field, horse, and mountain batteries, armed respectively with 18-, 12-, 9-, 6-, and 3-pounder guns, and 8-inch, 32-, 24-, and 12-pounders, and 4-inch howitzers. A rocket section was attached to each battery of field and horse artillery." (See Wagner, *Organization and Tactics.*) The Crimean War consisted principally of siege operations, and there was therefore little opportunity for the tactical use of fieldpieces. At Inkerman (Nov. 5, 1854), however, both sides employed artillery with some effect. The maximum effective range obtained by the guns of this period was only about one mile, and it became evident during the war that the power of the field gun had to be increased and its fire made more accurate if it was to become effective in a contest with infantry. Rifling, though first practically applied in 1846, was not developed until after the Crimean War. Rifled siege guns were first used by the British at the siege of Sebastopol, but with little effect, on account of poor construction. In reference to the question of rifling and breechloaders, Lloyd and Hadcock, in their *Artillery: Its Progress and Present Position*, state that as early as 1547 the principles of rifling and breech-loading had been experimented with in England. A few years after Sebastopol, the Armstrong breech-loading rifled gun, which was first used in the China Campaign of 1860, was introduced into the British artillery.

Italian War (1859). Rifled field guns first appeared on the field of battle in the Italian War of 1859, being one of the many improvements made practical by the French. The smooth-bore 12-pounder Napoleon gun and the 4- and 12-pounder rifled muzzle-loader familiar to the Union service during the Civil War, played a prominent part in this war. The Austrian artillery at this time consisted entirely of 6- and 12-pounder guns, and 32-pounder howitzers, all smoothbore. By rifling, the effective range of the French field gun was increased to about 2500 yards. The Austrian smoothbore, with an effective range of only 1450 yards, was therefore at a great disadvantage.

Civil War in the United States. *Field Artillery.*—At the beginning of the Civil War in the United States, the field artillery consisted of eight batteries. Most of the seacoast artillery was promptly converted into light batteries. One additional regular regiment and many volunteer batteries were organized. The armament consisted of 3-inch wrought-iron muzzle-loading rifled field guns, 6- and 12-pounder bronze smoothbores, 12-pounder bronze mountain howitzers, and 12-, 24-, and 32-pounder bronze field howitzers. The Napoleon gun was used throughout the Civil War, and with great effect at the shorter ranges. The range of the Ordnance Department 3-inch gun was 2800 yards, and that of the 12-pounder Napoleon about 1500. The objection to the Napoleon, as to all smoothbore arms, was its inaccuracy at long range. The projectiles of this period were shot, shell, grape, and canister. In the Eastern armies the battery contained at first six pieces, later four. There were four batteries to each division. When the divisions were organized into corps, about half of the divisional batteries formed the corps reserve. In 1863 division artillery was abolished, and the batteries of each corps were formed into an "artillery brigade." This system obtained until the close of the war. A brigade contained from 4 to 12 batteries. In the Western armies a battery of artillery was assigned to each infantry brigade, and this organization was retained until 1863. Subsequent changes all tended toward the concentration of batteries. In the Confederate Army of Northern Virginia the artillery was formed into battalions of four batteries each, and a battalion was assigned to each infantry division. To each army corps were assigned two battalions of "corps artillery." This organization of field artillery, with minor changes, has since been adopted by most of the powers. "The War of Secession gave the tactics of artillery a long stride forward. The increased range of the infantry weapon denied to the artillery the ability to manœuvre close to the enemy, as was done in the Napoleonic wars, and greatly restricted the use of grape and canister, which were suitable for short ranges only. The ranges ordinarily employed varied from one-half to one mile, although on occasions batteries sought positions considerably short of these distances. It developed the use of masses of guns to an extent unknown since the days of Napoleon. It infused into the handling of that arm a degree of audacity foreshadowing the tactics of 1870; and if its offensive use in masses had not been all that could be wished, it was due to causes beyond the control of the arm itself." (Wagner, *Organization and Tactics.*)

Siege and Seacoast Artillery.—Up to about 1890 the United States had for seacoast defense and siege trains only the guns left over from the Civil War. These were principally Rodman smoothbores and Parrot rifles, both cast iron and muzzle-loaders. They were supplemented in 1872 by the addition of 8-inch

muzzle-loading converted rifles, the old 10-inch Rodmans being utilized for this purpose. The leading position of American artillery in 1861 was largely due to Lieutenant Rodman, of the United States army. His principle consisted essentially in casting guns by cooling from the interior. The system of artillery in the United States at the beginning of the Civil War embraced the following: "Siege and garrison: Cast-iron 4½-inch rifle, 12-, 18-, and 24-pounder guns, 24-pounder and 8-inch howitzers, and 8-inch and 10-inch mortars; Coehorn mortars (bronze). Seacoast: 32-pounder gun, 8-, 10-, and 15-inch Columbiads, 10- and 13-inch mortars. The total embraced seven different calibres of guns, three of Columbiads, four of howitzers, and four of mortars, or 18 altogether—the same as in 1850. In 1861 the smoothbore system of the United States was certainly excellent. In quality of cast-iron used, and its manipulation during manufacture, it has been claimed, and with good reason, that the Ordnance Department of the United States army led all other countries. If not the first upon the ground, the department was among the pioneers in heavy modern armaments, as was shown by the casting, successfully in that year, of what at the time was the most powerful weapon known—a 15-inch Rodman gun, followed, in 1864, by a similar but 20-inch smoothbore, throwing a shot weighing 1080 pounds. This was a grand stride, and placed the American artillery in no secondary position in the array of national armaments at that time developing." (Birkhimer, *Historical Sketch of the Artillery, United States Army.*)

Austro-Prussian War (1866). During this war nothing of importance in *matériel*, organization, or tactics, was developed by either the Austrians or Prussians. The field battery of the Prussians consisted of six guns, steel breech-loading rifles and smoothbores in the proportion of 10 to 6. They were called 6- and 4-pounders, the first class using a 15-pound oblong shell, and the latter a similar 9-pound shell. Shell fire, using percussion fuze, was used almost exclusively. Muzzle-loading rifles and smoothbores were used in the proportion of 10 to 6 (8- and 4-pounders), each battery containing eight pieces. The Austrians still retained the system of "brigade" artillery and used rocket batteries. In this war "brigade" artillery and rocket batteries appeared for the last time, and breech-loading rifled field guns first came into general use, although some had been used by the Confederates during the Civil War. The Prussians handled their artillery ineffectively during the entire war, their principal fault being failure to use the batteries at hand. The Austrians were far superior in initiative and dash in the handling of their artillery.

Franco-German War. The Prussian artillery officers were bitterly chagrined because of the ineffectiveness of their arm in 1866, and their use of artillery in 1870 was one of the most important military lessons of that war. Reserve artillery disappeared, and divisional and corps artillery alone were employed. To each cavalry division two batteries of horse artillery were attached. The guns employed were steel breech-loading rifles, 6- and 4-pounders. The proportion of artillery was 3.7 guns to 1000 men. The French used muzzle-loading rifles (8- and 4-pounders). A few 12-pounder Napoleon guns seem still to have been in service. The mitrailleuse used by them was a machine gun. Their proportion of artillery was three guns to 1000 men. "The characteristic features of the artillery tactics of the Franco-German War may be summed up as follows: On the march the German artillery was no longer kept in rear of columns of infantry, but was pushed well to the front, being preceded only by enough infantry to protect it from surprise. It was brought into action at the very first opportunity, and almost invariably in large masses, which concentrated their fire upon the objective of the infantry attacks, and the mastery of the hostile artillery was deemed necessary before the infantry advance. Its fire, in almost every case, was deliberate and accurate, and was employed at ranges varying from 3300 to 650 yards, while the French wasted their ammunition in a rapid fire at ranges too long for the best effect. The French committed the further fault of retaining their batteries too long in reserve, and employing them, too often, singly instead of in masses. In this war shrapnel, although first used in 1808, was still in its infancy, and both sides depended mostly upon shell fire. The French time fuze had only two graduations, equivalent to ranges of about 1 and 1½ miles. The Germans used percussion fuzes. The mitrailleuse did not meet the high expectations that had been formed of it, though its effect was sufficient to foreshadow the extensive use of machine guns in future wars. Borbstaedt acknowledges that these guns did produce a considerable effect, partly from the strange, rattling noise they made, partly from the rapidity with which an immense number of projectiles were fired; and he says: 'It cannot be denied that the French mitrailleuses caused heavy losses to the attacking German troops, especially in positions where it was possible to keep them concealed till the decisive moment had arrived.' The mistake of pitting these guns against the German field artillery was frequently and disastrously made by the French. They were good only in the defense of positions." (Wagner, *Organization and Tactics.*)

Russo-Turkish War. The guns used by the Russians in this war were inferior to those used by Prussia seven years before. They were bronze breech-loading rifles, the heavy being 9-, and the light, 6-pounders. The *matériel* of the Turkish artillery was superior to that of the Russians, being composed of Krupp's steel breech-loading rifle guns, 8 and 9 centimeters calibre (3.2 and 3.5 inches). The Russians had 3.9 guns to 1000 men, the Turks only 2.2. During this war nothing new was developed either in organization or *matériel*. It was proved, however, in the actions around Plevna that the fire of field guns was ineffective against troops sheltered in intrenchments, and that no previous bombardment, no matter how severe, will justify the artillery in withholding its fire during the advance of the infantry. On this occasion the Russians had furiously bombarded the Turkish trenches preparatory to assaulting with their infantry. When the guns ceased, the Russian infantry advanced to the attack, and was greeted by a murderous fire from the Turkish riflemen who during the bombardment by the Russian guns had remained quiet and unharmed in their intrenchments.

Spanish-American War. The artillery played little part in the Spanish-American War of 1898. At Santiago the Americans employed four batteries of 3.2-inch breech-loading rifled

steel field guns. Unfortunately these were supplied with black powder, which immediately drew the fire of the Spanish guns. Major Herbert H. Sargent, in *The Campaign of Santiago*, states that, with the exception of one platoon of mountain guns, the Spanish artillery was composed only of the immobile guns placed for the defense of the city, and most of these were of an obsolete type. The United States organized a siege train composed of 3.6- and 5-inch rifles and 7-inch howitzers, but this equipment was never employed. The 3.2-inch field gun and a 2.95-inch mountain howitzer, purchased in England, were used in the Philippines. One battery of 3.2-inch field guns accompanied the American troops to China in 1900 and was used at Peking.

Boer War. In the South African War the British employed a 3-inch breech-loading field gun firing a 15-pound projectile, a horse artillery gun of the same calibre firing a 12½-pound projectile, a 5-inch siege rifle firing 50-pound lyddite shells, several types of howitzers, 2.5-inch mountain guns, and 4.7-inch naval guns. The last mentioned were handled by the naval battalion, and were hauled by horses or oxen, as the occasion required. The fuses of the field and horse artillery guns were graduated up to 3360 and 3960 yards, respectively. According to the comment of the German general staff in their *History of the Boer War*, the shooting and manœuvring of the British artillery were good, but it was not sufficiently trained in fire tactics and working with the infantry. The brigade divisions (battalions) which had not existed in time of peace, were handled with the dash and boldness that had marked the employment of the batteries against savage tribes, and this resulted in the loss of two batteries at Colenso. The Boer equipment consisted of 6-inch Creusot breech-loading siege rifles whose range was 8750 yards, 4.7-inch Krupp howitzers, 3-inch field guns, and 1.45 Vickers-Maxim machine guns (the pom-poms), but much of this armament was old and obsolete. Only in the first part of the war did the Boers employ their artillery by batteries, for after the battle of *Talana Hill* the guns were fought singly, and generally withdrawn before the crisis of the action.

The Russo-Japanese War (1904–05). Both sides used artillery to a very large extent, each being armed with modern rapid-fire guns, although not of the latest type, on long recoil carriages. The Russian weapon was superior to that of the Japanese, but the latter were brilliantly successful in the early stages of the war because of the thorough instruction of their *personnel* and the use of "indirect" fire, here employed for the first time in actual war, although originating with the French in their drill regulations of 1897. In this system the guns are concealed as long as possible, the fire being directed by the observer, who is stationed in a commanding position from which he can see the field of fire. Having telephonic or signal communication with the batteries, the observer is a more important man than the gunner. This method was adopted by the Russians later in the war. The artillery prepares for the attack by firing over the heads of the advancing infantry, instead of by the preliminary artillery duel of former days. Mobility is not so important as ballistic qualities, long range, and rapidity of fire. The Japanese field artillery was organized into 19 regiments of 2 battalions of 3 batteries of 6 guns each. One such regiment was attached to each of the 13 infantry divisions composing the army, the remaining 6 regiments forming an artillery reserve which remained at the disposition of the commander-in-chief. In addition, there was the heavy or siege *matériel* manned by the foot-artillery troops. The Japanese gun, although employed according to modern tactics, was not a true rapid-fire gun. It was not equipped with an hydraulic recoil buffer, and this necessitated relaying after each shot. Its calibre was 2.95 inches, and it fired a shrapnel weighing 11 pounds. High explosive shell were also used. The Russian artillery had no regimental formation, but was grouped into battalions of 3 or 4 batteries of 8 guns each. One or two such battalions were assigned to each infantry division (24 to 48 guns). The gun fired a 14½-pound shrapnel (no shell were carried), and was too heavy for the rough Manchurian terrain. Two types were employed, the later and better model being of such recent issue that the troops were entirely unacquainted with its use, and it was not until late in the war that it was handled in such manner as to bring out the real possibilities of the weapon. Prior to that time there had been a tendency to hold a large part of the artillery in reserve, in marked contrast to the Japanese, who early in the action assigned tasks to by far the greater part of their guns. The greatly superior ballistic properties of the Russian gun (it outranged its Japanese rival by 1000 meters or 1093.61 yards) were thus offset by the superior tactics of the Japanese and the presence with the latter of high explosive shell, the lack of which was a great handicap to the Russians. Neither gun was provided with shields; but both sides improvised this protection as the war progressed. Both belligerents used heavy artillery and mortars, but, if we except Port Arthur and the crossing of the Yalu and Tai-tzu, there is little evidence of their effect. Field mortars are described by Colonel Neznamov as without sufficient range and accuracy, and they may therefore be regarded as obsolete. The lessons brought out by this war were the employment of artillery at long ranges and from concealed positions, the danger of exposing the guns during the early stages of the action, the great rapidity of fire and its consequent drain upon the ammunition supply, the negligible effect of artillery fire against earthworks and hidden targets, and, finally, the urgent necessity for coöperation between the artillery and the infantry which it must support with its fire up to the moment of the final assault. For a full account, see RUSSO-JAPANESE WAR.

Balkan Wars. In the Balkan wars all reports make mention of the terrible effect of artillery fire. General Herr of the French artillery visited the theatre of operations while the war between Turkey and the Allies was still in progress, and as a result of his investigations concluded that artillery must seek the destruction of the hostile guns, therefore the artillery duel is necessary; that oblique fire so manifested its superiority that every effort should be made to gain positions from which it can be delivered; that a frontal attack is only possible after the mastery of the hostile artillery; that the employment of heavy guns at long range, both for the purpose of hastening the hostile deployment and the destruction of the hostile artillery, is necessary; that excessive ranges are uncertain; that field observatories are abso-

lutely necessary; that mountain batteries are preferable to field artillery as accompanying batteries; that aëroplanes under the control of the artillery are necessary; and finally that drag ropes and man harness should be provided.

The Allies were mostly armed with Schneider-Canet field guns, and their employment was generally similar to the French tactics. The Turks were armed with Krupp guns, but the demoralization which seemed to prevail in the Turkish army militated against their proper use.

The scientific development of coast artillery in which the United States has taken a prominent part, was commenced only during the last years of the nineteenth century. The modern weapons of artillery are now such complicated and complete pieces of mechanism that the various groups can best be considered when treated by themselves, and the reader is referred to the articles COAST ARTILLERY; FIELD ARTILLERY; GUNS, NAVAL; HORSE ARTILLERY; HOWITZERS; MACHINE GUNS; MORTARS; MOUNTAIN ARTILLERY; ORDNANCE; SIEGE GUNS, in which will be found illustrated descriptions of most forms of modern ordnance.

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ARTILLERY, PARK OF. A name applied to a collection of guns and accessories in camp or barracks. In action or siege, the guns are parked out of reach of the enemy's fire when not in use themselves. The equipment of a gun park consists of reserve guns and carriages, ammunition wagons and caissons, implements, and material necessary for repairing and completing equipments, and harness stores, field forges, etc. The *personnel* consists of the officers and men of the batteries, smiths, wheelwrights, saddlers, armorers, drivers, and other artificers and laborers.

ARTILLERY CARRIAGES. Artillery carriages are of two classes: First, gun carriages, designed so as to enable cannon to be transported thereon or fired therefrom. Of this class those for the seacoast guns are fixed in position. Second, carriages designed for the transportation of ammunition or material necessary for use of the artillery in the field. Artillery carriages and gun mounts will be found discussed at considerable length in ORDNANCE; GUNS, NAVAL. See also ARTILLERY; COAST ARTILLERY; FIELD ARTILLERY; MACHINE GUNS; SIEGE GUNS; HORSE ARTILLERY.

ARTILLERY COMPANY, ANCIENT AND HONORABLE, of Boston. The oldest regularly organized military company in America, dating from 1637, and formed on the model of the Honorable Artillery Company of London. In the early days of the Colony it was a purely military organization, composed of the leading citizens of Boston and adjacent towns, and always ready for service. The military organization is still preserved, but the functions of the corps are now more or less social, though regular drills are still held at its armory, in Faneuil Hall.

ARTILLERY COMPANY, HONORABLE. The oldest existing volunteer corps in Great Britain, and the model on which the Boston organization of similar name (see ARTILLERY COMPANY, ANCIENT AND HONORABLE) was formed. It had its origin in 1537, in the days of the Tudor sovereigns of England, and is closely rivaled in point of antiquity by the Yeomen of the Guard, the Sergeant-at-Arms, and the corps of Gentlemen Pensioners. The beginnings of the modern artillery school may clearly be seen in the patent forming the company, which, in 1537, Henry VIII granted to three persons, appointing them overseers of the "Science of Artillery" for longbows, crossbows, and hand guns. The city of London has always taken great pride in the organization, which, curiously enough, is the only body of British troops, not regulars, permitted to parade in London streets with bayonets fixed. Until 1849 the members elected their own officers. Since then they have been crown appointments, made on the nomination of the lieutenancy of the city of London.

ARTILLERY SCHOOLS. The United States Artillery School, established at Fort Monroe, Va., constitutes an independent command, from which all reports and returns are made to the headquarters of the army. It is governed by special regulations, modified from time to time, as may be necessary. The school consists of a commandant, adjutant, officers detailed as instructors, and of the troops and enlisted men assigned for duty or instruction. The commandant and the heads of the departments, in addition to forming the faculty, constitute a board of coast artillery for the general service, to which questions of professional interest can be submitted. The instructors and the student-officers have no duties other than those of the school. Practically all coast-artillery officers pass through this school. The first artillery school for practice was established at Fort Monroe in 1824, but was discontinued six years later. A second attempt was made in 1858, but was stopped by the Civil War. The school was again started in 1867, but it was temporarily discontinued in 1898, owing to the officers being needed in the field, etc., during the Spanish-American

War. It was reëstablished in 1900, the course being for one year, commencing September 1, and under the plan then adopted was intended chiefly for the recently appointed lieutenants of artillery not graduates of the Military Academy, a considerable number of whom were admitted to the army during and after the Spanish-American War. Instruction is both theoretical and practical, and the course is closed by an examination before a board of officers especially appointed for the purpose. The curriculum includes the subjects of ballistics and seacoast engineering, electricity, mines and mechanisms, artillery, coast defense, and explosives, special courses including customs and usages of service, property returns, correspondence, regulations, etc. A limited number of graduates are retained for the advanced course which occupies the second year. A branch of this same institution is the school for master gunners, under the management of the officer in charge of the artillery school.

A school of fire for field artillery was established at Fort Sill, Okla., in 1911. In this school the course for captains and lieutenants of the regular army lasts three months; for field officers it is one month. There is also a special course of one month for officers of the organized militia. The work consists mostly in the actual fire of field artillery projectiles and a study of the results obtained.

Foreign Artillery Schools. France, Germany, England, and Italy have artillery schools, some of which have been established for over 200 years. An artillery school was established in Venice as early as 1515. Louis XIV established a school of application for the artillery at Douai in 1679. This was in 1802 transferred to Metz, where it remained till the war of 1870. It is now at Fontainebleau. The artillery and engineering school of Prussia is at Berlin. The artillery and engineering school of England is at Woolwich. In some of the countries the artillery and engineers' schools are combined, but in most of the European states a separation of the two arms is made. Many countries maintain schools of fire; Germany at Jüterbog, Italy at Natturno, and Austria at Hajmasker.

ARTILLERY TRAIN. A certain number of cannon mounted on carriages, with all their furniture, fit for marching. See FIELD ARTILLERY; ARMY ORGANIZATION; ARTILLERY; SIEGE GUNS; TACTICS, MILITARY.

ART NOUVEAU. See NEW ART.

AR'TOCAR'PUS. See BREAD-FRUIT TREE.

ART OF POETRY. See ARS POETICA.

ARTOIS, är'twä' (from *Atrebates*, Lat. name of a Gallic tribe). A former province of France, bounded by Flanders and Picardy, almost corresponding to the modern department of Pas-de-Calais. The capital of Artois was Arras. Louis IX., in 1237, made Artois a county, and gave it to his brother Robert, who was succeeded by his son, Robert II, who died in 1302. Afterward it passed into the control of Flanders and Burgundy, but was ceded to France by treaties in 1659 and 1678. It is a fertile district, yielding grain and hops and vegetables, with abundant pasturage.

ARTOIS, COMTE D'. The title borne by Charles X (q.v.) before his accession to the throne of France.

ARTOIS, JACQUES. See ARTHOIS, JACQUES.

ARTOT, är'tō', MARGUERITE-JOSÉPHINE-DÉSIRÉE MONTAGNEY (1835–1907). A Belgian mezzo-soprano. She was born at Paris, July 21, 1835, studied under Pauline Viardot-Garcia, and made her début at Brussels in 1857. The next year she appeared at the Opera House in Paris, but left there to make a tour of France, Belgium, and Holland. Her success was immediate, and after 1860 she appeared in opera in London, St. Petersburg, and the capitals of the Continent, her repertory including parts in operas by Mozart, Rossini, Verdi, Gounod, etc. In 1869 she was married to the Spanish barytone, Padilla.

AR'TOTYPE. See PHOTOGRAPHY.

ARTS, LIBERAL, or SEVEN LIBERAL. The distinction between the liberal arts and the practical arts on the one hand, and philosophy on the other, originates in Greek education and philosophy. In the *Republic* (bk. xi) of Plato and the *Politics* (viii, 1) of Aristotle, the "liberal arts" are those subjects that are suitable for the development of intellectual and moral excellence, as distinguished from those that are merely useful or practical. The distinction was always made, by the Greek theorists, between music, literature in the form of grammar and rhetoric, and the mathematical studies, and that higher aspect of the liberal discipline termed philosophy. Philosophy was sometimes called the liberal art par excellence. Philo of Judæa, in his attempt to harmonize Hebrew religious literature and Greek philosophy by allegorical interpretation, takes this relationship of the arts and philosophy as the meaning of the union of Abraham with Hagar and Sarah—the former typifying the liberal arts, the latter typifying philosophy. No definite number was ever assigned to the liberal arts by the Greeks, though the distinction later indicated by the terms *trivium* and *quadrivium* is clearly made in the *Republic* of Plato. Varro (116–28 B.C.) reproduces the distinction and the substance of the various "liberal arts" for the Romans, though he includes medicine and architecture, both practical subjects, excluded alike by Greek and by Mediæval thought. Quintilian (35–95 A.D.) discusses five arts—grammar, rhetoric, music, geometry, and astronomy; but, with the subdivision of the first and fourth, there would be added dialectic and arithmetic. By the fifth century the number of arts is definitely recognized as seven, both by the churchman Augustine and the pagan Martianus Capella. Cassiodorus, in the sixth century, applies the term *quadrivium* to arithmetic, geometry, music, and astronomy. Probably before that time the term *trivium* had been applied to grammar, rhetoric, and dialectic, to indicate the trinity of the subject rather than simply their elementary character. By the time of Alcuin, in the eighth century, a sacred significance is attached to the number seven, and the Church appropriates this organization of human or pagan learning, to which at first it had been extremely hostile. Throughout the Middle Ages the "seven arts," as combined into the *trivium* and *quadrivium*, represent the sum of human learning. Dante, in his *Il convito* (bk. ii), identifies them with the seven planetary circles of the heavens, discovering in each planet the characteristic excellence of the corresponding study. The "Seven Liberal Arts" formed the curriculum of the early universities, and their mastery entitled one to the degree of *bachelor*, or *master* "in arts." For the greater portion of the Middle Ages philosophy had simply been the inclusive term, but with the development of the universities, it came to be regarded as a higher discipline. The Renais-

sance broke down even this limitation, and hereafter knowledge was no longer confined to these definite and narrow limits. For a survey of the significance of the term "liberal arts," consult: Abelson, *The Seven Liberal Arts* (New York, 1906), containing full bibliography; Parton, *The Arts Course at Mediæval Universities* (Urbana, Ill., 1910). See DEGREE; DIPLOMA; UNIVERSITY; PHILOSOPHY.

ART STUDENTS' LEAGUE OF NEW YORK. One of the most prominent schools of art in America, located in New York City. It was founded in 1875 by certain students from the National Academy of Design, who felt the need of study from life and a broader field of work than the more conservative institution could give them; was incorporated in 1878, and has since then risen steadily in importance. The annual membership is now over 1500, and the average daily attendance in its classes is 500. Its alumni include many of the most prominent artists in this country. The quarters of the League is the American Fine Arts Building at 215 West 57th Street. The League is self-supporting, the student's fees being from $30 to $70. It is governed by a board of control elected from the members, who in turn are elected from the advanced students. There are classes in drawing and painting from life, antique drawing, portrait, still life and miniature painting, composition, illustration, modeling, and lectures on anatomy, construction and history of art. There are, in general, no entrance requirements. The school year includes night classes for men and women, and a summer term in the American Fine Arts Building, also a summer school of landscape painting at Woodstock, Ulster Co., N. Y. Besides scholarships to some of the small art schools in other cities, the League gives prizes and scholarships in all of its own classes for the best work done. Among the prizes are the One Hundred Dollar Prize for the best painting, the Saltus Prize of $50 for antique drawing, the Saint-Gaudens Prize of $75 for figure modeling, the Saint-Gaudens Prize of $25 for composition modeling, and the Evans Prize of $50 for the encouragement of the practical side of art.

ARTSYBASHEV, MIKHAIL PETROVITCH (1878—). A Russian writer of the same school as Gorki and Andréev (qq.v.). He was born in South Russia and claims to have Tatar blood in his veins. He is undoubtedly of mixed descent. The famous Polish humanitarian, Kosciusko, was his maternal great-grandfather. Left a sickly orphan at the age of three, the boy struggled for an education. Painting engaged his attention in his early years, but the indigence of his father deprived him of means enough to master it. Then he turned to writing, and when, years later, a story of his happened to be printed, he determined to become a writer. Subsequent short stories, of which a great number have been published within a few years, showed the wisdom of his determination. At 25 he wrote a novel, *Sanin*, which at once placed him in the front rank of contemporary Russian writers. It took four years, however, to find a publisher for it; but when it was published (in 1907) its success was phenomenal. Favored by the reaction following the hopeful revolutionary days of 1906, this novel created more discussion in Russia than anything else published within a decade. For his frank realism and revolutionary heresies Artsybashev has already (in 1912) served a two months' sentence in a Russian prison. His popularity is very great, however, and he continues writing in the same realistic vein. His method and style are as simple as those of Maupassant, while his psychological analysis is as penetrating as that of Andréev. He treats of present-day Russia in so masterly a manner that his personal leanings are often indeterminable—resembling the great Turgenev in this respect. He writes of all sorts of men with equal frankness and sympathy. Indeed, Artsybashev is to-day the most promising Russian writer. His works, both long and short, have already been translated into German and Yiddish. *Sanin*, so far his only novel, has been dramatized and put on the Jewish stage.

ARTUSI, är-tōō'sē, GIOVANNI MARIA (c.1550–1613). An Italian musician, composer, and writer on musical theory. He was born at Bologna, was a canon of San Salvatore, Venice, and stanchly defended the musical traditions and views of his time against the innovations of Monteverde and Gabrieli. He published a *Canzonette*, for four voices, and a *Cantate Domino* (Vincenti collection). His theoretical works include the *L'arte del contrappunto ridotto in tavole* (1586 and 1589), *Delle imperfezioni della musica moderna* (1600 and 1603).

ARUBA, ä-rōō'bä, or ORUBA. An island of the Dutch West Indies, situated at the entrance to the Gulf of Venezuela, west of Curaçao, of which it is a dependency (Map: West Indies, E 4). Area, 69 square miles. The population in 1902 was 9105, and estimates in 1911 returned about 10,000. The surface is elevated and scantily watered. Gold is mined, and there are large phosphate deposits. Both of these commodities are important articles of export. Aruba was occupied by the Dutch West India Company in 1634. The capital is Oranjestadt, which contains the bulk of the population.

ARU, ä'rōō, or **ARRU,** ä-rōō', **ISLANDS.** A group of islands in the Arafura Sea, situated between lat. 5° 10′ and 6° 20′ S. and long. 134° and 135° E., southwest of New Guinea (Map: Australasia, F 3). It consists of one large island, divided into the five parts of Kola, Wokan, Kobrur, Tragan, and Maikor, and a number of small islands, all of which are generally low and inaccessible. The chief commercial centre is Dobbo, on the island of Womma, and is a resort for traders. The population is estimated at 22,000 and is made up chiefly of Papuans. The group belongs to the Dutch and forms an administrative dependency of the Moluccas.

ARUM (Lat. Gk. ἄρον, *aron*, wake-robin, cuckoo-pint). A genus of monocotyledonous plants of the family Araceæ. Most of the species are tropical or semi-tropical. They are characterized by a convolute spathe inclosing the spadix, which is naked at top and bears the pistillate flowers at its base. The staminate flowers are placed just above the base. In some of the species the spathes are highly colored and beautiful. These flowers are well known under the name "callas." The calla or calla lily of the greenhouse and gardens is *Richardia* or *Zantedeschia æthiopica*, a native of Africa. A common species in Europe is *Arum maculatum*, where it is known as cuckoo-pint, wake-robin, etc. In the United States there are a number of closely related genera, of which may be mentioned the Indian turnip (*Arisæma triphyllum*), the water arum (*Calla palustris*), and the skunk cabbage (*Symplocarpus fœtidus*). The

latter is well known for its fetid odor. An allied form, *Anthurium andreanum*, from Colombia, South America, with a large, brilliant, orange-red spathe, is often cultivated. Consult A. L. P. and C. Decandolle, *Monographiæ Phanerogamarum*, vol. ii (Paris, 1878–79). For illustration, see ANEMONE; CALLA.

ARUNDEL, ăr'ŭn-del, or colloquially, ärn'del. A small municipal borough of Sussex, England, situated on the navigable river of Arun, about 5 miles from the coast (Map: England, F 6). It has an old parish church, dating from the end of the fourteenth century; but its chief interest centres in Arundel Castle, the former seat of the earls of Arundel, which consists of an old Norman keep and a Gothic building restored late in the nineteenth century. It was besieged twice during the twelfth century and utterly ruined during the civil war of Charles I. It is now the residence of the dukes of Norfolk. Pop., 1891, 2644; 1901, 3059; 1911, 2842.

ARUNDEL, THOMAS (1353–1414). Archbishop of Canterbury in the reigns of Richard II, Henry IV, and Henry V. He was born in Arundel Castle, Sussex, the present seat of the dukes of Norfolk, and was the third son of Robert Fitz-Alan, Earl of Arundel and Warren. He became Archdeacon of Taunton (1373) by the Pope's appointment, and Bishop of Ely in August of the same year. In 1388 he was transferred to the archiepiscopal see of York. He was Lord High Chancellor of England from 1386 to 1389 and from 1391 to 1396. In 1396 he was promoted by a papal bull to the archiepiscopal see of Canterbury. Having been banished the kingdom (1397) for taking a leading part in the first attempt which was made to deliver the nation from the oppression of Richard II, he was honorably received at Rome, and at first favored by the Pope, Boniface IX (1389–1404), who later, prejudiced by the representations of Richard II, deprived him of his see and transferred him to St. Andrews in Scotland. He did not return till 1399 and then was reinstated at Canterbury. He crowned Henry IV, October, 1399, and served as his Lord Chancellor for a few days, again in 1407 and 1412. He was conscientiously a bitter persecutor of the Lollards, the followers of Wiclif, and a chief instrument in procuring the horrible act for the burning of heretics (*de heretico comburendo*), passed in the reign of Henry IV (1401). He even carried his bigotry so far as to solicit from the Pope a bull for digging up Wiclif's bones, which, however, was wisely refused him. He also procured a synodal constitution which forbade the translation of the Scriptures into the vulgar tongue. He died at Canterbury, Feb. 19, 1414.

ARUNDEL, THOMAS HOWARD, second EARL OF (1586–1646). An English art collector, the first to make any large assemblage of works of art in England. He was born at Finchingfield (Essex), was educated at Westminster School and at Trinity College, Cambridge, in 1616 was appointed a Privy Councilor, and in 1621 Earl Marshal of England. In 1636 he executed an important diplomatic mission at the court of Vienna. See ARUNDEL MARBLES; ARUNDEL SOCIETY.

ARUNDEL HOUSE. 1. The famous London house of Lord Arundel, situated where Arundel, Howard, Norfolk, and Surrey streets now unite at the Strand. Here the Arundel marbles were placed when first exported by their new owner from Italy. During the turbulent times of Charles I and Cromwell it was often deserted, and the splendid statuary in its gardens was partially destroyed. 2. The house of Lord Arundel, in which Lord Bacon died in 1626. It stood near Highgate.

ARUNDEL MAR'BLES. The inscribed marbles in the collection of ancient sculptures and antiquities formed about 1627 by Thomas Howard, second Earl of Arundel. Of the original collection of 250 pieces, 136 were presented in 1667 to the University of Oxford, by his grandson, Henry Howard, afterward Duke of Norfolk. The collection was formed for the Earl largely through the purchases of Mr. (afterward Sir) William Petty, who traveled in Italy, Greece, and Asia Minor for this purpose. The most important inscription is the "Parian Chronicle," a slab of marble containing a large part of a chronicle of events in Greek (chiefly Athenian) history. It originally extended from the reign of Cecrops, here reckoned as 1582, to 263–262 B.C., the year of its composition, but the Arundel copy breaks off at 355 B.C. In 1897 another fragment, covering the period from 336 to 299 B.C., was found on Paros. The unknown writer not only gives the Athenian archon in whose term the events recorded took place, but also the number of years before 264 B.C. This inscription, with others of the collection, was first published in *Marmora Arundelliana*, by John Selden (1628), later in *Marmora Oxoniensia* by Prideaux (Oxford, 1676), Chandler (Oxford, 1763), and Roberts (Oxford, 1791). The best edition is that of Boeckh, with full Latin commentary, in *Corpus Inscriptionum Græcarum* (Berlin, 1828–77). The new fragment is published in *Mitteilungen des kaiserlich deutschen archäologischen Instituts, Athenische Abteilung*, vol. xxiv (Berlin, 1897). Consult Sandys, *A History of Classical Scholarship*, vol. ii, pp. 342–343 (Cambridge, 1908).

The nobleman whose name is associated with these ancient marbles is worthy of remembrance, independently of his general merits, as the first of his order in England who liberally encouraged the fine arts and communicated the influence of his own taste and enthusiasm in their cultivation to a wide circle of imitators and successors.

ARUNDEL SOCI'ETY. A society founded at London in 1849 and named after the Earl of Arundel, the famous collector of the Arundel Marbles and one of the first great English patrons and lovers of the arts. It was discontinued in 1897.

ARUNDEL CLUB. A society founded at London in 1904 for the purpose of continuing more effectively the work of the Arundel Society. The Arundel Society encouraged the study of art by reproducing the best works of the old masters; but the Arundel Club goes further by copying and publishing important works in private collections previously inaccessible.

ARUN'DO. See REED.

ARUWIMI, ä'roo-wē'mē. An important right tributary of the Congo, rising from many sources on the slopes of the Blue Mountains west of Albert Nyanza, East Africa (Map: Belgian Congo, E 2). It flows westward through a densely wooded region to the Congo, forming numerous rapids and receiving the Nepoko from the right. It enters the Congo in lat. 1° 30′ N., after a course of nearly 800 miles. It is navigable to Yambuya. Natives give to parts of

its course the names Ituri, Novelle, Suhali, and Bijerre. Stanley, who discovered the river in 1883, ascended it in 1887 on his expedition in search of Emin Pasha.

ARVAD, är'vād. An ancient Phœnician city. The Greek form of the name Ἄραδος, *Arwados,* became Arados when the digamma was dropped; hence the Latinized *Aradus.* Arvad, or more correctly Arwad, was originally the designation of a town on a little island in the Mediterranean about a mile off the coast of Syria, 30 miles north of Tripoli. This island, as well as the small modern village upon it, still bears the name Ruad, or Arwad. But already in the beginning of the fifteenth century B.C. Arvad seems to have had colonies on the mainland. The early Egyptian form of the name, Aratutu or Arudot, corresponding to Arwadoth, is a plural and, as W. Max Müller has suggested, probably designates a city of which the colonies on the mainland were regarded as a part. Thothmes III (1501–1447) conquered the city and after a rebellion punished it severely. It was the home of Abdashirta, and Aziru and his Amoritish dynasty, known to us through the Boghaz Keui tablets, held possession of the city. Tiglath-pileser I (c.1140–1100) embarked in Arvadite ships; Arvad paid tribute to Asurnazirpal III (885–860); Matan Baal of Arvad sent 200 men to the battle of Qarqar against Shalmaneser III in 854; a Matan Baal of Arvad also paid tribute to Tiglath-pileser IV (745–728); Esarhaddon (681–668) demanded tribute of another Matan Baal of Arvad. During the Persian period Arvad formed with Tyre and Sidon a league whose capital was Tripolis. King Strato seems to have held considerable territory in Phœnicia on the advance of Alexander. When attacked by him, the city secured water from springs at the bottom of the sea. The colony Antaradus on the mainland gradually became more important. It is mentioned by Ptolemy. This city was rebuilt by Constantine in 346 A.D. and called Constantina: at the time of the Crusades it had the name Tortosa. The town itself and one of the castles were taken by Saladin, but it returned to the hands of the Christians and was the last possession of the Crusaders in Syria captured from the Templars by Malik al Ashraf in 1291. The walls of Tortosa, now Tartus, are still standing, and there are remains of a castle built by the Crusaders. On the island there are also remains of walls and castles. The latter are of Moslem origin, built since the destruction of the city in 638. The town has now about 3000 inhabitants. Consult: Pietschmann, *Geschichte der Phönizier,* pp. 36 ff. (1889); William Allan, "On the Island of Ruad," in *Journal of the Royal Geographical Society,* vol. xxiii, pp. 154 f. (1853); Renan, *Mission de Phénicie,* pp. 19 ff. (1874); W. Max Müller, *Asien und Europa,* pp. 186 f. (1893); and for Assyriological references, Rogers, *Cuneiform Parallels to the Old Testament* (1912).

ARVAK, är'vak (early awake). In Norse mythology, one of the horses of the sun. The other was called Alsvid (all-knowing).

AR'VAL BROTH'ERS (Lat. *Fratres Arvales,* from *arvum,* a field, arable land). A Roman priesthood of 12 members, whose duty it was to offer public sacrifices to insure the fertility of the fields. The place of their annual meeting was discovered near Rome in 1570, and since then large portions of their records, originally inscribed on slabs inside the temple of Dea Dia, have been recovered, including a list of magistrates from 2 B.C. to 27 A.D. The records end in 241 A.D. and may begin as early as 21 B.C. The college does not seem to have been of importance during the later Republic, but to have been raised to importance by the Emperor Augustus, who was a member, as were his successors, until Gordian III. The members were elected for life by the college, usually on nomination of the Emperor. The officers were a *magister* (master) and a *flamen;* and among the attendants were four boys, who were required to be the sons of senators and to have living parents. Each officer wore a wreath of green, a white fillet, and a white toga bordered with purple. The great annual festival under their charge was in honor of Dea Dia, an otherwise unknown goddess, who must have originally resembled Tellus and Ceres; indeed, W. W. Fowler, in his *Roman Festivals,* p. 74 (London, 1899), identifies her with Ceres. It occupied three days between the middle and end of May and was celebrated with an elaborate ritual. On the first day was the ceremony of "touching" samples of old and young grain; on the second the sacrifice of two white pigs, a cow, and a fat sheep, in a sacred grove beyond the city, followed by blessing or "touching" samples of grain, and after that the dance and song of brotherhood in the temple, and the election of officers for the coming year. On the third day there was a sacrifice in the city. The Arval Brothers celebrated also a festival called Ambarvalia (q.v.). Other important duties of the brothers were to offer sacrifice on the birthday of an emperor, or at the beginning of a consulate, or for escape from danger, or at the starting or ending of a journey, or on occasion of any important event touching the imperial family. On the 3d or 4th of January they recited a particular form of prayer for the ruling Emperor and made sacrifice to the Capitoline deities. Consult Henzen, *Acta Fratrum Arvalium* (Berlin, 1874), and *Ephemeris Epigraphica* (Rome, 1872–99).

ARVE, ärv. A tributary of the Rhône, 62 miles long, situated in the department of Haute-Savoie, France (Map: Switzerland, A 2). It rises on the Col-de-Balme (over 7000 feet high), in the canton of Valais, Switzerland, and flows southwest through the Val-des-Bagnes and the celebrated valley of Chamonix, emptying into the Rhône some distance below Geneva through a picturesque gorge at an elevation of over 1100 feet above the sea. The Arve is very swift and turbulent; and, as it is fed by glaciers, it often overflows its banks and is even the chief cause of the rises in the river Rhône itself. At flood, it is superior in volume to the Rhône itself. The district watered by the Arve contains many pleasure resorts and much fine scenery. The chief towns of interest are Servoz, Saint-Gervais-les-Bains, which has sulphur baths, and Sallanches.

ARVERNE. A borough in Queens Co., N. Y., comprising the fifth ward of New York City, 3 miles southwest of Far Rockaway on the Long Island Railroad, and on the Atlantic Ocean and Jamaica Bay (Map: New York City, Greater New York, G 8). It is a purely residential borough and is a popular summer resort for New Yorkers because of its accessibility and excellent bathing facilities. Pop. (est.), permanent, 2000; summer, 8000.

ARVEYRON, är'vâ'rôn'. A tributary of the Arve in the department of Haute-Savoie, France, rising in the Alps, 4400 feet above sea level, as the outlet of the Mer-de-Glace in Chamonix. Other tributaries of the Arve bear the name "Arveyron," and are further distinguished by the addition of the names of the glaciers from which they take their source.

ARWIDSSON, är'vêd-son, ADOLF IVAR (1791–1858). A Swedish poet, born at Padasjoki, Finland. In 1817 he was appointed *docent* in history at the University of Åbo; but his outspoken criticism of the acts of the authorities, in an essay contributed to a journal, the *Mnemosyne*, resulted in his banishment from Finland in 1822 and his removal to Stockholm, where he became director of the Royal Library (1843–58). His publications include a collection of poems, *Ungdoms Rimfrost* (1832); a collection of Swedish folk songs, entitled *Svenska Fornsånger* (3 vols., 1834–42); and a translation of the Icelandic *Frithjof's Saga* (2d ed., 1841).

ARYABHATA, är'ya-b'hät'â (end of fifth century A.D.). A Hindu astronomer, born at Pataliputra (mod. Patna, on the upper Ganges). He was known to the Arabs as Arjehir, and his writings had considerable influence on Arabic science. His only work known to us is the *Âryabhatîya*, a series of rules and propositions written in verse and so called after his own name. This was published in Sanskrit, and edited by Kern at Leyden in 1874. It is divided into four parts, entitled respectively, "Celestial Harmonies," "Elements of Calculation," "On Time and its Measures," and "Spheres." Of the second part, Rodet has published a translation (Paris, 1879). Aryabhata held that the earth rotates upon its axis, and he gave the correct explanation of eclipses of the sun and the moon. In mathematics he could solve the quadratic equation, but many of his geometric formulas were incorrect.

ARYAN, är'yan *or* är'i-an. The name commonly employed to designate that group of languages and that branch of the human family to which formerly the appellation "Caucasian" or "Japhetic," as opposed to "Semitic," was popularly but inaccurately given. It is synonymous in general with the terms "Indo-Germanic," "Indo-European," or "Indo-Celtic." German philologists commonly employ the term "Indo-Germanic" in its stead, and on good grounds they restrict the name "Aryan" to the sense of "Indo-Iranian," that is, to the Indian and Iranian branches of the great Indo-European family of languages and the early national communities which these languages represent. It can be proved, for example, that in ancient times the inhabitants of India and Persia proudly styled themselves Aryans, and there is no doubt that the term was a national designation in their case. In the oldest hymns of India, the Rig-Veda, Aryan (*ârya*) is employed as a national epithet of the members of the ruling people of northern India, as opposed to the Dasyus, the Gentile or subject races, and especially the darker-skinned inhabitants of the south. The Avesta divides countries into Aryan and non-Aryan (*airya, anairya*), and from *airya* comes the later form of the name *Erân* or *Irân*, and also the classical *Ariana* (see IRANIANS). In the old Persian inscriptions Darius boasts of being "an Aryan and of Aryan descent" (*ariya ariya ciθra*, Naqsh-i Rustam, Inscription a 14).

The etymology of the word *ârya, airya, ariya*, is obscure, and the real meaning of "Aryan" is uncertain. In the older Sanskrit *aryá, ârya* seems to denote 'true,' 'loyal,' and 'good'—in reference, perhaps, to those of the true stock, the real people, the loyal. In later Sanskrit *ârya* means 'noble.' Such explanations as 'plowmen,' 'tillers of the soil' (cf. Lat. *arare*, to plow), taken to denote an agricultural population in contradistinction to a nomadic tribe, have little to recommend them. Moreover, while Aryan, in the sense of Indo-Iranian, is well authenticated in antiquity, little success has followed the attempt to prove that "Aryan" was used in primitive times by the people themselves as a broad and general designation, in the sense in which philologists and anthropologists have employed it. At present the name is given to a family composed of eight great groups of European and Asiatic peoples, whose languages are as follows: (1) Indian and Iranian; (2) Armenian; (3) Greek; (4) Albanian; (5) Italic; (6) Celtic; (7) Germanic; (8) Balto-Slavonic. (See these titles.) A recently discovered Aryan language, Tocharish, has not yet received a definite classification, though it is believed to be more akin to the western groups of the Aryan languages than to the Indo-Iranian. This subject is treated in Sieg and Siegling, "Tocharisch, die Sprache der Indoskythen," in *Sitzungsberichte der Berl. Akad.* (1908). As a linguistic and ethnologic term, "Aryan," both in Europe and in the United States, is beginning to give place to the preferable term "Indo-European" or "Indo-Germanic." "Indo-Celtic," as a designation instead of "Aryan," has not had much vogue; but it is sometimes employed as a substitute for "Indo-Germanic," especially by the French, who use also "Indo-European." As a convenient term, however, for general usage, "Aryan" has much in its favor, and it will doubtless survive as an alternate to the more precise designations.

That the Aryan peoples had their primitive home in the Pamirian region of the Hindu-Kush was formerly the commonly accepted theory; but of late years the evidence is more in favor of the location of their home somewhere between the Caspian and the North Sea, or rather in the steppe land of southern Russia (O. Schrader, 1890, 1901). Brinton (1890) made the Aryans a West European development of the white race (primitively from northern Africa); Keane (1896) placed the Aryan cradle land somewhere in the Eurasian steppe area, while Much (1904) seeks it in northwestern Europe. Others, like Deniker (1900) and Sergi (1895–1901), prefer to speak of the Aryanization of prehistoric dwellers in Europe (from Asia?). The Aryan is a very ancient dweller in both Asia Minor and Central Asia, and the Aryan element in the culture of the south Asiatic peoples is both old and far-reaching. Consult: Schrader, *Reallexikon der indogermanischen Altertumskunde* (Strassburg, 1901), as well as his *Die Indogermanen* (Leipzig, 1911); E. de Michelis, *L'Origine degli Indo-Europei* (Turin, 1903); Taylor, *Origin of the Aryans* (New York, 1890); Reinach, *L'Origine des Aryens* (Paris, 1892); Ripley, *Races of Europe* (New York, 1899); Sergi, *Mediterranean Races* (1901); Much, *Heimat der Indogermanen* (2d ed., Berlin, 1904); Hirt, *Die Indogermanen* (Strassburg, 1905); "Untersuchungen zur indogermanischen Altertumskunde," in *Indogerm.*

Forsch., vol. xxii (1907); Ehrlich, *Zur indogermanischen Sprachgeschichte* (Königsberg, 1910). See INDO-GERMANIC LANGUAGES; INDO-EUROPEANS.

ARZAMAS, är'zä-mäs'. The capital of the district of the same name, in the government of Nizhni Novgorod, Russia (Map: Russia, F 3). It is situated on the high right bank of the Tesha River at its juncture with the Arsha, an affluent of the Volga, 75 miles by rail from Nizhni Novgorod and 340 miles east of Moscow. Arzamas has tanneries, brickyards, and manufactures iron, flour, soap, and tallow. The town is a commercial centre, trading in cloth and knitted goods. Pop. (latest report), 1897, 10,600. Arzamas was noted in the first half of the nineteenth century for its school of painting, whose products supplied a great part of Russia with holy pictures.

AS (Lat.). The designation both of a Roman weight (called also *libra*), corresponding very nearly to an English *pound*, twelve ounces, and of a coin made of the mixed metal *æs*, or bronze. The *as* (coin) originally no doubt weighed a (Roman) pound, but it was gradually reduced to 1–36 of a pound, and even less. It is therefore difficult to assign any fixed value to the *as*. About 270 B.C. the *denarius* (= 17c.) contained 10 asses; so that the value of the *as* was a little less than 1¾ cents. When the denarius was made equivalent to 16 asses instead of 10, the value of the *as* was about 1 cent. It was by the *sestertius* that money was reckoned at Rome. The oldest form of *as* usually bore the figure of an ox, a sheep, or other domestic animal (*pecus*); from which it is usually supposed that the Latin word for money, *pecunia*, is derived. Consult G. F. Hill, *A Handbook of Greek and Roman Coins* (London, 1899). See Plate II of NUMISMATICS.

A'SA, son of Abijah (1 Kings xv. 7–9) and the third King of Judah. According to the author of Chronicles he began his reign as a religious reformer by removing the idolatrous altars and breaking the images (2 Chron. xiv. 3). He next turned his attention to the fortifications of the land, building walls and towers (2 Chron. xiv. 6). With an army of 580,000 men he defeated Zerah, the Ethiopian King (2 Chron. xiv. 8–12). On his return from this glorious victory he was met by Azariah, the son of Oded, who preached a new religious reform. Azariah's preaching strengthened Asa in his work, and he removed the traces of idolatry from Judah and Benjamin. He even removed his mother, Maachah, from power because she had made an idol to Ashera (1 Kings xv. 13; 2 Chron. xv. 16). Many scholars question the historical character of this Ethiopian invasion, not mentioned in Kings, and these thoroughgoing religious reforms. For a time Asa had peace in the country, but war broke out between him and Baasha, King of Israel. Against this King Asa asked and secured the help of Bar Hadad, King of Damascus. For this step he was severely rebuked by Hanani, the seer. The King, in anger, imprisoned the prophet (2 Chron. xvi. 7–10). For the last two years of his reign Asa was afflicted with a disease of the foot. He died and was buried in the city of David (1 Kings xv. 23–24) with great solemnity. The duration of his reign may be fixed approximately at 934–877 B.C.

ASABA, ä-sä'bä. A town of southern Nigeria, Africa, situated on the Niger about 150 miles from the coast (Map: Africa, E 4). It was the administrative headquarters of the Royal Niger Company and is the seat of the Supreme Court. In a mineral survey of southern Nigeria important deposits of lignite were discovered near Asaba within a dozen miles of the river. Since 1910 the town has grown rapidly in commercial importance.

A'SA DUL'CIS (Neo.-Lat. *asa;* cf. Pers. *azā*, mastic, Ar. *asā*, healing, and Lat. *dulcis*, sweet). A drug in high repute among the ancients as an antispasmodic and diuretic; also for supposed virtues of the most extraordinary kind, such as neutralizing the effects of poison, curing envenomed wounds, restoring sight to the blind, youth to the aged, etc. Its value was estimated by its weight in gold. The princes of Cyrene caused a figure of the plant producing it to be struck on the reverse of their coins, and it was sometimes called *Laser cyrenaicum*. The plant is of the genus *Thapsia* (of the natural order Umbelliferæ). It is a native of the south of Europe and of Barbary.

AS'AFŒT'IDA, or **ASSAFŒTIDA** (Lat. fetid asa or assa). A gum resin, which has been supposed to be identical with the exuded juice of the *Silphion* of Dioscorides, so highly esteemed among the Greek physicians; but this, perhaps, was rather the *Asa dulcis* (q.v.). This drug is brought from Persia, Turkestan, and Afghanistan, and is procured by drying the milky juice which flows from the root of the *Ferula fœtida* of the order Umbelliferæ. The root is long, and generally undivided; white inside, but having a black covering; and contains in its interior a quantity of juice of an overpowering odor, which much resembles that of garlic. About April the root leaves are taken away, and the root itself is more or less exposed by removal of the soil from about it. After a lapse of six weeks a slice is cut horizontally from its summit and a thick white juice exudes, the smell of which even exceeds in strength that of the drug when dry. The drug is sometimes met with in the market in the form of tears, but more frequently in lumps, which are made up of irregularly shaped tears, agglutinated together by a softer substance. Asafœtida is used in medicine and possesses stimulant, carminative, and antispasmodic properties. It is most useful in minor hysteria, and, from its carminative action, in tympanitis or distension of the intestines with gas. When taken internally, it may be detected in almost every secretion of the body, in the saliva, breath, and urine. It is composed mainly of resin and gum, with oil of garlic and a small amount of ferulaic acid. In many parts of the East asafœtida is employed as a condiment.

ASAKAWA, ä'sä-kä'wä, KWAN-ICHI (1873—). A Japanese-American anthropologist and educator. He was born at Ninonmatsu, Japan, and received his earlier collegiate education at Waseda University in Tokio. He then came to the United States to study at Dartmouth College and at Yale. From the former he received the degree of B.Litt. in 1899 and from the latter, three years later, that of Ph.D. In 1906, after several years as lecturer on the history and civilization of East Asia at Dartmouth College, he went back to Japan to occupy the chair of English at Waseda University. A year later, however, he accepted an appointment as instructor at Yale in the history of Japanese civilization and in 1910

was made assistant professor in this department. Besides numerous articles in Japanese and American periodicals, his published writings include: *The Early Institutional Life of Japan* (1903); *The Russo-Japanese Conflict: Its Causes and Issues* (1904); *Notes on Village Government in Japan after 1600* (1910). He also contributed the concluding chapters to the new edition of *Japan*, edited by Capt. F. Brinkley (1904), and edited "Japan" in the *History of Nations Series* (1907).

ASAM, ä'säm. A family of Bavarian artists. —Hans Georg (c.1649–1711) prepared several oil paintings and frescoes for the churches at Benediktbeuren and Tegernsee. He later gave instruction in architecture at Prague.—His sons, Cosmas Damian (1680–1742), painter, and Ægidius Quirinus (d. c.1746), sculptor and worker in stucco, studied at Rome, and settled at Munich about 1715. They completely remodeled the cathedral of Freising and decorated the monasteries of Maria-Einsiedeln and Metten and the church of St. Emmeram at Ratisbon. They built the so-called Congregational Hall at Ingolstadt, and at their own expense constructed the church of St. John, besides their dwelling in Munich, which building, with its numerous fantastic features, is in some respects one of the most striking specimens of the Baroque style of architecture in Germany.

ASAMA-YAMA, ä-sä'mä-yä'mä. The largest active volcano in Japan (8280 feet high), situated in the province of Shinshu, in about 138° 30′ E. long. and 36° 25′ N. lat. (Map: Japan, F 5). The earliest-recorded eruption occurred in 1650. There was a very severe eruption in 1783, which caused the destruction of several villages and of a primeval forest. Since then its activity has been manifested largely in showers of ashes and stones. Its crater is circular in shape and measures about three-fourths of a mile in circumference.

A'SAPH. The eponym of a guild of singers in the Second Temple, who may have superintended the musical part of the worship as early as the time of Nehemiah (Neh. vii. 44). Afterward they shared this work with the "Sons of Korah." When the Korahites became porters and doorkeepers, the Asaphites were supplemented by the guilds of Heman and Ethan. The Chronicler, deeming it essential that the musical organizations of the temple should consist of Levites, represents Asaph, Heman, and Ethan as descendants of Gershon, Kohath, and Merari (1 Chron. vi. 33–47). Ps. l., lxxiii.–lxxxiii., are attributed to Asaph and consequently belonged to a hymn book used by this choir.

AS'APHUS (Gk. ἀ, *a*, priv. + σαφής, *saphēs*, clear, distinct). An Ordovician genus of smooth trilobites, often of large size, among the members of which there is manifested a tendency to lose that longitudinal lobation which is so peculiarly characteristic of the trilobites as a group. The large head shield has the central portion or glabella indistinctly limited and is provided with two reniform compound eyes, which in some species are placed upon immovable stalks that, rising far above the general surface of the head, enabled the animal to command a view of the entire horizon. This latter arrangement is of interest when considered in connection with the nature of the joint that connected the head with the thorax, this joint having in all trilobites been so constructed as to prevent any lateral motion of the head shield, a slight vertical motion only having been possible. The thorax has eight segments, and the tail shield, of a size somewhat less than that of the head, is generally quite smooth and nonsegmented.

The allied genus *Megalaspis* has a head of elongated triangular form, with the anterior and lateral angles produced into sharp spines. Another allied genus, *Niobe*, which appeared at a somewhat earlier age than did *Asaphus*, has the longitudinal lobation quite well marked, and seems to indicate the form of the stock from which *Asaphus* was evolved through a gradual loss of the trilobation and segmentation of the carapace. These three genera, together with four others of less importance and over 150 species, comprise the family Asaphidæ, which is found abundantly in all portions of the Ordovician system in Europe and North America. See Ordovician; Trilobita; and for illustration see Plate accompanying Trilobita.

ASAR, ä'sär, **OSAR,** ō'sär, or **OESAR,** ē'sär. Variations on the Swedish Åsar. The same as Esker (q.v.).

AS'ARABAC'CA (Lat. *asarum*, Gk. ἄσαρον, *asaron*, asarabacca + Lat. *bacca*, berry), *Asarum europæum*. A plant of the family Aristolochiaceæ, a native of Europe, growing in woods; rare, and perhaps not truly indigenous, in Great Britain. The whole plant has acrid properties; the roots and leaves are aromatic, purgative, and emetic. The use of asarabacca, however, as an emetic has been much superseded by that of ipecacuanha, which is milder and safer. The powdered roots and leaves enter into the composition of cephalic snuffs, which cause sneezing, and are employed as a counter-irritant in cases of headache, ophthalmia, toothache, etc. The plant contains a volatile oil and a crystalline substance called *asarin*, to which it seems to owe its active properties. The genus *Asarum* is distinguished by 12 pointed stamens, distinct from each other and from the style, and by a bell-shaped three-lobed perianth. *Asarum europæum* has a very short stem, with two shining kidney-shaped leaves on long stalks, from the axil of which springs a single drooping greenish-purple flower. A nearly allied species, *Asarum canadense*, a native of the United States, is stimulant and diaphoretic and is used under the name of Canada snakeroot, instead of *Aristolochia serpentaria*. It is also called wild ginger and used as a spice, being of a warm aromatic quality, and not acrid like its European congener.

AS'ARUM. See Asarabacca.

ASBEN, ȧs-bĕn. See Air.

ASBES'TIC. A name given to a mixture of second-grade asbestos and serpentine, obtained as a by-product in asbestos mining. The material is crushed and mixed with lime to form a light, strong, fireproof wall plaster, which can be given an excellent finish.

ASBES'TOLITH is a somewhat similar material, made from short-fibred asbestos, used for flooring and fireproofing. See Asbestos.

ASBES'TOS (Gk. ἄσβεστος, inextinguishable, incombustible, from ἀ, *a*, negat. + σβεννύναι, *sbennynai*, to extinguish). In mineralogy, antophyllite, amphibole, and serpentine, three minerals of fibrous, crystalline structure, are classified under asbestos. Chemically the two first-mentioned minerals resemble each other; being silicates of lime and magnesia, and alumina; the third being a hydrated silicate of magnesia.

The asbestos of commerce is the fibrous varieties of tremolite, actinolite, and other varieties of amphiboli, of which *chrysotile* is the silky kind. The Italian variety is true asbestos, while most of the output from Canada is chrysotile. *Mountain leather* and *mountain cork* are also varieties of asbestos, amphibole group, which occur as flexible sheets containing little or no alumina and distinguished by their thickness; they cannot be separated into fibre. The mountain cork is elastic, brown in color, and has a specific gravity of .68 to .99. Mountain wood is a variety resembling dried wood, but has no vegetable cells. *Crocidolite*, a beautiful fibrous mineral occurring in south Africa and western Australia, containing 34 to 38 per cent of oxide of iron, has no commercial fire-proofing value, as it disintegrates under heat.

Commercially asbestos has been used since ancient times, and its discovery is attributed to the Romans, who obtained their supply from the Italian Alps and the Urals. The Alps variety was known as *amianthus* (Gk. unpollutable). Amianthus cloth was indestructible by fire, and was used by the ancients to enwrap dead bodies placed on the funeral pile, in order to preserve the ashes of the body. Pliny refers to it as a rare and costly cloth, the funeral dress of kings. Marco Polo in the thirteenth century, while traveling in Siberia, was shown cloth made from fibrous mineral, called amianthus, which withstood the action of fire. Plutarch also refers to his perpetual lampwick made from Carpathian linen. In the Middle Ages it was rarely referred to. In 1720 it was discovered in the Urals, and 40 years later a factory was established for its manufacture. About 1860 interest was revived in Europe, and the first modern attempts were made by a London syndicate to exploit asbestos deposits. Mining operations began about 1878 in Quebec, and a sensation was created in London on the arrival of shipments of the better grades of mineral. The development was very rapid between 1878 and 1890, but was followed by a setback from overproduction and fall in price. This resulted in the introduction of mechanical means for the preparation of the mineral. In 1909 15 quarries were operating over an area 20 miles in length, and 19 mills having a daily capacity of 8520 tons. In 1911 Canada produced 85 per cent of the world's output, Russia 10 per cent, the United States 3 per cent, and Africa and other countries 2 per cent. Deposits are reported in several of the States, but little prospecting has been done. The output from the United States in 1912 came from Georgia, Vermont, and Wyoming. Deposits are known as cross fibre, slip fibre, or mass fibre, according as the fibre crosses the vein or is parallel to it. Veins vary from a mere thread in width up to from 4 to 6 inches and are very irregular; the width is no criterion of the length of the fibre. Development in Quebec has reached 400 feet, where the quality is found to be the same as on the surface. The commercial requirements are length, fineness of fibre, infusibility, tensile strength, and flexibility. Temperatures of from 2000° to 3000° F. are easily withstood, while some varieties will withstand 5000° F.

Up to 1898 the dressing of asbestos rock was entirely by hand. Overproduction, resulting in a reduction in price, necessitated the introduction of mechanical means for cheaper production and a much wider market. The first mill in Canada was erected in 1889, followed quickly by many new mills of improved type. The general milling practice to-day consists of hand sorting in the quarry, sending the better grades to cobbling houses, the waste rock to the dump, and the mill rock together with the fines to the mill. In the mill the rock goes to breakers, dryers, rotary crushers, fiberizers, and screens. The fibre is separated by fans. The mill rock from a quarry amounts to from 20 to 80 per cent of the output and the fibre from 6 to 12 per cent of the mill rock. The value of the product varies from $10 to $300 per ton.

The use of asbestos has increased and is increasing very rapidly. It is employed in the manufacture of woven fabrics, such as fireproof theatre curtains, cloth for theatre wall linings and scenery, firemen's clothing, and fireproof rope; roof shingles or asbestos slate, stucco plaster, lumber, mill board, asbestos paper, and insulating; coverings for pipes, furnaces, and locomotives to prevent radiation of heat; and as a filler for high-grade paints. Consult: Jones, *Asbestos: Its Properties and Uses* (London, 1890); "Asbestos" in *Mineral Industry*, vol. vi (New York, 1897); Fritz Cirkle, *Chrysotile—Asbestos, Occurrence, Exploitation, Milling and Uses*, Canadian Department of Mines (Ottawa, 1905); U. S. Geological Survey, *The Production of Asbestos* (1912). See AMPHIBOLE; SERPENTINE; ASBESTIC.

ASBESTOS. A village of Richmond Co. in the province of Quebec, Canada, 85 miles southwest of the city of Quebec, and 4 miles east of Danville (Map: Quebec, G 5). It is situated on the Danville and Atlantic and Grand Trunk railways. The town contains mills and factories, but the rich deposits of asbestos in Richmond and the adjacent counties of Wolfe and Megantic are the chief sources of its prosperity. Pop., 1901, 783; 1911, 2224.

ASBJÖRNSEN, ȧs-byĕrn'sen, PETER CHRISTEN (1812–85). A distinguished Norwegian student of folklore and zoölogy, born at Christiania. He studied at Christiania University and taught for several years. He made long journeys on foot for scientific purposes, in the course of which he collected popular tales and legends, which, in coöperation with his friend Jörgen Moe, the future Bishop of Christiansand (1838), he published, and later several times supplemented, as *Norske Folkeeventyr* (*Norwegian Folk Tales*, 1842–43). *A New Collection* appeared in 1871. It was followed by another, *Norske Huldre-eventyr og Folkesagn* (*Norwegian Fairy Tales and Folk Legends*, 1845–48). His scientific researches earned him traveling stipends at intervals from 1846 to 1853. He then studied forestry and held various official positions in connection with the forest and turf industries from 1860 to 1876, when he was pensioned. He made several important discoveries in deep-sea soundings and wrote on zoölogy and other scientific subjects; but this side of his work is quite overshadowed by work in folklore, which shows literary talent and much originality. He did not, like the Grimms and Arnason, aim merely at reproduction, but retold the stories in settings that illustrated the life and mental horizon of the people, with exquisite bits of natural description that found immediate and wide recognition. Many of Asbjörnsen's tales have been translated into English: *Popular Tales from the Norse*, tr. by Sir George

Dasent (London, 1859); *Tales from the Fjeld*, by the same (ib., 1874); *Fairy Tales from the Far North*, tr. by Braekstad (New York, 1897).

ASBOTH, ŏsh'bôt, SÁNDOR (ALEXANDER) (1811–68). A Hungarian-American soldier. After fighting under Kossuth (1848–49), he accompanied him to America in 1851 and became a citizen of the United States. During the Civil War he commanded divisions under Frémont and Curtis, as brigadier-general and was seriously wounded at the battles of Pea Ridge (March 7–8, 1862) and Marianna (Sept. 27, 1864). He resigned with the brevet rank of major-general (August, 1865), and was United States Minister to the Argentine Republic (1866–68), where he died of his wounds.

ASBURY, ăz'bĕr-ĭ, FRANCIS (1745–1816). The first bishop of the Methodist Episcopal church ordained in the United States. He was born at Hamstead Bridge, 4 miles northwest of Birmingham, Eng., Aug. 20 or 21, 1745. He obtained rudimentary education in a village school; at 18 became a local preacher; at 21 was received by Wesley into the itinerant ministry; and on Oct. 27, 1771, landed in Philadelphia as a missionary in America. It was but three years after the building of the first Methodist church in the country, and the conference of that year gave but 316 Methodists in America, chiefly in Philadelphia and New York. When the Revolution began, Asbury sympathized with the people, and while Mr. Rankin, who was the ecclesiastical superior, returned to England, Asbury remained; though, like many other non-jurors, he was subjected to suspicion and at one time to imprisonment. After about two years of surveillance the authorities concluded that the scruples of Asbury were not political, but religious, and he was permitted to go free. He improved his opportunity, and when the war closed there were 83 Methodist ministers at work, and the membership reached 14,000. In 1784 the several societies were organized into an Episcopal church, and Asbury and Thomas Coke were elected, by the conference in Baltimore, Md., 1784, joint superintendents. The title "bishop" was substituted later, which called out a rebuke from Wesley, who, however, approved of Asbury's superintendence. Thenceforward his life was devoted to preaching and the supervision and extension of churches. His labors were incessant, and his biography is itself a good history of the growth of Methodism in America. He never married, lest a wife should distract attention from his great work. He was always poor and always generous. In 1785 he laid the foundation for the first Methodist college, and afterward formed an educational plan for the whole country, by making districts with at least one classical academy in each. He was rather stout, of medium height, with a fresh countenance and a penetrating eye. Wesley alone was his superior as a practical worker and organizer, and the two were alike in zeal and spirit. During his ministry it is estimated that Asbury traveled more than 270,000 miles, visiting every part of the country; preached more than 16,000 sermons; ordained over 4000 ministers, and presided at 224 conferences. It is largely due to the labors of this indefatigable apostle that Methodism in America owes its excellent organization and wonderful growth. He died at Spottsylvania, Va., March 31, 1816. His only written works were his journals (New York, 1852), which are personally and historically of great value. For his biography, consult W. P. Strickland (New York, 1858), and Smith (Nashville, 1896); Du Bose, *Francis Asbury* (Nashville, Tenn., 1909); Mains, *Francis Asbury* (New York, 1909). Consult also Tipple, *Heart of Asbury's Journal* (New York, 1904).

ASBURY PARK. A city in Monmouth Co., N. J., 51 miles, by rail, south of New York City, on the Atlantic Ocean, and on the Central of New Jersey and the Pennsylvania railroads (Map: New Jersey, D 3). Asbury Park is one of the most popular watering places on the Atlantic coast. A board walk extends for almost two miles along a fine beach which is owned by the taxpayers. The city contains a large number of good hotels and cottages, a public library, several theatres, lecture halls and pavilions, parks, hospitals and dispensaries, and an aviation field. Among the notable events of the summer season are the big Baby Parade, at which $4000 is awarded in prizes, the lake carnival, the masque fête, and the fireworks displays. At Ocean Grove, which is separated from Asbury Park by Wesley Lake, is one of the largest musical auditoriums in the country, having a seating capacity of almost 10,000. The city has manufactories of sleeping garments and automobiles.

Asbury Park was founded in 1869, incorporated in 1874, and chartered as a city in 1897. The beach front, the water works, and sewage system are owned by the municipality. Pop., 1900, 4148; 1910, 10,150; 1920, 12,400. The summer population is estimated at about 100,000.

ASCAGNE, ȧs'kȧn'y'. A character in Molière's comedy, *Le dépit amoureux*, who is substituted for her dead brother of the same name and habited in his garments, but who later falls in love with Valère and marries him secretly.

AS'CALON. A city of Palestine. See ASHKELON.

ASCALON. The sword of St. George, mentioned in Richard Johnston's *Seven Champions of Christendom*, a romance printed in 1596.

ASCA'NIUS, called also Iulus, the son of Æneas, and mythical founder of the family of the Cæsars. He founded also the city of Lavinium. It is in the disguise of Ascanius that Cupid, in Vergil's *Æneid*, implants the flame of love for Æneas in Dido's breast.

AS'CAPART. The name of a giant, 30 feet high, often referred to by Elizabethan writers. He appears in the romance *Bevis of Hampton*, where he is conquered by the hero.

AS'CARIS (Gk. *δσκαρίς, askaris*, a worm in the intestines). A genus of intestinal nematode or round worms, which are of comparatively large size. The body is long and cylindrical, and the mouth is usually surrounded with three lips or cephalic valves, one in a dorsal position and the other two ventral. Species of *Ascaris* are found parasitic in man, pigs, sheep, calves, horses, dogs, cats, etc. In addition to their irritation of the intestinal mucosa, narrowing or stoppage of the intestinal lumen, and possibly rupture, they excrete toxins which may cause nervous disturbances and inflammatory changes. These worms are not attached by means of hooks or otherwise to the walls of the intestines, and may be expelled by the administration of cathartics and vermifuges. The best-known species is the round-worm of man, the pin-worm being placed in a closely allied genus. Another species (*Ascaris megalo-*

cephala), larger than the preceding, is found in the intestine of the horse. It is sometimes as large around as a lead pencil, and has a noticeably large head. It is of special interest to biologists, because it was upon the eggs of this species that the German scientist Boveri made his notable observations regarding cell division and the behavior of the chromosomes.

ASCEND'ANT (Lat. *ad*, to + *scandere*, to climb). In astrology, the easternmost or rising star in a horoscope is in the ascendant, or "house of life." It was deemed to have the most influence on destiny, or to give the strongest indication of the future; so it is said when one's prospects improve, "his star is in the ascendant."

ASCEN'SION (for origin of name, see below). An isolated volcanic island in the Atlantic, in lat. 7° 55′ S., and long. 14° 23′ W., about 700 miles northwest of St. Helena (Map: Africa, C 5). It has an area of 34 square miles, little of which is under cultivation, and rises to an elevation of 2870 feet in Green Mountain, on which a sanitarium for sailors has been erected. The island, which belongs to Great Britain, is fortified, is under the direct control of the Admiralty, and is used as a coaling and supply station for the British navy. The population in 1912 was estimated to be about 200. It consists principally of officers and their families, seamen, and a few natives. Vegetables and fruit are grown, and small game is abundant. The island was discovered by the Portuguese in 1501 and named Conception Island. It was revisited on Ascension Day, 1508, when it received its present name. It was settled by the British in 1815, during Napoleon's stay on St. Helena. Principal settlement, Georgetown.

ASCENSION, RIGHT (Lat. *ascensio*, an arising; Ger. *gerade Aufsteigung*). The name given in astronomy to one of the two factors which determine the position of a heavenly body in the sky with reference to the celestial equator, the other being the declination. Right ascension and declination are quite analogous to longitude and latitude on the earth. The initial point for measuring right ascension is one of the points of the celestial equator where it is intersected by the ecliptic, and this point is called the vernal equinox, or the first point of Aries. The right ascension of a heavenly body is then defined as the angular distance measured on the celestial equator from the vernal equinox to the foot of a perpendicular circle let fall on the equator from the heavenly body. The right ascension is ascertained by means of the transit instrument and clock. The transit instrument enables us to observe its meridian passage, and the transit clock gives the time at which this takes place. This clock is set so that when the first point of Aries is in the meridian it stands at 0 hours, 0 minutes, and 0 seconds, and it is so arranged as to indicate 24 sidereal hours, the time that elapses between two successive passages of that point. The reading of the clock at the passage of any heavenly body then enables us to calculate that body's right ascension. The right ascensions of all the fixed stars down to about the ninth magnitude have been thus determined and are published in printed star catalogues. With the completion of the International Star Catalogue now in progress, the right ascensions of all stars down to the eleventh magnitude, to the number of about 2,000,000, will become available.

ASCENSION DAY, or HOLY THURSDAY. One of the great religious festivals of the Episcopal and also of the Roman Catholic church. It is held on the fortieth day after Easter, and is intended to commemorate the ascension of Christ into heaven. It is one of the six days occurring in the year for which the Church of England appoints special psalms, and the same church also particularly recommends it as a fitting day for the receiving of communion. No mention of its celebration occurs before the fourth century, though St. Augustine believed it to have been instituted either by the apostles themselves, or the primitive bishops succeeding them. Connected with its religious observances were certain civic ones, which in some parts of England and Scotland are still continued, viz., *beating the bounds*, or *riding the marches*, though their religious connection is apparently forgotten. See ROGATION DAYS; PERAMBULATION OF PARISHES.

ASCET'ICISM. Among the Greeks, *ἄσκησις*, *askēsis*, denoted the exercise and discipline practiced by the athletes or wrestlers, who had to harden their bodies by exertion, and to avoid all sensual and effeminating indulgences. In the schools of the philosophers, especially of the Stoics, the same word signified the practice of mastering the desires and passions, or of severe virtue. In these senses it passed into the language of the early Christians. The essence of asceticism is to hold self-denial and suffering to be meritorious in the sight of God, as a means to perfect the moral nature and to rise to spiritual heights not otherwise attainable. Aside from asceticism for training, which the meaning of the word suggests, there is an asceticism which rests upon a dualistic philosophy. It holds that the material world is evil; redemption of the soul is found only by withdrawing from the world. Though complete separation from matter can take place only at death, yet the soul may, by asceticism, proclaim independence of the material world and so work toward its redemption. This dualistic asceticism is Oriental (Indian) in origin, but before the beginning of the Christian era had penetrated into the Greek world. Asceticism in the Christian Church is derived from both types. Judaism was not originally ascetic, but regarded the world as the good gift of God, to be used and enjoyed to his glory. Protestantism has in general taken the same attitude. Even in the Greek and Roman churches asceticism has been much modified in modern times. The reasons for asceticism have largely vanished in the belief that evil and good reside, not in matter, but in the moral life; and that normal living furnishes a sufficient training for spiritual life. Consult Hastings, *Encyclopædia of Religion and Ethics*, "Asceticism," and Moore, *Greek and Roman Ascetic Tendencies* (Boston, 1912). See MONASTICISM.

ASCH, äsh. A town of the Austrian crownland of Bohemia. It is situated at the foot of the Hainberg, about 2100 feet above the sea level, 13 miles northwest of Eger, and near the Bavarian and Saxon frontiers (Map: Austria, C 1). It manufactures woolen and mixed silk and woolen goods, particularly stockings, and there are machine shops and bleaching and dyeing establishments. Pop., 1890, 15,557; 1900, 18,700; 1910, 21,583.

ASCHAFFENBURG, ä-shäf'en-burk. The capital of the Bavarian district of lower Franconia, on the right bank of the Main, at its

junction with the Aschaff (lat. 50° 1′ N., long. 9° 7′ E.), about 23 miles east-southeast of Frankfort (Map: German Empire, C 4). It is built upon an eminence and has a healthful and attractive situation. Among its buildings is the castle of Johannisburg, built between 1605 and 1614 by Johann Schweikard, of Kronberg, Elector of Mainz, containing a collection of paintings and engravings and a fine library. Besides a cathedral, military barracks, and town hospitals, Aschaffenburg possesses a Roman villa, built by King Louis I, in imitation of the Castor and Pollux edifice discovered at Pompeii. Among its educational and charitable institutions are a gymnasium, a *real-schule*, two seminaries, a music school, and two orphan asylums. It is the burial place of the poets W. Heinse and K. Brentano. The town manufactures clothing, varnishes, glue, cigars, beer, and colored papers, for the latter of which it has long been famous. It carries on a considerable trade in cattle, wood, building stone, tobacco, wine, etc. Pop., 1890, 13,275; 1900, 18,091; 1910, 29,892. Aschaffenburg existed as early as the invasion of Germany by the Romans, who built a castle here. In 974 it came into the possession of the archbishops of Mainz and remained with them until the dissolution of the Germanic Empire. The Concordat between the Pope and the German nation was prepared at Aschaffenburg in 1447. In 1814, along with the principality of which it is the capital, it was ceded to Bavaria by Austria.

ASCHAM, ăs′kam, Roger (1515–68). A distinguished English writer, humanist, and classical scholar, born at Kirby Wiske, in Yorkshire. He received his early education at home under the direction of his father and in the family of Sir Anthony Wingfield, and in 1530 entered St. John's College, Cambridge, where he took his degree of M.A. in 1537. The study of the classics, especially Greek, had recently been revived at Cambridge, and Ascham's bent impelled him with ardor to these studies. His reputation as a classical scholar soon brought him numerous pupils, and, there being at that time no Greek chair, he was appointed by the university to read Greek lectures. At first he opposed the newly introduced (Erasmian) method of pronunciation, which is still used in England, but afterward adopted and defended it. His leisure was devoted to music, penmanship, in which he excelled, and archery. In defense of the latter art he published, in 1545, a treatise, entitled *Toxophilus*, the pure English style of which, independently of its other merits, ranks it among the classical pieces of English literature. For this treatise, which was dedicated to Henry VIII, he was rewarded with an annual pension of £10, equivalent to about $500 of our present money. In 1546 he was appointed university orator; and in 1548, on the death of his former pupil, Grindal, he was called to supply his place as master of languages to the Princess (afterward Queen) Elizabeth. In this office he gave the highest satisfaction, but at the end of two years abruptly resigned it because of a quarrel with the steward of the household. That he did not lose favor at court, however, is manifest from his having soon after been appointed secretary to serve Richard Morysin, Ambassador to the court of Charles V. He spent three years in Germany and in Italy, and on his return published the diary he had kept during his travels. The interest of Gardiner, Bishop of Winchester, secured his appointment as Latin secretary to Queen Mary; his pension also was doubled. His prudence and moderation preserved him from offending by his Protestantism. After the death of Mary, Queen Elizabeth retained him at court as secretary and tutor, posts which he held until his death, in 1568. His second important work, *The Scholemaster*, a treatise on classical education, was published in 1570 by his widow. An English version of Ascham's letters appeared in 1777, ed. by Kennedy, with a *Life* by Dr. Samuel Johnson (reprint, 1815). Consult: *The Collected Works of Ascham*, ed. J. A. Giles (London, 1864–65); *Toxophilus*, ed. Arber (ib., 1868, and reprinted, 1902); *The Scholemaster*, ed. Mayor (ib., 1863); and the reprint by Arber (1878); Katterfeld, *Roger Ascham, sein Leben und seine Werke* (Strassburg, 1880); English Works, ed. Wright (New York, 1905).

ASCHBACH, äsh′bäĸ, Joseph (1801–82). A German historian, born at Höchst, near Frankfort-on-the-Main. He held the professorship of history at Bonn (1842–53) and at the University of Vienna (1853–72). In 1870 he was ennobled. Among his works are *Geschichte der Westgothen* (1827); *Geschichte der Omajjaden in Spanien* (2 vols., 1829–30); *Geschichte Kaiser Sigismunds* (4 vols., 1838–45); *Geschichte der Wiener Universität* (1865); and *Roswitha und Konrad Celtes* (1867), in which he maintained that the panegyric of the Emperor Otho the Great, which was ascribed to the nun Roswitha, had been written by Konrad Celtes during the sixteenth century. This assertion was disproved by Waitz and by Köpke. Consult R. Köpke, *Ottonische Studien* (1869).

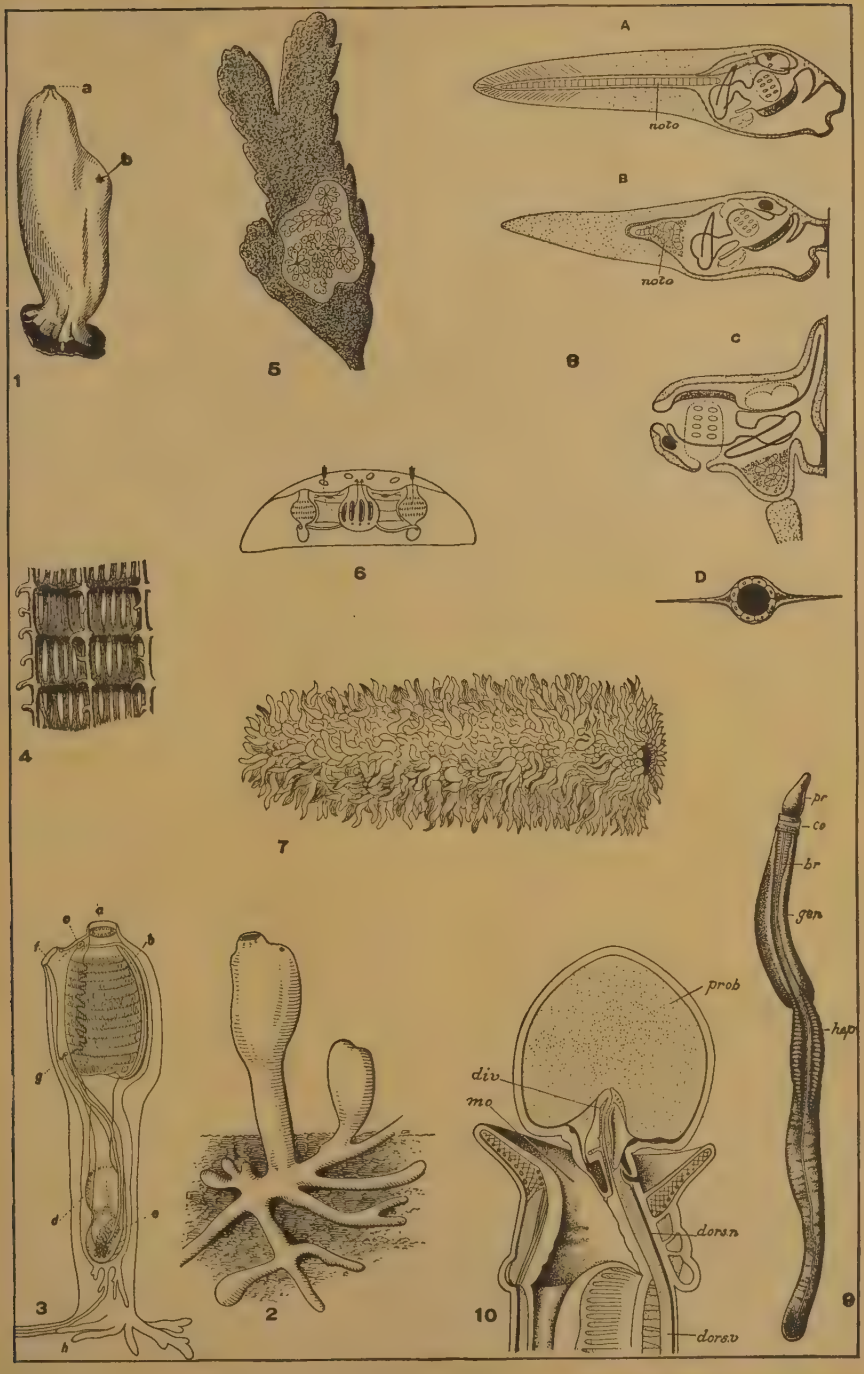
ASCHERSLEBEN, ä′shĕrs-lā′ben. A town in the Prussian province of Saxony. It is situated on the river Eine, 32 miles south-southwest of Magdeburg (Map: German Empire, D 3). It has considerable manufactures of beet sugar, woolens, linens, earthenware, tinware, chemicals, etc., and breweries, iron foundries, tanneries, etc. There are also coal and salt mines, and extensive beet gardens. Pop., 1890, 22,893; 1905, 27,876; 1910, 28,968. Aschersleben is mentioned in the twelfth century and was probably founded in the eleventh. It became Prussian in 1813.

ASCHERSON, ä′shĕr-zōn, Paul Friedrich August (1834–1913). A German botanist, born in Berlin. He studied medicine and natural science and in 1873 was appointed professor of botany at the university there. In 1873–74 he accompanied Rohlfs in his expedition to the Libyan Desert, which he again visited alone two years later. In 1884 he was made custodian of the Botanical Museum at Berlin. His principal contributions are on the subject of the flora of Europe and of Africa. His published works include *Flora der Provinz Brandenburg* (1864), and a *Synopsis der mitteleuropäischen Flora* (2d ed., 1912).

ASCIANS, ăsh′yanz, or Ascii, ăsh′ĭ-ī (Gk. *ἀ, a*, priv. + *σκιά, skia*, shadow). People near the equator, who have the sun over their heads and who, consequently, have no visible shadow twice a year.

ASCIDIAN (Gk. *ἀσκίδιον, askidion*, dim. of *ἀσκός, askos*, a skinbag, a bladder), or Tunicate (Lat. *tunicatus*, clothed with a tunic). One of the small marine animals, constituting the class Urochorda of the phylum Chordata, and popularly known as sea-squirts. They are of two kinds: (1) fixed and individual ones, to which

ASCIDIANS AND BALANOGLOSSUS



1-6. ASCIDIANS.
7. PYROSOMA.
8 ASCIDIAN EMBRYOS.
9-10. BALANOGLOSSUS.
For explanation of details, see articles "Ascidian" and "Balanoglossus."

the name "ascidian" is more properly applied; and (2) compound free-swimming ones, more properly designated as tunicates. Their principal interest is the evidence they show of affinity with the vertebrates by the presence in their larval conditions of a notochord and other fundamental characteristics of the chordata. See Plate of ASCIDIANS AND BALANOGLOSSUS.

The larvæ at first are free-swimming, and resemble a tadpole. The tail is fringed with a delicate transversely striated fin; in the axis of the tail is the notochord, and above it the central nerve-cord, which anteriorly is dilated, and still farther forward again expands into a vesicle, which is a true sense-organ—a primitive eye. The enteric canal exhibits a mouth, a pharynx, œsophagus, stomach, and intestine; and there is a heart and blood circulation. After a few hours of existence in this stage, so suggestive of an embryo vertebrate, it becomes fixed by adhesive papillæ upon its "head"; its "tail," including the notochord, disappears, the nervous system diminishes to a single ganglion, the body takes the form of a dilated sac, with an incurrent and excurrent orifice side by side at the outer end, the reproductive organs develop, and a purely vegetative existence within such protection as is given by a leathery, contractile tunic, takes the place of the promising condition of early youth. Appendicularia, a minute animal swimming on the surface of the sea, is like an ascidian larva and preserves its chordate condition throughout life.

These simple, solitary ascidians are bi-sexual and increase only by spawning; but the composite tunicates form colonies by budding, as well as emit eggs, and the economy of some of these communities is very complicated. See BALANOGLOSSUS; CHORDATA; ALIMENTARY SYSTEM, EVOLUTION OF; NERVOUS SYSTEM, EVOLUTION OF; ETC. Consult Parker and Haswell, *Text-Book of Zoölogy* (New York, 1898).

EXPLANATION OF PLATE OF ASCIDIANS, ETC.

1. A SIMPLE ASCIDIAN: *a*, mouth; *b*, exhalent pore.
2. A CREEPING FORM (Clavellina), showing stolons.
3. SAME AS No. 2: *a*, mouth; *b*, branchiæ; *c*, nervous centre; *d*, stomach; *e*, genital gland; *f*, exhalent pore; *g*, anus; *h*, stolons.
4. PORTION OF BRANCHIÆ, enlarged.
5. AN ENCRUSTING COMPOUND ASCIDIAN (Botrylloides).
6. DIAGRAM OF PART OF 5, showing structure; the arrows indicate inward and outward water currents.
7. COLONY OF FREE LUMINOUS ASCIDIANS (Pyrosoma).
8. ASCIDIAN EMBRYOS (tadpole stage), showing changes of form with growth, and disappearance of notochord (*noto*); *a*, youngest full-swimming tailed stage; *b*, larva recently fixed; *c*, older fixed stage; *d*, section of tail of *a*, showing relation of fins to notochord.
9. BALANOGLOSSUS; *br*, branchial region; *co*, collar; *gen*, genital ridges; *hep*, prominences formed by hepatic cæca; *pr*, proboscis.
10. Enlarged section of upper part of 9; *prob*, proboscis; *div*, supposed notochord (diverticulum); *mo*, mouth; *dors*, dorsal vessel.

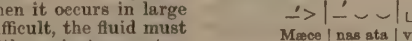
ASCI'TES, ă-sī'tēz. A collection of serous fluid in the peritoneal cavity. It occurs as a symptom of nephritis, chronic peritonitis, tuberculosis, heart disease, abdominal tumors, and especially of cirrhosis of the liver. The fluid is pale yellow, clear, with a specific gravity of 1.010 to 1.016, albuminous and coagulable. If bloody, cancer should be suspected. When it occurs in large quantity and breathing is difficult, the fluid must be drawn off repeatedly with aspirator or trochar, by the surgeon. Many cases, however, can be held in check by the administration of saline cathartics and diuretics, in conjunction with appropriate treatment directed to the particular organ at fault. In the case of cirrhosis of the liver an ingenious operation, devised by Talma, has proved effective when undertaken fairly early in the disease. *Omentopexy*, as it is called, consists in the suture of the peritoneum and omentum to the liver, thus establishing a collateral circulation and relieving the obstructed portal system.

ASCLE'PIADA'CEÆ (named after *Asclepias*). The milkweed family. A family of dicotyledonous plants, including herbs or shrubs, often with twining stems and mostly with a milky juice. The leaves are entire and without stipules. The flowers, commonly produced in umbels, are peculiar in structure, but perfectly symmetrical and regular; ovary of two carpels, styles short and united by their disk-shaped stigma; fruit of two follicles or pods; seed usually flattened and provided with long, fine hairs; embryo about as long as the seed; cotyledons flat.

This family, closely related to Apocynaceæ, embraces over 200 genera, and nearly 2000 species, which are widely distributed throughout the warmer portions of the globe, being especially numerous in Africa. The principal representative in the United States is the well-known *Asclepias*, or milkweed. The main sections of the family are Periplocoideæ represented by the genera *Periploca* and *Streptocaulon;* Asclepiadeæ, which includes *Asclepias* and *Cynanchum*, including *Vincetoxicum;* Tylophoreæ, of which the chief genera are *Marsdenia, Stephanotis, Cereopegia, Stapelia*, and *Hoya;* and Gonolobeæ, represented by *Gonolobus*. These plants vary widely in characteristics and uses. Many are cultivated for their perfume, as *Stephanotis floribunda*, etc.; others, such as some species of *Stapelia* and *Hoya*, are known as carrion flowers, from their repellent odor. Flies are attracted by them, and eggs are often deposited upon the flowers. Some species of *Asclepias* yield fibre from their stems, and the silky fibre of their pods has many uses. Among them are species of *Marsdenia, Periploca*, and *Orthanthera*. For the economic uses of others, see INDIAN SARSAPARILLA; MUDAR; ARGEL; CYNANCHUM.

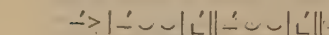
AS'CLEPI'ADÆ (Gk. *'Ασκληπιάδαι, Asklēpiadai*). Originally an association, claiming descent from the god of healing, Asclepius, or Æsculapius, in which the practice of medicine was hereditary. Later those not connected by blood were admitted, and the organization, which existed in various parts of Greece, became a training school for physicians. After the time of Hippocrates the Asclepiadæ seem to have required a comprehensive course of study of their candidates, and the Hippocratic Oath (q.v.) shows the ethical standard they maintained.

ASCLEPIADE'AN METRE, ASCLEPIADEAN VERSE. The name given to two kinds of Greek and Latin logaœdic verse, named, probably, after Asclepiades of Samos. 1. The Lesser Asclepiadean consisted of an irrational trochee, cyclic dactyl, syncopated foot, cyclic dactyl, trochee, syllaba anceps, thus:



2. The Greater Asclepiadean consisted of an irrational trochee, a cyclic dactyl, a syncopated

foot, a cyclic dactyl, syncopated foot, cyclic dactyl, trochee, and a syllaba anceps, thus:



In a word, the combination – ⏑ ⏑ | ⏑ is inserted between the halves of the Lesser Asclepiadean. The Lesser Asclepiadean is combined with the Glyconic metre into various systems, all employed by Horace.

ASCLEPIADES, ăs'klē-pī'ă-dēz (Gk. *Ἀσκληπιάδης, Asklēpiadēs*). A Greek physician, born at Prusa or Cius, in Bithynia. He lived at the beginning of the first century B.C., at first a teacher of oratory at Rome, and friend of L. Crassus, the famous orator, but later, without any preparation, a practitioner of medicine. What he lacked in real knowledge he supplied by clear-sightedness and understanding of human nature. He made unlimited use of wine, recommended frequent baths, dieting, and exercise, and denounced the excessive use of emetics and purgatives. In all this he followed largely Cleophantus, son of Cleombrotus, a physician of the third century B.C. He taught that all disease arose from an inharmonious distribution of the small, formless corpuscles of which the body is composed. He is said to have been the first to distinguish between acute and chronic diseases, but his knowledge of anatomy was apparently slight. Seventeen treatises of Asclepiades are mentioned. The fragments of his writings, which have been preserved, were edited by Gumpert, *Asclepiadis Bithyni Fragmenta* (Weimar, 1798). Consult also G. M. Reynaud, *De Asclepiade Bithyno Medico ac Philosopho* (Paris, 1862).

ASCLEPIADES OF SAMOS. A Greek lyric poet of the third century B.C., a younger contemporary of Theocritus. He was the author of 43 epigrams, mostly erotic, included in the Greek anthology, known as *The Garland*, prepared by Meleager (see ANTHOLOGY); many of them are among the prettiest epigrams of the erotic type. The Asclepiadean metre was probably named after him.

ASCLE'PIAS (so named from Asclepius, father of medicine), or SWALLOW WORT. A genus of the order Asclepiadaceæ, most of the species of which are American, and commonly called milkweeds, on account of the milky exudation from any part cut or injured. The numerous seeds contained in the pods are copiously covered with down and are dispersed by the wind. The milky juice of some species is said to contain caoutchouc, or a substance resembling it. The corolla is wheel-shaped, and reflexed with a corona of variously hooded appendages. The fibre of the stem of some species is strong and has been used for making ropes; the lint in the pods has been used for pillows, etc. While fine and silky, it lacks twist and cannot be used for spinning. *Asclepias cornuti*, or *Asclepias syriaca*, and *Asclepias tuberosa*, pleurisy root, are common plants, the latter possessing diaphoretic, carminative, and expectorant properties, and used in medicine for pectoral affections, such as pleurisy and bronchitis. The young shoots are sometimes used as a substitute for asparagus, to which they bear some resemblance. A few fossil leaves from rocks of Tertiary Age at Kumi, Greece, have been referred to the genus *Asclepius*. See Plate of MINT.

ASCLE'PIUS. See ÆSCULAPIUS.

ASCOLI, äs'kō-lē, GRAZIADIO ISAIA (1829–1907). An Italian philologist of European celebrity, and one of the pioneers in modern methods of comparative linguistics. He was born of a wealthy Jewish family at Görz, in the Austrian province of that name. Trained by his father for a business career, he pursued his linguistic studies without masters, and at the age of 15 gave evidence of exceptional talent by publishing a paper upon the relation between Wallachian and the Friuli dialect. His first important work, *Studi orientali linguistici* (1854), established his reputation and led to his appointment in 1860 to the chair of philology at the Accademia Scientifico-Letteraria of Milan. In addition to his academic work, he found time to issue a number of important volumes, including *Studi critici* (2 vols., 1861–77); *Studi irani* (1867); *Corsi di glottologia* (Turin, 1870); and his most notable work, *Saggi ladini* (1873), which marked an important advance in the methods of Romance philology, and initiated the monumental *Archivio glottologico italiano* (1873–1912), which under his editorship became the receptacle of the most important contributions made by him and by his pupils to the study of Celtic and Italian dialects. The numerous honors bestowed upon Ascoli testify to the wide recognition of his talents. He became a member of the Institute of France, of the Academies of Vienna, Budapest, Berlin, and St. Petersburg, was elected to the Italian Senate in 1888, and successively chosen as delegate of Italy to the Oriental congresses at Berlin, London, and Geneva. For bibliography, consult *Miscellanea di studi in onore di G. I. Ascoli* (Torino, 1901).

ASCOLI PICENO, äs'kō-lē pē-chā'nō (Lat. *Asculum Picenum*). The capital and an episcopal city of the province of Ascoli Piceno, in central Italy, on a hill beside the Tronto, 73 miles southwest of Ancona by rail (Map: Italy, H 5). A branch railway, 21 miles long, connects it with an inferior harbor on the Adriatic and with the Bologna-Brindisi Railway. The public buildings are beautiful, and constructed chiefly of marble, and there are several churches, a cathedral, a castle, a museum, and a picture gallery. Almost all traces of the ancient Asculum Picenum have disappeared, but several Roman bridges are still in general use. Ascoli is surrounded by rich agricultural land, and its manufactures include majolica ware, glass, wax, silks, leather, hats, and cloth. It is commercially very active. Pop., 1881, 11,200 (commune, 23,225); 1901 (commune), 28,882; 1911, 30,058.

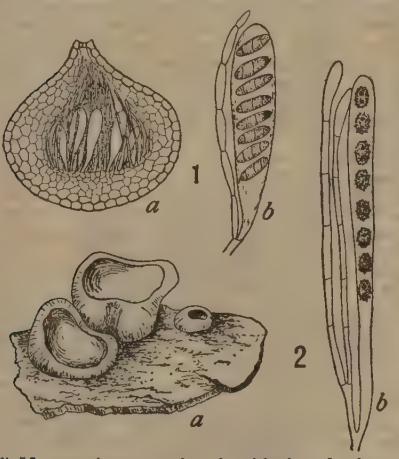
ASCOLI SATRIANO, sä'trē-ä'nō. A city and episcopal see in the province of Foggia, south Italy, 20 miles south of Foggia by rail. It is the ancient Asculum Apulum, celebrated as the scene of the defeat of the Romans by Pyrrhus, 279 B.C. Pop., 1881 (commune), 9906; 1901, 8550; 1911, 9701.

ASCOMYCETES, ăs'kō-mī-sē'tēz (Gk. *ἀσκός, askos*, skin-bag + nom. pl. *μύκητες, mykētes*, mushrooms, fungi). The largest of the three groups of true Fungi, including approximately 30,000 known species. The common character of this great assemblage of forms is the presence of an "ascus." An ascus is a special cell which produces spores (ascospores) in a characteristic way. The young ascus contains two nuclei, which unite to form a "fusion nucleus," and this fusion is followed by three successive divisions, resulting in eight nuclei. In connection with these nuclei the ascospores are formed, so that theoretically there are eight ascospores in an

ascus. Although there are usually eight ascospores, a larger number may appear by further division of the original eight; or there may be a smaller number through failure of ascospore formation in connection with some of the eight nuclei.

The asci appear in groups, generally forming a more or less extended layer (hymenium), and usually the hymenium is invested by a sterile jacket, the whole structure then being called an "ascocarp." Intermixed with the asci there are usually sterile, filamentous structures (paraphyses), so that an ascocarp consists of three elements—asci, paraphyses, and sterile jacket. Sex organs have been observed among the Ascomycetes sufficiently to indicate that ascocarps arise as a result of the sex act, although in many cases the sex act may have been eliminated.

The production of ascocarps is one phase in the life history of Ascomycetes. The other phase,



(1) Macrosporium; *a*, section of perithecium showing asci and paraphysis; *b*, a single ascus with 8 ascospores, and a paraphysis; (2) *'Lachneo-hemispherica; a*, apothecia; *b*, an ascus with paraphyses.

which is usually much more conspicuous, is that in which characteristic spores (conidia) are produced. There are thousands of Ascomycetes whose conidium stage and ascocarp stage have not been connected; and these conidia-bearing forms, whose ascocarps are unknown, are called "imperfect Fungi" (*Fungi imperfecti*). It is this conidium stage that is of special economic importance, for it is the cause of many destructive diseases of useful plants.

Although usually eight orders of Ascomycetes are recognized, they may all be considered in four groups, dependent on the character of the ascocarp. In one group there is no ascocarp, the asci (hymenium) appearing without any investment by a jacket. To this group belong such forms as the "yeasts" (somewhat doubtful Ascomycetes) and the parasites that induce the diseases known as "peach-leaf curl," "plum pockets," and certain of the "witch brooms."

In the second group the ascocarp has the form of a flat disk, a cup, or a funnel, in each case lined with the hymenium (the layer of asci and paraphyses). These widely open ascocarps are called "apothecia" (singular, "apothecium"), and the Ascomycetes with such ascocarps have long been called "Discomycetes," or "cup Fungi." The hymenium lining the cups of these Fungi is often brightly colored, a very common illustration being the so-called "scarlet cup.". Most of

PEZIZA, A CUP FUNGUS.

the Lichens belong here, for Lichens are chiefly cup Fungi that are parasitic upon certain Algæ. The common "morel," usually thought of as a mushroom, is also related to this assemblage, for although its ascocarp (the "morel" which is eaten) is not cup-shaped, the hymenium is freely exposed in depressions upon the surface of the mushroom-like ascocarp.

In the third group the ascocarp is a completely closed structure (cleistothecium). To this group belong the "truffles," whose fleshy ascocarps are subterranean; the various blue and green "molds," such as appear on bread, preserves, herbarium specimens, etc.; and the "powdery mildews," so very common on flowering plants, and always to be seen upon the leaves of lilac, covering them with its whitish growth.

In the fourth group the ascocarp is flask-shaped (perithecium), being neither widely open nor completely closed. This is far the largest assemblage of Ascomycetes, and contains most of those that cause destructive diseases of plants. In general they are called the "black Fungi" (Pyrenomycetes), because frequently they produce dark, wart-like excrescences on twigs that look like charred spots. Among the destructive diseases induced by this group is the "black knot," so common on plum and cherry trees; and also the "ergot fungus," which is parasitic in the young grains of grasses, especially rye, and from which the medicinal ergot is obtained. Since many of the "imperfect Fungi" probably belong here, some of the diseases they induce may be mentioned as follows: "cankers" (especially destructive in forest plantations), "wilts" (wilts of cotton, cowpea, and watermelon being notable diseases in the southern States), "scabs" (a very common disease in apple orchards), "bitter rot" of apples and other fruits, etc.

ASCO'NIUS PE'DIA'NUS, QUINTUS (c.3–c.88 A.D.). A Roman critic and historian. He was born probably at Patavium, but lived mainly at Rome. During the reigns of Claudius and Nero he made a careful study of state papers then extant, and wrote his valuable historical commentaries on Cicero's Orations, of which only those on the five orations, "In Pisonem," "Pro Scauro," "Pro Milone," "Pro Cornelio," and "In Toga Candida," are preserved. These, too, are in a fragmentary condition, but the fragments are of great value, because Asconius' work rested on a careful study of Cicero's writings and those of his contemporaries and on an examination of official documents. The commentaries, written in pure Latin, refer chiefly to points of history and antiquities, and contain interesting accounts of those constitutional forms of the senate, popular assemblies, and the courts of justice, which under the Empire were

rapidly disappearing. The notes on the Verrine Orations are of a much more grammatical cast and exhibit traces of a declining Latinity, so that, though originally ascribed to Asconius, they are probably to be attributed to a grammarian of a later date. Consult Madvig, *De Asconii Pediani Commentariis* (Copenhagen, 1828). Asconius is known to have written also a life of Sallust and a treatise against Vergil's critics, but these have been lost. For the text of Asconius' extant writings, consult C. G. Schultze's and Orelli-Baiter's editions of Cicero, and the edition of Asconius himself by A. C. Clark (Oxford, 1906). Consult also Thomas Stangl, *Ciceronis Orationum Scholiastæ*, vol. ii (Leipzig, 1912).

AS'COT HEATH. A famous English race-course (of almost exactly 2 miles) in the parish of the same name, in Berkshire, about 29 miles southwest of London. It was laid out in 1711 by order of Queen Anne, who attended the first meeting that year. The Ascot Gold Cup race was founded in 1771, and in 1807 a gold cup was first awarded. The track was improved in 1902. The meetings are held in June. Consult Cawthorne and Herod, *The Royal Ascot; Its History and its Associations* (London, 1902), and Rice, *History of the British Turf* (2 vols., London, 1879).

ASCOT RA'CES. One of the most fashionable horse-races in England, held at Ascot Heath in Berkshire.

ASCUT'NEY (Ind. 'Three Brothers'). A mountain rising 3329 feet above the level of the sea near the Connecticut River in Windsor Co., Vt. It presents a fine example of a *monadnock* (q.v.). From its summit a beautiful view of the Connecticut valley may be obtained. There are granite and olive-green syenite quarries.

ASELLI, ȧ-sĕl'lē, **ASELLIO,** ȧ-sĕl'yō, or **ASEL'LIUS,** GASPARO (c.1581–1626). A celebrated Italian physician, professor of anatomy and surgery at Pavia. In 1623 he discovered the lacteal vessels. Before his time anatomists had supposed that the chyle was carried from the intestines into the liver by the mesenteric veins. While dissecting a living dog, he noticed for the first time the multitude of little vessels which suck up the nutritive portion of the food. At first he mistook them for nerves and did not pay particular attention to them; but on pricking one with the point of his scalpel, a white liquid spurted out, and the discovery flashed on him. He seems, however, never to have understood or described them with complete accuracy. In the year following his death a treatise on the subject of his discovery was published, entitled *De Lactibus, sive Lacteis Venis.*

ASEN, ä'sen. The name of some of the Mediæval Bulgarian czars—JOHN ASEN I (1186–95) freed his country from the domination of Byzantium, added Sophia to his dominions, and made Tirnova the Bulgarian capital. JOHN ASEN II (1218–41), son of the preceding, was forced to flee to Russia when his uncle usurped the throne. His return to Bulgaria opened a new era for the nation. Theodore of Epirus, "Emperor of the East," was overthrown, and Albania and Macedonia conquered. Asen was thus afforded an opening on the Adriatic, which he used for the commercial advancement of Bulgaria.

AS'ENATH. The daughter of Potipherah, priest of On, wife of Joseph (Gen. xli. 45, 50; xlvi. 20). The name seems to be the Hebraized form of the Egyptian *'ws-n-nt*, 'she belongs to Neith.' Names of this type occur in the XXI Dynasty, and become frequent in the XXVI or Saite Dynasty. Consult Spiegelberg, *Ägyptologische Randglossen zum alten Testament*, p. 184 (1906).

ASENATH, LIFE OF. See APOCRYPHA.

ASEP'SIS. See ANTISEPTICS.

AS'ES. See ÆSIR.

ASGARD, ăs'gärd (Old Norse *āss*, god + *gardhr*, garth, inclosure, home). The home of the Norse gods, or the Scandinavian Olympus. It was said to stand in the middle and highest part of Ida's Plain, which is the centre of the universe. There the Æsir ('gods') built a hall, *Glads-heim* ('home of joy'), with seats for 12, and one high-seat for Odin, the All-father; and also a lofty abode called Vingolf, for the goddesses. The gods worked diligently, played at games, were rich in precious things, and happy until three maidens from Jötunheim, 'giants' world,' crossed the plain and entered Asaheim, when corruption began to spread among the inmates. Asgard had many mansions, the largest and noblest of which was Gladsheim, while another, not so large, but fairer and brighter than the sun, was called Gimle, i.e., the house of the jeweled roof. The latter mansion will stand when heaven and earth shall have been destroyed by fire and will be the dwelling place of brave and upright men. There is an historical explanation of this myth: that Asaheim was a country east of the Don in Asia, where there was a city of Asgard, in which ruled a chief named Odin, or Wodan; that Odin, fearing subjection by the Romans, led his people across Russia to Sweden and settled at Sigtuna (Upsala); that his priests or chief men founded other settlements and established the worship of their ancestors; that in lapse of time the man Odin and his chiefs came to be looked upon as gods. No date can be settled for such a migration; but from 120 to 80 B.C. has been thought probable, for then Mithridates Eupater was defying the armies of Rome. This theory is based on the account in Heimskringla, which is, however, of doubtful value. See ÆSIR; SCANDINAVIAN AND TEUTONIC MYTHOLOGY.

ASGILL, ăs'gĭl, JOHN (1659–1738). An eccentric English writer. He was born at Hanley Castle, Worcestershire, and studied for the bar. At intervals during the whole of his checkered life he practiced his profession in some form or other; but he was continually involved in financial and other difficulties. Fortunately for him, Parliament had just passed an act (1700) for the resumption of forfeited estates in Ireland, and commissioners were appointed to settle claims. Seeing his opportunity, he went to Ireland and found the whole country wrangling in lawsuits. His talents, and the favor of the commissioners, secured to him a lucrative practice; and he even acquired sufficient influence to obtain a seat in the Irish Parliament. Some time, however, before taking his seat, Asgill had published a most extraordinary pamphlet, entitled *An Argument Proving that, According to the Covenant of Eternal Life, Revealed in the Scriptures, Man May Be Translated Hence into the Eternal Life Without Passing Through Death, Although the Humane Nature of Christ Himself Could not thus be Translated till He had Passed Through Death* (1700). The Irish Parliament voted the treatise a libel and expelled the author. Asgill returned to England and entered the English Parliament in 1705 as a member for

Bramber, in Sussex. But the fame of his unlucky pamphlet at last proved a Nemesis; for the English House, resolving to be not less virtuous than the Irish one, took up the treatise, condemned it to be burned by the common hangman, as profane and blasphemous, and expelled Asgill (1707). After this, his circumstances rapidly grew worse, until he finally found something like peace in two prisons, the King's Bench and the Fleet, between which his excursions were confined for the remainder of his life. The famous pamphlet by which Asgill is remembered, was much praised by Coleridge for its irony. The case for man was, indeed, capitally argued in terms of the English law. Asgill professed to believe that he was to be translated without dying. Consult the Gregg edition of the argument (New York, 1875), and Coleridge, *Table Talk*, April 30, 1832, reprint (London, 1883).

ASH (AS. *æsc*, MHG. *asch*, Ger. *Esche*), *Fraxinus*. A genus of trees belonging to the family Oleaceæ. The leaves are deciduous and

ASH-TREE LEAF AND FRUITAGE.

are pinnate with a terminal leaflet. There are about 50 species, mostly natives of Europe, eastern Asia, and North America. The common ash (*Fraxinus excelsior*) grows wild in the middle and south of Europe and in the north of Asia. It is an undoubted native of Great Britain. The flowers are naked; the leaves have five or six pairs of leaflets. The flowers appear before the leaves in spring; indeed, the tree is not covered with leaves until the season is far advanced and loses them again early in autumn. It is, however, a most beautiful and umbrageous tree, highly ornamental in parks; but in parks or hedgerows it is injurious to the grass or crops immediately around it. It rises to the height of 100 to 150 feet, generally with a smooth stem. The wood is white, tough, and hard, much valued by wheelwrights, cartwrights, coachmakers, joiners, and turners. It is also excellent for fuel. Sometimes it becomes irregular in the disposition of its fibres and finely veined, and is then prized by cabinet-makers. The wood of the young trees is almost as valuable as that of the old. Indeed, the value of the timber is greatest in trees of which the growth has been rapid, as it exhibits the characteristic toughness in the highest degree. The ash prefers a loamy soil, but grows in almost any, and flourishes in situations too elevated or too exposed for most other trees. It has been extensively planted in elevated situations in some parts of the north of Scotland, and there, in the more sheltered glens, it grows to a large size. Cultivation has produced and perpetuated a number of varieties, of which the most remarkable are the *weeping* ash, with boughs bent almost straight down to the ground; the *curl-leaved* ash, with dark-green wrinkled or curled leaves; and the *entire-leaved* ash, a very curious variety, with many or all of the leaves simple (not pinnated), which has been erroneously regarded by some botanists as a distinct species, and named *Fraxinus simplicifolia*, *Fraxinus heterophylla*, etc. The small-leaved ash (*Fraxinus parvifolia*) and the lentisk ash (*Fraxinus lentiscifolia*) are both natives of the shores of the Mediterranean and are very graceful and ornamental trees. The American ash, or white ash (*Fraxinus americana*), is readily distinguished from the common European ash by its lighter bark and paler green leaves. The leaves have a rhachis, and the leaflets are shortly stalked and entire (those of the common ash are sessile and serrated). It is abundant in New Brunswick and Canada, but is less common south of New Jersey and west of Minnesota and Kansas. The trunk often rises more than 40 feet undivided. The wood is used for the same purposes as that of the common ash. The red ash (*Fraxinus pubescens* or *Fraxinus pennsylvanica*) is very similar, but of smaller size, and has a deep-brown bark. It is most abundant in Pennsylvania, Maryland, and Virginia, especially in swampy ground. The black ash or water ash of the New England States, New Brunswick, etc. (*Fraxinus sambucifolia* or *Fraxinus nigra*), is a large tree, with buds of a deep-blue color. This tree is more commonly found in wet places than the other species. Its wood is soft, tough, and easily separable into thin layers, on which account it is commonly used for barrel hoops, staves, and for splint baskets, etc. The blue ash of Ohio, Kentucky, Tennessee, etc. (*Fraxinus quadrangulata*), is also a large tree. The inner bark of this species gives a blue color to water, hence the name. The branches are quadrangular, the young shoots having on the angles four membranes which extend their whole length. The green ash (*Fraxinus viridis* or *Fraxinus lanceolata*), readily recognized by the brilliant green of its young shoots, is chiefly found in the Middle States; on account of its hardiness, the green ash is extensively planted for wind-breaks, and as an ornamental in Minnesota and the Dakotas. It is easily propagated from seed and is of very rapid growth. The wood is less valuable than that of the white ash. The Carolina ash (*Fraxinus caroliniana*), remarkable for the great size of its leaflets, is found chiefly in the southern States. Besides these, North America produces about a

dozen other species or varieties. The wood of all of them is used for somewhat similar purposes to that of the common ash. In the south of Europe grows the manna ash or flowering ash (*Fraxinus ornus*, called *Ornus europæa* by some botanists), whose flowers have a four-partite calyx and four small yellowish-white petals. The tree has much resemblance to the common ash. From it the substance called manna (q.v.) is obtained by means of transverse incisions in the bark; but in very favorable situations it flows spontaneously during the greatest heat of summer. Manna is chiefly collected in Calabria and Sicily. A nearly allied species, *Fraxinus rotundifolia*, a native of Greece and the Ionian Islands, yields it also in perhaps equal quantity. The common ash is said sometimes to produce the same exudation in the same warm climates.

The mountain ash or rowan tree belongs to a different family, its resemblance to the ash being chiefly in its leaves. Fossil forms of the ash (*Fraxinus*) are known in all the Tertiary beds above the Eocene, in Europe, but have not been found in beds of equivalent age in North America. Consult G. Nicholson, *Illustrated Dictionary of Gardening* (London, 1884–89), L. H. Bailey, *Cyclopædia of American Horticulture* (New York, 1900–01), and C. S. Sargent, *Manual of the Trees of North America* (Boston, 1905).

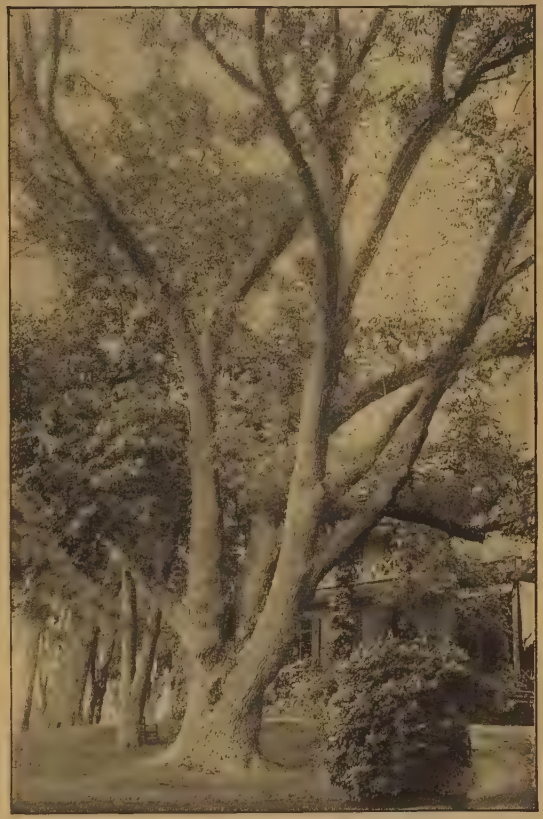
ASHANTI, ă-shăn'tē, or **ASHANTEE.** A British possession (formerly a negro kingdom) in west Africa, separated from the Gulf of Guinea by the British Gold Coast colony (q.v.), of which it has practically been a part since 1896 (Map: Africa, D 4). Its boundaries were defined by an order of the King in council dated Sept. 26, 1901, and by a subsequent order dated Oct. 22, 1906. The area is estimated at about 20,000 square miles. It is a fertile and well-watered region. Dense tropical forests, rich in cabinet woods and rubber and resinous plants, cover an area estimated at 12,000 square miles. Increased attention is being paid to the cultivation of the soil by the natives, especially in the planting and care of the kola-nut tree. Cacao plantations are extending. Other agricultural products are yams, grains, fruits, vegetables, tobacco, gum copal, rubber and dyewoods. Gold is found in quartz and alluvial deposits; the output in 1905 was 68,259 ounces (£254,790) and in 1911, 124,878 ounces (£530,853). The natives have several well-developed industries and are skilled workers in metals and in the weaving of fabrics as well as in the production of earthenware. The ornaments of gold and silver found in the palace at Kumasi in 1874 bore evidence of much artistic skill. The railway line from Sekondi, on the coast, to Kumasi, the capital of Ashanti, is 168 miles long. The population of Ashanti, according to the census of 1911, was 287,814. The natives are negroes and are divided into numerous tribes, each governed by its own headman, and all, previous to the deposition of Prempeh, in 1896, subject to the King of Kumasi as king paramount. Among these tribes are the Bekwais, Kokofus, Kumasis, Daniassis, and Mampons. Physically the inhabitants of Ashanti are strong and well developed. Their speech belongs to the Tshi group. They practice polygamy and their religion is a mixture of ancestor worship and animism or nature worship. The capital is Kumasi, with a population, 1911, of 18,853. Obuassi, Wam, Nkoranza, Atabubu, and Kintampo are other towns; Kintampo, an old slave mart, is now a station for the kola-nut trade.

The beginnings of the Ashanti kingdom are obscure, but traditions point to an immigration from the north of negro tribes fleeing from oppression at the hands of the Niger Moors, whose capital was Timbuktu. Our first positive glimpse of it is in the year 1700, when Kumasi was made the capital by Osai Tutu I, who conquered Akim, Assin, Gaman, Denkira, and other neighboring states. His successors continued the campaign of conquest; and about 1807 the Ashantis invaded the Fanti domains, thereby reaching the coast, where they became involved in a war with the British. Treaties were concluded and broken. From 1824 to 1826 the British met with heavy reverses, but at Dodowah the Ashantis were entirely routed. In 1831 they were driven from the seacoast, and the river Prah was fixed as the southern boundary of their kingdom. In 1873–74, in consequence of disputes arising in connection with the cession of the Dutch fort of Elmina to Britain, war broke out again, and an army under Sir Garnet Wolseley forced its way to the centre of the kingdom. After a severe battle at Amoaful and several days' fighting, Kumasi was taken Feb. 4, 1874, and burned on the 6th; and though the rainy season had set in, the British army returned in safety to the coast. The King submitted and promised to pay tribute and end the slave traffic. In 1895 the King of Ashanti (Prempeh), having molested the English settlers on the coast and raided the natives in numerous slave-hunting expeditions, a strong British force was sent again to Kumasi, which it reached with little resistance. The kingdom was then made a British protectorate (1896). In the spring of 1900 the Ashantis rose in sudden rebellion. The British governor of the Gold Coast colony and some 700 troops were pent up in Kumasi by 15,000 Ashanti warriors. On June 23 Governor Hodgson, with part of the garrison, succeeded in getting away to the coast, and on July 15 a relief expedition entered the town. The siege had lasted nearly four months. The country was definitively annexed to Great Britain Sept. 26, 1901. It is separately administered by a chief commissioner under the control of the governor of the Gold Coast, but the laws of the latter colony do not apply to it. Consult: H. C. J. Biss, *The Relief of Kumasi* (London, 1901); H. A. Freeman, *Travel and Life in Ashanti and Jaman* (London, 1898); C. C. Reindorf, *History of the Gold Coast and Ashanti* (Basel, 1895).

ASH'BOURNE, Edward Gibson, Baron (1837–1913). An Irish barrister and politician. After studying at Trinity College, Dublin, he became a barrister in 1860 and Queen's counsel in 1872. Having served as a member of Parliament (1875–85), and as Attorney-General for Ireland (1877–80), he was made Lord Chancellor of Ireland in 1885. In this latter office he was continued, with a seat in the cabinet, until 1892, and he again held it from 1895 to 1906. He was created first Baron Ashbourne in 1885.

ASH'BURNER, Charles Albert (1854–89). An American geologist, born in Philadelphia, where he received his collegiate education. He became engaged in the geological survey of Pennsylvania, in the capacity of assistant, and afterward was made head geologist, and carried on valuable investigations in connection with the

ARAUCARIA EXCELSA, as a house plant.



ASH (Fraxinus americana).

survey of the coal fields of Pennsylvania. He was a member of many scientific societies. His name is well known among geologists, both in this country and abroad, and is intimately associated with the history of coal stratigraphy. His writings include a large number of papers, especially on the subjects of coal, petroleum, and natural gas, contributed to various scientific and technical journals and to the reports of the Pennsylvania Geological Survey.

ASH'BURTON, BARON. See BARING, ALEXANDER.

ASHBURTON RIV'ER. A river of Western Australia, rising in the mountains west of the Great Sandy Desert and flowing 400 miles northwestward into the Indian Ocean, north of Exmouth Gulf. The Tropic of Capricorn crosses its middle course and here, and to some extent below, grass lands and trees border the river. It reaches the sea, however, through the desert coastal strip of Western Australia (Map: Western Australia, B 6).

ASHBURTON TREA'TY. See BARING, ALEXANDER; WEBSTER-ASHBURTON TREATY.

ASH'BY, TURNER (1824–62). A Confederate general. Early in 1861 he raised a regiment of cavalry, and by successive promotions attained the rank of brigadier-general in 1862. In May, 1861, he commanded at Point of Rocks, near Harper's Ferry, and in the spring of 1862 covered General Jackson's retreat before General Banks, earning the highest praise for his ability and gallantry. In June, 1862, he was killed in a skirmish at Harrisonburg, Va., two days before the battle of Cross Keys. Consult J. B. Avirett, *The Memoirs of General Turner Ashby and his Compeers* (Baltimore, 1867).

ASHBY-DE-LA-ZOUCH, ăsh'bĭ-de-lâ-zōōsh' *or* -zōōch' (after the Norman family La Zouch). A small town of Leicestershire, England, about 17 miles northwest of Leicester (Map: England, E 4). The town was once celebrated for its manufacture of stockings, hats, and fire-brick, but these industries have greatly declined. In the neighborhood there are saline springs; while coal, limestone, and fine clay are also found. The church of St. Helen is a rather handsome building; and the castle to the south of the town, now in ruins, known from Scott's *Ivanhoe,* was once the prison of Mary, Queen of Scots. Pop., 1891, 4500; 1901, 4700; 1911, 4927. Consult E. Mammatt, *History and Description of Ashby-de-la-Zouch* (London, 1852).

ASH'BY-STER'RY, JOSEPH. An English critic. He was born in London and was educated as a painter, but soon turned to journalism. He has written some brilliant verses, sketches, and novels, such as *Nutshell Novels* (1890); *Lazy Minstrel* (1892), which has run through many editions; *Naughty Girl: A Story of 1893* (1893); *A Tale of the Thames in Verse* (1896); and *The Bystander; or, Leaves for the Lazy* (1900); *Sketches in Song* (1903); and *River Poems* (1909).

ASH'DOD (Heb. stronghold). One of the five confederated Philistine cities, the modern village of Esdud, 3 miles from the Mediterranean coast, between Gaza and Joppa. It had a commanding situation and possessed a famous Dagon temple, in which the captured Yahwe ark was placed (1 Sam. v.). Sargon sent his general against this city in 711 B.C. Azuri had been superseded by his brother Ahimiti, and he had been overthrown by Yamani (or Yawani). Yamani was forced to flee to Muzri. Ahi-milki, King of Ashdod, is mentioned by Esarhaddon. According to Herodotus, the city was besieged 29 years by Psammetichus I (663–610 B.C.). In the time of Nehemiah an Ashdodite dialect was spoken by the children in Jerusalem whose mothers were Philistines. Whether this was a Canaanitish or Aramaic dialect cannot be determined. Jonathan took the city in 147 B.C. and burned the Dagon temple. Pompey enfranchised the city. As Azotus, it became a centre of Greek civilization, and was also the seat of a Christian bishop.

ASHE, ăsh, JOHN (1720–81). An American soldier. He was born in North Carolina; was a representative in the Colonial Assembly, and its presiding officer (1762–65), and was a member of the first Provincial Congress. Early in 1775 he recruited a force of 500, with which he took Fort Johnson, and in the following year he became brigadier-general of the North Carolina State troops. He was with General Lincoln in 1779, and while commanding an expedition sent to relieve Augusta, Ga., was surprised and defeated by General Prevost (March 3), at Brier Creek. In 1781 he was made a prisoner at the capture of Wilmington (February 1), and after being treated with the utmost cruelty, died of smallpox, October 24. Asheville, N. C., was named in his honor.

ASH'ER (Heb. blessed). The name given in Gen. xxxv. 26, to the eighth son of Jacob, being the second born to him by his concubine Zilpah, the handmaid of Leah. Asher is thus merely the customary eponymous hero of the tribe of Asher, which formed part of the confederation known as the Bene Israel. The genealogy of Asher, indicating merely the subdivisions of the clan, is furnished in Gen. xlvi. 17, and Num. xxvi. 44 (cf. 1 Chron. vii. 30). But little is known of the clan, which plays scarcely any part in Hebrew history. Asher takes no part in the uprising against Sisera (Judg. v. 17), while the statement (Judg. vi. 35 and vii. 23) that Asher participated in the conflict with Midian is open to question. The position of the tribe is also difficult to ascertain, since but few of the places mentioned (Josh. xix. 24–31) as belonging to Asher have been identified. There are indications that the tribe was originally settled in southern Palestine, where it became mixed with non-Hebrew clans, and subsequently moved northward toward the seacoast, though neither Accho, Achzib, nor Sidon (mentioned Josh. xix, as cities of Asher) could ever have belonged to it. The popular etymology as 'happy' (Gen. xxx. 13) may furnish the real meaning, and it is also possible that Asher may have originally been the name of a deity. In that case it may ultimately prove to be identical with Assur (q.v.) since the name of this god was written in early times Ashir, or Asir, both in Assyria and in Cappadocia. Ashera would then be the consort of this deity. A district or state of Aser in northwestern Galilee is mentioned in Egyptian inscriptions of the time of Seti I (c.1331–10 B.C.) and Rameses II (c.1310–1244 B.C.). See Max Müller, *Asien und Europa,* pp. 236 ff. (1893).

ASH'ERA. 1. A wooden post used in worship at the sanctuaries of Palestine in ancient times. It was employed not only by the Canaanites, but also by the Israelites at Samaria, Bethel, and Jerusalem (2 Kings xxiii. 6), in connection with the worship of Yahwe. It probably had phallic shape, represented a god or goddess of

fertility, and stood at the boundary of a field and especially a sacred inclosure. In Assyrian, *Asirtu* also has the meaning of 'sacred precincts,' and this is its manifest sense in the Phœnician Masud inscription. There was a strong prophetic opposition to this cultus-object, and many *asheras* were hewed down by Josiah after 620 B.C. 2. Ashera was also the name of a goddess. She was in all probability the wife of Assur (q.v.), or Asir, as the name of the chief Assyrian deity is written in early inscriptions found at Kalat Sherkat and at Kara Eyuk. Asirtu, or Asratu, also seems to have been identified with Ishtar (q.v.), and is sometimes represented as the consort of Amurru. (See AMORITES.) An Abdashirta, 'servant of Ashera,' flourished in Syria in the days of Amenhotep III (1411–1375 B.C.). Katabanian inscriptions show that this goddess was worshiped in south Arabia. Athirat is the consort of Wadd, the god of love. It is natural to infer that there was some connection between the goddess Ashera and the sacred pole. Consult Sayce, "Cappadocian Cuneiform Tablets from Kara Eyuk" in *Babyloniaca*, vol. vi, p. 68 (1911).

ASH'ES. The substance of all plants and animals contains as an indispensable ingredient a certain amount of mineral matter which remains behind as ash when the organic portion of the substance is burned.

According to Warington, the proportion of ash varies from 0.2 to 0.4 per cent in the dry matter of the wood of trees, from 2 to 5 per cent in seeds, from 4 to 7 per cent in the straw of cereals, from 4 to 8 per cent in roots and tubers, from 5 to 9 per cent in hay, and from 10 to 25 per cent in leaves of root crops. Lawes and Gilbert found that the proportion of ash varied from 4 to 5 per cent in cattle, from 2.8 to 3.5 per cent in sheep, and from 1.8 to 3 per cent in swine.

Uses. The ashes of sea plants were formerly a common source of bromine and iodine, and the ashes of animal bodies form a source of phosphorus. But the commercial value of ashes depends mainly on their use (1) as a source of alkali (pearl-ash, potashes, etc.), and (2) as a fertilizer. The fertilizing value of ashes is due to the fact that they contain all of the mineral constituents required by plants, especially potash, and that largely in one of the most desirable forms—viz., as carbonate. The following are the most important classes of ashes for agricultural purposes: (1) wood ashes from household fires, furnaces, etc.; (2) cotton-hull ashes, resulting from the use of cotton hulls as fuel under boilers, etc.; and (3) lime-kiln ashes, which are a mixture of more or less lime with the ashes of the fuel used in the kilns.

Wood Ashes. Wood ashes were formerly the almost exclusive source of potash for fertilizing and other purposes. They have, however, been very largely replaced by the German potash salts. The supply of wood ashes is limited on account of the general substitution of coal for wood as fuel. Canada is the main commercial source of supply in America. There the ashes are collected from house to house and stored in so-called "asheries." When first collected, they are said to weigh from 34 to 40 pounds per bushel; but when stored they undergo a heating and sweating process which causes them to shrink about one-fifth in bulk, the weight per bushel increasing from 40 to 48 pounds. It requires about 30 cords of hard wood to make one ton of ashes.

The composition of wood ashes is very variable. The hard woods yield ashes richer in potash than the soft woods. Pure ashes carefully prepared from hard woods have been found to contain more than 17 per cent of potash; those from soft woods almost 10 per cent, besides about 2 per cent of phosphoric acid. No such ashes are found on the market. Unleached ashes contain, on an average, about 5 per cent of potash, 1.5 per cent of phosphoric acid, and 30–35 per cent of lime. The fertilizing action of ashes is mainly but not entirely due to the potash. The small amount of phosphoric acid which they contain is not without fertilizing value, and the lime, which is present to the extent of 600 to 700 pounds per ton (of 2000 pounds), is of great value in improving the texture and in correcting the acidity of soils, besides supplying an element which is deficient in many soils.

Ashes which have been subjected to leaching show a reduced percentage of potash and an increased percentage of moisture. The average composition of such ashes is as follows: Moisture, 30 per cent; potash, 1.3 per cent; phosphoric acid, 1.5 per cent; lime, 28 per cent. The fertilizing action of leached ashes is due very largely to their favorable physical effects on the soil, which are brought about mainly by the lime present.

Cotton-Hull Ashes. Cotton-hull ashes are much richer in fertilizing constituents than wood ashes and are highly esteemed, especially in New England, as a fertilizer for tobacco. They contain on an average about 23 per cent of potash, 9 per cent of phosphoric acid, and 8.8 per cent of lime, although their quality varies greatly. The potash has been found to vary from 10 to 42 per cent, the phosphoric acid from 3 to 13 per cent. The high percentage of phosphoric acid which these ashes contain makes them a valuable source of this fertilizing constituent. The percentage of lime is too small to exert any marked influence on the fertilizing effect.

Lime-Kiln Ashes. These are obtained in the burning of lime with wood and usually contain less than 1.5 per cent of potash, about 1 per cent of phosphoric acid, and 45 to 50 per cent of lime. The low percentage of potash and phosphoric acid, and high percentage of lime, are due to admixture of lime from the kiln. Such ashes are valuable mainly for their lime.

Other Kinds of Ashes. Among other kinds of ashes which occasionally attain some agricultural importance are tan-bark ashes, which, according to Voorhees, seldom contain more than 2 per cent of potash, 1.5 per cent of phosphoric acid, and 33 per cent of lime; coal ashes, which contain only traces of phosphoric acid and soluble potash and are useful only for improving the physical condition of heavy soils; and seaweed ashes, which are very variable in composition on account of imperfect incineration or admixture of impurities, but are often quite rich in potash, as has been shown especially in the case of the kelps of the Pacific coast of the United States.

ASHEVILLE, ăsh'vĭl. A city and the county-seat of Buncombe Co., N. C., 129 miles by rail southeast of Knoxville, Tenn.; at the junction of the Swannanoa and the French Broad rivers, and on the Southern Railway (Map: North Carolina, B 4). It is finely situated, at an elevation of 2300 feet in a mountainous region, and is a celebrated health resort, both summer and winter. The city contains a public

library, Asheville Normal and Collegiate Institute, Bingham Military School, Asheville School for Boys, Home Industrial School, and other educational institutions. The post office, United States government building, county courthouse, city hall, public library, auditorium, Grove Park Inn, The Manor, Battery Park Hotel, and Winyah Sanitarium are notable features, and additional places of interest are Overlook Park, Richmond Hill, Beaumont (grounds), and Swannanoa Drive along the river bank. Adjoining the city is the Vanderbilt estate, Biltmore, whose forest preserves (132,000 acres) are now government property. Asheville is in a region which has considerable mineral wealth and valuable timber, and is especially adapted to stock raising, dairying, and general agriculture, as well as truck gardening, poultry raising, and fruit growing. Its apples are of a particularly fine variety. The manufactured articles include caskets, wood novelties, brick, cotton goods, mattresses, harness, cereals, furniture, mica products, building material, and tanned leather. City water comes from the Craggy and Black mountains. The French Broad River supplies hydroelectric power. Settled in 1792, Asheville was first incorporated about 1835. The government, under a revised charter of 1901, was vested in a mayor, biennially elected; a city council, chosen by wards and on a general ticket; and subordinate officials, who were nominated and elected by the council. In 1915 Asheville adopted the commission plan of government. Pop., 1890, 10,235; 1900, 14,694; 1910, 18,762; 1920, 28,504.

ASH FLY. A gall fly of the oak (*Cynips quercifolii*). See GALL INSECTS.

ASH'FORD. A market town of Kent, England, situated on the Stour, 56 miles by rail southeast of London (Map: England, G 5). It is well built and lighted and has an excellent water supply. The town maintains public baths, a park, hospital, and technical schools. It manufactures linen goods, agricultural implements, beer, and pianos, and has a large workshop of the Southeastern Railway. Pop., 1891, 10,700; 1901, 12,800; 1911, 13,668. Ashford was the home of Jack Cade.

ASHFORD, BAILEY KELLY (1873—). An American surgeon, born in Washington, D. C. His general education was obtained at the public schools and at Columbian (now George Washington) University. In 1896 he graduated from the Georgetown University Medical School and in 1898 from the Army Medical School, during this period serving also as resident physician in several hospitals. Having accompanied the military expedition to Porto Rico in 1898, he made during the next year an exhaustive study of anæmia in that island, and determined that the hookworm responsible for this disease caused as many as 12,000 deaths a year. The governmental campaign against the plague, organized by him and prosecuted in 1903–04, resulted in the treatment and cure of some 300,000 persons out of a total population of a million, and in a reduction of 90 per cent in the death rate from anæmia. Ashford founded the Porto Rico Anæmia Commission and by special authority of the Secretary of War served on it in 1904–06. He was also made chairman of the consulting staff of the Presbyterian Hospital in San Juan, Porto Rico, and was chosen to membership in many American and foreign medical societies. His writings include *Anæmia in Porto Rico* (1904); *Uncinariasis in Porto Rico: A Medical and Economic Problem* (1911).

ASH'HURST, JOHN, JR. (1839–1900). An American surgeon. He was born at Philadelphia, graduated in 1857 at the University of Pennsylvania; studied medicine, and from 1862 to 1865 was assistant surgeon in the United States army. He was appointed professor of clinical surgery in the University of Pennsylvania in 1877, Barton professor of surgery in 1883, and president of the Philadelphia College of Physicians in 1898. He was a member of several scientific societies and edited Erichsen's *Science and Art of Surgery* (1869) and the *International Encyclopædia of Surgery* (6 vols., rev. ed., 1888). His original publications include *Injuries of the Spine* (1867) and *Principles and Practice of Surgery* (1871; 6th ed., 1901).

ASHI, ăsh'ĭ, RABBI (352–427 A.D.). A son of Simai and member of a well-known family. Nothing is known of his childhood or education, but at an early age he became the head of the Rabbinical school at Sura in Babylonia. He is said to have rebuilt the schoolhouse at that place, and such was the distinction which he gained among his contemporaries that he was accorded the honorable title "Rabbana," i.e., 'our teacher.' His chief claim to fame rests upon the attempt that he made to gather the discussions of the Rabbis on the Mishnah into a compilation known as the "Gemara," which, together with the Mishnah, constitutes the Talmud. He worked at this task for more than 50 years, but it was left for his successors to complete it. See TALMUD.

ASHIKAGA, ä'shê-kä'gà. A town of Japan in the prefecture of Tochigi, situated in the southern part of Honshiu, 71 miles by the Riomo Railway north-northwest of Tokio (Map: Japan, F 5). The town was famous for its academy of Chinese learning said to have been founded in the ninth century. It contained an extensive library of Chinese works and was one of the most famous centres of Chinese culture and Confucianism. With the establishment of the Seido at Yolo, at the end of the seventeenth century, it lost its former importance and at present retains only a fraction of its library and an image of Confucius. Commercially Ashikaga is important for its extensive trade in cotton and silk goods. Pop. (latest report), 1898, 21,348.

ASHIKAGA. A dynasty of Shoguns or military lieutenants of the Mikado, who ruled Japan from 1336 to 1574, the last being overthrown by Ota Nobunaga. See SHOGUN.

ASHIO, ä-shē'ō. A town of Japan, situated in the southern part of Honshiu, 10½ miles southwest of Nikko. Silver is mined in the vicinity, and it is famous for the two copper mines of Ashio and Kotaki, 2 miles distant, considered the most productive in Japan. In 1910 the output of copper ore was about 300,000 tons. In the vicinity of the town are situated extensive smelting works run by electricity generated by water power. Pop., about 6000.

ASH'KELON (Gk. *'Ασκάλων, Askalōn*; Heb. *Ashkelon;* Ass. *Askaluna;* modern *Askalān*). An important Syrian city in ancient times, now in ruins. It is situated on the shores of the Mediterranean, north of Gaza, and about 40 miles west-southwest of Jerusalem. Before the Philistine invasion it was occupied by the Avites (Deut. ii. 23). In the beginning of the

fourteenth century B.C. the city was ruled by an Egyptian governor, Yitia, from whom we have three letters to Amenhotep IV in the Amarna correspondence. Ashkelon rebelled against Egypt in the reigns of Rameses II (1310–1244) and Merenptah (1244–1234). The latter refers to Ashkelon in his famous inscription mentioning Israel. (See ISRAEL.) The city passed into the hands of the Philistines when these invaders from Crete were driven from Egypt into Syria by Rameses III (c.1200 B.C.). It is mentioned as a Philistine city in the story of Samson (Judg. xiv. 19); it is one of the cities in which the captured ark of Yahwe was kept (1 Sam. vi. 17); and it is referred to by David in his elegy over Saul and Jonathan (2 Sam. i. 20). In the second half of the eighth century there were two parties in Ashkelon, as in other city kingdoms in Syria—one favorable to the Assyrians, and another striving for independence. Tiglath-pileser IV seems to have made Mitinti a vassal in 738; this King died in 733, and his son, Rukipti, was placed upon the throne by the Assyrian monarch. Sar-ludari, the son of Rukipti, was faithful to Assyria, but was driven away by Sidka. Sennacherib, in 701, brought him captive to Assyria and restored Sar-ludari. It became a part of the Achæmenian Empire and was conquered by Alexander. Under Ptolemaic and Seleucid rule it became a thoroughly Hellenistic city. The worship of its goddess Atargatis-Derketo continued, however, though temporarily checked by the Hasmonæan rulers, Jonathan and Alexander Jannæus, who held possession of the city (1 Maccabees x. 86; xi. 60). Its regained independence was marked by the city era of 104 B.C. Herod's family probably came from Ashkelon, and he embellished the city with baths, palaces, and fountains. All through the Hellenistic period it seems to have enjoyed great prosperity and was a centre of learning. It was the birthplace of philosophers like Antiochus and Eubius, grammarians like Ptolemy and Dorotheus, and historians like Apollonius and Artemidorus. The citizens were strongly opposed to Christianity down to a late period. After being captured by the Moslems, Ashkelon remained in their possession until it was taken by the Crusaders. Under the walls of the city the Christians won a brilliant victory on Aug. 12, 1099; but the city did not fall into their hands until 1154 after a siege by sea and land of five months. It was taken by Saladin in 1187 and dismantled in the beginning of the third Crusade. The attempt by Richard Cœur de Lion in 1191 to rebuild the walls had to be abandoned, and it was agreed that the city should remain unfortified. The final destruction came in 1270 through Sultan Bibars, who had the harbor filled with rocks. The ruins of the massive city walls still stand, and to the east between them and Mejdel some remains of the temple of Derketo. Consult: Guérin, *Judée*, vol. ii, pp. 153 ff. (1869); Winckler, *Geschichte Israels*, pp. 221 ff. (1895); Strack, *Gaza und die philistäische Küste* (1852); Schürer, *Geschichte des jüdischen Volkes* (4th ed., 1901).

ASH'KENA'ZIM. Already in the writings of Saadia (892–942) Ashkenaz seems to be used as a name of Germany. This interpretation may indeed be earlier, as Ashkenaz, Riphat, and Togarmah are explained as *Germanikiye*, or Germans, in *Bereshith Rabba*, xxxvii, 1. Since the twelfth century, at any rate, the Jews of Germany have been called Ashkenazim, and they as well as the Jews of other regions in which German Jews have settled are designated as Ashkenazim, as against the Sephardim —the so-called Portuguese Jews, the descendants of the Jews of Spain and Portugal. The difference between the two consists merely in a different pronunciation of the Hebrew, and slight divergences in the ritual. Doctrinally there is no difference. At times, however, social distinctions have been very great and intermarriage almost impossible.

ASHLAND. A city in Boyd Co., Ky., 146 miles east by south of Cincinnati, Ohio, on the Chesapeake and Ohio and the Norfolk and Western railroads, and on the Ohio and Big Sandy rivers (Map: Kentucky, H 2). The principal features of interest are Central Park, a public preserve of about 50 acres in the centre of the city, and Clyffeside Park, a summer resort with various attractions, maintained by a corporation, just outside the city limits. Ashland is important chiefly as a manufacturing city, though it carries on an extensive trade in coke, iron ore, and the varied products of its industrial plants, which include pig iron, cut and wire nails, wire rods, steel billets, sheet steel, fire brick, leather, cement, coke ovens, flour, ice, furniture stock, and oak and poplar lumber. Settled in 1854, Ashland was chartered as a city in 1870. Under a revised charter of 1894 the government is vested in a mayor, elected every four years, and a city council which chooses all municipal officials except the board of education and chief of police. Pop., 1900, 6800; 1910, 8688; 1920, 14,729.

ASHLAND. A city and the county-seat of Ashland Co., Ohio, 55 miles (direct) southwest of Cleveland, on the Erie and the Loraine, Ashland, and Southern railroads, and the Cleveland, Southwestern and Columbus electric line (Map: Ohio, F 4). It has a public library, the Samaritan Hospital, and manufactures stock and poultry foods, pumps, hay, tools, rubber goods, etc. The water works are owned by the municipality. Pop., 1900, 4087; 1910, 6795.

ASHLAND. A city in Jackson Co., Ore., 341 miles south of Portland, on the Southern Pacific Railroad (Map: Oregon, C 5). Ashland is the seat of a State normal school, a polytechnic and business college, the southern Oregon Chautauqua, and has a Carnegie library and a hospital. Because of its pleasant location in the Rogue River valley, and on account of the existence of hot and cold sulphur and other mineral springs, it is popular as a health resort. There are important fruit-growing, granite-quarrying, and lumber interests, and rich deposits of gold, copper, iron, and coal. The city also contains railroad shops, planing mills, a broom factory, iron foundry, and a creamery. The water works and electric light plant are owned by the municipality. Pop., 1890, 1784; 1900, 2634; 1910, 5020.

ASHLAND. A borough of Schuylkill Co., Pa., 12 miles (direct) northwest of Pottsville, on the Philadelphia and Reading, and Lehigh Valley railroads (Map: Pennsylvania, J 5). Coal mining is the chief industry, but there are also important foundries, machine shops, etc. Ashland owns and operates its water works. Settled in 1850, Ashland was incorporated in 1857. Its charter of that date provides for a mayor elected every three years and a city council of 15 members. Pop., 1900, 6438; 1910, 6855.

ASHLAND. A residential town in Hanover

Co., Va., 17 miles by rail north of Richmond, on the Richmond, Fredericksburg, and Potomac Railroad (Map: Virginia, G 4). It is the seat of Randolph-Macon College (Methodist Episcopal, South), founded in 1832, in Mecklenburg County, and removed to Ashland in 1866. Settled in 1845, Ashland was incorporated in 1856. The town suffered from a number of raids during the Civil War, and the locality was the scene of several battles. The town carries on a considerable trade in garden produce. Henry Clay was born about 7 miles from Ashland. Pop., 1890, 948; 1900, 1147; 1910, 1324.

ASHLAND. A city and the county-seat of Ashland Co., Wis., 70 miles east of Superior, on Chequamegon Bay, and one of the finest harbors on Lake Superior (Map: Wisconsin, C 2). Steamers connect it with lake ports, and it is on the Minneapolis, St. Paul, and Sault Ste. Marie, the Northern Pacific, and the Chicago and Northwestern railroads. Ashland is the seat of Northland College, the Sacred Heart Convent, and contains a hospital, the Vaughn Public Library, North Wisconsin Academy, an opera house, a fine United States government building and post office, and Knight Hotel. The Apostle Islands, in Chequamegon Bay, are of historic and scenic interest. Industrial and commercial interests are represented by several lumber mills, charcoal blast furnaces, steel plant, foundries and machine shops (including railroad shops of the Chicago and Northwestern), pulp works, creameries, flour mill, brownstone quarries, large wholesale houses, and extensive ore and merchandise docks. An extensive industry in dairying and fruit growing has been developed. Ashland is one of the most important ports on the Great Lakes, the place from which the product of the iron mines of the Gogebic Range is shipped. Settled in 1854, Ashland was incorporated in 1863, and since 1876 has grown rapidly. It was chartered as a city in 1887 and adopted the commission form of government in 1913. Pop., 1900, 13,074; 1910, 11,594; 1920, 11,334.

ASH'LAR. See MASONRY.

ASH'-LEAVED MA'PLE. See BOX ELDER.

ASHLEY. A borough in Luzerne Co., Pa., 1 mile from Wilkes-Barre, on the Central of New Jersey and the Wilkes-Barre and Hazleton railroads. It is in a productive coal-mining region and has railroad shops. Pop., 1900, 4046; 1910, 5601.

ASH'LEY, ANTHONY EVELYN MELBOURNE (1836–1907). An English statesman of the Liberal party, fourth son of the seventh Earl of Shaftesbury. After his graduation at Trinity College, Cambridge, he was called to the bar at Lincoln's Inn and joined the Oxford Circuit. He was private secretary to Lord Palmerston from 1858 to 1865, barrister of the Oxford Circuit from 1865 to 1874, and Parliamentary Secretary to the Board of Trade from 1880 to 1882. Mr. Gladstone selected him (in 1882) to succeed Mr. Courtney as Under Secretary of State for the Colonies. He was also member of Parliament from 1874 to 1885, when he was defeated in the Isle of Wight contest. In 1891 he was made a Privy Councilor. He wrote *The Life of Henry John Temple, Viscount Palmerston* (London, 1879).

ASHLEY, WILLIAM JAMES (1860—). An Anglo-American educator. He was born in London, England, graduated at Balliol College, Oxford, in 1881, was a lecturer in history at Lincoln and Corpus Christi in 1885–88, professor of constitutional history and political economy at the University of Toronto in 1888–92, and professor of economic history at Harvard in 1892–1901, when he became professor of commerce and finance, and then dean of the faculty of commerce, in the University of Birmingham, England. He translated for the "Economic Classics" series, of which he was editor, Schmoller's *Mercantile System* (1896) and Turgot's *Reflections* (1898), and wrote *James and Philip van Artevelde* (1883); *An Introduction to English Economic History and Theory* (1888–93); *Surveys, Historic and Economic* (1900); *The Tariff Problem* (3d ed., 1911) and *The Adjustment of Wages* (1903), and *Progress of the German Working Classes* (1904). He edited *British Industries* (1907), *British Dominions: Their Present Commercial and Industrial Condition* (1911), *Birmingham Studies in Social Economics* (1912), and wrote *Gold and Prices* (1912).

ASH'LEY COOP'ER, ANTHONY. See SHAFTESBURY, EARLS OF.

ASH'MEAD-BART'LETT, Sir ELLIS (1849–1902). An English statesman. He was born in Brooklyn, N. Y., the eldest son of Ellis Bartlett, a minister of Plymouth, Mass., and of Sophia, daughter of J. K. Ashmead, of Philadelphia. He received his education at Torquay and at Christ Church, Oxford, where he was president of the Oxford Union. He graduated with high honors and was called to the bar at the Inner Temple in 1877. He was member of Parliament from 1880 to 1885, in 1886, 1892, and 1895, and Civil Lord of the Admiralty from 1885 to 1886 and from 1886 to 1892. He served in South Africa in 1900 and in the Græco-Turkish War of 1897, when he was taken prisoner by a Greek warship, the commander of which mistook him for a spy. He was knighted in 1892. He was a frequent speaker in the House, especially on foreign questions, and published: *The Battlefields of Thessaly* (1897); *The Passing of the Shereefian Empire* (new ed., 1910); *With the Turks in Thrace* (new ed., 1913).

ASH'MOLE, ELIAS (1617–92). An English antiquary, founder of the Ashmolean Museum, at Oxford University. He was born at Lichfield and became a lawyer. In the Civil War he favored the royalist side and held a commission in the army. About this time he became interested in the study of astrology and alchemy and entered Brasenose College, Oxford, to study these subjects, together with physics and mathematics. He was one of the earliest of English Freemasons, having been initiated about 1646. With the Restoration Ashmole received many court offices and honors. His later interests were almost entirely in antiquarian subjects. He received by bequest the collection of curiosities of John Tradescant, and with his own additions it was turned over to Oxford University in 1682. He was the author of *Theatrum Chemicum* (1652), a collection of ancient metrical treatises on alchemy; *Institution, Laws, and Ceremonies of the Order of the Garter* (1672); *The Antiquities of Berkshire* (3 vols., 1719), and his *Diary* (1717).

ASHMO'LEAN MUSE'UM. A museum of antiquities at Oxford, founded by Elias Ashmole, and contained in a building erected by Christopher Wren in 1682. In the floor are some of the Arundel Marbles.

ASH'MUN, GEORGE (1804–70). An American lawyer and politician, born in Blandford, Mass.

He graduated at Yale in 1823 and was admitted to the bar in 1828; served for four terms in the Lower House of the Massachusetts Legislature, and for one term in the State Senate, and was an influential member of Congress from 1845 to 1851. In 1860 he presided over the convention at Chicago which nominated Lincoln for President.

ASHMUN, JEHUDI (1794–1828). An American missionary. He was born at Champlain, N. Y., graduated at the University of Vermont in 1816, and was elected a professor in Bangor Theological Seminary (Congregational). He soon resigned, joined the Episcopal church, and became editor at Washington of *The Theological Repertory*. In this periodical he advocated the views of the African Colonization Society for founding a colony of liberated negroes on the west coast of Africa. Soon he was appointed an agent of the Society, and in 1822 conducted a body of liberated negroes from Baltimore to Liberia. He devoted the next six years to the task of putting the colony on a solid basis, but was obliged to return to the United States and soon died. See his *Life*, by R. R. Gurley (New York, 1835).

ASHOKAN RESERVOIR. An artificial lake, about 14 miles west of Kingston, N. Y., formed by the Olive Bridge dam across Esopus Creek and the Beaver Kill and Hurley dikes across smaller streams and gaps between the hills. It has a water surface of 12.8 square miles and a capacity of 132,000,000,000 gallons. It is situated about 90 miles north of the city of New York and forms an important part of the Catskill water system, impounding the water of the Esopus watershed, which aggregates some 255 square miles. It is on the route of the Ulster and Delaware Railroad, which had to be re-located on account of the construction of the dams and reservoir. See AQUEDUCTS; DAMS AND RESERVOIRS.

ASHRAF, à-shräf'. A town of Persia in the province of Mazanderan, situated near the coast of the Caspian, 50 miles west of Astrabad (Map: Persia, E 3). It was the favorite residence of Shah Abbas the Great, and the ruins of the palaces and gardens bear evidence of their former splendor. The proximity to the Caspian coast gives the town some commercial importance, and Ashraf carries on a considerable trade with Russia in cotton and silk goods. In its flourishing days it is supposed to have contained as many as 2000 families which have dwindled to about 800.

ASH'TABU'LA. A city in Ashtabula Co., Ohio, 55 miles east by north of Cleveland; on Ashtabula River; on Lake Erie; and on the Lake Shore and Michigan Southern, the New York, Chicago, and St. Louis, and the Pittsburgh, Youngstown, and Ashtabula railroads (Map: Ohio, J 2). It contains a public library and a hospital, and has bow socket, box, and hardware factories, tanneries, worsted mills, and manufactures of farm implements, carriages and automobiles, shale paving bricks, etc.; it does a large business in the shipment of coal and transshipment of iron ore, through the fine harbor at the river's mouth; and it has also a large dry dock and shipbuilding plant, and one of the largest areas of winter vegetables under glass of any city in the United States. The river has been straightened and dredged by the city, greatly improving manufacturing and transporting facilities of Ashtabula and country adjacent to the upper river. Ashtabula was first settled in 1803, and in 1808 was organized as a township, including within its limits what are now Kingsville, Sheffield, and Plymouth, separately incorporated in 1810, 1820, and 1838, respectively. The electric light plant is owned by the city. Pop., 1890, 8338; 1900, 12,949; 1910, 18,266; 1920, 22,082.

ASH'TAROTH. See ASTARTE.

ASHTAROTH KAR'NAIM. A city mentioned in Gen. xiv. 5. The name should probably be read Ashtart Karnaim, and means 'Ashtart of the two-peaked [mountain].' It is possibly the modern Tell-Ashtarah, on the Bashan Plateau, 21 miles east of the Lake of Galilee, though places named after the great goddess must have been quite numerous. Consult Moore, in *Journal of Biblical Literature*, vol. xv, pp. 155 ff. (1896).

ASHTAR'TE. See ASTARTE.

ASH'TON, ALGERNON BENNET LANGTON (1859—). A distinguished English composer. He was born at Durham, but received his musical education at the Conservatory at Leipzig from 1875 to 1879. After his graduation he took a special course in composition with Raff. In 1881 he returned to his native country and settled as a teacher in London. In 1885 he became professor of piano at the Royal College of Music. As a composer he cultivated with evident predilection the field of chamber music. His works include four symphonies, three overtures, two string quartets, a quintet for wind instruments, compositions for organ, choruses, songs, and numerous sonatas for piano solo, piano and violin, piano and 'cello, and also one sonata for piano and viola.

ASHTON, JOHN (1834—). An English literary antiquarian, born in London. His many publications include: *Social Life in the Reign of Queen Anne* (1882); *History of the Chapbooks of the Eighteenth Century* (1882); *English Caricature and Satire on Napoleon I* (1884); *A Century of Ballads* (1887); *Social England under the Regency* (1890); *Real Sailor Songs* (1891); *The Devil in Britain and America* (1896); *When William IV was King* (1896); *Gambling in England* (1898); *Florizel's Folly; Gossip in the First Decade of Victoria's Reign* (1903); *The History of Bread: From Prehistoric to Modern Times* (1904); *Dawn of the Nineteenth Century in England: A Social Sketch of the Times* (5th ed., 1906).

ASHTON, LUCY. The daughter of Lord and Lady Ashton, in Scott's *Bride of Lammermoor*, and the heroine of the novel. Forbidden by her parents to marry her lover, Ravenswood, she goes mad on her wedding night and dies.

ASH'TON IN MAKERFIELD, -māk'ẽr-fēld. A town in Lancashire, England, on the Central Railway, about 15 miles west of Manchester. Its chief industries are the manufacture of iron goods, cotton, and pottery, and there are numerous collieries. Pop., 1891, 13,400; 1901, 18,700; 1911, 21,543.

ASH'TON-UN'DER-LYNE. A busy manufacturing town of Lancashire, England, on the Tame, about 6 miles east of Manchester (Map: England, D 3). It is a parliamentary borough, returning one member to Parliament. The town is of Saxon origin and came into the possession of the Assheton family in 1336. It was incorporated in 1847. Its change from comparative insignificance to an important manufacturing centre dates from the introduction of the

cotton industry in 1769. Bleaching, dyeing, and calico printing, coal mining, and the manufacture of machines, hats, etc., furnish considerable employment to the people. Its facilities for communication are excellent, as it is situated on three railway lines, and connected by a canal with Manchester and other important towns. Ashton possesses several hospitals, a technical school, a library, and a fine park. Pop., 1891, 40,500; 1901, 43,900; 1911, 45,172.

ASH'TORETH. See ASTARTE.

ASHUAPMOUCHOUAN, ăsh-wäp'mo͞o-chwän'. See CHAMOUCHOUAN.

ASHURADA, ä'shoo-rä'dä. A small island in the southeastern part of the Caspian Sea, northwest of Astrabad (Map: Persia, E 3). The Russian government maintains here a naval station.

ASHURST, HENRY FOUNTAIN (1875—). An American public official and legislator, born at Winnemucca, Nev. His earlier education was obtained in the public schools of Flagstaff, Ariz., and at the Stockton (Cal.) Business College. A special course in law and political economy he took in 1903–04 at the University of Michigan. In 1896, shortly after his admission to the bar at Williams, Ariz., he was appointed a justice of the peace, and in the same year he was chosen a member of the Arizona Territorial House of Representatives. To this body he was reëlected in 1898 and by it was chosen Speaker. Following a term in the Territorial Senate he was made district attorney of Coconino County, serving from 1905 to 1908. In the latter year he was admitted to practice before the Supreme Court of the United States. On March 27, 1913, he was elected United States Senator by the unanimous vote of the first Legislative Assembly of the new State of Arizona, for the term ending 1917. See ARIZONA, *History.*

ASH-WEDNESDAY. The first day of Lent, so called from the Roman Catholic ceremony of strewing ashes on the head as a sign of penitence. This custom was sanctioned by Pope Celestin III in 1191, but dates from at least as early as the tenth century. The present custom in the Church of Rome on this day is this: After an introit and four collects, the priest puts the ashes, which are those made by burning the palms consecrated on the preceding Palm Sunday, on the head of each penitent kneeling at the altar rails, while he says in Latin: "Remember, man, that thou art dust, and shalt return to dust." The Protestant church in Germany does not celebrate Ash-Wednesday. In the Church of England and in the Protestant Episcopal church in the United States, it is observed, but without anything of the ceremony from which it derives its name; and the *commination* —a series of denunciations against impenitent offenders—along with penitential prayers, is appointed to be read in the service for this day in the English church; but in the American church only the penitential prayers.

ASIA, ā'shȧ *or* ā'zhȧ. The largest and most easterly part of the Old World. Europe extends west from the northwestern part of Asia, something like a great peninsula. With an area of 17,250,000 square miles, Asia covers more than one-eleventh of the entire surface of the globe and more than a third of the entire land surface. A straight line from its most western point at Baba Kalessi, on the Ægean Sea, to its most eastern point at Cape Deshnef (East Cape), Bering Sea, has a length of 6820 miles. Its greatest breadth is measured from Cape Chelyuskin, on the Arctic Ocean, to Cape Buru, at the south end of the Malay Peninsula, 5270 miles. Among the three northern continents, Asia extends farthest to the north and to the south, and the extreme northern and southern points lie almost under the same meridian. The time distance between the most western and eastern points is 11 hours. The ninetieth meridian of east longitude may be regarded as the central meridian, and the fortieth parallel of north latitude as the central parallel of the continent. These lines of orientation cut one another near Lob Nor, in eastern Turkestan. This enormous continental mass, with the exception of a territory in the extreme northeast, about as large as the area of England, lies in the northern division of the Eastern Hemisphere, while its islands extend on the southeast across the Equator. On three sides it is surrounded by the ocean, but on the west it joins Europe, the line of separation between them being accepted as the Ural Mountains, an irregular line from their south end to the north end of the Caspian Sea, thence the Caucasus Range to the Black Sea. The population of Asia was estimated (1908) at 918,324,000.

By the Isthmus of Suez Asia has a connection with Africa, from which it is separated by the narrow Red Sea, occupying a rift valley of comparatively recent formation. The continent has an average elevation above the sea of over 3000 feet. The coast line is about 33,000 miles in length, and on the south and east is greatly diversified by seas, bays, and gulfs, affording advantages to navigation and commerce far superior to those of Africa and South America, but inferior to those possessed by Europe and North America. The indented and broken northern coast is, to some extent, available for navigation in the summer months from Waigat Strait, south of Nova Zembla, to the Obi and Yenisei rivers; and in 1912 and 1913 Russian survey vessels steamed along the northern coast from Bering Strait to Cape Chelyuskin; but the whole north coast is icebound most of the year.

Asia is bounded northward by the Arctic Ocean, into which its continental shelf, covered to depths of only 600 feet, penetrates far to the north, eastward by the Pacific Ocean, southward by the Indian Ocean, and westward by Europe, the Caspian Sea, the Black Sea, the Mediterranean, and the Red Sea. On the extreme northeast it is separated from North America only by the narrow Bering Strait, about 40 miles wide. On the southeast the vast eastern archipelago, comprising numerous great islands, Luzon and Mindanao in the Philippines, Sumatra, Borneo, Java, Celebes, New Guinea, and hundreds of smaller ones, extends almost to Australia. The body of the continent may be regarded as a trapezium, of which the projections, consisting of several large peninsulas, bear some resemblance to those of Europe, though in Asia everything is on a greater scale. On the west is the peninsula of Asia Minor, or Anatolia, separated from Europe by the Bosporus, the Sea of Marmora, and the Dardanelles, with the Black Sea on the north, the Ægean Sea on the west, and the Levant (the easternmost part of the Mediterranean) on the south. On the south of Asia Arabia may be considered as a counterpart of the Iberian Peninsula; Italy, with its neighboring island, Sicily, is rep-

resented by India and Ceylon; and as the broken Grecian Peninsula in Europe has numerous islands extending toward Asia on the southeast, so in Asia the Malay Peninsula has an island connection with Australia on the southeast by means of the Eastern Archipelago. The eastern coast of Asia is characterized by the deep indentations made by the Pacific Ocean, forming the South China Sea on the southeast, and the Yellow, East China, Japan, Okhotsk, and Bering seas on the east, all island-bound, and separated from the Pacific respectively by the Philippines, the Liu-Kiu Islands, Korea, Japan, and Kamchatka. On the north the Siberian coasts are also deeply indented, but rather by the embouchures of large rivers than by arms of the sea.

Topography. The relief features of this continent are characterized by great extremes and by an unparalleled variety; it has the most extensive lowlands, the greatest tablelands, the highest chains of mountains, and the most elevated summits in the world. Tracts doomed to everlasting snow and scorching sterility, salubrious valleys of continual verdure, and noisome jungles of the rankest growth are found within its limits.

Where India, Turkestan, and Afghanistan meet is an elevated region known as the Pamir, and to its inhabitants as the "roof of the world." It is of great height, even the valleys exceeding 11,000 feet in altitude above the sea, while the mountains are several thousand feet higher. From this region as a centre, mountain systems and ranges radiate in various directions, but mainly eastward and westward, inclosing between them elevated plateau-like areas. These mountain systems, with the inclosed plateaus, form the broad backbone of Asia, running with a widely differing breadth, nearly east and west across the continent. It is widest in the east, where it stretches from the Indo-China Peninsula across western China and Manchuria to southeastern Siberia, extending from lat. 20° to 50° N.; it narrows in the Pamir, and broadens again westward to include most of Afghanistan and much of Baluchistan, Persia, and Asia Minor. From the mountain knot of the Pamir stretches a mountain system, bordering the northern margin of the main plateau. The ranges comprising the system are somewhat broken and disconnected, and many of them arranged *en échelon*. They extend, under various names, to the coast of the Sea of Okhotsk and thence along the coast to Bering Strait. North of them lies Siberia, a great plain with a breadth of 130° of longitude, sloping gently over 25° of latitude to the Arctic Ocean.

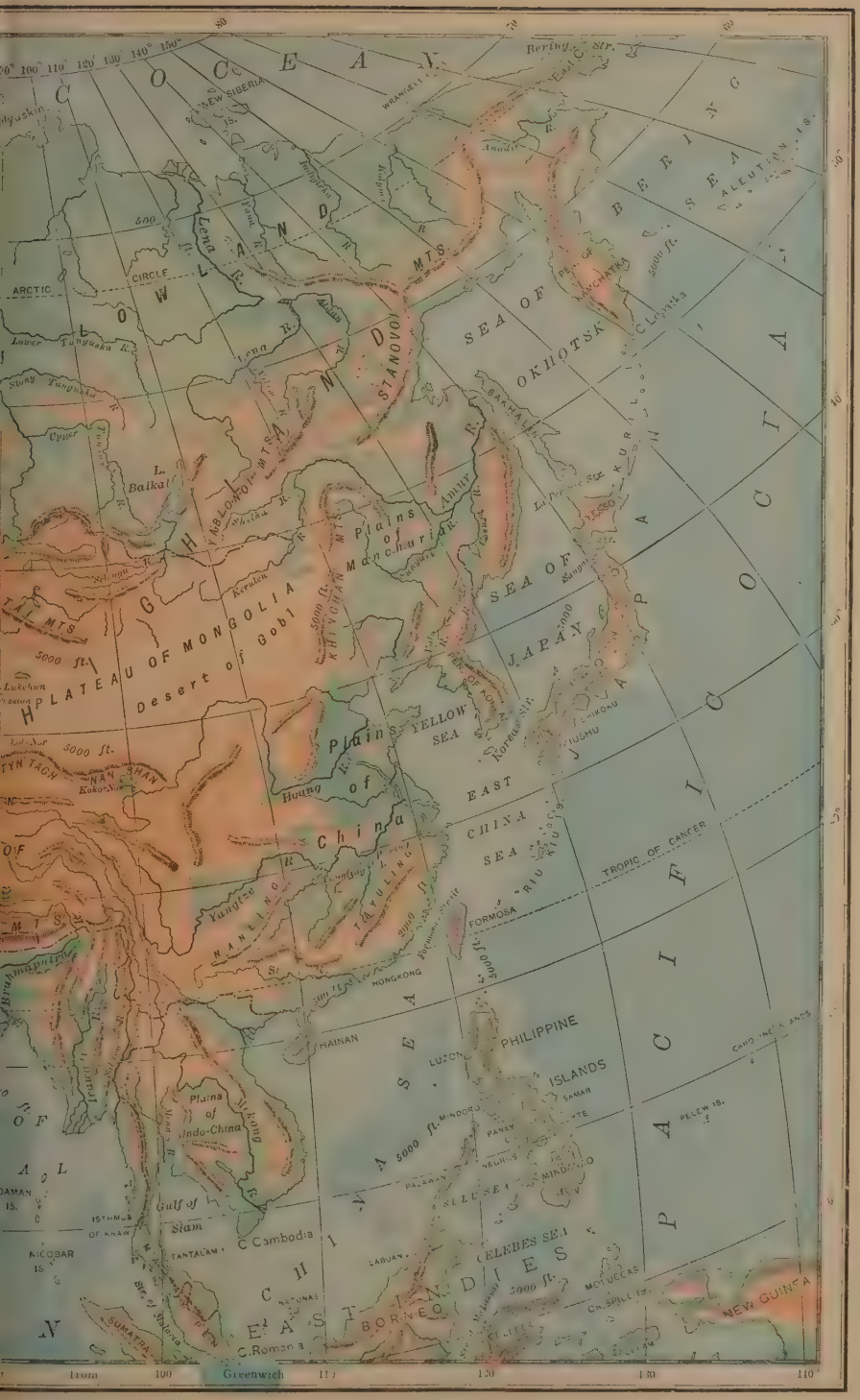
East of the Pamir the great plateau is limited on the south by the Himalayas, while between this great range and the northern system are many other ranges traversing it. This tableland contains the plateau of Tibet and the vast elevated expanse of Han-hai, which includes the desert of Gobi or Shamo, and the Takla Makan Desert. The plateau of Tibet lies directly north of the Himalayas, and is limited on the north by the Kuenlun, Altyn Tagh, and Nanshan ranges, and on the east by the broken mountainous country in the west of China. Its surface is a plain, diversified by many mountain ranges, trending generally east and west. It is the most elevated plateau on earth, its western part ranging in height from 14,000 to 17,000 feet, sloping eastward down to 9000 feet. It is a bleak, arid region, and its few inhabitants are occupied mainly in pastoral pursuits. The great plateau of Han-hai, which lies north and northeast of Tibet, is limited on the north by the succession of ranges which commence with the Tian Shan and are followed by the Ala-tau, Altai, Tan-nu, Sayan, Yablonoi, and Stanovoi ranges, and extend northeastward to the Sea of Okhotsk and Bering Strait; and on the east by the Khingan Mountains, mainly comprised in Mongolia. Its otherwise level surface is intersected by many mountain groups and has an elevation of 3000 to 4000 feet.

On the south the plateau region is separated from the plains of Hindustan by the Himalaya Mountains, many of whose summits rise from 25,000 to 29,000 feet above the level of the sea. Even the passes over this enormous range are almost as high as the summit of Mont Blanc. Here Dhaulagiri, in Nepal, long supposed to be the Mont Blanc of the Himalayas, rises to 26,800 feet, leaving all the peaks of the Andes far below, while K^2 rises to 28,250 feet, Kinchinjunga reaches nearly that altitude, and Mount Everest, now believed to be the loftiest summit on earth, attains the height of 29,000 feet.

From the Pamir stretches westward a great succession of mountain ranges, which, beginning with the Hindu Kush (which attains a height of 25,000 feet), and prolonged westward by the Paropamisus in Afghanistan, by the Elburz in northern Persia, with Demavend (about 18,500 feet), by the mountains of Armenia (culminating in Mount Ararat), and by the Taurus Range and other mountains of Asia Minor, forms a fairly continuous line of ranges to the shore of the Ægean Sea. North of it, in Russian Central Asia, is a depressed area, in some places below sea level, which is drained into the Aral and Caspian seas. The great plateau of which these ranges form the backbone consists of three sections. To the south of the Elburz Range and the Paropamisus is the great plateau of Iran, in Persia, Afghanistan, and Baluchistan. West of this is the Median-Armenian Alpine region, some of whose plateaus are at elevations of over 6000 feet. Beyond this the plateau formation extends westward in the Anatolian tableland. The western plateau of Asia, thus divided into three sections, is full of diversities of soil and scenery. A great part of the tableland of Iran is extremely barren and arid, which serves to explain the enthusiastic terms in which the Persian poets have spoken of the beautiful valleys found here and there among the mountains. The coasts of the Persian Gulf are sandy wastes. A great part of Baluchistan also is an arid plain, covered with red sand.

Besides these central elevated land masses, there are many detached mountain chains and plateaus. The Ural Mountains, forming in part the land boundary between Europe and Asia, are divided into three sections—the northern, central, and southern Ural. The second of these divisions is rich in minerals, gold, platinum, magnetic iron, and copper. On the isthmus between the Black Sea and the Caspian the Alpine ridges of the Caucasus reach a height of 10,000 to 11,000 feet, while individual peaks tower up to 17,000 and 18,000 feet, as in the still faintly volcanic peak of Elbruz, 18,500 feet, and Kasbek, 16,500 feet; both of these peaks are, however, on the northern or European side of the main mass of the Caucasus. The highlands of Syria rise gradually from the neighboring deserts in the

PHYSICAL MAP OF
ASIA
SCALE OF STATUTE MILES
0 200 400 600 800 1000 1200 1400
SCALE OF KILOMETERS
0 200 400 600 800 1000 1200 1400 1600 1800 2000
ELEVATIONS
Land below 500 feet
Land between 2000 and 5000 ft.
" between 500 and 2000 ft.
" above 5000 feet
OCEAN DEPTHS
0 to 5000 feet
Below 5000 feet
EUROPEAN PLATEAU
GREAT NORTHERN PLAIN
BALKAN PLATEAU
CARPATHIAN Mts.
BLACK SEA
Dnieper
Don R.
Volga R.
Ural R.
Ural Mts.
Tobol R.
Irtish R.
Caucasus Mts.
Mt. Elburz
CASPIAN SEA
Aral Sea
KIRGHIZ STEPPE
L. Balkash
Jangt Kiang
THIAN
MEDITERRANEAN SEA
ASIA MINOR
PLATEAU OF
Mt. Ararat
Euphrates R.
Tigris R.
Mesopotamia
Mt. Lebanon
CRETE
CYPRUS
TAURUS Mts.
ISTHMUS OF SUEZ
Nile R.
Mt. Sinai
Nefud Desert
RED SEA
ARABIA
PLATEAU OF
ARABIAN DESERT
PERSIAN GULF
Mts. of Oman
Ras el Had
Str. of Ormuz
Gulf of Oman
Mt. Demavend
ELBURZ MTS.
ZAGROS MTS.
PLATEAU OF IRAN
HINDU KUSH MTS.
PAMIR PLATEAU
KARAKORAM MTS.
Indus R.
Plains of
Str. of Bab el Mandeb
GULF OF ADEN
C. Guardafui
SOKOTRA I.
ARABIAN SEA
DEKKAN
WESTERN GHATS
EASTERN
LACCADIVE IS.
MALDIVE IS.
INDIAN OCEAN
EQUATOR
Palk Str.
CEY
P. de G
Longitude
40° 50 60 70 80
L. J. POATES ENGR'G CO., N.Y.


ARCTIC OCEAN
Bering Str.
East C. Str.
NEW SIBERIA
WRANGELL I.
Yukaghir
Anadir R.
BERING SEA
ALEUTIAN IS.
Lena R.
Yana R.
Indigirka R.
Kolyma R.
500
ARCTIC CIRCLE
LOWLAND
STANOVOI MTS.
PEN. OF KAMCHATKA
5000 ft.
C. Lopatka
SEA OF OKHOTSK
Lower Tunguska R.
Stony Tunguska R.
Upper Tunguska R.
Lena R.
Aldan R.
L. Baikal
YABLONOI MTS.
Vitim R.
Olekma R.
Amur R.
SAKHALIN I.
LA PEROUSE STR.
KURILE IS.
Plains of Manchuria
Selenga R.
Kerulen R.
ALTAI MTS.
5000 ft.
PLATEAU OF MONGOLIA
Desert of Gobi
KHINGAN MTS.
5000 ft.
SEA OF JAPAN
JAPAN
Lukchun
Lob-Nor
5000 ft.
TYNTAGH
NAN SHAN
Kuku-Nor
Yellow R.
Plains of China
YELLOW SEA
Korea Str.
JIUSHU
HONSHU
EAST CHINA SEA
RIU KIU IS.
TROPIC OF CANCER
Yangtse R.
NANLING MTS.
TAYULING
8000 ft.
FORMOSA
HONGKONG
Tropic of Cancer
HAINAN
PHILIPPINE ISLANDS
LUZON
SAMAR
LEYTE
MINDORO
PANAY
PALAWAN
CAROLINE IS.
PELEW IS.
Plains of Indo-China
Mekong R.
Gulf of Siam
C. Cambodia
ISTHMUS OF KRAW
TENASSERIM
TANTALAM I.
NICOBAR IS.
Sea of Sulu
CELEBES SEA
LABUAN
MOLUCCAS
CERAM I.
NEW GUINEA
SUMATRA
BORNEO
EAST INDIES
C. Romania
Greenwich
100
110
120
130
140

ranges known as the Lebanon and Anti-Lebanon to heights respectively of over 10,000 and 9000 feet, and slope steeply in terraces down to the narrow coast lands of Phœnicia and Palestine. The peninsula of Arabia is a tableland of moderate height, continuous with the Syrian Desert and bordered by low mountain ranges. In the extreme south the mountains attain an elevation of nearly 8000 feet. Arabia is separated from the Armenian Plateau on the north by the valleys of the Tigris and Euphrates. Most of its area is desert, but in the interior the plateau reaches an elevation sufficient to induce enough rainfall for the cultivation of crops; this is, therefore, the populated region.

South of the Himalayas, at the head of the peninsula of India, is a depression drained on the east by the Ganges and on the west by the Indus. The Ganges valley is the densely populated region of India. East of the lower Indus is the desert of Sindh. Farther south on the peninsula is the plateau of the Deccan, which rises to an average height of from 1500 to 2000 feet. It is separated on the west from the narrow coast level of Malabar by the Western Ghats; on the east, from the broad level coast of Coromandel, by the Eastern Ghats; on the north it is separated from the low plains of Hindustan by the Vindhya Range and Malwa Plateau; and on the south the Ghats unite at the sources of the Kaveri forming the Nilgiri, or Blue Mountains, 8760 feet high, the loftiest chain in the peninsular portion of India. Burma and Assam are crossed by numerous mountain groups, which extend in broken lines from the interior of Tibet to the extremity of the Malay Peninsula. China Proper and French Indo-China have mountainous interiors, while the whole eastern coast line of Asia from Korea northward is paralleled by lines of highlands. The Japanese Archipelago may be regarded as a submerged mountain chain rising from the immense depths of the Pacific and reaching with the Kurile Islands northward to Kamtchatka. The chain is crowned by numerous volcanic cones, and throughout its extent earthquakes and seismic disturbances are frequent phenomena.

Hydrography. The hydrography of Asia displays as striking a variety as does the structure of its land surface. The Asiatic Alpine regions send down, in some directions, torrents of water, which form rivers almost rivaling in magnificence those of America, and flowing for hundreds of miles through plains of unsurpassed fertility. On the other hand, there are wide-stretching tracts similar to the deserts of northern Africa and of equal sterility.

The seven great river systems of Asia are: the Mesopotamian, that of northwest India, that of northeast India and Tibet, the Indo-Chinese, the Chinese, the Siberian, and that of the Kirghiz steppe and Russian Turkestan. The first comprises the two famous streams, the Tigris and Euphrates, flowing into the Persian Gulf; the second comprises the Indus with its tributaries; the third system comprises the Brahmaputra and Ganges; the fourth comprises the rivers of the Indo-Chinese Peninsula, the chief of which are the Irawadi, the Salwen, the Menam, and the Mekong; the fifth system is the Chinese, comprising four great streams, all of which flow in a general easterly direction into the Pacific—the Si-kiang, the Yang-tzi-kiang, the Hoang-ho, and the Amur; the sixth system comprises the large rivers of Siberia, the principal of which are the Obi, the Yenisei, and the Lena—all have their source in the ranges bordering Siberia on the south and flow northward, traversing the great plain for 800 or 900 miles before their sluggish waters reach the Frozen Sea; the seventh system comprises the Ural, which flows into the Caspian Sea, and several other inland rivers, including the Amu-Darya and the Syr-Darya, flowing into the Aral Sea, the Ili, which flows into Lake Balkash, and the Tchui.

Asia is deficient in lakes. At the base of the ranges limiting Siberia on the south, are, however, several of magnitude, among them Baikal, believed to be the deepest fresh-water lake in the world, Balkash, and Issyk-kul. Farther west, in the depression east of the Caucasus, are the Aral and Caspian seas, which have no outlet; the Caspian Sea is 85 feet below the level of the sea. In Syria is the Dead Sea, occupying with its valley a deep depression, the surface of the lake being about 1300 feet below sea level. In the Armenian Mountains are lakes Van and Uramia, lying at great elevations and having no outlets. In Tibet and the desert of Gobi lakes without outlets are numerous, since, owing to arid conditions, drainage systems are not yet developed. A large part of Asia, comprising Tibet, Mongolia, Turkestan, and most of Baluchistan, Persia, and Arabia, i.e., nearly all the central and southwestern parts of the continent, the region in which the rainfall is deficient, has no drainage to the sea.

Geology. Little is known of the geology of the greater part of Asia. Certain limited regions, such as India, have been studied in detail, but our knowledge of the greater part of the continent has been derived from piecing together the reports of explorers. The great mountain systems consist principally of granites, gneisses, schists, and allied rocks, with, in many cases, the older stratified rocks lying on their flanks. This is the case with the Himalayas, whose uplift is believed to have occurred as late as Tertiary times and with the Tian-shan, Altai, Stanovoi, and the Kuenlun ranges. It has been found in two areas of the Kara-koram Mountains that elevations of igneous origin are fronted on the other side of glaciers by elevations of sedimentary formation. The Ural Mountains, also, have a metamorphic nucleus. In the Caucasus, in Armenia, the Vindhya Range of India, and in Persia, are extinct volcanoes, which have contributed lava and ashes to the building of the mountains, while in the peninsula of Kamtchatka, the Japanese Islands, and the East Indies are many active cones. Indeed, this region on the east and southeast of Asia is one of the largest and most active volcanic regions on the earth.

The vast plain of Siberia is floored in succession from east to west with stratified beds, ranging from the oldest to the youngest, with large areas of eruptive and metamorphic rocks. The desert of Gobi and the plateau of Tibet are, except for the mountain ranges, floored with Tertiary and Quaternary beds. In North China are enormously deep beds of loess, which, especially in the region of the Hoang-Ho, has occasioned both remarkable topography and great fertility. Farther south in China the rocks are much older, consisting of Carboniferous and Jurassic beds, and also of Paleozoic rocks and Mesozoic deposits. The western plateaus in Afghanistan, Baluchistan, Persia, and Asia

Minor are in the main covered with Tertiary and Quaternary rocks, but in Arabia a large part of the plateau is floored with Jurassic beds. The great depression of northern India, south of the Himalayas, is a Tertiary deposit and a part of a large land area that once extended across the Indian Ocean to South Africa. The peninsula itself is composed of metamorphic and igneous rocks, with here and there areas of Paleozoic beds. Glaciers are found chiefly in the high mountain regions of the Tian-shan, Kuenlun, and Himalaya ranges, in the Tibetan highland, and in the Caucasus. No glaciers are found near the Arctic coast, owing to the deficient precipitation. See *Geology*, under INDIA; CHINESE EMPIRE.

Climate. Asia has a great variety of climate, owing to its range of latitude, altitude, and its relations to the bordering seas. It is in the main a continental climate, with light rainfall, a dry atmosphere, and great extremes of temperature. Near the coasts the climate is modified by the proximity of the sea, but this influence extends but a short distance inland, as the prevailing winds are off the land, except in the south, and even there the contrary is the case only during the prevalence of the monsoons. The whole of northern Asia lies within the range of the prevailing westerly winds of the Northern Hemisphere, in which are found the extensive cyclones and anti-cyclones which give variability to the weather in temperate latitudes. On the eastern and southeastern coasts cyclones of the hurricane type originate in the region of the tropical islands, and, pursuing a course at first westerly, under the influence of the trades, gradually turn toward the north and east, often ravaging the coast to some distance inland. In the extreme southern part of Asia occur general storms of hurricane character and local storms of the tornado form.

Temperature. The mean annual temperature in Asia, reduced to sea level, decreases uninterruptedly from about 90° F. at the south to 0° at the north. On the eastern coast the decrease in temperature, with increase in latitude, is somewhat slower than in the interior, but on the whole the isotherms follow the parallels quite closely, especially in the southern half of Asia. The isotherm of 32° crosses eastward from Archangel with a slightly southerly bend, to the mouth of the Amur. On the western side of Asia the temperatures decrease from 72° at Suez to 14° at the northern end of the Ural Mountains. On the eastern coast there is a decrease from 78° in Siam to 10° at Bering Strait. The region of greatest cold is near Verkhoyansk, in Siberia, on the Yana River, but a short distance north of the Arctic Circle, between the meridians of 130° and 140° E.

The average temperatures for January decrease from about 80° at the south of the continent to —60° in the neighborhood of Verkhoyansk, whence there is an increase to —40° on the coast. From Verkhoyansk, the centre of cold, the temperature rises in all directions; westward along the Arctic coast to —4° at the northern end of the Urals, and eastward to —13° at Bering Strait. On the western side of the continent the temperature decreases from 57° at Suez to —4° in the northern Urals. On the eastern coast the temperature decreases from about 80° at the south to —13° at Bering Strait. The isotherms in the northern part of the continent swing far to the south in the interior, showing much lower temperatures there than on the coasts in winter. The isotherm of 32 runs nearly due east from the middle of the Caspian Sea to the middle of the Yellow Sea, showing in this latitude little difference in winter temperatures between the coast and the interior. Throughout the greater part of northern Asia the January temperatures are more than 18° below the normal for those latitudes, and at Verkhoyansk it is 47° below normal, owing to the distance from the sea and its influences.

In July the highest temperature is on the Arabian and Persian plateaus, where the average is 93°; from this section there is a fall to 82° in southern India, southern Siam, and southern China, and toward the north and east, to 39° throughout most of the Arctic coast. The maximum temperature of the whole continent ranges from 120° in Persia and Arabia to 75° on the northern coast, and in the northern interior it reaches 100°. The minimum ranges from about 65° in the extreme south to —58° on the northern coast, but in the neighborhood of Verkhoyansk, in the interior of northeastern Asia, a temperature of 92° below zero has been observed.

Rainfall. In most regions of Asia, except near the Pacific coast and south of the Himalayas, the rainfall is scanty. On the immediate coast of the Arctic Ocean in Siberia the annual precipitation is under 10 inches. Elsewhere in Siberia it is between 10 and 20 inches. In the great desert regions of Gobi, the Caspian and Aral Sea regions, and in Persia, it is below 10 inches. The explorations of Stein, Huntington and others, in the southern part of east Turkestan and especially in the dreaded Takla Makan Desert, have revealed the ruins of many large centres of population, showing that this region must once have had abundant rain. In most of Arabia the rainfall is below 10 inches, except in the higher plateau of the interior, where it reaches 20 inches. In Manchuria the rainfall increases to 30 inches, and in China it increases southward from 30 inches in the north to 40 inches at the mouth of the Hoang, to 70 inches in the southern part, and is 80 inches in Japan. The Malay Peninsula has an excessive rainfall. In the Himalaya region the rainfall on the southern slopes sometimes amounts to over 160 inches, in one limited region to 475 inches, and for much of the southeastern coast region of India it reaches from 120 to 160 inches; but it decreases very rapidly west of Calcutta, and on most of the Deccan Plateau it is only 20 inches, increasing again on the western coast to from 40 to 160 inches. The heaviest annual rainfall in the world occurs in Assam, to the south of the eastern Himalayas, where a precipitation of 800 inches is on record. While the normal rainfall for southern Asia may be estimated at from 40 to 60 inches, yet wherever a mountain range intercepts the moist winds blowing from the Indian Ocean, a rainfall of from 140 to 160 inches occurs on the windward side of the mountains, and usually of from 20 to 40 inches on the leeward side. Northern Asia has rain at all seasons, except in the deserts, where rain seldom falls. Southern Asia, including India and the Malay Peninsula, is subjected to periodic rains, the maximum occurring in summer, the period of the southwest monsoons.

Winds. While southern Asia is in the region of normal winds, the trades, yet these winds are very much, sometimes totally, changed by the monsoons. During the summer season the in-

ASIA
SCALE OF STATUTE MILES
0 500 1000
SCALE OF KILOMETERS
0 500 1000 1500 2000
Important towns are shown in heavy face type
Railroads
ATLANTIC OCEAN
ARCTIC OCEAN
EUROPE
ASIA
AFRICA
INDIA
ARABIA
PERSIA
TURKEY IN ASIA
EGYPT
ABYSSINIA
MEDITERRANEAN SEA
BLACK SEA
CASPIAN SEA
RED SEA
ARABIAN SEA
INDIAN OCEAN
BALTIC SEA
NORTH SEA
Petrograd
Moscow
Constantinople
Alexandria
Bombay
Longitudes

Bering Strait
ASIA
EUROPE
PACIFIC OCEAN
BERING SEA
SEA OF OKHOTSK
SEA OF JAPAN
YELLOW SEA
EASTERN CHINA SEA
SOUTH CHINA SEA
CELEBES SEA
SULU SEA
BANDA SEA
ARAFURA SEA
JAVA SEA
INDIAN OCEAN
PHILIPPINE ISLANDS
ALEUTIAN ISLANDS
KURILE IS.
JAPAN
RUSSIA
MONGOLIA
CHINA
SIBERIA
PEKING
Tientsin
Nagasaki
Kagoshima
Shanghai
Hongkong
Canton
Amoy
Foochow
Taihoku
Manila
Singapore
BANGKOK
HANOI
BATAVIA
Tropic of Cancer
Equator
from 90° Longitude
100
110
120
130
140

terior of the continent becomes intensely heated, and the surface winds blow inward from the south, forming the southwest monsoon; the air thus brought inland is saturated with moisture, which it discharges freely on being cooled in passing over hills or mountain ranges. This monsoon character of the winds has a very marked effect on the rainfall of southern Asia, and it is due to the summer monsoon that the great precipitation occurs on the windward side of the Asiatic highlands bordering the coast.

Flora. Along the Arctic coast there is a barren region from 150 to 500 miles wide, the tundra, where only dwarf Arctic plants and mosses grow. South of this is an extensive region of forests, mostly coniferous in the north and deciduous trees in the south. To the southward of these are great areas of pasture land which extend to the borders of the deserts. In the greater part of Central and western Asia the vegetation is of desert-like character, but wherever the rainfall is sufficient there is the vegetation common to the moister temperate climates. South of the Himalayas the flora is essentially tropical, and mostly occurs with the luxuriance belonging to the well-watered hot zone. The northern part of the continent differs little in the general character of its productions from the corresponding parts of Europe and America. Pines, birches, and willows form, as in the other continents, the last forests of the north; but on account of the more severe climate, they do not reach a limit so far northward as in Europe, though a little farther north than in America. Some of the common plants of Europe are abundant as far east as Kamtchatka; the crowberry (*Empetrum nigrum*), so plentiful on the moors of Scotland, is still more plentiful throughout Siberia; the same bilberries (*Vaccinium*) and brambles (*Rubus*) abound in Kamtchatka as in Scandinavia. There are, however, interesting differences. Heathers are comparatively rare in Asia, its flora agreeing in this respect with that of America rather than with that of Europe. The larch extends far northward, at the mouth of the Obi, to the utmost limits of arborescent vegetation. In Kamtchatka a different kind of birch replaces the common birch of Europe as a forest tree, and the Siberian stone pine is different from that of the south of Europe. Siberia in its less frigid and dry regions produces a rich vegetation, of which herbaceous plants, of a size unusually large for a cold or temperate climate, are a characteristic feature; among these may be mentioned species of rhubarb, angelica, and cow-parsnip. In the abundance of currants the warmer parts of Siberia resemble North America, although most of the species are different.

To the south of the Altai Mountains in the desert of Gobi and the plateau of Tibet the flora is very poor and scanty, owing to the severe climate and the scarcity of rain. The flora of Asia Minor and of the watered parts of Syria has a general resemblance to that of the south of Europe, although exhibiting also features which belong rather to that of India or of Africa. Shrubby members of the mint family are particularly characteristic of this region. The tropical flora of Arabia abounds in trees which yield fragrant balsams and resins, particularly those of the order Amyridaceæ. Indeed, both the warmer temperate and the tropical regions of Asia excel other parts of the world in the number and variety of the odoriferous drugs which they produce, from myrrh and frankincense to asafœtida. Arabia has long been noted for the production of coffee, which is now also extensively cultivated in other warm parts of Asia. The date palm is as characteristic of Arabia as it is of Egypt. Acacias and mimosas also abound. The flora of Persia in part resembles that of Arabia, although it is less tropical in character and the altitude of its mountains gives to it in some places a different character. The abundance of Scitamineæ is regarded as particularly characteristic of India; the plants of this order yield ginger, galangal, cardamoms, turmeric, and other articles of commerce, among which not the least important is a kind of arrowroot. Members of the pea family are also very numerous, both herbaceous and shrubby or arborescent; many of them exhibiting great beauty of foliage and splendor of flowers, and some producing useful kinds of pulse; others, timber, gum, medicines, etc. The number of valuable medicinal plants which belong to the Indian flora is very great, as is also that of dyewoods; and fine fruits, of which the mango and mangosteen may be particularly noticed. Cucurbitaceæ (gourds) are very numerous; as are also trees of the genus *Ficus* (fig), some of which produce caoutchouc, and among which are the sacred peepul and the banian tree, so remarkable for the roots which descend from its branches to become new stems, and for the extent of ground which it canopies.

Palms are numerous in the tropical parts of Asia, and particularly in its southeastern regions, but are less numerous than in the tropical parts of South America. The coconut is one of the most common palms in the vicinity of the sea. Some of the Asiatic palms are valuable for the sago which they yield. The natural order Dipteraceæ is one of those peculiar to India and southeastern Asia, and includes some of the noblest timber trees, including teak, so valuable for shipbuilding. The flora of the Indo-Chinese Peninsula, and of the southeastern part of Asia generally, differs from that of India, and exhibits, if possible, a richer variety. The change from the Indian flora is still greater in the islands, and a resemblance to that of Polynesia and of Australia begins to appear. The breadfruit takes the place of its congener, the jack of India. These regions produce nutmegs, cloves, and other spices. The Lauraceæ are abundant, yielding cinnamon, cassia, and camphor. China and Japan have many plants peculiar to themselves and are remarkable for the prevalence of the Ternstrœmiaceæ, the natural order to which the tea plant and the camellia belong. The Himalaya Mountains possess a flora very different from that of the Indian plains, and in some of its most characteristic features, particularly in the prevalence of large rhododendrons and magnolias, it has been found to agree remarkably with the flora of the southern parts of the United States; while at still greater altitudes there is a strong resemblance to that of more northern regions; forests of pine appear, and along with them the deodar, a cedar resembling the cedar of Lebanon. The mountains of Java also produce oaks and other trees resembling those of the temperate zone, although the species are peculiar. An important element in the flora of the lowlands of southern and eastern Asia is the bamboo, which often attains gigantic proportions.

Many of the cultivated plants of Europe are

known to be natives of Asia, and others are supposed to be so. Among the economic plants are rice, wheat, barley, oats, rye, maize (introduced), potato (introduced), beans, peas, buckwheat, millet; and in the south banana, plantain, yam, cacao, sugar cane, tobacco, spices, cotton, poppy, hemp, flax, and corchorus.

Fauna. Sclater and Wallace divide Asia into two great regions. North of the Himalaya Range lies the great Palæarchis region, while to the south of it is the Oriental zone. The climatic extremes of the former, with its long and intensely cold winters and its warm, short summers, are not favorable to animal life. Mammals, of which there are 41 families, are found throughout the region. Birds, of which there are 58 families, are common, and most of the genera of northern and central Europe are found here. Partridges and grouse are plentiful; the most northern birds are the Alpine ptarmigan, the snow bunting, the raven, the gyrfalcon, and the snowy owl. Reptiles (25 families) and amphibia (10 families) are comparatively scarce, especially in the northern section. Of fresh-water fishes there are 13 families. The insects as a whole are of European character, butterflies being especially numerous. The Oriental region, while it is comparatively limited in extent, has an exceedingly rich fauna, which is isolated from the Ethiopian fauna on the west by oceanic and desert barriers, and from the Palæarctic on the north by the mountainous and desert barriers. In this region are found 35 families of mammalia, 71 of birds, 35 of reptiles, 9 of amphibia, and 13 of fresh-water fishes. The warm climate of this region is especially conducive to the sustenance of animal life in great numbers. This is especially noticeable as regards birds, reptilia, and insects, which are found in great numbers.

Among domesticated animals belonging to Asia, the most important are the ox, reindeer, and buffalo, the sheep, the goat, the horse, the ass, the camel, and the elephant. A number of species of ox and buffalo are natives of Asia. Very distinct from all the others is the yak of Tibet, which is to the inhabitants almost what the reindeer is to the Laplander. The sheep and goat, the horse and ass, are natives of the mountainous parts of central Asia. The camel is almost indispensable as a beast of burden and of food in the deserts. It is used principally in Central and southwestern Asia. The elephant is a native of the tropical parts of Asia and is of a different species from that of Africa.

Under the titles INDIA, PERSIA, HIMALAYAS, SIBERIA, ETC., the local faunal characteristics will be treated in detail.

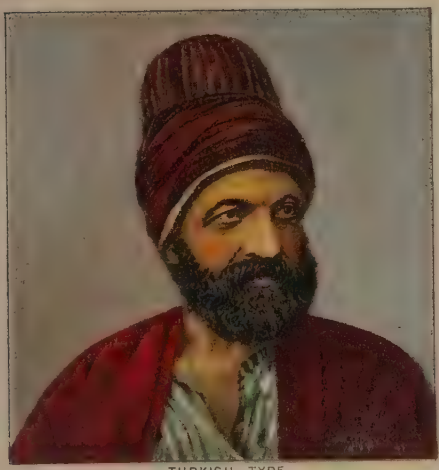
ETHNOLOGY

Within the limits of the Asiatic continent are included all the five great races of man. The number, however, of Amerinds, or Red Men, is so inconsiderable, and the absolute proportion of the negroid peoples so small, that, roughly speaking, the entire population of Asia and its islands may be said to consist of the three great races, the white, the yellow, and the brown, or, as they are commonly known, the Caucasian, the Mongolian, and the Malay.

The White Race. The white inhabitants indigenous to Asia, as opposed to white Europeans who have but recently entered the continent, constitute about one-tenth of the total population, and are found in Arabia, Asia Minor, the region of the Caucasus and Siberia, Persia, Afghanistan, Baluchistan, the great Indian peninsula. Though it is possible that the Semite branch of the great white race came originally from northern Africa and probable that the Aryan branch came from Europe, it nevertheless is true that from remote antiquity these families have been found on Asiatic soil, and that it was in Asia they acquired those physical characteristics and developed the peculiar form of genius which mark them to the present day. This race presents within itself a wonderful diversity of type, both mental and physical; in color of skin, in shape of the head, and in the general structure of the body, there is a great difference between the Arabians, for instance, and the inhabitants of the Caucasus region. So, too, the race embraces peoples in various stages of civilization, ranging from the agricultural Hindus, with their great cities and highly developed political institutions, down to the nomad tribes of the Arabian deserts or the mountain-dwellers of Afghanistan. Of the three subdivisions of the white race, the Aryans, the Caucasians in the narrow sense, and the Semites, the two former seem to have been the original occupants of Asia Minor, and of the two, the Aryans seem by far the more important. Indeed, the influence of the *Caucasian* population, comprising the Georgians, and the Mingrelians, with their related tribes, the Lesghians and the Circassians, upon the Aryo-Semitic culture of Asia Minor, must have been exerted in prehistoric times. Both Aryan and Caucasian yielded before the *Semite* peoples, who advanced from the interior of the Arabian Peninsula and spread over the region from Mesopotamia to the Mediterranean. The Semitic tribes became differentiated into three groups—the Aramaic, including the ancient Babylonians, Assyrians, and Chaldæans; the Canaanite, including the Philistines, the Hebrews, and the original inhabitants of Palestine; and the pure Arabian group, which comprised those who remained in the Southern Peninsula. Of the three stocks, only the Jews, as representatives of the second, and the Arabs, have survived. Farther to the east, on the plateau of Iran, the highlands of Pamir, and in the plains of India, lived and still lives the third branch of the white race—the *Aryan* or Indo-Germanic, which may be subdivided into the two great groups of Indians and Iranians. The former will include the ancient peoples whose tongue still survives in literature as the Pāli and Prākrit, and the modern Indian stocks of the Bengali, Sindhs, Hindustani, Marathi, Gujerati, Punjabi, and Nepali. The Iranian group would comprise the old and new Persians with their related stems, the Kurds and the Baluchis, the peoples of Afghanistan, and, lastly, the Armenians. In addition to the definitely determined members of the white race some ethnologists are inclined to find Caucasian elements in such peoples as the Khmers of Cambodia, the Miao-tse of southern China, and the Aino of Japan; these, however, for lack of authoritative information must be relegated to the category of unclassified breeds. Finally, there has undoubtedly been a considerable infusion of Aryan blood into the Mongolian hordes in some parts of Tibet, China, Farther India, and perhaps some of the neighboring islands.

In the history of civilization the part played by the white race of Asia is of surpassing im-

YELLOW RACES OF ASIA

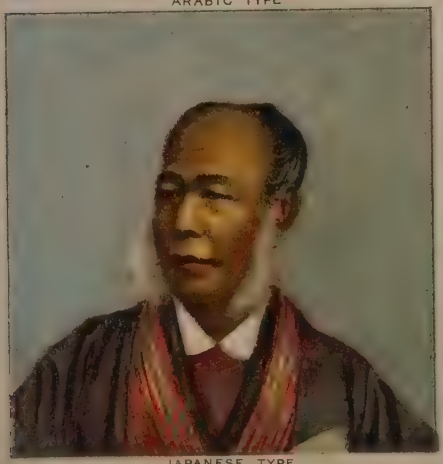


TURKISH TYPE

PERSIAN TYPE

ARABIC TYPE

CHINESE TYPE



JAPANESE TYPE

EAST INDIAN TYPE

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portance. The great empires of antiquity arose among the Semites of Mesopotamia and the Aryans of Iran and Hindustan. The art of writing, literature, the sciences, political institutions, were developed here to a higher degree of perfection than even in ancient Egypt. Above all, the white race in Asia has been the promulgator of the world's great religions. From the Asiatic Semites came Judaism, Christianity, and Mohammedanism—three faiths which embrace the whole western world. From the Asiatic Aryans came Zoroastrianism with its great principle of the conflict between good and evil, destined subsequently to influence the Jew and the Christian; Brahmanism, which is the ritualistic and sacerdotal expression of the Aryan nature; and Buddhism, which may be considered as the Aryan anticipation of Christianity. From the last developed Jainism and Lamaism. The spread of Aryan Buddhism in eastern Asia, with its influence on the social life of the people, corresponds to the expansion of Semitic religions in the West.

The Yellow Race. The yellow race is the most typically Asiatic of all. It numbers seven-tenths of the population of the continent and covers practically all its extent outside of the domains of the Aryo-Semites—into which, indeed, it has not failed to intrude, first in prehistoric ages and again in modern times, with the result that there is a large Mongolian element in the Caucasians of Asia Minor, Afghanistan, Baluchistan, and India. The race may be divided into two great geographical groups—one in the north, embracing all the tribes of Siberia and Turkestan, with their centre somewhere near the Altai Mountains; the other in the south, comprehending the peoples of China and Farther India, with their primitive home in the mountains of Tibet. 1. The Siberian branch of the yellow race includes a large variety of stocks. In the extreme north, on the borders of the Arctic Ocean, exist a handful of aboriginal groups, the survivors of numerous tribes which lived there in ancient times, destined themselves to speedy extinction. Such are the Yukaghirs, the Tchuktchis, the Koriaks, and the Kamtchatkans, numbering in all about 10,000. The results of the Jesup North Pacific Expedition (1900–13) suggest that the so-called "Palæo-Asiatic" group of Siberian peoples (i.e., the Tchuktchis or Chukchees, Koriaks, Kamtchatkans, Yukaghirs, etc.) belong properly with the American Indians, representing an overflow from the New World into the Old. Farther west is the great Ural-Altaic stock, consisting of a large number of families which are themselves subdivided into powerful tribes. These include the Samoyed group, which comprises the Yenisei and the Ostiaks, living near the shores of the Arctic; the Finno-Lapponic group, including the Votiaks, Mordwins, and Voguls, dwelling in the neighborhood of Tobolsk, Tomsk, and the Ural Mountains, as well as the Magyars of Hungary and some of the population of the Balkan region and European Russia, now Aryanized as to speech; the Turko-Tatar group, Yakuts, Uigurs, Turkomans, and Khirgiz, occupying a vast territory in southwestern Siberia and Central Asia; the Mongol group, subdivided geographically into North Mongols, East Mongols, and West Mongols (Kalmuks), with their centre of population around Lake Baikal, but found also in the region bounded by the Volga, the Don, the Caucasus, and the Caspian Sea, and in China; finally, the Tungus group, consisting of the Tunguses proper, the Manchus, and the Orotong peoples which dwell in the forests of eastern Siberia and extend into northern China. To the Siberian branch also belong the Japanese, the Koreans in part, the natives of the Liu-Kiu Islands, etc. In Turkestan and the region of the Caucasus are minor people of mixed origin, who may belong by language or by blood to the Siberian branch of the yellow race.

2. The southern branch of the yellow race, the Sinitic or Tibeto-Chinese, embraces the Chinese proper, with many variations in language and much mixture of blood; the Tibetans, to whom should be added as related by blood more than by language, minor peoples of the southern slope of the Himalayas; the races of Farther India, comprising the Annamese, the Burmese, the Siamese, the Cambodians, the Karens, the Khamtis, and a number of others. In addition, some ethnologists make the Malays and Polynesians, and even the Amerinds, mere subdivisions of the yellow race. The two great branches of the yellow race diverge in the mode of inflecting their language, just as the two great branches of the white race in Asia, the Semites and the Aryans do, the Siberian peoples possessing polysyllabic agglutinative vernaculars, while those of the Chinese peoples are monosyllabic, isolating. The Japanese language is polysyllabic though its alphabet has been adopted from the Chinese. The theory which made the yellow race the first inhabitants of most of Europe and all of western Asia (Turanians, Accado-Sumerians, etc.), seems no longer tenable; neither can it be asserted that the oldest culture of the yellow race in China, Korea, and Japan is either a copy of the old Babylonian civilization or the result of comparatively recent Aryan influence. Chinese civilization must be regarded as having originated with the removal of the prehistoric races from the plateau of Tibet to the rich river lands of eastern China, just as Aramaic civilization originated with the immigration of the Semites of Arabia into the plains of Mesopotamia. Chinese civilization, therefore, may be considered as the first great accomplishment of the yellow race. The characteristics of that civilization — inveterate conservatism, general apathy, and unlimited submissiveness—should not, however, be considered as inherent in the race, one great branch of which, the Japanese, have only recently demonstrated the possession of quite the opposite qualities. The Siberian members of the race are more notable for what they have done in Europe than for the part they have played in Asia; the mighty empires of Genghis Khan, Timur, and Baber were not enduring; on the other hand, the inroads of the Bulgarians, Finns, and Magyars into Europe have produced lasting results.

The Brown Race. The Malayan or Malayo-Polynesian peoples are denied by many ethnologists the position of a race, and are regarded as merely the insular and oceanic divisions of the yellow race. Their primitive home was somewhere in the neighborhood of the peninsula of Malacca, the situation of which favored the distribution of the stock over the islands of the Indian and Pacific oceans. Physically the Malays of the continent stand nearer to the Tibeto-Chinese branch of the yellow race, while the Polynesians come closer to the Siberians. The brown race includes the Malays proper of Malacca, the Sundanese and Javanese of Java, the tribes of Sumatra, Borneo, Celebes, and For-

mosa, and the inhabitants of the Philippines, where the most important family is that of the Tagals. Lastly, there are the Polynesians and the Micronesians, all over the Pacific, and the Hovas of Madagascar. The presence of branches of the Malays in such widely scattered regions as the Philippines, Hawaii, Madagascar, and New Zealand evidences the wonderful power of expansion possessed by the race. Its capacities for culture have been demonstrated in New Zealand, where it has attained its highest development. There the Maoris are on terms of equality in every way with their white fellow-citizens, enjoying representation in Parliament and a share in the government. Malay elements are discernible in New Guinea, northern Australia, the interior of Farther India, southern Hindustan, and its adjacent islands, parts of China, and even Japan. Indeed, there is some reason to believe that the addition of the Malayan element may have made in great part the difference between the Japanese and the Chinese.

Other Races. *The Black Race.*—Examples are the Negritos of the Philippines, the Papuans and their Melanesian kindred, the Andaman islanders, and a few small tribes in the Malay Peninsula, such as the Sakai and the Semangs. Some ethnologists maintain that the white, yellow, and brown races were preceded all over southeastern Asia and a great part of the Malayo-Polynesian area by tribes of the black race, which they regard as nearer to the original human stock. It would seem, however, that the yellow race, from its nearness to the type of the child and for certain psychic reasons, has an equal claim to this distinction. *The Red Race.*—In the extreme northeast of the continent, about East Cape, dwell the Yuit, a people of Eskimo stock, whose numbers were much larger formerly. As immigrants from Arctic America, these Yuit represent the Amerinds or red race of America. Some of the Aleuts also, who belong to the Eskimo stock, have wandered from island to island until they have reached the Asiatic coast, while a few have been transferred thither by the Russians. *Peoples of Doubtful Affinities.*—Such are the Aino of Japan, the Miao-tse and perhaps some other primitive peoples of China, the Cambodian Khmers, the Veddas of Ceylon, and the Dravidian and Kolarian peoples of southern India. Of these, the Aino represent probably a very ancient mixture of primitive white and yellow races, and the same may be true of the Miao-tse and the Khmers. The Dravidians, more by language than by physical type, stand distinct from the mass of Indian natives, and though ethnologists are inclined to group them with the Australians, they represent, more probably, a mixture of early negroid, yellow, and white types. They are now considerably Aryanized in culture and assimilated more to the type of the white race in India. The Veddas, one of the most primitive peoples in existence, are an older, mixed people of similar ancestry. Some of the Dravidian peoples (Tamil, Telugu, etc.) have shown themselves capable of a high degree of culture, while others still linger in barbarism.

The Origin of Man. The oldest evidences of a high order of civilization in Asia (belonging, in all probability, to the white race) exist in Asia Minor; the most ancient remains of individual man may be looked for in the southeastern region of the continent. Man's precursor, the *Pithecanthropus*, was discovered in the Pliocene deposits of Trinil, in Java, in 1891, by Dr. Dubois. Somewhere in southeastern Asia, then, possibly, individual man was born, just as somewhere in southwestern Asia men in society laid the foundations of the first great civilizations.

GENERAL HISTORY

It was characteristic of the social groups of Asia that they early attained the limit of their development and settled into grooves in which their life ran for ages. (See under ASSYRIA; BABYLONIA; CHINESE EMPIRE.) After the rise of the great Medo-Persian Empire under Cyrus, southwestern Asia was brought into contact with the earliest European civilization, that of the Hellenic people, and a contest for supremacy took place. (See GREECE; PERSIA.) This was terminated by the triumphant march of Alexander the Great eastward to the Indus and the establishment of the Hellenistic kingdoms. Later the Roman Empire conquered most of these kingdoms, but was constantly menaced by Persia. The struggle of the two powers weakened both at the beginning of the seventh century. Then the rise of Mohammedanism created a new religio-secular power in the southwest which, when the warlike Turkish tribes from the interior became dominant in the Mohammedan world, wrested all of its Asiatic provinces from the weakened Eastern Empire. The Crusades (eleventh to thirteenth centuries) were the last mediæval struggle for possession between the West and the East. The rise of the Ottoman power made Asia once more a menace to Europe. (See MOHAMMED; CALIPH; ABBASSIDES; OMMIADS; SELJUKS; CRUSADES; TURKEY.) The march of events in the southwest cut off the rest of Asia completely from the western world, depriving the latter of even such incomplete knowledge of the vast Oriental continent as was possessed in antiquity, when there were trading routes to the farther East through Bactria. The stationary character of Asiatic civilization, and the lack of initiative among the mass of the people, prevented the great social and political changes that make the general continental history of Europe so full of meaning. Until the advent of the European powers there was little of this general history for Asia, except in connection with the great waves of conquest which rolled over the continent and frequently extended into Europe. These are treated in the articles GENGHIS KHAN; KUBLAI KHAN; MONGOL DYNASTIES; TIMUR; MOGUL, GREAT.

A new era opened with the rediscovery of the East by Europe in the fifteenth and sixteenth centuries. Portuguese navigators and traders followed in the path of Vasco da Gama (1497–98) and established factories at Goa and Macao and in other places. Spain took possession of the Philippines in 1565, as a result of Magellan's epochal voyage across the Pacific. The Dutch were also among the early comers. The pushing western nations, in pursuit of commercial advantage, thereafter steadily increased their influence and gradually acquired control of depots or considerable territory in India, the East Indies, and China. In the middle of the eighteenth century an apparently insignificant phase of the Seven Years' War was fought out in India between the English, led by Clive, and the French, under Dupleix. The fate of that country of ancient and warring nations was determined by the English triumph. The advance of European influence may be followed in this

41° A 46° B 48° C 50° D 52° E 54° F 56° G 58° H
Long 54°
CAUCASUS MTS.
RUSSIA
CASPIAN SEA
TERSKAYA PLATEAU
KUMA STEPPE
KARA-KUM DESERT
TURKOMANIA
CENTRAL PLATEAU OF PERSIA
Vladikavkas
Petrovsk
Temirkhan-Shura
Alexander B.
Sal Kuru
Buraga
Tabansu
Jau Kalo
Barsa-Kilmas
Kizil Aghir
Kinderli B.
Kinderlinsk
Sumbula
Uzunk
Karakin
Sari Kamish L.
Tiflis
Derbent
C. Sin-Artli
Kara-ilik
Khojali
Kubo Urenj
Gulf of Kara Bugaz
Kara-Bugaz Str.
Dirin
Kazakhli
Akcha Gelin
Elizabetpol
Kuba
Sevan L.
Erivan
Mt. Ararat
Baku
C. Aspheron
Jomud Turkomans
Oglanish
Gogunak
Krasnovodsk
Krasnovodsk B.
Igdi
Bala Ishem
Kizil Arvat
Ogurchinski
Cheleken I.
Ct. Balkan
Derbend
Aidin
Deun-Su
Ula Chashmo
Bugdalli
Dur Olun
Kurendagh
Geok Tepe
Kaakhka
Ashabad
Kizil Agatch Gulf
Lenkoran
85 feet below level of Black Sea
Tabriz
Ardebil
Sirab
Chilvand
Karghan
Urmia L.
Urmia
Maragha
Miandoab
Mianeh
Zenjan
Kasbin
Kasbin
Tehran
Mt. Demavend
Firuzkuh
Damghan
Shahrud
Bostam
Jajarm
Astrabad
Mazanderan
Jagatai Mts
Sebzewar
Khorasan
Dasht-i-Kavir
Great Salt Desert
Hamadan
Kum
Kashan
Irak-Ajemi
Luristan
Khuzistan
Persian Gulf
Ispahan
Kuh-i-Sefid
Nejefabad
Yezd
Kuh-i-Shah
Kerman
Kerman
Shiraz
Farsistan
Bushire
Persian Gulf
Arabistan
Basra
Mohammerah
Abadan
Bahrein I.
Ras Rekkan
El Katif
Bahrein I.
Abu Musa I.
Shargeh
Dibai
Gulf of Oman
Jask
Kuh-i-Hormuz
Kuh-i-Shahr
Minab
Bunder Abbas
Jeb Jurunjah
Ormuz
Strait of Ormuz
Sirik
Angulfan
Tigal
Jask
Gwadel
Arabian Sea
Gulf of Oman
Tigris
Euphrates
Shatt-el-Arab
Kafai
Ras Bani Jas
Abu Dhabi
Das I.
Dubai
Sharjah
Ras Musandam
Ras Dibba
Ras Sharbatat
Ras Fartak
Ras Hasik
Ras Sajer
Ras Ateiba
Ras Sharwein
Ras Darbat Ali
Ras Nabend
Ras Jibsh
Ras Jask
Ras Kuh
Ras Jibsh
Ras Nabend
Ras Darbat Ali
Ras Sharwein
Ras Ateiba
Ras Sajer
Ras Hasik
Ras Fartak
Ras Sharbatat
Ras Dibba
Ras Musandam
Sharjah
Dubai
Das I.
Abu Dhabi
Ras Bani Jas
Kafai
Shatt-el-Arab
Euphrates
Tigris
Arabian Sea
Gulf of Oman
Strait of Ormuz
Gulf of Oman
Jask
Gwadel
Tigal
Angulfan
Sirik
Kuhran
Motarabad
Kuh-i-Shahr
Minab
Kuh-i-Hormuz

PERSIA
AFGHANISTAN,
BALUCHISTAN,
AND PARTS OF
CENTRAL ASIA
SCALE OF STATUTE MILES
0 25 50 100 200
SCALE OF KILOMETERS
0 50 100 200 300
Important towns are shown in heavy face type
Capitals of Countries ⊛ Capitals of Provinces ⊙
Railroads Telegraph and Cables
Important Roads
KIZIL KUM (Red Sands)
KARA KUM
DASHT-I-LUT
DASHT-I-KAVIR
DASHT-I-MARGO (Arid Plain)
REGISTAN DESERT
GREAT SALT DESERT
KOH-I-BABA
HINDU KUSH
PAMIR PLATEAU
ALEXANDER MTS
TASHKENT
KOKAN
SAMARKAND
BOKHARA
KHIVA
MERV
HERAT
KABUL
KANDAHAR
KELAT
QUETTA
BRITISH BALUCHISTAN
KAFIRISTAN
CHINESE TURKESTAN
Oxus R.
Indus R.
Helmund R.
Murghab R.
Zerafshan R.
Jaxartes R.
Caspian Sea
Aral Sea
Lake Victoria
Great Pamir
Lit. Pamir
Karakul
Yasin
Chitral
Peshawur
Khelat
Bhawalpur
Karachi
Haidarabad
Sunmiani
Gwadur
Jask
Bampusht
Kohik
Kerman
Yezd
Meshed
Herat
Sistan
Seistan
Lake Hamun
Lake Zirreh
Lake Abistada
Lake Kamal Khan
Lake Hamun-i-Mashkel
Lake Hamun-i-Lora
Lake Hamun-i-Kharan
Lake Hamun-i-Dalgan
Lake Hamun-i-Kaor
Lake Hamun-i-Kharan
Lake Hamun-i-Dalgan
Lake Hamun-i-Kaor

work through the history of the different countries affected thereby. In the meantime the expedition of the Cossack partisan leader Yermak across the Urals (1580–82) into what is now Siberia began the steady movement of Russia into Central Asia and across the continent to the Pacific. (See RUSSIA; SIBERIA.) These latter movements brought the impulse of western life into the development of Asia, and with it the complications of European politics, the sharp rivalries for political influence in the interest of commercial expansion, and the active modern competition with railway and steamship. The rapid growth of world politics has given a new significance and unity to the history of Asia. The details of this later period of transformation may be followed in the histories of the several countries, especially CHINA, JAPAN, INDIA, and RUSSIA. See also the article FAR EASTERN QUESTION, and the references therewith.

Political Problems. In the political affairs of Asia, as in those of the African continent, the predominance of European influence has become marked during the last 200 years, though the power of the European nations has not been as completely established over the native races of Asia as over those of the Dark Continent. Still, reference to the table appended to this article will show that nearly two-thirds of the area of Asia and nearly one-half of its population are under the control of the European powers, and even in the unappropriated area and over the nominally independent peoples, the ascendency of western culture, spreading mainly through the channels of commerce, is rapidly being established. While Siam and Persia are as yet autonomous, the play of European politics is rapidly becoming the guiding force of their national life. Ultimately Siam seems destined to be annexed to the Indo-Chinese Empire, which France has built up in Farther India; Persia at present is a stake in the political game going on between Great Britain and Russia; and China, by reason of its huge size and the immense opportunities it promises for exploitation, has awakened the ambitions of all the nations of Europe. Japan and China alone have safely grounded their national existence, because their people have shown an aptitude for adopting the civilization of the Europeans without falling under the power of their civilizers. The striking fact, then, about conditions in Asia at the present time is that the continent which first gave civilization to the world has in turn become subject to the higher state of civilization to which Europe, favored by many circumstances, has attained. The struggle for supremacy is much more acute in Asia than in Africa, because in the former country European culture has no free field to work in, and finds itself confronted by political and religious systems of great antiquity and of sufficient strength to render powerful resistance. In the southern part of Asia there is not any room for the influx of European colonization, as there is in the sparsely settled continent of Africa. With an area exceeding that of Africa by one-half, the Asiatic continent has about five times its population, and therefore the establishment of European domination must mean not so much the actual occupation of the soil by the western nations as the control of the native races by the European powers, acting through the long-established machinery of local government and ancient forms of life. The rôle played by Russia in Siberia, however, must be distinguished from the part played by the other nations in southern Asia; for Siberia, the Russian provinces in Central Asia, and the Caucasus region are in reality not foreign possessions, but constitute an integral unit with the Russian Empire in Europe, from which the first two are separated by no considerable physical barriers. The plains of Siberia are a continuation of the South Russian steppes, and the nomad inhabitants of Siberia are closely akin to the Tatar peoples that dwell on the lower Volga and the Caspian. Finally, the vast stretches of Russian Asia, with their mere sprinkling of inhabitants, afford such an opportunity for European colonization as the southern part of the continent can never present.

Among the powers of Europe jealousy and dissension have appeared over the question of predominance in Asia, and, as in Africa, certain spheres of influence have been marked out in which individual powers are allowed a free hand in their dealings with the natives. The danger of conflict arises when the boundaries approach too near to each other. The supremacy of England is, of course, recognized in India and Burma. Russia is predominant over all of northern Asia. Persia and Afghanistan are at present neutral ground, or rather the battle-places of Russian and British influence. French influence is supreme in Indo-China, and the power of the Dutch is predominant in the East Indies. Germany is an important factor in the Turkish provinces of Asia Minor, and by the seizure of Kiao-chau in 1897 gained a foothold in China. Much of that republic, also, although still intact, has been partitioned into certain spheres, and the most interesting question of the future is whether these spheres of influence in China are destined to become foreign dependencies in fact, or whether one power or a combination of powers will prove strong enough to preserve its integrity until such a time as China, inspired by the example of Japan, shall succeed in developing its resources to a point where it may openly challenge any attack on its existence. For the spread of Christianity, the establishment of the republic, and the civil war in Mongolia and China proper, see CHINA.

Political Divisions of Asia. Over one-third of Asia is included in the former Russian Empire; the area of Siberia, Transcaucasia, and Russian Central Asia is stated at 6,294,121 square miles, and the population 25,645,000. About one-fourth of Asia is included in the Chinese dominions (China proper, Manchuria, Mongolia, Sinkiang, and Tibet), which have an area of about 4,278,000 square miles, with a population calculated at about 329,600,000. About one-ninth (India, Ceylon, Straits Settlements, Cyprus, Aden, etc.) is under the sway of England, whose subjects, including the inhabitants of the native states of India, number over 320,000,000. Independent Arabia embraces about 5 per cent of the area of Asia. An area of about 684,000 square miles is included in former Asiatic Turkey, comprising Asia Minor, Armenia, Kurdistan, Mesopotamia, Syria, and the Arabian territories of Hejaz and Yemen, with an estimated population of 17,000,000. Persia has an area of about 635,000 square miles, and its population is supposed to be upward of 9,000,000. French Indo-China (Annam, Tongking, Cambodia, Cochin China, etc.) embraces about 310,000 square miles, the population being in the neigh-

borhood of 17,000,000. The area of Siam is about 230,000 square miles, and its population 8,820,000. Afghanistan has an area of about 250,000 square miles, with a population estimated at about 6,380,500. The dominions of Japan (excluding Korea) embrace 174,700 square miles, with a population of about 55,990,000; Korea has an area of 84,106 square miles and about 17,300,000 inhabitants. Oman, in Arabia, has an area of about 82,000 square miles and a population of about 500,000. In the Himalayan region are the independent states of Nepal and Bhutan. The estimated area of the former is 54,000 square miles; its population is probably about 3,000,000, though some estimates are higher. The area of Bhutan is about 20,000 square miles, and its population about 250,000. In the Malay Peninsula there are several states under British protection; the Federated Malay States comprise 27,500 square miles, with 1,037,000 inhabitants. Portugal and France have small possessions in India, and Portugal, Great Britain, France, and Japan have establishments on the coast of China. The great archipelago which lies to the southeast of the Asiatic continent belongs mainly to the Netherlands; the Dutch East Indies (exclusive of Dutch New Guinea) embrace some 587,000 square miles, with upward of 47,700,000 inhabitants.

See articles on the separate geographic regions of Asia and on its rivers and mountains. See also DISTRIBUTION OF ANIMALS; GEOGRAPHY; MOUNTAIN. For political aspects, see SUPPLEMENT.

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ASIA, IN THE BIBLE. The name "Asia" is not met with in the Old Testament, but occurs several times in the Apocrypha, where it is used as a general term to indicate the territory ruled over by the Seleucidæ, i.e., the Tigris-Euphrates valley, eastern Asia Minor, Syria, Phœnicia, and Palestine. This was in harmony with Greek usage, according to which the term meant much the same as it does to-day. The Romans, however, used the word in a more restricted sense, to indicate the province of Asia, which was constituted in 133–130 B.C., after the death of Attalus III of Pergamum, having been ceded to the Romans in his will. It was comprised of Mysia, Lydia, Caria, and the islands of the coast. The western part of Phrygia (Phrygia Asiana) was annexed to Asia temporarily in 116 B.C., and, after being detached and assigned to Cilicia, was finally incorporated with it in 49 B.C. It was governed by the Senate, through a proconsul, with three legates and a quæstor under him. Its principal cities were Ephesus, Pergamum, and Smyrna. It was the wealthiest, and, with the exception of Africa, the most important of the imperial provinces. As such, it was conscious of the vital significance of its connection with the Empire, and maintained with great devotion the cult of Augustus, in which the Emperor came to be associated in worship with the Ephesian Diana. In 297 A.D., under Diocletian, it was broken up into several small provinces, one of which, having Ephesus as its capital, retained the Asian name. In the New Testament the word is used in its Roman sense. At Ephesus, its chief city, Paul labored for upward of two years, with the result that the whole province became permeated with the truth of Christianity (Acts xix. 10, 26). To the churches of this province the circular Epistle to the Ephesians was addressed by Paul (see reference to them in the closing salutation of 1 Corinthians, which was written from Ephesus, xvi. 19), and they were made the formal recipients of the message of John in the Book of

Revelation (i. 9–iii. 22). See EPHESIANS, EPISTLE TO; CHURCHES OF ASIA, THE SEVEN.

ASIA MI'NOR (Lat.). The ancient name of what is now called Anatolia. It was divided into Pontus, Paphlagonia, Bithynia, Mysia, Lydia, Caria, Lycia, Pisidia, Pamphylia, Isauria, Cilicia, Cappadocia, Galatia, Phrygia, and Lycaonia. Along the western coast were Troas, Æolis, Ionia, and Doris (in Caria), the last three a series of Greek colonies. Greek colonies were also numerous along the north coast, on the shores of the Hellespont, Propontis, Bosporus, and Euxine. In the seventh century B.C. the Lydian Kingdom was the ruling power; but in the sixth century Asia passed under Persian rule. After the death of Alexander the Great Asia was portioned out among his generals, finally falling partly to the Seleucidæ and partly to the kingdom of Pergamum, which developed on the west coast. Under the Roman Emperors Asia Minor was generally prosperous, but suffered severely during the wars of the Byzantine Empire and has not recovered under Turkish rule. Consult Ramsay, *Historical Geography of Asia Minor* (London, 1890).

ASIARCH, ā'shī-ärk (Gk. *'Ασιάρχης, Asiarchēs,* from *'Ασία, Asia* + *ἄρχειν, archein,* to govern). The title of the delegates from the individual cities of Asia to the provincial assembly (*Commune Asiæ*), which met annually to regulate the worship of Rome and the Emperor, to institute games and gladiatorial contests, and to deliberate on political matters affecting the province. The position of Asiarch, paralleled in the other provinces, *Galatarch, Lykiarch, Pamphyliarch,* could be held in connection with any civil or religious office, even with the high-priesthood of an individual city, though the title of high priest of Asia was given alone to the officer who presided over the provincial assembly. The position was only for the year, though reëlection was possible, and the title might be retained. The honor was much sought for and was necessarily confined to persons of wealth. The institution lasted until the disintegration of the province under Diocletian in the third century. (See ASIA, IN THE BIBLE.) Among those who perhaps had had the position formerly but still retained the title were the friends of Paul, who cautioned him for his safety on the occasion of the uproar in the theatre at Ephesus (Acts xix. 31). Consult Mommsen, *Provinces of the Roman Empire* (Eng. trans., London, 1895), and Ramsay, *Cities and Bishoprics of Phrygia* (2 vols., London, 1895–97).

ASIATIC (ā'shī-ăt'ĭk) **BROTH'ERS.** A secret society, with aims similar to those of the Rosicrucians, which was formed in 1780 in Austria and thence extended over all Germany.

ASIATIC SOCI'ETIES. Associations for the study of the languages, antiquities, and history of the Eastern continent. The first was founded by the Dutch in 1780. In 1784 the Royal Asiatic Society of Bengal was formed. A French society was organized at Paris in 1822, and the Royal Asiatic Society of Great Britain and Ireland in 1823. An American society (see ORIENTAL SOCIETY, AMERICAN) was formed in 1842, a German society in 1845, and an Italian society in 1887.

ASIMINA, ā-sĭm'ĭ-nā *or* ăs'ĭ-mī'nā. See PAPAW.

ASK, ăsk (Ash Tree). The name in Norse mythology of the first man created by the gods. See also EMBLA.

ASKABAD. See ASKHABAD.

AS'KALON. See ASHKELON.

ASKEW, ăs'kû, or ASCOUGH, ANNE (1521–46). An English Protestant zealot and martyr. She was born at Stallingborough, Lincolnshire. She was of gentle birth, and against her will was made to supply the place of a deceased elder sister, as wife of Thomas Kyme, by whom she had two children. She was highly educated and devoted to biblical study. Because she had offended the priests, her husband, a stanch Roman Catholic, put her out of his house, which she willingly left. She went to London, it is supposed, to sue for a separation, but was arrested on a charge of heresy in March, 1545. Examined by the Bishop of London and others on the doctrine of transubstantiation, she denied its truth. She was imprisoned, but released on bail and acquitted on June 13. Again she antagonized her persecutors by the steadfast profession of her faith, and was rearrested in June, 1546, tortured by the rack, and finally burned at the stake in Smithfield, July 16, 1546. Consult J. Bale, *The Lattre Examinacyon of Anne Askew, etc.* (Marburg, 1547), and M. Webb, *An Account of Anne Askew* (London, 1865).

ASKHABAD, äs'kȧ-bäd' (Ar. and Pers. *askh,* love + *abad,* dwelling, town). A town of Russian Turkestan, the political centre of the Trans-Caspian territory, situated on the Trans-Caspian Railway, 290 miles southeast of Mikhailovsk, the seaward terminus of the railway (Map: Asia Central, G 2). It is a thriving town, owing its prosperity to its transportation facilities and its position near the Persian frontier, which has made of it a commercial entrepôt for goods exchanged between Russia, Persia, Khiva, Bokhara, and Turkestan. It has a garrison of 4000 soldiers. Pop., 1904, 36,286; 1908, 41,729.

ASKJA, äsk'yȧ. A volcano of Iceland, east of the centre of the island, in about lat. 65° N. and long. 16° 45′ W. It is 4600 feet high, has the largest crater in Iceland, over 700 feet deep, 34 square miles in area, and is still active. Its last eruption took place in 1875, and traces of it are found in the large pumice-covered tract on the northeastern slope of the mountain. The volcano stands in the midst of a widespread lava plain.

ASMA'I, äs-mī' (ABU SAÏD ABD-AL-MALEK IBN KURAÏB AL-ASMA'I) (c.740–828 A.D.). The preceptor of Harun al-Rashid, and an important representative of Arabic literature. He was born in Bosra and after his career at Bagdad returned to his native city, where he died. Sir Henry Rawlinson calls Asma'i's history of the kings of Persia and Arabia previous to Islam, "perhaps the most valuable and authentic historic volume in the whole range of Arabian literature." His romance of *Antar* has been called "the Iliad of the desert." Several of his pupils became celebrated. One of them, Abu Hatim al Sejestani, collected his opinions on the greatest Arabic poets. Besides the great collection called al Asma'iyat, most of the diwans that have been preserved go back to him. Numerous manuscripts of his works are known to exist in private libraries, but have not yet been made accessible to scholars. Consult Ahlwardt, *Sammlungen alter arabischer Dichter, I, El Açma'ijjat* (Berlin, 1902); A. Haffner, *Texte zur arabischen Lexikographie* (Leipzig, 1905).

ASMANNSHAUSEN, äs'måns-hou'zen. See ASSMANNSHAUSEN.

ASMARA. Since 1900 the seat of govern-

ment in the Italian colony of Eritrea, northeast Africa, situated at an elevation of 7650 feet above sea level, about 50 miles southwest of the seaport of Massawa on the Red Sea (Map: Africa, H 3). The town is in the heart of a fertile region and is the centre of an active trade. It has had railway connection with Massawa since 1911, and extensions to the line have been proposed, those to Keren and Ghinda being the most important. There are gold mines in the vicinity. Asmara is strongly fortified and contains a garrison of Italian and native troops. The population, including Italians, Mohammedans, and natives (the latter chiefly), is about 10,000.

AS'MODE'US. Asmodeus figures largely in later Hebrew tradition, where he appears as the chief of the demons, just as Lilith was their queen (Talmud Babli, Erubin 100b). In Tobit (iii. 8, 17) he appears simply as an evil spirit possessed of great lust. Many scholars identify Asmodeus with *Aeshma daeva;* i.e., the demon of wrath who plays a prominent rôle in Mazdaism, the religion of Persia. In the Book of Tobit both have the same quality of lust and the same power of killing any one standing in their way. In the Book of Tobit Asmodeus is represented as having loved Sarah, the daughter of Raguel, and slain seven men in succession who were married to Sarah. When, however, Tobias came with the intention of marrying Sarah, he succeeded, with the help of his companion Raphael, in exorcising the demon by fumigating the heart and liver of a fish. Flying to Upper Egypt, the demon was pursued by Raphael, and bound, so that the couple henceforth had peace (Tobit vi. 14; vii. 2). In Talmudic legends Asmodeus is brought into association with Solomon, and while aiding him on certain occasions, notably in building the temple, he is regarded also as the cause of the offenses which history attaches to Solomon.

ASMONEANS. See HASMONÆANS.

ASNIERES, ä'nyâr'. A northern suburb of Paris, France, 3 miles distant, on the left bank of the Seine (Map: Paris). It is the chief town of its canton, an important railway junction, has domestic industries, and is a favorite summer pleasure resort of the Parisians. It is the headquarters of Parisian yachtsmen, and regattas are held here in July, August, and September. Pop., 1896, 24,317; 1901, 31,336; 1906, 36,482; 1911, 42,583.

ASNYK, äs'nék, ADAM (1838–97). A Polish poet and dramatist, born at Kalisch. He studied medicine at Warsaw and Breslau, but finally turned to philosophy and took his degree at Heidelberg in 1866. During several years he was a political exile for participation in the insurrection of 1863, and about that time he began to publish poetry. He resided at Cracow from 1870 till his death. Several volumes of his "poetical" work appeared under the pseudonym of "El—y," and have given their author a high place in Polish lyric literature. As a dramatic writer, he produced, among other successful pieces, *Cola Rienzi; The Jew; The Friends of Job,* and a tragedy dealing with Lithuanian history, called *Kiejstut.*

AŚOKA, â-sō'kà, written also **AÇOKA, ASHOKA.** A renowned King of early India, famous as the patron of Buddhism, to which he stands in a similar relation to that of Constantine to Christianity. His full name was Aśoka Vardhana. He was the son of Bindusāra Amitraghāta, of the Maurya line, and he ascended the throne of Magadha (modern Behar) about 264 B.C., as inheritor of the northern empire which his famous grandfather, Chandragupta, or Sandrocottus (q.v.), the contemporary of Alexander the Great, had founded. Through conquest he extended his power by bringing the kingdoms of Bengal and Orissa into his vast domain. At first he seems to have been of a cruel and savage nature, as is shown by his causing his own brothers to be assassinated when he succeeded to the crown; but he appears to have experienced a change of heart or to have undergone a transformation when he was converted from Brahmanism to Buddhism. He devoted himself zealously to spreading the faith of the Buddha, convoking great Buddhist councils and making Buddhism the state religion of his extensive realm. The numerous edicts which he caused to be inscribed upon rocks and pillars in various parts of India bear witness to his religious devotion and show his loving care for animals as well as for man; and they entitle him to the proud name, "Beloved of the Gods," by which he designated himself. They also shed much light upon the wisdom and justice of his administration and upon the condition of India at the time when he reigned. One column, which was discovered as recently as 1896, is especially interesting, because we learn from it that he had caused it to be erected upon the spot where, according to tradition, the Buddha was born. Aśoka died about 228 B.C. Consult: V. A. Smith, *Aśoka, the Buddhist Emperor of India* (London, 1901); *Edicts of Aśoka* (1909); E. Senart, *Les inscriptions de Piyadasi* (Paris, 1881–86); Hardy, *König Açoka* (Mainz, 1902).

AS'OLAN'DO: FAN'CIES AND FACTS. A volume of poems by Robert Browning, published on the day of his death, Dec. 12, 1889.

ASO'PUS (Gk. *Ἀσωπός, Asōpos*). The god of the river Asopus. By Metope, daughter of the river god Ladon, he had numerous daughters, through whom he became the ancestor of many of the heroes of Greece. When his daughter Ægina was carried away by Zeus, Asopus pursued, but was slain by a thunderbolt.

ASO'TUS. A character in Jonson's *Cynthia's Revels;* a hanger-on of Amorphus, whom he slavishly imitates.

ASP. The name applied in Europe to the *Vipera aspis,* a venomous serpent distributed all over southern Europe and the Alps region. It is the only poisonous snake that is found as far north as Sweden. The word *bethen* of the Bible, usually translated 'asp,' and the *aspis* of the Greeks (*ἀσπίς*) and the Romans, probably referred to several venomous snakes; at any rate, several poisonous serpents are found in Palestine and Egypt, but in some cases the biblical context seems to show that the much-dreaded cobra (*Naja haie*) of Egypt and Cyprus is referred to. This serpent is represented in the hieroglyphics of ancient Egypt, and is the snake which, after the poison fangs have been extracted, is used by modern Egyptian jugglers in their snake dances. It has loose skin on the neck that can be dilated into a hood much like that of the cobra di capello of India, but it does not have the spectacled markings. (See COBRA.) The asp of Cleopatra fame was probably the small-horned viper (*Aspis hasselquistii,* or *Cerastes cornutus*). Several other vipers are sometimes called asps, especially the south African puff-adder (q.v.).

ASPAR'AGINE $(NH_2)CO.CH(NH_2).CH_2COOH$. A crystalline substance which exists ready formed in common asparagus and in many other plants. Chemically it is, as the structural formula shows, an amide of asparitic (amidosuccinic) acid; like the amide of any other acid, it yields the acid itself when boiled with dilute mineral acids or with alkalis. Asparagine is readily obtained from the expressed juice of the young shoots of asparagus, young vetches, etc., which, after filtration and evaporation to a sirup, soon deposits it in crystalline form. These crystals dissolve freely in boiling water, the cooled solution having a mawkish and cooling taste. That asparagine plays an important part in the physiology of plants is obvious from its wide distribution. It occurs in plants as a product of decomposition of protein.

ASPAR'AGUS (Gk. *ἀσπάραγος, asparagos*, or *ἀσφάραγος, aspharagos*). A genus of plants of the family Liliaceæ. The species of this genus are herbaceous or shrubby plants, natives chiefly of the south of Europe and of Africa. The most widely diffused species is the common asparagus (*Asparagus officinalis*), a native of Europe, which grows on the banks of rivers and on the seashore, in meadows and bushy places, especially in sandy soils, occurring in a few places in Great Britain, and is also in general cultivation as a garden vegetable; its young shoots, when they first sprout from the earth, form a much-esteemed article of food. These sprouts contain a peculiar crystalline substance called *asparagine* (q.v.). The peculiar odor asparagus imparts to the urine is due to methylmercaptan—a sulphur body—liberated when it is digested. The thick and tender kinds of asparagus are most esteemed for the table and much used, both fresh and canned. Asparagus has a very high water content, 94 per cent on an average, and so a low food value, resembling other green succulent vegetables in this respect. It contains a little carbohydrate and protein and a very little fat and ash. It is prized for its flavor and wholesomeness. It can be cooked in a great many ways, but is most commonly boiled and served hot, with butter or a sauce, or cold as a salad. It should be cooked only until tender, inasmuch as overcooking spoils the flavor and color. The preference for blanched or for green asparagus is a matter of taste, not of actual quality. Asparagus has been much increased in size and considerably altered in general appearance by cultivation, being seldom more than a foot high in its wild state, and not much thicker than a goose quill, whereas it is now obtained more than half an inch in diameter, with a stem 4 or 5 feet in height. Asparagus is grown from seed. When the plants are one year old, they are transplanted to rows from 2½ to 5 feet apart, according to method of cultivation, and set at distances varying from 1 to 2 feet in the row. The plant will grow on almost any soil, but gives the best results on deep, rich, sandy loams, with a south or east exposure. It requires heavy manuring each year if large yields are desired. Male plants are held to be more productive than female. The first sprouts may be gathered when the plants are three years old, but a full crop is not to be expected until the spring of the fourth year. Beds once established and cared for endure many years. The raising of asparagus for the market has become an important industry near the larger cities of Europe and the United States. Asparagus is sometimes forced out of season. For this purpose mature roots may be placed under the greenhouse benches or in pits, cellars, or almost any place where there is sufficient heat. But little light is needed. The asparagus shoots thus obtained are formed from the reserve material already stored in the roots. Roots thus forced once are exhausted and thrown away.

In the open field, forcing trenches are sometimes dug between the rows, and filled with fermenting manure. The trenches may also be heated with hot-water pipes and with loose steam. The latter method has proved very effective at the Missouri Agricultural Experiment Station. Another method of forcing is to place sashes over the plants. At the Cornell Experiment Station, in New York, a low house was built over the bed, the frame of which was made of steam pipes and the top covered with canvas. Asparagus plants forced in place by any of these methods recuperate after one or two years, when they may be again forced. The young shoots of several other species of asparagus are also eaten, as those of *Asparagus tenuifolius, Asparagus acutifolius*, and *Asparagus albus*, natives of the south of Europe; the last of which is much used in Spain and Portugal as a salad, in soups, and as a boiled vegetable. On the other hand, the sprouts of the bitter asparagus (*Asparagus scaber*), which is very similar to the common asparagus, are not edible, on account of their bitterness. There are a number of species of asparagus grown in greenhouses as ornamentals. See Liliaceæ; Flowers; also Plate of Yam, etc.

Asparagus Diseases. The principal disease of which this plant is subject is a rust caused by the fungus *Puccinia asparagi*. The disease has been known for many years in Europe, but did not appear in the United States to a threatening degree until 1897. The leaves and stems are attacked and become covered with red blotches. Varieties seem to differ in the degree of susceptibility to disease, the variety Palmetto having been found fairly resistant in the East. In California the thorough application of sulphur has proved an efficient treatment.

ASPARAGUS IN'SECTS. Cultivated asparagus is remarkably free from insect pests. It is, however, preyed upon by two small chrysomelid beetles (*Crioceris asparagi* and *Crioceris duodecim-punctata*), the former introduced from Europe to Long Island, N. Y., about 1856, and the latter more lately. The common one is nearly half an inch long. "The head is black, the prothorax reddish, often with two black spots above; the elytra are yellow, with a sutural (median) stripe of black, from which stripe extend two black bands dividing the yellow part of each elytron into three portions. . . . Beneath, the beetle is nearly or entirely shining black." These beetles, as adults, attack the young growing shoots, and as larvæ destroy shoots, berries, and seeds. The heads of the asparagus should be cut off, after the eggs are laid, and boiled. Wild asparagus in the neighborhood of the cultivated beds should also be destroyed. Several other beetles are more or less injurious to this plant in Europe. The larvæ of several moths feed upon the plant, as do many species of plant bugs and aphides, but none does persistent damage. Consult Chittenden, United States Department of Agriculture *Year-Book* (Washington, 1896), and *Bulletin No. 10*, Division of Entomology, United States Department of Agriculture (Washington, 1898).

ASPARAGUS STONE. See APATITE.

ASPASIA, ăs-pā'shĭ-ȧ (Gk. *Ἀσπασία*) (c.440 B.C.). A celebrated woman of ancient Greece, noted for her genius, beauty, and political influence; daughter of Axiochus, and born at Miletus. The circumstances of her removal to Athens are unknown, but the beginning of her connection with Pericles dates from about 460 B.C. Pericles finally divorced his first wife by her own consent and married Aspasia, by whom he had a son, also called Pericles. The real status of Aspasia in Athenian society has been a subject of much difference of opinion. The fact that at Athens marriage with any woman of foreign birth was held to be incomplete, and the offspring of such a union illegitimate, may have contributed to the notion that Aspasia was a courtesan. She was without doubt a woman of intelligence and wit; and this fact, combined with her freedom from the restraints which regularly confined the activity of women at Athens, naturally gave her prominence and brought upon her not a little obloquy. After her marriage with Pericles her house became the rendezvous of men of learning and distinction. The comic writers found her a convenient butt for their satire. Pericles is said to have been greatly influenced by her, but we can hardly consider as serious the charge that she was the cause of the Samian and the Peloponnesian wars. On one occasion the comic poet, Hermippus, charged Aspasia with impiety, but she was successfully defended by Pericles himself. When the two sons of Pericles by his first marriage died, Pericles obtained from the state the rights of full citizenship for his son by Aspasia. After the death of Pericles Aspasia married a sheepowner, with whom she lived but a single year and by whom she had one son. Her further career is unknown, but she continued to live in Athens and died there.

ASPASIA, or **ASPATIA.** The heroine in Beaumont and Fletcher's *Maid's Tragedy*, whom Amintor makes love to, and then deserts.

ASPASIA, THE YOUNGER. A Phocean, at first, according to Plutarch, called Milto. She became the lawful wife of Cyrus the Younger, who named her Aspasia, perhaps after the wife of Pericles. Upon the death of Cyrus she was claimed by his brother Artaxerxes, with whom she lived until his son Darius was designated as his successor. Darius then claimed Aspasia, according to the custom of the Persians. Artaxerxes, to thwart Darius' desires, made her a priestess of Artemis at Ecbatana. In revenge Darius formed a plot to assassinate his father, but was detected and put to death.

ASPE, ăs'pā. A town of Spain, in the province of Alicante, 16 miles west of the town of Alicante (Map: Spain, E 3). It manufactures oil, spirits, and soap, and coal is mined. Near it is Mount Rollo, famous for its marble quarries. Pop., 1900, 7927; 1910, 7961.

ASPE, ȧsp. A picturesque valley in the French department of Basses-Pyrénnées, extending from the Spanish border to Aloron. It contains numerous mineral springs. The Pico d'Aspe is 8880 feet high.

ASPECTS (Lat. *aspectus*, a sight, appearance; from *ad*, to + *spicere*, to look). In astronomy and astrology, certain positions of planets with respect to one another, as seen from the earth. In the days of Ptolemy there were five aspects—conjunction, indicated by the symbol (☌), sextile (⚹), quartile or quadrate (□), trine (△), opposition (☍). Two planets are in conjunction when they have the same longitude; the aspect is sextile when they are 60° apart; quartile or quadrate when the distance is 90°; trine, when it is 120°; and at 180° they are opposite to one another, or in opposition. Astrology ascribed to these aspects great influence over the fate of individuals and of nations. Later astrologers added other aspects, based on further subdivision of the circle. In addition to the five ancient aspects, Kepler at one time made use of semisextile (30°), semiquintile (36°), quintile (72°), sesquiquintile (108°), sesquiquadrate (135°), and biquintile (144°), but as the last three did not correspond to an exact division of the circle, they came to be regarded as having negligible influence and were consequently abandoned. Only two of the terms, *conjunction* and *opposition*, are now in general use.

AS'PEN, or TREMULOUS POPLAR, *Populus tremula*. (See POPLAR.) A tree which grows plentifully in Europe and in Siberia, belonging to the family Salicaceæ. It is a native of Great Britain and is frequent in Scotland, where it is found even at an elevation of 1500 feet above the sea. It has received the specific name *tremula* from the readiness with which its leaves are thrown into a tremulous motion by the slightest breath of wind—a property for which, indeed, the aspen leaf has become proverbial. The leaves are nearly orbicular, but are broadly toothed, so as almost to exhibit angles. The footstalks are compressed, and in part to this compression is due the sensitiveness of the leaves to the breeze. The aspen grows quickly, with a straight stem, reaching to a height of from 50 to 80, or even 100 feet. In unfavorable situations it becomes dwarfish. The wood is soft, porous, light, white, and smooth; it does not make good fuel, but is very fit for the turning lathe, and especially for manufacture of troughs, trays, pails, etc. It is deemed excellent for arrows. If the stem is peeled and allowed to dry before it has been cut down, the wood becomes harder, and it may then be used as timber for the interior of houses. On this account the tree is of great importance in many districts, the more so as it succeeds in any soil, although it prefers one that is moist and gravelly. The bark contains considerable quantities of the glucoside called salicin. The charcoal made from the tree is sometimes used in the manufacture of gunpowder. *Populus tremuloides*, a similar species (according to some, a mere variety of the ordinary aspen), is a native of North America, and is called the American aspen, commonly, "quakin' asp'." This is one of the widest-distributed trees of North America. It is found in Labrador and Alaska, and again as far south as Pennsylvania, Missouri, and even New Mexico. It lives in California also. Very similar also is another North American species, *Populus grandidentata*, which has a more restricted range. The wood of both these species is extensively used in the United States for the manufacture of wood pulp. *Populus grandidentata* has given rise to a number of forms with pendulous branches that are extensively grown as ornamentals. See also POPLAR.

AS'PEN. A city and the county-seat of Pitkin Co., Colo., 25 miles west of Leadville, on the Denver and Rio Grande and the Colorado Midland railroads (Map: Colorado, C 2). It has an altitude of 7900 feet. Rich silver and lead mines are located here. Aspen was settled 1879–80 and incorporated in 1881. It is gov-

erned by a mayor, elected biennially, and a council, composed of the mayor and four aldermen. Pop., 1890, 5108; 1900, 3303; 1910, 1834.

AS'PER. A character meant to portray the author in Ben Jonson's *Every Man Out of His Humour.*

ASPERGIL'LUM. See WATERING-POT SHELL.

ASPERN, äs'pĕrn, or GROSS ASPERN. A village of Austria, on the left bank of the Danube, 5 miles east-northeast of Vienna. Pop., about 1400. This village and the neighboring one of Essling are celebrated as the scene of a sanguinary battle in the summer of 1809, between the French army, under Napoleon I, and the Austrians, under Archduke Charles. After the battle of Eckmühl, in which the Austrians were defeated, the Archduke retired to the left bank of the Danube, leaving the road to Vienna open to the French. On May 12, 1809, the French army entered Vienna, when the Archduke concentrated his forces on the opposite bank of the river. Napoleon threw bridges over the river, from the island of Lobau, which he had occupied, and on the 21st the French army began crossing to the attack and seized Aspern and Essling. The Austrians at first seemed to give way; but when about half the French had crossed the river, they returned to the charge and almost surrounded the enemy in the narrow plain between the two villages. Here ensued the battle of Aspern, a terrible conflict, the grand object of the contending hosts being the possession of the villages, of which Aspern was thrice lost and retaken by the Austrians. At the close of the day it remained undecided, but next morning it was renewed with fury on either side. The French had almost snatched the victory, when fresh Austrian troops marched on the field and saved the day. After terrible slaughter Napoleon ordered a retreat, and his shattered ranks retired to the little island of Lobau, in the middle of the river, whence they afterward slowly withdrew to the right bank. The loss on the side of the Austrians was given at 4000 killed and 16,000 wounded; that of the French at double that number. Marshal Lannes, the most daring among the French generals, was among the slain. Both the villages were reduced to heaps of ruins. The French called this the battle of Essling, while the Austrians gave it the name of Aspern.

ASPER'ULA. See WOODRUFF.

AS'PHALT, or **ASPHAL'TUM** (Gk. *Ἄσφαλτος, -οῦ, asphaltos, -on,* a loan-word of uncertain origin). A name applied to certain natural bitumens composed of unsaturated hydrocarbons (see HYDROCARBONS; CARBON COMPOUNDS) and their sulphur derivatives, together with some nitrogenous substances. Asphalt is probably formed from lighter hydrocarbons by condensation and polymerization in the presence of sulphur, and possibly under its influence. That the formation of asphalt is still going on in nature is shown by the continual evolution of sulphuretted hydrogen in the asphalt deposits of Trinidad and Bermudez. While there is a great similarity in natural asphalts, extending to both physical and chemical characters, we may find them in a great variety of forms and conditions of occurrence. They may be free bitumens, either liquids, or viscous, or brittle solids, containing little or no mineral matter; or they may be mixtures in various proportions, more or less intimate, of the bitumens with inorganic matter or with both inorganic and organic matter.

A *liquid bitumen,* under the name of "mineral tar," was first found at Bechelbronn in Alsace many years ago, and was studied by Boussingault, who described it as a viscid, tarry liquid of bituminous odor, having a specific gravity of 0.966, and containing, besides hydrocarbons, both sulphur and nitrogen. Liquid bitumens, known as malthas, are also found in California: in Kern, Ventura, and Santa Barbara counties. Those from California which have been chemically examined invariably contain nitrogen, present in the form of basic hydrocarbons. One of the most interesting of the occurrences of liquid bitumens is that at Las Conchas mine, 13 miles east of Santa Barbara, Cal., where there are numerous beds of shale, which appear to be saturated with it. A well sunk 400 feet in this material continues to ooze liquid asphalt at all points. The shale itself is not, however, worked to obtain the substance, because on top of the shale is an immense bed of sea sand, the locality being immediately on the beach, and this sand acts like a sponge in taking up and holding the liquid bitumen. After clearing off the surface soil, this beach sand has been exposed for considerable distances, and it is then dug up and transported to the factory, where it is treated with hot water and the bitumen allowed to rise to the surface, from which it is then skimmed off; the sand, being in this treatment completely cleansed, is thrown back upon the beach.

More important than the liquid asphalts, however, are the solid asphalts. The purest of the solid asphalts are sometimes known as "glance pitch" or gum asphaltum. Prominent among them is gilsonite, which is found in the Uintah Indian reservation, in Wasatch and Uintah counties, Utah. The purity of this product (some 90 to 98 per cent soluble in carbon disulphide) is such that it finds larger application in the manufacture of varnishes and insulating compounds than in paving and building construction, for which the commoner asphalts are generally used. This glance pitch is extremely brittle and friable, crumbling easily between the fingers, and has a bright lustre like anthracite coal. Notable quantities of this solid, relatively pure asphalt, are also found in Cuba, but because of its brittleness it is not of the same practical value for paving purposes as the softer, though less pure, varieties in common use.

Of the *solid asphalts* of commercial importance, by far the best known is asphalt from the island of Trinidad. Near the western border of the island is the so-called "lake," situated at an altitude of about 130 feet above the ocean and one mile from the shore of the Gulf of Paria. This lake is a level tract, nearly circular in shape, and about 114 acres in area, the surface of which shows a brownish material of a somewhat earthy appearance, sufficiently hard to bear the weight of carts and animals, moving across it, yet so plastic that excavations 15 feet in depth will be filled up and leveled in the course of a few months by the flow of adjacent material. This lake undoubtedly represents the crater of an extinct mud volcano, as the borings indicate that it is saucer-shaped and of greater depth toward the centre, where borings have shown uniformity of material to a depth of 78 feet. The amount of asphalt in the lake, judging from the excavations and depth indicated, must be about 6,000,000 tons. However, at some time in the past the asphalt very probably overflowed

the rim of the crater in many directions, so that extensive deposits of what is known as "land pitch" are now found all the way from the borders of the lake to the sea. This latter material, however, is not only of a more earthy character because of the included mineral matter, but has become more dry, presumably by long evaporation, and, therefore, is inferior for paving purposes to the tougher and more tenacious material known as "lake pitch." In the crude state, the Trinidad asphalt shows about 40 per cent of bitumen, 34 per cent of earthy matter, 9.3 per cent of organic non-bituminous matter, and 16.5 per cent of water. After refining, the water is eliminated and the bitumen is raised to about 60 per cent in amount. The mineral matter of this Trinidad asphalt is very finely divided, largely silicious, and not objectionable when the asphalt is to be used for paving purposes or the manufacture of mastic.

A second important natural asphalt of semi-solid character is that known as Bermudez asphalt, brought from the province of Bermudez in Venezuela, where it occurs near the coast in a large expanse of marsh, not entirely unlike the Trinidad lake, although at Bermudez there is no distinct indication of a crater. Bermudez asphalt contains 2.6 per cent of mineral matter and over 90 per cent of bitumen. It is, therefore, purer than Trinidad asphalt, containing less non-bitumen. It is of great value for paving purposes because of the plastic character of its bitumen as contrasted with the material of the glance pitch referred to above.

Considerable deposits of natural solid asphalts occur in the United States, notably in Indian Territory and on the Pacific coast. One of the best-known deposits in California is at La Patera, 12 miles west of Santa Barbara, where a rock asphalt is found containing on an average 60 per cent bitumen as it is mined, and a residue of fine silica free from clay and organic matter. Because of this relative purity of the mineral matter, it is possible to extract the bitumen from the rock after crushing, by the action of solvents, and by the recovery of these to obtain a solid asphalt in a very pure state.

In addition to these varieties of solid natural asphalt, there are natural mixtures of bitumen with large quantities of mineral matter. These may be classified as asphaltic limestones and asphaltic sandstones. The limestones are much better known and perhaps more widely distributed. They constitute what has long been known in Europe as "asphalt," extensive deposits being found, for instance, in the valley of the Rhône in France, in Switzerland, in Sicily, and at Hanover in Germany. These deposits form beds of fine, amorphous limestone naturally impregnated with bitumen, and have furnished the asphalt pavements of the various European cities. We may mention among them the asphaltic limestones of Val de Travers in the canton of Neuchâtel, Switzerland, the Seyssel on the lower Rhône, a few miles above Lyons in France, Ragusa in Sicily, and the Limmer and Vorwohle mines in Germany.

These bituminous limestones contain from 5 to 15 per cent of bitumen, and from 67 to 91 per cent of calcium carbonate. The amount of bitumen in them is sufficient to cause the powdered rock to soften somewhat when heated, and they can therefore be utilized directly, in the form of heated powder, for laying asphalt pavements. In the United States a similar deposit of limestone, largely fossil in character, is found in Uvalde Co., Texas. It contains from 15 to 25 per cent of bitumen. It has been brought into commerce under the name of "lithocarbon," when extracted for a variety of purposes, such as the manufacture of insulating material. Asphaltic sandstones are found on the coast of California and in numerous sections of Colorado, Utah, and New Mexico, containing from 15 to 20 per cent of bitumen. Still richer bituminous sandstones have in recent years been found in Kentucky.

Artificial Asphalts. Many natural petroleums are said to have an asphalt base. This means that the residuum, instead of containing paraffin, as is generally found in petroleum, contains a product which has many of the characteristics of a maltha or liquid asphalt. Thus the California petroleums yield malthas which can hardly be distinguished from the naturally occurring liquid asphalts. By heating these natural liquid asphalts with sulphur, the process of change whereby the natural solid asphalt was formed in nature is imitated, and artificial solid asphalts are obtainable. Large quantities of such solid asphalts, artificially prepared, are made from California and Texas petroleum. Again, by passing oxygen through heavy petroleum oils, a solid product known as *Byerlite* has been formed, which is a variety of artificial asphalt, although differing considerably from that produced by the action of sulphur. Finally, by the distillation of a mixture of fish remains and wood, and redistilling the resulting oil, William C. Day obtained a product which he named "artificial gilsonite" because of its close resemblance in both physical and chemical characters to natural gilsonite or glance pitch.

Technical Uses of Asphalt. As already stated, the purest varieties of asphalt are extensively used in the manufacture of asphalt varnish. For this purpose glance pitch and gilsonite are preferably taken, although a thoroughly refined Trinidad or Bermudez asphalt is also available. The product is a combination of asphalt, turpentine, and linseed oil, combined in varying proportions, such as 3 parts of asphalt to 4 of boiled oil with 15 to 18 of turpentine. These varnishes are very extensively used in coating metal and wood. A refined asphalt usually mixed with some petroleum residuum is used for saturating felt, the process being carried out with the aid of machinery, and a paint or varnish of similar composition is generally applied subsequently, after the asphalt felt is in place. The asphalt felting possesses an advantage over simple coal-tar felting, in that it does not become brittle under the influence of heat or with age.

Insulating paints are also made quite extensively from some of the extracted bitumens admixed with various substances, so as to produce a hard product corresponding to ebonite.

By far the most important application of asphalt, however, at the present day, is in the paving industry. We may distinguish here between sheet asphalt, in which the asphalt composition is spread so as to form large continuous sheets, as in street-paving, and asphalt block-paving, in which blocks of asphalt composition are first manufactured by machinery. The use of asphalt for street paving dates back to 1838, when sidewalks were laid in Paris with the bituminous limestone from Seyssel and Val de Travers, and, as before stated, almost all the

European asphalt-paving has been done with this asphaltic limestone. In the United States, however, an asphalt-paving composition is made up containing about 15 per cent of an asphaltic cement made by incorporating a small quantity of free liquid maltha or petroleum residuum with a refined solid asphalt, to which is then added some 60 to 70 per cent of clean sand, and 10 to 25 per cent of pulverized limestone. This makes the surface coating, and is usually put upon a prepared concrete foundation and smoothed and rolled with heavy road engines. Asphalt blocks are made from crushed stone and refined solid asphalts compacted and pressed into forms by suitable briquetting machinery. Mastic is another form of asphalt pavement used largely for the covering of sidewalks and lining of areas, and is manufactured of asphaltic limestone, such as the Seyssel or Neuchâtel, with which about 8 per cent of its weight of refined Trinidad asphalt has been incorporated, heated, and cast into blocks. When ready for use these blocks are broken up and again heated with the addition of a mixture of refined solid asphalt with petroleum residuums and then brought to the proper consistency by the addition of a certain proportion of sand and fine gravel. Mastic is poured hot upon the prepared foundation and spread by the aid of wooden trowels and afterward smoothed with wooden implements.

In 1911, 360,004 tons of asphalt and bituminous rock, valued at $3,828,751, were produced in the United States. The amount imported in the same year was 165,288 tons, valued at $789,236.

PRODUCTION OF ASPHALT, 1911, BY STATES

State	Short tons	Value
California	190,945	$2,104,421
Oklahoma *	82,387	420,931
Texas	55,826	786,785
Utah	30,846	516,614
Total	360,004	$3,828,751

* Includes a small production for Illinois and Kentucky.

Consult: Delano, *Natural Asphalt and Mineral Bitumen* (New York, 1893); Howard, *Natural Asphaltum and its Compounds* (Troy, N. Y., 1894); Richardson, *On the Nature and Origin of Asphalt* (London, 1899); Klein and Peckham, *Asphalt Paving* (Report of the Commissioners of Accounts of the City of New York, 1904); Köhler, *Die Chemie und Technologie der natürliche und künstliche Asphalte* (Braunschweig, 1904); Richardson, *Modern Asphalt Pavement* (New York, 1905; 2d ed., 1908); and *Asphalt Construction for Pavements and Highways* (New York, 1913); Eldridge, "The Asphalt and Bituminous Rock Deposits of the United States," *Twenty-Second Annual Report of the United States Geological Survey*, part i (Washington, 1901). See PAVEMENTS; DAMS AND RESERVOIRS; ASPHALTIC COAL; BITUMEN; BITUMINOUS LIMESTONE; BITUMINOUS SANDSTONE; PETROLEUM.

ASPHAL'TIC COAL, or **ASPHAL'TITE.** Solid forms of asphalt, originally derived from petroleum, which, through loss of their oil content, have assumed an appearance analogous to that of glance coal. Asphaltic coal occurs usually in fissures, into which it has flowed while in a liquid or viscous condition. Such fissure deposits have been found in rocks of Devonian, Carboniferous, and Tertiary Age, and the contained material has received various names in different portions of the country. The chief uses of these asphaltic coals are as bases for varnishes, as insulators, and formerly, to a large extent, as gas-enrichers. The more important varieties, with the localities where mined, are: Albertite, Albert Co., N. B., Canada; gilsonite and uintahite, in the Uintah Mountains of Utah; grahamite, originally from Wood Co., W. Va., but subsequently found in Colorado, Texas, and Mexico; wurtzilite, in Utah.

An allied substance is ozocerite, or mineral wax, obtained in Galicia (Austria) and in Utah. (See under special heads.) For descriptions of the various deposits and theories regarding the origin of the asphaltic coals, the reader is referred to the following papers: Bailey and Ells, "Report on the Lower Carboniferous Belt of Albert and Westmoreland Counties, New Brunswick," in *Geological Survey of Canada, Report of Progress, 1876–77* (Montreal, 1878); Peckham, "The Probable Origin of Albertite and Allied Minerals," *American Journal of Science*, 2d series, vol. xlviii (New Haven, 1869); Lesley, "On an Asphaltic Coal Vein in West Virginia," *American Philosophical Society, Proceedings, 1865* (Philadelphia, 1865); Wurtz, "On Grahamite," *American Journal of Science*, 2d series, vol. xlii; Blake, "Uintahite, Albertite, etc.," *Transactions of the American Institute of Mining Engineers*, vol. xviii (New York, 1890); Eldridge, "The Uintahite (Gilsonite) Deposits of Utah," *Seventeenth Annual Report of the United States Geological Survey*, part i (Washington, 1896); Taff, "An Albertite-like Asphalt in the Choctaw Nation, Indian Territory," *American Journal of Science*, vol. clviii (New Haven, 1899); Taft and Anderson, *United States Geological Survey*, Bulletins 285 (1905) and 380 (1908).

AS'PHODEL (Gk. *ἀσφόδελος, asphodelos*, king's spear, asphodel), *Asphodelus*. A genus of plants belonging to the family Liliaceæ. The roots of the asphodels are fleshy and thick. The species are not very numerous and are mostly natives of the countries around the Mediterranean. The yellow asphodel (*Asphodeline lutea*) and the white asphodel (*Asphodelus albus*) have long been known as garden flowers. The yellow asphodel has an unbranched stem 2 to 3 feet high, much covered by the sheathing bases of the long narrow leaves. The leaves of the white asphodel are all radical, and its flowers are in branched clusters. Both species flower about the time when spring passes into summer. *Narthecium ossifragum*, abundant in the moors of England and elsewhere in Europe, is the well-known bog asphodel. In the United States *Narthecium americanum* is known by the same name. False asphodel is a name given to some of the species of *Tofieldia*. All these plants are rather closely related. The asphodel often referred to by poets is *Narcissus Pseudo-Narcissus*. For illustration, see ARAUCARIA.

ASPHYX'IA (Gk. *ἀσφυξία*, a stopping of the pulse, from *ἀ, a*, negat. *σφύξις, sphyxis*, pulse). A condition brought about in oxygen-breathing animals when any obstacle prevents the entrance of air into the pulmonary vesicles, and unconsciousness or death occurs. Aquatic animals may be asphyxiated either by depriving the water they inhabit of oxygen or impregnating it with noxious gases. Asphyxia may de-

velop suddenly, by strangulation, or throttling, by the lodgment of foreign bodies in the larynx or trachea, or spasm of the glottis, or growths in the same; or gradually as in close rooms or mines when the supply of oxygen is cut off; or by the inhalation of noxious gases, anæsthesia, or poisoning by strychnine or curare; and in many other ways. The most frequent cause is drowning.

In acute asphyxia there is an increase of carbon dioxid in the blood, which first stimulates the respiratory centre in the medulla and finally paralyzes it. Respiratory efforts are at first increased and then slowly cease; the blood pressure falls; the right side of the heart becomes engorged with blood, and unconsciousness takes place in two or three minutes. In the early stages the face becomes livid; later it becomes pale; the mucous membranes and skin become bluish, and the fine blood vessels injected. Small hemorrhages may occur. The heart, which at first beats strongly, becomes weaker and weaker and finally ceases to beat, and death occurs. In man, this occurs in from a minute and a half to five minutes. Some persons, no doubt, as pearl divers, can by habit do without a fresh supply of air for a longer period; and some diving animals have an arrangement of blood vessels by which they are enabled to remain under water for a long time. In the treatment of asphyxia the cause must be removed immediately, if possible. Tracheotomy saves many lives when the upper air passages are obstructed. In laryngeal diphtheria the insertion of a tube into the larynx is a common practice.

Ordinary restorative measures may be employed with hopes of success at a very long period after apparent death. Some have recovered after being submerged in water for two hours. The object of all methods is to supply fresh air to the lungs and to force the blood from the engorged right side of the heart—in other words, to supply an artificial respiration and an artificial circulation.

Asphyxia neonatorum. This is a condition of suspended animation in new-born infants, due to compression of the umbilical cord, or other obstetrical accident, cutting off the circulation which supplies the fœtus with oxygen, before natural respiration begins. Infants may be revived by stimulation and artificial respiration if the heart has not stopped beating. See RESPIRATION, ARTIFICIAL.

ASPHYX'IANTS (for derivation, see ASPHYXIA). When applied to particular munitions of war, the term refers to shells or other projectiles containing chemical substances designed to produce a suffocating or poisonous effect. The Chinese have, from the earliest times, availed themselves of this device, and in their "stink-pot" secured such results. The use of asphyxiants has always been discouraged by the more enlightened authorities, both military and civil; so much so that The Hague Peace Conference of 1899 strongly condemned their employment. Lyddite shells were used by the British during the Anglo-Boer War of 1899–1902, and shimose and similar shells, opaque powders and hand grenades by both sides in the Russo-Japanese War. While not strictly asphyxiants, they render untenable a larger area of ground than would be accomplished by the projectile itself. These shells in exploding give rise to fumes and smoke which serve the double purpose of enabling the gunners to locate the point where they strike and obscuring the sight of the forces among whom they fall. Other compositions that may be used are designed to burn fiercely, igniting whatever inflammable material they may come in contact with, such as the interior fittings of ships, forts, or other buildings.

AS'PIC (Fr. probably from *aspic*, an asp, alluding to its coolness). A savory meat jelly molded into a regular form and containing portions of fowl, game, fish, and the like, usually with hard-boiled eggs and sliced pickles. The term is used also in poetry for any venomous snake like the asp or viper. In botany it is sometimes used to designate the spikenard (*Lavandula spica*).

AS'PINWALL. See COLON.

ASPINWALL. A borough in Allegheny Co., Pa., about 3 miles northeast of Pittsburgh, on the Pennsylvania Railroad and on the Allegheny River. It is essentially a residential place. Aspinwall is governed by a council of seven members, elected by the people. The water works and light plant are owned by the borough. Pop., 1900, 1231; 1910, 2592.

ASPINWALL, WILLIAM (1743–1823). An American physician, born at Brookline, Mass. He received his education at Harvard and studied medicine in Philadelphia. He acted as a surgeon in the Revolutionary army and subsequently practiced his profession at Brookline. He is remembered for having introduced vaccination in this country.

ASPINWALL, WILLIAM H. (1807–75). An American railroad builder. He was born in New York City, and as early as 1837 was a partner in the firm of Howland and Aspinwall, then one of the largest shipping firms in New York. In 1850 he retired from the firm and devoted his entire attention to building the Panama Railroad, the eastern terminus of which was named after him. He was also active in the formation of the Pacific Mail Steamship Company.

AS'PIRATE (Lat. *aspiratus*, breathed upon). The term is applied by philologists to certain sounds, especially in Sanskrit and Greek, such as *kh*, *gh*, χ (ch), θ (th), φ (ph), accompanied by a breathing. The term may also include the English *f*, *th*, which are more properly called breathings or spirants. Its application to the sounds *ch* and *h* is popular and is not recognized by specialists. See PHONETICS.

AS'PIRA'TOR (Lat. *ad*, to + *spirare*, to breathe). An apparatus for drawing off air or other gases. The simplest form of aspirator consists of a tight receptacle filled with water, provided with a stopcock at each end. With both cocks open, the escape of the water draws the gas into the receptacle. A similar instrument is used by surgeons to draw fluid from a cavity.

AS'PIRIN. Acetyl-salicylic acid. An unofficinal salicylate, thought to be more efficient than others and to cause less gastric disturbance because it passes through the stomach unchanged and liberates its salicylic acid in the intestine. It is a white powder, soluble in 100 parts of water. It is employed in rheumatism, gout, tonsilitis, pleurisy, chorea, neuralgia, and multiple neuritis.

ASPÍROZ, ȧs-pē'rōs, MANUEL DE (1836–1905). A Mexican statesman and diplomat. He was born at Puebla and graduated in 1855 at the University of Mexico. He fought in the war

against the French. Upon the capture of Maximilian he was appointed "fiscal" in the council of war chosen to try the Emperor. In this capacity he drew up the accusations and took the evidence against Maximilian. In 1867 he was appointed Assistant Secretary of State for Foreign Affairs in the newly established republic. From 1873 to 1875 he was Mexican Consul at San Francisco and in 1875 was elected to the Senate. He was professor of law in the College of Puebla from 1883 to 1890; again became Assistant Secretary of State for Foreign Affairs in 1890; and in 1899 succeeded Señor Romero as Mexican Ambassador to the United States. This post Aspíroz held for the six years preceding his death. Throughout his services in Washington his relations with the Austrian Ambassador were confined to official transactions, as the Austrian court held him responsible for the fate of Maximilian, the brother of the Emperor Francis Joseph. His works include *Código de extranjería de los Estados-Unidos Mexicanos* (1876) and *La libertad civil como base del derecho internacional privado* (1896).

ASPLE'NIUM (Gk. *ἀσπλήνον, asplēnon,* spleenwort, from *ἀ, a* euphonic + *σπλήν, splēn,* spleen). A genus of ferns of the family Polypodiaceæ. The species are numerous, there being about 200, widely diffused both in the Northern and Southern hemispheres. Many of them are of great beauty; and the small size of some recommends them to cultivators of ferns who find themselves much limited as to space. The species of this genus may be readily recognized by their free veins and their elongated sori, which are covered by the indusium. Some of the species bear the English name "spleenwort," as *Asplenium trichomanes, viride, adiantum-nigrum,* etc., having been formerly supposed efficacious in removing obstructions of the viscera. They have now fallen completely into disuse, but were at one time very much employed, principally in the form of sirupy decoctions. Some of them, as *Asplenium trichomanes* and *Asplenium adiantum-nigrum,* are frequently called "maidenhair spleenwort." At least a dozen species are met with in the eastern United States, of which the tall-growing ones, 1 to 4 feet high, *Asplenium filix-fœmina, Asplenium angustifolium,* and *Asplenium thelypteroides* are the best known. They are often cultivated, especially the first named, of which there are said to be at least half a hundred varieties. See Plate of FERNS.

ASPRAMONTE, äs'prä-mōn'tâ. An Italian epic poem founded on the traditional defeat of the Saracens by Charlemagne near a place called in the legend "Asparamonte." Its author is unknown, but it was published in 1516, at Milan, a year after *Orlando Furioso.*

ASPROMONTE, äs'prô-mōn'tâ (It. steep mount). A steep gneissic mountain ridge, over 30 miles long, near Reggio, in southwest Italy, abutting on the Strait of Messina (Map: Italy, K 9). It rises 6365 feet above the sea and is famous on account of the defeat and capture of Garibaldi by the forces of Victor Emmanuel, Aug. 29, 1862, which took place near it.

ASPROPOTAMO, äs'prô-pŏt'â-mô. See ACHELOUS.

ASQUITH, HERBERT HENRY (1852—). A distinguished lawyer and statesman, Prime Minister of Great Britain. He was born in Yorkshire, graduated from Oxford, and shortly afterward admitted to the bar. In 1887 Asquith was chosen to defend Mr. John Burns for his participation in the so-called riot at Trafalgar Square, and two years later he took a prominent part as counsel before the Parnell Commission on behalf of the Irish Nationalists. Becoming a member of Parliament, he quickly won the favor of Gladstone, and in 1892 he was promoted to the post of Home Secretary. His activity and effectiveness during the Home Rule debates made him the most conspicuous figure in the House. The position he assumed during the labor troubles of 1893 led to his appointment as an arbitrator of the strike of the London cabmen in 1894. In 1894 he drew up the bill providing for the disestablishment of the Church of Wales and supported that measure until it was rejected by the House. In 1895, with the defeat of the Liberals, he resigned his cabinet position, but continued in Parliament as a member of the Opposition. During the period of Conservative ascendency (1895–1905) his reputation steadily increased. Throughout the Boer War he stood steadily by the government, but with the raising of the protectionist banner by Chamberlain in 1903, he came forward as a defender of free trade. Among those who helped turn the Conservatives out of office in 1905 none took a more active part than he, and in the newly formed Liberal Ministry of Sir Henry Campbell-Bannerman he became Chancellor of the Exchequer, and, owing to the enfeebled health of the Prime Minister, the virtual head of the British government. The only bill of prime importance to be passed by the Upper House at this period was that providing for old-age pensions, a bill he presented in person as Chancellor of the Exchequer.

In 1908 Asquith became Prime Minister, and the formulation of the Liberal reform programme was immediately accelerated. The list of reform measures presented was a long one, including the famous Lloyd George budget (1909), the Parliament Act (1911), the Insurance Act, and the Irish Home Rule Bill. (See UNITED KINGDOM, *History.*) All of these proposals received Asquith's hearty approval, but the one which was passed under his especial guidance was the Parliament Act, which, in shearing the House of Lords of its veto power, virtually revolutionized the Constitution of Great Britain. The immediate cause of the passage of this act was the unprecedented rejection by the House of Lords of the budget of 1909; the underlying cause, the persistent refusal of the Lords for more than 50 years either to democratize their membership or to permit the House of Commons to enact long-delayed and much-needed social legislation.

Asquith, incensed by the Lords' rejection of the budget, obtained the King's consent to create a sufficient number of new peers to pass it and advised a general election, which took place in January, 1910. The government was sustained. The Commons again passed the budget and the Lords yielded their assent without a division. Asquith's opponents charged him with imposing upon a new and inexperienced King, overturning the work of the Magna Charta, and making himself simply a phonograph for radicalism. In addition, the more extreme members of the Labor party accused him of truckling, while the rage of the British "suffragettes," because of his attitude toward them, knew no bounds. Asquith finally consented to permit an equal-suffrage amendment to the government's electoral bill of 1912 to be voted upon, with the distinct proviso that said amendment should not be considered

a government measure. Owing to a technical ruling by the Speaker, it became necessary to withdraw the entire bill. Asquith was forthwith accused of betraying the suffrage cause, nor were his critics content with verbal attacks; on several occasions he was assaulted. Mr. Asquith is not noted for his oratory; his personality is said to be cold and unmagnetic; his statesmanship is held by many to be neither brilliant nor original. But for long he controlled with tact the discordant elements in his own party and placated the Labor members and the Irish Nationalists. In May, 1915, after 10 months of war in Europe, a cabinet crisis resulted from disagreements, and Asquith announced that, unless the Liberals would accept complete defeat, a coalition must be formed. This was done, eight Unionists being admitted. Consult Elias, *The Rt. Hon. H. H. Asquith, M.P.* (London, 1909). See UNITED KINGDOM, *History*.

ASS (AS. *assa*, Goth. *asilus*, Rus. *oselŭ*, Lat. *asinus*, probably of Eastern origin; cf. Heb. *āthōn*, she-ass), or DONKEY, when domesticated. A member of the family Equidæ and genus *Equus*. Two species are recognized—one Asiatic and the other African. Asses resemble zebras in size, the presence of callosities on the fore legs alone, and the shortness of the hairs of the mane and tail. They differ from the zebras in color, in not having stripes (except as hereafter mentioned), and in having somewhat longer ears. Their colors are pale, and their voices are between the neighing of the horse and the braying of a donkey.

Asiatic Ass. The Asiatic asses are distributed over all the arid interior of Asia, from Syria to eastern Mongolia and northern India, although more restricted now than formerly by the encroachments of civilization. They were well known to the ancients, who called them *onager*, *hemionus*, etc., to which more recent writers have added confusing native names. There appear to be three species (or varieties, as some taxonomists are disposed to consider them), of these wild asses. One is the kiang, koulan, or dziggettai (*Equus hemionus*), of Tibet and Mongolia, which is the largest, reaching 4 feet in height at the shoulders. It is dark-reddish in color and has a narrow black stripe from (and including) the mane along the spine to the top of the tail; it inhabits mountains from 15,000 feet elevation up to the snow line. In adaptation to this environment its coat is thick and furry. The second is the ghorkhar, or onager (*Equus onager*), frequenting the plains of northwestern India, Afghanistan, and Baluchistan, which is smaller and paler, sometimes silvery white, and has a comparatively broad dorsal stripe. The third variety (*Equus hemippus*), less well marked, is the wild ass of Persia and Syria. All are white underneath and are likely to show obscure bars on the lower legs. This last-named ass, no doubt, is that known to the writers of the Old Testament, who use it as a type of wildness and freedom—"Whose house I have made the wilderness, and the barren land his dwellings. . . . The range of the mountains is his pasture" (Job xxxix. 6, 7, 8). It is, indeed, one of the freest, most agile, and perhaps the swiftest of wild quadrupeds. The kiang will rush over broken, rocky ground in an astonishing manner, and those of the plains are beyond the power of a single horseman to overtake. "In the Bakanir Desert the foals are captured during the summer by parties of mounted Baluchis, who, by relieving one another, hunt them till they fall from sheer exhaustion, when they are taken and bound." These foals bring high prices in India, but are kept more as curiosities than for service. Another plan is to lie in wait at night by a drinking place and then run the animals down when heavy with water; but their keen scent and wariness make this difficult. Among the Persians the pursuit of asses with greyhounds is a favorite sport, and their flesh is esteemed by many and said to resemble venison. The kiangs of the mountainous wilderness of Tibet are less shy and will often approach one closely, with manifest curiosity, and even mingle with the horses of a train or enter the camp. "The food of these wild asses," says Lydekker, "consists in the lowlands of different kinds of grasses, which are frequently dry; but in Tibet it is chiefly composed of various woody plants, which form the main vegetation of these arid regions. In the hills to the west of the Indus these animals are to be found wandering pretty well throughout the year; but in the early summer, when the grass and the water in the pools have dried up from the hot winds, the greater number, if not all, of the ghorkars migrate to the hills.

African Ass. The best known of the two species of African wild asses, the Nubian ass, is usually called *Equus africanus*, but the terms *asinus* and *taeniopus* have also been applied to it. It is very distinct from the Asiatic forms. It is larger than the Asiatic species, reaching 4 feet 8 inches, or 14 hands, in height, and in color is always bluish or else creamy, with no tinge of red; the muzzle, throat, and belly are white; and a dark stripe extends from the shoulders along the spine to the tail, and also down the withers, while the legs are barred; but the last two markings vary greatly. The ears are very long, and the mane and tail hairs are comparatively short and indistinct in color. This species ranges throughout the open regions of northeastern Africa, from Somaliland to the Red Sea, and westward throughout the desert, where its food and habits are much like those of the ghorkhar, except that its small troops do not congregate into herds. Sir Samuel Baker describes them in western Abyssinia as follows:

"Those who have seen donkeys in their civilized state have no conception of the wild and original animal. Far from the passive and subdued appearance of the English ass, the animal in its native desert is the perfection of activity and courage; there is a high-bred tone in the deportment, a high-actioned step when it trots freely over the rocks and sand with the speed of a horse. When it gallops freely over the boundless desert, no animal is more difficult to approach; and although they are frequently captured by the Arabs, those taken are invariably the foals, which are run down by fast dromedaries, while the mothers escape."

The rarer Somaliland ass (*Equus somalicus*) is grayer, lacks the shoulder stripe, but shows numerous cross stripes on the legs.

The Donkey. The domestic ass is undoubtedly, in its origin, the tamed African species (*africanus*). Its prevailing color is gray, varying to pure white or full black, and with the shoulder stripes and leg bars more or less preserved. It was known in Egypt long before the horse and probably was first domesticated in that region, where it is still a favorite ani-

mal, not only for riding, but for its milk; nevertheless, it is said to have been hated and abused by the ancient Egyptians in their flourishing period, and the prejudice against it was carried among the Romans. From Judg. iv. 10 we learn that at a very early period the great were accustomed to ride upon white asses, and a preference is still given to white asses in the East. Fine large breeds exist at the present day in Syria and Turkey. In Europe choice breeds are to be found in Italy, Malta, and especially in Spain. The animal seems not to have come into general use in Great Britain until after the time of Elizabeth, and now is chiefly employed there by peddlers and the poor, or for children's carriages. Its price is scarcely one-twentieth that of a good horse, and it can be kept at one-fourth of the expense, delighting in the coarse herbage which other animals reject and satisfied with comparatively scanty fare. The obstinacy ascribed to the ass seems to be very generally the result of ill treatment; and proverbial as it has become for stupidity, it is probably quite equal in intelligence to the horse. It was early brought to America, and the finest donkeys in the world are now said to be those in the United States, where some 60,000 are owned upon farms, chiefly in the southern central States, and used for the propagation of mules and hinnies (see MULE), the useful hybrids between the ass and the horse. Consult V. Hehn, *Wanderings of Plants and Animals*, Eng. trans. by Stallybrass (London, 1891).

The milk of the ass contains more sugar of milk and less caseine than that of the cow, and is therefore recommended as a nutritious diet in cases of weak digestion. Its usefulness in cases of consumption has long been known, and it was often prescribed as a kind of specific when that disease was treated on principles very different from those which now regulate its treatment. In some parts of the Sudan large herds of she-asses are kept solely for milking.

The leather called shagreen is made by a peculiar process from the skin of the ass, which also affords excellent leather for shoes and the best material for drums. The bones of the ass, which are very solid, were used by the ancients for making flutes. Consult Osborn, *New York Zoölogical Society Bulletin*, No. 55 (New York, 1913). See Colored Plate of HORSES and Plate of EQUIDÆ.

ASS, FEAST OF THE. A religious carnival especially popular in northern France during the Middle Ages. It was of the nature of a parody on the service of the Church, but seems to have been instituted in good faith and without any intentional irreverence, to commemorate the biblical flight of Mary and her child into Egypt. It degenerated, however, into scurrilous indecency and was prohibited by the ecclesiastical authorities in the fifteenth century. It was variously celebrated in different places; thus, e.g., at Rouen it occurred shortly before Christmas and consisted in the representation of a little farce, in the principal scene of which Balaam's ass appeared before the altar of the cathedral (hence the name "Feast of the Ass") and uttered a prophecy of the early coming of Christ. See ABBOT OF JOY.

ASSAB, ȧs-säb′, or **SABA,** sä′bȧ. A sheltered bay and town in Eritrea, on the African coast, near the south end of the Red Sea (Map: Africa, J 3). The bay is about 16 miles long by 5 miles wide, and about 50 feet deep at Busna, the main anchoring place. Together with two small islands in front of it, Assab was ceded to the Italian government, in 1881, by an Italian steamship company, which had acquired it in 1869. The town of Assab is at the entrance to the bay, has a population of 5000, and is the export centre of the products of the Danakil coast, hides, pearls, and mother of pearl.

ASSAFŒTIDA. See ASAFŒTIDA.

ASSAI, ȧs-sī′ (from the native Brazilian name of the palm tree). A beverage much used at Pará and other places on the Amazon. It is prepared from the fruit of certain species of palm nearly allied to the cabbage palm of the West Indies. (See ARECA; CABBAGE PALM.) The assai palms are remarkably slender trees, the most common species (*Euterpe edulis*) rising to the height of 60 or 80 feet, with a smooth stem only about 4 inches in diameter. The fruit is small, but is produced in great quantity upon branched spadices, which are thrown out horizontally beneath the crown of leaves. It consists of a hard seed, with a very thin covering of a firm pulp or flesh. The tree grows in swamps flooded by the high tides. Warm water is poured upon the fruit; and by rubbing and kneading, a liquid is procured, consisting simply of the pulp of the fruit and water, which is constantly sold in the streets of Pará, and of which the inhabitants are extremely fond. This is assai. It is a thick, creamy liquid, of a purplish color, and a flavor like that of a freshly gathered nut. It is commonly used with the bread made from manioc, called farina, and either with or without sugar. The stem of the assai palm is sometimes used for poles and rafters, and its terminal bud as a cabbage or as a salad with oil and vinegar; but it is too much valued upon account of its fruit to be often cut down for these purposes. Another species, *Euterpe catinga*, is found in forests of a dry, sandy soil and very peculiar vegetation, known as catinga forests. The beverage made from it is sweeter than the common kind, but the product of the tree is much smaller.

ASSAL, ȧs-säl′. An important salt lake in the east of Africa, near the head of the Bay of Tajura, French Somaliland. It is over 8 miles in length and 4 miles broad, and its surface is over 530 feet below the sea level. Its shores are covered with salt, which is exported in considerable quantities to Abyssinia.

ASSAM. A province of British India, lying northeast of Bengal and bordering on China and Burma. In October, 1905, it was amalgamated with 15 districts of northern and eastern Bengal to form the province of Eastern Bengal and Assam. Prior to this amalgamation the area of Assam was 61,682 square miles, including the native State of Manipur (8456 square miles); and the population, including Manipur, was 6,126,343, according to the census of 1901. The area of the new province, Eastern Bengal and Assam, was 111,569 square miles, of which 12,542 square miles were included in the native states of Manipur and Hill Tipperah; and the total population, adjusted to the 1901 census, was 30,961,459, of whom only 457,790 were in the two native states. On April 1, 1912, Eastern Bengal and Assam ceased to exist as a political division, and Assam again became a separate province, under a chief commissioner. The area of the new province of Assam is stated at 61,471 square miles, and the population (1911 census)

7,059,857; these figures include Manipur state, with 8456 square miles and 346,222 inhabitants. The population is almost wholly rural. The province of Assam falls into three natural divisions: the valley of the Surma, the valley of the Brahmaputra, or Assam proper, and the intervening range of hills. Among the mountain districts are the Garo Hills, the Khasi Hills, and the Jaintia Hills. The streams are abundant, and the lower lands often suffer inundations. The annual rainfall is copious, but sometimes unfavorably distributed; in some sections it is perhaps the heaviest on the globe; at Sylhet, in the Surma valley, the annual average is 157 inches, and 458 inches at Cherapunji, where, in 1861, 905 inches are said to have fallen, of which 503 inches were recorded in June and July. The atmosphere is consequently extremely humid, but at no period of the year is the heat excessive. The frequent occurrence of earthquakes is a great hindrance to the development of the region. A large portion of the country is covered with jungle, in which elephants, tigers, leopards, rhinoceroses, bears, wild dogs, wild hogs, and other wild beasts are found in abundance. Large deposits of coal, iron, and petroleum are known to exist, but only the first is exploited to any extent. The soil is mostly very fertile, and the extensive forests contain numerous useful woods. The tea plant is indigenous, and tea culture has grown rapidly. The area under tea is over 300,000 acres, and the plantations are owned largely by Europeans. In 1901 there were over 700,000 immigrants from other parts of India employed as coolies in tea gardens in Assam. The great staple of agriculture is rice. The principal articles of export are rice, tea, silk, cotton, rubber, ivory, and gold. The commerce is mostly in the hands of the Jains.

The Assamese, or Ahoms, are probably a Hindu-Shan (Mongolian) mixed stock, with the Hindu element predominant. They are short and thickset, with coarse black hair and Mongoloid face. The two main indigenous languages are Bengali, spoken by 48 per cent of the population in 1901, and a sister language, Assamese, spoken by 22 per cent; altogether 167 different languages and dialects were reported. The Assamese literature is extremely scanty. The country contains a number of primitive peoples, especially the Lushai, accounts of whose language, customs, folk tales, etc., were published in 1894 and 1912 by John Shakespeare, an English army officer. In religion nearly three-fifths of the people of Assam are Hindu, about one-fourth Mohammedan, and one-sixth animist.

Consult: Hunter, *Statistical Account of Assam* (London, 1880); Reid, *Chin-Lushai Land* (Calcutta, 1894); Brown, *Grammatical Notes on the Assamese Language* (Nowgong, 1893); Bronson, *Dictionary in Assamese and English* (Sibsagor, 1867); Grierson, *Specimens of the Bengali and Assamese Languages* (*Linguistic Survey of India*, vol. v, part i, Calcutta, 1903); Gait, *History of Assam* (Calcutta, 1906); article "Assam" in *Imperial Gazetteer of India* (Oxford, 1908).

ASSAS'SINATION. The act of taking the life of any one by surprise or treacherous violence, either by a hired emissary, as in the case of political plots, or by a fanatic who hopes to further his ideas through the death of his victim, as in the case of anarchists in recent times. Generally the term is applied to the murder of a public personage by one who aims solely at the death of his victim. In ancient times assassination was not unknown, and was often even applauded, as in the scriptural instances of Ehud and Jael, and in the murder of Hipparchus by Harmodius and Aristogiton. The following list includes the most important assassinations: Philip of Macedon, 336 B.C.; Julius Cæsar, 44 B.C.; Thomas à Becket, 1170; Albert I, Emperor of Germany, 1308; James I of Scotland, 1437; Alessandro de' Medici, 1537; Cardinal Beaton, 1546; David Rizzio, 1566; Darnley, 1567; James, Earl of Murray, Regent of Scotland, 1570; William of Orange, 1584; Henry III of France, by Jacques Clément, 1589; Henry IV of France, by Ravaillac, 1610; Villiers, Duke of Buckingham, by Felton, 1628; Wallenstein, 1634; Archbishop Sharp, 1679; Gustavus III of Sweden, 1792; Marat, by Charlotte Corday, 1793; General Kléber, at Cairo, 1800; Paul, Czar of Russia, 1801; Perceval, English premier, by Bellingham, 1812; Kotzebue, the dramatist, 1819; Duc de Berry, 1820; Charles III, Duke of Parma, 1854; Abraham Lincoln, by Booth, 1865; Michael, Prince of Servia, 1868; Marshal Prim, 1870; Georges Darboy, Archbishop of Paris, by communists, 1871; Earl of Mayo, Governor-General of India, 1872; Abdul Aziz, 1876; Alexander II, Czar of Russia, 1881; President J. A. Garfield, at Washington, by Guiteau, 1881; Lord Frederick Cavendish and T. H. Burke, at Phœnix Park, Dublin, 1882; President Carnot of France, at Lyons, 1894; Stefan Stambuloff in Sofia, Bulgaria, 1895; Empress Elizabeth, of Austria, at Geneva, by an anarchist, 1898; King Humbert I, of Italy, at Monza, by an anarchist, Bresci, 1900; President William McKinley, at Buffalo, N. Y., 1901; M. von Plehve in St. Petersburg, 1904; Grand Duke Sergius in Moscow, 1905; M. Petkoff, Premier of Bulgaria, 1907; General von der Launitz, St. Petersburg, 1907; General Pavloff, St. Petersburg, 1907; Carlos I of Portugal, in Lisbon, 1908; Prince Ito, at Harbin, Manchuria, 1909; Premier Stolypin in Kieff, 1911; Premier Canalejas of Spain, in Madrid, 1912; King George I of Greece, in Salonica, 1913; Mahmud Shefket Pasha, Grand Vizier of Turkey, in Constantinople, 1913. Consult Johnson, *Famous Assassinations* (Chicago, 1903). See ASSASSINS.

ASSASSIN-BUG. A bug of the bloodsucking family Reduviidæ. See CONE-NOSE; INSECT, *Poisonous Insects*.

ASSAS'SINS (Fr. *assassin*, OF. pl. *hassasis*, from Ar. *hashashin*, pl. of *hashash*, hashish-eater). A secret order of Islam, partly religious and partly secular in character, and an offshoot of the sect of Ismaili, which was in turn a branch of the great Shiite faction. The members of the Order of Ismaili derived their name from Ismail, a descendant of Ali, in whose line they considered the religious headship of the Mohammedan world to be rightfully vested. They united to this tenet the belief in the moral indifference of all actions and in the worthlessness of popular religion. Toward the middle of the eleventh century Hassan ben Sabbah, a Persian of gifted mind and energetic character, came to Cairo and attained a high rank among the Initiated of the Ishmaelite Order. Political reasons forced him to flee to Persia. In 1090 he acquired the fortress of Alamut, in the district of Rudba, and made it the home of a new organization, whose principles were in the main those of the Ismailites, with the addition of a

new feature, namely, the practice of the secret assassination of all enemies of the order. At the head of the new organization stood an absolute ruler, the Sheik-al-Jebal, or, as he became known in mediæval folk-lore, "The Old Man of the Mountain." Below him were three deputy-masters, in the provinces of Jebal, Kohistan, and Syria. Next in rank were the Dais, or Initiated, and the Refiks, or Students, who were only partially acquainted with the secrets of the order, but were graduated in time into the rank of Dais. Below these came the active members of the order, the Fedavis, or Fedais, meaning 'The Devoted Ones,' young men who were kept in absolute ignorance of the teachings of the order, but from whom complete obedience was expected. These were the blind instruments in the work of assassination planned by the leaders. Before they were assigned to their tasks these youths were stupefied by means of *hashish*, or the hemp plant, and while in an ecstatic condition they were plunged into all the pleasures of the senses as a foretaste of the bliss which awaited them in Paradise if they should faithfully execute the commands of their superiors. But the word *hashashin*, or hemp-eaters, was changed by the Europeans into *assassins*, and acquired the common meaning of murderers, which it bears at present. The novices, mechanics, and laborers formed the sixth and seventh classes of the order, and upon them the observance of Islam was strictly enjoined, though the Initiated were exempted from its precepts. For 150 years the Order of Assassins held Asia Minor and Persia in terror. More than one caliph fell a victim to their knives. Princes paid tribute to the "Old Man of the Mountain," and the services of his followers were even hired by contending political factions. In all, there were six Grand Masters of the order besides Hassan, who died in 1124. Of these, Hassan II, in 1163, extended the secret privilege of the Initiated (that is, exemption from the precepts of religion) to the people generally, and abolished Islam in his dominions; but he was speedily assassinated, and under his grandson, Hassan III, the old institutions were restored. Under Mohammed II, the Deputy Grand Master of Syria made himself independent, and during the wars of the Crusades, wielded a terrible power. The murder of Conrad of Montferrat and other distinguished victims of assassination was attributed to him. The Mongol rulers of Persia broke up the order in 1255. The Syrian branch was put down by the Mameluke Sultan Bibars; but remnants of the sect lingered in Kohistan, and are said still to exist in different parts of India, Persia, and Syria.

Consult: Hammer-Purgstall, *Geschichte der Assassinen* (Stuttgart and Tübingen, 1818); F. Walpole, *The Ansayrii, or Assassins* (London, 1851); Heckethorn's *Secret Societies of All Ages and Countries* (New York, 1897), which contains much curious information, but is ill-digested and unreliable; Bliss, *The Religions of Modern Syria and Palestine* (New York, 1912); Guyard, *Fragments rélatifs à doctrine des Ismaélis* (Paris, 1847–77).

ASSAULT' (Lat. *ad*, to, at + *saltare*, to jump, leap). A military term signifying 'to attack.' Until very recent times troops would be told off to assault a fortified post, or position, being divided into three divisions: "storming parties," "supports," and "firing parties." It has always been a costly undertaking, now more so than ever, owing to the modern guns and magazine rifles with which all armies are equipped. In the assault on the fortified lines of the Confederate army at Cold Harbor (1864), in the Civil War, General Grant lost some 8000 men in about 15 minutes. The great losses suffered by the British in the Boer War of 1899–1902 were inflicted during the attack on the Boer *kopjes;* and the losses of the Japanese in their repeated assaults on Port Arthur were unparalleled. See ATTACK.

ASSAULT AND BAT'TERY (Fr. *batterie*, from *battre*, to beat, batter). An infringement of the common-law right to personal safety and freedom. The words "assault" and "battery" are commonly used together, for the reason that the two offenses which they indicate are usually committed together. But the offenses are separate and distinct.

An assault is an attempt or offer to inflict bodily injury upon another, accompanied by such circumstances as denote, at the time, an intention, coupled with the present ability, to do violence to the person. Battery is the actual infliction of threatened violence, the consummation of an assault. Mere words of abuse will not constitute an assault; nor will a threat or offer to do violence, when it clearly appears that he who makes the threat or offer has no intention or no present ability to carry it into execution. But an *actual* intent or an *actual* present ability to injure the person is not necessary. It is sufficient that these are apparent and that the circumstances are such as to cause the person threatened to believe, on reasonable grounds, that such apparent intent and ability are real. Thus the pointing of an unloaded gun at a person who is ignorant of the fact that it is not loaded, the circumstances indicating an intention to shoot, will amount to an assault. The least touching of another's person in anger or willfully or negligently, whether with the hand or with a stone or other weapon, is a battery.

To use, or to attempt or offer to use, violence upon the body of another is in some cases justifiable. Thus a father or a schoolmaster may chastise a child, within proper bounds and in the process of rightful discipline. So a person is justified in using all necessary means, even though obliged to resort to force, to protect and defend his person, the person of his servant, or of one of his family, or his real or personal property. The force employed in defense, however, must be no greater than the emergency requires; for any excess of violence the person using it will be responsible, as for an assault and battery.

Assault and battery are both civil and criminal offenses. As civil wrongs they are classified under the head of torts, and subject the wrongdoer to an action for damages; and as crimes, under that of misdemeanors. Certain criminal assaults are known as aggravated assaults and are followed by a more severe punishment. Such are assaults with intent to kill or with intent to commit rape, and assaults upon magistrates in courts of justice, with knowledge of the official character of the persons assaulted. See the authorities referred to under CRIMINAL LAW; TORTS.

ASSAYE, âs-sī'. A village 261 miles northwest of Hyderabad, south India, lat. 20° 18′ N., and long. 75° 55′ E., 43 miles northeast of

Aurangabad (Map: India, C 4). It claims notice chiefly as the scene of the first great victory of the Duke of Wellington, then Major-General Wellesley, won on Sept. 23, 1803. The British troops in action were about 9500, while the Mahrattas, under Scindia and the Rajah of Berar, numbered 50,000, of whom 10,000 were commanded by French officers. Ninety-eight pieces of cannon, seven standards, all the baggage, and a large part of the ammunition of the Mahrattas fell into the hands of the conquerors, whose casualties numbered 1560 in killed and wounded. The loss of their opponents was 12,000.

ASSAYING (OF. *assai*, Lat. *exagium*, a weighing, weight; *exigere*, to drive out, examine, from *ex*, out + *agere*, to drive, lead, guide; cf. *examen*, for *exagmen*, and *exact*). In its widest meaning, the term includes all those operations of analytical chemistry which have for their object the determination of the value of ores and their metallurgical products. In its more limited meaning, assaying is the process employed in determining the proportion of gold and silver in ores, coins, silver and gold plate, jewelry and other commercial alloys of the precious metals. In Great Britain each article of gold or silver is assayed at the Goldsmith's Hall previously to being sold, to determine its standard of purity, and at the various mints of the United States and foreign governments the bullion received for coinage is assayed for a similar purpose. Two general methods are employed for assaying metals and metal-bearing ores, which are commonly known as the wet method and the dry method. To the dry method belongs fire-assaying, and to the wet method belongs gravimetric and volumetric analysis, including colorimetric determinations. Any attempt to define or explain these methods of analysis without technicalities, understood only by the chemist, is always somewhat disappointing, but the following definitions will give a general notion of what is meant in each case.

Fire-assay Determinations involve the separation of the metal sought from the other constituents of the ore or alloy by the aid of heat and suitable fluxes to form a slag with the foreign matter, and its estimation by weighing in a state of purity. To illustrate, if the object is the determination of lead in an ore, the ore is mixed in a crucible with suitable fluxes and fused; the lead is returned to the metallic state, in which condition it is readily detached from the slag for weighing, the various non-metallic elements present in the original ore combining with the materials in the flux and forming new substances.

Gravimetric Determinations involve the separation of the substance sought from the other constituents of the ore, and its estimation by weighing the substance either in a state of purity or as a constituent of a chemical compound whose composition is accurately known. To illustrate, if the object is the determination of lime in a mineral, the latter may be treated in such a manner that the ultimate product of the treatment is pure lime, which can be weighed direct; or the treatment may be such that the product is calcium sulphate, whose weight may be determined, and as this salt is of invariable composition the contained lime can be readily calculated.

Volumetric Determinations are those which involve the separation of the substance to be determined from all interfering constituents of the ore, and the final measuring of the quantity of a solution necessary to complete a certain chemical reaction; or, as in the case of colorimetric determinations, by measuring the color imparted to a definite quantity of the liquid by the constituent sought, in comparison with the color imparted to the same quantity of water, or other suitable fluid, by a known quantity of the constituent sought. Fire-assaying was formerly applied to gold, silver, copper, tin, and lead ores, but in recent years has been applied only to gold-silver ores and alloys of gold and silver, determining one or both metals from the same sample; in gravimetric analysis, frequently several or all of the constituents are determined from one sample; and in volumetric analysis a separate sample is often taken for each determination. To save time or when large numbers of samples are to be analyzed for the same ingredients it is customary to make more than one determination on each sample tested.

Sampling. The first operation in making an assay is to obtain a sample which represents in every respect the original material. In ore sampling the same percentage of coarse and fine ore as contained in the original lot should enter the sample, as the percentage of metal contained in the fine is generally higher than that contained in the coarse. Great care should be exercised, and one who is not thoroughly familiar with ores, metals, and the theory of sampling should not attempt to obtain an average sample for assay. Sampling may be subdivided under the two heads of ore sampling, and sampling of metallurgical products. Ore sampling may be done either by hand or machinery. The common method of hand sampling is known as coning and quartering. The method is as follows: As the ore is unloaded from the cars every third, fifth, or tenth shovelful, depending on the size, quantity, and value of the ore, is taken indiscriminately and thrown into a wheelbarrow as a sample. This sample is crushed to the proper size and shoveled into a conical pile. The coarse ore rolls down the sides and the fines, which are usually high grade, remain on the apex of the cone. If the location of the apex is changed a few inches from the centre during this process, the resultant sample will not be an average. The cone is then flattened into a circular cake working the pile down from the periphery and gradually advancing toward the centre containing the fine rich ore. In this operation the sample can be vitiated by unequal distribution of the fines. The cake thus formed is then divided diametrically into quarters, separated, two diagonal quarters rejected, and the two remaining diagonal quarters selected for a sample. These operations of coning and quartering are repeated several times, the ore being crushed between the several operations when necessary to obtain the proper size of ore, relative to the weight of the sample, until the resultant sample weighs from 10 to 50 pounds. The size of this ore should be under ¼ inch, depending on its character. From this point the weight of the sample is reduced by riffling, crushing to finer sizes when necessary between the operations. When the weight of the sample is reduced to about one pound, it is customary to pulverize it until it will fall through a screen of from 60 to 100 meshes to the inch, thoroughly mix, and separate into four samples. This powdered sample of ore is called

pulp. The samples, weighing about four ounces each, are placed in paper sample bags and sealed. If the work is being performed for a public smelter one sample goes to the buyer, one to the seller, and two are marked for umpiring in case of a dispute on the results. This method cannot be recommended, as it is exceedingly difficult to obtain by hand an average sample from the original ore shipped.

In most large smelting plants the sampling and preparing of the pulp are now done entirely by machinery.

Metallurgical products are sampled either by drilling, or dipping from the molten metal. Dip samples of bullion are more accurate than drillings, on account of the segregation of values which takes place in cooling when bullion is cast into bars.

When a sample is submitted to an assayer for analysis a preliminary examination with a magnifying glass, blowpipe, and sometimes qualitative tests, are made to determine its character and general composition. The formal analysis is then undertaken. The laboratory apparatus necessary for general assaying is quite extensive, consisting of a large variety of chemicals, balances, crucibles, cupels, furnaces, beakers, etc. A different mode of procedure is adopted in assaying different metals, and for illustration the method of assaying gold and silver by the fire-assay, and of silver by gravimetric analysis, will be described, the reader being referred to special treatises on assaying, metallurgy, and chemistry for details of the processes employed for other metals.

Assaying Gold and Silver Ores. Gold and silver generally occur together in ores, and such ores are universally determined by fire-assay, either by means of scorification or by the crucible method. If the ore contains volatile materials such as antimony, arsenic, etc., it should be assayed by scorification. If the ore is free from volatile materials it is usually assayed by the crucible method, which permits a much larger amount of ore being taken, thereby reducing errors in weighing the resultant button of gold or silver. The American practice is to use assay-ton weights where 1 milligram of gold or silver obtained from 1 assay-ton of ore represents 1 ounce of gold or silver per ton of 2000 pounds. This system of weights was devised by Prof. Charles F. Chandler to reduce assay computations. The fire-assay consists essentially in the collection of the gold and silver in a button of metallic lead. Large buttons tend to cause loss in cupelling and small buttons are liable not to collect all of the gold and silver in the sample. The lead button is freed from adhering slag, hammered into the form of a cube for convenience in handling, and cupelled; resulting in a button of gold and silver.

In the scorification assay the charge consists of a mixture of from 20 to 50 grams of granulated lead, from .1 to .4 assay-ton of ore dependent on the character, and about 1 gram or less of borax glass. This charge is placed in a scorifier, a shallow, unglazed, earthenware saucer, and covered with from 20 to 50 grams of granulated lead. The scorifier containing the charge of ore covered with lead is then placed in a muffle furnace, melted, oxidized by permitting a current of air to pass through the furnace, and fused until the slag, formed by the combination of the oxide of lead and silica of the ore, forms a covering over the molten lead which now contains the gold and silver that was in the original ore. This is poured into an iron mold, cooled, and the lead separated from the slag for cupelling.

In the crucible assay various charges are used, depending on the character of the ore. Sulphide ores require less litharge and may require the addition of iron and nitre to the charge. Ores containing copper require large amounts of litharge to hold the copper in suspension or solution in the slag. The common fluxes used in the crucible assay are: litharge, bicarbonate of soda, potassium-carbonate, borax glass, iron in the form of nails, nitre, flour, and silica. The crucible charge consists of a mixture of from ½ assay-ton to 2 assay-tons of ore and from 2 to 3 times as much flux. This mixture is placed in a fireclay crucible, covered with salt or borax, placed either in a muffle or pot furnace, heated slowly for half an hour to drive off the gases produced from the chemical reactions, and then heated at a high temperature for half an hour to form a complete fusion. The litharge, reduced to metallic lead, collects the gold and silver, and settles to the bottom of the crucible. The contents can be poured into an iron mold while hot or the crucible withdrawn from the furnace and allowed to cool. The lead containing the gold and silver is separated from the slag preparatory to cupellation.

Cupellation is conducted as follows: the cupel, a small basin-shaped vessel made of bone-ash, is placed in a muffle furnace thoroughly heated; the lead button is placed in the cupel, melted, and oxidized by the air passing through the furnace; the oxide of lead produced is either volatilized or absorbed by the cupel. Just before the last traces of lead are removed the melted button exhibits a play of color, darkens, and finally brightens, which is the completion of the operation. The cupel is taken from the furnace, cooled, the button removed, cleaned of adhering dirt, and weighed for gold and silver.

The gold is separated from the silver by *parting,* which consists of dissolving out the silver in a hot dilute nitric acid. To accomplish this it is necessary for the gold-silver button to contain at least 2½ times as much silver as gold. If the ratio is less, the gold-silver button is wrapped in lead foil with a piece of pure silver and re-cupelled. The resultant gold, after the silver has been dissolved, is black and must be washed, dried, and annealed by heating to redness. After cooling, the gold button is weighed and the amount deducted from the weight of the gold-silver button.

Assaying Silver Bullion. Silver bullion may be assayed by cupellation with lead, as explained above, the process being exactly as described for gold and silver ore, except for the preliminary scorification or fusing. The method of assay for silver bullion adopted by the United States mints and assay offices, and in the mints of most foreign countries, is volumetric analysis. Briefly described, this consists in dissolving the silver compound in nitric acid and then adding sodium chloride (common salt) solution, which insures the precipitation of the chloride of silver. The salt solution is made of definite strength, and is poured out of a graduated vessel until further precipitation of the silver ceases, when the amount of salt solution used is read off the graduated vessel, and by a simple calculation its equivalent in pure silver is determined.

Assaying Gold Bullion. The assay of gold bullion requires the removal first of the base metals, and second of the contained silver. The base metal is removed by cupellation with lead, as described above, leaving a button of gold and silver. The silver is then removed from the gold by solution in nitric acid, the gold remaining behind in an insoluble state, when it is annealed and weighed. The mode of assaying gold described cannot always be followed out in the examination of jewelry and other manufactured articles, as, though only a few grains are required for the assay, yet the removal of such might entail the destruction of the article, and in such circumstances the *touch-stone* is resorted to. This stone was originally brought from Lydia, in Asia Minor, and consisted of a cross-grained quartz saturated with bituminous matter, but black basalt and other stones are now employed for the same purpose. The manner of using the stone is to draw a streak upon it with the auriferous article and on each side to draw similar streaks with gold points of known value; from the color of the streaks the richness of the gold can be very accurately determined by the practiced assayer. The subsequent action of nitric acid on the golden streaks serves also as a means of determining the purity of the metal, as the acid readily dissolves the copper and silver and leaves the gold. The assay of gold-silver ores is always reported in Troy ounces per ton of 2000 pounds. The value of gold is $20.67 per Troy ounce. The assay of gold-silver bullion is always reported in fineness or the number of parts of metal in 1000 parts of bullion. Jewelers report the fineness in karats or the number of parts in 24. Gold marked 18 kt. should contain 75 per cent of gold and should be 750 fine. Consult: Low, *Technical Methods of Ore Analysis* (New York, 1905, 5th ed., 1911); Ricketts and Miller, *Fire-Assaying* (New York); Prest, *Manual of Chemical Analysis* (New York, 1905); Lodge, *Fire-Assaying* (New York, 1904; 3d ed., 1911); Aaron, *Assaying* (2 vols., San Francisco, 1906); Fulton, *Manual of Fire-Assaying* (2d ed., New York, 1911).

ASSAY' OF'FICE. A government bureau where gold and silver bullion is purchased, sold, assayed, and refined, but no coin produced. (See ASSAYING.) The assay offices of the United States are included in the Mint Service of the Treasury Department, and are located at New York; Charlotte, N. C.; Deadwood, S. D.; Helena, Mont.; Boise, Idaho; Salt Lake City, Utah; Carson, Nev.; New Orleans, La.; Seattle, Wash.; and at the coinage mints of Philadelphia, San Francisco, and Denver. From the gold and silver deposited at the mints and assay offices bars are manufactured which are graded as follows: Fine bars, mint bars, standard bars, and unparted bars. The value of all gold bullion, contained in original deposits at the mints and assay offices of the United States for 1912, amounted to $151,929,881. During 1911 the San Francisco Mint received the largest amount by weight, about 80 per cent coming from California and Alaska. Deadwood, Seattle, and Denver received large amounts in the order named. About 70 per cent of the gold received at Seattle during 1911 came from Alaska. Of the more important gold-producing countries, Alaska sends most of its production to Seattle and San Francisco; South Dakota to Deadwood; Nevada to Denver, San Francisco, Carson, and Salt Lake; California to San Francisco; and Colorado to Denver. The refining of bullion is carried on at the mints and the New York Assay Office. During 1912 the New York Assay Office received and refined more bullion than any one mint. For the enforcing of the stamping act governing the manufacture and sale of jewelry, marked with karat fineness, a large number of articles were assayed. The office was also called upon to make a large number of gold assays for the United States District Attorney. This office was established in 1854 in a building erected on Wall Street in 1823 for the Second National Bank of the United States, transferred to the Bank of the State of New York in 1836, and to the United States government in 1854. The building was vacated January, 1912, and the department moved to the refinery building in the rear pending the erection of a new and larger structure on the site of the old building.

Consult the *Annual Report* of the Director of the Mint. See MINT.

ASSE, ăs. A fennec. See CAAMA.

ASSEGAI, ă'sē-gā (Sp. *azagaya*, Ar. *az-zaghāyah*, from *al*, the + Berber *zaghāyah*, spear). A short spear used by natives of south Africa, especially the warlike Zulus and other Kaffir tribes, with a very thin shaft of hard wood of about 5 feet in length, and an iron blade secured by a strip of rawhide. When used for throwing, the blade is convex on one side and concave on the other, so as to transmit a rotary motion to it. A shorter form of the weapon with a very broad blade is used at close quarters for stabbing.

ASSEMANI, ăs'sē-mä'nē (Ar. AL-SAMANI), GIUSEPPE ALOYSIO (1710–82). Brother of Giuseppe Simone Assemani, and professor of Oriental languages in Rome. He published *Codex Liturgicus ecclesiæ universæ* (1749–60); *Commentaria de catholicis seu patriarchis Chaldæorum et Nestorianorum* (1775).

ASSEMANI, GIUSEPPE SIMONE (1687–1768). A Syrian Orientalist. He was born at Tripoli, Syria, and was educated at the Maronite College in Rome. During two journeys in the East, in 1717 and 1735, he collected a large number of Oriental manuscripts in Egypt and Syria for the library of the Vatican, of which he was the custodian. As a reward for his services, he was made titular Archbishop of Tyre. His principal works are: *Bibliotheca Orientalis Clementino-Vaticana* (4 vols., 1719–28); German abridgment, A. F. Pfeiffer, containing Syrian manuscripts in the library of the Vatican; *Opera Ephraëmi Syri* (6 vols., 1732–46); *Italicæ historicæ Scriptores* (4 vols., 1751–53); *Kalendaria Ecclesiæ Universæ* (6 vols., 1755–57); *Bibliotheca Juris Orientalis Canonici et Civilis* (5 vols., 1762–66).

ASSEMANI, SIMONE (1752–1821). An Oriental scholar, grandnephew of Giuseppe Simone Assemani. He was born at Tripoli, Syria, was educated at Rome, worked for some time as a missionary in Syria, and in 1785 was appointed professor of Oriental languages at Padua. His principal works are: *Museo cufico Naniano illustrato* (2 vols., Padua, 1787), an important contribution to numismatics; and *Saggio sull' origine, culto, letteratura, e costumi degli Arabi avanti Maometto* (Padua, 1787). He was one of the scholars who detected the fraudulent character of the *Codice diplomatico di Sicilia sotto il governo degli Arabi*, published in 1789–92 by Alfonso Airoldi, and claiming to be a

correspondence between the Arabic governors of Sicily and their sovereigns in Africa, translated by Giuseppe Vella, after the first volume of the pretended Arabic text had been published by Vella under the title *Kitab divan Misr* in 1793. See VELLA, GIUSEPPE.

ASSEMANI, STEFANO EVODIO (1707–82). A Syrian Orientalist. He followed the studies of his uncle, Giuseppe Simone Assemani, whom he succeeded as custodian of the Vatican Library. He was titular Archbishop of Apamæa and held several lucrative positions in Italy. His works include *Bibliothecæ Mediceo-Laurentianæ et Palatinæ Codd. Manuscr. Orientalium Catalogus* (2 vols., Florence, 1742) and *Acta ss. Martyrum Orientalium et Occidentalium* (2 vols., Rome, 1748), and a part of *Bibliothecæ Apostolicæ Vaticanæ Codd. Manuscr. Catalogus* (3 vols., Rome, 1756–69), which he wrote in conjunction with his uncle.

ASSEM'BLY (Fr. *assemblée,* ultimately from Lat. *ad,* to + *simul,* together). Any drum-beat or bugle-call designated to bring troops into ranks or to appointed stations. See BUGLE AND TRUMPET CALLS; DRUM.

ASSEMBLY, GENERAL. See PRESBYTERIANISM; also LEGISLATURE.

ASSEMBLY, NATIONAL (France). The States-General (q.v.), convoked by Louis XVI of France, and opened May 5, 1789, consisted of the two privileged orders, the clergy and the nobles, and of the *tiers-état,* or commons. The Third Estate, composed of representatives from the towns and rural communities, outnumbered the other orders, and demanded that the voting should be by heads, in united assembly, and not by orders sitting separately. Upon the refusal of the privileged orders to concede this demand the Third Estate, on June 17, assumed the title of *Assemblée Nationale,* and the right to act in the name of France. The court attempted to annul this resolution in a royal sitting, June 23, but the deputies of the Third Estate, together with the liberal members of the other two orders, had bound themselves three days before by the so-called Oath of the Tennis Court not to separate until they had given France a constitution, and declared every attempt at violence on the part of the court treason. The King yielded, commanding the nobles and clergy to join the National Assembly. The Revolution had begun. The Assembly proceeded with astounding rapidity to metamorphose old France. Feudal rights and hereditary privileges were abolished on August 4, and the Declaration of the Rights of Man followed. In February, 1790, succession by primogeniture was abolished; in March *lettres de cachet* and the oppressive salt tax were abolished; in June all orders and titles of nobility were annulled. In July the civil constitution of the clergy was decreed; at the same time non-Catholics were reinvested with the property forfeited by their ancestors on account of their faith; Jews were relieved from personal taxation, and the game laws done away with. In September the Parliaments were suppressed. A decree of October 18 abolished the cruel criminal penalties of Louis XIV. In January, 1791, all corporations and guilds were abolished and free trade introduced. In February political rights were conceded to Quakers and in September to all citizens, of whatever color or religion.

The principles on which the Assembly proceeded were the sovereignty of the People, the limitation of the royal power through a conditional veto, the separation of the legislative and the executive powers, and the responsibility of ministers. Accordingly the Assembly, shortly after it was constituted, declared that to it alone, subject to the royal veto, belonged the legislative power. Several decrees in September, 1789, determined that the legislative body should form only one chamber, and should be renewed every two years; other decrees declared that the King was inviolable and the throne inalienable. A decree of November 7 forbade the deputies to undertake the place of ministers; and in December the new organization of the communes was begun. In January, 1790, France was divided into departments; in April trial by jury was introduced; in May it was declared that the right of war and peace belonged to the nation alone, i.e., to the Assembly.

The ecclesiastical and financial policies of the Assembly were closely connected. The bankruptcy of the State led to the confiscation in toto of the real estate of the Church; but the State, on the other hand, agreed to pay the Church debt and to provide also the salaries of both bishops and parish priests, lowering the former and raising the latter. The ecclesiastical policy, indeed, would have met with little opposition had it not been for the proposed method of electing priests and the oath of allegiance required from them. (See FRENCH REVOLUTION.) The financial policy of the Assembly was less felicitous. Certain reforms were, it is true, decreed; but they availed nothing in face of the slough of paper money into which the Assembly speedily sank. The first issue of assignats, based on Church lands, in the beginning circulated at par; but a second, floated on the guarantee that there would be no further issue; and a third, which broke the guarantee, soon brought about a state of chaos.

When the new constitution had been accepted by the King, and sworn to by the Assembly, that body closed its sittings, Sept. 30, 1791. From its having framed the constitution (which lasted only 12 months), this assembly is usually called the Constituent Assembly. It made way for the *Legislative Assembly,* which was to reform the civil and criminal laws in accordance with the spirit of the new constitution. A decree provided that no member of the Constituent should be returned to the Legislative Assembly; and, as a result, the only men whose experience made them fit to carry on the work of the Revolution were excluded, and the Legislative Assembly was captured by untried and hot-headed radicals. The Assembly, from the very first, began an attack upon the remnants of the royal authority, which culminated in the rising of Aug. 10, 1792, the suspension of the royal power, and the establishment of the Republic by the National Convention in September, 1792. The constitution had provided for an appeal to the nation in extreme cases, and the Legislative Assembly exercised that right by convoking a *National Convention,* which was invested with the powers of the sovereign, was to decide the fate of the monarchy, and remodel the whole political system.

The title of National Assembly has been assumed by various other parliamentary bodies, originating in popular commotions and aiming at radical political changes; as the French Assembly that met after the Revolution of February, 1848, followed, May, 1849, by a legislative assembly; the German National Assembly at

Frankfort, known as the Frankfort Parliament (1848); the Prussian National (Constituent) Assembly; and the legislative body in France, which was instituted in 1871 after the fall of the Empire. Under the existing French Republic, the Senate and the Chamber of Deputies unite to form the National Assembly for amending the constitution and electing the President of the Republic.

For further information, consult: H. Morse-Stephens, *History of the French Revolution* (London and New York, 1886–91); Buchez and Roux, *Histoire parlementaire de la révolution française* (Paris, 1834–38); Montigny, *Mémoires de Mirabeau* (8 vols., Paris, 1834–43); Oulard, *The French Revolution* (3d ed., trans. from the French, London, 1910). See FRANCE.

ASSEMBLY, RIGHT OF. The right of the people peaceably to assemble for any purpose not expressly prohibited by law is an essential principle of popular government as understood under the British and American constitutions. While there seems to be no explicit declaration of the right in any English statute, it is deemed to be implied in the right of petition affirmed in the Bill of Rights enacted by Parliament on the accession of William III (1689). In the Federal Constitution of the United States, as well as in the constitutions of the several States, it is expressly declared, usually in connection with the right of petition. In the Federal Constitution it forms a part of the first amendment, which provides that "Congress shall make no law . . . abridging . . . the right of the people peaceably to assemble and to petition the government for a redress of grievances."

It will be observed that these constitutional provisions are aimed only at congressional or legislative interference with the right of assembly and do not explicitly protect it against arbitrary interference on the part of administrative or judicial officers, and it is in the unauthorized use of the powers conferred on such officials that the danger to the due exercise of the right lies. Such interference is, of course, illegal, as is any arbitrary and unauthorized exercise of power by the authorities of the state or nation, the remedy afforded being an action at law for damages or a criminal proceeding under federal or state statutes. While these provisions are theoretically adequate to protect the rights, they have not in practice always proved sufficient to secure it against occasional infringement.

Unlawful assembly is a criminal offense at common law. It is defined as "an assembly of three or more persons, either with intent to commit a crime by open force, or intent to carry out a common purpose, lawful or unlawful, in such a manner as to give reasonable grounds to apprehend a breach of the peace in consequence of it." It is distinguished from the offense of *riot* (q.v.) by the fact that the latter involves an actual attempt to carry the unlawful purpose of the assembly into effect.

ASSEMBLY OF DIVINES. See WESTMINSTER ASSEMBLY.

ASSEN, ä'sen. The capital of the province of Drenthe, in the Netherlands, 15½ miles by rail south of Groningen (Map: Netherlands, E 2). By a canal (Hoofdvart) it is connected with Meppel and the Zuider Zee. Assen contains an interesting set of buildings which, before the Reformation, were a nunnery, and which now contain the town hall, provincial offices, and a museum. Near the town are the "Giants' Caves," mentioned by Tacitus, with huge glacial-boulders resembling the rocks at Stonehenge. Pop., 1900, 11,191; 1910, 13,000.

ASSENT', ROYAL (Lat. *assentari*, to agree with, assent, from *ad*, to + *sentire*, to feel). The official act by which the sanction of the crown is given to bills which have passed both houses of Parliament. Under the modern parliamentary system this assent is given as a matter of course, the veto of the crown on legislation being practically obsolete. But in theory, the royal assent is still necessary, all acts of Parliament being "by the King's majesty, by and with the advice and consent of the lords spiritual and temporal, and commons in Parliament assembled." By the recent Parliament Act (1911) the assent of the Lords which has been twice refused to a bill passed by the Commons becomes unnecessary if the bill is passed a third time by the Commons without substantial change, provided that at least two years have elapsed since the introduction of the bill. (See PARLIAMENT; LORDS, HOUSE OF.) The principle of the royal assent to legislation has been adopted in all countries which have adopted a parliamentary form of government as well as in the government of the United States and of the several States. Nowhere else has it been reduced to the shadow that it has become in Great Britain, the veto power of the crown, of the president, or the governor being freely and effectively exercised. (See VETO.) Consult Blackstone, *Commentaries on the Laws of England*, and Amos, *A Primer of the English Constitution and Government* (London, 1886).

ASSER, ä'sĕr, TOBIAS MICHAEL CAREL (1838–1913). A Dutch statesman, born in Amsterdam. He was appointed in 1862 professor of law in the Athenæum of Amsterdam, and from 1876 to 1893 held a similar chair in the university. In 1875 he became counselor to the Foreign Office and in 1893 member of the Dutch Council of State. He was delegated to represent Holland in the Peace Conference at The Hague in 1899 and in the International Court of Arbitration in 1900. He received the Nobel peace prize in 1911. A profound student of international law, he published *Schets van het Nederlandsche Handelsregt*, 'Outlines of Dutch Commercial Law' (1899); *Schets van het International Privatsregt*, 'Outlines of Private International Law' (1879); *La codification du droit international privé* (1901); *Arbitrage international entre les Etats-Unis d'Amérique et la Russe* (1902).

ASSESS'OR (Lat. *assessor*, one who sits beside, from *ad*, to + *sedere*, to sit). In Roman law, a person called in by those administering public justice to sit with them and give legal advice and assistance. The practice has continued in those European countries in which the Civil Law system prevails, and such assessors constitute a regular part of the judicial machinery. In Great Britain statutory provision is made for the employment of assessors in various courts. The House of Lords may call in the aid of one or more assessors in admiralty appeals; the Privy Council, in ecclesiastical cases; the Court of Appeal, in any cause or matter; and the county courts, on the application of either party. The admiralty division may call in nautical assessors, and in ecclesiastical courts the bishop or his representative (known as the "Ordinary") sits with assessors.

It is the practice in some of the United States district courts, sitting in admiralty, for the judge, even without statutory authority, to call in the assistance, in difficult negligence cases, of two experienced shipmasters, who sit with the judge during the trial and give their advice upon questions of seamanship or the weight of testimony. Except in admiralty causes, the employment of assessors by courts does not obtain in this country. Our foreign consuls exercising a judicial authority under treaty in certain Oriental countries, are authorized in criminal cases to summon associates, who act in the capacity of assessors. (U. S. Rev. Stat., sec. 4106.)

In this country, however, the term is applied generally to officers who assess or value property for taxation. Their functions are partly ministerial and partly quasi-judicial. Where acting in a quasi-judicial capacity, they are not liable to a civil action for errors of judgment; nor in some States, e.g., New York, for willful misconduct. The only redress for the taxpayer injured by such misconduct is by a proceeding to review and correct the assessment or by a criminal prosecution. Consult the works referred to under CIVIL LAW; ADMIRALTY LAW; TAX.

ASSETEAGUE, ăs'sê-tēg', **ISLAND.** A small island off the east coast of Virginia, forming a part of Northampton County (Map: Virginia, J 4). It is surmounted by a brick lighthouse 129 feet high.

ASSETS (Lat. *ad satis,* up to what is enough). One of those terms in the law of England which in itself bears evidence of a Norman origin. It is derived from the French word *assez,* or more exactly, in Norman-French, *assetz,* 'enough,' or 'sufficient,' signifying the property of a deceased person, which is sufficient in the hands of his executor and heir for the payment of his debts and legacies. In strictness, therefore, the term is not applicable to the property of a person who dies intestate or without any debts to be paid. In general acceptation, however, it is understood to mean the property left for distribution by a deceased person, whether testate or intestate; and in commerce, and also in bankruptcy and insolvency, the term is used to designate the stock in trade and entire property of all sorts belonging to a merchant or trading association, or to a bankrupt or insolvent.

Assets, in the law of administration, are either *personal* or *real,* the former comprehending such goods, chattels, and claims as devolve on the executor, and the latter including all real estate, whether devised or descending to the heir at law. Assets are also characterized as *legal* or *equitable,* according to the nature of the remedy which may be used by creditors against the executor or heir. These distinctions were important in connection with the common law rule that the realty of a deceased person was liable only for the payment of specialty debts (i.e., debts secured by a sealed instrument, as a bond), unless made liable for the payment of other debts by will. In the former case the specialty creditor was compelled to proceed against the heir or devisee; and in the latter case simple contract creditors might proceed against the executor to recover from either the real estate devised or from the personal property of the decedent. In the case of equitable assets courts of equity made no distinction in their distribution between specialty and simple contract creditors. Under modern statutes sometimes certain classes of debts such as taxes or funeral expenses are given a preference, but generally all creditors are placed on an equal footing, and, where there are several creditors, no one can, by anything done after the death of the decedent, secure priority over any other. If, after exhausting the whole assets which have come into his hands, by the payment of debts in due order, the executor or administrator is afterward sued by a creditor remaining unpaid, he is entitled to protect himself by an allegation that he has fully administered, or, technically, by a plea of *plene administravit;* and upon this plea the creditor is entitled to judgment that he shall be paid out of any other assets that shall come to the defendants, which is called a judgment of assets *in futuro.*

Assets is not a technical term in Scots' law, but it is nevertheless much used in the legal business of that country. Consult the authorities referred to under ADMINISTRATION; BANKRUPTCY; DISTRIBUTION; INSOLVENCY.

AS'SIDE'ANS. See CHASIDIM.

ASSIENTO, ä-syān'tô (Sp. *asiento,* seat, contract, treaty). A word specially applied to a compact between Spain and some foreign nation, according to which the Spanish government conferred upon the latter, under certain conditions, the monopoly of the supply of negroes for its American colonies. It was Charles I of Spain who first concluded an assiento with the Flemings in 1517. Next, a similar compact was entered into with the Genoese (1580), the Portuguese (1696), and on the accession of Philip V to the Spanish throne, in 1701, with the French Guinea Company, which from that time took the name of the Assiento Company, upon the understanding that for 10 years it should have the exclusive right of annually importing 4800 negroes into the continent and islands of Spanish America. The assiento was next transferred to England at the Peace of Utrecht, in 1713, and made over by government to the South Sea Company for 30 years, permission being also granted to the company to send yearly, during the term of contract, a ship, carrying 500 tons of goods, to these Spanish colonies. The misunderstanding that grew out of this last clause, of which England took advantage to carry on an extensive contraband trade, contributed not a little to the war that broke out between the two nations in 1739. By the Treaty of Aix-la-Chapelle the South Sea Company was confirmed in its title to the assiento for a period of four years, but this right was surrendered in the Treaty of Madrid, Oct. 5, 1750 in return for £100,000.

ASSIER, ä'syā', ADOLPHE D' (1828–). A French traveler and philologist, born at Labastide de Séron. He became professor of mathematics and member of the Academy of Sciences at Bordeaux, and made numerous voyages abroad, results of which are embodied in the works: *Le Brésil contemporain, races, mœurs, institutions, paysages* (1867); and *Souvenirs des Pyrénées* (1872; 3d ed., 1885). He also published various other important works, of which the following are devoted to philology: *Essai de grammaire générale, d'après la comparaison des principales langues indo-européennes* (1857); *Histoire naturelle du langage; Physiologie du langage phonétique* (1868); *Le langage graphique* (1868).

ASSIGN', ASSIGNEE'. In the most general sense "to assign" means 'to convey or transfer to another any property right or interest.' At the common law the term was specifically applied to the transfer of personal property and, in a still more limited sense, to the transfer of *choses in action* (i.e., claims for money due or to become due; negotiable paper after maturity, and the like). To-day the term is generally employed, especially in the United States, as equivalent to the grant, conveyance, or transfer of any property right, whether real or personal.

An assignee (sometimes shortened to "assign," as in the phrase "heirs and assigns") is a person to whom property or a right, as above defined, is transferred; the assign or assignee becoming invested with the rights formerly belonging to his assignor. Under some circumstances a person in whom property is vested by operation of law, as an executor or administrator is known as an *assignee in law* as distinguished from the ordinary assignee above described, who is known as *assignee in fact*.

The term "assignee" has a special and distinctive use to designate one to whom under an insolvent or bankrupt law, the whole estate of a debtor is transferred to be administered for the benefit of creditors; thus, "Assignee for the benefit of creditors," "Assignee in bankruptcy." See BANKRUPTCY; INSOLVENCY.

AS'SIGNA'TION. A legal term in Scotch conveyancing, analogous in meaning to the English word "assignment" and "conveyance," signifying the process by which the holder of any property right, or the creditor in any obligation, or the proprietor of any property not strictly feudal, transfers his right or estate to another. See ASSIGNMENT; CONVEYANCE.

ASSIGNATIONS (Lat. *ad*, to + *signare*, to sign; cf. ASSIGNATS). The paper currency of Russia, issued by Catharine II, about 1770, to assist in carrying on the war against Turkey. Like similar experiments in other countries, before and afterward, the assignations started at par, but rapidly declined to less than 25 per cent. About 20 years later the assignations were the general currency; but traders began to refuse them, and the most stringent edicts of Paul failed to force them into good standing. In the war with Napoleon heavy issues were made, the value keeping steadily at about 4 rubles of paper to 1 of silver. The rate rose somewhat after the peace, and fluctuation became so troublesome that the government fixed the value by special law. In 1839 the silver ruble was made the unit, and the value of assignations fixed at 3½ for 1 of silver. At the same time bills of credit were issued which took the place of the assignations.

ASSIGNATS, *ä'sē'nyä'* or *ăs'ĭg-năts* (Fr. *assignat*, from Lat. p.p. *assignatus*, assigned, from *ad*, to + *signare*, to sign). Paper money issued during the French Revolution, which derived its name from the public domain *assigned* for its ultimate redemption. One of the earliest acts of the Revolutionary authorities was the confiscation of lands belonging to the crown and the Church, to which later the estates of the *émigrés* were added. These lands were to be used as a source of income for the state, but the process of selling was too slow to meet the pressing needs of the treasury. The government therefore issued what were practically treasury notes (q.v.), bearing interest at 5 per cent, for the total amount of 400,000,000 livres (francs). They were to be retired within five years from the proceeds of the sales of the national lands which were assigned to this purpose.

When first issued, the notes were sold in the market in the same way as treasury notes in our own history. They were in fact securities, the lowest denomination being of 200 livres ($40), and on the first issue, in December, 1789, were well received and suffered no depreciation. By a decree of April, 1790, these notes acquired a legal tender character, and the interest upon them was reduced to 3 per cent. The payment of interest was suppressed in October, 1790, after the maximum issue had been increased in the preceding month to 1,200,000,000 francs.

After this date the successive issues of this paper money became more and more rapid. As early as 1791 notes of 5 francs appeared; and later, notes of 10 sous (one-half franc) were issued. So rapid was the issue of notes that the record of their amount is lost; the formality of passing laws was omitted, and the executive authorities increased the issues by simple decrees. By the year 1793 the circulation had reached nearly 4,000,000,000 francs, but the actual value of the notes had sunk to one-fifth their nominal value. Futile efforts were made to sustain the value of the notes. An effort, late in 1793, to fund them, and thus restrict their quantity, proved ineffective, while penal provisions, culminating in a decree of Sept. 23, 1793, punishing the refusal to take them in payment, or taking them at a discount, with death and confiscation of property, were equally powerless. The wholesale issue of paper money could only have the most disastrous results. In July, 1794, 100 francs in paper were valued at 34 francs in coin; but in January, 1795, the value had fallen to 18 francs, and in July of the same year was less than 3 francs. In February, 1796, when the issues were finally abandoned, 100 francs equaled about 30 centimes in coin. The whole issue of money had been upward of 45,000,000,000 francs. It was now proposed that the assignats be redeemed at the rate of 30 to 1 in a new form of paper money known as territorial *mandats*. The mandats had this advantage over assignats, that they enabled the holder to take possession of public lands immediately, while the assignats could be offered only in lieu of the purchase price at a sale. As much as 1,400,000,000 of this money was issued, but it soon lost any value which it might have had and was finally repudiated by the refusal of the government to receive it at its own treasuries. By a law passed in July, 1796, it was enacted that every one was entitled to transact business in whatever medium he pleased, and that mandats might be taken only at their current value in private transactions, as well as in the payment of taxes. On May 21, 1797, all outstanding assignats were declared void. This riotous issue of paper worked rank injustice and a complete redistribution of the national wealth. If its history is comparatively unknown except in generalities, it is because it was only one of a vast number of measures which reversed the whole order of society during the Revolutionary period. Consult René Stourm, *Les finances de l'ancien régime et de la révolution française* (Paris, 1885).

ASSIGN'MENT (from Lat. *ad*, to + *signare*, to sign). In law, a transfer or making over to another of any property, real or personal, or of any right therein. The term is usually,

although not with strict accuracy, applied to a transfer in writing, as distinguished from a transfer whose validity depends upon mere delivery or unwritten agreement; and it is more frequently applied to the transfer of personal property than of real property, which requires to be transferred by an instrument under seal, and which at early common law required other formalities, not referable to the doctrine of assignment, in order to effect the conveyance. The formal words of assignment are: *assign, transfer,* and *set-over.* At common law all personal property in being, and other property not yet in being, but having potential existence (as crops planted but not yet grown, the wool to be grown by the assignor's flock of sheep within the year, etc.) could be freely assigned, and the assignment vested a present property right in the assignee. Courts of equity also recognize assignments of property to be created *in futuro* when such assignments are made for value, and enforce them against the assignor whenever this property comes into existence. At common law, the assignment of a chose in action, other than commercial paper, was forbidden, as violating the rules against maintenance (q.v.) and champerty (q.v.). Such assignments, nevertheless, conferred upon the assignee the right to sue in the assignor's name, and, if the assignment was made for value, equity would restrain the assignor from interfering with the assignee's rights thereunder. To this rule, however, there were certain exceptions, based on grounds of public policy. Thus equity refused to protect the assignment of the salary of a public officer or judge, rights of action based on personal torts, etc. In the United States, generally, assignments of legal choses in action capable of manual delivery, such as bonds and insurance policies, when accompanied by delivery, are protected by courts of equity, although made without consideration. Equitable choses in action have always been held assignable, although the assignment is made without consideration; and in the United States to-day legal choses in action are generally made subject to the same rule by statute.

An assignment for the *benefit of creditors* is an assignment of real or personal property, or both, to a trustee, usually made by an insolvent debtor for the protection of his creditors and to obtain discharge from further obligations. These are regulated by special statutes in each jurisdiction. See BILL OF SALE; CHOSE IN ACTION; BANKRUPTCY; INSOLVENCY; CONTRACTS.

ASSIM'ILA'TION (Lat. *assimilare, assimulare,* to make like, from *ad,* to + *similis,* like, similar) IN PLANTS. The term "assimilation" is used in at least two ways by plant physiologists. Most of them include under the term all the processes involved in the transformation of inorganic materials (salts, carbon dioxide, and water) into the tissues themselves (cell walls and protoplasm). In this sense the term includes the synthesis of carbohydrates, fats, proteins, and other substances, along with the transformation of these into the tissues. The term thus used is synonymous with anabolism, and stands in contrast to digestion, fermentation, and respiration, or catabolism.

Sometimes the term is applied to the processes of changing the synthesized organic materials into the tissues—the carbohydrates, fats, proteins, etc., into walls and protoplasm. Concerning the process of transforming soluble carbohydrates and allied substances into wall structures (cellulose, hemicellulose, pectin, etc.), it is now quite well established that enzymes (q.v.) are active, at least in the later stages. These enzymes are included under the general head of cytocoaguloses. Concerning the transformation of proteins, carbohydrates, fats, and lipoids, all entering into the composition of protoplasm, into living protoplasm itself we know but little. Proteins constitute more than 50 per cent of protoplasm, but it is not known to what extent they are tied chemically to the carbohydrate, fat, and lipoid constituents. It is known that physically the protoplasm is a colloidal gel or sol. (See COLLOID.) As a disperse system it is far less stable than the gels and sols of most proteins. This is shown by the fact that protoplasm is more quickly coagulated by heat, especially of medium intensity, than are most proteins. Unlike proteins, also, even pressure or mechanical agitation may coagulate protoplasm. Such coagulations may be incipient or reversible or they may be permanent. In the latter case death results. The instability of the protoplasmic colloidal system is one of the marks of living matter. This may be in part due to the nature of the proteins entering into its composition or in part to the combination of the proteins with other compounds. With the lack of definite knowledge concerning the chemical constitution of protoplasm, and in the absence of very definite knowledge concerning its physical state and structure, it is not strange that little that is definite can be said concerning the synthesis of protoplasm. See CELL; PROTOPLASM; PHOTOSYNTHESIS; CHEMOSYNTHESIS; NUTRITION; FOOD OF PLANTS. For assimilation in animals, see NUTRITION.

ASSING, äs'sĭng, LUDMILLA (1827–80). A German biographer and translator, the niece of Varnhagen von Ense. As an orphan she was adopted by her uncle and received a superior education. She wrote for newspapers and reviews and published in 1857 a biography of Elise, Countess von Ahlefeldt. She edited and published, after her uncle's death, Alexander von Humboldt's letters to him; also her uncle's memoirs and his diaries (14 vols., 1861–71). The political matter in the diaries so offended the court that she was prosecuted and sentenced to eight months' imprisonment. But she had gone to Florence, and the punishment could not be inflicted. She immediately published the remaining volumes of the obnoxious diary, to which the court answered by the form of a trial and sentence to further imprisonment for two years.

ASSINI, äs-sē'nē. A seaport village and trading centre in the Baule district, French Sudan, Africa. It lies between Lake Tando and the sea, on the Ivory Coast, about 80 miles west of Axim and 120 miles west of Cape Coast Castle. Logging is the principal industry, and much coffee is grown. Pop., 3000.

ASSINIBOIA, äs-sĭn'ĭ-boi'ä (Ojibwa, *asinni,* stone + *bwa,* the Dakota). Formerly a district in Canada, formed in 1882 out of the Northwest Territories, containing 88,879 square miles (of which 600 square miles are water). It was bounded on the north by the former district of Saskatchewan, on the east by Manitoba, on the south by the United States, on the west by the former district of Alberta. The eastern third of the district belongs to the second or middle plateau and has an average elevation of about

1600 feet. The remainder of the district to the west belongs to the third or west plateau, with an average elevation approaching 3000 feet. The precipitation is light, and the temperature is subject to great extremes of heat and cold. The severity of the winters is often moderated by the warm chinooks from the west. The greater portion of the district consists of prairies. The eastern plateau is best adapted to agriculture, there being a great deal of very excellent wheat land, and mixed farming is practicable. In this section the agricultural industry has developed notably in recent years. On the western plateau there is a greater variety of soils, and it is not so well adapted to cultivation, but is excellent for grazing purposes. Lignite is found in a large portion of the district and is mined in the southeast corner. Regina was the capital of the district and also of the Northwest Territories. In 1905 the district of Assiniboia was divided between the newly created provinces of Alberta and Saskatchewan, by far the greater portion going to the latter. For further details see ALBERTA; SASKATCHEWAN.

ASSINIBOIN, ăs-sĭn'ĭ-boin ('stone-boilers,' a name given by some of the Algonquian tribes, and supposed to allude to their former method of boiling water by dropping hot stones into it). A tribe of Siouan stock, formerly roving over the plains between the Missouri and the Saskatchewan, on both sides of the Canadian border. They are said to have been originally a seceded band from the Yankton Dakota, and speak a dialect of the Dakota language, but are generally considered as a distinct division. In 1904 there were 1234 on reservations at Fort Belknap and Fort Peck, in Montana, while the remainder, amounting, in 1902, to 1371, are on reservations on the other side of the line in British America. Consult R. H. Lowie, "The Assiniboine," *Anthropological Papers, American Museum of Natural History*, vol. iv (1910).

ASSINIBOINE. A Canadian river, with two large affluents, the Qu'Appelle and Souris rivers, rising in Saskatchewan, and flowing east into the Red River at the city of Winnipeg (Map: Manitoba, K 5). From the source of its principal headwater, the Qu'Appelle, in the southeast of Saskatchewan, to its outlet in the Red River, it has a course of 450 miles. Drainage basin, 52,600 square miles. The river derives its name from the Assiniboin Indians. See ASSINIBOIN.

ASSISI, ăs-sē'zê (anciently, Umbrian, *Assisium*). An episcopal city in Umbria, central Italy, 15 miles east of Perugia (Map: Italy, G 4). It is famous as the birthplace of St. Francis, whose body rests here in the crypt of the first monastery of the Franciscans, which he founded in 1208. The monastery was suppressed in 1866, and part of the building was converted by the government into a school for the sons of teachers. Its two churches, built one above the other, also date from the thirteenth century, and contain many old and valuable paintings and other objects of interest. Besides the "convento sacro," there are 11 other monasteries, of which the largest is the Portiuncula, which has a richly decorated church with a cupola by Vignola. Every year, at the beginning of August, Assisi is visited by great numbers of pilgrims. There are in evidence the remains of the ancient Assisium, including the forum, baths, and aqueducts. In the piazza stands a beautiful portico of the ancient temple of Minerva. There are olive groves and mineral springs in the vicinity. Manufactures are insignificant. Pop., 1881, 6704; 1901 (commune), 17,378; 1911, 18,587. Consult Cruikshank, *The Umbrian Towns* (London, 1901), and Gordon, *Assisi* (1904).

ASSIST'ANCE, WRIT OF. The process issuing from a court of equity to a sheriff, marshal, or similar officer, for the enforcement of an order or decree for the possession of lands. In England this process is now styled a writ of possession. Formerly the latter term appears to have been confined to process for the enforcement of a decree for the possession of a leasehold interest in land; and in some of our States it is used to denote the process for enforcing a judgment in a common-law action for the possession of lands, while like process from a court of equity is called a writ of assistance. During our Colonial period writs of assistance were issued by the courts to officers of the customs, authorizing them to take a constable or other public officer, and to enter any building and there to seize, and thence to bring, goods upon which customs duties had not been paid. For a learned discussion of these writs, consult Quincy, *Reports, Superior Court of Judicature, Province of Massachusetts Bay, 1761–72; With an Appendix upon Writs of Assistance* (Boston, 1865). See OTIS, JAMES.

ASSIUT, or **SIUT,** ăs'sê-ōōt'. A city of upper Egypt, situated near the west bank of the Nile, in lat. 27° 10′ N., 248 miles south of Cairo (Map: Egypt, C 2). In very early times it was a place of importance, owing to its favorable situation in the midst of a fertile district at the starting point of the great caravan route leading to the oases of the Libyan desert and the Sudan, but it has lost some of its commercial greatness because much of its trade has been diverted. It was the seat of worship of the deity Wep-wat, who is represented in the form of a jackal or wolf, and hence in later times the city was called by the Greeks Lycopolis, or 'Wolftown.' Under the twelfth dynasty the monarchs of Assiut seem to have maintained great state, and their rock-hewn tombs in the vicinity are richly adorned with sculptures and paintings and contain inscriptions of great historical value. Plotinus, the greatest of the Neo-Platonic philosophers, was born here, and about 205 A.D. the city and the adjacent district were converted to Christianity. Many anchorites took up their abode in the neighboring necropolis, and one of these, John of Lycopolis, is said to have predicted to Theodosius his victory over Eugenius in 394. The modern town is situated on the Nile Valley Railway. It has several fine mosques, a college, bazaars, good baths, and well-built houses. It is noted for its pottery and extensive manufactures of the best pipe bowls. There is trade in linen, embroidered leather goods, carved ivory, corn, and fruit, and fine tulle shawls are made. It is the residence of the Governor of Upper Egypt. Pop., 1882, 31,575; 1907, 39,442. Consult: *Description de l'Egypte* (Paris, 1809–29); Lepsius, *Denkmäler* (Berlin, 1849–58); Mariette, *Monuments of Upper Egypt* (London, 1877); Griffith, *The Inscriptions of Siût and Dêr Rifeh* (ib., 1889).

ASSIZE' (Lat. *assidere*, to sit by, from *ad*, to + *sedere*, to sit). Originally, in English law, a jury sitting together for the trial of a cause. Later, the term came to signify the court which summoned the jury by a commission of assize.

In the plural form, "assizes," it is the equivalent of circuits, and is applied not only to the judicial assemblies of the superior courts in the various counties, for the trial of civil and criminal cases, but also to the sittings of such courts. The term is used, too, as synonymous with edict, or decree, or even with law. A *writ of assize* was an action to recover possession of land, so named because it commanded the sheriff to summon a jury, or assize. It was of great importance in the early history of the law of real property in England, but was superseded by the writ of ejectment and other simpler remedies. *Rents of assize* are the rents of freeholders or copyholders, which had been fixed in amount by the assize of the freeholders of a manor and continued by custom, as distinguished from arbitrary rents or rents fixed by agreement. Consult Blackstone, *Commentaries on the Laws of England.*

ASSIZE OF CLAR'ENDON. See CLARENDON, ASSIZE OF.

ASSIZE OF JERU'SALEM. The name given to a body of laws in the Latin kingdoms of Jerusalem and Cyprus, formerly supposed to have been compiled by Godfrey de Bouillon, but dating in reality from a later period. The assize consisted of two parts, the Assize of the High Court, and the Assize of the Court of Burgesses. In the "Key to the Assize," "assize" is defined as "everything which one has seen in use and customary in the kingdoms of Jerusalem and Cypress." This aids in determining the much-debated question of its history. The Assize of the High Court was probably a body of customs, unwritten for the most part, until Jean d'Ibelin, about 1255, attempted to frame them into a code. In order to give importance to his compilation, he inserted at the beginning a historical sketch, in which he states that the assize had been framed by Godfrey de Bouillon and deposited by him in the church of the Holy Sepulchre, and that this code had been lost when Saladin conquered Jerusalem. This account is now recognized as fabulous. The book of Ibelin was reworked twice, in 1368 and in 1531, and the present text is based upon the latter redaction. The Assize of the Court of Burgesses was probably framed in the second half of the twelfth century, but the date is a disputed point. The two codes, together with the comments of jurists of the thirteenth century and later, throw much light upon the history of the kingdom of Jerusalem, but the Assize of the High Court must be used with great caution, as it is a document of the sixteenth century, and as it has been revised twice to suit the needs of principalities other than the Latin kingdom of Jerusalem; for the assize passed from Jerusalem to Cyprus, and later to the Morea, and was adapted to meet the needs of the later kingdoms. The best edition is by Beugnot in the *Recueil des historiens des Croisades* (1841–43). The Assizes of Antioch have been discovered, in an Armenian translation, and published, with a French version, at Venice, in 1876. Consult Dodu, *Institutions monarchiques dans le royaume latin de Jérusalem* (Paris, 1894).

ASSMANNSHAUSEN, ăs'mâns-hou-zen. A village in the Prussian province of Hesse-Nassau, on the right bank of the Rhine, about 3 miles below Rüdesheim. It is celebrated for its red wine, made of a Burgundy grape and distinguished for its aromatic flavor, and its uncommon strength and fire. There are mineral springs and baths. Pop., 1895, 1100; 1900, 1000.

ASSO'CIATED PRESS. See PRESS ASSOCIATION; NEWSPAPER.

ASSOCIATE PRES'BYTERY, or THE SECEDERS. See PRESBYTERIANISM.

ASSOCIATE SYNOD, sĭn'ŏd, ASSOCIATE PRESBYTERY. See PRESBYTERIANISM.

ASSO'CIA'TION. See COÖPERATION; SOCIETIES; COMPANY. In psychology, see ASSOCIATION OF IDEAS.

ASSO'CIA'TIONISM. See ASSOCIATION OF IDEAS.

ASSOCIATION OF IDE'AS. The phrase "association of ideas" seems to have been first used by the English philosopher, John Locke, although the facts to which it gives expression were often discussed long before Locke's time. Even as early as the time of Aristotle, we find four classes of association described; that is, four ways in which the mind passes from one idea to another. These are association by similarity, by contiguity, by contrast, and by succession. It was not, however, till the time of Hume that the principles of association became "laws" which were intended to explain not only the way in which idea follows idea, but also the means by which the mind builds up all its knowledge of the world. Hume conceived of association as a "gentle force" arising in "original qualities of human nature," and "pointing out to every one those simple ideas which are most proper to be united into a complex one." Since the days of Hume the principle of association has played a very large part in various systems of philosophy, particularly among the writers of the empirical school of philosophy in England. It has been worked out most elaborately in the writings of James Mill, Alexander Bain, and Herbert Spencer. At times the advocates of the doctrine have gone so far as to speak of association as a law as universal in the mental world as that of gravity in the physical world. The theory thus developed is known as associationism; a theory which sees in the laws of association the fundamental modes of mental action.

Association has now a different significance among writers on psychology. In the works to which we have referred it had not so much a psychological as an epistemological significance (see EPISTEMOLOGY); i.e., it was regarded as a principle of explanation of our knowledge of things. As thus conceived, associationism implied an atomic arrangement of the mind, and furnished rather an external and mechanical means for putting the various elements of knowledge together than an intrinsic mode of synthesis. It is only very gradually that the association of ideas has come to lose its philosophical flavor within psychology, and to represent a grouping of mental processes instead of standing as an explanation of experience in general. But even within modern psychological systems it has received so many shades of meaning that it is hard to define. It has stood (*a*) as the one mode of connection of ideas; or (*b*) as the sole condition of reproduction, i.e., the way in which "past" ideas are brought again to mind; or (*c*) as reproduction itself—as when one is said to associate black with sorrow; finally, (*d*) it has signified a particular kind of grouping of mental elements. Let us see in what directions these conceptions are open to criticism.

First of all, we will examine association as

the one mode of connection of ideas. This definition of association is too narrow. Unless we are content to make association a perfectly arbitrary thing, we must extend it beyond ideas. When, e.g., we look at a stone, we seem to see a heavy, hard, rough, cold, resisting mass. What we actually see is, of course, only the "look" of the stone; the shape, the color, and the brightness. We "think in" the rest from what our past experience has told us of the "properties" of the stone. This "thinking in" is just the same kind of an operation as is to be found in association. We have a sense-experience completed by ideational elements. (See SENSATION; IDEA.) Since there is no successive "calling up" of the parts, and since we have not a grouping of idea with idea, it is plain that we cannot speak of an association of ideas. We must rather speak of this form of connection as a *simultaneous association*.

From this simplest form of associative grouping we pass by short stages to the *successive association*, the association in which part follows part. Even here it need not be a sequence *of ideas* which is experienced. A *perception* may start the train. The sight of the stone may bring the verbal idea "geology," and this, in turn, the idea of the Carboniferous period, and so on. It is only in cases of abstraction—as in reverie—that our primitive pilot, perception, is off duty, and we are guided by the central nervous processes underlying ideation.

We may dismiss the theory that association is the sole cause of reproduction (the second definition) by pointing out that the previous joining of ideas is not the only cause for the reproduction of one by another. This may be due—to mention only two exceptions—to mood (we are likely to recall melancholy events when we are in a melancholy mood); or to a similar relation which two ideas chance to have to a third (as when "dog" reminds us of "cat," both standing in the class of domestic animals). But neither is association satisfactorily considered as reproduction or recollection itself. It becomes in this case only a subheading under memory, and tells us nothing of the relation in consciousness of process to process. This leaves us with only our final definition, which says no more than that when sensational and ideational elements group themselves under certain conditions they may be said to associate. Association then becomes simply the form of grouping in which the elements stand united. Let us look more closely into this group. First, we must distinguish between the processes which do the associating and the materials united in association. In the simultaneous association, it is always the sensational elements which start the association. These it is in the case of the stone which make the perception a stone-perception instead of a table- or a wall-perception. It may happen, however, that a tendency toward reproduction of certain ideas wholly diverts the normal course of the association or the assimilation, as it may be called. Think, for example, of the apprehensive traveler who comes upon the stone in the dusk and takes it for a ghastly head. Or it may be mood, or sentiment, or temperament, or a violent emotion, which determines the course of the perception. Take, as an illustration, the transformation of the stone by poetic fancy into a treasure-casket or a plaything of the gods. When we look again, at the level of the successive associations, for the critical portion of the perception or idea, the part which does the associating, we find that it may be a single element or the whole perception or idea which is the determining factor. The red (sensation) in a sunset may bring the idea of blood; or a geometrical figure (perception) may suggest the arrangement of petals in a flower; or a melody (perception) an opera in which it has been sung.

The consideration of association as a form of mental connection removes one more difficulty which the older associationism encountered. It makes a more intimate relation within a perception or a train of ideas than the latter could posit. There is a unity in the associated members. We may even speak of a whole perception or train of ideas as being "bright," "vivid," "pleasing," as if it were a single thing. This would hardly be appropriate if the connection were entirely external and simply brought the elements into juxtaposition.

If, now, we are to speak of "laws of association," we can mean only the conditions under which a given association is made. These conditions will stand in place of the regularity with which the environment brings together certain groups of stimuli and presents them to the organism. Conceiving our laws thus, we find that the old category of contiguity comes nearest to expressing the truth of the matter. Similarity is a very doubtful rubric. In the first place, the term is too indefinite to be of much service. Almost anything may be considered more or less similar to anything else, and it is very hard to see how simple likeness should determine an association. At least, greater likeness does not seem to mean greater associability. It seems to be possible, in every case, to reduce an apparent "association by similarity" to some other form; there may be partial identity, in which case the identical member of two groups is first experienced with the one and then with the other, as the red of the sunset passing over into the red of blood; or there may be simple contiguity, the similar objects having stood together in experience; or there may be an indirect association, such as we found above, where two things stand in the same relation to a third, as two objects to the name of the class to which they belong.

On the other hand, "contiguity" can be regarded as an explanation only when we think of it in terms of neural activity. It is true that we can state it in general psychological terms, saying that conscious connections once set up tend to persist, so that when a single item (sensation, fusion, perception) comes to consciousness, it tends to bring with it other items with which it has appeared before in consciousness. This formula, which may be regarded either as a law of habit—if we think of the tendency to persist—or as a law of redintegration—if we think of its results—receives, however, its full significance only when we translate it into physiological terms and state it as a tendency in the nervous system to do that which has been done before. Neural tracts which have once been excited together tend to functionate together again; hence if an excitation finds its way to one part of the brain, there is a tendency for the parts previously involved to be reëxcited. Now, just what path an excitation will take in any particular case we cannot foretell; but we are able to name with a good deal of certainty the factors which contribute to association, i.e., to state the conditions under which the tendency to form old connections are realized. At this point

experiment comes to our aid. It enables us to invite association under first one set of conditions and then another and to watch the results. If a given process, *a*, has formed several connections, at various times, say, with *d*, *s*, and *z*, the one of these connections which is actually realized when *a* is brought to consciousness will depend upon the frequency of connection of each with *a*, the recency of connection, the relative vividness of *d*, *s*, and *z*, their relative positions in a series of processes, and their relative power to attract a wandering attention. The comparative values of these factors are determined by presenting to the observer simple stimuli (as colors, letters, or sounds), arranged in definite groups of two, and then asking him, when the one member of a group is given again, to recall the other member which was previously given with it. The series are so arranged as to bring into prominence, one after another, the various factors.

In investigating association, we have not only to give a quantitative measure of associability in terms of sensational elements; we must also study (1) the influence of other processes which chance to stand in consciousness, and (2) the nature of the associative consciousness; i.e., we must note what there is in mind when an association is being made. The first of these problems is illustrated by the overwrought traveler who "colors" his association by his apprehensiveness, or by the proof reader who becomes interested in his page and easily overlooks typographical errors. The case is brought under experimental conditions by giving an incentive to reproduction under the influence of a suggested idea. If the word "part" is seen an instant, for example, just after the word "wine" has been pronounced, it is likely to be read "port." The experiment shows us (*a*) within what wide limits an association may be influenced by the appropriate, momentary trend of consciousness, which thus becomes part-incentive, and (*b*) it also illustrates the last condition of association named above; the greater power to fascinate the attention and to start associations possessed by an idea when it bears a close relation to other contents of consciousness. The best way to solve our second problem—the analysis of associated contents—is to make the observer as much at his ease and free from distracting influences as possible (seat him, say, in a dark room), and ask him to report in outline the associative train which follows from a word or sentence repeated to him. After this experience he is able to fill in the outline by describing minutely the nature and the amount of the associative material, whether made up of visual, or auditory, or other imagery, whether intense or weak, whether clear or obscure, whether full or thin; the number and arrangement of the ideas, the elements which carry the association and the changes in affective disposition at the various stages of the process.

One other point connected with the analysis of associated contents deserves to be noticed. There is a well-marked tendency toward economy in mental functions. The mind becomes expert, as does the body, so that after carrying through laboriously a sequence of processes for some time, the operation becomes gradually curtailed. We think our thoughts out (if, indeed, we do not take them ready-made from our parents and neighbors), and then just use them as counters with a swift, shorthand review, without going through the trouble to "think" or "reason" every time we want to know. This mental ellipsis is common in the process leading to association. It is, as John Stuart Mill says, "like a stream which, breaking through its banks, cuts off a bend in its course." If we have the sequence *a b c* given several times, we become able to pass directly to *c* from *a* without the intermediate link *b* being given at all; e.g. *alarm—fire—loss*, and then *alarm—loss*. This is only another evidence that contents in an association form a whole, and not a mere sequence of events. Some psychologists have gone so far as to say that associations may be held together by a link which has never entered into consciousness at all. The evidence for this is not good, although it is a fact that often the links are hard to find, either because they are fleeting or because they are not attended to. A speaker's facial expression or gesture may recall, for example, an event or a place, even if the listener's attention is kept on the discourse. Nevertheless, a full attention is an indispensable aid to the forming of permanent associative relations.

Beyond the search for conditions of association and the analysis of association, much work has been done on the duration of association and of its elements by the use of the reaction experiment. (See ACTION.) The time, for instance, is taken for the associating of an object seen or heard, with the idea of another object in the same class, as "cat"—"dog." The time depends both upon the factors in the association (each one of the conditions mentioned above exerting an influence), and upon the individual associating. The individual factor is resolvable into differences in ideational type (the kinds of ideas —visual, auditory, tactual, etc.—which the individual uses with greatest facility), and what have been called "differences in intellectual temperament," i.e., the tendency to associate general names to the names of individuals (the superordinating temperament), as man to Cæsar; or individual to generals (the subordinating temperament), as Cæsar to man; or to associate ideas upon the same level of generality (coördinating temperament), as plant to animal. Moreover, experiments have also revealed individual differences in associative furniture as conditioned upon age, sex, training, physical state, mental disposition, etc. The results show that, given the conditions, the normal individual tends to form associations in certain definite ways and within regular time intervals. It has been found possible, therefore, to devise "association-tests" which are of service in the study of insanity, feeble-mindedness, hysteria, and in the detection of crime (as in Jung's diagnostic association-tests). See MENTAL TESTS.

When we have made a full analysis of the mind during association, and when we have a complete tabulation of the conditions under which association takes place, and have measured the temporal course of association, we shall have solved the problem which association presents to psychology. Even now (and experiment on association is comparatively new) we know that frequency, recency, vividness, position, and ability to attract the attention are real conditions upon which association depends; they are the credentials, so to speak, which gain for processes a place in consciousness. We are not to understand by this that past experiences are waiting in the ante-chamber of the subconscious; but only that by reason of frequent repetitions, or recent excitations, or what not, there is a ten-

dency for nervous processes to discharge in such and such a way. So that neural disposition determines the direction of discharge, and this, in turn, the appearance in consciousness of the associated contents. This view of the matter makes it clear why there is no distinct bit of consciousness answering to the associative bond, but only conscious processes standing related, and hence more or less unified. The bond is a figure. More than this, we have set the time relations of the association and have learned that associated contents are now exceedingly rich and now a mere thread; that the mass is now intensive and now weak, now clear and now obscure, now directed by a single element and now by the union of two or more streams of influence, now run through with pleasantness and now affectively indifferent; that successive association is, like every consciousness, kaleidoscopic, picking up processes here and dropping others there, but carried always by a common core, so that there is never a jump from one stage to another, never an hiatus within the chain, but invariably a gradual transition from point to point. These facts make clear to us that the old contention regarding the "laws" of contiguity, similarity, contrast, etc., was, after all, a secondary matter, and that it is the analysis of the contents collected within the association and the factual conditions of association that are of prime importance.

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ASSOCIATIONS FOR THE ADVANCEMENT OF SCIENCE. See ADVANCEMENT OF SCIENCE, ASSOCIATIONS FOR THE.

ASSOCIATIVE LAW. One of the fundamental laws governing certain elementary processes of mathematics. It is first met in addition, being stated thus: The sum is the same in whatever way the addends are grouped, e.g., $(2 + 3) + 5 = 2 + (3 + 5)$; or, in general, $a + (b + c) = (a + b) + c$. The associative law of multiplication may be stated thus: The product is the same in whatever way the factors are grouped, e.g., $2 \cdot (3 \cdot 5) = (2 \cdot 3) \cdot 5$; or in general, $a \cdot (b \cdot c) = (a \cdot b) \cdot c$. Exponents and vectors are subject to similar laws.

ASSOLLANT, ȧs'sȯ'läN', JEAN-BAPTISTE ALFRED (1827–86). A French writer. He was born in Aubusson, in 1852 visited America, and on his return published *Scènes de la vie des Etats-Unis* (1858), a series of brilliant and skillful sketches. He wrote a number of stories and romances, such as *Brancas* (1859), *Marcomir* (1873), and *Pendragon* (1881), and contributed to many of the leading Parisian journals. His political articles forcefully and bitterly attacked alike Imperialists and Opportunists. A charge of plagiarism was brought by him against Sardou on the ground that the latter's *L'Oncle Sam* was copied from *Scènes de la vie.* A court of authors decided in favor of M. Sardou.

ASSOMMOIR, L', lȧ'sȯ'mwȧr' (Fr. the bludgeon). A novel by Emile Zola, belonging to his early "realistic" period, and dealing with the evils of drunkenness among the poor. It was published in 1878.

AS'SONANCE (Fr. from Lat. *ad,* to + *sonare,* to sound). A substitute for rhyme, consisting of a repetition of the same stressed vowels at the end of a line, without regard to the consonantal sounds of the syllable. It was common in the early verse of the Romance peoples, and it has survived in popular poetry, being, in English, usually styled "imperfect rhyme," as "man" and "dam." Examples of assonance, taken from George Eliot's *Spanish Gypsy,* are *blackness* and *dances,* and *roaming* and *floating.* Assonance is much employed in Spanish poetry. See SPANISH LITERATURE.

ASSOS. See ASSUS.

ASSUAN, ȧ-swän', or **ASWAN** (Ar. *al,* the + *souaan,* the opening—i.e., at the mouth of the Nile). The ancient *Syene* (Gk. Συήνη). A town, the capital of a province of the same name in upper Egypt, on the east bank of the Nile, near the borders of Nubia and at the first cataract, about 40 miles north of the Tropic of Cancer (Map: Egypt, C 3). In Assuan and vicinity are many ruins, among which are the remains of a Ptolemaic temple dedicated to Isis of Syene, tombs, etc. The town is a popular health resort and centre for tourists. Modern structures include the government building and hospital, an English church, bazaars, hotels, etc. In the environs are Arab cemeteries, an interesting Arab camp, and many granite quarries, which were worked under the earliest Egyptian dynasties. Some red granite—"Syenite" from Syene, so called by Pliny—is still found in the neighborhood. In the river just off the town and dividing the stream of the Nile is Elephantine Island, which is covered with verdant palm trees and which contains the ruins of the ancient town of Elephantine and several villages. On the west bank of the Nile there are many rock-hewn tombs of the Old and Middle Empires. The Roman poet Juvenal, whose keen satire was resented by the Imperial court, was banished to Syene, and lived there for some time as commander of the garrison. At one time Assuan had an important caravan trade which declined after the Mahdist revolt. It has gained considerably in commercial importance because of railway connection established with Alexandria, and the stimulus given to agricultural interests by the completion, in 1903, of the great Nile dam near this place (see DAMS AND RESERVOIRS). Its population, including the suburbs, is, 1907, 16,125.

ASSUMP'SIT (Lat. 3d pers. sing. perf. of *assumere,* to undertake). The technical name of a form of action at common law. It was first used as a form of action on the case (see CASE) after the Statute of Westminster II (1285), in which the plaintiff pleaded that the defendant undertook to perform some act by doing or giving something, the breach of which undertaking resulted in damage to the plaintiff. If the defendant's promise or undertaking did not amount to the assumption of a common law duty, a breach of which would be a tort (q.v.), it was necessary for the plaintiff to allege and prove that he had given consideration—i.e., that he had given up a right or suffered a detriment in return for the defendant's promise—in order to show that he had suffered damage. This was the origin of the modern doctrine of consideration in the law of contracts. The action of assumpsit is now limited as an action on contract, and as quite distinct from actions on the case, notwithstanding their common origin. The term "assumpsit" is also applied, though less fre-

quently, to the promise, contract, or obligation of one against whom the action of assumpsit would lie. *Express* or *special* assumpsit is the form of the action employed to recover damages for the breach of a bilateral contract, either express or implied in fact—i.e., a contract in which the promise of one party to the contract is given in exchange for the promise of the other. It was not the proper form of action in which to recover on contracts under seal, the action in that case being in debt or covenant. *Common, general,* or *indebitatus* assumpsit is a form of assumpsit in which the use of that action was extended, for reasons now purely historical, so as to apply in nearly every case in which the common law action of debt would lie. It was used to recover a liquidated sum of money, as distinguished from mere damages, as in an action to recover the purchase price of goods sold and delivered, or for money lent. The obligation to pay the liquidated sum may arise from contract, express or implied; or, in the absence of contract, it may be an obligation imposed on the defendant by law, sometimes incorrectly termed a contract implied in law, and known to modern legal writers as a *quasi contract* (q.v.). Thus, *indebitatus assumpsit* was at common law the proper form of action in which to recover a penalty imposed by statute or money paid by mistake.

In modern times the use of this form of assumpsit has been still further extended, so as to cover nearly all cases where the defendant is under an obligation to pay a sum of money to the plaintiff, even though unliquidated, provided the money is not payable as damages. The various forms of declaration in *indebitatus assumpsit* were known as *common counts* (q.v.). The usual plea to the declaration in assumpsit is at common law *non assumpsit,* i.e., a general denial, under which the defendant may give in evidence any legal defense to the action which he may have. Consult Gould, *Treatise on the Principles of Pleading in Civil Actions* (Chicago, 1899).

ASSUMP'TION, capital of Paraguay. See ASUNCION.

ASSUMPTION, SISTERS OF. 1. An order of French nuns devoted to the teaching of girls, founded in 1839. It aims to combine secular education with religious training. The mother house is in Auteuil, a suburb of Paris, and is a famous school. The order has spread to other countries. 2. LITTLE SISTERS OF THE ASSUMPTION, an order for nursing the sick poor in their own homes and bringing to them the influences of religion. It was founded in Paris in 1865 and has spread to most of the countries of western Europe and to the United States.

ASSUMPTION OF MO'SES. The title of an apocryphal book giving predictions of a glorious future for Israel and exhortations to prepare for it by repentance and obedience to the law, put in the mouth of Moses before his death. Jude, verse 9, is a quotation from it. It was written in Hebrew or Aramaic, by a Pharisee, in Palestine, between 7 and 30 A.D., and is preserved only in a Latin translation. A critical translation in English was made by Charles (London, 1897).

ASSUMPTION OF THE VIR'GIN MA'RY. A festival of the Roman Catholic and Greek churches, celebrated before the sixth century, in both the East and the West, in commemoration of the assumption of the Virgin Mary into heaven. Both churches keep August 15, in memory of Mary's translation into glory, body and soul, by Christ and the angels.

ASSUR, ăs'sŏor. 1. The earliest capital of Assyria, situated on the western bank of the Tigris, about 37 miles below the place where the upper Zab enters the river, the modern Kal'at Sherkat. Before the Semitic conquest it seems to have had the Sumerian name A-usar, which was frequently used even in later times. On the lips of the invaders it became Assur, while Babylonians and Hebrews pronounced it Ashshur. It is probably referred to in Gen. ii. 14, where Tigris is said to go in front of, i.e., flow east of, Asshur, which would be true of the city but not of the country. The ruins were visited by Rich in 1820 and Layard in 1840, but systematic excavations were not undertaken until 1903, when the Deutsche Orient-Gesellschaft began the work that has continued to the present day. Parts of the ancient walls, quays, streets, palaces, and temples have been laid bare; objects of art, including statues of kings, and numerous inscriptions of great importance have been found. The temple of the god Asur was founded, according to one of these inscriptions, by Uspia, a King who must have reigned a long time before Ilusuma, the contemporary of Sumuabu (2232–2217 B.C.). The city wall was built by Kikia, another King reigning probably in the earlier part of the third millennium B.C. Enlarged and beautified by the various priestly rulers and kings of Assyria, Assur never ceased to be a great centre of the religious and political life of the nation. Even after Calah (Kalchu, modern Nimrud) in the fourteenth century had been made the seat of the government, and this city had given place to Nineveh as capital of the Empire, the Assyrian monarchs still continued their building operations in Assur. The city was destroyed by the Medes and the Chaldæans in 606 B.C. Consult *Mitteilungen der deutschen Orient-Gesellschaft* (1903–13); W. Andrae, *Die Festungswerke von Assur* (1913).

2. The country of Assyria, the chief part of which was after its occupation by the Medes called Adiabene. The Hebrews always used the name Asshur.

3. The chief god of the Assyrians. It is possible that the name originally was Anshar, as the identification with this Babylonian deity suggests. An assimilation to the name of the city would be natural. But it was also important to differentiate. Hence the god's name was generally written with only one sibilant, and that seems to have been pronounced by the Assyrians as an *s,* consequently Asur, a form conveying the idea that he was a 'helper,' 'savior.' In earlier inscriptions found at Assur and in the Cappadocian tablets, Asir also occurs. The worship of Asir and his spouse, Asirta, seems to have prevailed also among the Amorites of Syria. (See ASHER, ASHERA.) Asur was the tribal god of the Assyrians, as Chaldis was of the Chaldians; his relations to his people were as close as those of Chemosh to Moab, or Yahwe to Israel in earlier times. There were other gods besides him, but in the cult he was supreme. With his name those of numerous kings were compounded. To carry out his commands, to make his will respected, to spread the fear of his majesty, they went forth upon their expeditions. The trisagion sung in the temples of Assyria was "Asur, Asur, Asur!" Other gods had to contribute to his

glory. When Sennacherib had destroyed Babylon in 689, he ascribed to Asur the struggle with the chaos-monster Tiamat and the creation of the world which in Babylon were regarded as the achievements of Marduk. In Nineveh Istar was probably considered as his wife. Consult Zimmern, *Die Keilinschriften und das Alte Testament* (1902); Jeremias, *Das Alte Testament im Lichte des alten Orients* (1906); Jastrow, *Die Religion Babyloniens und Assyriens* (1902–12); Sayce, "Cappadocian Cuneiform Tablets from Kara Eyuk," in *Babyloniaca*, vol. iv, p. 68 (1911).

4. The eponymous hero of Assyria, represented in Gen. x. 22 as a son of Shem, and a brother of Elam, Arpachshad, Lud, and Aram. The Arabs refer to him as al Athur.

ASSUR'ANCE. See INSURANCE.

ASSURBANIPAL, ăs'sōōr-bă'nē-păl'. See SARDANAPALUS; ASSYRIA.

AS'SUS, or **AS'SOS** (Gk. Ἄσσος). An ancient Hellenic seaport city in the Mysian Territory, Asia Minor, on the north shore of the Adramyttium Gulf, opposite, and 7 miles distant from, the coast of the island of Mitylene (ancient Lesbos), in existence as early as 1000 B.C. The city rose in terraces from the shore, on a trachyte cone, 700 feet high, crowned by a temple of Athene, commanding a magnificent view. The site, now partly occupied by the village and seaport of Behram or Bekhram, is noted for its interesting archæological remains and historical associations; the extant walls are concededly the finest known example of Greek fortification building; the larger part goes back to the fourth century B.C. Strabo mentions the independent attitude of Assus during the latter Persian invasion. During the governorship of the eunuch Hermeas—a pupil of Plato—Xenocrates and Aristotle were invited guests at his court, and Aristotle married the ruler's niece. Later, Assus passed under the domination of Lysimachus and of the kings of Pergamum. On their way from Troas to Mitylene, St. Paul and St. Luke visited Assus, as recorded in Acts xx. 13. After the Byzantine period it sank into oblivion. From Assus came the Stoic philosopher Cleanthes. In ancient times Assus was famous for grain and for its building stone. In later times the city's remains became a prolific quarry of building stone, especially for the docks built at Constantinople after the Crimean War, but the scattered remains of the walls, the baths, the marketplace, the temple of Augustus, treasury, gymnasium, and the temple of Athene, attest the city's ancient magnificence. The American archæological school at Athens has done much to make the treasures of Assus known. Consult J. T. Clarke, "Report on the Investigations at Assus" in *Papers, Classical, of the Archæological Institute of America* (Boston, 1882–98).

ASSYRIA (Gk. Ἀσσυρία and Ἀτουρία, *Aturia;* OPers. *Athura;* Aram. *Athur, Attur,* and *Athuriya;* Bab. and Heb. *Asshur;* Ass. *Assur*). The ancient name of the country between the Armenian mountains in the north and the alluvial plain of Babylonia in the south, the Tigris in the west, and the mountains of Kurdistan in the east, as well as of the Empire ruled by the Assyrian kings, which included a varying extent of adjacent territory. As Mesopotamia during a long period, Babylonia at various times, and a large part of Syria for a while, belonged to this Empire, the Jews seem to have continued to employ the term occasionally, after the destruction of Nineveh, to the Achæmenian (Ezra vi. 22) and the Seleucid (Zech. x. 10 f.) kingdoms. Some of the classical writers use Assyria in such a manner as plainly to include Mesopotamia and Babylonia; and it is altogether probable that Syria is an abbreviation of Assyria. After the fall of the Assyrian Empire, the name "Adiabene" (q.v.) came to be used for the chief part of Assyria proper. Trajan, in 115 A.D., created a Roman province of Assyria, but this attempt to restore the old name was abandoned by Hadrian. Athuriya survived as the designation of a Nestorian diocese.

Topography. Assyria consists of a plain broken up by low ranges of hills into a number of shallow valleys. Through these the great tributaries of the Tigris flow—the upper Zab, the lower Zab, the Adhem, and the Diyala—and many smaller streams, such as the Husur, northwest of Nineveh. The Tigris itself forms the western border of Assyria proper. Because of its ample supply of water, the plain is very fertile. The rainfall is good, and in ancient times an extensive system of canals was kept up for irrigation. Cereals, olives, vines, citrons, and other fruits were cultivated. Vegetables of various kinds were grown. The land was in part covered with woods. Iron, copper, and lead were found in the hills; and limestone, sandstone, alabaster, and basalt could be cut in the neighboring mountains. The fauna was rich and varied, including lions, wild bulls, bears, foxes, jackals, boars, and deer, a large number of birds, and all the domestic animals.

Cities. Assur, the oldest capital, was situated on the western bank of the Tigris, near the modern Kal'at Sherkat, half-way between the upper and the lower Zab. Calah, which was made capital by Shalmaneser I (c.1320), stood on the site of the modern Nimrud just north of the upper Zab, on the eastern bank of the Tigris. Nineveh, which is mentioned in the prologue to the Code of Hammurapi (2124–2081), but does not seem to have been made a capital before Asurbelkala (c.1100) and not permanently until Sennacherib, was farther north in the angle between the Husur and the Tigris, east of the latter. Its site is represented by the mounds of Kuyunjik and Nebi Yunus opposite Mosul. The capital of Sargon II, Dur Sargina, was found at Khorsabad, north of Nineveh. The important city of Arbailu, the later capital of Adiabene, is the modern Arbela, and Imgur Bel corresponds to the mound called Balawat. Besides these there were many smaller towns.

Excavations. The destruction of the chief cities of Assyria by the Medes, avenging themselves for centuries of wrong and oppression, came suddenly and with terrible thoroughness. Their temples and palaces were given to the flames. They never rose from their ruins; in course of time they were completely buried by the earth, and other towns grew up around them. The mounds that covered them aroused no suspicions of hidden treasures. Not until 1842 were excavations begun. Paul Emile Botta undertook to examine a mound at Khorsabad and found that it contained the remains of a magnificent palace of Sargon II. Three years were spent there by Botta. During this time he unearthed numerous chambers of the palace, revealing an abundance of inscriptions, sculptured slabs, statues, and other objects of art. Meanwhile Sir Austen Henry Layard was making preparations for work in the mounds op-

posite Mosul. He began his excavations in 1845 and continued them at Kuyunjik and at Nimrud until 1850. Layard thus was the modern discoverer of Nineveh and Calah. No less than five palaces and several temples were found by him. He discovered a part of Asurbanipal's library, of which some 30,000 fragments were sent to the British Museum. The French excavations begun by Botta were continued at Khorsabad by Victor Place in 1855 and Jules Oppert (1859–62). Under the direction of Sir Henry Rawlinson, Hormuzd Rassam, a native of Mosul, began excavations at Kal'at Sherkat in 1852, and continued until 1854 at Nimrud and at Kuyunjik, where he discovered another large portion of Asurbanipal's library. In 1873 and 1874 George Smith conducted excavations at Kuyunjik and Nebi Yunus; and Rassam again was in the field from 1878 to 1882. From 1903 to 1913 extensive and methodical excavations have been carried on by the Deutsche Orient Gesellschaft at Kal'at Sherkat under the leadership of Andrae. The finds have been very rich, and the numerous inscriptions discovered have been promptly interpreted by Professor Delitzsch. See ASSUR.

Chronology. For the last 300 years of Assyrian history the chronology is in the main very well established. It is based chiefly upon what remains of the *limmu*-lists. In Assyria every year was named after a high official. From the Cappadocian tablets we know that this institution already existed in the third millennium B.C. Like the archontate in Athens and the consulate in Rome, this eponymate, or *limmu*, may be a sign of an original republican form of government, as Ed. Meyer has suggested, *Geschichte des Altertums*, i, 2, p. 539 (2d ed., 1909). We possess several *limmu*-lists, with or without notes, discovered by Rawlinson and Bezold, and last published by Rogers, *Cuneiform Parallels to the Old Testament* (1912). They cover the years from 893 to 666. Usually, though not always, the King held this position in the first year of his reign, and then in a certain rotation the governors of important cities and provinces. Chronologically the succession has been fixed by the reference to an eclipse of the sun in the month Sivan of the eponymate of Pursagale, of Guzana, which took place on the 15th of June, 763. From the third year of Nabunasir (745), when Tiglath-pileser IV became King, the *Babylonian Chronicle* and the *Canon of Ptolemy* are of great importance, and for the earlier part of the period the *Synchronous History*, published by Peiser and Winckler in *Keilinschriftliche Bibliothek* (1889). Only the regnal years of the last three kings cannot be given. The accuracy of Assyrian chronology back to the end of the tenth century is of value also for that of the Syrian states in this period. See JEWS.

From c.1400 to 911 we are at present able to construct a fairly complete list of kings, but not to determine the exact date and regnal years of a single king. Nevertheless the margin of uncertainty is not in any case very wide. Two statements of Sennacherib, based no doubt upon accurate *limmu*-lists, help to fix the time of Tiglath-pileser I and of Tiglath Ninib I. The former is said to have suffered the loss of two gods, Adad and Sala, taken away from Ikallati by Marduknadinahi 418 years before Sennacherib destroyed Babylon, in 689, and brought back these deities to the Assyrian city (*Bavian Inscription*, 48–50), consequently in 1107. A seal of the latter was carried away by Sennacherib on the same occasion, and the conqueror of Babylon added that this conquest took place "after 600 years," evidently counted from the time of Tiglath Ninib (III *Rawlinson*, 4, 2, translated in *Keilinschriftliche Bibliothek* (1889), consequently in 1289. Unfortunately, these dates do not indicate when the two kings began to reign. The references to Babylonian kings whose dates are fixed (see BABYLONIA) and the *Synchronous History* are also of value. From the Amarna letters it is known that Asuruballit II was a contemporary not only of Burnaburiash of Babylon but also of Amenhotep III and Amenhotep IV of Egypt, whose dates have been approximately determined by Egyptian documents.

More uncertainty prevails concerning the period from c.2250 to 1400. We have the names of about a score of kings, perhaps one-half of the whole number, but, in spite of apparently very precise chronological statements, it is extremely difficult to assign even an approximately correct date to more than a few of them. Among these must probably be reckoned the first King, Ilusuma, and his immediate successors, Irisum, Ikunum, and Sargon I, as Ilusuma's enemy, Suabu, in all probability is identical with Sumuabu, the founder of the first Babylonian dynasty (2232–17). Concerning the two important kings, Samsi Adad I and Samsi Adad II, there are several perplexing statements. Tiglath-pileser I (*Cylinder Inscription*, 60 ff.) says that Samsi Adad, son of Isme Dagan, built on the Anu and Adad temple in Assur, but that it fell into disrepair for 641 years, when it was torn down by Asurdan, after which it lay in ruins for 60 years until it was rebuilt in the beginning of his own reign. One year of his reign, 1107, is known, but that may have been his last, and we have no means of finding out when he began to reign. It may have been as early as 1140. If so, Samsi Adad, son of Isme Dagan, would have built on this temple c.1840. Shalmaneser I, on a stone tablet found at Assur, states that the Asur temple built by Irisu was rebuilt by Samsi Adad, after a period of decay lasting 159 years; after 580 years it was destroyed by a fire, and then was rebuilt by himself. On the other hand, Esarhaddon, in an inscription on a prism found at Assur in 1904, says that after Irisu there came 126 years of decay, then a rebuilding by Samsi Adad, son of Belkapi, and a destruction by fire 434 years later. If this son of Belkapi is the same as the Samsi Adad who reigned in the tenth year of Hammurapi (2124–2081), mentioned in a legal document from Sippara published by Ranke, *Babylonian Expedition*, vi, 1, p. 9, there would be room for 126 years, but not for 159, between him and Irisum. The conflict between Ilusuma and Sumuabu may have taken place at the end of the former's reign and in the beginning of the latter's. Irisum may then have built on the Asur temple c.2226, and Samsi Adad, son of Belkapi, c.2100. It is possible that the fire occurring 434 years later (c. 1666) was an earlier one than that referred to by Shalmaneser. If Tiglath Ninib I was defeated by the Babylonians at the beginning of his reign, and Shalmaneser I, his father, inscribed the stone tablet at the end of his, the 580-year period, counted from 1290, would give the date of 1870 for Samsi Adad. There can

scarcely be any doubt that this is Samsi Adad, son of Isme Dagan, referred to by Tiglath-pileser I. He seems to have rebuilt the Asur temple early in his reign, and restored the Anu and Adad temple some 30 years later. There may have been a confusion on the part of Shalmaneser's scribes of the two Samsi Adads, and a further mistake of 33 years in estimating the period from Irisum to Samsi Adad I. Though some uncertainty still exists, these data seem to indicate that Samsi Adad I, son of Belkapi (or Belkapkapu) reigned c.2115–2095, and Samsi Adad II, son of Isme Dagan, c.1870–40. Concerning the time when Uspia built the Asur temple and Kikia the wall of Assur nothing is known, but it must have been many centuries before Ilusuma.

Ethnology. The Assyrians were a people of Semitic stock, akin to the Akkadians, Chaldæans, Arrapachians, Gutians, Lulubians, Amorites, Aramæans, Hebrews, and Arabs. But on the monuments they exhibit a distinct and easily recognized type. The closeness of their relationship to the Akkadians has probably been exaggerated. There is no historic evidence that they were a colony sent forth from Babylonia. Language alone is not a sufficient criterium. Amorites, Kassites, Chaldæans, Gutians, and Lulubians spoke and wrote the language of Akkad. There were differences of pronunciation, however, notably in the case of the sibilants. While the cultural influence of Babylonia was at all times very great, and the worship of many gods, together with much mythological material, passed into Assyria from the south, it is significant that Asur was never worshiped in Babylonia, nor Marduk in Assyria. Adad and Dagan did not come from Babylonia, nor is it necessary to suppose that Samsu and Sin were derived from there. Distinctly Babylonian gods never occur in the proper names of Assyrian kings. The difference in physical environment, climate, and natural resources between the two countries is not so great as to account for the difference in national character. A certain fierceness characterizes the Assyrian, showing itself in the torture of prisoners, the impalement of rebels, and the mutilation of the slain. The Assyrians are generally regarded as having preserved their racial purity better than their southern neighbors, and maintained themselves as a more homogeneous people. This is quite possibly true. Yet the land was probably to some extent occupied when the Semites came in. No Sumerian inscriptions have yet been found in Assyria. But the earliest kings known, Uspia and Kikia, have names that certainly are not of a Semitic type. Winckler suggests that they are Mitannian (*Vorderasien im zweiten Jahrtausend*, p. 67 (1913)). Whoever the aborigines may have been, a process of assimilation is likely to have ensued. The Mitannian conquest of a large part of Assyria and the later conquest of Mesopotamia by the Assyrians must have affected the nature of the population. Amorites, Hittites, Iranians, and Aramæans formed the largest constituent of the new province to the west of Assyria and poured into the capitals on the Tigris. The policy of deporting people from one end of the Empire to another likewise exercised its influence upon the ethnic character of the population.

History. The Assyrians do not seem to have drawn up lists of dynasties like those of the Babylonians. One reason for this may have been the eponymate, another the apparent absence of any periods of foreign domination. There were indeed palace revolutions, usurpers, and founders of new families establishing themselves upon the throne. But until these changes are better known than they are to-day, it may be expedient to adopt some other method of division. Periods may be marked by the appearance of great rulers extending the power of Assyria and forcing the political development into new channels. Such a scheme is naturally subject to revision, since fresh discoveries may bring to light rulers of greater prominence or reveal epochal events now unknown, but it may be followed for the sake of convenience.

The First Period (?–c.2250 B.C.).—It is impossible at present even to conjecture when Assyria was first inhabited by man, to what race the original settlers belonged, and at what time Semites began to occupy the land. The earliest known rulers in Assur were Uspia, who built the Asur temple, and Kikia, who constructed the wall of the city. From the term employed it cannot be determined whether Uspia was the original builder or simply restored and enlarged an already existing shrine. These names have a Hittite rather than a Semitic sound, and the deity to whom the temple was built may not have been Semitic. As to their date there is not the slightest indication. Kate Asir and Salimahum are clearly Semites, but it is not known when they reigned. Semitic kings of the Gutians and the Lulubians were contemporaries of Sargon I of Akkad (see BABYLONIA), and Semitic tribes may have settled in Assyria at as early a time. It is not impossible that before the end of this period Assyria had already pushed her power into Asia Minor. Sulili and Belbani, son of Adasi, may belong to this epoch.

The Second Period (c.2250–1870).—Ilusuma is the first Assyrian monarch whose date can be approximately established. Toward the end of his reign, apparently, he came into conflict with Sumuabu, the founder of the first dynasty of Babylon (2232–17). His son Irisum seems to have built on the Asur temple c.2226. His son was Ikunum, and his grandson Sargon I of Assyria. Sayce has shown that this Sargon, vassal of the god Asir, is referred to on the Cappadocian tablets (*Babyloniaca*, p. 67, 1911). By this discovery the date of the tablets found at Kara Eyuk has been fixed, and the fact established that the authority of the Assyrian rulers was recognized in the twenty-second century in Cappadocia. It is probable that his successor was Belkapi, whose son Samsi Adad I was a contemporary of Hammurapi (2124–2081) and is known by his building enterprises in Assur. The Hittites fell upon Babylonia in the time of Samsuditana (1963–32) and probably put an end to the dynasty; cf. King, *Chronicles concerning Early Babylonian Kings*, vol. ii, pp. 113 ff. (1907). But they must have crushed the power of Assyria in Cappadocia, and are likely to have punished Assyria herself, before they invaded Babylonia. It may not have been long after Sargon's time, in the twenty-first century, that the expansion of Hittite power began which pushed the Hyksos into Egypt, drove new ethnic elements into Mesopotamia, conquered Babylonia, and reduced Assyria to weakness. There is a certain similarity of the names of the kings to those of the first Babylonian dynasty, and it is not improbable that

the Ilusuma dynasty was also of Amoritish origin.

The Third Period (c.1870–c.1500).—A reaction seems to have set in with Samsi Adad II, son of Isme Dagan, who probably reigned from 1870 to 1840. He was a strong and resourceful ruler, claiming to have held dominion over the land between the Tigris and the Euphrates, to have received tribute from the kings of Tugrish, and to have erected monuments to himself "in the land of Labana on the shore of the great sea," by which either Lebanon and the Mediterranean or a district in northern Asia Minor and the Black Sea is meant. An inscription of his has been found on the Euphrates, south of the Chabur, in Tirka, the capital of Chana, where he built a temple to Dagan. His building activities in Assur were very extensive. We know the names of some of his successors, such as Isme Dagan II, Asurnirari I, Asirresisi I, Kisru sa Asir, a group consisting of Samsi Adad III, Adadnirari I, and Asurdan I, and, toward the end of the period, Asirrabu I and Asurnirari II, father of Asurrimnisesu. No exact dates can be given to any of them. It is not impossible that they still maintained some suzerainty over Mesopotamia and other regions in the west. Manetho may be right in stating that the Hyksos, expelled from Egypt about 1580, fortified themselves in Palestine rather than pushing farther north "for fear of the Assyrians" (Josephus, *Against Apion*, i, 90, ed. Niese).

The Fourth Period (c.1500–c.1320).—The Mitannians in Mesopotamia, invigorated by the infusion of a strong Iranian element, the Mithras and Varuna worshiping Harri, or Arrians, of Armenia, seem to have forced the Assyrians and the Kassites in Babylonia into peace with each other and an alliance probably for defense. Asurrimnisesu, son of Asurnirari II, and Karaindash entered into a covenant (*biritu*). This may have been as early as 1500. To all appearances Asurrimnisesu was an able monarch, maintaining his independence of Assyria, beautifying his capital, and strengthening its walls. But the power of the Mitannians was growing apace, and in less than a century northern Assyria, including Nineveh, was in their hands or at least in a condition of vassalage. Erba Adad I, Asurnadinahi I, Asururballit I, and Adad . . . may have preceded Puzur Asur, who was a contemporary of Burnaburiash of Babylonia (c.1381–56). Asurnadinahi II corresponded with Amenhotep III (1411–1375), and Asuruballit II with Amenhotep IV (1375–50). Belnirari, Arikdenilu, and Adadnirari II reigned between c.1350 and 1320.

The Fifth Period (c.1320–c.1140).—Shalmaneser I, son of Adadnirari II (c.1320–1290), conquered northern Mesopotamia and may have invaded northern Syria. He moved his capital to Calah, which remained the residence of the Assyrian kings, except for brief intervals, until Sargon II. His son Tiglath Ninib I after long wars conquered Babylonia and reigned over this country seven years, but was murdered by his son Asurnazirpal I. Assyria takes the place of Mitanni as suzerain of Mesopotamia in the treaty between the Hittite King Dudhalia and the son of the Amoritish King Benteshina (c.1250). During the time of Asurnirari III, Tiglath Asur, Belkuduruzur, Erba Adad II, Ninibpileser, Asurdan II, Mutakkil Nusku, and Asurresisi II the power of Assyria seems to have declined.

The Sixth Period (c.1140–911).—A great conqueror appeared again in Tiglath-pileser I (c.1140–c.1105), son of Asurresisi II. He subdued the tribes of Commagene and Melitene, went into Armenia, placed his statue on the Supnat, a tributary of the Tigris, pushed into Syria, visited the island city of Arvad, and reduced Babylonia to vassalage. His son Asurbelkala moved the capital to Nineveh. Concerning his successors Samsi Adad IV, Asurnazirpal II, Shalmaneser II, Adadnirari III, Tiglath-pileser III, Asurrabi II, Asurresisi III, Tiglath-pileser III, and Asurdan III our information is scanty. Aside from occasional raids they seem to have allowed the Aramæans to establish their kingdoms in the neighboring Mesopotamia, and Babylonia to resume its independence.

The Seventh Period (911–745).—Adadnirari IV (911–890), son of Asurdan III, carried on successful wars with Babylonia. Tiglath Ninib II (890–885) waged war in Armenia (*Nairi*) and placed his stele on the Supnat. Extensive conquests were made in the north by Asurnazirpal III (885–860). In 882–881 he reduced the Zamua tribes in Media. He fought with the strong Aramæan kingdom of Bit Adini and captured its capital in 877, and received tribute from Hittite and Phœnician cities the following year. He resided at Calah, where he built the famous "North-West Palace." Shalmaneser III (860–825) defeated the King of Bit Adini and annexed his domain (859–856), whereupon he turned his attention to Damascus. In the great battle of Karkar (854) he met a coalition of Syrian princes led by Bar Hadad I of Damascus, among whom were Ahab of Israel and Gindibu, the Arab, and, in spite of his own assurances, the probability is that he was defeated. In 849, 846, 842, and 839 he made unsuccessful expeditions against Damascus, but Jehu of Israel sent him presents in 842. He was scarcely more fortunate in his wars with the Chaldæans in Armenia, but subdued some tribes in Media. Samsi Adad V (825–812) continued these wars in Armenia and Media as well as with Babylonia. Adadnirari V (812–783) defeated Bar Hadad II of Damascus, invaded Babylonia four times, and made raids into Media. The whole reign of Shalmaneser IV (783–773) seems to have been spent in attempts to check the growth of the Chaldian power in Armenia, which now held the leading place in western Asia. Asurdan III (773–755) still undertook invasions of Syria and Babylonia, but without marked success, and rapid decay characterized the reign of Asurnirari IV (755–745).

The Eighth Period (745–606).—Tiglath-pileser IV (745–728) was a usurper whose accession was probably due to a reaction of the military classes against the priests. The conflict with Sarduris II of Chaldia for supremacy in Syria ended in the victory of Assyria (743), and eight years later Turuspa on Lake Van was in part captured and destroyed. Ahaz of Judah became a vassal in 734; part of Galilee and Gilead were ceded by Israel in 733, and Damascus was taken in 732. In 729 Tiglath-pileser invaded Babylonia and seated himself on the throne, assuming the name of Pulu. It is not certain whether his successor Shalmaneser V (728–722) was his son. The chief event of his reign was the siege and capture of Samaria (Samarain) in 723; cf. Olmstead, *Western Asia in the Days of Sargon of Assyria*, pp. 45

ff. (1907), and see SAMARIA. Sargon II (722–705) was a usurper, probably raised to the throne by the priestly interests. In the battle of Durilu he was defeated by Humbanigash of Elam and the Chaldæan Mardukapaliddin, and the latter reigned for 12 years over Babylonia (721–709). But Hamath was taken in 720 and Carchemish in 717. He invaded Arabia in 715 and brought a large number of people from Hejaz to Samaria, whence he had deported 27,290 Israelites to Mesopotamia and Media. An insurrection in Ashdod was quelled by his *turtanu*, or commander-in-chief, in 711, and Babylonia was conquered in 709. Wars were also fought, with more or less success, in Armenia, Militene, Comagene, Cilicia, Cappadocia, and Ellip. Sargon built a splendid palace in his new capital, Dur-Sargon, the modern Balawat. He seems to have fallen in a battle with the Cimmerians in Cappadocia. His son Sennacherib (705–681) moved the capital to Nineveh, which he beautified in many ways. A large part of his reign was occupied by his struggles with Babylon. Here Mardukapaliddin again established himself in 703, and appears to have headed a formidable coalition against Assyria. He was indeed driven away in 702, and his allies in Syria, among them Hezekiah of Judah and Luli of Tyre, were forced to pay heavy tribute in 701. But his son Asurnadinsum, whom he made King of Babylonia, was carried away to Susa as a captive by Hallus of Elam in revenge for an invasion of his territory by the fleet sent out from Nineveh in 594. The conflict with Nergalushezib and Mushezib Marduk ended in the terrible destruction of Babylon by Sennacherib in 689. A fruitless attempt seems to have been made to invade Egypt about 683; the outbreak of pestilence obliged the King to return. He was murdered in 681. A greater king than Sennacherib was Esarhaddon (681–668). His first act as ruler of Babylonia was to order the rebuilding of the city of Babylon. He had to conquer Assyria from his brothers, who had murdered their father. In 674 he destroyed Sidon, but he was unable to take Tyre, though his statue at Zenjirli represents him as having put his hook in the nose of Baal of Tyre as well as of Taharka of Egypt. The greatest achievement of his reign was the conquest of Egypt in 673. The 22 nomes were constituted as kingdoms, and their rulers were made Assyrian vassals. Taharka escaped to Napata, but returned; and even Esarhaddon's second expedition in 671, when Necho I was made vassal king of Sais, did not establish very securely the Assyrian control of the country. Esarhaddon made a campaign into the interior of Arabia, fought with Cimmerians and Medes. With Protothyas (Bartatua), the Scythian King, he seems to have entered into an alliance. He died on his third expedition to Egypt. Esarhaddon gives the impression of having been a wise administrator and a humane ruler. Before his death he designated Asurbanipal as his successor in Assyria, and Samassumukin, a younger son, as regent in Babylonia. Asurbanipal (668–625) continued the Egyptian campaign, occupied Memphis, captured Thebes in 667, and restored, at least nominally, the authority of Assyria. In 663 he appointed Psammetichus I as vassal in Memphis and Sais in place of his father, Necho I. Some years later Psammetichus made himself independent with the aid of Gyges of Lydia, who apparently had reasons to regret his request for Assyrian assistance against the Cimmerians. From 665 to c.645 the war with Elam continued. In 652 the great rebellion of his brother Samassumukin broke out. Filled with ambition to achieve for Babylon and himself what was to be accomplished a generation later by Nabopolassar, he entered into alliance with various nations, declared his independence, and forbade Asurbanipal to offer sacrifices in the sanctuaries of Babylonia. After four years of struggle the Assyrian monarch captured Babylon, and Samassumukin perished in the fire of his burning palace (648). Since that time Asurbanipal himself ruled in Babylon under the name of Kandalanu. The greatest military achievement of his reign was the capture of Susa (c.645). It put an end to the kingdom of Elam and enriched Nineveh with the vast treasures accumulated by a long line of kings. Sippar, Borsippa, and Cutha were punished for their participation in the rebellion of Samassumukin; some of the inhabitants were killed, others seem to have been carried away to Samaria (Ezra iv. 10). During the last 20 years of his reign Asurbanipal devoted himself to works of peace. He beautified Nineveh and other cities with palaces and temples, and he gathered a very great library in the capital. Numerous scribes were employed to copy tablets in Uruk and Sippar, and independent literary work was encouraged. The memory of his magnificence survived the fall of the Assyrian Empire, and the Greeks, who seem to have called him Sardanapalus (Σαρδανατπάλλος), exaggerated the luxury of his court and wrongly represented him as a weakling. It is true, however, that he allowed Egypt and Elam to slip out of his hands, and Phraortes to build up a powerful Median Empire with Ecbatana as its capital. His death brought about important changes. Nabopolassar, the Chaldæan governor of Babylonia, made himself independent and founded a dynasty. Cyaxares of Media, according to a cuneiform inscription, his "ally and helper," besieged Nineveh. He was defeated, however, and driven away by Madyas, son of Protothyas, the Scythian King (Herodotus, i, 103 ff.). By this timely assistance of the only ally Assyria had, the capital was saved, and the Syrian provinces were in a measure secured by the march of the Scythians to the border of Egypt to prevent Psammetichus from occupying Assyrian territory. Asuritililaniukin (625–c.618) seems to have been succeeded by Asursumlisir (c.618–c.616), and Sinsariskun (c.616–606) was the last King of Assyria. At length the two allies, Cyaxares and Nabopolassar, accomplished their end, the Medes probably doing the larger part of the work, as Assyria proper was to be their share. All the cities were destroyed.

Government. It is possible, though it cannot yet be proved, that the earliest rulers were elected annually and bore the title of *limmu*. Before it became an honor assumed by kings and conferred on governors, the eponymate is likely to have implied supreme power. But the growth of the priesthood naturally developed a theocratic form of government. The *isakku*, or high priest, of Asur became the head of the state. As the vicegerent of Asur he was his king (*sarru*). It is now certain that one of these titles does not exclude the other; and that the use of *isakku* alone does not indicate dependence on a foreign power. The king

of Assyria always remained ruler by the grace of Asur. But his military and administrative occupations tended to put a limit to his priestly functions and to facilitate the growth of a well-organized Asur priesthood pursuing its own ends. The king was not worshiped as a god. Nominally he was an autocrat. He is represented as accomplishing everything himself; he commands his armies, defeats his enemies, disposes of the booty, subdues kingdoms, builds cities, temples, and palaces, puts to death whom he pleases, saves whom he favors. No council is mentioned, and we do not know whether there was a written law as in Babylonia; it is rarely that the name is recorded of a general, a statesman, an official, an artist, or a builder. Yet the tartan (*turtanu*) was practically a wazir; his position is no doubt correctly represented in the old Ahikar (q.v.) romance. Many of the great victories were won, many of the campaigns planned, by generals, while the king remained quietly at the capital. The work of government was carried on according to precedent or the judgment of powerful officials without his personal participation. The authority and influence of the rab-saris, the rab-sake, the rab-mag, the rab-dupsari, the rab-sangu, must have been very great. Occasional revolutions and insurrections throw a light on the operation of these military, priestly, and bureaucratic powers within the state. The cities were ruled by governors; extensive privileges and exemptions were enjoyed by Assur, Calah, Nineveh, and Arbela, by Haran in Mesopotamia, and by certain Babylonian cities when they formed a part of the Empire. No careful study has yet been made of the provincial government. But it is evident that, as in the Roman Empire, different principles were followed in the case of countries that were attached to Assyria by a sort of personal union, those that were ruled directly by governors, and those that were treated as vassal states, subject to tribute, but allowed to have their own kings.

Religion. The chief deity of the Assyrians was Asur. In our earliest inscriptions he is generally called Asir. Originally the local god of the city of Assur, he became, with the growth of the kingdom, the national deity, as truly as Chaldis of Chaldia, Chemosh of Moab, and Yahwe of Israel. Besides him Istar occupies the most prominent place. In Nineveh her character as the goddess of love seems to have been emphasized, while in Arbela she appears predominantly as the goddess of war. Some oracles given by priestesses at the sanctuary in Arbela have come down to us. (See Astarte.) Dagan, probably an Amoritish deity (see Dagon), and Adad, who may have been of Aramæan origin (see Hadad), appear at an early time. Samsu, the sun god, was worshiped in Assyria, as everywhere in the Semitic world. The same is true of the moon god, Sin, especially after the conquest of Mesopotamia, where he had a famous sanctuary at Haran, though no prominent king has a name compounded with his before Sennacherib (Sin ahi erba). Esarra is of Hittite origin, and the true pronunciation of Ninib is still uncertain. Adad shared his temple in Assur with Anu, and the Sumerian gods Ea, or Ae, Ellil (probably pronounced Bel in Assyria), and Nergal, the god of war, were recognized. Babylonia naturally exercised a very strong influence, though it may have been somewhat exaggerated. There seems to have been a marked similarity between the forms of worship and the religious festivals in the two countries, and some Babylonian myths were evidently taken over by the Assyrians. Since no complete temple has been preserved, it is difficult to say whether Babylonia furnished the models. That some of the temples of Assyria were built of bricks may not be due to imitation but to practical considerations. It has been customary to look upon the large number of copies made by Asurbanipal's scribes from Babylonian temple archives as an evidence of the inferior culture of the Assyrian priesthood; but a considerable part of the library is evidently earlier than Asurbanipal's time, and it may be wise to await the results of more complete excavations before far-reaching conclusions are drawn. Such prayers as those offered to the sun god show genuine piety, and even the horror with which offenses against the majesty of Asur are regarded, and the pride with which his deeds are recorded, by the royal scribes reveal a sense of divine glory and transcendence as well as national feeling. Beyond a general trend toward monolatry and monotheism, there is no indication that Assyrian thought ever followed to the end the road that in Israel led to the worship of one god only. But the Assyrian gods were represented in human form, and Asur, the "father of the gods," was conceived of as the creator of heaven and earth. Concerning man's fate after death the Assyrians do not seem to have speculated much; even before their acquaintance with the story of Istar's descent to the nether world they are likely to have looked upon it as "the land of no return" which holds no attractions for the living.

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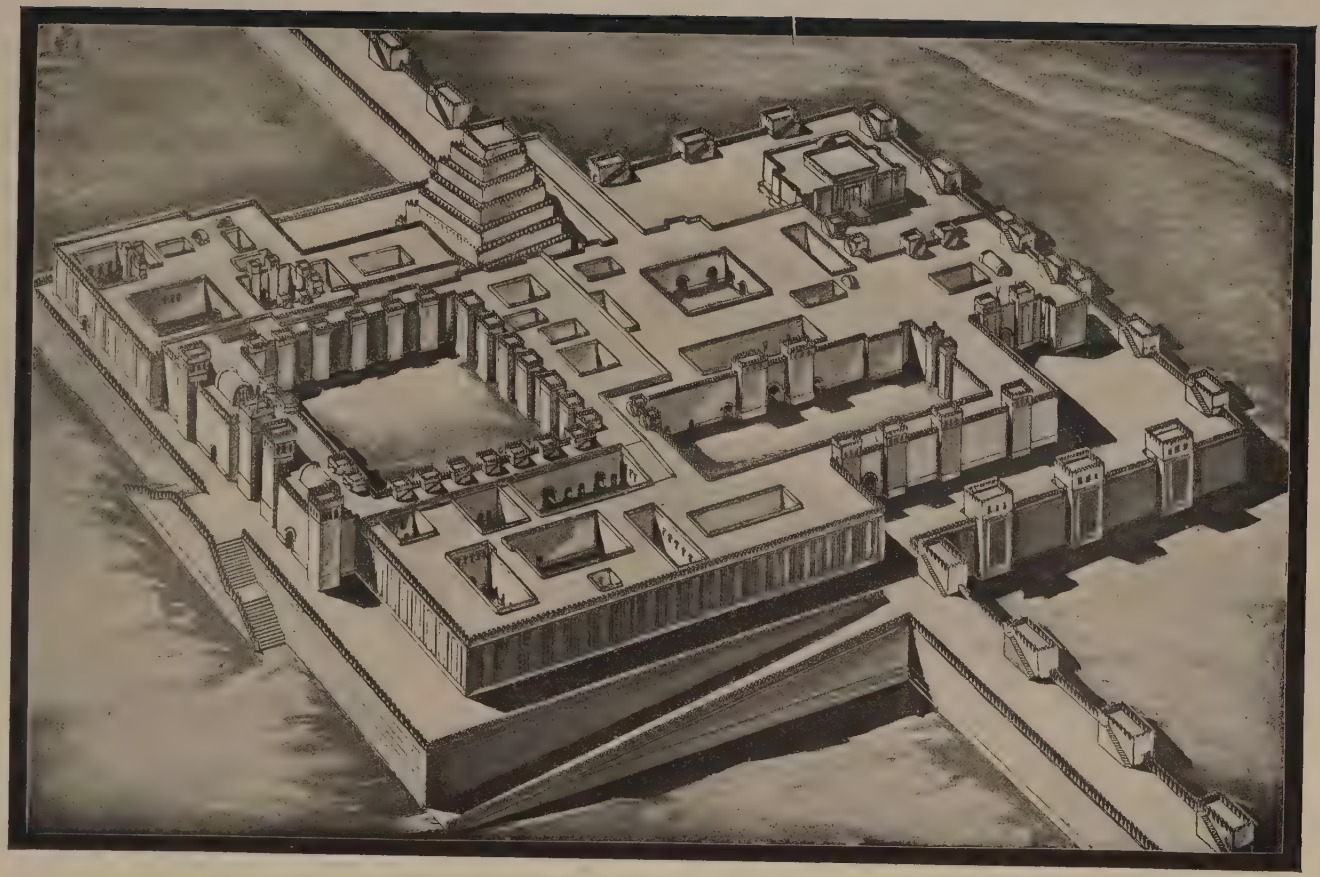
ASSYRIAN ART. The historic inscriptions show that the earliest rulers of Assyria in the seventeenth century B.C. built monuments and enriched them with images, with colored decorations, and with hangings. None of these early works has yet been found, but it is probable that they resemble the art of Babylonia even more closely than later works, because at first the Assyrians, being cruder in their culture, were more imitative than when their national characteristics found artistic expression after Assyria became a great power. Roughly speaking, the following periods may be recognized: (1) Babylonish, seventeenth to twelfth centuries; (2) Archaic, twelfth to ninth centuries; (3) Developed or Epic, ninth to eighth centuries; (4) Picturesque, seventh century. The temple and all forms of religious art predominating during the earliest centuries, had taken second place by the time of Asurnazirpal III (ninth century), and the building and decorating of the royal palace, the celebrating of royal victories, exploits, and every-day life became and remained the principal theme of Assyrian art, in harmony with the despotic and secular character of Assyrian institutions. It is a help in tracing its history that nearly every King built at least one palace to commemorate his reign, in which everything was executed by his royal artists. Successive shiftings of the capital to Nineveh, Calah, and Ashur helped to multiply royal constructions. Beginning in the reign of Asurnazirpal III, Assyria came in touch with every phase of Oriental art—Egyptian, Phœnician, Hittite, Ægean. The result was a strong reciprocal influence. Between the ninth and seventh centuries Nineveh was the centre of the entire East for art as well as commerce; here colonies of foreign artists settled, and imitated or transformed the strongly marked character of Assyrian art, sending their works, by the hands especially of Phœnician traders, over the entire civilized world. This Assyrian supremacy did not cease until the fall of Nineveh, about 607 B.C. In describing the character of Assyrian art, it is not easy to detach the other arts from architecture, because the construction itself, being of brick, was necessarily so plain, so devoid of special features, such as colonnades or elaborate moldings, that both relief sculptures and color decoration were used for effect and became an integral part of architecture. Cult images of the gods, often of precious metals, were placed in the temples, as well as reliefs with mythological subjects. Doors were covered with bronze-figured plaques or carved in wood; obelisks and stelae were set up in the open air; but the favorite form of sculpture remained the low-relief frieze, and the favorite material, soft limestone. The industrial arts were highly developed. The King and his courtiers dressed in superbly embroidered and figured stuffs; horses were superbly caparisoned—arms and armor were highly finished; the King's throne was of carved ivory and gold, and the King was served out of gold, silver, and bronze vessels, with figures in relief. The Phœnicians and Syrians in particular were cunning workmen, who supplied all that Assyrian luxury demanded, and life was then as luxurious as under the Roman Empire. The bronze gates of Balawat, the dishes and ivories from Nimrud now in the British Museum, the carved cylinders and gems there and in the Louvre, Metropolitan Museum, and De Clercq Collection, show the character of the smaller arts.

Architecture. The Assyrians copied the Babylonians far more closely in architecture than in the other arts. They employed brick in similar fashion, though they occasionally faced their substructures and walls with stone slabs as the Babylonians never did. Their temples were of the same stepped shape; their palaces on a similar quadrangular plan, with chambers also grouped around three courts. Color decoration was used, both outside in the form of reliefs of glazed faïence, and inside in wall paintings and in the coloring of the sculptured dadoes in all the large halls and passageways. But we cannot yet say that in these particular forms which the Assyrians gave to their colored decoration they were following Babylonian models. Certainly it seems as if they innovated in one very important particular, i.e., in the use of long lines of bas-reliefs for internal decoration. The alabaster and soft limestone which they quarried on their borders had not been available to their southern neighbors, the Babylonians; and in these materials the Assyrian sculptor reveled quite as much as had the Egyptian, and he carved on these slabs sculptures appropriate in subject for all the different parts of the palaces and temples. There is nothing to show how the Assyrians treated sepulchral or private architecture, though future excavations may do this. But their military architecture can be studied on several sites, especially at Dur-Sargina (Khorsabad). The use of crude brick for the mass of all platforms, substructures, and bulk of walls subjected the buildings to the same disintegrating process through infiltration of water, as in Babylonia, which made constant repair necessary and led to the collapse of the vaults after the buildings had been abandoned. In fact, the Assyrian practice of using the crude bricks before they were dry produced a sort of brick amalgam far softer and more destructible than the Babylonian; nor were the Assyrians so careful to face this *pesé* with hard-burned and enameled bricks as were the Babylonians. In the interiors they usually protected it below by the dado of sculptured slabs and above only by a thin layer of painted stucco. In one way the Assyrians had the advantage, by using quarried stone blocks for facing their foundations; but, again, they



ASSYRIAN ARCHITECTURE

PALACE OF SARGON—RESTORATION

did not use the good lime-mortar or beds of bitumen with which the Babylonians cemented their courses of brick.

The immensely thick walls—sometimes 20 and 30 feet—were made necessary by the great weight of the massive vaults and flat roofs, which made a second story impossible in palaces and houses, and also made it necessary to admit light from above, as windows cut through such walls would be almost useless. Both these facts made the residences extremely cool—a most important item in such a hot climate. Of course the Assyrian use of the arch, vault, and dome was rudimentary; each unit being supported on its solid walls, so that there were no long lines of arcades, no grouping of domes supported on piers. But there was a type of lighter architecture in accessories, such as porches and pavilions, shrines and small temples, summer-houses and belvederes. Here small columns of stone or marble or wood sheathed in metal (e.g., bronze), supported architraves and decorated roofs. Where fancy could have play without regard to structural necessities, we see the Assyrian supporting his columns on the backs of lions or sphinxes, surmounting their capitals with gazelles and antelopes. They here used capitals of at least two orders—cubic and Ionic—of extremely well-proportioned and appropriate types. But in these rather ephemeral works there lay such a contrast to the main buildings, with their heavy, unrelieved masses, that no harmony could be established between them.

The royal palaces of Assyria are its best preserved as well as most characteristic monuments. The religious fanaticism of the Babylonians had given to their temples the same preponderance that the civil despotism of Assyria gave to its palaces, in comparison with which the temples were insignificant. Long before Nineveh, the capital of Assyria was Calah, the modern Nimrud (q.v.). Here most of the prominent Assyrian kings from the thirteenth to the seventh century built or rebuilt palaces. The palace of King Asurnazirpal (885–860 B.C.) has been most systematically excavated and was the most artistic. That of Esarhaddon shows how, notwithstanding the dread of the curses called down upon such sacrilegious work, the pernicious habit was indulged in by the later Assyrian kings of despoiling older palaces to decorate their own. Nineveh itself is represented by the mounds of Nebbi Yunas and Koyunjik; only the latter has been excavated, especially the palaces of Sennacherib and Asurbanipal, whose sculptures decorate the British Museum. That of Sennacherib was magnificent. One of its vaulted halls measured 176 × 40 feet; another 124 × 30 feet. Many other mounds conceal superb palaces. One of these has been excavated with scientific care, the city and palace of Sargon at Khorsabad (q.v.), called Dur-Sargina, 'City of Sargon.' Sargon's own official account of its construction has been preserved in several inscriptions, and the ruins help us to understand it. Nothing in palace architecture of any age—not even Nero's Golden House—could have surpassed this Assyrian palace. It was built during 721–705 B.C., as a sort of Versailles to the neighboring Nineveh; it was never disturbed by later monarchs, and represents the plans of a single architect. As for the city, it formed an almost perfect square; it was on flat ground as usual. Its walls are about 80 feet thick, and their present height of 40 to 60 feet is but a fraction of the original height, which was, however, considerably less than the 348 feet given by Herodotus to the walls of Babylon. They were strengthened by about 167 towers. On each of three sides were two gates, one of which was the decorated state gateway for foot passengers, enriched with figured enameled bricks and sculptured bulls and winged genii. These gateways were immense edifices, covering 10,000 square yards, and their courts and vaulted halls and passages were the market places and forums of the city. The royal palace itself made a break in the city wall, being partly inside, partly outside the city line. Its plan includes 209 apartments. Its level was high above that of the city, and its outer wall was defended by towers. The area covered was nearly 25 acres (128,500 square yards). The arrangement of apartments in three general groups each around a main court, supplemented by other smaller courts, is the clearest commentary upon the conditions of ancient life in the East, which have been more or less handed down to modern times. First comes the *Seraglio* for the men, joined to the *Selamlik*, or state apartments. Second is the *Harem*, or private apartments of the King, his wives, and their attendants. Third is the *Khan*, or dependencies, offices, and storerooms. The Seraglio itself had 10 courts and 60 apartments. Each court, with its chambers and passages, was a separate unit. Even the largest state court could be used, by the help of awnings, for ceremonial occasions. The sculptures, enameled bricks, frescoes, colored stucco, marble pavements, and hangings made a gorgeous display.

Sculpture. When Layard, Botta, and Place made the first excavations in Assyria, it was the sculptures that excited the greatest amazement throughout the world. The colossal bulls and lions guarding the portals and the miles of scenes in low relief were unlike anything yet known in the history of art, and their interest was not merely artistic, since they furnished the most graphic information as to the life, costume, and history of the people. There are still gaps. A solitary female statue of the fourteenth century B.C. seems to hint that Babylonian models were then supreme, for its counterpart is found in earlier Babylonian terra-cottas and gems. But later works show that statuary was seldom produced, as the Assyrian artist never mastered its technique; the few remaining statues of kings—such as Asurnazirpal, Sennacherib, and Asurbanipal, or of divinities, like Nebo—when compared with the mass of relief work, show that the heart of the Assyrian sculptor was not in this branch of his art. He did not know how to model the figure under the drapery, nor had he learned to treat drapery in folds, but only as a smooth sheath. The colossal man-headed bulls and lions are in reality not works in the round, but in relief, standing out from a central block. Where the Assyrian sculptor showed his power was in the observation of Nature eye to eye, and his ability to reproduce his impressions with realism without descending to triviality. In the royal hunting scenes this is particularly striking. The lion standing regally in the royal park gazing down at the reclining lioness; the lioness shot through the spine and dragging along her paralyzed hind quarters; the mortally wounded lion gnawing his paws; the scene of the wild-ass hunt, with the various stages of watchfulness, panic, and flight, wounding and tearing down by hounds; the hunting hounds themselves led in

the leash—these and many more variations on similar themes are studies from life such as no other art has given us. Only the needlessly fastidious will carp at the amusingly primitive composition of some of these scenes, due to the entire absence of a knowledge of perspective. Each figure in itself is perfect; and when the artist confines himself to a simple frieze-like procession, as in the scenes of the return from the hunt with the dead animals, or the King in his chariot starting the game, his composition does not suffer even from this imperfection.

Up to the present no discoveries of relief sculptures have been made earlier than the time of Asurnazirpal in the early ninth century; but the art of his time, so powerful and complete, shows that probably even under the great Tiglath-pileser in the twelfth century Assyrian sculpture must have freed itself from its Babylonian swaddling-clothes. When this was happening, Babylonian sculpture, after a development of some 3000 years, had fallen into absolute decay, and such works as those of Meredach-idinachi, lifeless and fussy, would have been incapable of inspiring a new art. In fact, the Assyrian sculptor found quite a new manner. Instead of the soft contours and delicate gradations of early Babylonian art, the Assyrian technique was sharp and clear-cut, the outlines distinct, the details given with accuracy. In the figures, the muscles, features, and hair; in the drapery, the patterns; and in the armor, harness, chariots, and other accessories—all the details are given with crisp touch. Doubtless the softness of the limestone that served as material helped the sculptor to realize his ideal, and to produce the immense quantity of contemporary annals in stone that amazes us. The realism was assisted by the use of color in figures, drapery, and accessories. The Assyrians in this polychromy of sculpture, as well as in the successful use of the frieze in low relief, were the worthy predecessors of Greek art. The sculptures themselves can be studied in European museums; there remain on Assyrian sites only the yet undiscovered works—probably numerous. Reliefs from Asurnazirpal's palace may be seen not only at the British Museum, whither the great bulk of them were taken, but also at the Gregorian Museum in the Vatican, at the Historical Society in New York, etc. They illustrate the simple, epic stage of Assyrian sculpture, and are mostly colossal figures arranged in a single row on the marble dado that decorated the rooms and corridors of the palaces. The figures are heavier and more strongly marked than later, and there are few or no accessories. What the course of development was during the next 150 years we can only surmise, for the next large group of stone reliefs is that of the palace of Sargon at Khorsabad, now in the Louvre, which shows the last stage of this epic style; it is still colossal and simple, but while the guardian lion of Asurnazirpal snarls and strikes terror, the man-headed bulls of Sargon are genteel colossi of colorless mien. The processions, also, have lost the early fire. The time was ripe for a change of style, which appeared under Sargon's successor, Sennacherib, whose reliefs show the advent of a novel picturesqueness. Figures are multiplied on a background often full of accessories, of landscape, and of buildings; in place of the majestic frieze of large personages, small figures are scattered everywhere. It is true that more respect is shown to art by not allowing the rescriptive inscriptions which accompanied the reliefs to be run straight across the figures, as hitherto; but the defects consequent on ignorance of perspective are made far more conspicuous. This introduction of the pictorial element, in order to infuse new life into the art, seems to have been successful; for the art of the succeeding generation—that of Asurbanipal, whose sculptures form the most fascinating group in the British Museum—shows the good qualities of both the old and the new schools. There is a riot of many figures in the battle scenes of the Elamite War; there is the quiet simplicity of the antique frieze in many hunting and banquet scenes. If we miss the greater force of the time of Asurnazirpal, there is an added delicacy.

The subjects of the reliefs fall into several categories: 1. Religious and mythological scenes were rare and belonged mostly to the temples, which have not yet been as fully explored as the palaces; there were statues of the gods and heroes, and reliefs of the conflict of Merodach with the dragon, the labors of Gilgamesh, and the wars of the evil spirits. 2. Scenes of contemporary history were particularly numerous. There were court sculptors who were as much the King's historiographers as were the writers. Every incident in the long war was portrayed in a fashion similar to that of the later artists in such works as the columns of Trajan and Marcus Aurelius. In such scenes as the battle of Susa, which completed Asurbanipal's conquest of Elam, each successive incident of the battle, even each separate phase of the duel of the two leading warriors, is given separately and side by side. It is a sort of moving panorama, which proceeds *pari passu* with the descriptive text. The Assyrian official annals of each yearly campaign are thus illustrated at every point. We see exactly how the Assyrian soldiers were armed and fought, marched, encamped, crossed rivers, attacked cities, slaughtered and tortured enemies, cooked, and sacrificed to the gods. 3. Scenes of daily peaceful life are only less numerous. The King banqueting with his Queen in the palace garden, or hunting lions, gazelles, or wild asses; the construction of a royal palace; the royal horses led to the river to be watered; incidents of court life and glimpses of the royal parks—all show the versatility of the artist. It is, however, true that far less use is made of such material than was the case in Egypt, where many more details of manners and customs are portrayed. The Assyrian artist cared more for the official acts of his sovereign than for the life of the people or for the mysteries of religion. Consult the bibliography given in the preceding article.

AST, äst, Georg Anton Friedrich (1778–1841). A German philologist and philosopher. He became professor of classical literature at Landshut (1805) and at Munich (1826). Among his works were a *System der Kunstlehre oder Lehr- und Handbuch der Aesthetik* (1805); *Grundlinien der Geschichte der Philosophie* (1807); *Wissenschaftliche Darstellung der Grammatik, Hermeneutik und Kritik* (1808); *Platos Leben und Schriften* (1816), and an edition of Plato in 11 volumes (1819–32) with Latin translation and extensive notes.

ASTAR'BOARD. See Helm.

ASTARTE, ăs-tär'tē. The woman whom the hero of Byron's *Manfred* had guiltily loved, and whose lovely shade appears to him at the close of the second act.

ASTARTE, ASH'TORETH. A goddess appearing frequently in the Old Testament (1 Kings xi. 5–33; 2 Kings xxiii. 13), where she is called the goddess of the Sidonians. The form of her name in the Masoretic text of the Old Testament appears to be due to intentional perversion, her real name being Ashtart, to the consonants of which late scribes assigned the vowels of Bosheth, 'shame,' thus producing the form Ashtoreth. Her worship was quite prevalent in the time of the Judges, and Solomon built a temple to her. Astarte was, however, not only the goddess of the Sidonians; the Bible mentions a temple of Astarte at Ashkelon (1 Sam. xxxi. 10), and from Semitic inscriptions we learn of a temple to Astarte at Citium in Cyprus, and at Eryx in Sicily, as well as in Carthage. It is fair to infer, then, that she was a Phœnician goddess. From Cyprus her cult was carried to Greece and appears as that of Aphrodite. Astarte herself is not original with the Phœnicians. In Assyria there is an Ishtar, "the Lady," "the Queen of the Gods," "the Goddess of War," the planet Venus; she, too, is the goddess of various localities, "Ishtar of Arbela," "Ishtar of Ninua," and she finally assumes a national position. In south Arabia there was a male deity Athtar. The inscription of Mesha, King of Moab, mentions an Ashtar-Chemosh. This has been supposed to be a male Ashtar; but in all probability it is an abbreviated form of Ashtart-Chemosh, the goddess Astarte as spouse of the chief god of Moab. Astarte is represented as a female figure, generally naked, rather short and round, with hands holding the breasts. Recent excavations in Palestine have brought to light a number of representations of this goddess. Astarte was regarded as the goddess of fertility, fruitfulness, and love. She is sometimes represented with her symbol, the dove, or in the form of a cow. There can be no doubt that Astarte is meant by the designation "Queen of Heaven." The plural Ashtaroth is often used in the Old Testament as a general term for "goddesses." Consult Jeremias, *Das Alte Testament in Lichte des Orients*, pp. 107 ff. (1906), and Gressmann, *Altorientalische Texte und Bilder*, vol. ii, pp. 79 ff. (1909).

ASTAT'IC NEE'DLE (unstable, from Gk. *ἀ, a*, priv. + *στατός, statos*, standing). A compound magnetic needle which has little if any directive power and is composed of two magnetic needles suspended parallel in the same system, but with their poles reversed. The effect of one needle is to neutralize the other, and the result is the same as if a very weak needle were placed in the magnetic field. The chief use of the astatic needle is in the astatic galvanometer, where great sensitiveness is required. Possessing but a slight directive power, it will deflect under the action of very weak currents of electricity in the surrounding coils. (See GALVANOMETER.) A simple description of the astatic needle and the astatic galvanometer will be found in Silvanus P. Thompson, *Elementary Lessons in Electricity and Magnetism* (New York, 1901).

ASTAY'. See ANCHOR.

ASTEN, äs'ten, FRIEDRICH EMIL VON (1842–78). A German astronomer. He was born at Cologne and studied at the University of Bonn. From 1870 he was connected with the observatory of Pulkova, Russia. He is chiefly known for his researches in connection with Encke's comet.

AS'TER (Lat., Gk. *ἀστήρ, astēr*, star). A genus of plants of the family Compositæ. The genus contains a great number of species, both herbaceous and shrubby, mostly natives of the United States. A number of perennial species are in cultivation as garden flowers. They bloom from July to November and are among the most valuable hardy plants for border and roadside planting. The ray and the disk are of different colors. The New England aster (*Aster novæ-angliæ*) is one of the most showy native American asters. The best known and most valued of all the asters is the China aster (*Aster chinensis*), a summer annual, of which more than 250 varieties are in cultivation, and new ones are continually being introduced. The plant was brought from China in the early part of the eighteenth century and has been greatly improved by cultivation. The different varieties exhibit diversity of form and color. The plant prospers in a rich, free soil. *Aster argophyllus*, or *Haxtonia argophylla*, a native of Van Diemen's Land, is a whitish shrub, smelling strongly of musk. A plant, known in the West as woody aster, *Xylorrhiza parryi*, is reported as very poisonous to sheep in Wyoming. For illustration, see ARAUCARIA.

ASTER, äs'tĕr, ERNST LUDWIG VON (1778–1855). A German military engineer. While an officer in the Saxon army, then an ally of the French, he submitted to Napoleon in 1811 a plan for the fortification of Torgau. Napoleon became much interested in it, and the fortress was finished under Aster's superintendence. After the Russian campaign, in which he took part, he served in the Russian army for some time and then returned to the Saxon service. In 1815 he became colonel in the Prussian army, and after the battle of Waterloo, in which he was engaged, he was promoted to be general and made inspector of Prussian fortifications. He planned the elaborate defenses of Coblenz and Ehrenbreitstein and was made commander of both fortresses. In 1827 he was promoted to be lieutenant-general, and in 1842, general of infantry. He left essays and other works posthumously published.

ASTERABAD, äs'tĕr-â-bäd'. See ASTRABAD.

AS'TE'RIA. See SAPPHIRE.

AS'TERISK (Gk. *ἀστερίσκος, asteriskos*, a little star). A sign or symbol (*) used in writing and printing as a reference either to a note at the bottom or on the margin of the page. The obelisk or dagger (†) and many other marks are similarly employed; but when there are several references on the same page, it is now common to use the numerals 1, 2, 3, etc. The asterisk and other similar signs may have any arbitrary meaning assigned to them, at the will of the writer, their signification being previously explained. The Greek grammarians, or critics, used the asterisk to mark a passage that had been unjustly suspected but was to be held as genuine, or a passage in any way remarkable; the obelisk, again, marked an interpolated or an objectionable word or passage. See TEXTUAL CRITICISM.

ASTERN'. See BEARING.

AS'TEROIDS. See PLANETOIDS.

AS'TEROPH'YLLITES (Gk. *ἀστήρ, astēr*, star + *φύλλον, phyllon*, leaf, alluding to the arrangement of the leaves). Fossil plant remains, formerly considered as representing a distinct genus, but now known to be, together with *Annularia* and *Sphenophyllum*, the heteromorphous leaves of the large group of *Calamites*,

of Devonian, Carboniferous, and Permian time. See CALAMITES.

ASTHE'NIA (Gk. ἀσθένεια, *astheneia*, loss of strength, from ἀ, *a*, priv. + σθένος, *sthenos*, strength). 1. In medicine, a condition of weakness, general or local, resulting from disease. General asthenia is a depression of the vital forces, attended by emaciation, such as occurs in advanced tuberculosis or long-continued fevers. 2. A specific infectious disease of chickens, due to *Bacillus* (*Bacterium*) *asthenicæ*, a member of the colon group. Cultures of this germ are killed by immersion in a 1 per cent solution of carbolic acid for five minutes, though they can vegetate between the temperatures 40° and 55° C. (104° to 131° F.). The organism is killed at a temperature between 57° and 60° C. (134.6° to 140° F.). The most marked symptom of asthenia is extreme emaciation; the chief lesions are found in the duodenum; and in the contents of this part of the intestine the pathogenic organism occurs in large numbers. Thorough purgation followed by tonics has been recommended in the treatment of fowls suffering from asthenia. At present the disease is reported only in the United States and is popularly known as "going light."

AS'THENO'PIA (Gk. ἀ, *a*, priv. + σθένος, *sthenos*, strength + ὤψ, ὄps, eye), or WEAK SIGHT. A very common affection of the eye, caused by fatigue of the muscles moving the eyeball or of the ciliary muscle. It occurs most often in debilitated or neurasthenic persons, and its chief symptom is pain in or around the eyes, or headache, which is increased by use of the eyes, particularly upon near objects and in artificial light. If the strain is prolonged, the results may be temporary dimness of vision, sometimes double vision, confusion of the lines in reading, photophobia, irritability, itching and burning of the margins of the lids, and lachrymation. Disturbances of the stomach and of menstruation may also result. The affection may be muscular, accommodative, or nervous.

Muscular Asthenopia. This is caused by weakness of some of the muscles moving the eyeball, and often depends upon defects of sight. The symptoms result from the prolonged strain upon the weaker muscles in the effort to keep the visual axes of the eyes in the proper plane, in opposition to the action of stronger muscles.

Accommodative Asthenopia. This is due to strain and subsequent fatigue of the ciliary muscle which regulates the curvature of the crystalline lens. It occurs in various forms of defects of sight, such as astigmatism and hyperopia (see SIGHT, DEFECTS OF), and is due to the efforts of the ciliary muscle to alter the degree of curvature of the lens so as to bring rays of light entering the eye to a focus upon the retina.

Nervous Asthenopia. This is a functional disorder of the normal eye, depending upon hysteria, neurasthenia, or debility.

ASTHMA, ăs'mȧ *or* ăz'mȧ (Gk. ἄσθμα, short-drawn breath, panting, from ἄειν, *aein*, to blow). A disorder of the function of respiration characterized by acute attacks of difficult breathing accompanied by coughing, wheezing, and, in severe paroxysms, by slight asphyxia. Asthma most often develops after some slight catarrhal inflammation of the bronchial mucous membrane. Only the physician can diagnose asthma from an attack of shortness of breath. The theories of its causation have been numerous, but the one that best explains the symptoms is that asthma is due to spasm of the muscle fibres in the walls of the bronchi. In some cases it seems to be hereditary, and intensely nervous people seem to be more often affected. It occurs in men oftener than in women, and very frequently in children, especially after measles, bronchitis, or whooping cough. The attack may be set up by the inhalation of pollen, as in hay fever, by closure of the nostrils with polypi or other growths, causing intra-nasal pressure. In some people particular odors will bring on a paroxysm. An asthmatic attack usually begins suddenly, at night, with a preliminary sense of oppression. The patient wakes with much distress and anxiety, some pain in the chest, and great difficulty in breathing. The efforts to obtain air may necessitate great muscular exertion, and the patient may become covered with perspiration. The face may become purple and the eyes bloodshot. The attack may pass off and not reappear, but the disease is prone to be a chronic one. Treatment is mainly dietetic and hygienic, but many cases are cured by appropriate intra-nasal surgery. Dry inland climates are favorable. Bromides, iodides, nitrites, and opium, atropine, and adrenalin are the drugs most widely employed. Consult Osler, *Principles and Practice of Medicine* (New York, 1912).

ASTI, äs'tē (anciently, *Asta Pompeia*). An episcopal city in the province of Alessandria, north Italy, on the left bank of the Tanaro, 35 miles southeast of Turin (Map: Italy, C 3). The walls are dilapidated, the streets narrow and irregular, and the general appearance mediæval. The cathedral dates from 1348, and the church of San Giovanni, built over an ancient Christian basilica, has monolithic columns bearing sixth-century symbols. Asti is famous for its sparkling wine (*Asti spumante*). It has trade in leather, woolen goods, hats, wine, and agricultural produce, and manufactures of silk. It excelled in the manufacture of pottery in ancient times. In the Middle Ages it was a powerful republic and famous for its 100 towers, of which 30 still remain. It was burned by the Emperor Frederick I in 1155, and after a series of vicissitudes came into the possession of the Visconti of Milan, by whom it was ceded to the French, who held it till the middle of the sixteenth century, when it passed into the possession of the dukes of Savoy. The poet Alfieri was born here in 1749. Pop., 1881 (commune), 32,233; 1901, 38,045; 1911, 41,252.

ASTIE, äs'tyȧ', JEAN FRÉDÉRIC (1822–94). A Protestant theologian. He was born at Nérac, France, and studied at Geneva, Halle, and Berlin. He was a clergyman in New York from 1848 to 1853, when he removed to Paris. In 1855 he settled at Lausanne, Switzerland, where, in the following year, he was appointed professor of philosophy and theology. The influence of Kant, Schleiermacher, and Vinet is revealed in his numerous writings on theology. In 1868 he became the editor of the *Revue de Théologie et de Philosophie*, which he conducted for many years. He published *Histoire de la république des Etats-Unis* (2 vols., 1865); *Mélanges de théologie et de philosophie* (1878).

ASTIG'MATISM (Gk. ἀ, *a*, priv. + στίγμα, *stigma*, prick of a pointed instrument; spot, mark). A defect in vision caused by the refraction of light by the eye differently in different planes. To an eye thus affected, a pinhole in a paper may appear round, but when the paper is moved a little, the circular hole will seem to be

an ellipse. Irregular astigmatism is that form in which there is a difference of refraction in various parts of the same meridian, as after injuries of the cornea or congenital defects in the lens. Regular astigmatism is that variety in which the degree of refraction of the two principal meridians differs. Astigmatism is usually due to differences in the curvature of the cornea: less frequently, of the lens. It is either simple, in which one meridian is normal and the other hyperopic; compound, in which both meridians are unequally hyperopic or myopic; or mixed, in which one is hyperopic and the other myopic. Astigmatism causes diminution of vision and asthenopia, with the usual manifestations of eye strain. Drowsiness, congestion of the conjunctiva, or blepharitis, may be the only symptoms; but severe headaches, neuralgias, ocular pains, and nausea are often present. In persons of a neurotic tendency especially, a wide range of reflex disturbances may accompany even a low degree of astigmatism. It is corrected by glasses ground as cylinders, sphero-cylinders, or a combination of a spherical and a cylindrical lens; or by crossed cylinders, which are a combination of two cylindrical lenses, with their axes at right angles to each other.

ASTLE, ăs'l, THOMAS (1735–1803). An English antiquary and paleographer. He wrote *The Origin and Progress of Writing* (1784; reprinted, 1876), an important contribution to English writings on the subject of paleography. He published also *An Account of the Seals of the Kings, Royal Boroughs, and Magnates of Scotland* (1792).

ASTLEY, HUGH JOHN DUKINFIELD (1856—). An English clergyman and anthropologist. Educated at Trinity College, Dublin, he was in 1881 ordained a clergyman in the Church of England. In 1894–96 he was incumbent of the parish of St. John the Evangelist, at Brixton, and from then on was vicar of East and West Rudham, Norfolk. He was Donellan lecturer at the University of Dublin (1906–07), honorary editorial secretary of the British Archæological Association (1897–1906), and librarian of the British Numismatic Society (1903–06). Becoming noted for his researches in archæology and anthropology, he was made a fellow of the Royal Historical Society and of the Royal Anthropological Institute, and a member of many other organizations. The degrees of M.A. and Litt.D were conferred upon him. His writings on theological, scientific, and social subjects include: *The Resurrection and Modern Thought* (1889); *The Date of the Samaritan Pentateuch* (1892); *The Higher Critics and Holy Writ* (1905); *Prehistoric Archæology and the Old Testament* (1908); *Portuguese Parallels to the Clydeside Discoveries* (1904); *The Saxon Church at Bradford-on-Avon* (1905); *Memorials of Old Norfolk* (1908); *The Housing Problem in the Country* (1901).

ASTLEY, ăst'lĭ, PHILIP (1742–1814). A noted English equestrian performer and manager. He was born at Newcastle-under-Lyne, and began work as a cabinetmaker, but enlisted as a cavalryman in the Seven Years' War, and after returning with an honorable discharge, gave exhibitions of horsemanship in Lambeth and elsewhere. At Lambeth he built, in 1770, a wooden circus, which grew, in course of prosperity and rebuilding after successive fires, into Astley's Royal Amphitheatre. This was the scene of a variety of exhibitions under his direction; but the special attraction was the equestrian performances, in which he himself excelled. He opened a similar establishment in Paris, which was seized for a barracks at the time of the Revolution, but he afterward recovered possession of his property. He died in Paris and was buried in Père-la-Chaise.

ASTOLF. See AISTULF.

ASTOL'FO. An English noble in Charlemagne's train—a boastful but generous character. In Ariosto's *Orlando Furioso* he cures Orlando's madness by bringing back from the moon the great Paladin's wits in a vial. He is renowned for his fairy gifts of a magic horn, through whose notes all living things are panic-stricken, and a book which tells everything.

ASTOL'PHUS. See AISTULF.

AS'TON, WILLIAM GEORGE (1841–1911). An Irish philologist and diplomat, born near Londonderry in 1841. He was educated (1859–63) at Queen's College, Belfast; one of his professors was Dr. James McCosh. He was appointed in 1864 student interpreter to the British Legation in Japan. He mastered the theory of the Japanese verb, and in Tokio began, with E. M. Satow, those profound researches into the Japanese language which laid the foundations of critical study in the Mikado's Empire. He held various offices in Japan until 1883; was made consul-general in Korea in 1884, and secretary of legation in Tokio in 1886. He retired on a pension in 1889. His publications include grammars of the Japanese language, spoken and written (1868 and 1872); a translation of the *Nihongi*, or *Annals of Ancient Japan* (1896), which show acute scholarship; *A History of Japanese Literature* (1899); and a great number of papers for learned societies on Korean and Japanese subjects, many of them in the *Transactions* of the Asiatic Society of Japan. In 1905 he published *Shinto*, a valuable study of primitive religion.

ASTON HALL. Supposedly the original of Irving's *Bracebridge Hall.* It was built of red brick in the Elizabethan style, by Sir Thomas Holte, in 1618–35. For some time before its purchase by the city of Birmingham in 1864, when it was turned into an art gallery and museum, it was in the possession of Charles Holt Bracebridge, of that city.

ASTON MAN'OR. A municipal borough in Warwickshire, England, adjoining Birmingham (q.v.), of which it is really a suburb, although it was separately incorporated in 1903 and returns one member to Parliament. The town is an industrial centre, its manufactures including beer, paper, and motor vehicles. A large athletic field in Aston is the scene of important football matches. Pop., 1891, 68,600; 1901, 77,300; 1911, 75,029.

AS'TOR, JOHN JACOB (1763–1848). An American merchant. He was born in Waldorf, a village near Heidelberg, Germany, the son of a butcher. He followed his elder brother, first to London and then to New York, whither he went in 1783. He soon invested his small capital in furs, and by economy and industry he so increased his means that after six years he had acquired a fortune of $200,000. He traded directly with the Indians, peddling gewgaws among them and buying their furs at a ridiculously low rate. At first he prepared the furs with his own hands and took them to the London market. He also became the New York agent of his brother's

house, which dealt in musical instruments. Although the increasing influence of the English fur companies in North America was unfavorable to his plans, he ventured to fit out two expeditions to the Oregon Territory—one by land and one by sea—the purpose of which was to open up regular commercial intercourse with the natives. After many mishaps, his object was achieved in 1811, and the fur-trading station of Astoria was established; but the War of 1812 stopped its prosperity for a time. From this period Astor's commercial connections extended over the entire globe, and his ships were found in every sea. He was especially successful in the China trade. He left property amounting to $30,000,000, largely invested in real estate, which has since enormously increased in value. The Astor House, on lower Broadway, New York, was built by him. He left a legacy of $350,000 for the establishment of a public library in New York. (Consult Washington Irving's *Astoria* (Philadelphia, 1836) and James Parton's *Life of John Jacob Astor*, 1865.) His wealth was mainly inherited by his son, WILLIAM BACKHOUSE, who continued to augment it till his death in 1875, when it had increased to about $50,000,000. During his lifetime he made many gifts to the Astor Library, and at his death left it $250,000 and books worth $200,000. He was known as the "Landlord of New York," from the extent of his property in that city.

ASTOR, JOHN JACOB (1864–1912). An American capitalist, inventor, and soldier; the fourth of the name. He was born at Rhinebeck-on-Hudson, N. Y., graduated in 1888 at Harvard, traveled extensively, and afterward was occupied chiefly with the management of the Astor estate. The St. Regis and Knickerbocker hotels, and the Astoria (later part of the Waldorf-Astoria) in New York were built by him. In 1894–96 he was on the staff of Gov. L. P. Morton, and in 1898 was commissioned lieutenant-colonel of United States Volunteers. During the Spanish-American War he served as a staff officer in the Santiago campaign and presented to the government a fully equipped mountain battery, which was named for him, and which did effective work in the campaign before Manila. He became known as an inventor of several useful devices, such as a bicycle brake, a pneumatic road improver, improved marine turbines, a machine for the utilization of peat deposits, etc. He was director of many financial organizations and railroads, and was one of the founders of the New Theatre. Colonel Astor published *A Journey in Other Worlds* (1890) and *A Romance of the Future* (1894). He was drowned at sea when the *Titanic* sank.

ASTOR, WILLIAM WALDORF (1848–1919). The great-grandson of John Jacob Astor. He was born in New York City, and studied law in order to qualify himself for assuming the management of the Astor estate. He was elected to the New York State Assembly in 1877 and to the Senate in 1879. In 1881 he was defeated by Roswell P. Flower as a candidate for Congress. He was appointed by President Arthur Minister to Italy in 1882, a post which he held till March 1, 1885. As a result of studies made at Rome, he published two romances: *Valentino* (1886) and *Sforza* (1889). On the death of his father he became the head of the family and the inheritor of the estate, estimated at $200,000,000, largely invested in real estate. He built three magnificent hotels in New York City, the Netherland, the Waldorf, and the Astor. In 1890 he went to London to live and in 1899 became a British subject. He bought the *Pall Mall Gazette* in 1893 and founded the *Pall Mall Magazine*.

ASTORGA, ȧs-tōr'gȧ (anciently, Lat. *Asturica*). A town of Spain near the river Tuerto in the province of Leon, still surrounded by massive Roman fortifications (Map: Spain, B 1). It was the ancient Asturica Augusta, a Roman provincial capital where four military roads met. In the neighborhood is a ruined castle which was a famous centre of Spanish resistance to Moorish onslaughts in the eighth century. The town was once known as the "City of Priests." It has been the see of a bishop since the third century, and its bishop is suffragan to the Archbishop of Valladolid. Pop., 1910, 5682.

ASTORGA, EMANUELE BARON D' (1680–c. 1750). An Italian composer. Born at Augusta, Sicily, the son of a Spanish nobleman, he later became widely known as a composer. After travels through Europe he lived in Spain, but Rochlitz's (1825) romantic story of his life is pure fiction. His best-known work is his *Stabat Mater*, (London, 1752). He also wrote numerous chamber-cantatas and an opera, *Dafni* (Genoa, 1709). Consult H. Volkmann, *Emmanuel d' Astorga* (Leipzig 1911).

ASTO'RIA. A city, port of entry, and the county-seat of Clatsop Co., Oreg., 100 miles northwest of Portland, on the south bank of the Columbia River (Map: Oregon, B 1). It is on the Spokane, Portland, and Seattle Railroad, and has several steamship lines to domestic and foreign ports. There are now about 5 miles of water front within the city limits. Astoria is the centre of an extensive salmon-fishing and canning industry, one of the most important in the world, and contains iron works, can factories, lumber mills, and other industrial establishments. It controls, also, a large export trade in lumber, wheat, flour, etc. The United States custom house and post office, Astor Park, the public library, and St. Mary's Hospital (Roman Catholic) are among the more important features of the city. Here is located Fort Clatsop, established in 1805 by the Lewis and Clark Expedition. Astoria, founded as a fur-trading station in 1811 by John Jacob Astor, was the first settlement in the valley of the Columbia. In 1813 the English took possession, renamed it Fort St. George, and held it until 1818, though until 1845 the Northwest Company, English fur-traders, continued to occupy it. In 1876 it was chartered as a city. The water works are owned by the municipality. Pop., 1890, 6184; 1900, 8381; 1910, 9599; 1920, 14,027. Consult Washington Irving, *Astoria; or, Anecdotes of an Enterprise beyond the Rocky Mountains* (Philadelphia, 1836).

ASTORIA. An account of Astoria, the settlement founded by John Jacob Astor on the Columbia River, by Washington Irving (1836).

AS'TOR LI'BRARY. See NEW YORK PUBLIC LIBRARY.

ASTOR PLACE RI'OT, THE. In American history, a riot which occurred in Astor Place, New York City, on the evening of May 10, 1849, and which grew out of an attempt by partisans of the American actor Edwin Forrest, assisted by the rabid anti-English element of the lower classes in the city, to prevent the English actor William C. Macready from giving a performance of *Macbeth* in the Astor Place Opera House. A disorderly crowd assembled in

Astor Place early in the evening, and soon after the performance began, fiercely attacked the opera house and endeavored to force their way inside. The police proving unable to disperse the mob, the Seventh Regiment was called out; and before order could be restored, 34 of the rioters had been killed and many more wounded, while 141 of the militiamen had been more or less seriously injured by brickbats and stones. After the performance Macready was taken to a private house, and two days later proceeded secretly to Boston, where he took ship for England. Consult Wilson, *Memorial History of New York*, vol. iii (4 vols., New York, 1892–93), and Barrett, *Edwin Forrest* (Boston, 1882).

ASTRABAD, ăs'trȧ-băd', or **ASTERABAD** (*Aster*, name of a river + Pers. *abad*, dwelling, town). A town of Persia; capital of the province of Astrabad, situated in about lat. 37° N., and long. 54° 30′ E., about 20 miles from Astrabad Bay (Caspian Sea) (Map: Persia, E 3). It is surrounded by a ditch and a mud wall, and its streets and houses, once substantially built and well kept, are now little better than ruins. Astrabad contains an extensive bazaar, several fine mosques, and the remains of a palace built by Shah Abbas. It was long the residence of the Rajah princes, who are related to the present ruling house of Persia, and a number of whom are still living at Astrabad. The trade with Russia, which country has a naval station and a fort on the island of Ashurada in Astrabad Bay, has increased steadily. The chief articles of export are cotton, rice, silk, grain, carpets, salt, and caviar. The port of Astrabad is Gez, a little village with a population of about 1200. Astrabad is connected by a caravan route with Afghanistan, and is the seat of a Russian consulate. The city is in an unhealthful region and is known colloquially as the "City of the Plague." It was swept by a disastrous fire in 1898. The population is variously estimated from 10,000 to 30,000.

ASTRÆ'A (Gk. *Ἀστραία, Astraia*). The "Star Maiden," who, according to Greek stories reflected by Ovid in his *Metamorphoses*, dwelt among men during the Golden Age, but left the earth in the Iron Age, in grief at the wickedness of mortals, and returned to the gods. She was the last of the gods to quit the earth. Some writers made her a daughter of Zeus; others called her the daughter of the Titan Astræus and Eos, and identified her with Dike. On her return to heaven she became the constellation Virgo. Astræa is also the name of one of the planetoids.

ASTRÆA, THE DIVINE. Mrs. Aphra Behn, "the first Englishwoman to live by her pen." A vivacious and ingenious, though somewhat coarse, dramatist and novelist of the eighteenth century. Author of *Oroonoko*, the story of a "royal slave." Mrs. Behn and William Congreve were the first to oppose the vogue of heroic French romances, which were translated and imitated in England during the latter part of the seventeenth century.

ASTRÆA RE'DUX (Lat. Astræa brought back). A poem written by Dryden, commemorating the return of Charles II. It was published in 1660, only two years after the appearance of the same poet's obituary eulogy of Cromwell, "Heroic Stanzas." Admirers find in the later poem a line which they think explains the apparent contradiction in the poet's sympathies. According to them, the line, "To stanch the blood by breathing of the vein," means that Cromwell was justified in the execution of Charles II's father, but that Charles II's speedy succession to Cromwell was equally advantageous for England.

AS'TRAGAL (Lat. *astragalus*, from Gk. *ἀστράγαλος, astragalos*, the ball of the ankle joint). In architecture, a rounded bead molding, either plain or divided into rounded sections; used especially to designate the small molding at the top of the shaft of a classic column, corresponding to the cincture at the bottom. Also, the molded strip applied to the meeting stiles of folding doors.

ASTRAG'ALUS (Lat., Gk. *ἀστράγαλος, astragalos*). A bone of the foot, which forms, with the leg bones, the hinge of the ankle joint. Its lower surface is concave, and rests on the *os calcis*, or heel bone, to which it is attached by a strong ligament. In front it has a round head, which rests in the concavity of the scaphoid, another bone of the tarsus, and upon an elastic ligament, its pressure upon which gives in a great measure the necessary elasticity to the foot. It is at this joint that inversion and eversion of the foot take place. The astragalus is a bone of great importance, as it supports the weight of the body in standing and enters into most of the movements of the foot.

ASTRAGALUS. A genus of shrubby or herbaceous plants belonging to the family Leguminosæ and embracing about 1000 species. They are found in almost all parts of the world except Australia. The leaves are pinnate and the pods more or less two-celled. They are commonly met with on dry soils. A number of species, among them *Astragalus gummifer* and *Astragalus microcephalus*, yield gum tragacanth. In the western United States many species abound, and poisonous properties are attributed to some, which are called "loco weeds." *Astragalus mollissimus* and *Aragallus lamberti* are very common "loco weeds," and horses or cattle eating them are said to lose appetite for anything else, become deranged, and finally die. If taken from pastures where these weeds abound and well fed, stock usually recover. The administering of Fowler's solution to horses and small doses of strychnine to cattle have proved valuable treatments. They should be given only under advice of a veterinarian, as locoed animals are very susceptible to the bad effects of overdosing. See GUMS.

ASTRAKHAN, ăs'trȧ-kăn', or *Russian pron.* ăs'trȧ-kän'y'. A government in southeastern Russia; previous to 1554 a province of the Mongol Empire. It borders on the Caspian Sea (Map: Russia, J 5) and is the fourth government of Russia in order of size, having an area of 91,042 square miles, exclusive of inner waters. The capital is Astrakhan. The surface is almost entirely a barren waste, the only fertile portions being the banks of the Volga, which divides the province into two equal parts, the steppes of the Kalmuks on its right and of the Kirghiz on its left. The principal industry of the population is herring and sturgeon fishing, in which are also engaged about 30,000 persons from the adjacent governments. The annual catch of herring ranges from 21,000,000 in bad years to 78,000,000 in good. An auxiliary to this industry is the extraction of salt from the lakes and from the marshes of the steppes, to the amount of about 300,000 tons annually. Another industry of importance is

cattle breeding, the only means of subsistence of the Kalmuks, Kirghiz, and a considerable portion of the Tatars. Agriculture is undeveloped. The population, numbering 879,000 in 1892, 1,230,300 in 1909, and 1,262,000 in 1911, is composed of diverse elements—Russian, Tatar, Georgian, Armenian, Bokharese; the semi-nomadic Kalmuk (Buddhist) and Kirghiz (Mohammedan) tribes number over 300,000. There are also some Persians and Hindus.

ASTRAKHAN (named after the Khan *Aster*). The capital of the government of the same name in Russia, situated on an island of the Volga, 60 miles from the Caspian Sea and 933 miles southeast of Moscow (Map: Russia, G 5). It is the seat of a Greek and an Armenian archbishop; has Greek, Roman Catholic, Protestant, and Armenian churches, many mosques, an Indian temple, several museums, botanical gardens, technical schools, and a seminary for priests. The town is situated on very low ground, the average elevation reaching but 8½ feet above the level of the Volga, and its highest point not exceeding 46½ feet. It is irregularly built; the streets are filthy, since they are neither paved nor ever sprinkled or swept. There is no modern sewerage system, and cesspools contaminate the air. The low situation of the town has made it necessary to surround it by a wall of earth rising about 14 feet above the ordinary water level of the Volga; all of which gives the place rather an Oriental appearance. The position of the town on the Volga, the greatest river in Europe, its proximity to the Caspian Sea, an advantage which has been further enhanced by the construction of the Trans-Caspian Railway, and the development of petroleum deposits in the vicinity of Baku, have made Astrakhan one of the most important commercial centres of Russia and the entrepôt for goods exchanged between Russia and western Europe on the one hand, and Persia, Bokhara, Khiva, and other Middle Asiatic countries on the other. The chief articles of import from the East are gold, embroidered silken goods, silk stuffs, woolen goods, raw silk, grain, timber, rhubarb, and drugs. The exports include cotton, fish, petroleum and petroleum products, linen, leather, paper, dry goods, glass, paints, salt, and sugar. The annual value of the imports and exports is about 68,000,000 rubles (about $34,000,000). The industries show little progress and include chiefly the manufacture of silk goods, leather, machinery, tar, paper, and brick. There are over 70 docks, accommodating more than 4000 ships annually. The fisheries in the Volga employ a great number of the inhabitants, and the vine is cultivated in the environs. The town gives its name to a fine quality of fur, the product of a variety of sheep found in Bokhara, Persia, and Syria. There are many charitable institutions and hospitals. Pop., 1897, 113,000; 1908, 136,841; 1912, 149,630. Astrakhan was important during the Middle Ages. For several centuries it was in the hands of the Tatars and did not come into undisputed possession of Russia until 1554.

ASTRAL BODY. See THEOSOPHY.

AS'TRAL SPIR'ITS. In ancient Oriental and Greek religious systems, the spirits which animated and controlled the heavenly bodies (Gk. *ἄστρα, astra*). When these notions, possibly handed down by the Gnostics, passed into the demonology of the Middle Ages, the astral spirits were sometimes adapted into fallen angels—the transition being easy from the general belief that angels personally directed all physical manifestations, such as thunder-storms; sometimes they were conceived of as the souls of departed men, sometimes as spirits originating in fire, and hovering between heaven, earth, and hell, without belonging to any one of these provinces. Paracelsus and others attributed to every human being an astral spirit or sidereal element in which the human soul, or spirit proper, is thought to inhere, and which lives for a time after the person dies.

ASTREE, âs'trâ'. A novel. See URFÉ.

ASTRIN'GENTS (Lat. *ad,* to + *stringere,* to bind fast, tight). Medicines which cause contraction of tissues, and thus prevent excessive discharges of blood, mucus, and other secretions. They are used to arrest diarrhœa, hemorrhage, and discharges from mucous membranes. They act locally, although gallic acid is thought to act as a remote astringent, tending to check hemorrhage in any part of the body when given by mouth. Astringents are of two classes, vegetable and mineral. The most important of the first class are: tannic and gallic acids (derived from nut-gall), rhatany, catechu, kino, logwood and white-oak bark. Mineral astringents include nitrate of silver, the sulphates of copper, zinc, and iron, chloride of iron, acetate of lead, alum, sulphuric, nitric, and hydrochloric acids.

AS'TROCAR'YUM (Gk. *ἄστρον, astron,* star + *κάρυον, karyon,* nut; referring to the arrangement of the fruits). A genus of palms, of which about 30 species are known, natives of tropical America, remarkable for the abundance of acute and formidable spines, in some cases a foot long, with which almost every part—stem, leaves, spathe, and fruit-stalk—is armed. They have beautiful pinnate leaves; some of them are lofty, others are of very moderate height, as 8 to 15 feet, while some are almost or altogether stemless, as *Astrocaryum acaule,* the Iu palm. The fruit of some species is eatable—a juicy pulp covering a stony seed—as the fruit of the Murumurú palm (*Astrocaryum murumurú*), the pulp of which is said to resemble a melon in flavor, has a sort of musky odor, and is highly esteemed. It is a palm only about 8 to 12 feet high, abundant about Pará and elsewhere on the Amazon. Cattle roam the forests in quest of its fruit, and swine fatten on the seed, which they crush with their teeth, although in hardness it almost resembles vegetable ivory. Another edible fruit is that of the Tucumá palm (*Astrocaryum tucuma*), abundant in the same regions. These fruits are about an inch long, the Murumurú ovate, the Tucumá almost globular. The Tucumá palm is 30 to 40 feet high, the stem encircled with narrow rings of black spines, which are disposed with beautiful regularity. The Tucum palm (*Astrocaryum vulgare*), a species quite distinct from the Tucumá, and more lofty, is of great importance to the Indians, and in places where it is not indigenous is cultivated with care for the sake of the epidermis of its unopened leaves, of which they make cordage, very useful for bowstrings, fishing nets, etc. The fibre is at once fine, strong, and durable, and may yet perhaps become important as an article of commerce. Beautiful hammocks are made of Tucum thread. The fibre is obtained by cutting down the terminal bud or column of unopened leaves which rises from the centre of the crown of foliage. The tender

leaflets are then carefully stripped of their epidermis, in pale, ribbon-like pellicles, which shrivel up almost to a thread. These are tied in bundles and dried, and are afterward twisted into thread, or made into thicker cords, by mere rolling and manipulation. The mature leaves yield a coarser fibre, which varies considerably with the different species. It is used for cordage, and the split stems of the new leaves are braided into hats and baskets.

ASTROGRAPHIC CONGRESS. See ASTRO-PHOTOGRAPHY.

AS'TROLABE (Gk. *ἀστρολάβον, astrolabon*, star-taker). The name given by the Greeks to any circular instrument for observing the stars. Circular rings, arranged as in the armillary sphere, were used for this purpose. A projection of the sphere upon a plane, with a graduated rim and sights for taking altitudes, was known as an astrolabe in the palmy days of astrology, and was the badge of the astrologer. The astrolabe has been superseded by the more perfect instruments of modern astronomy.

ASTROLABE, THE, OF THE CONCLUSIONS OF. A fragmentary prose treatise by Chaucer, written in 1391 or shortly after, for the instruction of his son Lewis. It is an English rendering, from a Latin copy, of a work by the Arabian astronomer, Messahala.

ASTROL'OGY (Gk. *ἄστρον, astron*, star + *λόγος, logos*, science). The term meant originally much the same as *astronomy*, "the knowledge of the stars," but was at length restricted to the science of predicting future events, especially the fortunes of men, from the positions of the heavenly bodies. This was considered the higher, the real science; while the mere knowledge of the stars themselves, their places and motions (astronomy), was, till a very recent period, cultivated mostly with a view to (judicial) astrology. Astrology is one of the most ancient forms of superstition, and is found prevailing among the nations of the East (Egyptians, Chaldæans, Hindus, Chinese) at the very dawn of history. The Jews became much addicted to it after the Captivity. It spread into the West and to Rome about the beginning of the Christian Era. Astrologers played an important part at Rome, where they were called Chaldæans and "mathematicians"; and though often banished by the Senate and emperors under pain of death, and otherwise persecuted, they continued to hold their ground. The Roman poet, Manilius, author of an astronomical poem still extant, was addicted to astrology; and even Ptolemy, the astronomer, did not escape the infection, which in his time had become universal. It accords well with the predestinarian doctrines of Mohammedanism, and was therefore cultivated with great ardor by the Arabs from the seventh to the thirteenth century. Some of the early Christian Fathers argued against the doctrines of the earlier astrology, while others received them in a modified form; and indeed it formed part of the basis of their religion in the Gospel narrative of the visit to Bethlehem of the Wise Men from the East, who were Chaldæan magi or astrologers. In its public capacity the Church several times condemned the study as tending to fatalism, superstition, and unlawful prying into the future; but many zealous Catholics—even churchmen—have cultivated it. The fourteenth and fifteenth centuries were the palmy days of the science; chairs for its teaching were founded in the two oldest universities—those of Bologna and Padua—and no prince's court was complete without its official astrologer. After the Renaissance the study was vigorously opposed from diametrically opposite points of view—such as those of Savonarola and Pico della Mirandola. But for centuries the most learned men still remained devoted to its teachings, including among astronomers Cardan, Tycho Brahe, and Kepler; Wallenstein absolutely, and Napoleon partly, believed in it, though the frequent references of the latter to his "star" seem to have been made largely for effect. Bacon maintained the reality of an underlying basis of truth at least, while discrediting the practitioners of his day. Burton and Sir Thomas Browne also retained a belief in its possibilities. William Lilly was the last astrologer in England who had any great public influence; he asserted and partly proved his wonderful success in foretelling both public and private events. But the acceptance of the Copernican system and new fashions in science tended to destroy the older beliefs; and by the following century the study had so far lost its hold that the merciless ridicule of Swift, applied to the unfortunate almanac-maker Partridge, was sufficient to discredit it. But believers in it are still found, even among educated men. In Germany J. M. Pfaff published a notable treatise in its favor entitled *Astrologie* (Bamberg, 1816). The natural tendency of the ignorant and credulous to seek for insight into the future has allowed a multitude of quacks to trade upon the name of astrology and to give the impression that it is beneath contempt. It is well to point out, however, that the predictions of the better class of astrologers are not mere haphazard guesses, as is frequently supposed, but are based upon rigidly scientific determination from observed phenomena, according to definite rules of interpretation; and also that astrology lays no claim to absolute prediction of future events, undertaking merely to point out the direction which affairs are likely to take, other things being equal—according to the old saying: *"Astra regunt homines; sed regit astra Deus."*

The ordinary method of applying judicial, or, as it is sometimes called, mundane, astrology to the decision of a question was to calculate the moment when the question was asked or at the birth of the "querent." Then the circle of the heavens was divided into twelve equal parts, six above and six below the horizon. These are the twelve "houses," through which the planets pass in their regular movements. The first house, that which lay in the east from 5° above the horizon to 25° below, called the ascendant, was considered of the most importance, as it contained that part of the heavens which was about to rise. The planet which was "lord" of this house was usually taken as the "significator" of the "querent." Each house, however, had one of the heavenly bodies as its lord, who was considered to be strongest in his own house. The first was called the house of life; the second, that of fortune or riches; the third, of brethren; the fourth, of relations; the fifth, of children; the sixth, of health; the seventh, of marriage; the eighth, of death; the ninth, of religion; the tenth, of dignities; the eleventh, of friends and benefactors; the twelfth, of enemies or of captivity. Besides the positions of the planets in the different houses, it was necessary to consider their position in relation to

each other—in conjunction, in opposition, and so on through a variety of technical descriptions. Each planet was supposed to rule some special part of the world and of the human body, so that according to its position it might bring on certain conditions for the countries under its influence and cause or avert certain diseases. Persons born under particular planets were believed to be endowed with temperamental characteristics corresponding to the nature of the planet. From this belief the epithets *mercurial, jovial, saturnine* have passed into common speech; in fact, a larger number of expressions than would be generally supposed come from astrology. *Disastrous* and its Saxon equivalent *ill-starred, ascendancy, consider,* are examples of words which are relics of this once universal belief; and many passages in our older writers are unintelligible without some knowledge of it.

The accompanying figure shows the positions of the planets at the time of the signing of the

Declaration of Independence. According to astrological interpretation, the newly formed nation was destined to enjoy success in war and to develop an extensive commerce with every country of the earth, while fecundity and prosperity were to reign among its people.

Consult: Sibley, *A New and Complete Illustration of the Celestial Science of Astrology* (London, 1789); Maury, *La magie et l'astrologie à l'antiquité et au moyen âge* (4th ed., Paris, 1877); Meyer, *Handbuch der Astrologie* (Berlin, 1891); Butler, *Solar Biology* (5th ed., Applegate, Cal., 1892); Bennett, *Astrology* (New York, 1894); Fomalhaut, *Manuel d'astrologie sphérique et judiciaire* (Paris, 1897); Merton, *Heliocentric Astrology* (Philadelphia, 1910); Cumont, *Astrology and Religion among the Greeks and Romans* (New York, 1912); Jastrow, *Hepatoscopy and Astrology in Babylonia and Assyria* (Philadelphia, 1908); Wilde, *Chaldean Astrology* (London, 1912).

AS'TRONOM'ICAL AND AS'TROPHYS'ICAL SOCI'ETY OF AMER'ICA. A national organization with membership limited to persons possessing technical attainments in astronomical and astrophysical science. The society was founded in 1899. It has about 235 members.

ASTRONOMY (Gk. *ἀστρον, astron,* a star + *νόμος, nomos,* law). The science which deals with the celestial bodies. These comprise all the various bodies distributed throughout the universe, such as the earth (considered as a whole) and the moon, the sun, the planets and their satellites, the planetoids or minor planets, the comets and meteors, the fixed stars, and the nebulæ. Of these, all but the fixed stars and the nebulæ, which are immeasurably remote, belong to the solar system.

In the eyes of the ancients certain celestial bodies, seven in number, early assumed an importance from the fact that they changed their positions relatively to the stars and quite independently of the diurnal motion of the heavens. For this reason they were called planets, or "wanderers." They were believed to revolve round the earth, which was regarded as fixed in space and was thought to be the centre of the universe. The two brightest, and apparently the largest, of these wandering bodies were the sun and the moon, the rest, much less bright than these and apparently of diminutive size, but still distinguished by their brilliancy in comparison with all but a few of the stars, came to be known by the names Mercury, Venus, Mars, Jupiter, and Saturn. We now know that the ideas of the ancients regarding the constitution of the universe were erroneous; that, in fact, it is the earth which revolves round the sun, and not vice versa, and that its path or orbit is an ellipse, while the moon moves round the earth in a similar orbit and is carried along with the earth in its annual journey round the sun. We know, moreover, that the five remaining bodies, like the earth, travel in ellipses round the sun. This aggregation of celestial bodies constituted the solar system as known at the beginning of the seventeenth century. The telescope has since added to the sun's family two other planets, Uranus and Neptune, revolving far beyond the orbit of Saturn, and an ever-increasing number of small planetary bodies, known as minor planets or planetoids, lying between Mars and Jupiter, and has further disclosed the fact that all of the major planets with the exception of Venus and Mercury have attendant moons, or satellites, which vary in number from one in the case of Neptune to 10 in that of Saturn. When we come to consider the distances of the planets from the sun, we find that they are approximately connected by a remarkable empirical law, known as Bode's Law (q.v.). The distance of the earth from the sun is, roughly, 92,500,000 miles. Between the earth and the sun revolve the two so-called "inferior" planets, Mercury and Venus, while the remaining planets, known as the superior planets, lie outside the earth's orbit, Neptune, the outermost, revolving round the sun at the enormous distance of nearly 3,000,000,000 miles. In addition to the planets, the solar system also contains certain somewhat erratic bodies called comets. Nothing definite is known as to their origin; but it is certain that they move, under the influence of gravitation, in orbits that admit of calculation. In appearance comets vary greatly. At times they are so tenuous that they can barely be glimpsed in the telescope and allow the stars to be seen easily through them on the background of the sky. At other times they form magnificent objects, very conspicuous to the naked eye, and often possess tails which extend over a large part of the celestial vault. There is good reason to suppose that comets occasionally become completely disintegrated, subsequently changing into swarms of small particles. When the earth passes through such a swarm, friction with our atmosphere heats the particles until they become incandescent. They are then plainly visible as meteors,

and even quite large ones have at times been found actually to fall upon the earth's surface.

From a terrestrial point of view, being the source of our light and heat, the sun is certainly the most important of all the heavenly bodies. But considered as a cosmic body the sun is simply a blazing star, and not even a very great one as compared with the average of all the stars. One of the most interesting questions in connection with the sun is the probable source of its great and continuing heat. Why does it not become completely consumed as a result of continuous combustion? This question was answered by Helmholtz, who showed that the energy required to generate the sun's heat could be derived from a gradual contraction or shrinkage of its bulk. So great is this bulk that a contraction sufficient to produce the heat in question might go on for 10,000 years without producing a diminution in the sun's apparent diameter large enough to be perceived even by our greatest telescopes.

Far beyond the confines of the solar system, and, indeed, at a distance almost inconceivably great, is situated the universe of stars. According to the accepted theory these stars, which to us appear merely as points of light, are really great blazing suns, in many cases, doubtless, attended by systems of planets analogous to our own. The stars are usually called "fixed stars." It is known, however, that they are not really immovable, but are in continuous motion through space in orbits so vast that we have as yet been unable to do more than guess at their dimensions. Even the sun, regarded as a star, is known to be moving through space toward a point in the constellation Lyra with a velocity of about 12 miles per second. The whole solar system of course partakes of this motion.

Many attempts have been made to measure the distances of the stars. But as we can actually observe only their directions in space, the sole method open to us is to note whether such directions suffer any change when the earth is situated at opposite sides of its orbit around the sun. So great, however, are the stellar distances that no star has yet been found for which this change of direction is greater than about one second of arc. (See PARALLAX.) With reference to their brilliancy, the stars have been classified in groups, and the term "magnitude" has been used to designate brilliancy. Thus by a star of the first magnitude is meant one whose light is so brilliant as to place it among, say, the 20 brightest stars. Of course, the number of stars of each magnitude increases very rapidly as we come to the classes of lower brilliancy. Strangely enough, the magnitudes of the stars are not constant. There is, for instance, one star in the constellation Argo that has diminished so much in brightness that it is at present no longer visible to the naked eye, though about the middle of the past century it was at least the equal of any star in the sky. To this class of variable stars belong also the "temporary stars," which blaze up now and then like a great conflagration, only again to subside into invisibility after a short time.

Frequently we find a couple of stars very close together on the sky. Indeed, often they are so near that the eye fails to distinguish them, and it requires a powerful telescope to separate their light. It was thought at first that these double stars were accidental merely, and that while the two stars had nearly the same direction in space, they might nevertheless be separated by an immense linear distance. But it has been found that many double stars are true *binaries*, showing an orbital revolution about the common centre of gravity of the two component stars. Sometimes such stellar systems have three or more components. Even entire clusters may have a physical connection within themselves, and it is not improbable that the forces of gravitational attraction compel and control the complex movements of such aggregations of stars, just as they do the lesser intricacies of our own solar system. A magnificent field for speculation is opened by a consideration of the vast possibilities of such mighty stellar groups—true universes within the universe.

In addition to the stellar systems, we have in the sky another interesting class of objects, the nebulæ. These appear in the telescope as hazy clouds of light, usually condensing here and there into brighter nuclei. It is impossible to escape the conviction that these nebulæ are gaseous, and that they furnish a sort of key to the life history of the ordinary stars. Indeed, spectroscopic evidence tends to show that many of the nebulæ are composed of matter in the form of incandescent gas. What, then, can be more plausible than to see in the stars the result of a gradual process of cooling in nebulous matter? One can imagine readily that condensation and contraction might result in the formation of a single central sun, or that there might be two or more such centres. Indeed, the sky actually does show some cases of "double nebulæ." Mathematical research has indicated that the tidal effects seen on a small scale in the case of the earth and moon would play a much more important part in double nebulæ while still in the plastic condition. The mighty cosmic tides that would there be set up might undoubtedly produce perturbations great enough to account for the most complete changes in the character of motion within the system. An account of this study of the past and future history of cosmic systems may be found in the article COSMOGONY.

The whole subject of astronomy is so extensive that it is convenient to consider it from several different standpoints. What is termed Practical Astronomy, for example, treats of the manipulation of astronomical instruments and is concerned with the observing and recording of the positions and motions of the heavenly bodies and with the determination of their distances and dimensions. Theoretical Astronomy, on the other hand, deals with the computation of orbits, and with the prediction of the positions of the heavenly bodies at any subsequent time; it includes also the application of spherical trigonometry to astronomy, which regards these bodies simply as points on the surface of the celestial sphere. In Gravitational Astronomy, or Celestial Mechanics, we have the application of the principles of dynamics to account for the motions of the celestial bodies. One of the most important developments of astronomy is found in what is known as Physical Astronomy, or Astrophysics, which deals with the determination of the physical and chemical characteristics of the celestial bodies. The study of the physics and chemistry of the heavenly bodies originated during the nineteenth century and has already resulted in the development of astronomy along lines scarcely deemed possible by the older astronomers; and it is along these lines that our

knowledge of the heavens seems destined to progress most rapidly. No hard and fast lines can be drawn separating these divisions of astronomy, which overlap to a greater or less degree. Moreover, each has many subdivisions which are frequently so extended in their range as to rank almost as divisions of the first order; thus, solar physics has now attained a position of such importance that observatories have been established with the sole object of the prosecution of that branch of astrophysics. Theoretical Astronomy and Celestial Mechanics are largely mathematical in their treatment.

Astronomy is the oldest of the sciences. Its early history is perhaps more important than that of any other science; indeed, it may be said that a study of the state of scientific culture among the early peoples amounts to little more than an examination of their notions on astronomy. The science had its beginning with the Chaldæans and Chinese, working, of course, independently of each other. The former, according to Greek historians, were able to predict eclipses with considerable accuracy; they were also acquainted with the year of 365¼ days, and we owe to them the invention of the sun-dial and the clepsydra for the purpose of measuring time. The Chinese, on the other hand, were acquainted with certain elementary forms of the calendar and have left authentic observations of eclipses, comets, etc., extending back at least 1000 years before our era; their most notable achievement seems to have been a determination of the obliquity of the ecliptic about 1100 B.C. confirming the secular diminution of that constant. Other early peoples who cultivated astronomy were the Hindus and the Egyptians, but their observations were connected mainly with religious ritual.

It was to the Greeks, more than all other peoples of antiquity, that the rise of astronomy to the position of an exact science was due. Among them we find various names conspicuous at a very early date. Thales of Miletus (c.640–546 B.C.), who is generally called the Founder of Greek Astronomy, taught that the stars shone by their own light, but that the light of the moon was derived from the sun; he also held that the earth is a sphere. Among his successors, Anaximander, Anaxagoras, Democritus of Abdera, Pythagoras (c.580–497 B.C.), Meton, Eudoxus of Cnidus, and Aristotle are all mentioned by later writers as distinguished astronomers. It is true that some of these occupied themselves principally with imaginary systems of the universe based upon abstract speculation rather than accurate observation, but others made real contributions to knowledge. Thus, to Pythagoras we owe the first suggestion that the earth revolves round the sun; to Meton, the introduction of the Metonic cycle of 19 years which displaced the old Chaldæan Saros as a means of calculating the recurrence of eclipses; and to Eudoxus, the first attempt to express the motions of the planets with the aid of geometry. About the end of the third century B.C. a noted school of astronomers grew up at Alexandria under the patronage of the Ptolemaic dynasty, and the development of astronomy received a fresh impulse. Aristyllus and Timocharis, who flourished under Ptolemy Soter, the first of the dynasty and the founder of the famous Alexandrian library, left observations of the relative positions of the stars in the zodiac which later led to the discovery of the precession of the equinoxes by Hipparchus. Aristarchus of Samos (c.275 B.C.) calculated the distances and magnitudes of the sun and moon, and Eratosthenes (c.275–195 B.C.) determined the obliquity of the ecliptic by means of the armillary sphere which he invented. The latter held that the earth was a sphere, and, by measuring an arc of the meridian between Alexandria and Syene, deduced from it the first estimate of the earth's circumference, viz., 250,000 stadia, or 24,662 miles, a surprisingly accurate value under the circumstances. But by far the greatest of the Greek astronomers was Hipparchus (c.161–126 B.C.), a native of Bithynia, who has been justly called the Father of Astronomy. He was the author of the first star catalogue, from which, by comparing his own observations with those of Aristyllus and Timocharis, he was able to infer the precession of the equinoxes, with an accuracy which came within 5 per cent of the truth. Believing in the fixity of the earth in space, he was led to explain the inequality of the sun's motion by supposing that the earth was not situated exactly at the centre of the sun's orbit, and he proceeded to find the positions of perigee and apogee, and the eccentricity or distance of the earth from the centre of the orbit. He also constructed the first tables giving the position of the sun among the stars at any time. His contributions to lunar astronomy were no less important. He investigated the mean motion of the moon, the regression of her nodes, and the revolution of the line of apsides, and he detected the lunar inequality known as the evection. He was the first to use the eclipses of the moon in determining longitudes. After Hipparchus a gap of nearly three centuries occurs, in which the only notable astronomical advance was the reform of the calendar, which was carried out by Julius Cæsar with the aid and advice of Sosigenes of Alexandria. Second only in importance to Hipparchus was Ptolemy, who flourished at Alexandria about 130 A.D., and to whom was due a brief revival of the glories of the Alexandrian school. He wrote the *Almagest*, a compendium of the astronomical knowledge of his time, but his chief claim to fame rests on his invention of the Epicyclic System of the Universe, the germ of which was found in the teachings of Eudoxus. The Ptolemaic System, as it is generally called, makes the sun and planets move in circles whose centres are themselves in motion upon other circles, the earth being considered at rest. (See PTOLEMY; EPICYCLE; ECCENTRIC.) With Ptolemy the Alexandrian school practically ceased to exist, and no names of importance are found during the five centuries which elapsed before its final extinction in 640 A.D., when Alexandria was captured by the Caliph Omar.

During the next eight centuries, Europe was sunk in the gloom of the Dark Ages, and the flame of scientific learning was kept alive by the Arabs and the nations which came under their influence through the spread of Islam. Their knowledge of astronomy was derived from the writings of Ptolemy and the earlier Greek astronomers, and, while they made few positive contributions to the science, their improved methods of observation resulted in the greatly increased accuracy of their astronomical tables as compared with those of the ancients. The most important names are those of Al Battani, or Albategnius (c.900 A.D.) and Ulugh Beg, who lived about five centuries later. The latter, a

Tatar prince and grandson of Tamerlane, established an observatory at Samarcand and constructed the second known catalogue of stars.

Modern European astronomy begins with Purbach and Regiomontanus in the fifteenth century. Copernicus (1473–1543) stands out conspicuously as the author of a system of the universe nearly the same as that now accepted. (See COPERNICAN SYSTEM.) Copernicus was followed by Tycho Brahe of Denmark (1546–1601), who left a most important collection of solar and planetary observations as well as a catalogue of 777 stars far superior in precision to those of Hipparchus and Ulugh Beg. It was upon a discussion of Tycho's observations that his famous pupil Kepler (1571–1630) built his well-known laws of planetary motion, which are now accepted and which will be stated below. Galileo (1564–1642), one of the first constructors of the telescope, made with it unprecedented observations. To his gaze were first disclosed the moons of the planet Jupiter, and his clear mental vision saw in that planetary system a true miniature of our solar system itself—an ocular demonstration of the Copernican plan of the universe. To Galileo we owe also the discovery of the pendulum, perhaps the most important astronomical instrument. This was adapted to the astronomical clock by Huygens (1629–95), whereby observation in the modern sense was first rendered possible.

We come now to the great name of Newton (1642–1727). With him we may say that astronomy really begins; it is no longer purely a science of observation, but, by his transcendent powers of mathematical analysis, is elevated to its true position among the exact sciences. Newton's conception of the universe makes all phenomena of motion subject to a single law —the law of gravitation. (See GRAVITATION; FORCE; FALLING BODIES; PROJECTILES; NEWTON.) According to this, every material body attracts or draws every other material body with a force which varies directly as the product of the masses of the two bodies and inversely as the square of the distance between them. It is possible by mathematical reasoning to prove from Newton's Law just how a system of planetary bodies would move under the influence of the attraction of some larger central sun. We thus find mathematically that such motion must follow these three laws: 1. Each planet must revolve in an elliptic orbit having the sun in one focus. 2. The straight line joining the sun and planet must pass over equal areas in equal times. 3. The square of the time of revolution of each planet must be proportional to the cube of its mean distance from the sun. Now, these are precisely the laws found by Kepler from the actual observations of Tycho Brahe. Newton's law of gravitation is therefore seen to lead by deduction to the general facts actually observed by astronomers, and hence the mechanical construction of the solar system in which we live may be regarded as fully explained by Newton. Later investigators, among whom may be mentioned Euler (1707–83), Clairaut (1713–65), D'Alembert (1717–83), and Lagrange (1736–1813), elaborated his theory and carried the mathematical explanation of visible phenomena down to the minutest precision attainable with the most powerful modern observational machinery. The work of Newton may be said to have been crowned by that of Laplace (1749–1827), who analytically demonstrated the stability of the solar system, and whose *Mécanique céleste* was a worthy successor to Newton's *Principia*. The question now suggests itself as to whether this same law of Newton holds sway even to the most distant confines of the visible universe. Does it control the motions of stars whose vast distance allows us barely to glimpse them in our largest telescopes? The answer in the present state of astronomical knowledge is not quite so certain for the distant stellar systems as it is within our immediate neighborhood in space. Yet we may say that observations so far made have brought to light no phenomena positively contradicting the universality of Newton's Law.

With the invention of the telescope the progress of observational astronomy was profoundly stimulated. As already mentioned, Galileo's first great achievement with the new instrument was the detection of the four moons of Jupiter. He also discovered that Venus exhibited phases like those of the moon and noticed with astonishment that the planet Saturn at times appeared triple. Gassendi observed a transit of Mercury in 1631, and in 1639 Horrocks and Crabtree saw the first recorded transit of Venus. In 1655 Huygens found that the triple appearance of Saturn which had so puzzled Galileo was due to the presence of a flat bright ring surrounding the planet, and he also discovered the first of the Saturnian moons. This period saw the foundation of the Paris Observatory in 1671 under the direction of Giovanni Domenico Cassini, to whom we owe the detection of four more satellites of Saturn and the division in Saturn's ring which bears his name. He also determined the periods of rotation of Jupiter, Venus, and Mars. In the same year, Roemer, a Danish astronomer, deduced from the irregularity in the times of the eclipses of Jupiter's satellites the important conclusion that light travels with finite, though very great, velocity. Four years later, Greenwich Observatory was founded, and, under the direction of John Flamsteed, the first Astronomer Royal, began its long career of systematic observation of the heavens in which its supremacy was not seriously challenged for at least a century. Flamsteed's work was hampered for a long time by the lack of reliable instruments, but his catalogue of stars, *Historia Cœlestis*, the compilation of which is his chief claim to fame, showed a marked advance on previous works of a similar nature. Flamsteed's immediate successors in the post of Astronomer Royal were Edmund Halley and James Bradley. Halley devised the method of determining the sun's parallax from observations of the transits of Mercury and Venus and discovered the long inequality of Jupiter and Saturn, the elucidation of which called forth some of the most acute investigations in the field of gravitational astronomy on the part of Euler, Clairaut, and D'Alembert. Among his other important discoveries may be mentioned the variation of the compass, the acceleration of the moon's mean motion, and the proper motions of the stars. To Halley was also due the recognition of the periodic character of the comet which bears his name and the prediction of its return about 1759. Bradley's great contributions to astronomy were the discoveries of the aberration of light and the nutation of the pole. He left, moreover, a large mass of painstaking and accurate observations of the stars which formed

the basis of Bessel's epoch-making catalogue, *Fundamenta Astronomiæ*, published in 1813.

Little was done before the middle of the eighteenth century toward charting the southern heavens. Halley, indeed, had made a beginning during a visit to St. Helena in 1676, but his catalogue was hastily prepared and suffered in consequence. Seventy-five years elapsed before the work was taken up in earnest by the French astronomer, Lacaille. In 1751 he proceeded to the Cape of Good Hope, and during the next four years catalogued upwards of 10,000 stars, and outlined 14 new constellations of the southern sky. It was not, however, until the advent of Sir William Herschel (q.v.) that the thorough and systematic sweeping of the heavens was inaugurated. With the aid of larger and larger reflecting telescopes constructed by himself, he made four complete surveys of the northern skies, in the course of which he discovered the planet Uranus and two of its four satellites and added two more satellites of Saturn to those previously known. In his observation of nebulæ and double stars he was *facile princeps*, discovering no less than 2500 of the former and 800 of the latter; and his many contributions to the science have justly caused him to be called the founder of sidereal astronomy.

By his discovery of Uranus in 1781, Herschel simply confirmed the law of planetary distances, announced by Titius in 1772 and since known as Bode's Law, but there still remained a gap between Mars and Jupiter untenanted by any known planet. However, on the first day of the nineteenth century, Piazzi of Palermo announced the discovery of a small planetary body which was found to lie between those two planets and thus to conform to the law. The name "Ceres" was given to this minor planet. The discovery of Ceres was followed by the detection of three similar bodies in the course of the next seven years; these were Pallas and Vesta, discovered by Olbers in 1802 and 1807 respectively, and Juno, first detected by Harding in 1804. No others came to light until 1845, when Hencke found Astræa, and in 1847 three more were discovered—Hebe by Hencke, and Iris and Flora by Hind. Since then no year has passed without the detection of one or more of these bodies, and by 1890 about 300 had been found, but so long as visual methods only were employed their numbers remained relatively small. In 1891 Wolf of Heidelberg called in photography to his aid, and since that time the number has increased by leaps and bounds until in 1913 nearly 800 had been definitely catalogued and numbered. The minor planets, or planetoids as they are called, form a group of bodies which, with few exceptions, travel in orbits lying entirely between Mars and Jupiter. The most notable of these exceptions is Eros, which was discovered in 1898 by Witt. Part of its orbit lies between the earth and Mars, so that, with the single exception of the moon, it is our nearest celestial neighbor. On this account it has acquired a special importance, since it affords astronomers another means of determining the solar parallax and consequently the sun's distance from the earth. The supreme achievement in the field of planetary discovery, however, was the prediction and immediate discovery of Neptune in 1846. This was due to the genius of two young men—one a Frenchman, Urbain Jean Joseph Leverrier, the other an Englishman, John Couch Adams. It had long been observed that the motion of Uranus, the latest of the larger planets to be discovered, was subject to perturbations which could not be accounted for on the theory of disturbance by the other known planets, and as an explanation an unknown exterior planet had been suggested. To the solution of the difficult inverse problem of finding the mass and position of such a disturbing body from the perturbations of the disturbed, Leverrier and Adams devoted their powers of mathematical analysis with such complete success that, when the former announced the result of his investigations, the unknown planet was found without trouble on Sept. 23, 1846. Seventeen days later Lassell found Neptune's only satellite, and in 1851 the two remaining moons of Uranus, while Bond in 1846 added an eighth member to Saturn's family of satellites. It was not until 1877 that any further discoveries of satellites were made. In that year Hall of Washington discovered Phobos and Deimos, the only known satellites of Mars. Barnard in 1892 found the fifth satellite of Jupiter. In 1898 Pickering of Harvard succeeded in detecting Phœbe, the ninth, and in 1905 Themis, the tenth, satellite of Saturn. In the latter year also two more satellites of Jupiter were discovered by Perrine of the Lick Observatory, and another, making eight in all, was found by Melotte at Greenwich in 1908; all three are remarkable for the great distance at which they revolve about the primary. Certain unexplained anomalies in the motion of Mercury led Leverrier in 1859 to suggest the possibility of the existence of a planet lying between Mercury and the sun, but in spite of the most careful search no such body has yet been found. Whether there exist other planets beyond the orbit of Neptune is uncertain, but the "residual errors" of Uranus and the slight perturbations in the motion of Neptune which cannot be attributed to the known planets have induced astronomers to consider at least such a possibility. Pickering has arrived at the conclusion that an ultra-Neptunian planet, which he terms "O," is revolving round the sun at a distance 52 times as great as that of the earth, while Gaillot has suggested that there may be two such bodies—one lying between the orbit of Neptune and that of Pickering's hypothetical "O," and the other at a distance of more than twice the radius of Neptune's orbit.

The labors of Sir William Herschel and his predecessors in systematically observing the positions of the stars resulted in the accumulation of a large mass of material which was to prove of the utmost service to the astronomers of the nineteenth century, but instrumental imperfections made it impossible to take the fullest advantage of these observations. It was by Friedrich Wilhelm Bessel that the necessary step was taken which rendered the observations of the astronomers of the eighteenth century fully available. Before his time increased accuracy of observation had been largely sought by effecting mechanical improvements in the instruments used, and corrections for precession, nutation, and aberration, due, in the first case, to the slow secular, and, in the others, to the periodical shifting of the points of reference, had been applied by astronomers in somewhat haphazard fashion and with varying degrees of success. Bessel at once placed the whole matter on a firm foundation by his elaboration of a theory of instrumental errors which he applied to the

observations, left by Bradley. Bessel's labors were not confined to the reduction of Bradley's observations which covered only 3222 stars, but by his own careful and industrious work he brought the number of accurately known stars up to more than 50,000. Not the least important of Bessel's services to sidereal astronomy was the training of Argelander, to whom was due the compilation of the great Bonn *Durchmusterung*, which raised the number of accurately known stars of the northern hemisphere to more than 300,000, and, if the stars of the southern hemisphere observed by Schönfeld are included, to more than 400,000. The work of mapping the stars of the southern hemisphere was completed by Sir David Gill in his *Cape Photographic Durchmusterung*, which was begun in 1885, and completed in 1900 by the reduction of the negatives by Professor Kapteyn of Groningen. The value of the camera as an adjunct to a survey of the heavens was strikingly shown in this case, for the entire work was carried out twice in less than six years. This work, which did for the southern heavens what Argelander's work had done for the northern, gives the places of more than 450,000 southern stars. But all previous catalogues will be eclipsed by the *International Star Chart and Catalogue* which was initiated by the International Astrographic Congress which met at Paris in 1887.

Until Bessel's time the question of stellar distances which had long vexed astronomers remained unsolved. The fixed stars are so immeasurably more remote than the members of the solar system that, although the base line for the measurement of their parallaxes is the radius of the earth's orbit, the parallactic angle is found to be so small that a new unit of distance, the "light-year," or the distance traveled by light in one year, has been adopted for the purpose of expressing the distance of the stars in suitable terms. In general, it may be said that brightness and the possession of a large proper motion are the criteria of the nearness of any star. In 1792 Piazzi had discovered that the star 61 Cygni had a large proper motion of about five seconds annually, indicating its comparative proximity to the earth. Twenty years later Bessel confirmed Piazzi's determination of the motion of this star, but not until the end of 1838 was he in a position to announce its parallax, which he found to be about a third of a second. Only a few weeks after this epoch-making announcement, Henderson announced that α Centauri had a parallax of a second, an amount which has since been reduced somewhat by later observers. The work of Bessel and Henderson opened up a field of investigation in which Gill, Elkin, Kapteyn, Pritchard, Peter, and others have since labored with conspicuous success. Between 200 and 300 stars have had their parallaxes determined, but so far none has been found to be nearer than α Centauri, which is situated at a distance of about four and a half light-years from us.

Reference has already been made to the great stimulus given to the study of astronomy by the invention of the telescope. The first telescopes were refractors, i.e., the image was formed by refraction through a lens and consequently suffered from the defect of being chromatic. Gregory in 1663, and later Newton, in 1669, introduced new designs in which the image was formed by reflection instead of refraction, and for a long time this form of telescope was preferred. It was steadily improved in both size and power until at the hands of Sir William Herschel it attained a diameter of 4 feet and a focal length of 40 feet. This remained for 60 years the limit for instruments of this type, but in 1845 it was eclipsed when a reflector of 6 feet diameter and 54 feet focal length was constructed by Lord Rosse at Parsonstown, Ireland. The largest reflectors in actual use at present are the 5-foot instruments of the Harvard and Mount Wilson observatories. A still larger one, with an aperture of 100 inches, is being constructed for the Mount Wilson Solar Physics Observatory. The development of the refracting telescope may be said to date from 1758, when Dollond of London succeeded by the use of two lenses—one of flint, the other of crown glass—in overcoming the defect of chromatism. But the difficulty of making flint-glass lenses of any considerable size proved a serious obstacle to the growth of the refractor, which was removed only when Guinand and Fraunhofer, during the early years of the nineteenth century, succeeded in manufacturing disks up to 15 inches in diameter. These were surpassed by the Clarks of Cambridgeport, Mass., whose efforts during more than 50 years culminated in the construction of the 36-inch refractor of the Lick Observatory and the 40-inch Yerkes telescope, with both of which results commensurate with the size of the instruments have been obtained.

While the large instruments of the nineteenth century have resulted in the sounding of the heavens to an extent not dreamt of by the earlier observers, other instruments have contributed in no less degree to the progress of the science, and the chief advances of the nineteenth century have come from the application of the spectroscope, the photometer, and the camera to astronomical research.

One of the latest and most interesting developments of astronomy is the inauguration of international coöperation in astronomical research. We have already alluded to the great *Star Chart and Catalogue*, first projected by the International Astrographic Congress in 1887 and now approaching completion. Another important undertaking of this body was the determination of the solar parallax from observations of Eros at its opposition in 1900, and a still more formidable attack on this problem is planned for 1931, when the next opposition takes place. Mention may also be made of the work of the International Latitude Service in determining the variation of latitude due to the "wandering" of the pole, and the investigation of the period of rotation of the sun by the International Union for Coöperation in Solar Research. The huge scale on which it is possible to plan undertakings like those mentioned above, and the completeness with which they can be carried out, have already led to important discoveries and indicate that international coöperation is destined to result in even greater gains to astronomical science.

Consult also ABERRATION, *Constant of Aberration;* ASTROPHOTOGRAPHY; ASTROPHYSICS; COMET; CONSTELLATION; COSMOGONY; DOUBLE STARS; EARTH; ECLIPSE; JUPITER; MARS; MERCURY; METEORS; MOON; NEBULÆ; NEPTUNE; OBSERVATORY; PLANETOIDS; PLANETS; SATURN; SEASONS; SOLAR SYSTEM; STAR; SUN; TELESCOPE; URANUS; VARIABLE STARS; VENUS; YEAR.

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found useful in a more detailed study of the science of astronomy: Grant, *History of Physical Astronomy* (London, 1852); Chauvenet, *Manual of Spherical and Practical Astronomy* (Philadelphia, 1863); Young, *The Sun* (New York, 1881); Newcomb, *Popular Astronomy* (New York, 1882); Oppolzer, *Lehrbuch zur Bahnbestimmung* (Leipzig, 1882); Doolittle, *Treatise on Practical Astronomy Applied to Geodesy and Navigation* (New York, 1885); Young, *Textbook of General Astronomy* (New York, 1888); Tisserand, *Traité de mécanique céleste* (4 vols., Paris, 1889–96); Lockyer, *Dawn of Astronomy* (London, 1894); Ball, *Atlas of Astronomy* (New York, 1893); Valentiner, *Handwörterbuch der Astronomie* (Karlsruhe, 1896); Berry, *Short History of Astronomy* (London, 1898); Darwin, *The Tides, and Kindred Phenomena in the Solar System* (Boston, 1898); Ambronn, *Handbuch der astronomischen Instrumentenkunde* (2 vols., Berlin, 1899); Ball, *Story of the Heavens* (New York, 1900); Lockyer, *Recent and Coming Eclipses* (New York, 1900); Newcomb, *Elements of Astronomy* (New York, 1900); Comstock, *Text-book of Astronomy* (New York, 1901); Newcomb, *The Stars* (New York, 1901); Krisch, *Astronomisches Lexikon* (Vienna, 1902); Jacoby, *Practical Talks by an Astronomer* (New York, 1902); Newcomb, *Astronomy for Everybody* (New York, 1903); Lowell, *The Solar System* (Boston, 1903); Pickering, *The Moon* (New York, 1903); Fahie, *Galileo: His Life and Work* (London, 1903); Pickering, *Photographic Atlas of the Moon* (London, 1904); Turner, *Astronomical Discovery* (New York, 1904); Macpherson, *Astronomers of To-day: Their Work* (London, 1905); Baly, *Spectroscopy* (London, 1905); Ball, *Popular Guide to the Heavens* (London, 1905); Clerke, *The System of the Stars* (London, 1905); Dreyer, *History of the Planetary System* (Cambridge, 1906); Bryant, *A History of Astronomy* (London, 1907); Gore, *Astronomical Essays, Historical and Descriptive* (London, 1907); Hale, *Study of the Stellar Evolution* (Chicago, 1908); Poor, *The Solar System* (New York, 1908); Clerke, *Popular History of Astronomy in the Nineteenth Century* (London, 1908); Schuster, *Solar Research* (Manchester, 1909); Chambers, *The Story of the Comets* (Oxford, 1909); Turner, *Modern Astronomy* (London, 1909); Lowell, *The Evolution of Worlds* (New York, 1910); Abbot, *The Sun* (New York, 1911); Dreyer, *A Short Account of Sir William Herschel's Life and Works* (London, 1912); Campbell, *Stellar Motions* (New Haven, 1913); Jacoby, *Astronomy* (New York, 1913).

ASTROPALIA (It. *Stampalia*), the modern Greek name for the classical Astypalæa. An island of the Sporades (q.v.), 20 miles southeast of Amorgos (Map: Greece, H 5). It is mountainous, consists of an eastern and western half connected by the isthmus, and has good harbors. Its area is 62 (according to others, 84) square miles. Its population is about 2000, mostly residing in the town of Astropalia, on the isthmus. By imperial edict it held the rank of a free state under the Roman emperors. A Venetian possession in the Middle Ages, it has belonged to the Turks since the sixteenth century.

AS'TROPHEL. The name under which Sir Philip Sidney disguised his identity in writing the sonnets to "Stella," 1575–83. These poems appeared in 1591 and are considered the author's most remarkable achievement. Also the title of Spenser's elegy on Sidney.

AS'TROPHOTOG'RAPHY (Gk. *ἄστρον, astron*, star + *photography*). In no department of astronomy has development in recent years been so marked as in the application of photographic processes of observation. If photography could accomplish nothing more than what it has done and is doing for descriptive astronomy alone, we should still rank it among the most powerful weapons in the armory of the astronomer. It is but necessary, for instance, to examine a series of eye and hand drawings of some total eclipse, executed by different skilled observers at the same time, to come at once to the conclusion that it is well-nigh impossible to obtain correct information in this way; even the outlines of the corona and prominences will sometimes differ so greatly that one would scarcely believe an attempt had been made to delineate the same objects. Photography, of course, gives us a far more faithful picture, and thus furnishes observational material of specially high value. But even more important, perhaps, are the services it is capable of rendering to the astronomy of precise measurement, and photographic processes seem to be destined to replace the less facile visual methods which were employed exclusively until a few years ago. The heliometer (q.v.) is generally known as the most exact instrument for executing measurements on the sky. Yet, in the opinion of some of the highest authorities, the equality of photographic results with those of the heliometer may now be considered as conclusively demonstrated. The year 1892 saw the first complete publication of an extensive series of results. These were derived from excellent photographs of the cluster Pleiades, made in 1872 and 1873 by Rutherfurd, in New York. These results have been followed in the last few years by many other star-cluster measures, so that an extensive mass of material is being gathered by photography—material of the highest precision and of the last importance in stellar astronomy.

It is only by the study of minute inter-stellar changes in the star-clusters that we may hope, within the bounds of human time, to throw some light upon the problems of motion within the greater universe that lies beyond our own solar system; and it is to photography that we must look for our observational material. Generalizations of science can be secured only by the discussion of very large masses of observations; but although the heliometer can give us sufficient precision, it involves so much labor that by its exclusive use astronomy could not hope to do more than touch the surface of those great problems.

An account of the immense advances made, since the introduction of photography, in our knowledge of planetoids is given in a special article concerning these bodies. Suffice it to mention here that the photographic revelations in this important field have culminated in the discovery of the planet Eros (q.v.), now known to be, with the exception of the moon, our nearest neighbor in space. Many comets, too, have been discovered, and many doubtless will be discovered with the aid of photography; and it is photography again that furnishes the means of determining their positions and measuring their orbits with greater facility than could be obtained by any other method at present known. There is no doubt, further, that photography will greatly increase the list of known distances between the earth and remote

heavenly bodies (see PARALLAX), and that before many years it will replace the eye even in noting the instant of a star's transit across the meridian of an observatory. See TRANSIT INSTRUMENT.

But decidedly the most complete triumph of astrophotography is Gill and Kapteyn's Cape of Good Hope photographic *Durchmusterung*, the results of which are comprised in a remarkably complete catalogue of the southern heavens. In the year 1882 a very bright comet appeared in the sky, and was especially conspicuous in the southern hemisphere. Its brightness led Gill, at the Cape of Good Hope Observatory, to attempt to photograph it. In examining the negative, Gill's attention was attracted to the large number of stars appearing on the plate as minute points or dots, and it was these that first suggested to him the possibility of making a complete examination of the heavens with the aid of photography.

The German term *Durchmusterung*, now naturalized in scientific English, was first applied to Argelander's great catalogue of stars in the northern half of the sky, a work which has rendered possible many statistical and other researches of far-reaching importance in stellar astronomy. But Argelander and his successor, Schönfeld, observing at Bonn, in Germany, were able to carry on their survey only a short distance beyond the northern half of the sky. Gill, in his observatory at the Cape of Good Hope, far south of the equator, saw the possibility of extending Argelander's work, by means of photography, to the South Pole. To have so extended it by the visual methods that were used by Argelander would have required an enormous expenditure of time and labor; but a small photographic telescope was procured, and, in the hands of C. Ray Woods, a scientific photographer who was summoned from England, a complete collection of plates of the southern sky was made. The negatives were sent to Groningen, Holland, and were there measured by Kapteyn. The resulting catalogue, published in three large volumes by the British government, is found to possess even greater completeness than Argelander's; for the fallible human eye could not avoid omitting a star now and then, while the photographic plate is of course subject to no such error.

The Cape *Durchmusterung* is, however, not the only great result to which Gill's 1882 comet photograph has led. The *Durchmusterung* was carried out much on the same lines as Argelander's older work in the northern hemisphere, the idea being to make a census of all the stars in the sky down to a given magnitude, even if it should be impossible to give more than a rough approximation of their positions in the sky. But the success of the first enterprise led Gill to conceive the idea of preparing a new star catalogue that should satisfy the condition of high precision as well as that of completeness as to numbers. So vast an undertaking could be rendered possible only by the combined efforts of many astronomers and many observations, and, as the result of preliminary correspondence, a meeting to consider the subject was called at Paris by the French government in 1887. Delegates from all the civilized nations attended this Astrographic Congress, as it was called, and it was decided that the proposed photographic catalogue of precision should really be made, that it might stand for all time as the foundation of research in sidereal astronomy. Eighteen observatories have since been engaged in carrying out this astronomical enterprise, the greatest the world has ever seen. To make error of any kind practically impossible, the photographs are taken in duplicate, the total number of plates required being 44,108, each representing a surface of four square degrees. All stars down to the fourteenth magnitude, to the estimated number of 20,000,000, will be shown on the charts, while all stars down to the eleventh magnitude, numbering about 2,000,000, will be subjected to precise measurement and will have their places recorded in the catalogues which are to be published with the charts. Already considerable progress has been made with the publication of the charts and catalogues, many of the volumes having appeared since 1900. In 1909, however, it was found that while some of the observatories to which the work was originally allotted had practically completed their share, others, for various reasons, were far in arrears, and the work still remaining to be done was assigned to the more active observatories by the permanent committee of the Astrographic Congress. It is now highly probable that the year 1920 will see the completion of this great international undertaking.

Besides Rutherfurd other American astronomers have distinguished themselves in the new methods of observation. Probably the first really successful celestial photograph was made in 1840 by J. W. Draper. He was able to obtain negatives of the moon, showing the principal formations of her surface. Ten years later, in 1850, Bond and Whipple made still better moon pictures at Harvard College, Cambridge, Mass. Coming down to more recent years we find among American photographic astronomers, Pickering, who has done much in the photography of stellar spectra and in other departments of astrophysical photography; Hale, who has succeeded in photographing the solar prominences and faculæ in full sunlight and who, by his detection of the Zeeman effect in sun-spot spectra, has established the existence of strong magnetic fields in sun-spots; Campbell, who has determined photographically the velocities of motion in many of the stellar systems; Adams, who has made an exhaustive study of the rotation of the sun; St. John, whose spectrophotographic investigations have disclosed the circulatory system of the sun-spot vapors; and Ritchey, whose photographs of nebulæ and globular clusters have thrown new light on the constitution of these bodies. See ASTRONOMY.

More detailed information on the subject of astrophotography may be found in the *Bulletin du comité permanent de la carte du ciel*, vols. i, ii (Paris, Institut de France), Scheimer, *Photographie der Gestirne* (Leipzig, 1898), and Turner, *The Great Star Map* (London, 1912).

ASTROPHYSICS. The branch of astronomy which deals with the nature, physical condition, temperature, and chemical constitution of the celestial bodies. Owing to the inaccessibility of the heavenly bodies by ordinary means, the astronomer is entirely dependent for his knowledge of their physical and chemical properties on the energy which is radiated from them in the form of light and heat. The instruments which enable him to acquire this knowledge are the spectroscope, the bolometer, the photometer, and the camera. Of these the most important is the spectroscope, which depends for its operation

on Newton's discovery of the composite nature of sunlight and the possibility of separating it into its components by refraction through a prism. Melvill, in 1753, discovered that various chemical substances when burnt in an alcohol flame imparted a distinctive color to it, and that the spectra of such flames were not continuous but were made up of a few colors only. Fifty years later, Wollaston, using a narrow slit instead of a round hole for the admission of light, made the discovery that the solar spectrum was traversed by seven dark lines, but the significance of these lines escaped him. It was reserved for Fraunhofer, in 1815, to show that the dark lines were far more numerous than Wollaston had supposed, in fact, he found that the solar spectrum was crossed by hundreds of these lines and that many of them coincided in position with the bright lines due to glowing metallic vapors. Many theories were brought forward to account for the phenomenon, but it was not until 1859 that Kirchhoff showed that when sunlight is passed through glowing sodium vapor, the dark lines corresponding to that element are not effaced but, on the contrary, darkened. In this way he came to the conclusion that sodium, iron, calcium, and other terrestrial elements were actually present in the atmosphere of the sun, and thus laid the foundation of solar and stellar chemistry, the study of which has since been so fruitful in results.

Although the development of astrophysics has been almost entirely due to the use of the spectroscope, the foundation of the science may be said to date from the year 1826, when Schwabe began his study of the sun-spots, those great temporary breaks or openings which appear from time to time in the surface of the sun, and which are often 100,000 miles in diameter. He found that in some years the number of spots observed was very large, while in others only a few were seen, and in 1843 he was in a position to announce that the years of maximum sun-spot activity recur at intervals of 10 years. Later investigators have fixed this period at 11.11 years, and have shown that it coincides with the period which governs magnetic disturbances on the earth as well as the occurrence of the aurora borealis. Modern sun-spot research is largely spectroscopic, and has established the fact that the sun-spots are the seats of intense cyclonic action in the photosphere, while Hale, by his detection of the Zeeman effect in their spectra, has conclusively proved that they are also magnetic fields of great intensity.

The application of the spectroscope to the study of the sun and the stars may be regarded as the second stage in the development of astrophysics. The third great advance was made when the principle of the effect of motion on the refrangibility of light, first enunciated by Christian Doppler in 1842, was applied to the study of stellar motions. The telescope had enabled astronomers to determine the velocities of stars at right angles to the line of sight, because such a motion gave rise to a displacement of the positions of the stars on the celestial sphere, but it was unable to reveal any movement which might be taking place along the line of sight. Doppler's principle is briefly this: When a body emitting light is in motion towards us, the number of vibrations reaching us in a second is increased by an amount depending on the relative velocity of approach, and consequently the corresponding spectrum lines are shifted toward the violet end of the spectrum, while if the star is receding from us, the lines are shifted toward the red end of the spectrum. The possibility of the use of this principle in determining end-on motions was first suggested by Fizeau in 1848, but it was not until 1868 that Huggins actually applied it and succeeded in measuring the radial velocities of Sirius and other stars. This epoch-making achievement was followed, three years later, by Vogel's determination of the period of rotation of the sun from observations of the relative shifting of the solar lines due to light from the eastern and western limbs of the sun. So long, however, as the shifting of the lines was observed by visual methods alone, the results obtained were unsatisfactory, for the displacements are minute and difficult to estimate, and the lines, being often somewhat hazy, do not lend themselves well to accurate measurement, while the human eye itself adds a further uncertainty from its tendency to exaggerate the effects observed. These difficulties were obviated by Vogel's introduction of the spectrograph in 1888. In this instrument the camera takes the place of the eye, and the displaced lines are recorded on the photographic plate along with standard lines of reference from terrestrial sources, so that far greater accuracy of measurement is now possible.

The vast field of research opened up by Kirchhoff and Huggins has attracted a host of workers whose labors have been rewarded with such an abundant harvest of results that only a few of the most important can be mentioned here. Stars are now classified according to the character of their spectra; the first classification of this kind, since considerably extended by Pickering of Harvard, was made by Father Secchi in 1863, while other schemes of classification have since been proposed by Lockyer and Vogel. Nebular astronomy has been revolutionized; Huggins, in 1864, established the gaseous nature of the nebulæ by means of the spectroscope, and Keeler, in 1890, succeeded in obtaining the first reliable evidence of the existence of nebular radial motions. Stellar photometry has been prosecuted assiduously by Pritchard and Pickering, who have published photometric catalogues of the stars; and the latter has contributed a new and valuable method of research by his introduction of photographic photometry. By means of the spectroscope double stars are resolved into their components even when those components are too close to be separated by the telescope. In solar physics striking results, some of which have already been referred to, have been obtained, and the field has grown to be so extensive that observatories, like those at Mount Wilson (California), Mendon (France), Kodaikanal (Madras), and South Kensington, have been established, the work of which is restricted almost entirely to the prosecution of this important branch of astrophysics. See DOUBLE STARS; NEBULÆ; STARS; SUN; SUN-SPOTS; VARIABLE STARS.

Consult: Steiner, *Die Spektralanalyse der Gestirne* (Leipzig, 1890); Clerke, *Problems in Astrophysics* (New York, 1903); Baly, *Spectroscopy* (London, 1905); Clerke, *The System of the Stars* (London, 1905); Schuster, *Solar Research* (Manchester, 1909); Abbot, *The Sun* (New York, 1911); Campbell, *Stellar Motions* (New Haven, 1913).

ASTRUC, ȧs'trŭk', JEAN (1684–1766). A distinguished physician. He was born at Sauves,

in Languedoc, March 19, 1684. He studied at Montpellier, where he took his degree as doctor in 1703, and where he lectured (1707–09). In 1711 he was appointed to a professorship at Toulouse, and in 1716 he was called to a chair in medicine at Montpellier. In 1729 he became physician to the King of Poland, but the next year accepted a chair at Paris, where he died on May 5, 1766. His most important works are his dissertations on the epidemic diseases, published at the time of the plague (1722–25); his great work on venereal diseases (*De Morbis Venereis*), that appeared at Paris in 1736; his *Tractatus Therapeuticus et Pathologicus* (Venice, 1748); and his epoch-making *Conjectures sur les mémoires originaux dont il paraît que Moïse s'est servi pour composer le livre de la Genèse* (Brussels, 1753). The last book was written in the apologetic interest of curing what the author called "the malady of the century"—the doubt as to the Mosaic authorship of the Pentateuch. It furnished the clue to the documentary analysis of this work, which has occupied scholars ever since (see PENTATEUCH), by calling attention to the fact that in the Hebrew text of Genesis the name for God is sometimes Elohim and sometimes Yahwe, and that the passages employing the first of these names seem to differ in fundamental conceptions from those in which the second is used. Astruc inferred from this that Moses had used different sources in compiling Genesis.

AS'TRUP, äs'trŭp, EIVIND (1870–96). A Norwegian explorer, born at Christiania. He came to America in 1891 and in the same year joined the Peary expedition to Greenland. In 1893–94 he was a member of the second Peary expedition to Greenland and made the first survey of the northern and northeastern coast of Melville Bay. He lost his life during a snowshoe expedition from Dovre, Norway. His body was found Jan. 21, 1896, at Lille Elvedälen. His published works include *Blandt Nordpolens Naboer* (1895).

ASTURIAS, äs-tōō'rĭ-äs (from Basque *asta*, rock + *ura*, river; literally, 'the country of the dwellers by the rocky river'). A former division of Spain, now included in the province of Oviedo, bounded on the north by the Bay of Biscay, east by Santander, south by León, and west by Galicia. The low hills of León and Old Castile rise gradually to the mountain chain which forms the southern boundary, towering to a height of nearly 9000 feet in the summit of Torre de Cerredo. The northern slopes are broken by steep and dark valleys or chasms, which are among the wildest and most picturesque in Spain. The climate is damp, as the clouds and fogs of the Atlantic hang continually about the snow-capped mountains. The principal kinds of wood are oak, chestnut, and silver and Scotch firs; in the more remote districts the forests are superb. Pasturage is found along the slopes in the narrow valleys, supporting an excellent breed of horses and cattle. In the wider valleys, barley, wheat, maize, figs, olives, grapes, and oranges are cultivated; along the coast are excellent fisheries. Copper, iron, lead, cobalt, arsenic, antimony, and coal are found in the province.

Asturias became a place of refuge for the Goths in the eighth century. Here the famous Pelayo was made King in 718, and his successors, continuing the fight against the Arabs, became kings of León in the tenth century. Because of this long struggle against the Moors and the consequent exclusive sentiments of the Asturians which kept them free from foreign domination other than that of the Romans and the Goths, they are probably to be regarded as the purest representatives of the original Iberian race; and their language (*lenguage bable*) furnishes much light upon general problems of Castilian linguistics. (See recent studies by Ramón Menéndez Pidal.) The Asturians still boast of their independence as free Hidalgos and are simple in manners and brave, but less industrious and sociable than their neighbors in Biscay and Galicia. They have been termed the Swiss of Spain, and they are equally faithful and fond of money. The Vaqueros form a distinct caste in the province, intermarrying among themselves and leading a nomadic life, wintering on the seacoast and summering on the hills of Leytariegos. Oviedo, the capital, has, since 1833, given its name to the whole province. The other important towns are the ports of Gijón and Avilés. The area of the province of Oviedo is 4207 square miles, with a population in 1900 of 627,069.

Since 1388 the heir-apparent, whether male or female, to the crown of Castile, and later to the crowns of the Spains, has been known as Prince, or Princess, of Asturias.

ASTYAGES, ăs-tī'ă-jēz (Gk. *'Αστυάγης*, in the Babylonian inscriptions called *Istuvēg*, 'the good warrior'). The last King of Media, son and successor of Cyaxares, reigned c.584–550 B.C. According to the story told by Herodotus, Astyages, on account of a dream, gave his daughter Mandane in marriage to Cambyses, a Persian of eminence; but later, being influenced by an alarming dream, he sent Harpagus to destroy the child which was the fruit of the marriage. But the child Cyrus (q.v.) was hidden away by a shepherd, and was after many years brought to the notice of Astyages, who easily discovered the boy's parentage. Astyages punished Harpagus for deceiving him, and Harpagus instigated the bold and ambitious Cyrus to lead a revolt of the Persians, through which Astyages was made prisoner, and Cyrus took the sceptre. Astyages was treated mildly, but kept a prisoner until his death. According to the more reliable account given in the Babylonian inscriptions of Nabonidus, Cyrus, the King of Anzan, revolted against his lord, Astyages. The troops of Astyages deserted him and delivered him to Cyrus, who captured Ecbatana in 552 B.C.

ASTY'ANAX (Gk. lord of the city, from *ἄστυ*, *asty*, city + *ἄναξ*, *anax*, ruler, lord). The son of Hector and Andromache, deported, according to the story, with his mother from the ruins of Troy by Pyrrhus. Upon the fortunes of these two Trojans Racine has founded his admirable tragedy, *Andromaque*. At the death of Pyrrhus, Astyanax became King of Epirus. According to another legend, he was hurled from the walls of Troy, in fulfillment of an oracle.

ASUNCIÓN, ä-sōōn'syōn', NUESTRA SEÑORA DE LA, nwä'-strä sä-nyō'-rä dä lä. The capital of Paraguay, an episcopal city, situated on the east bank of the Paraguay River (Map: Argentina). It was founded in 1536, on the feast day of the Assumption of the Virgin (August 15), and for more than a century was the capital of all the Spanish territory in the valley of the Rio de la Plata. Among the notable buildings are a cathedral, several churches, a government palace, a public library, and a national college, and there is an agricultural

school. The regularity of its streets and its fine situation on the river bank make it notable among South American cities. A railway connects Asunción with Eucarnacion, on the Paraná, a distance of nearly 250 miles, and in 1913 through train service to Buenos Ayres was established. There is a line of river steamers connecting Asunción with Buenos Ayres and Montevideo. There are distilleries, mills, foundries, and shipyards, and manufacturing is carried on to a large extent. This city is the chief centre of trade for the country and has a considerable commerce, the principal articles of export being leather, tobacco, sugar, and *yerba maté*, or Paraguay tea. Pop., 1895, 45,000; 1900, 51,700; 1905, 60,259; 1912 (est.), 84,000.

ASUR, ä'sōōr. See ASSYRIA.

ASURBANIPAL, ä'sōōr-bä'nê-pâl. See SARDANAPALUS; ASSYRIA.

ĀSVAGHŌSHA, åsh'vâ-g'hō'shâ, or **ĀÇVAGHOSA.** A Buddhist monk, author of a life of the Buddha, written in Sanskrit, and entitled *Buddha-carita*, or "Acts of the Buddha." He lived in the second or the fourth century A.D., and his poetical work on the legend of Buddha follows the manner of a classical Sanskrit epic, but is written with the elaboration and artificiality of the later court poetry. It was translated into Chinese between 414 and 421 A.D. For the Sanskrit edition consult Cowell, *Açvaghosha's Buddha-carita* Oxford, 1893), and *Sacred Books of the East*, vol. xlix; and on the Chinese version consult Asvaghosha, *Discourse on the Awakening of Faith*, translated by Suzuki (Chicago, 1900).

ĀSVĀLAYANA, or **ĀÇVALYANA,** äsh'vâ-lä'yâ-nâ. The name of an ancient Sanskrit author, familiar in connection with Vedic literature, because of the Srauta-Sūtra and the Grhya-Sūtra, which bear his name. See VEDA.

ASVAMEDHA, äs'vâ-mād'hâ (horse-sacrifice). A Vedic and later Hindu rite, believed to be efficacious in insuring progeny.

ASVINS, äs'vĭnz. Two Vedic divinities of the heaven, the Aryan Dioscuroi, later called Dasra and Nasatya. They are the first bringers of light in the morning sky, and the husbands of Surya, daughter of the sun god. The Asvins are the divine physicians and are frequently implored in the Rigveda, where they are always addressed together for release from ills of all kinds. Consult Bergaigne, *La religion védique*, vol. ii (Paris, 1878–83), and Macdonnell, *Vedic Mythology* (Strassburg, 1897).

ASWAIL, äs'wāl. See BEAR.

ASWAN, à-swän'. See ASSUAN.

ASY'LUM (Lat. Gk. *ἄσυλον, asylon*, right of sanctuary, refuge, a place safe from violence, from *ἀ, a*, priv. + *σύλη, sylē*, right of seizure). A place of refuge. 1. In ancient times sacred places, especially the temples and altars of the gods, were appointed as asylums to which criminals as well as persecuted individuals might flee for refuge, and to molest them in such places was regarded as an impiety. An analogous institution is the "cities of refuge" (Num. xxxv. 9–34). Among the Greeks in early times these asylums might be sometimes useful in preventing hasty retribution; but in the course of time they were so much abused that their sanctity was in a great measure disregarded. Thus Pausanias, who fled to the altar of Athene, was taken and slain there by the Lacedæmonians, and in other cases the refugee was compelled to leave the asylum by fire or starvation. In Rome the Emperor Tiberius abolished all such places of refuge from law, excepting those in the temples of Juno and Æsculapius. The custom of allowing to real or supposed criminals a place of safety in temples was also adopted by the Christian church. In the time of Constantine the Great the churches were made asylums; and Theodosius II extended the privilege to all courts, alleys, gardens, and houses belonging to the Church. In 681 A.D. the Synod of Toledo extended the privilege of asylum to a space of 30 paces around every church. In the lawless periods of the Middle Ages the influence of the Church often prevented deeds of gross injustice and violence; but the sanctity of churches was abused by criminals, and this led to several modifications which gradually destroyed the privilege of sanctuary (q.v.). In England it was abolished by acts passed in 1534 and 1697. 2. The word "asylum" is now applied to places of shelter for unfortunate or destitute persons and to hospitals for the insane. See LUNACY.

ASYLUM, RIGHT OF. In international law, a privilege accorded by the law of nations or by custom to foreign legations to shelter within their precincts persons subject to the jurisdiction of the state in which such legation is maintained. As this definition indicates, the right, so far as it exists at all, is a right to *extend* protection, not to *claim* it; and this circumstance differentiates it strikingly from the institution of asylum or sanctuary (q.v.) as practiced in primitive society. See ASYLUM, above; and also AVENGER OF BLOOD; CITY OF REFUGE.

The right of asylum originated in the fiction of extra-territoriality (q.v.), or the extension by a state of its territorial jurisdiction by its legations into the territory of another state, to the exclusion, so far as the precincts of the legation were concerned, of the domestic jurisdiction. The person taking refuge within the legation was deemed to have come under the protection of its flag, and, so long as he remained there, to be as completely exempt from the legal or executive process of the country as if he had escaped to the foreign territory represented by the legation. He might be surrendered by the government under whose flag he had taken refuge, at its pleasure, or as the subject of extradition (q.v.) proceedings; but any attempt to take him by force was an invasion of the territory of the state in whose legation he was sheltered. This is the theory upon which the alleged right of asylum rests, but it is a theory so clearly at variance with the real basis of international relations of independent states, and it has been so discredited by the abuses to which its application has led, that it has completely broken down. The fiction of extra-territoriality having been abandoned, attempts have been made to justify the right of asylum by the doctrine of the inviolability (q.v.) of diplomatic agents (q.v.), the members of their families, their official houses and property. But, in practice as well as in theory, this doctrine, which is intended only to guarantee the perfect freedom and fearlessness of the minister in the discharge of his functions as the representative of a foreign government, is strictly applicable only to the bona fide members of his household, not to visitors, and still less to strangers temporarily residing with him.

Notwithstanding the absence in international law of any justification of the right of asylum, it has been frequently granted in modern times, but only in countries whose civil institutions

fail to command the respect of foreign states, and in times of civil tumult. It was repeatedly practiced by the representatives of the Powers in Greece during the Revolution of 1862, and in Spain in the periods of anarchy between 1840 and 1850 and from 1865 to 1875. In the Spanish-American states it has been a common and recognized practice to protect in the legations the successive victims of the frequent revolutions by which changes in administration are commonly effected, and the legitimacy of the practice has not infrequently been acquiesced in by the state in which it occurred. This condition of affairs has given a certain legal sanction to the right of asylum in those countries, though it is usually justified by the states exercising it, not on legal grounds, but upon grounds of humanity. It is, however, universally conceded that it has no application to ordinary criminals, but only, as a measure of temporary protection, to political offenders. Even in this restricted form the practice has been generally discouraged and forbidden by the United States government, though the grant of asylum by our ministers in Central and South America has in exceptional cases been condoned or approved by the Department of State.

The following rules may be taken to represent the official, if not the consistent, attitude of our government:

1. In no case is a minister to offer his dwelling as a resort for refugees.

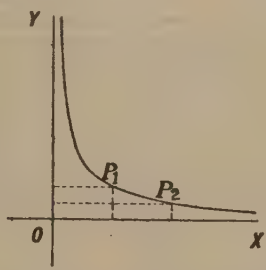
2. If a fugitive, uninvited, applies for protection, it is to be accorded only when his life is in imminent danger from mob violence and only for so long as such imminent danger continues.

3. A minister is bound to refuse asylum to persons fleeing from the pursuit of the legitimate agents of the government, and, in case such persons have been admitted, he must either surrender or dismiss them.

4. A minister is obliged strictly to abstain, except under the conditions and limitations prescribed by rule 2, from receiving or retaining persons who are engaged in political agitation, or who, though not formally accused, inspire the government with distrust.

As ships of war are generally conceded to be exempt from the local jurisdiction of the foreign ports visited by them, it is clearly within the power of commanders of such ships to grant asylum to refugees from that jurisdiction; but it is well settled that "considerations of propriety and good faith require" them "to abstain from abusing the hospitality of the port in which they may be by making their vessels an asylum for offenders against the law." Neither consuls (who are not diplomatic agents) nor merchant vessels, as a rule, enjoy any exemption from the local jurisdiction, and consequently they can assert no claim to grant asylum. Certain immunities which have been conceded to them from time to time have been exceptional in character, and more in the nature of courtesies extended than of rights admitted. The subject of asylum has been fully and learnedly treated by Prof. John B. Moore in his *Asylum in Legations and Consulates* (New York, 1892); and more briefly in Snow's *International Law* (Washington, 1898). Consult also *Moore on Extradition* (Boston, 1891); Wharton's *International Law Digest* (Washington, 1896); and Woolsey's *International Law* (New York, 1899).

ASYMPTOTE, ăs'ĭm-tōt (Gk. *ασύμπτωτος, asymptōtos*, not falling together, from *ἀ, a*, priv. + *σύν, syn*, with + *πίπτειν, piptein*, to fall). A straight line which a curve approaches nearer and nearer, but does not reach within any finite distance; or, in other words, a tangent to a curve, having the point of tangency at infinity. A clear idea of how a curve may have such a tangent can be procured from one of the well-known laws in physics. According to that law, the greater the pressure exerted upon a gas the smaller the volume it occupies. This law may be presented in geometrical form by drawing two lines, *OX* and *OY* (see figure), perpendicular to each other, and then representing pressures by perpendicular distances from the line *OX* and the corresponding volumes by perpendicular distances from the line *OY*. By joining the series of points, P_1 P_2, etc., thus obtained, the relation existing between the various pressures and volumes may be graphically shown by a curve called an equilateral hyperbola. The greater the pressure the smaller the volume, and hence the smaller the distance between the curve and the line *OY*. But where will the curve and the lin *OY* be tangent? In other words, where will the distance between them, and hence the volume of gas, become naught? Evidently, at a point infinitely distant from the line *OX*, i.e.,



at a point representing an infinitely great pressure. For under any finite pressure, no matter how great, a gas still occupies a certain definite volume. The line *OY* is therefore, according to the definition, an asymptote of our curve, and so is, for analogous reasons, the line *OX*.

AS YOU LIKE IT. A comedy by Shakespeare, founded entirely on Lodge's romance, *Rosalynde*, save for the introduction of Touchstone, Audrey, and Jaques. It was written in 1600, but did not exist in folio until 1623.

ATA, ä-tä'. A mixed Malay and Negrito people of Davao district, Mindanao. They do not form a distinct tribe, nor are they of uniform culture. Their language is broken up into many dialects not mutually intelligible. They are not to be confounded with the Aeta. See PHILIPPINES.

ATACAMA, ä'tä-kä'mȧ. A northern province of Chile, bounded by the province of Antofagasta on the north, the Argentine province of Catamarca on the east, Coquimbo on the south, and the Pacific Ocean on the west. Its area, excluding the desert portion, is 30,728 square miles. The surface is stony, scantily watered, and mostly barren, but it is especially rich in minerals. Of these, copper and silver are mined on a large scale and are the most important, commercially, but there are also found considerable quantities of gold, nickel, cobalt, and iron. The salt and saltpetre deposits of the province are almost inexhaustible. Owing to its

important mineral production, Atacama is well supplied with railway lines, which connect the more important mining centres. The first railway built in Chile connects the capital with Caldera, the best ocean port of the country. Pop., 1895, 59,713; 1907, 64,000; 1910 (est.), 65,000. Capital, Copiapó.

ATACAMA. That part of the long coast desert of South America extending between the Pacific and the Andes, from the river Loa to Copiapó (23°–27° S. lat.) and embracing the larger part of the Chilean province of Antofagasta and the smaller part of the province of Atacama (Map: Chile, C 9). It rises abruptly from the coast to about 3500 feet, then more gradually to over 13,000 feet, with groups of mountains rising above the high plain, on whose surface are also interspersed small salt lakes and swamps. The surface is strewn with stones and is seldom sandy. The only river from the Cordilleras reaching the sea is the Rio Loa. The region is very rich in minerals, especially in copper and silver and nitrate deposits. The scanty rainfall and the scarcity of fresh water make it almost uninhabitable. No vegetation is found between the elevations of 2000 and 8000 feet except where mountain streams debouch upon the plateau.

AT'ACA'MAN, or **AT'ACAME'ÑAN.** The territory of this South American linguistic stock, now represented by a few hundred individuals, of whom hardly any still speak their mother tongue, included the region around Atacama (19°–24° S. lat.) except that portion in the southwest occupied by another stock, the Changoan. This part of the continent is archæologically and ethnologically important as the seat of the ancient "Atacaman culture," recently studied by de Créqui-Montfort, Boman, etc. The surviving Atacamans are to be found at San Pedro de Atacama, etc. Consult Chamberlain in the *American Anthropologist*, vol. xiii, pp. 465–467 (N. S., 1911).

ATAC'AMITE. A copper hydroxychloride that crystallizes in the orthorhombic system. It is usually found in confused crystalline aggregates and fibrous or granular massive forms. The lustre is vitrious and the color bright to dark green. As sand it was originally discovered in the Atacama province in northern Chile, whence its name; and it also occurs in Peru, Bolivia, and Australia. It has been found as a crust on the lavas of Vesuvius and Etna in Italy; also in Saxony and in Arizona. The deposits in South America, which contain from 50 to 60 per cent of copper, are regarded as valuable sources of copper, and have been sent to England to be smelted. Atacamite has been ground up in Chile and sold under the name of *arsenillo* as sand for letters. The greenish incrustation found on antique bronze utensils, weapons, and other articles, and commonly known as *ærugo nobilis*, is composed of this mineral.

ATAHUALPA, ä'tà-wäl'pà (?–1533). Inca of Peru. He was the favorite son of Huayna Capac, who, upon his death-bed made Atahualpa King of Quito, while Huascar, his eldest son, received Peru (1525). In the spring of 1530 Atahualpa, incensed at Huascar's demand for homage, declared war against him and completely defeated Huascar on the plains of Quipaypan, in the neighborhood of Cuzco, the native Peruvian capital, in 1532, a few months before the arrival of the Spaniards. Huascar was taken prisoner and confined in the strong fortress of Xauxa. Then followed, according to Garcilasso de la Vega, a series of atrocious massacres of all the royal family of the Incas. The extent of these massacres was undoubtedly grossly exaggerated by the surviving relatives of the victims, from whom Garcilasso derived his information; but there seems to be no sufficient reason for doubting that Atahualpa killed all whom he had reason to fear as future rivals. In the meantime the Spaniards had disembarked at Tumbez, and after a perilous march through the unknown country, Pizarro, at the head of his 200 cavaliers, approached the victorious camp of Atahualpa, where he found some 50,000 men assembled. By a stratagem Pizarro obtained possession of the person of the King. Atahualpa was treated with a great show of kindness at first, and more especially when he offered, as a ransom, to fill the room in which he stood with gold as high as he could reach. When Atahualpa's brother, Huascar, who was still a prisoner, heard of this, he offered still more advantageous terms for himself. To prevent this Atahualpa had him secretly assassinated. The golden treasure which was to constitute the ransom of Atahualpa now began to pour in, and at length Atahualpa demanded his freedom. This Pizarro refused to grant and accused Atahualpa of plotting against him. Atahualpa was placed on trial and formally condemned to death upon evidence furnished by an interpreter, who was desirous of possessing one of the wives of the King. He was threatened with burning at the stake as a heretic, but, as he submitted to baptism according to the rites of the Church, he was garroted, Aug. 29, 1533. The principal authority is Garcilasso de la Vega's *Royal Commentaries of the Incas*, trans. by C. R. Markham for the Hakluyt Society (London, 1869–81). Garcilasso's mother was of the Inca blood, or, according to more probable authority, one of the royal concubines.

ATAKAPA, ä't'à-kä'pà, or **ATTACAPA** (Choctaw, man-eater). A tribe, now extinct, formerly occupying the western part of Louisiana. They are believed to have constituted a distinct linguistic stock, the Attacapan family, although the language shows some slight correspondence with both Carankawa and Tonkawa.

ATALA, ä't'à'là'. A romance of Chateaubriand, published in the Paris newspaper *Le Mercure de France* in 1801. Atala is the daughter of a North American Indian chief. She falls in love with a prisoner, who is the chief of another tribe, releases him, and flees with him. Having been brought up as a Christian, and sworn by her mother to a single life, she remains faithful to the vow and finally commits suicide in a fit of religious scrupulosity.

AT'ALAN'TA (Gk. Ἀταλάντη, *Atalantē*). A heroine in Greek mythology. The tradition recognizes two persons of this name, the Bœotian Atalanta and the Arcadian Atalanta, who are often confounded in the ancient accounts and whom it is not easy to keep apart. 1. The Bœotian Atalanta, daughter of Schœneus, was the most swift-footed of mortals. Being reluctant to marry any one of her many suitors, she imposed upon all who sought her hand the test of a foot-race with herself. If successful, the suitor was to receive her hand, but, if defeated, he was to be put to death. Hippomenes, son of Megareus, came to the contest with three golden

apples, which he had received from Aphrodite. By dropping these successively as he ran along he retarded the course of Atalanta—who stopped to pick them up—and thus won the race and the maiden. Since husband and wife failed to thank Aphrodite, the goddess led them, on their way home, to profane by their love a sanctuary of Cybele. Cybele, angered in her turn, changed them both into lions and yoked them to her chariot. For this version of the story see Ovid, *Metamorphoses*, x, 560–707. 2. The Arcadian Atalanta, daughter of Jasius and Clymene, was, when an infant, exposed on Mount Parthenius by her father, who desired a son. She was suckled by a she-wolf, and afterward rescued and brought up by shepherds. She lived apart from men, the companion of Artemis, skilled with the bow. Many achievements are ascribed to her. She slew the centaurs, Rhœcus and Hylæus, wounded the Calydonian boar, took part in the funeral games of Pelias, and sailed with the Argonauts to Colchis. She finally gave her hand to her suitor Meilanion, by whom she had a son, Parthenopæos, one of the Seven against Thebes.

ATALANTA IN CAL'YDON. A play by Swinburne. It is a quaint dramatic experiment, uniting Greek classic form with modern romantic treatment; a poem rather than a play. It appeared in 1864. It is founded on the famous boar hunt of Greek legend, and its choruses are among the author's highest achievements.

ATTAL'LA. A city in Etowah Co., Ala., 56 miles northeast of Birmingham, on the Alabama Great Southern, the Louisville and Nashville, the Nashville, Chattanooga, and St. Louis, and the Southern railroads (Map: Alabama, C 1). It is the seat of the Etowah County high school, and has foundry and machine shops, iron mines, compress and storage plant, lumber yards, cooperage, and manufactories of cotton-mill castings, sink brackets, grates, etc. The water works are owned by the city. Pop., 1900, 1560; 1910, 2625.

AT'AMAN (Russ. *ataman*, Little Russ. *otamen*, *hetman*, Polish *hetman*, chief of any band or gang. By some explained as an adaptation *via* Poland, of the AS. *heafodman*, Ger. *Hauptmann*, Eng. *headman*, or *hetman*). The title borne by the chief of the Cossack tribes. Formerly the ataman was elected by an assembly of the people and held the power of life and death. Even as subjects of the Czar the atamans held their power until in 1708; after the part played by Mazeppa in the war with Charles XII Peter the Great reduced them to little more than provisional governors. The head of each Cossack army is still called ataman, and an ataman presides over the government of the territory of the Don Cossacks. Since 1835 the title of Chief Ataman has been vested in the Russian heir-apparent. Hetman was also the title given by the Poles to the commander-in-chief of their armies, who was absolute in power during time of war, except when the King took command of the army.

AT'AMAS'CO LILY. See Plate of AMARYLLIDACEÆ.

ATAUL'FUS, AT'AULF, or **ADOLF,** ä'dôlf (?–415). The brother-in-law of Alaric, and his successor as King of the Visigoths (410–415). He assisted Alaric in the sieges of Rome, and after the latter's death went to Gaul, taking as a captive Galla Placidia, sister of the Emperor Honorius, who became his wife in June, 414. He wished to ally himself with Rome, but Honorius was unwilling to form such an alliance. Late in 414 he entered Spain, and in 415 he was assassinated at Barcelona. His last words are said to have been: "If possible live in friendship with Rome, and restore Placidia to the Emperor." Consult Hodgkin, *Italy and her Invaders* (Oxford, 1880–85).

AT'AVISM (from Lat. *atavus*, the father of a great-grandfather, an ancestor). A term used in biology to signify the temporary appearance in an individual—plant or animal—of a peculiar character which is not typical of the immediate race or genus, but which is found in allied ancestral races. The term "atavism" is sometimes incorrectly used as a synonym for reversion. Reversion, as employed by paleontologists and students of evolution, refers to the gradual resumption by a race, during the later stages of its existence, of the general form of its ancestors, generally the form of the earliest ancestral members of the race. Abnormal developments are often examples of atavism, as are occasional modern many-toed horses, which recall the foot structure of the extinct three-toed horses of Tertiary time. Good illustrations of atavism are often also furnished by hybrids. See EVOLUTION; HEREDITY.

In sociological literature the term "atavism" is frequently used, in the sense of reversion to more primitive types, to explain criminal instincts and other social-pathological phenomena. In this sense the term is continually used by Lombroso, and by other authors of both the Italian and French schools of criminologists. See CRIMINOLOGY.

ATAX'IA, LOCOMOTOR. See LOCOMOTOR ATAXIA.

ATBARA, ät-bä'rä, or BAHR-EL-ASWAD. The most northerly tributary of the Nile, rising at the northern end of Lake Tsana, in Abyssinia (Map: Africa, H 3). It flows 800 miles northwest through the Nubian Desert and enters the Nile in lat. 17° N., above Berber. Its most important tributaries are the Bahr-Setit and Mareb. The Atbara is unavailable for navigation, but it is important on account of the large quantity of water it contributes to the Nile during the rainy season. It contributes to the Nile a large proportion of the silt which fertilizes the fields of Egypt. In the dry season the Atbara is almost waterless, except for a few stagnant pools, unfit for drinking.

ATCHAFALAYA, ăch'a-fâ-lī'yâ. A river of Louisiana, having its source near the mouth of the Red River in Avoyelles Parish, and serving as an outlet for the Red and the Mississippi rivers during high water (Map: Louisiana, D 3). It flows south, and passing through Grand Lake, empties into Atchafalaya Bay, Gulf of Mexico. It is about 225 miles long and navigable for small boats for 218 miles.

ATCHEEN'. See ACHIN.

ATCHIEVE'MENT. See HATCHMENT.

ATCHINSK, â-chēnsk', or **ACHINSK.** The chief town of a district in the Yeniseisk government, southern Siberia, on the Chulym River. It is on the road to Tomsk and on the Trans-Siberian Railway, 108 miles west of Krasnoyarsk. Pop., 1897, 6714; 1910, 7000.

ATCH'ISON. A city, and the county-seat of Atchison Co., Kans., 49 miles northwest of Kansas City, Mo., on the Missouri Pacific, the Chicago, Rock Island, and Pacific, the Atchison, Topeka, and Santa Fe, and the Chicago, Burlington, and Quincy railroads, and on the Missouri

River (Map: Kansas, G 3). It is finely situated on the "Great Bend" of the Missouri; is the seat of a State soldiers' orphans' home and of Midland College (Lutheran), St. Benedict's College (Roman Catholic), and Mount St. Scholastica's Academy (Roman Catholic). It contains a public library; fine county courthouse and government buildings; Forest, City, and Central parks; a hospital; and a noteworthy bridge across the river, some 1200 feet long. The union station, erected at a cost of about $140,000, is among the prominent buildings of the city. The city's exceptional facilities for transportation by rail and water have made Atchison one of the principal commercial cities of the State; it has an extensive trade in grain, lumber, live stock, fruit, and general agricultural produce, and large wholesale interests in groceries, drugs, and hardware. Manufactures also are of importance, the industrial establishments including large grain elevators, flour, corn, and oatmeal mills, railroad shops, foundries, lumber mills, furniture, broom, and harness factories, carriage works, and brickyards. The government, under a charter of 1881, is vested in a mayor, elected every two years; a municipal council; and administrative officials, appointed by the mayor. The school board is independently chosen by popular vote. Atchison was settled by the pro-slavery party in 1854, during the conflict between that party and the anti-slavery party for the control of Kansas, and was named in honor of Senator D. R. Atchison. It was incorporated in 1858. Pop., 1890, 13,963; 1900, 15,722; 1910, 16,429; 1920, 12,630.

ATCHISON, David Rice (1807–86). An American politician. He was born in Kentucky, removed to Missouri in 1830, and practiced law. In 1834, and again in 1838, he was a member of the State Legislature, and from 1843 to 1855 sat in the United States Senate, being president pro tempore in 1846–49 and in 1852–54. By virtue of this office Senator Atchison was for one day legal President of the United States, since General Taylor was not sworn in until Monday, March 5, 1849. A slave-holder himself, he soon became conspicuous as a pro-slavery leader in the debates over the organization of Kansas and Nebraska, and in 1854 fought with Douglas for the passage of the Kansas-Nebraska Act, which involved the repeal of the Missouri Compromise of 1820. Returning to western Missouri in 1855, he there took an active part in the struggle (1856–57) between the pro-slavery and "free state" parties for the control of Kansas, though for the most part he discountenanced violence and bloodshed.

ATE, ā'tē (Gk. Ἄτη, *Atē*, bewilderment, infatuation, from *dáein*, *aaein*, to hurt, damage, infatuate). The personification, in Greek mythology, of the blindness which leads men to ruin, called sometimes daughter of Zeus and Eris (Strife). She tricked Zeus into the oath which made Hercules subject to Eurystheus, and was in consequence cast forth from heaven; on earth thenceforth she led men into evil. Ate is seldom clearly personified. Even in the legend of her deception of Zeus we have scarcely more than allegory, and even in Greek tragedy Ate is rarely more than a quality.

ATELIERS NATIONAUX, à'te-lyā' nà'-syô'nô'. See National Workshops.

ATELLA. See Atellanæ.

AT'ELLA'NÆ (Lat. *Fabulæ Atellanæ*, the Atellan fables, farces; also styled *Ludi Osci*, the Oscan plays). A kind of popular drama in Rome, introduced, tradition said, from Atella, a town in Campania, between Capua and Naples. After the Greek drama had been brought to Rome by Livius Andronicus, the old Fabulæ Atellanæ were still retained as interludes and after-pieces. The Maccus (Fool) and the Bucco (Fat-Chaps) of the Fabulæ Atellanæ may be considered the origin of the modern Italian *arlecchino* (harlequin), and other characters of the same stamp. They were the favorite characters and, in the view of some, spoke the Oscan dialect, exciting laughter by its quaint, old-fashioned words and phrases. It is, however, not likely that the Oscan speech was used in them, at least to any extent; rather the Atellanæ ridiculed country life and manners. Other stock characters in the Atellanæ were Pappus (Papa, Daddy) and Dossennus (Sharper, Trickster). The Atellanæ were neither so dignified as the *comœdia palliata*, nor so low as the *comœdia tabernaria*, but indulged in a kind of genial and decent drollery. The caricature was at first always pleasant, and, though quizzical, did not lapse into the obscenity which characterized the *mimi*. Respectable Roman youths, who could not appear as actors in the regular Greek drama without losing caste, were allowed to take part in the Atellanæ. In Sulla's time the Atellanæ made an approach to literary form, in the writings of Pomponius and Novius. A few fragments of these popular farces have been collected by Ribbeck in his *Comicorum Romanorum Fragmenta* (Leipzig, 1898). Consult also Munk, *De Fabulis Atellanis* (Leipzig, 1840).

A TEMPO, ä tĕm'pô (It. to, or in time). A term used in music to denote that, after some short change in the time, the performer must return to the original tempo.

ATEUCHEUS SACER, à-tū'kûs sā'sẽr. See Scarabæus.

ATH, ät, or **AATH.** A town in the province of Hainault, Belgium, situated on the navigable Dender, 14 miles northwest of Mons (Map: Belgium, B 4). It has a hospital and college, and important manufactures of linen, calico, lace, gloves, cutlery, etc., and carries on a brisk general trade. There are many lime kilns in the vicinity. Pop., 1890, 9900; 1900, 11,100; 1910, 11,108.

ATHABASCA, ăth'ă-băs'kà (N. Amer. Indian, place of hay or reeds). Formerly a district in Canada, formed in 1882 out of the Northwest Territories, and enlarged in 1895, so as to contain 251,300 square miles, including 11,800 square miles of water area. The district lay between lat. 55° and 60° N. and long. 100° and 120° W. It was bounded on the north by the former district of Mackenzie, on the east by the former district of Keewatin, on the south by the former districts of Saskatchewan and Alberta, and on the west by the province of British Columbia. It is a part of the great American Plain, and only in the southwest corner, where it approaches the mountains of British Columbia, does it attain any considerable elevation. Much of its surface, however, is decidedly broken and hilly. The greater portion drains northward into the Mackenzie River system. The western half is crossed by the Athabasca and Peace rivers. There are numerous lakes, of which Reindeer Lake, in the east, and Athabasca, in the north, are very large; the former is included in the province of Saskatchewan, while the latter is divided between Saskatchewan

and Alberta. The climate is subject to great extremes of heat and cold, but is clear and bracing. There is little rain or snow, but the rainfall is greatest when most needed, during the growing summer months. In the west the soil is highly fertile, and wheat, potatoes, and other of the hardier varieties of cereals and vegetables can be successfully raised. In the east the soil is rocky and sandy and less fertile. Salt and gypsum are found in the Slave River region. The inhabitants are mostly Indians and half-breeds, who live by hunting, the product of the chase constituting almost the only revenue-producing resource of the district. Dunvegan, in the southwest, is the principal settlement. In 1905 Athabasca ceased to exist as a political division, the western part falling to the new province of Alberta, the central part to the new province of Saskatchewan, and the extreme east to the Northwest Territories; the latter part in 1912 was included in Manitoba. For a further description, see ALBERTA; SASKATCHEWAN.

ATHABASCA, or ELK, RIVER. A river in the northwest of Canada, included in the great basin of the Mackenzie (Map: Canada, H 5). It rises near Yellowhead Pass in the Rocky Mountains. Its general course is east and then north to Athabasca Lake, from which it emerges and unites with the Peace River to form the Slave River. Its length is 765 miles, its drainage area 58,910 square miles, and its most important tributaries are the McLeod, Pembina, and Lesser Slave rivers.

ATHABASCA LAKE. A Canadian lake in the northern part of Alberta and Saskatchewan (Map: Canada, J 5). It is traversed by the parallel of 59° N. and by the meridian of 110° W.; length, 195 miles; average width, 20 miles; area, 3085 square miles. Its principal feeder is the Athabasca River.

ATHABASCA PASS. A defile of the Canadian Rocky Mountains between Mounts Brown and Hooker, which crosses the boundary between Alberta and British Columbia (Map: Northwest Territories, F 4).

ATHAL'ARIC (516–534). King of the Ostrogoths. He was selected by his grandfather, Theodoric the Great, as his successor, and upon the death of Theodoric was recognized as such by the Goths and Romans. In consequence of dissipation, however, he died at an early age.

ATH'ALI'AH (Heb. Yahwe is powerful). The daughter of Ahab (2 Kings viii. 18), King of Israel, and Jezebel, who married Jehoram, King of Judah (ib. viii. 26). After the murder of her son, Ahaziah (2 Kings ix. 27), who succeeded Jehoram, but reigned for only one year, she paved her own way to the throne by a general slaughter of her grandchildren, Joash alone escaping through the intervention of Jehosheba, the daughter of Jehoram. This occurred c.842 B.C. The young prince thus rescued was privately educated in the temple, and, after Athaliah had reigned six years, the high priest, Jehoida, succeeded by a carefully contrived plan in placing Joash on the throne (c.836 B.C.). Athaliah, hearing the noise attending the coronation, hastened to the temple, where the people were shouting "God Save the King!" As she looked around in astonishment on the young King, whom she had supposed to be dead, surrounded by priests, Levites, rulers, captains, and a rejoicing multitude, she "rent her clothes, and cried, 'Treason! treason!'" By the command of the high priest she was led out of the temple and slain in the gateway of the palace. The house of Baal, with its altars and images, was broken down. This narrative (2 Kings, xi.; 2 Chron. xxii. and xxiii.) is the subject of Racine's drama *Athalie*.

ATHALIE, *á'tá'lê'* (Fr. Athaliah). The title of a tragedy by Racine, and his last play (1691). Founded upon the story of Athaliah in 2 Kings, it was written at the suggestion of Madame de Maintenon, who desired for her protégées, the girls of her school at Saint Cyr, a play in which there should be no word of sexual love. The dramatic quality of the play is no less striking than its religious fervor, and the tragedy may well have given a fit opportunity to Rachel's emotional gifts. If not the poet's masterpiece, it is perhaps inferior only to his dramas *Andromaque* and *Phèdre*.

ATH'AMAS. The son of Æolus, and ruler of Orchomenus in Bœotia. At first he married the cloud goddess Nephele, who bore him Phrixos and Helle, but he was abandoned by her on account of his love for the mortal Ino, daughter of Cadmus. By Ino he was the father of Melicertes and Learchus, the latter of whom he slew in a fit of madness. Thereupon Ino cast herself into the sea with Melicertes and was changed into the sea goddess Leucothea, while Melicertes became Palæmon, a divinity of sailors. Athamas fled to Thessaly, where, presently purged of his guilt, he married Themisto. The story of Athamas was much used by the Greek tragic writers.

ATHAN'AGILD (?–567). King of the Visigoths of Spain. In 554 he led the uprising against King Agila (549–554) and called the Byzantines of North Africa to his aid. The Emperor Justinian also lent his aid to Athanagild by sending to Spain an army under Patricius Liberius, which conquered the principal seaports on the southeastern coast of the peninsula. Agila was defeated at Seville and murdered by his followers, and Athanagild succeeded to the throne. He built the churches of St. Justa and St. Rufina at Toledo.

ATHAN'ARIC (?–381 A.D.). A ruler, with the title of judge, of the Western Goths (Visigoths), whose settlements lay on the north bank of the lower Danube. Since he took advantage of the weakness of the Roman Empire when the imperial armies were engaged in suppressing the rebellion of Procopius, war was declared against him by the Emperor Valens. Athanaric acted strictly on the defensive during two campaigns, in which the Romans gained no advantage over him; but in the third year of the war (369 A.D.) he hazarded a general battle, and was defeated, whereupon he sued for peace, and, with that object, had a conference with Valens in a boat on the Danube. After peace was concluded Athanaric was occupied in settling dissensions arising out of the Arian controversy, which then agitated his people; he was a relentless foe of all Christians. When the first advance of the Huns on Europe alarmed the Gothic nation, Athanaric attempted to secure the eastern borders of his kingdom; but the Huns forced the passages of the Dnieper, defeated the Goths, and advanced in great force into the plains of Dacia. When, in 376, the Western Goths were received by the Romans as allies, and had settlements granted them on the south of the Danube, Athanaric, with a part of his people, refused to accompany them, removing to the west and fortifying himself against the new enemy. In 380, however, banished by his followers, he accepted the hospitality of the Empire, and re-

moved to Constantinople, where he was cordially and honorably received by the Emperor Theodosius. Fourteen days later he died. Consult Hodgkin, *Italy and her Invaders*, vol. i (Oxford, 1880), *and The Cambridge Mediæval History*, vol. i (New York, 1911).

ATHANASIAN (ăth'ā-nā'zhan) **CREED,** THE. Often called the Quicunque, from its first Latin word. The longest of the three so-called ecumenical creeds and the latest in time of composition. (See CREEDS AND CONFESSIONS and NICENE CREED.) It was long supposed that the Athanasian Creed was the work of the saint whose name it bears. Mediæval legend said that Athanasius wrote it while in exile in Rome, during the episcopate of Julius I (337–352), but since the seventeenth century this theory has been shown to be untenable. Among the arguments against it are these: The creed was written in Latin, whereas Athanasius spoke and wrote Greek; it is nowhere mentioned by Athanasius, or by any of the other Greek fathers of the century after his death; it omits certain forms of statement which Athanasius was specially interested in maintaining, and includes others which were not formulated until a later time; and it appears first in the West, and never received the sanction of the Eastern church at all. On the other hand, a study of the contents of this so-called creed, and a careful comparison of other documents, make it appear probable that what we have is in fact not a creed at all, but rather an explication, or setting forth, first, of the Catholic doctrine of the Trinity, and, secondly, of the person and work of Christ. The creed thus falls into two main divisions, the former clearly depending upon the teaching of St. Augustine, the latter upon the Christology of Chalcedon (q.v.). It may have been, wholly or in part, a sermon on the creed, such discourses being very common at that age of the Church. And indeed Hincmar of Rheims (ninth century) expressly calls this creed *sermonem Athanasii de fide.* Or it may have been regarded as a sort of hymn or chant, to be used in public worship, like the Te Deum. We know that in the Middle Ages the Quicunque was actually recited at Prime by the monks in the monasteries of southern Gaul. This liturgical use of our symbol can be traced as far back as the Carolingian period, and the formula itself is doubtless still older. It is apparently referred to in the acts of the Synod of Autun (c.670 A.D.), and most modern scholars are inclined to place its composition, or compilation, in the sixth century.

Striking parallels, amounting sometimes to verbal identity, are found to the Athanasian Creed in a sermon falsely attributed to Augustine, but really perhaps by Cæsarius of Arles (ps. Augustine, *Sermo* 244), in the *Commonitory* of Vincent, of Lerins (434 A.D.), and in Augustine's treatises on *The Trinity* and *Christian Doctrine*, which are still older. At least one of the characteristic phrases of this creed was current in the West early in the third century (Tertullian, *Adv. Prax.*, 13, "The Father is God, and the Son is God, and the Holy Ghost is God, and each is God"). It would appear, therefore, that we have to do, not with the work of any single writer, but with a document which was produced gradually, perhaps from various sources, but worked into a unity under Augustinian influence, and reaching its present form by the sixth century, probably in southern Gaul or north Africa.

At the beginning of the Athanasian Creed, and also at the end of each of its two divisions, occur damnatory clauses, pronouncing eternal doom upon all who do not accept the Catholic faith as here set forth. So far as doctrine is concerned, the creed agrees with the theology of western Christendom, including Protestantism. But objection has often been made to the way in which the faith is here expressed, especially to its rigid form, its highly artificial refinements, its mathematical precision, the minute detail arising from its great length, and the damnatory clauses. Most Protestant churches do not make use of this creed, although it is retained in the English Book of Common Prayer and is appointed to be read in that church on thirteen special days of the year. The American Episcopal church has dropped it entirely.

For the text of the Athanasian Creed, consult the English Prayer Book, and Philip Schaff, *Creeds of Christendom*, vols. i, ii (New York, 1884). Consult also: A. E. Burn, *The Athanasian Creed and its Early Commentators* (Cambridge, 1896); G. D. W. Ommanney, *Critical Dissertation on the Athanasian Creed* (Oxford, 1897).

ATHANASIUS, ăth'ā-nā'zhĭ-ŭs, SAINT (Gk. *Ἀθανάσιος, Athanasios*) (c.293–373). The father of Greek orthodoxy, Bishop of Alexandria, and the most eminent theologian of the fourth century. He was probably born in Alexandria, and died there. His parents are said to have been Christians. We know little about his youth, except that he was well educated and brought up for the service of the Church. Rufinus tells us that in early boyhood Athanasius played at being bishop and baptized some of his mates according to the rules of the Church, and that the bishop afterward recognized their baptism as valid; but this story rests upon no sufficient evidence. Athanasius began to serve the Church as reader, and was advanced to the office of deacon before the beginning of the great theological struggle which led up to the Council of Nicæa (325), where he appears as an opponent of the presbyter Arius, who also lived in Alexandria. His life is intimately connected with the progress of the Arian controversy, and he was by far the most formidable antagonist whom that heresy encountered. For many years it was "Athanasius contra mundum," but his great ability and perseverance gained the victory in the end. (For particulars respecting this struggle, see NICÆA, COUNCIL OF; ARIUS.) Athanasius advocated the famous *homoousion* doctrine, which was that the Son of God is of the same essence or substance with the Father, whereas Arius maintained that the Son was of like substance with the Father, but the first of creation, and more than man. All the Trinitarian and Christological speculations of the fourth and fifth centuries have their roots in this controversy.

Athanasius became Bishop of Alexandria, probably in 326, and his episcopate lasted until his death, 47 years afterward. At this time Alexandria was not only one of the leading cities of the Empire, but also one of the most important in the Church. For more than a century the greatest theologians had worked and taught here, and here, too, divergences from Catholic orthodoxy were by no means rare. During the progress of the Arian controversy politics mingled with theology, and each side labored to win Imperial favor. The Arian party was influential at court and very active. Five times

Athanasius was sent into exile, and more than one-third of his long episcopate was spent away from his see. Almost from the first, charges of immorality, sacrilege, sorcery, treason, and even murder were brought against him by his enemies; but in every case the verdict of history has pronounced him innocent. A grossly partisan synod at Tyre (335) condemned him, and the outcome was his first banishment, lasting two years, which he spent at Treves. He was pardoned after the death of Arius, and returned to Alexandria amid the acclamations of the people (337). The Emperor Constantius banished him again in 339, and this second exile extended over seven years. Athanasius sought refuge with Julius, Bishop of Rome, where he was well received, and where, according to an unreliable tradition, he is said to have written the Athanasian creed (q.v.). Leaving Rome, he visited Gaul, Dacia, Aquileia, and Antioch. In 346 he was permitted to return to his see, and the joyful people streamed forth to meet him "like another Nile." By favor of the Emperor Constans Athanasius now enjoyed 10 years of comparative quiet; but in 356, owing to the renewed ascendency of the Arian party, who had gained control of all the churches in Alexandria, he was once more compelled to seek safety in flight. For six years he dwelt among the Egyptian hermits, or concealed himself in the neighborhood of the capital, where he could secretly watch the fortunes of his church. These years were fruitful in literary labor, and at the same time they gave him a more intimate knowledge of the monastic life. Athanasius was the first episcopal patron of the monks, and it is largely through him that the Western church came to know of the Egyptian hermits. After Julian's accession a policy of religious toleration was inaugurated, and Athanasius was recalled. But the Emperor had a personal falling out with the Bishop the same year (362) and issued a special edict against him, so that he fled to Thebaïs, where he remained about 18 months. His fifth and last exile lasted only four months and brings us down to the year 366. Seven years of life remained to the aged Bishop, and these were spent in quiet labor at his post, and in enjoyment of the honors his fidelity had earned. The theological battle was practically over, and the victory rested with the cause of Nicene orthodoxy. Athanasius's disciples, especially Basil the Great and the two Gregories, were instrumental in securing the final verdict in its favor at the second Ecumenical Council at Constantinople (381).

Athanasius was a voluminous writer. His works are chiefly controversial and dogmatic, though some are exegetical and pastoral. Highly valuable to the historian are such works as the *Discourses against the Arians*, the *History of the Arians*, the *Apology against the Arians*, and *On the Decrees of the Nicene Synod*. The *Life of St. Anthony* purports to describe that famous hermit, but it is full of legendary material. A series of *Festal Epistles*, relating to the celebration of Easter, contains much valuable material of various kinds; e.g., the Thirty-ninth Epistle, for the year 367, gives a very important list of the canonical books of the Bible.

The Benedictine edition of Athanasius's works appeared in Paris (3 vols., 1698). Migne's *Patrologia Græca*, vols. xxv–xxviii (Paris, 1857), is more nearly complete, but has the usual faults of that collection. The *Festal Epistles* were edited by Cureton (London, 1848). An English translation of the "Historical Tracts" and "Treatises in Controversy with the Arians" may be found in *The Library of the Fathers* (Oxford, 1843). Selections from his writings, including all the most important, and also his letters, are translated by Archibald Robertson, who furnishes elaborate prolegomena discussing "The Life and Theology of Athanasius," in the *Nicene and Post-Nicene Fathers*, 2d series, vol. iv, ed. by Schaff and Wace (New York, 1892). Consult also William Bright, *Lessons from the Lives of Three Great Fathers* (London, 1890); F. W. Farrar, *Lives of the Fathers*, vol. i (New York, 1889); W. Cave, *Lives of the Fathers*, vol. ii, ed. by Cary (Oxford, 1840); and the article on Athanasius in Smith and Wace's *Dictionary of Christian Biography*. For the teaching of Athanasius, consult: Harnack, *History of Dogma*, vol. iv (Boston, 1898), and Fisher, *History of Christian Doctrine* (New York, 1896); Bishop, *Development of the Trinitarian Doctrine in the Nicene and Athanasian Creed* (New York, 1911); Simpson, *Athanasian Warning* (New York, 1911); Taylor, *Athanasian Creed in the Twentieth Century* (New York, 1911); Burn, *The Athanasian Creed* (London, 1912).

ATH'APAS'CAN STOCK. One of the most important and most widely extended linguistic stocks of North America, having its territorial and tribal nucleus along the Yukon and Mackenzie rivers of Alaska and British America, but extending in detached tribes on both sides of the great divide southward almost to central Mexico. The line of migration has evidently been by successive conquests from north to south, the original tribes everywhere giving way before the more warlike Athapascans. Tribal characteristics and habits are as various as might be expected in a race scattered from the Arctic zone to the tropics. Among the more important tribes may be named the Chippewayan, Kuchín, Taculli, Sarsi, Hupa, Navajo, Apache, Jicarilla, Mescalero, and Lipan. See these tribal names for detailed information.

ATHARVA, ȧ-t'här'vȧ, or **ATHARVAN,** ȧ-t'här'van, or **ATHARVAVEDA,** ȧ-t'här'vȧ-vā'dȧ. The name of the fourth Veda.

A'THEISM (Gk. *ȧ, a,* priv. + *θeós, theos,* god). The doctrine that there is no God. It is to be clearly distinguished from agnosticism (q.v.), which is a profession of ignorance about God, not a denial of His existence. Many of those charged with atheism have merely rejected some particular form of popular belief in the gods. The early Christians were called atheists because they denied the gods of the Greeks and Romans, and Christians themselves have sometimes used the term with little more justification. Voltaire and Thomas Paine are instances of men widely denounced as atheists, who were not atheists, but deists (see DEISM). Real atheism, however, has appeared in almost every highly developed civilization. Its cause is usually new philosophical or moral ideas, which seem, at least for a time, to be incompatible with current theistic belief. Often it voices a protest against an unworthy conception of God. In India the Sankya philosophy, which is one of the great systems of Hindu thought, Buddhism, and Jainism are atheistic, each arguing against an eternal Creator on the ground that the conception is both needless and illogical. Atheism appeared occasionally in Greek and Roman thought, though some of those charged with it, as Protagoras, were really agnostics. In the

modern world it arises from a belief that the arguments to prove a God are not sufficient to compel acceptance; from materialism, the belief that no power except that of physical forces is needed to explain the universe; and from sensationalism, the belief that all ideas are the result of sensations, and that we can know nothing about the Absolute or Infinite. The last position leads more logically to agnosticism. In the eighteenth century atheism gained some followers in France, and later, in Germany. The most famous exponents of it were La Mettrie, Holbach, Feuerbach, and Carl Vogt. In modern thought Comte, from the philosophical side, and Haeckel, from the scientific, have put forward systems of thought essentially atheistic, in that they account for the universe without the hypothesis of a self-existent and self-conscious God. Atheism is not necessarily irreligious. On the contrary, Buddhism, Jainism, and the Positivism of Comte are organized religions. For modern atheism, consult Flint, *Anti-theistic Theories* (Edinburgh, 1879); Otto, *Naturalism and Religion* (London, 1907).

A'THEIST, THE. Otway's last play, being a continuation of *The Soldier's Fortune,* produced at Dorset Gardens in 1684, with Betterton as Beaugard and Mrs. Barry as Porcia. Its plot, which is extremely involved, is drawn from a French novel, *The Invisible Mistress,* by Scarron. It was dedicated to Lord Elande, son of the Marquis of Halifax.

ATHEIST'S TRAG'EDY, THE. One of Cyril Tourneur's best-known plays. It bears the subtitle of *The Honest Man's Revenge,* and, when published in 1611, also bore the note, "As in divers places it hath often beene acted." It was probably written in 1600. The plot, grotesque and crude, is drawn from the *Decameron.* As poetry, it contains several passages of no little imaginative power.

ATH'ELARD. See ADELARD.

ATH'ELING (AS. *Ætheling;* Ger. *Adel,* nobility). Among the Anglo-Saxons a general designation for a noble. In the ninth and tenth centuries it was often restricted to members of the royal family and sometimes to the heir to the throne.

ATHELNEY, ăth'*e*l-nĭ, ISLE OF (AS. *Æthelinga,* princes' + *ig,* island). An island in the midst of a marsh, at the junction of the rivers Tone and Parret, in the middle of Somersetshire, England. Here Alfred established his camp as a rallying point against the Danes, and later (in 888) founded a Benedictine abbey, now entirely gone. Athelney is the scene of Alfred's reputed adventure with the cakes. The "Alfred Jewel" was found there in 1693. See ALFRED.

ATH'ELSTAN (AS. *Æthele,* noble + *stān,* stone), or **ÆTHELSTAN** (c.894–940). The grandson of Alfred the Great and the first monarch who took the title of King of England. He was crowned at Kingston, in Surrey, in 924 or 925, and seems to have possessed both great ambition and high talent. It is supposed that his design was to unite in subjection to his single sway the entire island of Britain. On the death of Sihtric, King of Northumbria, who had married one of his sisters, Athelstan took possession of his dominions. The other kings of the island submitted to him, and he styled himself *Rex totius Britanniæ.* A league, composed of Welsh, Scotch, and English, was formed against him. A fierce and decisive battle was fought at Brunanburh, in 937, in which the allies were utterly defeated and which became famous in Saxon song. After this the reputation of Athelstan spread to the Continent. Five of his half-sisters married continental nobles, viz., Otho the Great, Charles the Simple, Hugh the Great, Louis, King of Arles, and a German noble. At home he exhibited a deep interest in the welfare of his people, improved the laws, built monasteries, and encouraged the translation of the Bible into the vernacular. He died at Gloucester, Oct. 27, 940. Consult Freeman, *Old English History* (London, 1869) and *The Norman Conquest* (London, 1885).

ATH'ELSTANE. A character in Scott's *Ivanhoe.* Although of gigantic strength, he is nicknamed "The Unready," because of his phlegmatic temperament. He is a suitor for the hand of Rowena, but in the end renounces his pretensions in favor of Ivanhoe. His title is "Thane of Coningsburgh."

ATHE'NA. See MINERVA.

ATH'ENÆ'UM (Lat. *Athenæum,* from Gk. *'Αθήναιον, Athēnaion,* temple of Athene). The name applied in general to temples dedicated to the tutelary goddess of Athens, though more particularly used to designate one of these temples in Athens where poets and men of letters were accustomed to meet and read their productions. (See ATHENE, TEMPLE OF.) At Rome the Athenæum was a celebrated institution of learning, founded by Hadrian about 135 A.D., and developed by those of his successors who were interested in literature and education. The building was in the form of a theatre, in which poets and rhetoricians read their productions, delivered lectures, and held recitations. In time salaried professorial chairs were attached to the Athenæum, which thus became a university like that at Alexandria. In this form it survived until the fifth century. Similar institutions, bearing the same name, were established in Lyons, Marseilles, and other provincial centres. The term is applied also in Belgium and Holland to schools of a grade below the universities. In modern times the term has become a very general designation for literary or scientific clubs and societies, or for the buildings in which they meet, and has been adopted as the title of a number of important literary journals, notably of one in Paris and of one in London. The best-known club is that founded in London in 1824. Its members are elected from among men "of distinguished eminence in sciences, literature, or the arts, or for public service." The club is situated at 107 Pall Mall.

ATH'ENÆ'US (Gk. *'Αθήναιος, Athēnaios*). A Greek writer who flourished in the latter half of the second and the early third century A.D., born at Naucratis, in Egypt. He lived first at Alexandria and afterward in Rome; but we possess no further details of his life. His great work was the *Deipnosophistæ* ('The Dinner of the Learned'), in 15 books. Of this the first two and parts of the third, eleventh, and fifteenth have come down to us only in an abridged form; the remaining books are complete. After the model of Plato's Symposium, Athenæus relates to his friend Timocrates the table talk at a dinner given by one Larensius, to which 29 guests were invited. Among them were jurists, poets, grammarians, philosophers, orators, physicians, and musicians. The work, as a matter of fact, consisted of extracts from an enormous

number of books (2500, by 800 writers) which are introduced into the imaginary conversation. Almost every possible subject, from cookery to grammar and literary criticism, is discussed, but the author is especially fond of scandal and of cookery. The work has not a single gleam of genius, the dialogue is prolix and lumbering; but as a storehouse of miscellaneous information the book is invaluable. The date of composition is after 192 A.D., for the Emperor Commodus, who was murdered in that year, is ridiculed in it; according to Kaibel, after 228. The best edition is by Kaibel (1887–90). The work was also edited by Schweighäuser (1801–07), Dindorf (1827), Meineke (1858–67), and was translated by Yonge in Bohn's Classical Library (1854).

ATH'ENAG'ORAS (Gk. *'Αθηναγόρας*). An early Christian philosopher, who taught first at Athens and afterward at Alexandria. He is one of the oldest of the apologetical writers, and is favorably known by his *Legatio pro Christianis*, which he addressed to the Emperor Marcus Aurelius, about the year 177 A.D. He therein defended the Christians against the monstrous accusations of the heathens—viz., that they were guilty of atheism, incest, and cannibalism. His work is written in a philosophical spirit and is marked by great clearness and cogency of style. We likewise possess a valuable treatise of his on the resurrection of the dead. Consult the English translation in *Ante-Nicene Christian Library*, vol. ii, pp. 129–162 (New York, 1867).

ATH'ENA'IS. See EUDOCIA.

ATHENE, ă-thē'nē. See MINERVA.

ATHENE, TEMPLE OF. 1. The name long given to a famous Doric temple at Ægina, of which 22 columns remain. The sculptures of the pediment, representing a contest of Trojans and Greeks, are among the Æginetan Marbles at Munich. In recent years scholars have inclined to believe that the temple was built rather in honor of Aphæa. (See ÆGINETAN SCULPTURES.) 2. An old temple at Athens, situated between the Parthenon and the Erechtheum, the foundations of which were identified in 1885 by Dörpfeld, who has based on them a reconstruction of the temple. (See ATHENS.) 3. An archaic Doric temple dating from the sixth century B.C., at Syracuse, now a cathedral. 4. See PARTHENON.

ATHENE NI'KE, TEMPLE OF. See NIKE APTEROS, TEMPLE OF.

ATHENE PAR'THENOS (Gk. *'Αθήνη παρθένος*, Athene, the Virgin). A small, inferior copy of the great chryselephantine statue of Athene. It is in the possession of the National Museum at Athens. The original was the work of Phidias for the Parthenon.

ATHE'NIS. See BUPALUS.

ATHEN'ODO'RUS (Gk. *'Αθηνόδωρος, Athēnodōros*). 1. The Rhodian sculptor of the first century B.C., who, with two others, produced the famous "Laocoön." (See LAOCOÖN; GREEK ART.) 2. Surnamed *Cananites*, from *Cana*, near Tarsus, his birthplace, son of Sandon (c.74 B.C.–8 A.D.). A Stoic philosopher, the instructor of Augustus when the latter was a boy at Apollonia; he came afterward to Rome, where the Emperor favored him highly, and made him tutor of the young Tiberius. His influence was great at court, and he was very free-spoken; he is said to have advised Augustus to repeat the alphabet whenever he felt himself giving way to anger. He was on friendly terms, too, with Cicero and Strabo; the latter declares that he was a learned scientist. In his old age Athenodorus returned to his native town, Tarsus, where he died. 3. A Stoic philosopher, of Tarsus, surnamed Cordylion (c.110–40 B.C.). As director of the library at Pergamum, he sought to purify Stoic writings by cutting out of them passages which did not meet his views. From 70 B.C. he lived at Rome in the house of Cato Uticensis.

ATH'ENS (Gk. *'Αθῆναι, Athēnai*, usually derived from the name of the goddess Athene). The capital of the kingdom of Greece and of the nome of Attica; situated in lat. 37° 58′ N., and long. 23° 44′ E., on the southwest coast of Attica, less than 3 miles from the Saronic Gulf at the nearest point, and about 4½ miles from the harbor of Piræus, in the plain bounded on the northwest and north by Mount Parnes, on the northwest by Mount Pentelicon, on the east by Mount Hymettus, on the south by the sea, and on the west by Mount Ægaleos (Map: Greece, E 4). It is 350 feet above sea level and has a moderate climate, the mean temperature ranging from 46° F. in January to 81° in July. The cluster of houses at the foot of the Acropolis on the site of ancient Athens forms the inner city, with narrow, crooked streets; and outside of this the Neapolis, or new city, extends in a semicircular arc, which is regularly laid out and divided into six districts. It is connected with the older portion by Hermes and Æolus streets, the main business thoroughfares, which intersect at Constitution Square, the site of the royal palace and gardens. In the modern section the Square of Harmony (Place de la Concorde) forms a centre from which wide boulevards radiate in various directions, the most important of which are Piræus Street, Athens Street, Stadion Street, and University Street, the last two ending in Constitution Square. On the two avenues last mentioned stand the government offices and the buildings of the archæological colleges, of the Academy of Sciences, of the National Library, and of the National University. Other important modern structures are the Royal Palace, erected from 1834 to 1838, situated amid magnificent gardens, the House of Parliament, Palace of Justice, the Polytechnic Institute, National Archæological Museum with its priceless collections, the Metropolitan, Roman, and Anglican churches, and extensive cavalry barracks. For illustrations of the architectural features of Athens, see ARCHITECTURE.

The government of the city is administered by a mayor, or *demarchos*, chosen by popular vote every four years, together with a council of 18 members, which has jurisdiction over the suburbs of the parish. There is a municipal fire department, but the police is under the control of the central government. The city owns its gas and electric plants as well as the water works, which include the ancient aqueduct of Hadrian, but the water supply is so scanty that the inhabitants are obliged to supplement it by purchase from water-carriers. Street cars traverse the city in every direction, and railroads from all parts of Greece converge here. A suburban line runs to the bathing resort of Phaleron, close to the port of Piræus. Athens is the seat of several foreign consulates, including one of the United States. It is the financial centre of Greece, although it does little manufacturing and trades only in imports for its own consumption. It is the seat of a Greek Metropolitan. The population has been steadily increasing in the

last quarter of a century. It numbered 66,834 in 1879, 107,251 in 1889, 111,486 in 1896, exclusive of the suburbs, 167,479 in 1907; 1920, 300,704.

Education. There are primary, secondary, normal, technical, and industrial schools. The National University, founded in 1837 and named in honor of King Otho, received its present title after his abdication. Its income is about $80,000, the number of students about 2500. The faculties comprise theology, law, medicine, philosophy, and mathematics and physics. The university has a number of museums, laboratories, and a library, which is also the National Library, of 250,000 volumes, 2300 MSS., and 200,000 historical documents. Besides this there are the library of Parliament, with 160,000 volumes, the National Museum, and that of the Acropolis.

But to foreigners the chief educational importance of Athens centres not in the university, but in the various schools established there by other nations, for study of Greek archæology. Of these the American School of Classical Studies is of especial importance. It was founded by the Archæological Institute of America and opened in 1882. It is supported by regular contributions from American universities and colleges and by gifts, and has a permanent director and secretary and a professor of Greek language and literature chosen annually from among the institutions which support it. It has three scholarships, two for men and one for women. Its students are in the main drawn from American colleges and universities. Besides instruction it devotes much time to investigation. Its organ is the *American Journal of Archæology*. Like this in many respects is the French School at Athens, founded in 1846, which is supported by the State and controlled by it, with the assistance of the Academy of Inscriptions and Belles-Lettres. It is managed by a director and associates. The British School at Athens was founded in 1886, is supported partly by the government and partly by contributions from the universities of Oxford and Cambridge, the Society for the Promotion of Hellenic Studies, and private subscription. It is under the control of a managing committee in London and a director, assistant director, and secretary in Athens. Like the American School, it devotes itself to both teaching and excavation. Of equal importance is the Royal German Archæological Institute, founded in 1874, supported by the government and under the control of a directorate in Berlin, represented by secretaries both in Athens and in Rome. The work of this institute has been of an unusually high character. All these organizations issue monographs and proceedings.

History. The early history of Athens is involved in obscurity. The Athenians themselves claimed to be *autochthones*, and there can be no doubt that Attica was outside of the great waves of migration that swept over northern Greece and the Peloponnesus. In all probability the early inhabitants of Athens were a people made up of an original stock which occupied the place from Minoan times at least and an admixture of incomers from Ionia. These newcomers seem to have been responsible for many of the important changes which subsequently took place in Attica. In the earliest times Athens, or Cecropia, was only one of a number of petty states, but tradition said that it became the capital under Theseus, who united the whole of Attica under his rule. Theseus may be mythical, but it is certain that Athens early became so thoroughly the capital of the country that only Eleusis preserved the memory of independence. Like all the early states, Athens is said to have been ruled by kings, of whom the last was Codrus. The rule of archons, chosen for life, seems to represent the limitation of the royal power by the nobles, Eupatridæ; and when, in 753 B.C. (according to tradition), the term of office was made 10 years, and in 683 B.C. reduced to one, it is clear that the government had become an aristocracy. The name of king was indeed always retained as a title for that one of the archons to whom were intrusted the old priestly functions of royalty. Another archon was called Polemarchus, as the commander in war; while the first, who seems to have been charged with the civil government, was called simply "the archon," and gave his name to the year. See ARCHON.

During this early time the citizens were divided into four tribes, and each tribe into three brotherhoods, though these associations seem to have been older than the tribes. At first only the members of the noble clans belonged to the brotherhoods; but some time in the seventh century B.C. the peasants and craftsmen, who were organized like the nobles, seem to have been admitted, and later enrollment in a brotherhood was required of all legitimate children. The aristocratic government of the three archons and the Council of Elders was forced by the changes common to the Greek world after 700 B.C. to give increasing recognition to wealth apart from birth. The exact course of this revolution cannot be traced, but one step was the institution of the six Thesmothetæ, or junior archons, who took charge of the judicial system. The commercial development of Athens was rapid during this period and led early to the creation of a fleet, though of the details of its organization we are not informed. This prosperity and the introduction of a metallic currency do not seem to have helped the small landowners or the peasants, and, though they loyally supported the government against the conspiracy of Cylon (about 630 B.C.), their condition seems to have grown worse rapidly, perhaps in consequence of a war with Megara. To help them against the oppression under which they suffered, it was decided to form a written code of laws, and about 621 B.C. this work was intrusted to Draco. His labors did not give sufficient relief. The small farmers were driven to borrow money, mortgaging their land, and thus rapidly falling into the power of the rich, while the tenants, who rented land, were often reduced to slavery and even sold out of the country, from inability to pay their debts. A revolution seemed imminent, but was averted by the wise legislation of Solon, in 594–593 or 592–591 B.C. By cancellation of all debts involving the freedom of the debtor, and by freeing all in slavery for debt, he relieved the freeman, while, by the substitution of the Eubœic for the Æginetan standard in coinage, he brought Athens in alliance with Chalcis, and opened the way to the development of the western trade. His great service was the reform of the constitution on a really democratic basis, though outwardly it was still a timocracy. Four classes were now recognized, according to the wealth of the individual citizens, and, though the archonship was open only to the first class, and no offices were granted to those in the fourth, yet as all citizens could vote in the Ecclesia, and sit in the courts, now

established, the election and judgment of the magistrates were in the hands of all and not a privileged few.

The old Council of the Areopagus, composed henceforth of ex-archons, was made the supreme guardian of the laws, and a new senate of 400, chosen equally from the four tribes, was instituted to prepare the business for the Ecclesia. Though the situation was much alleviated by the reforms of Solon, the political parties still continued their struggles. The party of the nobles, living chiefly in the city and the Attic plain, was known as that of the Plain; the moderate party, which was satisfied with the new order, was largely composed of the middle class, and, from the residence of many of them, was called that of the Coast; a third party of a more radical type was that of the Hills, for most of its members seem to have come from the mountain regions. Aided by the Hillmen, Pisistratus made himself tyrant (561 B.C.), and, though twice driven out, finally handed down his power to his sons, who ruled till the murder of Hipparchus (514 B.C.), and expulsion of Hippias (510 B.C). During this time the forms of the constitution had been observed, though all offices had been filled by the friends of the tyrants. The period was one of growth in foreign influence and internal prosperity. The tyrants beautified the city with new temples, introduced a better supply of water, and inaugurated more splendid festivals, thus producing greater contentment with their rule.

After the overthrow of this tyranny by Clisthenes, party strife broke out afresh; but Clisthenes finally succeeded in securing a revision of the constitution which removed entirely the danger of local parties. As a basis for his division of the people, he took the villages or small districts scattered through Attica. These were divided into 30 groups, so arranged that 10 groups were along the coast, 10 in the inland, and 10 about the city. By combining one group from each of these three regions, he formed 10 tribes, which he named after ancient Attic heroes (Erechtheïs, Aigeïs, Pandionis, Leontis, Acamantis, Oineïs, Cecropis, Hippothontis, Aiantis, Antiochis). These tribes were the chief divisions of the people, and from this time the number 10 regularly recurs among the various governing boards of Athens. The old Senate of 400 was replaced by a new one of 500, which became the executive organ of the government, supervising all officials and the finances and even the military management. For convenience in the transaction of routine business the year was divided into 10 periods, and during each period the 50 senators of a tribe, the so-called Prytanes, acted as a standing committee, though the whole body met daily. Along with the new constitution an increase in the citizenship took place, and, though the old property classes and their privileges were undisturbed, the increase of wealth had largely increased the number who could hold office. With Clisthenes the Athenian democracy was fairly established, though other changes in the direction of equalization of privileges, such as the election of archons by lot, the establishment of pay for service in the courts and at the assembly, and a reduction of the power and influence of the Areopagus, were carried out in the course of the fifth and fourth centuries, not always to the advantage of the State. The new government at once proved its value by the rapid advance of Athenian power, which was raised to an undreamed-of height by the repulse of the Persians, and the establishment of the Delian League, which made Athens mistress of the Ægean and its islands. This period (480–430 B.C.), which culminated in the age of Pericles, is the Golden Age of Athenian greatness, and to it belong the greatest triumphs of Athenian genius, the poetry of Æschylus and Sophocles, and the sculpture of Phidias. From this time the history of Athens is merged in the general history of Greece. Though the Peloponnesian War deprived Athens of much of her power, her place as the centre of Hellenic culture remained unshaken, and even when the battle of Chæronea (338 B.C.) deprived her of political position, the philosophic schools and the traditions of the past continued to attract foreigners. The democratic constitution was overthrown by Antipater (322 B.C.), but its forms were afterward restored, and many of the official titles continued to exist long after the incorporation of the city in the Roman Empire.

Under Roman rule Athens prospered, and became the great centre of education for the youth of aristocratic Rome. (See Capes, *University Life in Ancient Athens*, London, 1877.) The Emperor Hadrian, in particular, enlarged the city to the northeast, where a new quarter was named Hadrianapolis in his honor, and built a gymnasium and library. It was about this time that Herodes Atticus erected his Odeum as a memorial of his wife Regilla and repaired the Stadium. The fame of the philosophic schools continued to attract students, though with the spread of Christianity they lost influence and were finally closed by Justinian in 529 A.D. During the following centuries many of the temples were converted into churches; but from the sixth to the eleventh century Athens almost disappears from history. Basil II visited it in 1018 to celebrate a victory over the Bulgarians, and in 1175 Michael Acominatos became Metropolitan of Athens. His letters and orations give a valuable picture of the wretchedness and desolation into which the city had fallen. In 1204 the capture of Constantinople by the Crusaders enabled Boniface of Montferrat to establish himself as King at Thessalonica, while Athens and Thebes fell to his feudal vassal, Otho de la Roche, and in 1260 the Frankish rulers assumed the title of Dukes of Athens, their dominion also including Thebes, Megara, and Argos. A succession of Frankish dukes ruled until the disastrous battle of Lake Copaïs threw the real power into the hands of the great Catalan company of mercenaries, and they seem to have held the real control, though recognizing the suzerainty of non-resident dukes, until 1387, when Nerio Acciajuoli, a Florentine who at the time ruled Corinth, made himself master of the city, and he and his successors maintained control over it until 1458, though after 1392 they were tributary to the Sultan, who was the real ruler of Athens.

For a long while after its capture by the Turks Athens almost disappeared from the view of the Western world, but a letter written in 1578 gives the population at the time as 12,000. The Venetians captured the city in 1687, and during the siege a bomb partially destroyed the Parthenon, which had been used as a powder magazine by the Turks. In 1690 the Turkish rule was reëstablished, and continued until the achievement of Greek independence, though it was not till 1833 that the Turkish garrison was

withdrawn. In 1835 the capital of the new kingdom was established at Athens, and with this period begins the history of the modern city.

Archæology. The central point of the ancient city was the Acropolis, but the modern city lies almost entirely to the north and east between the Acropolis and Mount Lycabettus, and along the west slope of the latter, though a modern quarter is growing up on the banks of the Ilissus. On the east and south of the city flows the Ilissus, and on the west the Cephissus, whose scanty supply of water is now largely diverted for the irrigation of the extensive olive groves in that quarter. Though the city itself is some distance from the sea, it is well supplied with harbors. The first harbor was the open bay of Phalerum, with its sloping sandy beach, well suited for the light boats of the early time, but not easy of defense. Somewhat farther from the city is the rocky peninsula of the Piræus, with two small harbors, Munichia and Zea, on the east; and on the west a much larger basin, all nearly landlocked, and easily defended from the rugged hill of Munichia. The advantages of Piræus were first seen by Themistocles; and the fortification of the peninsula was completed soon after the Persian wars. The harbors were connected with the city by the "long walls," at first so built as to include Phalerum, though later the southern wall was abandoned and a new one built close to the northern, furnishing connection with Piræus alone, which had become the only important harbor.

The earliest city was undoubtedly on the Acropolis, where excavations have shown a "cyclopean" wall like those of Tiryns and Mycenæ, and remains of a palace and dwellings of the Mycenæan Period. The town seems also to have extended down the west slope into the valley at the foot of the Pnyx and probably along the south side for some distance; and this lower city was also inclosed by a strong wall in whose circuit there were nine gates. The most remarkable of these gates was the Dipylon, so called, within and without which was located the famous Ceramicus, or Potters' quarter. This gate, the principal one of Ancient Athens, consisted of inner and outer double gates separated by a rectangular court. The structure was flanked by towers. It is outside this gate that the great cemetery of Athens was discovered. A part of the ancient settlement embraced within this wall, including various sanctuaries, was regarded in later times as sacred ground, the so-called Pelargicon. There were also ancient settlements along the Ilissus, where later were some of the most revered sanctuaries, and apparently also on the hills to the west of the Acropolis, where there are many foundations for small houses, cisterns, and steps cut in the rock. These dwellings were outside the later walls and were abandoned before the fourth century B.C., as graves of that period have been found inside the earlier houses. Close to the Acropolis on the northwest is the bare rock of the Areopagus, and, farther to the west and southwest, across a valley runs a long ridge, crowned at the south by the Hill of the Muses, with the monument of Philipappus, erected at the beginning of the second century A.D., and at the north by the Hill of the Nymphs, the site of the modern astronomical observatory. Between the two is the Pnyx Hill, where was the ancient place of assembly. In the earliest times the Acropolis and its neighboring walls formed the only fortification, and it is still a disputed point whether there were any other defenses at the time of the Persian wars. The evidence renders it not improbable that there was an outer wall at that time, but the extent inclosed by it cannot be determined. We only know that it was much less than the space inclosed by the wall of Themistocles, built in great haste immediately after the Persian wars (479 B.C.). The course of this wall seems to have been preserved in later times and can be traced in places by remains of the foundations, by the nature of the ground, and by the presence of graves, which in later times were always outside the walls. Its exact line, however, cannot be determined. Under the Emperor Hadrian the limits of the city seem to have been extended on the east so as to include the Olympieum (see below), and that portion of the city now occupied by the palace and its gardens. The line of the ancient wall in this region is probably marked by the Gate of Hadrian.

The Acropolis was the religious centre of the city, and before the time of Pericles was given up to temples and shrines. The site of the old royal palace seems early to have been marked by a temple of Athena, the patron goddess of the city, which was adorned by the Pisistratidæ with a colonnade, the gables of which were filled with sculptures representing the battle of the gods and giants. A part of these sculptures, valuable as illustrating the art of the close of the sixth century B.C., have been pieced together from fragments discovered during the excavations. Probably to the same time as this temple belong the foundations of an ancient gateway, set at an angle to the present line of ascent. The temple and all the other buildings on the Acropolis were destroyed by the Persians (480–479 B.C.) and were certainly never entirely rebuilt, though it is believed by some that the cella (q.v.) of the old temple was reërected and remained standing even into Roman times. Under Themistocles, Cimon, and Pericles the work

ACROPOLIS OF ATHENS.

A—Parthenon.
B—Foundation of Early Temple.
C—Museum.
D—Terrace.
E—Erechtheum.
F—Propylæa.
G—Precinct of Artemis Brauronia.
H—Temple of Victory.
I—Agrippa Pedestal.
J—Ainacotheca.
K—Altar to Rome and Augustus Cæsar.

of reconstructing the Acropolis was carried forward. On the south side a lofty retaining wall was built, and the ground filled in so as to form a terrace at the level of the old summit, and on this terrace was erected the Parthenon (q.v.), the chief glory of Athens and even in its ruins the most perfect specimen of Greek architectural genius. The present building was erected on the site of a temple begun by Themistocles or Cimon, and seems to have been completed about 437 B.C. North of the Parthenon, close to the

ATHENS—RESTORATIONS

1. THE ACROPOLIS.

2. THE AGORA.

site of the old temple was built the Erechtheum, containing probably the ancient statue of Athena Polias, said to have fallen from heaven, the sacred olive of Athena, and the salt spring where Poseidon smote the rock with his trident. The building is now partially restored. (Consult B. H. Hill, "Structural Notes on the Erechtheum," *American Journal of Archæology*, pp. 291–297 (1910); G. P. Stevens, "The East Wall of the Erechtheum," op. cit.; and G. W. Elderkin, *Problems in Periclean Buildings* (Princeton, 1912).) Near the west end stood the colossal bronze statue of Athena Promachos, erected by the Athenians as a memorial of the victories over Persia.

Northeast of the Parthenon was the great altar of Athena, and near by was erected later a temple of Augustus and Rome. On the south side of the Acropolis, west of the Parthenon, were sacred precincts, dedicated to Athena Ergane (the worker) and Artemis Brauronia. At the west end of the Acropolis, where alone the rock permits an easy ascent, stood the great gateway, the Propylæa, begun in 437 B.C. and never completed according to the original plan. (See W. B. Dinsmoor, "The Gables of the Propylæa," *American Journal of Archæology*, 1910, pp. 143–184). Just outside the Propylæa, on a high platform, reached now from the upper part of the Acropolis, but in ancient times also accessible by a staircase outside the gate, stood the little Ionic temple of Athena Nike, less correctly called that of "Wingless Victory." All these buildings were of white Pentelic marble and richly decorated with gilding and color. At the foot of the steep precipice on the northeast side of the Areopagus is a cave with a pool of dark water, which is believed to have been the site of the shrine of the Eumenides, and the region west of the Acropolis and south of the Areopagus probably contained other temples, of which all traces have disappeared. Farther down the slope toward the west, in the valley between the Pnyx and the Areopagus, has been discovered an ancient street, which evidently led from the market place to the Acropolis. It was lined with private houses and shrines. On the slope of the Areopagus was a large sacred inclosure, containing wine vats, and apparently dedicated to Dionysus, as it contained a long inscription with various regulations of the Iobacchæ, a society of worshipers of that god. At the foot of the Pnyx were many wells and chambers for collecting water, and there are traces of a large fountain, to which water was brought by an underground channel from the upper Ilissus along the south side of the Acropolis. This is held by many archæologists to be the work of Pisistratus and to mark the site of the Enneacrunos, or fountain with nine streams, erected by him over an open spring, Callirrhoë. Others, however, maintain that the evidence favors placing Callirrhoë and the Enneacrunos at a point in the bed of the Ilissus, where abundant springs are still found.

Passing from the gate down to the south side of the Acropolis, we find at the west end the Odeum of Herodes Atticus (see ATTICUS HERODES), which is still well preserved. Adjoining this was the long stoa, or portico built for the Athenians by Eumenes II, King of Pergamum (197–159 B.C.). Back of the stoa on a terrace at the foot of the steep cliff of the Acropolis lay the sanctuary of Asclepius, containing his temple and altar, and colonnades and other buildings for the sick, who came thither for healing. In a cave inside the sacred ground was a spring, still supposed to possess curative powers and dedicated to the Virgin. East of the Asclepieum and the Stoa of Eumenes was the great theatre of Dionysus, with its seats partly cut in the solid rock, and back of its stage buildings the temple and precinct of the god in whose honor the plays were performed. This theatre was erected on the site of an older building in the last half of the fourth century during the administration of the orator Lycurgus. On the north side of the Acropolis lay many public buildings, but this region is still thickly populated, and only the caves of Pan and Apollo high in the northwest corner of the Acropolis have been thoroughly excavated. North of the Areopagus lay the great market place, surrounded with colonnades and public buildings, and near by Hadrian built a large gymnasium and baths, considerable remains of which can still be traced.

The most notable building of ancient times in this portion of the city is the so-called Theseum, perhaps better designated as the Hephæsteum, a hexastyle peripteral temple in the Doric style (104 feet by 45½ feet), situated on a slight eminence north of the Areopagus and west of the market place. This is the best-preserved Greek temple left to us. The name Theseum is certainly wrong, as the sanctuary of Theseus was in another part of Athens and was a large inclosure; but the true name of the building is still uncertain, though modern archæological opinion tends in favor of the temple of Hephæstus, which must have stood in this quarter of the city. The temple was built about the same time as the Parthenon, or, more probably, somewhat earlier, though on this point authority is divided. Of the pediment sculptures no trace remains, but at the east end of the portico are sculptured metopes, and across each end of the cella is a frieze in relief. The metopes represent the labors of Heracles and Theseus; the subject of the west frieze is the battle between the Centaurs and Lapithæ, and that of the east a battle in the presence of six seated gods. During the Middle Ages the building was changed into a church, but with little change of the exterior. Outside the Themistoclean Wall to the southeast of the Acropolis was the great temple of Olympian Zeus, begun by Pisistratus, but long left unfinished. About 174 B.C. Antiochus Epiphanes of Syria completed, or rather rebuilt, the temple, on a scale of magnificence which led Livy to say that, though unfinished, it was the only one on earth corresponding to the greatness of the god. The great platform measures 676 feet by 426 feet, and on this the architect Cossutius erected a temple 354 feet by 135 feet, measured on the upper step of the stylobate. It had three rows of eight Corinthian columns at each end, and two rows of 20 columns each at the sides, counting the corner columns twice. The magnificent scale of the work again delayed its completion, and it was not till the second visit of the Emperor Hadrian (129 A.D.) that it was finally dedicated. At present only 16 columns remain, one of which lies where it was prostrated by an earthquake. These columns are 56 feet 7 inches high and 5 feet 7 inches in diameter at the base, with 24 flutings. Excavations have brought to light the foundations of the earlier temple of Pisistratus.

Not far from the Olympieum, across the Ilis-

sus, was the Stadium, laid out in a hollow between low parallel hills. The ground inclosed by the seats is 670 feet long by 109 feet wide. The Stadium seems to have been constructed by the orator Lycurgus, about 330 B.C., was rebuilt in white marble by Herodes Atticus, about 140 A.D., and largely burned for lime during the Middle Ages; its restoration in marble (completed in 1902) was made possible by the liberality of a wealthy Greek of Alexandria, to whose initiative the establishment of the new Olympic games in 1896 was due. See ATHLETICS.

For the topography and monuments of ancient Athens, consult: Stuart and Revett, *Antiquities of Athens* (London, 1762–1816); Leake, *Topography of Athens* (London, 1841); Wachsmuth, *Die Stadt Athen im Alterthum* (Leipzig, 1874–90); Harrison and Verrall, *Mythology and Monuments of Ancient Athens* (London, 1890); Curtius, *Stadtgeschichte von Athen* (Berlin, 1891), which contains a very valuable classified collection of ancient passages relating to this subject, by Milchhöfer; Frazer, *Pausanias*, vols. i, ii (London, 1898). Pausanias (q.v.) gives an account of the monuments of Athens in his day, and the works of Frazer and Miss Harrison include a translation of his text and full commentary. Valuable also is the work of Lolling in Müller's *Handbuch der klassischen Altertumswissenschaft*, vol. iii (Nördlingen, 1889); and Milchhöfer in Baumeister's *Denkmäler des klassischen Altertums*, vol. i (Munich, 1885). For the Acropolis, consult: Bötticher, *Die Akropolis von Athen* (Berlin, 1888), and Miller, in *American Journal of Archæology*, vol. viii[4] (Baltimore, 1893); also, Curtius and Kiepert, *Atlas von Athen* (Berlin, 1878). Athenian history is treated in the general histories of Greece. Aristotle wrote on the Constitution of Athens, and his work, first published in 1891, has been translated by Kenyon (London, 1891). Other important works are: Botsford, *Development of the Athenian Constitution* (Boston, 1893); and Wilamowitz-Möllendorf, *Aristoteles und Athen* (Berlin, 1893). For Athens during the Roman period and later, consult: Finlay, *History of Greece* (Oxford, 1877); Hertzberg, *Athen* (Halle, 1885). Other works of special value are: Laborde, *Athènes aux XVème, XVIème, et XVIIème siècles* (Paris, 1855) for its collection of documents; Gregorovius, *Geschichte der Stadt Athen im Mittelalter* (Stuttgart, 1889). Consult also: Dyer, *Ancient Athens* (London, 1873); C. Wordsworth, *Athens and Attica* (London, 1869); Symonds, *Sketches in Italy and Greece* (London, 1882); Freeman, *Historical Essays*, series iii (London, 1892); Horton, *Modern Athens* (New York, 1901); Bikelas, "L'Athènes d'aujourd'hui," in *Revue d'études grecques*, no. xi (Paris, 1898); Ferguson "Bibliography of Works Referring to Athens," in *The Athenian Secretaries* (New York, 1898); F. C. Penrose, *Principles of Athenian Architecture* (London, 1888); J. H. Middleton and E. A. Gardner, *Plans and Drawings of Athenian Buildings* (London, 1900); W. Judeich, *Topographie Von Athen* (Munich, 1905: is second half of part ii, vol. iii of 3d ed. of Von Müller's *Handbuch der klassichen Alterthumswissenschaft*); M. L. D'Ooge, *Acropolis of Athens* (1909); Michaelis, *Der Parthenon* (Leipzig, 1871); W. Miller, *Latins in the Levant* (London, 1908); C. H. Weller, *Athens and its Monuments* (New York, 1913).

ATHENS. A town and the county-seat of Limestone Co., Ala., 100 miles north of Birmingham, on the Louisville and Nashville Railroad (Map: Alabama, C 1). It is the seat of Athens Female College (Methodist Episcopal South), opened in 1843, Greens University, the (colored) Trinity College, and of a State Agricultural School. The town has a cotton mill, a planing mill, and an ice plant, and owns its water works and electric light plant. Pop., 1900, 1010; 1910, 1715. On Sept. 23, 1864, Colonel Campbell, with 600 Federal troops, surrendered here to General Forrest, at the head of a large force of Confederate cavalry, who soon evacuated.

ATHENS. A city and the county-seat of Clarke Co., Ga., on the Oconee River, 69 miles by rail east by north of Atlanta, and on the Southern, the Central of Georgia, the Georgia, the Seaboard Air Line, and the Gainesville Midland railroads (Map: Georgia, C 2). The city is an important cotton market, and contains several cotton mills, fertilizer factories, etc. It is the seat of the University of Georgia (q.v.), opened in 1801, the Georgia State College of Agriculture, organized in 1872, the Lucy Cobb Institute for Girls, and a State normal school and has a public library and the celebrated "tree that owns itself," a tree protected by a deed to it of 16 feet of land made by Col. William H. Jackson. The city owns and operates its water works. The government is vested in a mayor, elected biennially, and a council. Athens was founded, as the seat of the State University, in 1801. Pop., 1900, 10,245; 1910, 14,913; 1920, 16,748.

ATHENS. A city and the county-seat of Athens Co., Ohio, 75 miles southwest of Columbus, on the Hocking River, and on the Baltimore and Ohio Southwestern, the Toledo and Ohio Central, and the Hocking Valley railroads (Map: Ohio, F 7). Athens has manufactures of lumber and brick and is the centre of an extensive coal-mining region. It is the seat of the Ohio University (State) (q.v.), opened in 1804, and of a State hospital for the insane, and has a Carnegie library. Settled in 1797, and incorporated in 1811, Athens is governed by a mayor, elected biennially, and a city council. The water works and electric light plant are owned and operated by the municipality. Pop., 1900, 3066; 1910, 5463. Consult Walker, *History of Athens County* (Cincinnati, 1869).

ATHENS. A borough in Bradford Co., Pa., 2 miles south of N. Y. State Line, on the Lehigh Valley Railroad, and on the Susquehanna and Chemung rivers (Map: Pennsylvania, H 2). The principal industries include cigar, overall, tool, and furniture factories, foundries, silk and planing mills, boat, milling and produce companies. Pop., 1900, 3749; 1910, 3796.

ATHENS. A town and the county-seat of McMinn Co., Tenn., 56 miles northeast of Chattanooga, on the Southern Railway (Map: Tennessee, F 3). It is the seat of the U. S. Grant University (Methodist Episcopal), opened in 1867. The town has planing, cotton, knitting and woolen mills. Athens was laid out in 1823 and was incorporated in 1868. Pop., 1890, 2224; 1900, 1849; 1910, 2264.

ATHENS. A city and the county-seat of Henderson Co., Tex., 75 miles southeast of Dallas, on the St. Louis Southwestern and Texas and New Orleans railroads (Map: Texas, E 3). The region is adapted to cotton, fruit, and vegetable growing, has an abundance of hard and soft timber, and contains deposits of coal. The principal industries include the manufacture of

pottery, fire brick, and tile. The city has a fine courthouse, good schools, and owns its water works. Pop., 1910, 2261.

ATHENS OF AMER'ICA, THE, or THE MODERN ATHENS. A name given to Boston, Mass., in the day of her literary preëminence, and still hers by reason of her spirit of culture.

ATHENS OF THE NORTH, THE. A title sometimes applied to Edinburgh. Copenhagen is another European city so styled.

ATHENS OF THE WEST, THE. Cordova (q.v.).

ATH'ERO'MA (Gk. *ἀθήρωμα, athērōma,* a tumor full of gruel-like matter, from *ἀθήρη, athērē,* groats, meal). A yellow, cheesy material, composed of fat, cholesterin, sebaceous matter, albumen, chalk, and detritus of epithelium, found in cysts (as of the scalp). The term is now more commonly applied to the fatty degeneration of the arterial walls. See ARTERIOSCLEROSIS; ARTERY.

ATH'ERTON. A manufacturing and mining town in Lançashire, England, 4½ miles southwest of Bolton. The civic spirit is exemplified by the municipalization of water, gas, and electric lighting and traffic plants, and the erection of a dust destructor and public offices. There are numerous collieries, and cotton and iron goods are the leading manufactures. Pop., 1891, 13,700; 1901, 16,200; 1911, 18,982.

ATHERTON, CHARLES GORDON (1804–53). An American politician, born in Amherst, N. H. He graduated at Harvard in 1822 and was a member of the State Legislature for five years and Speaker of the Lower House for three. In 1837 he was elected to Congress and served in the House in 1837–43, and in the Senate in 1843–49 and in 1852–53. In December, 1838, he introduced the notorious "Atherton-gag" resolution, prescribing that "all petitions relating to slavery, or to its abolition, be laid on the table without debate." The measure was stubbornly fought by John Quincy Adams, who insisted on the "right of petition"; but it was passed by a vote of 120 to 78 and remained in effect until 1844. See GAG RULES.

ATHERTON, GERTRUDE FRANKLIN (HORN) (1857–). An American novelist, the grandniece of Benjamin Franklin, born at San Francisco, Cal., educated in California and in Lexington, Ky. She became the wife of G. H. B. Atherton, now deceased. The background to a series of her novels (see below) is California, and of the life of her State to-day she has given memorable studies. In the East she is almost equally at home: witness *Patience Sparhawk* (1897), with its satirical study of life in New York and Westchester County; *Aristocrats* (1901), which has the Adirondacks for its setting; or *Senator North* (1900), with its intimate pictures of social and political life in Washington. Frequently she attempts subjects of an epic breadth, as in *The Conqueror* (1902), where the personal story of Alexander Hamilton stands out in relief against the national life of his time. The following list includes the more important of her books: The California series—*The Splendid Idle Forties,* a revised and enlarged edition of *Before the Gringo Came* (1892); *The Doomswoman* (1892); *A Whirl Asunder* (1895); *The Californians* (1898); *American Wives and English Husbands* (1898); *A Daughter of the Vine* (1899); *Rezanov* (1906); *Ancestors* (1907). Other novels: *Patience Sparhawk* (1897); *Senator North* (1900); *Aristocrats* (1901); *The Conqueror* (1902); *Tower of Ivory* (1910); *Julia France and Her Times* (1912).

ATHERTON RES'OLU'TIONS. See GAG RULES.

ATH'LETE, THE. A statue representing the typical proportions of the Greek athlete, a copy of the Doryphorus (spear-bearer) of Polycletus. It was found in the so-called Curia Isiaca at Pompeii and is now at Naples in the Museo Nazionale.

ATHLET'ICS (from Gk. *ἀθλητής, athlētēs,* contestant). The term has of late been definitely applied to recognized contests of physical skill and endurance for pastime and for the development of bodily strength. These are commonly divided into two classes—track and field games and gymnastic performances. The former include the running or walking of various distances, hurdling, high and broad jumping, polevaulting, throwing the hammer and weight, and putting the shot. The latter comprise the use of Indian clubs, dumbbells, parallel and horizontal bars, weight-lifting, rope-climbing, tug of war, and various exercises in vaulting over fixed objects.

Athletic games were brought to a high development among the Greeks, and a class of professional athletes grew up, who began their training when scarcely out of boyhood. They were obliged to submit to a rigorous discipline, including careful avoidance of excesses, a special diet, regular exercise, and the cultivation of courage, self-control, and resourcefulness. There were at all times among the Greeks those who practiced athletic exercises from pure love of sport; but when these ancient amateurs competed in the games, they preferred running, jumping, and javelin-throwing, where natural vigor might take the place of long exercise. In later times the athlete was a huge mass of flesh and muscle, as may be seen in the mosaic from the Baths of Caracalla, or even in the fine realistic bronze statue of a pugilist in Rome, or the brutal head of a boxer from Olympia. Under the Roman Empire we find the professional athletes organized into corporations. See GAMES, ANCIENT.

Of the Britons before the Roman conquest we know that they were bold, active, and capable of bearing great fatigue. The Romans drafted the strongest of them into military service, and by the introduction of luxurious habits debilitated the weaker ones who were left at home. The later infusion of the new blood of the Teutonic tribes corrected this tendency and brought with it a new love of athletic contests. Wherever a Scandinavian leader has left a tradition at all, it is one relating to his feats of strength and agility. Thus Olaf Tryggeson, an early King of Norway, boasted that he could walk round the outside of his boat upon the oars as the men were rowing; that he could hurl two spears at once, one from either hand, and that he excelled all men in archery and swimming. In the later Saxon period such exercises as inured the body to hardship and fatigue constituted the chief part of the education of youth. With the introduction of the Norman influence and the tendencies of the age of chivalry, tournaments, jousts, and other contests of personal skill and prowess were the principal diversion of the upper classes. The sons of citizens and yeomen had their sports as well; they fought with clubs and bucklers and ran at the quintain on every village green, and contended with poles

on the ice in winter, "not always without hurt," as Fitzstephen says, "for some break their arms and some their legs, but youth, emulous of glory, seek these exercises." With the decay of chivalry a great change took place toward the end of the fifteenth century, and exercises requiring the exertion of muscular strength went out of fashion to such an extent that the government thought it necessary to interfere. A proclamation of Henry VII, after reciting that "it ever hath bene of old antiquitie used in this realme for all lustye gentlemen to pass the delectable season of summer after divers manner and sundry fashions of disport," establishes a series of exercises with prizes to be contested for in open competition. His successor, Henry VIII, added example to precept in his younger days, and daily amused himself in casting the bar, wrestling, fencing with sword or battle-axe, throwing the hammer, and similar recreations, in which few could excel him. Such pastimes, with broad jumping and running, were, according to the authority of Thomas Wilson in *The Arte of Rhetorique* (1551), "the necessary accomplishment of a man of fashion." James I formulated a set of rules for his son, with the very modern conclusion that "bodily exercises are very commendable, as well for the banishing of idleness as for the making the body able and durable"; adding in a passage of the true spirit, "the exercises I would have you to use, although but moderately, *not making a craft of them*, are running, leaping, wrestling, fencing, playing at the caitch or tennise, archerie, palle-malle, and such like other fair and pleasant field games." The troublous times of the Rebellion, with the prejudice of the Puritans against all that had gone to make appropriate the title of "Merry England," and the dissoluteness of the court of Charles II, tended to destroy the athletic spirit, except in the country villages, where the old games lingered. Otherwise during the eighteenth century and the early part of the nineteenth athletics dwindled well-nigh to extinction, and the moral and physical condition of the youth of England suffered to a proportionate extent.

Fortunately, about the year 1850, an athletic revival occurred in England affecting all branches of sport, furthered not a little by the energetic deliverances of Charles Kingsley and his school in favor of "muscular Christianity." Athletic games of a sort had been established about the year 1812 at the Royal Military College, Sandhurst. In 1837 the Rugby Crick run began, and soon afterward regular games were held also at the Woolwich Military Academy and a number of the great public schools. Probably the first athletic sports held in modern fashion occurred at Exeter College, Oxford, in 1850; they included sprints and long-distance running, followed later by jumping, hurdling, and weight events. The movement rapidly spread, and athletic clubs began to be formed. The Cambridge University games were established in 1857, and the Oxford games three years later. The inter-university boat race dates from 1856 as an annual event; there had been a university boat club at Oxford since 1839. In 1864 the Oxford and Cambridge track and field games were established. The events of the first meeting were 100 yards, 440 yards, and one-mile runs; high and broad jumps; 120 yards and 200 yards hurdle races; and a steeplechase. Within the decade 1850–60 athletic meetings became a regular feature of school and college life, and through their influence amateur athletic sport became general throughout the kingdom. The London Athletic Club dates from 1866 (though it really grew out of a smaller organization of three years earlier), and the national amateur championships were established in the same year. The latter were for some years managed by the Amateur Athletic Club, whose attempt to become the regulating amateur organization subsequently failed. In 1880 the Amateur Athletic Association was founded as the national governing body for England. It is allied with the Scottish and Irish Amateur Associations and with the British swimming and cycling associations. The national championships now consist of 100 yards; 440 yards, half-mile, mile, and four-mile and ten-mile runs; 120-yard hurdles; high and broad jumps; hammer-throwing and weight-putting; pole-vaulting; two-mile and seven-mile walks; and two-mile steeplechase. A 10-mile championship run is also held in the spring. The Oxford and Cambridge sports include the first 11 of the above events, substituting a three-mile for the two distance runs. Other important English events are the London Athletic Club and Putney Athletic Club games, the Civil Service, the United Hospitals, and the Railway Clearing-house sports. Cross-country running has made Englishmen the best of long-distance runners.

American and International Athletics. Athletics became popular in the United States in the early seventies. A movement soon arose to bring them under definite organization, and in 1879 the National Association of Amateur Athletes of America was formed, out of which grew the Amateur Athletic Union, which held its first annual meeting at Detroit, Mich., in 1888, and was reorganized in 1891. It controls all matters concerning amateur athletics and recognizes the following sports: basket ball, billiards, boxing, fencing, gymnastics, hand-ball, running, jumping, walking, weight-putting, hurdle-racing, lacrosse, pole-vaulting, swimming, tugs-of-war, and wrestling. Its authority is universally recognized.

In America, as in England, the colleges exert an important influence on amateur athletics. College training methods are, on the whole, more scientific than those of the majority of athletic clubs, and most of the leading athletes come from the colleges. Their governing bodies are the Intercollegiate Association of Amateur Athletes of America and the Western Intercollegiate Association. Allied with them is the national body, the Amateur Athletic Union, with its eight sectional groups. The first intercollegiate athletic meeting was held at Saratoga in 1873. Contests have been held between representative American and English athletes on both sides of the Atlantic for over half a century.

Consult: Anderson, *The Making of a Perfect Man* (New York, 1901); James, *Practical Training* (New York, 1897); Dowdwig, *Games in Preparatory Schools* (London, 1900); Crowther and Ruhl, *Rowing and Track Athletics* (New York, 1905); Sargent, *Athletic Sports* (New York, 1897); Barbour and others, *Book of School and College Sports* (New York, 1904); Dudley and Kellor, *Athletic Games in the Education of Women* (New York, 1909); Graham and Clark, *Practical Track and Field Athletics* (New York, 1910); *Outdoor Sports* (New York, 1912). Consult also the books in the Badminton Library

1. SPRINTERS, showing different styles of starting.
2. POLE VAULTING.
3. BROAD JUMP.
4. HURDLING.
5. PUTTING THE SHOT.
6. HIGH JUMP.
7. THROWING THE HAMMER.

on Athletics. See articles on BASEBALL; FIELD SPORTS; OLYMPIC GAMES; FOOTBALL; ROWING; BASKET BALL; AMATEUR.

ATHLONE, ăth-lōn′. A town of Ireland, on both sides of the Shannon, 75 miles west of Dublin, in the counties of Westmeath and Roscommon (Map: Ireland, D 3). It is an agricultural centre, and has manufactures of felt hats, friezes, linens, and corsets. Improved transportation facilities by means of locks and canals enable large river steamers to navigate the Shannon for 116 miles from Killaloe to Carrick-on-Shannon, thus circumnavigating the river rapids. The Shannon is here crossed by a fine iron railroad bridge. Athlone is one of the chief military positions in Ireland. The fortifications once covered 15 acres and contained barracks for 1500 men, but are now dismantled. Pop., 1901, 10,701; 1911, 9,631. During the last attempt of James II to recover his throne in 1690 Athlone suffered two sieges and was finally taken by assault.

ATHOL, ăth′ŏl. A town in Worcester Co., Mass., 82 miles west by north of Boston, on the Fitchburg Division of the Boston and Maine and a branch of the Boston and Albany railroads (Map: Massachusetts, C 2). It has a public library and manufactories of shoes, mechanical tools and machinery, silk, furniture, lumber products, toys, woolen goods, etc. The government is administered by town meetings. Athol was first settled in 1735 and was called Pequoig until 1762, when it was incorporated as a town under its present name. It owns its water works. Pop., 1890, 6319; 1900, 7061; 1910, 8536. Consult *History of Worcester County* (2 vols., Boston, 1879).

ATHOR, ä′thōr, **ATHYR,** ä′thĭr, or **HATHOR,** hä′thōr (Egyptian *Hat-hor*). An Egyptian goddess. The original seat of her cult seems to have been Denderah in upper Egypt, where the ruins of her famous temple are still to be seen, but at a very early period her worship spread over the whole of Egypt. Her primitive fetish was, apparently, a buffalo's skull raised on a pole, and from this was developed the sacred Athor column, which plays an important part in Egyptian architecture, bearing, as capital, a female head with the ears of a cow. The same head forms the central ornament of the *sistrum*, or rattle for temple music, which appears among the insignia of this goddess. In later times Athor was regarded as the goddess of music and the dance, of joy and love. By the Greeks she was identified with Aphrodite (Venus). Earlier, however, she was conceived as a cosmical divinity, typifying the sky, and the traditional explanation of her name as meaning "the house of horns" (i.e., of the sun) is a result of this conception. The world is frequently represented in the form of her sacred animal, the cow, bearing between her horns the sun-god or his disk. In Egyptian mythological texts Athor is sometimes called the mother of the sun, which is daily born from the sky. As the nocturnal sky, she became the goddess of the dead, and, under the latest dynasties, deceased women were supposed to become Athor, just as deceased men became Osiris. The representations of Athor vary greatly. Usually she is depicted in the form of a woman with a cow's head. The third month of the Egyptian year (Athor) was named for this goddess. For illustration, see EGYPT.

ATH'OS (Gk. Ἄθως, called in modern times Ἅγιον Ὄρος, *Hagion Oros*, by the Greeks, and Monte Santo by the Italians, both names signifying Holy Mount) (Map: Greece, F 1). Properly the highest elevation on the easternmost of the three Chalcidian peninsulas. In a broader sense of the word the whole peninsula was called Athos. The peninsula is about 40 miles long and is connected with the mainland by an isthmus hardly a mile and a half broad. It contained in ancient times several towns. The mountain Athos (6349 feet), called in ancient times Acte, is at its southern extremity. The point was a perilous one for sailors, and Xerxes, when planning the invasion of Greece, ran a canal through the isthmus, traces of which are still to be seen. Mount Athos has been since the Middle Ages the seat of a monastic republic, which, at the present time, consists of 20 monasteries, about 3000 monks, and 3000 lay brethren. The origin of some of these religious houses is dated by legend as far back as the time of Constantine. In the thirteenth century they were pillaged by the Latin conquerors of Constantinople, but recovered under the succeeding emperors. In recent times they have through three centuries of Moslem rule preserved their independence and former privileges. In the Middle Ages they were the centre of Greek learning and they have furnished to scholars many valuable Greek manuscripts, but at the present day there is a universal lack of learning among the monks of these establishments. Consult: Curzon, *Visits to Monasteries in the Levant* (London, 1881); A. Neyrat, *L'Athos* (Paris, 1880); Athelstan Riley, *Athos* (London, 1887); Brockhaus, *Die Kunst in den Athosklöstern* (Leipzig, 1891); Gelzer, *Vom Heiligen Berge und aus Makedonien* (Leipzig, 1904); S. Lambros, *Catalogue of the Greek Manuscripts on Mount Athos* (1895, 1900). See BALKAN WAR.

ATHOS, ä′tŏs′. The *nom-de-guerre* of a character in Dumas's *Musketeer* romances, whose real name in the story was the Comte de la Fère. He is one of the three guardsmen with whom D'Artagnan associates himself—the husband of the infamous "Miladi," and father of the Vicomte de Bragelonne, who gave his name to the last book of the trilogy.

ATHWART′, ATHWART′SHIP. See BEARING.

ATHYR, ä′thĭr. See ATHOR.

ATITLAN, ä′tē-tlän′. A lake situated in the department of Solola, Guatemala, 4700 feet above the sea level, over 24 miles long and 10 miles wide, with a circumference of 64 miles (Map: Central America, B 3). It has a depth of more than 1000 feet, is surrounded by steep declivities, and has no visible outlet, though many small streams flow into it. At its southern end is the large inactive volcano Atitlan, 11,849 feet high.

ATITLAN, or **SANTIAGO DE ATITLAN,** sän′tē-ä′gō dā ä′tē-tlän′. An Indian town situated on the south side of the mountain lake of Atitlan, in the department of Solola, Guatemala. 49 miles west of the city of Guatemala. It has mineral springs, and cotton spinning and fishing occupy the majority of the inhabitants. Pop., 9000.

ATKARSK, ät-kärsk′. The capital of a district, 50 miles northwest of Saratov, in the government of Saratov, southeast Russia; near the junction of the Medvieditza with one of its feeders. It carries on a brisk trade in grain.

Pop., 1897, 9750. The settlement of Etkara was mentioned as early as the fourteenth century.

AT'KINSON, Edward (1827–1905). An American economist. He was born in Brookline, Mass., and was educated in private schools. For many years he managed manufacturing companies and afterward conducted a fire insurance company for the mutual insurance of factories. He invented the "Aladdin oven," an improved cooking apparatus. He contributed extensively to the periodicals and published many pamphlets and books on economic subjects, banking, railways, cotton manufactures, the tariff, money, fire prevention, and the nutritive value of foods. During and after the presidential campaign of 1900 he was an active opponent of the administration's policy of expansion. Among his more extended works are: *The Distribution of Products* (1885); *The Industrial Progress of the Nation* (1889); *The Science of Nutrition* (10th ed., 1898); *The Prevention of Loss by Fire; Fifty Years Record of Factory Mutual Insurance* (1900); *Facts and Figures the Basis of Economic Science* (1904). Consult T. W. Higginson, biographical notice in *Proceedings of the American Academy of Arts and Sciences* (Boston, 1907).

ATKINSON, Eleanor (Stackhouse). An American author, born at Rensselaer, Ind. She was educated at the Indianapolis Normal Training School, for several years taught in the schools of Indianapolis and Chicago, and from 1889 to 1891 was a special writer for the *Chicago Tribune* under the pen name of "Nora Marks." In the latter year she married Francis Blake Atkinson of Chicago. She edited *The Little Chronicle* in 1900–07. Her published books include: *Mamzelle Fifine* (1903); *Boyhood of Lincoln* (1908); *Lincoln's Love Story* (1909); *The Story of Chicago* (1910); *The Students' Reference Work*, vol. v (1911); *Greyfriars Bobby* (1912); *Loyal Love* (1912); *How and Why Library* (1913).

ATKINSON, George Francis (1854—). An American botanist. He was born at Raisinville, Monroe Co., Mich., received his education at Olivet College, Mich., and at Cornell University, and was made assistant professor of general zoölogy and entomology at the University of North Carolina in 1885 and associate professor of botany and zoölogy there in 1886. Two years later he became professor of the same subjects in the University of South Carolina, and botanist of the experiment station. In 1889 he was appointed professor of biology at the Alabama Polytechnic Institute and at the Agricultural and Mechanical College of Alabama, and in 1892 was appointed assistant professor, and afterward professor, of botany at Cornell, where he became head of the department in 1906. In 1896 he was elected vice president of the American Association for the Advancement of Science, and in 1907 president of the Botanical Society of America. For two years he was associate editor of the *Botanical Gazette*. His publications include several excellent text-books and treatises, such as *Studies of American Fungi* (2d ed., 1903); *College Text-Book of Botany* (1905); *Botany for High Schools* (1910; 2d ed., 1912); *Practice Key and Flora of the Eastern, Northern, and Central States* (1912).

ATKINSON, George Wesley (1845—). An American writer and politician, born in Charleston, W. Va. He studied at Ohio Wesleyan, and at Howard University (D. C.), and was admitted to the bar in 1875. From 1876 to 1880 he was United States internal revenue agent, and from 1881 to 1885 United States marshal in West Virginia. He was a member of the Fifty-first Congress (1889–91), and Governor of West Virginia from 1897 to 1901. After having served as United States Attorney for four years, he was appointed judge of the United States Court of Claims in 1905. He is author of *History of Kanawha* (1876); *After the Moonshiners* (1879); *Handbook for Revenue Officers* (1881); *ABC of the Tariff* (1882); *Prominent Men of West Virginia* (1895); *Psychology Simplified* (1897); *Public Addresses* (1901); *Chips and Whetstones* (1908).

ATKINSON, John (1835–97). An American preacher. He was born at Deerfield, N. Y., and served in the ministry of the Methodist Episcopal church till his death at Haverstraw, N. Y. He wrote the familiar hymn, "We shall Meet beyond the River," and the historical works, *Memorials of Methodism* (1860); *The Centennial History of American Methodism* (1884); *The Beginnings of the Wesleyan Movement in America, and the Establishment therein of Methodism* (1896).

ATKINSON, John Christopher (1814–1900). An English clergyman and antiquary. He was born at Goldhanger, in Essex, where his father was curate. In 1838 he graduated B.A. from St. John's College, Cambridge, and three years later was ordained curate of Brockhampton in Herefordshire. In 1847 he became vicar of Danby, in the North Riding of Yorkshire, where he resided till his death. In 1887 he received from Durham University the degree of D.C.L., and in 1891 he became a prebendary in York Cathedral. A delightful antiquary somewhat after the type of Gilbert White (q.v.), he is best known for his *Forty Years in a Moorland Parish* (1891). Among his other popular books are: *The Walks, Talks, Travels, and Exploits of Two Schoolboys* (1859); *Play-Hours and Half-Holidays* (1880); *British Birds' Eggs and Nests* (1861); and *The Last of the Giant-Killers* (1891). Among his learned works are: "A Glossary of the Dialect of the Hundred of Lonsdale," in *Transactions of the Philological Society* (1867); *A Glossary of the Cleveland Dialect* (1868) with *Additions* (1876); *The History of Cleveland* (incomplete, 1872–77). He also edited for the Surtees Society *Cartularium Abbathiæ de Whiteby* (1879) and *Cartularium Abbathiæ Rievalle* (1889).

ATKINSON, Thomas Witlam (1799–1861). An English artist and traveler. He first devoted himself to architecture, but afterward traveled extensively in western Siberia and published accounts of his travels in works beautifully illustrated by himself. The works are entitled *Explorations in Oriental and Western Siberia* (1858) and *Travels in the Regions of the Upper and Lower Amoor* (1860).

AT'KYNS, Sir Robert (1621–1709). An English jurist and Lord Chief Baron of the Exchequer. He was descended from a family of distinguished lawyers, no less than four successive generations being represented in high judicial office. In 1659 he entered Richard Cromwell's Parliament as member for Evesham and was evidently of the King's party, as he was made Knight of the Bath at Charles's coronation (1661). He became judge of the Court of Common Pleas in 1672, but, owing to his

collision with the notorious Chief Justice Scroggs and his sturdy independence in urging the right of petition, was forced to resign his office in 1680. During his retirement he continued his agitation against the arrogant pretensions of the Stuarts and acted as legal adviser to the lords after the flight of James II. When the case against Lord William Russell was instituted in 1683, Atkyns published two powerful pamphlets to establish the innocence of that nobleman. Upon the accession of William III he succeeded his brother Edward as Lord Chief Baron of the Exchequer, a position which he held until 1694. From 1689 to 1693 he was Speaker of the House of Lords. His *Parliamentary and Political Tracts* (1734) constitute a valuable contribution to the history of the time.

ATLAN'TA. The capital of Georgia, and the county-seat of Fulton County, 171 miles by rail west by north of Augusta and 294 miles by rail northwest of Savannah (Map: Georgia, B 2). It is popularly known as the "Gate City," is the largest city in the State, and one of the important railroad centres of the South. It lies at the base of the Blue Ridge, near the Chattahoochee River, and has an elevation of 1000 to 1100 feet above sea level and a healthful climate with a mean annual temperature of about 60° Fahrenheit. The city possesses a fine public library, the State Library with over 80,000 volumes, a valuable geological collection, and numerous educational institutions. It is the seat of the Georgia School of Technology (founded in 1888), a branch of the State University at Athens; Atlanta University, founded in 1869; Clark University (Methodist Episcopal), established in 1870; Atlanta Baptist College, organized in 1867; and two medical schools. Among the more important buildings are the State Capitol, courthouse, city hall, custom house, opera house, Piedmont, Kimball, Georgian Terrace, Ansley, Winecoff, and Aragon hotels, and a Carnegie library. Other points of interest are Grant and Piedmont parks, the latter being the site of the Atlanta Exposition of 1895. In the vicinity of the city is Fort McPherson (q.v.), a government army post.

Atlanta carries on a large export trade in cotton, tobacco, grain, horses, and mules, its mule market being the second in importance in the United States. The products of its industrial establishments include cotton goods, cotton-seed oil, bags, furniture, machinery, fertilizers, patent medicines, flour, lumber, and planing mill products, and agricultural implements.

The government is administered under a charter of 1874, revised several times since. It provides for a mayor, who holds office for two years, and a bicameral municipal council; the board of aldermen, consisting of 10 members elected at large for three years, and the council of 20 members, chosen for two years to represent the whole city, but chosen respectively by the 10 wards—two from each. Of the administrative officials, only the license inspector and city warden are appointed by the executive, the municipal council controlling appointments to all other offices except the following, which are filled by popular election: attorney, commissioner of public works, engineer, tax collector, treasurer, and sexton. The annual income and expenditures of the city balance at about $3,500,000; the principal items of expense being $325,000 for the police department (including amounts for police courts, jails, etc.), $250,000 for the fire department, $450,000 for the health department (including amounts for street cleaning and sprinkling, and garbage removal), and $550,000 for schools. Atlanta owns its water works which for the year 1913 yielded the city a revenue of $485,000 against a total cost of $262,000 for the year's maintenance.

Pop., 1850, 2572; 1870, 21,789; 1890, 65,533; 1900, 89,872, including 2500 persons of foreign birth and 35,900 of negro descent; 1910, 154,839; 1920, 200,616. The first settlement was made here about 1839, and was called Terminus, from its being the intended terminus of the Georgia Railroad, completed in 1845. In 1843 it was incorporated as a town under the name Marthasville, and two years later the present name was adopted, while in 1847 a city charter was secured. Atlanta's growth was very rapid, its population being about 15,000 in 1861, and, from its admirable location, it became, at the outbreak of the Civil War, one of the most important cities in the Confederacy, being used as a depot for supplies and a rallying-place for recruits. In 1864 it was the objective point of General Sherman's campaign from Chattanooga. (See CIVIL WAR IN AMERICA.) The Federal army approached the city in July, and after fighting the battle of Peachtree Creek (q.v.), on July 20, closely invested the Confederate works. On July 22 the battle of Atlanta was fought southeast of the city, Hood, the Confederate general in command, making a bloody but unsuccessful attack on Sherman's extreme left under McPherson, who was killed early in the engagement. The Federal loss in killed, wounded, and prisoners in the battle in and around Atlanta was about 20,000; the Confederate, never accurately determined, was probably as great as 15,000. On the 28th another severe engagement, the battle of Ezra Church, was fought west of the city, Hood again attacking, and being again repulsed, the Federals losing about 600 and the Confederates about 4500. Meanwhile Sherman had kept up an almost continual bombardment, and on September 1, by a flank movement, compelled Hood to evacuate, the Federals taking possession on the following day. Here he stayed until November 15, when he started for Savannah, on his famous march to the sea. Atlanta was almost totally destroyed; but after the war it was quickly rebuilt and grew with great rapidity. In 1878 it became the capital of Georgia, and in 1895–96 the celebrated Cotton States and International Exposition was held here. For Atlanta during the Civil War, consult Jacob D. Cox, "Atlanta" (New York, 1882), in the *Campaigns of the Civil War Series;* and for the general history of the city, W. P. Reed (editor), *History of Atlanta* (Syracuse, 1889).

ATLANTA EX'POSI'TION, or COTTON STATES AND INDUSTRIAL EXPOSITION. An exhibition held in Atlanta, Ga., from Sept. 18 to Dec. 31, 1895, having for its chief purpose the presentation of the agricultural, manufacturing, and mineral resources of the southern States. The site selected was Piedmont Park, about 2 miles from the centre of the city, and covered an area of 189 acres, on which over 30 buildings, mostly in the Romanesque style of architecture, were erected. Numerous congresses were held during the Exposition, and to nearly every day was assigned some important feature that attracted special visitors. Among these were: Georgia Day, Confederate Day, Negro Day, etc.

A Department of Awards, presided over by Daniel C. Gilman, president of the Johns Hopkins University, viewed the exhibits during the two weeks between October 15 and November 1. The total attendance was 1,179,889, and the cost of the Exposition was $960,930, while the receipts from the admissions were $500,000, from concessions $125,230, and from floor space $79,000.

ATLANTA UNIVERSITY. A non-sectarian institution for the colored at Atlanta, Ga., opened in 1869. It was originally aided by the Freedmen's Bureau and the American Missionary Association, but soon became undenominational and independent. The university property, including buildings, is valued at about $285,000, and there is an endowment of $100,000. Collegiate, normal, and high school departments are maintained, and emphasis is also placed upon industrial training, the education of kindergarten teachers, and sociological work. In 1912–13 the officers and instructors numbered 34 and the students 404. The library had 15,000 volumes. President, Edward Twichell Ware, A.B.

ATLANTES, ăt-lăn'tēz (Gk. nom. pl. *Ἄτλαντες*; see ATLAS). Carved male figures used in architecture as supports to cornices, architraves, etc. They correspond to the female Caryatides, but were not so popular in Greek art. Examples are in the temple of Zeus at Girgenti, the theatre at Athens, in minor parts of mediæval decorative work, and especially, on a large scale, in late Renaissance buildings; sometimes called "Telamones."

ATLAN'TIC. A city and the county-seat of Cass Co., Iowa, 82 miles west-southwest of Des Moines, on the Chicago, Rock Island and Pacific Railroad (Map: Iowa, B 3). It has a large corn-canning factory, machine shops, and other manufactures. Atlantic was incorporated in 1869; by the existing charter the mayor holds office for two years and the city council consists of six members. The electric light and water plant is owned by the city. Pop., 1890, 4351; 1900, 5046; 1910, 4560; 1913 (est.), 5600.

ATLANTIC CA'BLE. See ATLANTIC TELEGRAPH, HISTORY OF.

ATLANTIC CITY. The most popular seaside resort in the United States, situated on a long, narrow, sandy island, known as Absecon Beach, in Atlantic Co., N. J., 56 miles by rail southeast of Philadelphia, and about 95 miles (direct) southwest of New York; on the Pennsylvania and the Reading railroads (Map: New Jersey, D 5). The island, three-quarters of a mile wide, stretches for 10 miles along the coast and is separated from the mainland by four or five miles of meadows, partly covered with water at high tide, and by a narrow strait. Absecon Lighthouse, 167 feet high, is on the north end of the beach. The city's most distinctive feature is the unique "Board walk" (built of steel and concrete with board flooring), which skirts the ocean for 8 miles, and forms a charming promenade. It is the centre of the resort's activities. Along its land side are situated stores of almost every kind, a great many places of amusement, many playhouses, and a score of fine hotels. Extending seaward are six great ocean piers, devoted exclusively to recreation. The best known of these is Young's "Million Dollar Pier." The boating and bathing facilities are excellent. During the season about 90,000 persons enjoy the surf daily. Fishing and shooting are other popular amusements. The city has a fine country club and abounds in hotels, boarding houses, and private cottages for the accommodation of visitors. It also contains a Carnegie library, a hospital, the Mercer Memorial Home for Invalid Women, and the Children's Seashore Home. The government is administered by five commissioners, elected for four years, and restricted by the referendum and recall. The water works are owned and operated by the municipality.

A few settlers came to the site as early as 1780, but there were only seven houses standing in 1852, and the existence of the city and summer resort really dates from the completion of the Camden and Atlantic Railroad in 1854, when the name "Atlantic City" was first adopted. On April 3, 1902, the city suffered from a disastrous fire, which destroyed several hotels and smaller buildings, and part of Young's Pier, a loss estimated at $500,000. Pop., 1900, 27,838; 1910, 46,150; 1920, 50,682. During the summer the transient population varies, but it is estimated at between 300,000 and 400,000.

ATLANTIC HIGHLANDS. A borough and seaside resort, in Monmouth Co., N. J., 20 miles south of New York, on Sandy Hook Bay and the Central Railroad of New Jersey (Map: New Jersey, E 3). It has beautiful residences and drives, a casino, yacht and tennis clubs, and numerous resort amusements. The borough owns its water works and electric light plant. It was settled in 1880 and incorporated in 1887. Pop., 1900, 1383; 1910, 1645.

ATLANTIC OCEAN. An ocean so named from Atlas, probably because it was the sea beyond Mount Atlas in northwestern Africa. It lies to the west of the great land masses of the Old World, and extends from the Arctic to the Antarctic regions. It is bounded on the east by Europe and Africa and on the west by the two Americas. On the north it connects with the Arctic Ocean by a channel which is as broad as the narrower parts of the main body of the ocean, but which is itself obstructed by islands, of which Greenland is the largest. Greenland lies to the west of the main connecting channel, which is obstructed by Iceland. On the south the Atlantic extends as far as the Antarctic Continent, but no natural line of demarcation here separates it from the Pacific or the Indian oceans, with both of which it communicates freely. A line, 560 miles long, connecting Tierra del Fuego at the southern end of South America with the South Shetland Islands off the coast of West Antarctica, and the twentieth meridian east of Greenwich between Cape Agulhas at the southern end of Africa and the Antarctic Continent (length, about 2500 miles) are therefore generally taken to be the boundaries which separate the Atlantic from the Pacific and the Indian oceans, respectively. A Southern, or Antarctic, ocean is no longer recognized, since the existence of an Antarctic land mass has been established. The waters surrounding the Antarctic Continent are divided up among the three oceans along the lines just mentioned. The length of the Atlantic between these north and south

boundaries is over 13,000 miles; the breadth averages perhaps something over 3000 miles, being less than 1800 miles in the narrowest place in the middle Atlantic between Sierra Leone, on the west coast of Africa, and Cape São Roque, on the east coast of South America. By the protrusion of the two continents in the equatorial zone the Atlantic is divided into two basins, the North and the South Atlantic.

The whole complex of waters constituting the Atlantic may be divided into two parts: (1) the main body of the ocean itself, and (2) the seas which are branches of it. To the latter belong the Arctic Ocean, the deep European Northern Sea (between Greenland and Norway on the one hand and Ireland-Faroe-Orkney and Spitzbergen-Bear Island on the other), the shallow Barents Sea, Hudson Bay, the Gulf of St. Lawrence, the North Sea, the Baltic, the American Mediterranean (Gulf of Mexico and Caribbean Sea), and, finally, the European Mediterranean (including the Black Sea). The area of the whole Atlantic basin is about 41,000,000 square miles—more than one-fifth of the earth's surface and three-tenths of the water surface of the globe—that of its main body 31,600,000 square miles (77 per cent) and that of its branches 9,400,000 square miles (23 per cent). The eastern and western borders are irregular in outline, but are peculiarly parallel, the embayment of the North Atlantic between Newfoundland and the Lesser Antilles corresponding to the northeastern projection of Africa, and the northwestern projection of South America to the wide expanse of the Gulf of Guinea in the South Atlantic. The main groups of islands in the Atlantic are the American Arctic Archipelago, Greenland, Iceland, and Spitzbergen at the north, the British Isles at the northeast, Newfoundland at the northwest, and the West Indies in the west-central part. The Atlantic, including all its connecting inland seas, receives most of the drainage of northeastern central, and southern North America, practically the whole of South America, most of Europe, except the eastern portion (Volga), and most of Africa except the southeastern part (Zambezi).

From the edge of the continental shelf, or platform, as that part of the continental land masses is termed which is submerged to a depth of 600 feet below the sea, the Atlantic basin generally deepens rapidly to depths of 10,000 to 13,000 feet. The main body of the Atlantic varies between 10,000 and 18,000 feet in depth; 13,000 feet may be considered the average depth of the ocean floor. The most conspicuous feature of the submarine relief of the Atlantic is a long, narrow ridge which extends throughout its whole length approximately midway between the eastern and western continents in the shape of the letter S. This coincidence with the general shape of the basin itself, together with the striking parallelism, mentioned above, of the western and eastern shores of the Atlantic, seems to indicate that these are major features in the structure of the earth's crust, although we are still ignorant of their details. In the North Atlantic this central ridge rises to within 13,000 feet of the surface, in the South Atlantic to within 10,000 feet; to the east and west of it lie depths of 16,000 to as much as 20,000 feet. The most marked depressions in the floor of the Atlantic are the Porto Rico Trough, north of Porto Rico, with a maximum known depth of nearly 28,000 feet—the greatest yet recorded in the Atlantic—and the Romanche Deep, on the equator and in 18° W. long., with a maximum depth of over 24,000 feet.

The surface salinity of the main body of the Atlantic reaches its maximum in two elliptical areas—the one, in the North Atlantic, lying along the Tropic of Cancer with its nucleus nearer the African coast; the other, in the South Atlantic, lying north of the Tropic of Capricorn nearer the South American coast. The salinity here amounts to from 3.70 to 3.75 per cent. From these two areas the salinity decreases to about 3.40 per cent both toward the equator and the poles. The highest salinity within the confines of the Atlantic occurs in the eastern Mediterranean, where it exceeds 3.90 per cent.

The temperature on the ocean floors is about 35° F. in the North Atlantic, 35° to 37° in the equatorial regions, 32° to 34° in the western part of the South Atlantic, and 34° to 36° in the eastern part. The distribution of average surface temperatures shows a displacement to the north, inasmuch as the line of maximum temperature (81° F.) does not coincide with the equator, but extends from the Caribbean southeastward and eastward along 5° N. to the African coast. The 68° isotherm in the north lies in about 35° N. lat., in the south in 30° S. lat.; the 50° isotherm in the North Atlantic extends as far as 60° N. lat. on the European side, while in the South Atlantic it does not go beyond 46° S. lat. In the north the 32° isotherm extends from Denmark Strait, between Greenland and Iceland, northeast to beyond 80° N. lat., and then recurves around the western and southern coast of Spitzbergen until it reaches Barents Sea. In the south this isotherm lies in general as far north as 55° S. lat. The surface temperatures follow the changes in atmospheric temperature, but vary much less in amount. The decrease in temperature with the depth of the water is, in lower latitudes, very rapid for a short distance below the surface; but below a depth of from 1800 to 2400 feet the change in temperature is slight.

The surface waters of the North Atlantic and the South Atlantic have each independent circulatory systems. The Gulf Stream takes its origin from the offshoot of the South Equatorial Current, which flows northwest along the northern coast of Brazil and the Guianas. Reinforcing the westward-flowing North Equatorial Current, it enters the Caribbean through the Lesser Antilles (while a branch, the Antillean Current, flows along their outer side), is forced into the Gulf of Mexico through the narrow Yucatan Channel and out again through Florida Strait, whence it flows along the eastern coast of the United States and thence along the fortieth parallel. In about 40° W. long. it loses its individuality and is merged with the general eastern surface drift. This latter spreads and divides, one branch of it flowing northward along the western coast of northern Europe, there, above latitude 70°, to join the colder currents flowing to the west; the other branch of it flowing, as a relatively cold current, southward along the western coast of Portugal and that of northern Africa; here, below lat. 20° N., it joins, where it is known as the Canary Current, the warm westward North Equatorial Current, and forms, between lat. 10° and 45° N., a clockwise-moving circulatory system. Off the western shores of the Atlantic the cold Arctic

Current flows southward from the north (called the Greenland Current on the coast of Greenland and the Labrador Current farther south), part of it branching off toward the east about lat. 50°, and forming a return current, completing another counter-clockwise system of circulation between lat. 45° and 60° N.

In the South Atlantic there appears to be but a single great circulatory system, moving in a counter-clockwise direction. The South Equatorial Current flows westward across the Atlantic in the region of the equator, but on reaching the northeastern corner of South America in long. 34° W., it separates, the northern branch moving toward the northwest along the north Brazilian and Guiana coast toward the Gulf of Mexico, and the southern branch moving toward the southwest and forming the Brazilian Current along the eastern coast of Brazil. It turns eastward beyond lat. 40° S. and joins the cold West Wind Drift, whose northeastern-flowing waters probably emanate from the Weddell Sea. As the coast of Africa is approached, a part of this current turns northward and flows along the southern part of the western coast of Guinea, where it is known as the Benguela Current, to join again the westward current across the Atlantic near the equator. From it a current detaches itself to the right, which flows east along the Guinea coast and is known as the Guinea Current. In the southwest corner of the circulatory system of the South Atlantic the cold Falkland Current enters from the strait between Tierra del Fuego and West Antarctica and flows north between the Patagonian coast and the western side of the Brazil Current. These various oceanic currents range in velocity from 20 to 75 miles per day.

The northern Atlantic lies in the path of the great procession of cyclones and anti-cyclones of middle latitudes, and also in the path of the West Indian hurricanes over its lower latitudes; the counterparts of these atmospheric disturbances are found in the South Atlantic. The winds of the Atlantic are divided into two corresponding systems—one in the North and one in the South Atlantic. In January and February, in the North Atlantic, north of lat. 35°, the winds are chiefly from the west; they are northwest on the North American coast, west toward the middle, and southwest on the European coast; but between Iceland and Greenland they are from the northeast. South of about lat. 35° N. the winds are generally from the northeast (the northeast trade winds) almost to the equator. In the South Atlantic, north of lat. 20° S. in the western part, and north of lat. 35° S. in the eastern part, the winds are from the southeast (the southeast trade winds), becoming more distinctly from the south just at the equator. In lat. 30° S. the winds are from the south on the eastern side and from the north on the western side; but southward of lat. 40° S. they are in general from the west. In July and August the dividing lines between the wind systems of the North and South Atlantic are pushed farther northward by from 10° to 15°.

The mean annual rainfall over the Atlantic Ocean is dependent on the wind systems. The regions of the northeast and southeast trades—the former the westward extension of arid region of the Sahara, the latter projecting northwest from the west coast of South Africa across to the northeast corner of South America—are extremely deficient in rainfall (10 to 30 inches). Between the two trade-wind zones lies the equatorial belt of high rainfall (40 to 80 inches and more). The region of the prevailing westerlies has moderate rainfall (40 inches) both in the North and the South Atlantic.

The vegetable and animal life of the Atlantic is treated under the subject OCEAN LIFE.

The distribution of algæ is dependent on the light and temperature of the water, and so rapid is the decrease of the former that below a depth of from 800 to 1000 feet few algæ are found; those in the surface waters belong mainly to the Fucaceæ, and those at greater depths are mainly Ceraminaceæ. The chief feature of the flora which can receive mention here is the great Sargasso region between lat. 24° and 30° N. and long. 40° and 80° W. on the west side of the circulatory system of the North Atlantic, where the seaweed *Sargassum baccifer-um* is found in such great abundance as to interfere in some places with the progress of sailing vessels.

The distribution of mammalia, fishes, and floating mollusks is determined largely by the temperature of the surface waters. Of the Cetacea, some species of whales are distributed over various sections of the Atlantic Ocean, but those found in polar regions do not descend to lower latitudes, and vice versa.

The ocean bottom, near the coasts, is covered with a great variety of deposits of continental waste. The greater portion—that between depths of 3000 and 12,000 feet—is, however, covered with Foraminiferæ (*Globigerina, Orbulina, Pulvinulina, Sphæroidina*). At these latter depths the calcareous bottom is replaced by gray clay, which forms a transition region between the foraminiferan ooze and the red clay of the greater depths below 14,000 feet, which consequently covers a large area. The flora and the fauna of the regions of the Atlantic visited by the *Challenger* are given in minute detail in the *Report of the Challenger Expedition*, prepared under the direction of C. Wyville Thomson and John Murray (London, 1880–95). See OCEAN; OCEANIC DEPOSITS; DISTRIBUTION OF ANIMALS.

Bibliography. The leading general work is *Geographie des Atlantischen Ozeans* by G. Schott (Hamburg, 1912), which discusses, besides the physical features, the discovery and exploration and the transportation and commerce of the Atlantic Ocean. It is accompanied by a bathymetrical map on the scale of 1: 30,000,000. Similar representations are found on the *Carte générale bathymétrique des océans*, ed. by J. Thoulet, Inst. Océanoger. de Monaco, and the *Tiefenkarte des Atlantischen Ozeans*, 1 : 40,000,000, by M. Groll (Versölent. Inst. Meereskunde, Berlin, Series A, No. 2, 1912). Current meteorological conditions are represented on the monthly Pilot Charts of the North and the South Atlantic Ocean published by the United States Hydrographic Office, Washington, D. C.

ATLANTIC TELEGRAPH, HISTORY OF THE. The first definite suggestion of telegraphic communication between England and America dates from 1845, when the Messrs. Brett, who a few years later were active in the construction of the first telegraph lines across the English Channel, registered a "General Oceanic Telegraph Company." Before proceeding with this enterprise they laid a cable across the English Channel (1851), the success of which and

other European cables led to the discussion of telegraphic communication between America and Europe by way of Newfoundland. The original plan was to carry the line across that island to St. John's and there intercept the incoming steamers and, by means of carrier-pigeons and a direct telegraph line to the United States, transmit messages. The coöperation of Cyrus W. Field was enlisted in 1854, and he became interested not only in this scheme, but also in a project of a transatlantic cable, which he pushed with vigor. The government of Newfoundland conferred on the company exclusive rights of landing a cable upon its coast, and privileges were also obtained from the governments of Prince Edward's Island, Canada, and the State of Maine. An unsuccessful attempt to lay a cable across the Gulf of St. Lawrence was made in 1855, but in the following year this work was accomplished satisfactorily and one link in the chain completed. The next question was that of the main cable from Newfoundland to Ireland along a route which had previously been surveyed by American and British war vessels, and which, on account of its comparatively shallow depth, was called the Telegraphic Plateau. Extensive tests meanwhile were made to determine the character of the cable, and the many problems involved were discussed with interest by eminent engineers and electricians, many of whom declared the laying and operation of the cable to be impossible.

Through the efforts of Mr. Field, and with the aid of Liverpool and London capitalists, the Atlantic Telegraph Company was formed, with a capital of £350,000, and assistance in the form of subsidies (£14,000 per annum during the operation of the cable was promised by Great Britain); and ships for laying the cable were secured from the governments of Great Britain and the United States. In the first board of directors were William Thomson, who was the electrical engineer of the company, and John Pender; the former, afterward Lord Kelvin, becoming widely known in the scientific world, while the latter was subsequently interested in the construction and laying of many ocean cables. The conductor, which was prepared under certain specifications, consisted of seven fine copper wires, each of No. 22 gauge, twisted together so as to form a cord which was one-twelfth inch in thickness, and weighed 107 pounds per nautical mile. This was covered with three layers of gutta-percha, over which was a coating of hempen yarn saturated with pitch, tar, beeswax, and boiled linseed oil. The sheathing consisted of 18 strands, each formed by seven No. 22 iron wires, making the entire cable about six-tenths inch in diameter, and its weight one ton to the mile.

This cable, when completed, was divided in two equal portions, and loaded on the U.S.S. *Niagara* and H.M.S. *Agamemnon*, which were loaned for this purpose by the respective governments and suitably equipped. A start was made from Valentia, a port on the west coast of Ireland, on Aug. 6, 1857, and the cable was paid out from the *Niagara* until a break occurred and the end was lost. The vessels returned to Plymouth, where the cable was stored and protected. Additional capital was raised by the company, 700 miles of new cable constructed, and another attempt was essayed in the following year. Instead of laying the cable directly from the Irish coast, the *Niagara* and *Agamemnon* proceeded to mid-ocean, where they joined the ends of their respective cables and then steamed in opposite directions. Again misfortune attended the expedition, and owing to a double break 144 miles of cable were lost. Notwithstanding these mishaps, another start was made July 17, and on July 29, 1858, the two vessels separated. As a result of good fortune and careful management, they succeeded in landing safely the ends of the cable on the Irish and Newfoundland shores. On August 17 complete connections of the cable with the receiving instruments and land wires were made, and the following message was sent over the wire: "Europe and America are united by telegraph. Glory to God in the highest; on earth peace, and good-will toward men." Messages and replies from Queen to President, and between other officials followed, and the event was celebrated enthusiastically on both sides of the Atlantic. The station at Newfoundland was connected with the general telegraphic system of America, and that at Valentia with the British and European lines.

The commercial success of the Atlantic cable was early demonstrated, but, owing to the use of currents of too high potential, the cable soon became impaired, and after September 1 it was found impossible to transmit messages; while after October 20 no signals whatsoever passed over the cable. For several years there were no further attempts at laying an Atlantic cable; but Mr. Field was still active in furthering the enterprise and enlisting new capital. During this time a number of cables were laid in Europe and Asia, and improved methods of construction, testing, and operation were being developed. As a result of Mr. Field's efforts, more capital was subscribed, the company reorganized, and an improved cable, heavier and of greater conductivity, was manufactured. To lay this cable the steamer *Great Eastern* (q.v.), then and for many years the largest vessel afloat, was secured, and special cable-tanks and machinery fitted to it. On July 23, 1865, the *Great Eastern* sailed from Valentia and successfully laid over 1000 miles of the cable, which was under test for the entire trip. At this point, however, a break occurred, and the cable parted. Various attempts were made to pick up the cable with grappling appliances, which, though demonstrating the possibility of finding and raising to the surface a submerged cable, were not attended with success. For another attempt further capital was necessary, and the Atlantic Telegraph Company was practically amalgamated with the newly formed Anglo-American Telegraph Company. Again the *Great Eastern* set forth from Valentia, carrying not only a new cable of improved design, but also a sufficient length to complete the 1865 cable, which was to be recovered and a new length laid from the splice. In both attempts the engineers on the *Great Eastern* were successful, and on July 27 Heart's Content Harbor, Newfoundland, was entered, and the cable was soon landed and connected with the shore. The *Great Eastern* then returned to mid-ocean, and after a series of trials found the broken cable and completed the circuit to Newfoundland. With two working cables, the success of the enterprise was assured, and they were soon in steady use, the rate of transmission of messages improving with new apparatus and the increasing skill of the operators. In 1869 a French cable was laid from Brest to

Saint-Pierre, and four years later the Direct United States Cable Company was formed, and a cable laid across the Atlantic, landing at Torbay, Nova Scotia. This landing was subsequently abandoned, the cable lengthened and diverted to Halifax. This company was the first competitor of the Anglo-American Company, which in 1873 and 1874 laid new cables, again employing the *Great Eastern* for this purpose. In 1872 the 1866 cable broke down, and in 1877 the 1865 cable also, so that in 1880 another cable was laid, which was connected to the shore ends of the 1866 cable. In 1879 the Compagnie Française du Télegraphe de Paris à New-York laid a cable across the Atlantic, and in 1881 the American Telegraph and Cable Company, formed by Jay Gould, laid a cable, which was followed by a second in the following year. In 1884 the Commercial Cable Company, or Mackay-Bennett Company, as it was known from the names of its two chief owners, laid two cables, one of which was extended from Nova Scotia to New York. In 1894 another cable was laid for the Commercial Cable Company, and also a new one for the Anglo-American Company, giving the latter organization five working lines across the Atlantic Ocean. The longest telegraph cable to cross the Atlantic is that of the Compagnie Française des Cables Télégraphiques, which was laid in 1898 and extends from Brest to Cape Cod, Mass., being 3200 miles in length. It is one of the heaviest cables ever constructed, having 661 pounds of copper and 400 pounds of gutta-percha per nautical mile. In 1900 two cables were laid across the Atlantic, using the Azores as an intermediate station. One of these belonged to the Commercial Cable Company and extended from Fayal to New York, via Nova Scotia, making the fourth cable operated by this company. At Fayal direct connection is had with Europe by means of the Europe and Azores Telegraph Company's system. In the spring of 1900 the cable of the Deutsch-Atlantische Telegraphen-Gesellschaft was laid from Borkum to Fayal, and in the summer extended to New York, so that on August 31 Emperor William and President McKinley were able to exchange messages. Late in the year 1901 a cable from Waterville, Ireland, to Fayal, Azores, was laid by the Commercial Cable Company and successfully landed at the latter place on November 30. In 1904 the Deutsch-Atlantische Telegraphen-Gesellschaft completed a second cable from Borkum to New York; in 1905 a fifth cable, from Canso to Waterville, was completed by the Commercial Cable Company, at a cost of $3,500,000, which very appropriately can be compared with the contract price of the first Atlantic cable, $1,100,000. The difference is due to the greater conductivity, involving more weight in the core, and to the increased price of gutta-percha, the supply of which is stationary, if not diminishing.

In 1910 the Western Union Telegraph Company, which had previously extended from Nova Scotia to New York the two cables laid in 1881 and 1882 by the American Telegraph and Cable Company, laid a new cable of the heaviest and most improved type between New York and Bay Roberts in Newfoundland and between the last-mentioned point and Penzance in England. This cable was, in 1911, transferred to the Anglo-American Cable Company, and all the cables of the Anglo-American Company and the cable of the Direct United States Cable Company were leased by the Western Union Telegraph Company for a term of 99 years from April 1, 1911, making, with the two cables laid by the American Telegraph and Cable Company, a total of eight transatlantic cables operated by the Western Union Telegraph Company under the title "The Western Union Cable System." By 1913 three of these eight cables landed at Bay Roberts, and one of the Commercial Cable Company's cables had been transferred to St. Johns, Newfoundland, making a total of eight cables landed at Newfoundland, which has supplanted Nova Scotia as a landing point for transatlantic cables. In 1913 the Gott method for the direct transmission of Morse signals—dots and dashes—was used by the Commercial Cable Company.

Until 1911 the tolls on transatlantic cable messages had invariably been computed upon a word basis, both addresses and signature counted and charged for, but in December of that year the Western Union Cable System, following the precedent established by the land line system of the Western Union Telegraph Company in inaugurating the "Night Letter" service, involving the use of facilities which otherwise would be idle at night for communications of a semi-urgent character and of considerable length, announced a "Cable Letter" and "Week-End Letter" service under which a specified charge is made for a given number of words with small added charges for additional words. These new services were adopted by other companies, and because of their low cost (as low as 5 cents per word) at once became very popular for social and other communications of a non-urgent character.

Consult Bright, *Submarine Telegraphs* (London, 1898), a thoroughly systematic and historical work; Judson, *Cyrus W. Field: His Life and Work* (New York, 1896). See TELEGRAPHY, SUBMARINE, for description of instruments and methods.

ATLAN'TIS (Gk. *'Ατλαντίς*, scil. *νῆσος*, *nēsos*, island). A large island, which, according to an ancient tradition, was situated in the Atlantic Ocean, over against the Pillars of Hercules. It is first mentioned by Plato, who, in the *Timæus*, represents an Egyptian priest as describing it to Solon. According to this account Atlantis was an island larger than Libya and Asia Minor combined. Nine thousand years before the time of Solon it had been a powerful nation and had been successfully resisted by the Athenians alone. It had finally been engulfed by the sea, which ever after remained unnavigable by reason of the shoal of mud which had been raised on the spot. In the *Critias* Plato gives a glowing description of the island and adds thereto its fabulous history. The account of Plato has been considered by some a pure invention of the author's imagination, while others have looked upon it as a real tradition. Various attempts have been made to identify the island. The Canary Islands, the Scandinavian Peninsula, and the American Continent have all been thought to be the land in question. The remains of a very ancient civilization in Crete, brought to light by recent archæological excavations, have led some to identify Atlantis with Crete in the Minoan period. This view is discussed in the London *Times* of Feb. 19, 1909. Atlantis is also the name of a romance by Ignatius Donnelly (1882). Consult Volquardsen, *Ueber die Mythen bei Plato* (Schleswig, 1871), and Steiner, *Submerged Continents of Atlantis and Lemuria* (Chicago, 1911).

ATLAN'TOSAU'RUS. See TITANOSAURUS.

AT'LAS (Ar. satin, smooth, from *talasa*, to make smooth). The name given to a silk satin manufactured in India and other eastern countries and at one time largely imported by European merchants. This material was wrought with threads of gold or silver, was either striped or flowered, and was woven in the most skillful manner, though it lacked the lustre of French silks.

ATLAS (so named from its sustaining the globe of the head, as the giant Atlas sustained the vault of heaven). The uppermost segment of the vertebral column; the first cervical vertebra. It differs from the other six in having no body or spinous process, being a mere irregular bony ring, partly divided into two unequal parts by a constriction; this division is completed by a ligament, the space in front being occupied by the tooth-like process of the second cervical vertebra (see AXIS) and that behind by the spinal marrow. On each side the ring is very thick; it is smooth and cupped above to receive the condyles of the occipital bone. The corresponding parts below are flat and rest on the second cervical vertebra. The atlas, with the occipital bone, forms the joint on which the head moves in nodding, and turns on the pivot of the second cervical vertebra when we look from side to side.

ATLAS. A mountain system of northern Africa, extending about 1500 miles in a southwest and northeast direction from the western end of Morocco to the eastern coast of Tunis, in the main parallel with the coast of the Atlantic and the Mediterranean (Map: Africa, D 1). These mountains are a part of the orographic system that extends in ranges parallel with them through the Iberian Peninsula to the Pyrenees, and all belonged to the same physical area till separated by the creation of the Strait of Gibraltar. The ranges may be divided into two parts, the Moroccan, or Western, and the Algerian, or Eastern, Atlas. The former comprises three chains—the Great Atlas in the middle, the Little Atlas on the Mediterranean coast, and the Anti-Atlas south of the Great Atlas. The Great Atlas is the longest range and contains the highest summits of the entire system, as the Jebel Ayashi (14,600 feet) and Tamjurt (14,500 feet). Its average height is over 11,000 feet, while the highest summits in Algeria and Tunis do not exceed 8000 and 6000 feet, respectively. The Anti-Atlas is less elevated and shorter than the main chain. The Little Atlas begins in about long. 7° W. and finally joins the coast ridge of the Rif. In the Algerian, or Eastern, Atlas only two chains are distinguished, separated by an elevated plateau interspersed with numerous saline marshes, called Shotts. The northern chain, Tell Atlas, is cut up by coast streams and deep valleys into several separate groups. The valleys are very fertile, highly cultivated, and are among the most favored regions of the Mediterranean basin. The highest summits are more than 7000 feet. The southern range, or Great Atlas, is very wide and sends off numerous spurs into the desert. It reaches in its highest peak, Shelia, an altitude of 7611 feet. In Tunis the Atlas system spreads out into a number of separate mountains of inferior altitude. The rocks composing the Atlas system comprise igneous and sedimentary rocks, which belong chiefly to the Archæan and Paleozoic periods. Jurassic, as well as more recent Tertiary formations, are also much in evidence. Copper, iron, salt, and several kinds of beautiful marble occur in the Atlas. Some of the summits are under snow for the larger part of the year, but even the highest peaks are usually without a snow cover in summer. Consult: P. Schnell, *L'Atlas marocain* (Paris, 1898); T. Fischer, "Ueber meine Reise im marokkanischen Atlas," in *Zeitschrift der Gesellschaft für Erdkunde*, vol. xxvi (Berlin, 1899); Louis Gentil, *Mission de Sagonzac* (Paris, 1906) and later writings; Joseph Thomson, *Travels in the Atlas and Southern Morocco* (London, 1889).

ATLAS (Gk. Ἄτλας). According to Hesiod's *Theogony*, one of the Titans, the son of Iapetus and Clymene, and brother of Menœtius, Prometheus, and Epimetheus. Apollodorus, however, says he was a son of Asia; Hyginus makes him a son of Æther and Gæa. The Pleiades were daughters of Atlas and Pleione, the Hesperides of Atlas and Hesperis; and countless noble houses in Greek legend traced their origin to the union of a daughter of Atlas with a god. Through all antiquity, from Homer onward, Atlas bears the heavens on his shoulders, and this is early declared a punishment for rebellion against Zeus, which story was later elaborated until Atlas became the leader of the Titans in their war against the gods. Atlas was always located in the far west, beyond the horizon; finally, he was localized in northwestern Africa. There he was a king, rich in flocks, owner of the gardens of the Hesperides. Atlas, as bearer of the heavens, appears in early Greek art on vases and reliefs in connection with Hercules' search for the apples of the Hesperides. In statuary Atlas is first represented by the Pergamene school; he is portrayed as carrying the heavens or the terrestrial globe. The plural, Atlantes, is applied in architecture to male figures serving as columns. In consequence of the ancient views, which made the vault of heaven rest on solid pillars or other supports, the name "Atlas," originally mythological and cosmogonic, was introduced into geography; it was given to a hill in northwest Africa. Mercator, in the sixteenth century, applied the name "Atlas" to a collection of maps, probably because the figure of Atlas supporting the heavens had been given on the title-pages of such works.

ATLAS POW'DER. A high explosive dynamite (of great strength and destructive potentiality), used for mining, quarrying, driving tunnels, sinking shafts and wells, submarine blasting, removing wrecks, clearing ice gorges, road building, excavating ditches, in farming for removing stumps and boulders from new land, and subsoiling. It also has been used with great success for planting fruit and other trees. It consists of nitroglycerin, sodium nitrate, wood pulp, and a small quantity of chalk or other antiacid. The proportions are varied to fulfill the desired requirements as to strength and quickness. Like other varieties of dynamite, when not confined it will burn harmlessly; but when fired by a blasting cap it explodes with enormous force. It is put up in cartridges 6 and 8 inches in length and from ⅞ of an inch to 2 inches in diameter, containing from 20 to 75 per cent of nitroglycerin, according to the special use for which it is desired. The 40 per cent strength, put up in cartridges 1¼ inches in diameter and 8 inches long, is the most popular in strength and size, as it fulfills the greatest number of requirements. See EXPLOSIVES.

AT'MOGRAPH (*ἀτμός, atmos*, vapor + *γράφειν, graphein*, to write). A simple or self-recording instrument for measuring the amount of evaporation, usually of water, from water, from a vessel or other body. See ATMOMETER.

ATMOM'ETER, or EVAPOROMETER (Gk. *ἀτμός, atmos*, vapor + *μέτρον, metron*, measure). An instrument used to measure the amount of evaporation in the open air from a surface of water. It consists of a round dish supplied with an inclined scale to give a magnified reading of the differences in level caused by the evaporation. This loss can also be obtained by weighing the dish and water at the beginning and end of the experiment. The evaporation pan and still well of Marvin consists of a surface of water fed from a supply tank where the amount lost by evaporation can be measured. In the Piche evaporometer the evaporation is measured by the change in level of water in a vertical graduated glass tube closed at the upper end and open below. The tube is filled with water, and the open end is covered with a paper disk held in place by a metal clamp. The water is absorbed by the paper, from which it evaporates, and the amount is measured by taking the difference in readings on the scale. The paper surface gives off about one-third more water in a given time than an equal extent of surface of water in an open dish. The first instrument of this kind was constructed by Sir John Leslie, who employed a porous earthenware ball instead of the paper. Other modifications of this instrument have been employed by Livingston, and there is also the balance evaporimeter of Wild, when a pan of water is carried as the variable weight on a quadrant balance. The atmograph serves to produce an automatic record of the amount of evaporation. When the wind is blowing 5 miles an hour, the evaporation is 2.2 times as great as in a calm; at 10 miles, 3.8 times; 15 miles, 4.9 times; 20 miles, 5.7 times; 25 miles, 6.1 times; 30 miles, 6.3 times. Atmometers and other meteorological instruments will be found described in Russell, *Meteorology* (New York, 1899), a popular treatise; also by Marvin in *Monthly Weather Review* for 1909.

AT'MOSPHERE (Gk. *ἀτμός, atmos*, vapor + *σφαῖρα, sphaira*, sphere, globe). The name applied to the mixture of gases and vapors surrounding any climate or sun, but especially the envelope of our globe. Spectrum analysis tells us much about the constituent gases and vapors, and even the relative motion of these in the atmospheres of the earth, the sun, and the distant stars; we know, in general, that nearly all of the chemical elements that occur in those are also present either on our earth or in its own atmosphere. The principal constituents of the earth's atmosphere are oxygen and nitrogen, in the ratio of 21 to 78 respectively. The next most important constituent is aqueous vapor, the proportion of which varies from 5 per cent to nothing, depending upon the temperature and location of the sample of air that is analyzed. The other gases that are most commonly found are carbonic-acid gas, whose proportion varies slightly, but may be considered as being on an average 0.03 per cent and to this extent may be considered as a normal constituent; when this gas is in excess (as in many dwellings where the combustion of fuel or illuminating gas is not properly guarded, or when persons are gathered together without proper provision for ventilation) it is to be considered as an undesirable impurity. Traces of ammonia, hydrocarbons, and possibly ozone, are frequently encountered. The most interesting recent additions to our knowledge have resulted from our ability to cool and condense the air into a liquid form. By the fractional distillation of this liquid air, Rayleigh, Ramsay, Dewar, and others have shown the presence of gases whose densities, calling that of hydrogen 1 and oxygen 16, are as follows: helium, 1.98; neon, 9.97; argon, 19.96; kryptom, 40.88, and xenon, 64. These rare gases are exceedingly volatile, and their presence is held to indicate not that they belong to the earth's atmosphere, but that they are simply diffused through the whole interplanetary space, and are not held down to the earth's surface to any great extent by the attraction of gravitation. On the other hand, a larger body like our sun may have an attractive power sufficient to accumulate a larger proportion of some of these gases in its atmosphere. The accompanying figure and table recently calculated by Humphreys present the vertical change in composition of the atmosphere up to an altitude of 140 kilometers (87 miles). (Consult *Journal of the Franklin Institute*, March, 1913, pp. 212, 215.)

Height in kilometers	Argon	Nitrogen	Water vapor	Oxygen	Carbon dioxide	Hydrogen	Helium	Total pressure in millimeters
140	...	0.01	...	....	...	99.63	0.36	0.0040
130	...	0.04	...	....	...	99.55	0.41	0.0046
120	...	0.19	...	....	...	99.35	0.46	0.0052
110	...	0.68	0.02	0.02	...	98.77	0.51	0.0059
100	...	2.97	0.05	0.11	...	96.31	0.56	0.0067
90	...	9.86	0.10	0.49	...	88.97	0.58	0.0081
80	...	32.39	0.17	1.86	...	65.11	0.47	0.0123
70	0.03	62.04	0.20	4.74	...	32.73	0.26	0.0274
60	0.03	81.33	0.15	7.70	...	10.69	0.10	0.0935
50	0.12	86.82	0.10	10.17	...	2.76	0.03	0.403
40	0.22	86.43	0.06	12.61	...	0.67	0.01	1.84
30	0.35	84.27	0.03	15.18	0.01	0.16	...	8.63
20	0.59	81.24	0.02	18.10	0.01	0.04	...	40.99
15	0.77	79.52	0.01	19.66	0.02	0.02	...	89.66
11	0.94	78.02	0.01	20.99	0.03	0.01	...	168.00
5	0.94	77.89	0.18	20.95	0.03	0.01	...	405.
0	0.93	77.08	1.20	20.75	0.03	0.01	...	760.

The chemical and physical properties of the earth's atmosphere are of vital importance to mankind. In a general way it is ordinarily stated that the stratified portion of the earth's crust, including the fossils, the coal beds, the oils, the gases, and all hydrocarbon compounds, as well as all the water contained in the rocks, the oceans, and lakes, represents an immense volume of oxygen, nitrogen, hydrogen, carbonic-acid gas, etc., that has been abstracted from the primitive atmosphere of the earth, which must therefore have at one time been very much greater than at present. It is supposed that at the present time the formation of new compounds and the disintegration of others on the earth's surface are going on at such a rate as to counterbalance each other, taking the earth as a whole, although there is probably no experimental or observational demonstration of this hypothesis. It is calculated that at the present time any excess of ammonia or carbonic-acid gas would be rapidly absorbed by the ocean water, resulting in the formation of precipitates that would accumulate at the bottom of the sea. In general, living plants absorb carbonic-acid gas from the air and give up oxygen to it, while ani-

mal life absorbs oxygen and gives up carbonic-acid gas. It cannot be shown that these two processes exactly counterbalance each other, but of course the tendency is in that direction. An appreciable portion of the atmospheric gases is held in solution by fresh and salt water, where it is utilized by plants and animals that live in the water.

A large part of the aqueous vapor in the atmosphere is retained for months on the earth's surface as solid snow or ice, while other portions, forming as rain or dew, either evaporate quickly or accumulate in lakes and oceans and the superficial strata of soil. But so far as is known, there is at the present time no special tendency toward a steady increase of snow on land or rain water in lakes and oceans, except possibly over the interior of Greenland and in the central portion of the Antarctic Continent, both of which regions are in a glacial condition similar to what must have prevailed over large portions of North America and Europe during the Glacial Period. The steady accumulation of a great mass of snow, and especially its periodical accumulations and evaporation, must disturb the earth's axis of rotation, producing periodic changes in latitude, such as are now going on even on a very small scale.

The physical properties of the atmosphere are as important as its chemical. The air becomes thinner as we ascend above sea level, owing to the fact that it is a compressible gas. The logarithm of the pressure due to the weight of the air above us diminishes in inverse proportion to our altitude above sea level; this logarithmic law (erroneously called the law of Boyle and Mariotte), which obtains only so long as the air is dense enough to be considered as a gas that obeys the law of Boyle, gives us for the actual density of the atmosphere at an altitude of 50 kilometers, or 31 miles, something less than the 1-7000 part of the density at the earth's surface; i.e., if there is a pressure of 760 millimeters at sea level, there will be a pressure of only 0.1 millimeter at 50 kilometers. At some elevation not much greater than this it is neces-

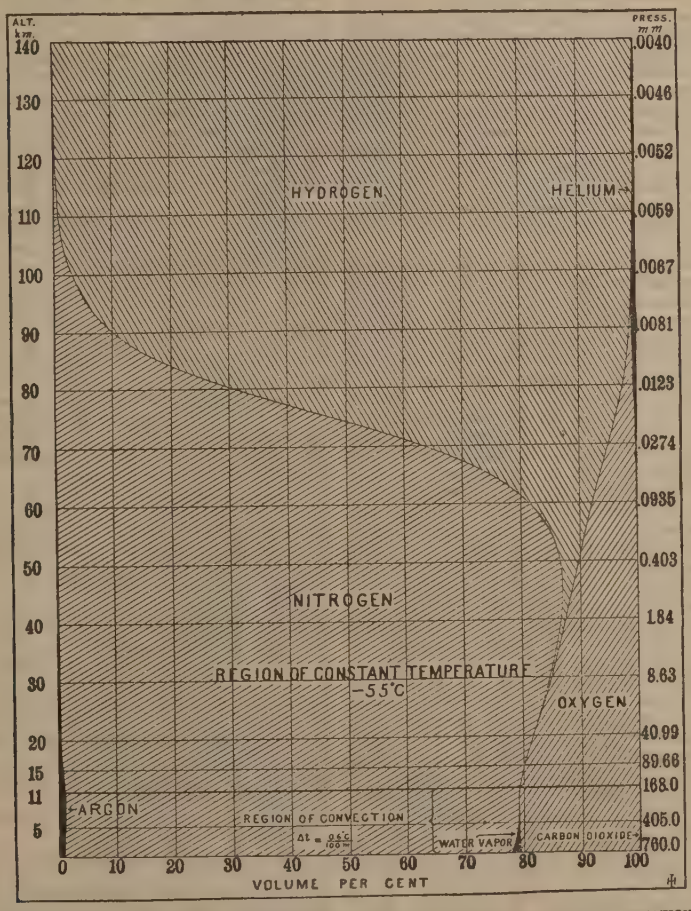


CHART SHOWING VARIATIONS IN CONSTITUENTS OF THE ATMOSPHERE AT DIFFERENT ELEVATIONS.

sary to consider each particle of air as a separate satellite, moving rather freely with other particles around the earth in orbits controlled by the general law of gravity, but modified by an occasional impact of one particle on the other. At the earth's surface these impacts occur with great frequency and control the phenomena or determine the properties of the gas; but at great altitudes the impacts have less importance, and the gas behaves so differently that it is sometimes spoken of as the ultra-gaseous state, or a fourth condition of matter, or a Crookes's vacuum, since the phenomena peculiar to this condition were first illustrated by Crookes in his vacuum tube. That particles of matter in some form permanently attend the earth at 100 miles above sea level, seems to be demonstrated by the behavior of shooting stars or aërolites, which enter the atmosphere at a velocity of 20 miles per second and are at once heated up to the burning point by striking the air in front of them; it is only when they descend to the lower atmosphere that they can be said to be heated and burned up by the heat evolved by the compression of the gas immediately in front of them.

The density of the atmosphere at the earth's surface is about the 1-800 part of that of water, varying from the 750th to the 850th with the ordinary variations in pressure and temperature. This slight density offers no appreciable resistance to the ordinary motion of men and quadrupeds, but makes it possible for birds and insects to fly. On the other hand, when the air itself is in motion, the breeze produces a pressure that has been utilized by mankind from the earliest ages to propel sailboats and ships and drive windmills, so that the atmosphere must be recognized as affording a motive power that has played a most important part in the development of the human race. In fact, the winds set in motion by the solar heat constitute a great "hot-air" engine. The fact that the atmosphere has weight was first maintained by Galileo and demonstrated by the experiments of Otto von Guericke in his air pump, and Torricelli with his mercurial barometer, but more especially by Pascal, who, at the request of Descartes, carried his barometer to the summit of Puy-de-Dôme, a mountain in central France. It is by virtue of this pressure that water ascends the bore of a pump when the piston is raised. The total mass of the earth's atmosphere has been calculated to be about 1-1,000,000 or 1-1,125,000 of the mass of the earth. (Consult the *Monthly Weather Review* for January, 1899, p. 58.)

As the atmosphere is a fluid, subject at any place to the pressure of all the air above it, it is not only compressed by this weight, but by its elastic reaction it presses outward in all directions with an equal force; consequently every substance that is immersed in the atmosphere is buoyed up to an extent equal to the weight of the air that it displaces. This buoyancy must be allowed for in all delicate weighings. If the object is a bag or a balloon full of hydrogen, hot air, or other very light gas, the upward pressure or buoyancy may be greater than the weight of the balloon; consequently the latter rises. (See AËRONAUTICS.) This principle gave rise, in the hands of Montgolfier, to the art of aërial navigation, the future of which now depends almost entirely upon our knowledge of the currents of air and our power to steer or guide the balloon.

The air is not a perfect gas, but has an internal friction called viscosity, by reason of which one layer of air sliding past another, experiences a drag, or retard, or resistance. Therefore any movement of one portion of the atmosphere over or through another portion soon ceases, unless an external force is continuously applied sufficient to overcome the viscosity. This viscous resistance increases with temperature, but is apparently independent of pressure; it is, therefore, greatest in the warmer portions of the globe and less at the poles, and may be zero at the outer boundary of the atmosphere.

The elastic pressure pervading a mass of quiet air is measured by the barometer; but if the air is in motion the barometer must move with the air, or else some device must be used in order to separate the elastic pressure from the pressure produced by the action of the wind on the barometer itself, considered as an obstacle to the wind. This matter will be found fully explained in Abbe, "Meteorological Apparatus and Methods," *Annual Report, Chief Signal Officer for 1887*, app. 46 (Washington, 1888). The observed pressure at any point on the earth's surface is subject to great changes from day to day, which are associated with the movements of the areas of high and low pressure attending fair weather and storms respectively; therefore the barometer can serve a useful purpose as an indicator of approaching changes of weather. The local pressure also goes through diurnal and annual periodic changes; formerly these were spoken of as waves of pressure, moving as such over the surface of the globe, but it is not necessary to commit ourselves to such an hypothesis before the true explanation of these variations has been discovered.

Another important physical property is the power of the air to absorb and radiate heat. The specific heat of the air when it is kept at a constant pressure is 0.2412, that of water being unity, and the specific heat, when kept at a constant volume, is 0.1721; the ratio of the two is 1.4011. This latter ratio affects the velocity of sound, and, in general, it determines the rate at which air will cool when it is allowed to expand without the addition of heat from extraneous sources. This so-called adiabatic expansion and cooling is the principle that is utilized in cooling the air to the liquid, or even solid state; it is also the principle that controls the cooling of ascending masses of air in the free atmosphere, by which the moisture contained therein condenses into cloud, rain, snow, or hail; this is, therefore, a property of great importance in meteorology.

The absorption of radiant heat by the atmosphere, especially the radiation from the sun and the earth, has been studied minutely, both with the spectroscope and the bolometer. Fraunhofer showed that the dark lines seen in the spectrum of a narrow beam of sunlight proceed mostly from absorption taking place in the sun's atmosphere, but that additional lines and bands seen when the sun is near the horizon must be due to absorption by the earth's atmosphere. The amount of absorption was assumed to be about 25 per cent when the sun is in the zenith, until Langley and Abbot showed that it must be 40 or 50 per cent of all the energy originally present in the sunbeam. The absorption is greater among the short waves than among the long waves, although there are specific wave lengths in all parts of the spectrum that are almost wholly

absorbed, and others that are very little affected. By virtue of this absorption the air retains a considerable body of heat, which it can lose only by the slow process of radiation; it therefore acts as a moderator of our extremes of temperature both by day and by night, both in summer and in winter. Without the atmosphere and especially without its moisture and its carbonic-acid gas, we should be subject to much greater vicissitudes of cold and heat than we are at present.

Bibliography. With reference to the chemical constitution of the atmosphere, general summaries of our knowledge will be found in Schmid, *Lehrbuch der Meteorologie* (Jena, 1861); Hann, *Lehrbuch der Meteorologie* (Leipzig, 1913); Ebermayer, *Die Beschaffenheit der Waldluft* (Munich, 1885); Spring and Roland, *Recherches sur l'acide carbonique de l'air* (Brussels, 1886); Letts and Blake, "On the Carbonic-Acid Gas in the Atmosphere," *Memoirs of the Royal Society of Dublin, 1899.* With reference to the absorption and radiation of heat by the atmosphere, consult Langley, "Researches on Solar Heat: A Report of the Expedition to Mount Whitney," in *Professional Papers United States Signal Service,* No. 15 (Washington, 1884); Langley and Abbot, *Annals of the Astro-Physical Observatory,* vols. i–iii (Washington, 1901–13); Flammarion, *L'Atmosphère* (Paris, 1905); Hann, *Lehrbuch der Meteorologie,* 3te Aufl. (Leipzig, 1913).

AT'MOSPHER'IC E'LECTRIC'ITY. Observation shows that the lower atmosphere, with its clouds and rain, or snow and dust, is generally in an electrified state. In November, 1749, Benjamin Franklin argued that lightning is but an immense electric flash, similar to the sparks obtained from electrical machines. On May 10, 1752, Buffon and d'Alibard experimentally confirmed this hypothesis by the use of a lightning-rod near Paris; and in June Franklin himself, by means of a kite raised during a thunderstorm at Philadelphia, was able to draw electric sparks from the clouds and the atmosphere. Since that day an immense number of observations have been made upon the various electric phenomena of the air. Regular observations of atmospheric electricity were originally made either by means of kites carrying insulated wire from the ground up toward the clouds, or more conveniently by means of metal rods insulated from the ground by resin or glass or silk; the upper end of the rod was sometimes pointed, but more properly ended in a sphere; the lower end was connected with a pair of gold-leaf strips, as in the earliest form of electroscope. This apparatus was improved by attaching a slow-burning match or flame at the upper end of the rod. The best of the early forms of apparatus was that of Dellman, in which a brass ball is electrified by induction and afterward its exact condition is determined by applying an electrometer. The modern method devised by Sir William Thomson (Lord Kelvin), about 1860, consists of a reservoir of water, supported on insulating glass pedestals; a small insulated tube leads from the reservoir to some point in the open air, at a distance from the building, and the water flowing through this tube forms a stream that is broken into drops within a few inches of the end of the tube. This constitutes the water-dropping collector. In freezing weather the water must be replaced by a vessel of oil, with wick and flame. The most modern apparatus was suggested by Paulsen. A metal plate has one face coated, electrolytically, with some radio-active substance, preferably ionium. This plate is exposed with its radio-active face down, beneath a metal funnel. Such radio collectors become charged more slowly than good flame and water collectors, and they do not work as well as the latter in light winds. In the water-dropping collector, if the electric potential of the tube and the water at the point where the stream breaks into drops differs from that of the adjacent air, the drops will carry away the positive or negative excess, and soon bring the collector to the same potential as that of the air. The electric condition is observed by measuring, not sparks or currents, but the difference of potential that tends to cause such currents. For brevity, the word "potential" is used to signify difference of potential. The difference of potential between the air and the earth is measured by connecting the ground and the collector to the opposite poles of some form of electrometer, and for this purpose the quadrant electrometer of Kelvin has been most widely used, since it was first introduced at the Kew Observatory in 1861. A modification of all this apparatus has been used in France since 1875, known as Mascart's system, and this apparatus has also been used by the United States Weather Bureau. In 1884 that bureau inaugurated a systematic investigation of this subject by starting observations and studies under the guidance of Professors Rowland at Johns Hopkins and Trowbridge at Harvard University. This work was subsequently placed under the control of Prof. T. C. Mendenhall, whose report was published in the *Memoirs of the National Academy of Sciences,* vol. v (1889). The specific object of this investigation was to determine whether there was any apparent connection between the electrical condition of the atmosphere and the development and progress of storms, so that such observations could be utilized in the improvement of storm and weather predictions, or in drawing lines of equal electric potential on the Daily Weather Map. It was, however, demonstrated that the potential depends so much upon local conditions that observations made in the same neighborhood gave entirely different results, and that it was necessary to learn how to interpret the local record and its oscillations before combining it with records from another station. As it did not seem likely that results of any value in weather forecasting could be secured at present, the further prosecution of the subject was discontinued. The principal work that has been done since 1887 has been that of Elster and Geitel in Germany, Mascart and Chauveau in France, and J. J. Thomson and C. T. R. Wilson in England.

As regards the general phenomena of atmospheric electricity, observations throughout the globe harmonize in showing that, in general, in calm, clear weather a difference of potential exists such that the air is positive and the earth negative; this difference is larger during east and northeast winds in the northern hemisphere, and it oscillates violently during thunderstorms; there are also two daily maxima and two minima; the potential difference is much larger in winter than in summer, except during thunderstorms; the difference increases greatly during falling snow and during strong winds. Lord Kelvin suggests that there may be cloudless masses of air having different charges of electricity floating above and producing the ob-

served changes in potential as they pass by the observer.

As regards the origin of atmospheric electricity, a great number of hypotheses have been advanced and discussed; most of the older ones have been shown to be unsatisfactory, but the newest suggestions are still undergoing discussion, and our knowledge of the whole subject remains in an elementary condition. Perhaps the nearest approach to a plausible explanation is found in the work of J. J. Thomson and C. T. R. Wilson, who have been able to show that when aqueous vapor begins to condense from the air it settles by preference on the particles of dust that have a negative electrical charge, and that a considerable degree of supersaturation is required to make it condense upon those that are positively electrified. It follows that the first formed particles of fog or cloud are negative and are larger and, therefore, heavier; and that they, settling to the earth as rain, give the ground and the lower portion of the atmosphere a negative charge relative to the upper strata of air. This explanation is, perhaps, better than another which has had many adherents, viz., that the earth, being negatively electrified, induces a positive charge in the air. The action of ultra-violet radiations in discharging a negatively electrified body is the same as though they themselves were positively electrified; and this has led to the hypothesis that the radiation from the sun may give a positive charge to the upper layers of the atmosphere. The hypotheses that atmospheric electricity is due to the evaporation of water at the earth's surface, or to the friction of the wind, or to thermo-electric currents, or to the discharge of great volumes of steam through volcanic vents and geysers, must all be given up as insufficient. If it should be found that we must return to the original theory of Peltier that the earth has a negative charge, and that the atmosphere becomes positive by induction, then the most plausible suggestion—but as yet undemonstrated—is that of Clerk Maxwell, viz., that the tidal strains within the earth's crust and the slipping that cause faults and earthquakes give rise to a development of piezo-electricity that has gradually accumulated until the present condition has been attained. This hypothesis connects terrestrial electricity and terrestrial magnetism, and may be considered as a new example of the transformation of energy, since it is equivalent to the daily conversion of a small fraction of the force of gravitation into electricity. Elster and Geitel and Ebert prefer to explain the negative earth-charge by the fact that the solids of the earth's crust select out the negative charges from the highly conductive subterranean and soil air, passing over them as the earth breathes it out. This air is always more or less heavily charged by reason of the radio-active substances now known to abound in the earth's crust. As a result of the absorption the ground-air emerges with a preponderance of positive charges which keep the atmosphere positively charged toward the earth.

For a general summary of our knowledge of atmospheric electricity at the present time, consult Hann, *Lehrbuch der Meteorologie*, 2te Aufl., pp. 546–547 (Leipzig, 1906); H. Mache and E. von Schweidler, *Die atmosphärische Elektrizität* (Braunschweig, 1909); A. Gockel, *Die Luftelektrizität* (Leipzig, 1908). For special memoirs, see Mendenhall, "Report on Atmospheric Electricity," *Memoirs of the National Academy* (Washington, 1889); J. J. Thomson and C. T. R. Wilson, numerous articles in the *London, Edinburgh, and Dublin Philosophical Magazine*, and in the *Proceedings* of the Royal Society of London; Elster and Geitel, numerous memoirs in the *Sitzungsberichte* of the Vienna Academy of Sciences; Elster, a general report published in *Terrestrial Magnetism* (Baltimore, 1900); Gerdiess, articles in the *Physikalische Zeitschrift;* G. C. Simpson, "Atmospheric Electricity in High Latitudes," in the *Philosophical Transactions of the Royal Society* (London, 1905).

ATMOSPHERIC EN'GINE. See Caloric Engine.

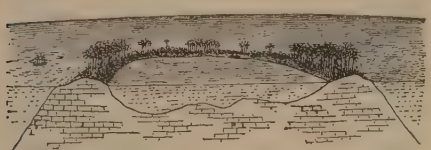
ATMOSPHERIC IN'FLUENCE. Air consists normally of oxygen, nitrogen, water vapor, and carbon dioxide; but owing to the continual decomposition of organic bodies that is taking place in nature, its constituents usually include many other gases, as hydrogen disulphide, sulphur trioxide, etc., which may act chemically on various bodies and thus gradually cause their destruction. The destructive effects of atmospheric electricity and changes of temperature may also be included among the influences that tend to destroy various materials.

Atmospheric influence is conspicuously shown on buildings and other structures that are exposed to the air. The atmosphere of large towns usually contains an excess of carbon-dioxide gas, and, where coal is burned, of sulphur. The resistance of many building materials to atmospheric influence is, however, very great. Granite is regarded as the most stable of building stones. Egyptian porphyry is also remarkably enduring. Basalt disintegrates unequally according to the amount of feldspar that it contains. The durability of slate is in proportion to its density. Sandstone, millstone grit, and conglomerates are affected through the decomposition of the material cementing their particles, or the mechanical effect of moisture, as by freezing. Limestone decays with varying degrees of rapidity. The application of melted paraffin to structures that tend to disintegrate has been found of value in protecting them from decay. A notable example of atmospheric influence is presented by the Egyptian obelisk in Central Park, New York, which had withstood the ravages of centuries in a dry atmosphere, but is rapidly disintegrating in the moist climate of New York. The power of brick, tile, and the like to resist the influence of the atmosphere is dependent on the chemical composition of the material and the amount of burning in their manufacture. If they contain lime, they tend to crack and crumble under moisture. Much care is usually exercised in the proper selection of materials in making cements, and those best adapted to resist atmospheric influence are naturally selected. Wood and timbers are easily influenced, and, when moist and exposed to currents, resulting in rapid evaporation, cracks ensue from shrinkage. The decay of wood is due to the action of micro-organisms which secrete the enzyme cytase. For the protection of wood, ordinary oil paint is the usual preservative. Treatment with special preparations, such as kyanizing, creosoting, and pickling in mineral salts, is also not infrequently resorted to. (See Wood Preserving.) In the case of metals the influence is somewhat complicated by chemical and physical changes. Iron, when exposed to the influence of the atmosphere, absorbs oxygen from the air and becomes rusty or coated with iron

oxide. For its protection, as in the case of bridges, a suitable paint is the most satisfactory preservative. Zinc, when exposed, similarly becomes coated with oxide of zinc, which serves to prevent further oxidation. Copper likewise is soon coated with an oxide that serves as a protecting agent. Glass, which is deficient in silica, deteriorates in consequence of the decomposition of its potassium and sodium silicates. Paintings, statuary, and other works of art, as well as books and manuscripts, readily decay under the influence of the atmosphere. The bindings of books in libraries occasionally disintegrate in consequence of the sulphur that is often contained in illuminating gas.

ATMOSPHERIC RAIL'WAY. See PNEUMATIC DISPATCH.

ATOLL, ȧ-tŏl'. The name given by the Malays to a coral reef which forms an annular island, inclosing a lake of water. Some atolls are nearly 100 miles in circumference, and have from 15 to 60 fathoms of water. They make ex-



CROSS-SECTION AND BIRD'S-EYE VIEW OF AN ATOLL.

cellent harbors, with safe entrances, always on the windward side. Some of the reefs sustain considerable vegetation and are inhabited. See CORAL ISLAND AND CORAL REEF.

AT'OM. See DIVISIBILITY; CHEMISTRY; MOLECULES — MOLECULAR WEIGHTS; ATOMIC WEIGHTS; MATTER.

ATOM, THE HISTORY AND ADVENTURES OF AN. A romance by Smollett (1769), satirizing the English political parties of the day.

ATOM'IC THE'ORY. See CHEMISTRY.

ATOMIC WEIGHTS. If one should weigh out a number of volatile oxygen compounds in such quantities that the volumes occupied by them (under some given pressure and temperature) should be equal to one another as well as to the volume occupied by 2 parts by weight of hydrogen gas, he would find, by analysis, that some of these compounds contain 16 parts of oxygen, others 32 parts of this element, still others 48 parts of it, etc. The number of parts of oxygen in any one of the compounds would be either 16 or some multiple of this number; but in no case less. A similar comparison of the compounds of chlorine would show that they contain either 35.5 parts of this element, or some multiple of 35.5, but in no case less. By extending investigations of this kind to volatile compounds in general, chemists have been able to demonstrate that for every element there is a characteristic number representing the smallest amount of that element capable of existing in a certain fixed quantity of a chemical compound, viz., in a quantity occupying, in the state of vapor, the same volume as 2 parts by weight of hydrogen gas under the same conditions of temperature and pressure. This characteristic number is called the *atomic weight* of the element, and is generally implied in its chemical symbol; thus the symbol Cl stands for 35.5 parts of chlorine, and the symbol O for 16 parts of oxygen. The formula ClO_2, representing an explosive compound of chlorine and oxygen, shows therefore that that compound contains once 35.5 parts of chlorine and twice 16 parts of oxygen; or, briefly, one "atom" of chlorine and two "atoms" of oxygen. The great advantage of using atomic weights as units of measurement for the several elements consists mainly in the fact that it permits of representing by integral numbers (usually small ones) the composition of any chemical compound, and that it therefore greatly simplifies inquiry concerning the similarities and dissimilarities in the chemical nature of material substances.

In analyzing equal volumes of compounds, it was seen above that the amounts of the elements found would represent either their atomic weights or multiples of these. Water would yield 2×1 parts of hydrogen and 16 parts of oxygen; hydrochloric acid, 1 part of hydrogen and 35.5 parts of chlorine; caustic soda, 23 parts of the metal sodium (Na), 16 parts of oxygen, and 1 part of hydrogen; common salt, 23 parts of the metal sodium and 35.5 parts of chlorine, etc. If, in studying these compounds, we analyzed, not equal volumes, but equal weights,—say, 100 parts by weight of each—we should find their composition in the form of percentages as follows: Water, 11.11 per cent of hydrogen and 88.89 per cent of oxygen; hydrochloric acid, 2.74 per cent of hydrogen and 97.26 per cent of chlorine; caustic soda, 57.5 per cent of sodium, 40 per cent of oxygen, and 2.5 per cent of hydrogen; common salt, 39.32 per cent of sodium and 60.68 per cent of chlorine, etc. Of course, to say that water contains 11.11 per cent of hydrogen and 88.89 per cent of oxygen is the same as to say that it contains 2 parts of hydrogen and 16 parts of oxygen. But by comparing the two sets of results just cited it is easy to see that, while the percentage figures have apparently nothing in common with one another, those derived from comparing equal volumes indicate plainly the simple laws according to which the chemical elements are distributed in their compounds.

The reason for choosing the volume occupied by two parts of hydrogen gas as the standard volume for the investigation of compounds is simply this, that by doing so no compound will be found to contain less than 1 part by weight of hydrogen; so that the atomic weight of hydrogen will be 1. If, instead of two, one part of hydrogen gas were chosen as the standard, the atomic weight of hydrogen in its compounds would be found to be one-half, the atomic weight of oxygen would be 8, that of chlorine 17.75, etc. The relative magnitude of the atomic weights would, of course, be the same, but the atomic weight of hydrogen would be one-half. Now, the atomic weight of hydrogen being less than that of any other element, chemists prefer to assign to it the value 1, thus making it the unit with which the atomic weights of the other elements are compared. That by doing so they do not render their results any less general may be readily seen from the fact that the "two parts by weight of hydrogen gas" taken may be 2 grains, 2 grams, 2 pounds, 2 anything.

But why should equal volumes of compounds form their comparable quantities? A plausible answer to this question is furnished by Avogadro's hypothesis, according to which equal volumes of all gases and vapors contain, under the

same conditions of temperature and pressure, equal numbers of molecules. Comparing the composition of equal volumes is consequently tantamount to comparing the composition of single molecules; and that a comparison of molecules should be expected to bring out the laws of chemical composition is clear. The smallest weights of the elements found in equal volumes of compounds represent, evidently, the relative weights of single atoms of the several elements, and this is why those weights are termed "atomic weights." It was the application of Avogadro's hypothesis that first led chemists to compare equal volumes of compounds. The first to demonstrate clearly the advantage of doing so was the French chemist Gerhardt, from whom the modern system of denoting the composition of substances is sometimes called Gerhardt's Notation.

In the above discussion, showing that Avogadro's rule is at the basis of the definition and determination of atomic weights, it was tacitly assumed, for simplicity's sake, that the rule is an equally reliable guide no matter what the equal temperatures and pressures, and no matter what the gas or vapor be. In reality the result of applying the rule to a given gas or vapor under a given set of physical conditions can be of no greater precision than the simple gas laws as applied to that substance under those conditions. From this it might be concluded that Avogadro's rule can only approximately indicate the magnitude of atomic weights, and that their precise values can only be obtained by purely chemical methods. In recent years, however, it has been shown that if the deviations from the simple gas laws are properly taken into account, Avogadro's rule leads to atomic weight values of no less precision than those obtained by the best chemical methods.

The rule directing us to compare equal volumes of compounds in the gaseous state, and thus leading to a knowledge of atomic weights, has been extended also to the state of bodies when dissolved in some solvent. (See MOLECULES—MOLECULAR WEIGHTS.) In case, however, compounds can be neither vaporized without decomposition nor dissolved in any suitable solvent, Avogadro's rule cannot be applied, and then some other principle has to be employed, if in the absence of better material the refractory compound must be used for determining the atomic weight of one of its elements.

Isomorphism. One such principle is based on the general fact that isomorphous compounds, i.e., substances which have about the same crystalline form, usually resemble one another also in their chemical composition. An example may serve to explain how this general fact is made use of for the purpose of determining atomic weights. Suppose the oxide known as alumina were the only compound available for determining the atomic weight of its metal, aluminum. Alumina is neither volatile nor soluble, and hence its molecular weight could not be determined by Avogadro's rule. But it is isomorphous with the oxide of iron, which is known to contain 2 atomic weights of iron to 3 atomic weights of oxygen. Alumina is therefore supposed to have a similar composition, i.e., to be made up of 2 atomic weights of aluminum and 3 atomic weights of oxygen. A chemical analysis would show that alumina contains 53.03 per cent of aluminum and 46.97 per cent of oxygen. Calling the atomic weight of aluminum Al, and remembering that the atomic weight of oxygen is 16, we therefore have:

$$2\,\mathrm{Al} : 3 \times 16 = 53.03 : 46.97.$$

This atomic weight is consequently found to be

$$\mathrm{Al} = \frac{3 \times 16 \times 53.03}{2 \times 46.97} = 27.1-.$$

The Discovery of Dulong and Petit. Dulong and Petit discovered a remarkable fact, which may be stated as follows: When the atomic weight of a solid element is multiplied by its specific heat (i.e., the amount of heat required to raise the temperature one degree), a number is obtained which is nearly the same whichever element is considered. Thus the atomic weight of iron being about 56, and its specific heat 0.1138, the product is about 6.37; again, the atomic weight of zinc being about 65.2, and its specific heat 0.0956, the product is about 6.24. The two products, while not absolutely the same, are nearly equal. Why the products of such different numbers should be about the same is not yet clearly understood. But the fact can nevertheless be used for practical purposes. The mean value of the products corresponding to the several elements is about 6.3. If, therefore, a new element were discovered, and it would be desirable to ascertain roughly its atomic weight, all a chemist would have to do would be to determine its specific heat and divide 6.3 by that quantity. This method of determining atomic weights is especially useful in cases in which there is doubt as to whether the number assigned to an element is its true atomic weight or a multiple of it. The fact discovered by Dulong and Petit can thus be used at least as a check on the atomic weights determined by other methods.

The Periodic Law. The celebrated Russian chemist Mendeléeff demonstrated a remarkable relation between the physical and chemical properties of the elements and their atomic weights. For an account of this relation see PERIODIC LAW. Suffice it to say here that the existence of this relation has definitely proved that the atomic weights at present used by chemists are in the truest sense of the term characteristic of the several elements known, and that it is hardly imaginable that future discovery should show them to be worthless and bring about their abolition. Once established, the Periodic Law has been employed as a check on the accepted atomic weights of the elements, but in a sense somewhat different from the law of Dulong and Petit. In several cases (e.g., in the case of platinum), accepted atomic weights were found to disagree with the general relation established by Mendeléeff. The periodic relation thus indicated that those atomic weights must be somewhat incorrect; and, as a matter of fact, careful re-determination showed them to be so and brought to light their true values.

Atomic Weights referred either to Hydrogen or to Oxygen. Being purely relative quantities, the atomic weights of the elements assume definite values only if referred to some fixed number chosen to represent one of them. Different sets of atomic weights may therefore be obtained by choosing different standards, and one such set is obtained by assigning to the atomic weight of hydrogen the value 1. This standard seemed at one time preferable to any

other, in the light of Prout's hypothesis, according to which the several chemical elements are not really different from one another in substance, but are condensation products of hydrogen. It was consequently expected that careful atomic weight determination would yield integral numbers, if the atomic weight of hydrogen were taken as the unit. Experiment of the highest precision has, however, shown conclusively that while a really remarkable proportion of atomic weights are integral numbers, many of the exactly known atomic weights cannot possibly be represented by commensurable numbers; so that the common derivation of *all* the elements from one of them is extremely improbable, and choosing a "common unit of measurement" for the atomic weights is useless. Nevertheless the choice of a standard need not be altogether arbitrary. The actual determination of atomic weights involves analytical processes in which many of the elements are weighed as oxides, the required atomic weights being calculated from the weights of these and from the atomic weight of the oxygen contained in them. If hydrogen is taken as the standard, the figure for the atomic weight of oxygen, being determined by an analysis of water, cannot be absolutely exact. That error must then enter into all atomic weights calculated from that of oxygen; and every new determination of the atomic weight of oxygen must necessitate a recalculation of all atomic weights based on that of oxygen. To-day chemists obviate this by taking the atomic weight of oxygen itself as the standard. The atomic weights given in the accompanying table are those recommended in 1913 by an international committee representing the chemical societies of the world. Among the names connected with precise determinations of atomic weights, that of Stas is foremost. In recent years Prof. Theodore W. Richards, of Harvard, has carried out a number of determinations of great precision. See also CHEMISTRY; AVOGADRO'S RULE; MOLECULES—MOLECULAR WEIGHTS; PERIODIC LAW. Consult Richards, *Experimentelle Untersuchungen über Atomgewichte* (Hamburg and Leipzig, 1909).

Element	Symbol	Atomic weight
Aluminium	Al	27.1
Antimony	Sb	120.2
Argon	A	39.88
Arsenic	As	74.96
Barium	Ba	137.37
Bismuth	Bi	208.0
Boron	B	11.0
Bromine	Br	79.92
Cadmium	Cd	112.40
Caesium	Cs	132.81
Calcium	Ca	40.07
Carbon	C	12.00
Cerium	Ce	140.25
Chlorine	Cl	35.46
Chromium	Cr	52.0
Cobalt	Co	58.97
Columbium	Cb	93.5
Copper	Cu	63.57
Dysprosium	Dy	162.5
Erbium	Er	167.7
Europium	Eu	152.0
Fluorine	F	19.0
Gadolinium	Gd	157.3
Gallium	Ga	69.9
Germanium	Ge	72.5
Glucinum	Gl	9.1
Gold	Au	197.2
Helium	He	3.99
Hydrogen	H	1.008
Indium	In	114.8
Iodine	I	126.92
Iridium	Ir	193.1
Iron	Fe	55.84
Krypton	Kr	82.92
Lanthanum	La	139.0
Lead	Pb	207.10
Lithium	Li	6.94
Lutecium	Lu	174.0
Magnesium	Mg	24.32
Manganese	Mn	54.93
Mercury	Hg	200.6
Molybdenum	Mo	96.0
Neodymium	Nd	144.3
Neon	Ne	20.2
Nickel	Ni	58.68
Niton (radium emanation)	Nt	222.4
Nitrogen	N	14.01
Osmium	Os	190.9
Oxygen	O	16.00
Palladium	Pd	106.7
Phosphorus	P	31.04
Platinum	Pt	195.2
Potassium	K	39.10
Praseodymium	Pr	140.6
Radium	Ra	226.4
Rhodium	Rh	102.9
Rubidium	Rb	85.45
Ruthenium	Ru	101.7
Samarium	Sa	150.4
Scandium	Sc	44.1
Selenium	Se	79.2
Silicon	Si	28.3
Silver	Ag	107.88
Sodium	Na	23.00
Strontium	Sr	87.63
Sulphur	S	32.07
Tantalum	Ta	181.5
Tellerium	Te	127.5
Terbium	Tb	159.2
Thallium	Tl	204.0
Thorium	Th	232.4
Thulium	Tm	168.5
Tin	Sn	119.0
Titanium	Ti	48.1
Tungsten	W	184.0
Uranium	U	238.5
Vanadium	V	51.0
Xenon	Xe	130.2
Ytterbium (Neoytterbium)	Yb	172.0
Yttrium	Yt	89.0
Zinc	Zn	65.37
Zirconium	Zr	90.6

AT'OMIC'ITY. See VALENCY.

AT'OMISM (Gk. *ἄτομος, atomos*, uncut, indivisible, from *ἀ, a*, priv. + *τέμνειν, temnein*, to cut). The term used in philosophy to designate the theory that the universe is not an organic whole—i.e., a whole constituted of parts each of which is what it is only in virtue of its essential relation to other parts. Atomism maintains that the universe is an aggregate of elements (atoms), each of which has an intrinsic nature, and that this intrinsic nature would remain unchanged even if there were no universe, but merely this single element existing in absolute solitariness. Atomism is often materialistic (see MATERIALISM); but spiritualistic or psychic atomism has also been stoutly maintained (see HUME), and a dualistic atomism is equally possible, and is the ordinary commonsense view, according to which the material universe is composed of irreducible and essentially independent units, while the world of mind is regarded as composed of self-subsistent souls standing only in accidental relations. These souls may further be regarded as composed of perceptions, emotions, etc., co-existent and successive. Recently there has been a significant revival of a kind of atomism in William James's philosophy of "radical empiricism"; James regards the universe as composed of elements which he calls "pure experiences," each "pure experience" being a "comminuted absolute." This view is distinguished from earlier atomisms by its emphatic recognition of relations as being fully as real and as ultimate as qualities. See JAMES, WILLIAM; EMPIRICISM.

Some neo-realists (see REALISM) are also atomistic in their philosophy. For adverse criticism of Hume's atomism, consult Green, *Introduction to Hume*, in Green and Grote's edition of Hume's philosophical works (London, 1874), or in Green, *Works* (London, 1885–86).

AT'OMISTS. See DEMOCRITUS; LEUCIPPUS; EPICURUS.

ATONE'MENT (from *atone*, literally, to be *at one*). The word is used of reconciliation with God, as expressed in the Bible and Christian thought. The underlying conceptions are common to most religions, but no other religion has formulated them into a theory as Christianity. The theory rests on the idea of a connection between an individual man, or a tribe, and a personal deity; of a rupture between man and his God; of the attempt to heal the rupture. The word can only be properly used of a personal deity. The attempt to conform to a law or ideal of life, as in Buddhism and Confucianism, is not atonement in its historic meaning, for there is no broken personal relation to be made right. Any religion which conceives of a personal God, and of that God as displeased with his people, furnishes the ground for some kind of an atonement. This includes most forms of savage religion; the popular forms of Hinduism, with their personal gods, Vishnu, Siva, and others; the Semitic religions; Mohammedanism and Christianity. The universal assumption of primitive religion is that a god is friendly to his worshipers; but soon evils and disasters lead to the thought that the god is sometimes angry and must be propitiated. The attempt is made to win back his favor by gifts, as would be the case with an angry chief. This, though probably not the origin of sacrifice (q.v.), is one of its early uses. It is natural that gifts of great value should be offered. The need of reconciliation led to valuable gifts in two ways: (1) as demanding costly gifts from the worshipers; (2) as demanding gifts valued by the deity. In this way human sacrifices arose, and also fasting, tortures, and mutilations of the worshiper. The Hebrew ritual provided for no atonement for deliberate crimes, only for unwitting offenses, ritual delinquencies, and business dishonesty. The prophetic conception was that God was not reconciled to man by offerings, but by penitence and a righteous life. The New Testament presents no detailed theory of atonement. Paul emphasized the death of Christ as an element of the reconciliation, and the author of Hebrews thought of reconciliation in terms of the sacrifices of the Hebrew ritual, while Jesus himself spoke of giving his life for the world; but the emphasis of his teaching was on the prophetic idea of repentance as the door of approach to God. In the early Church the problem of the relation of Christ's suffering to the reconciliation of man and God received little attention. The person of Christ, rather than the doctrine of the atonement, was the first great question in the history of Christian thought. That Christ paid a ransom for man was a common thought, but to whom, and how it resulted in the salvation of man, were questions answered either crudely or not at all. Some, including Irenæus, Origen, and Augustine, conceived the ransom as given to the devil. Man, by sin, fell into the power of the devil. God, being just even to the prince of injustice, made a bargain with him by which the devil consented to receive Jesus as a ransom for man; but hell could not keep the Holy One of God, and so the devil lost both Jesus and humanity. This mythological tale of trickery made a strong, if not lofty, appeal and was long used, with increasing dramatic effect, in popular explanations of Christianity. The more refined and philosophical minds could not fail to find it degrading. Athanasius voiced the idea that the ransom was given to God. God was pledged to inflict death for the punishment of sin and could save man only by the incarnation and punishment of his Son in man's stead. How and why this should save man was, however, not satisfactorily explained. There have been three great lines of thought on the atonement in Christian theology: (1) judicial; (2) governmental; (3) moral influence. These group further, in that (1) and (2) are objective, conceiving of the sufferings of Christ as having an objective effect on the attitude of God toward man, and (3) is subjective, conceiving that the effect of the atonement is upon man, not upon God. 1. The first great treatise on the atonement was the *Cur Deus Homo* of Anselm (1033–1109). Man owes God perfect obedience; but man has sinned and so robbed God of the homage due to him. Should any one live a perfect life, that would not repair the injury done to the honor of God by past sins. Man must pay the debt, but man cannot. Since the debt is against the Infinite, only an Infinite Being can discharge it; hence the need of the God-man. Christ yielded perfect obedience, but he also gave his life. Justice did not demand death from a sinless being, and so he deserves a reward. But Christ cannot be rewarded, since all things that are the Father's already belong to him. The salvation of men, his human kindred, is therefore given him as a fitting reward. This theory rests upon legal notions of homage and merit (whether Roman or German is still disputed); upon the ideas that sin is infinite, because against an infinite God, and that the entire redemptive work of Christ lies in his death, not in his life. This general type of judicial theory has persisted to this day, sometimes with modifications, in both Catholic and Protestant theology. Other forms of the judicial, or penal, theory arose. Thomas Aquinas held that Christ's perfect obedience actually made complete compensation for sin. The theory of Aquinas has become the orthodox theology of the Catholic church. The same general theory was held by the Protestant reformers. They emphasize, however, not the violation of God's honor, as did Anselm, but of his justice. Frequently retributive justice was regarded as an eternal law, binding the action of God himself, prohibiting the free exercise of divine mercy, and demanding satisfaction before man could be saved. 2. The governmental theory arose from the work of the great Dutch jurist, Hugo Grotius (1583–1645). He set out to defend the orthodox views from the attacks of Socinus, who, assuming from Anselm that the relation of God and man was that of creditor and debtor, held that no objective atonement was necessary, since the love of God could forgive the debt of sin in a penitent soul. Grotius substituted the relation of ruler and subject for creditor and debtor. Sin is a wrong against public law, and law must be vindicated. A ruler may, however, remit a penalty if the law can be

otherwise vindicated. The death of Christ secures this result by showing impressively what sin deserves. It is not the actual punishment, but rather a symbol of punishment. So the purpose of justice is attained, and the love of God may forgive the penitent sinner. In general the Calvinistic theology rejected, and the Arminian accepted, the governmental theory. It affected New England Calvinistic theology, however, till its later representatives, the younger Edwards, President Dwight, Nathaniel Taylor, and the "New School" Presbyterians held firmly to it. It has been characteristic of the less strictly conservative of the schools of Protestant thought. 3. A third general group of theories is known as the moral-influence theory. Its roots, though not its completed form, go back to Duns Scotus (d.1308) (q.v.). He held that, since the will of God is absolute, he might have accepted deeds of love done by an angel, or by a mere man, as the satisfaction for sin, but God chose the gift of his own Son as the most impressive means of arousing love and so winning man back to himself. In modern times the conception of Christ's life and death as God's appeal to man has been very influential. It has been felt that God needed not to be reconciled to man, but man to God. The most effective presentation of this general theory made in America was in the writings of Horace Bushnell. He published three works on the subject, each of which modifies in some measure the positions of the last. His final work, *Forgiveness and Law* (1874), holds that forgiveness is possible only if one suffers on behalf of the offender; that in Christ God himself has done this on behalf of man. These sufferings are the expression of God. The correlative of expression is impression, and this exhibition of the love of God draws men to him. The moral-influence theory, in varying form, has been expressed by Schleiermacher, Nitsch, Rothe, and Ritschl and his followers in Germany; by Vinet, Bouvier, and Auguste Sabatier in French thought; by F. D. Maurice, John Caird, and Jowett in England; and, besides Bushnell, by William N. Clarke and by George B. Stevens among recent writers in America. All three types of atonement are held in modern thought, as is shown by such a book as *The Atonement in Modern Religious Thought* (New York, 1901), where essays from 17 writers are gathered, representing widely varying opinions, all held within the bounds of orthodoxy. For recent discussions, consult Dale, *The Atonement* (London, 1885); Clarke, *Outline of Christian Theology* (New York, 1897); Sabatier, *The Doctrine of the Atonement and its Historical Evolution* (New York, 1904); Tymms, *The Christian Idea of the Atonement* (New York, 1904); Stevens, *The Christian Doctrine of Salvation* (New York, 1905); Burton, J. M. P. and G. B. Smith, *Biblical Ideas of the Atonement* (Chicago, 1909). See CHRISTIAN SCIENCE.

ATONEMENT, OR EXPIATION, DAY OF. A Jewish fast day, occurring on the tenth day of the seventh month (Tishri) and observed as a day of humiliation and supplication. The laws in connection with it are found in Lev. xvi., and in some scattered passages (Ex. xxx. 10; Num. xxix. 7–11), all regarded as of comparatively late origin. (See PENTATEUCH.) It was a day devoted to worship, on which all manner of work was forbidden; abstention from food, from drink, and pleasure commanded; and so long as the temple stood, during the post-exilic period, a long sacrificial service was gone through. The centre of the service was the high priest, who had, according to the Talmudical tradition, to spend the seven preceding days in separation from all persons and in careful study of the duty imposed upon him. On the day of Atonement, dressed in white linen garments (not in the gorgeous dress of his office), he entered the holy of holies and confessed his sins. He then chose two goats and by lot determined which one was to be sacrificed. This one was killed, and its blood sprinkled in front of the veil in the holy of holies. The second one, after the high priest had rested his hands on its head and had confessed the sins of the whole people, was given in charge of trusty men, who led it outside of the city limits, and then one of them released it in the wilderness (Lev. xvi. 10–21). While the biblical ritual for the day contains some evidently ancient features, and while the sanctity of the tenth day of the "sacred" seventh month probably reverts to an early epoch, the institution of the distinctively Jewish Day of Atonement is regarded by many scholars as an outcome of religious conditions during the Babylonian exile. The earliest trace of the biblical ceremonial outside of the Pentateuch is to be found in Ezek. xlv., though his prescriptions for the day are much simpler than those found in Leviticus. With the destruction of the temple and the abolition of sacrifice, the Day of Atonement was changed in one important particular—from being a purely national fast it came to have also an individual side. At present the day is kept by fasting from sunset of the ninth to sunset of the tenth day of Tishri and by services in the evening and all day. An important part of the service is the recital of the service of the temple, as handed down by tradition.

Just as the popular sense of guilt experienced during the Babylonian exile seems to have furnished the conditions favorable for the institution of a great atonement day, so the second destruction of Jerusalem directly contributed not only toward enhancing the importance of the day, but toward giving to it a sombre character relieved only by the consolatory hope of securing, by a strict obedience to elaborate ceremonial regulations, forgiveness of individual sin and the assuagement of divine anger manifested by the loss of national independence. An entire treatise of the Talmud, known as *Yoma* (i.e., 'The Day par excellence'), is devoted to setting forth the ceremonies and ritual for the fast, and despite general laxity prevailing in wide circles, Jews of the most advanced views still observe the day as the most sacred of the year.

Bibliography. On the biblical observances and questions connected with its origin consult: W. Nowack, *Hebräische Archäologie*, vol. ii (Freiburg, 1894); I. Benzinger, *Hebräische Archäologie* (ib., 1894); I. J. Wellhausen, *Prolegomena zur Geschichte Israels* (Berlin, 1899); for the later observances; J. Lightfoot, *The Temple Service*, vol. ii of his Collected Works (London, 1864); A. Edersheim, *The Temple: Its Ministry and Services* (ib., 1894); L. Dembitz, *Jewish Services in Synagogue and Home* (Philadelphia, 1898).

ATOS'SA (Gk. *Ἄτοσσα*, Per. *Atuša*). The daughter of Cyrus, and the wife successively of her brother Cambyses, Smerdis, and Darius,

son of Hystaspis. She is mentioned by Herodotus, and according to one account was killed by her son Xerxes. The name corresponds merely in form to that of Vīshtāspa's wife, Hutaosa, in the *Avesta*. See ZOROASTER.

ATOXYL. Sodium arsanilate. An arsenic compound having the same action as Fowler's solution and said to be many times less poisonous. Koch believed the drug to be a specific for sleeping sickness, and it was for a time much used in that disease as well as in syphilis. It was found, however, to produce atrophy of the optic nerve in some cases and is therefore less frequently employed now than formerly. In syphilis it has been entirely superseded by salvarsan (q.v.).

ATRATO, ȧ-trä'tō. A river of western Colombia, South America, flowing into the Gulf of Darien (Map: Colombia, B 2). It is about 400 miles long, occupying a longitudinal valley just west of the Coastal Cordillera, its bed sloping very gently to the north, its sources high on the western slopes of the Cordillera Occidental. It is navigable for 250 miles. Its sources are not far from those of the San Juan River, which empties into the Pacific, and A. von Humboldt suggested that the two rivers might be utilized in making a canal route between the Atlantic and the Pacific. Survey parties were sent out by the United States in 1857 and 1870; but the reports in both cases were unfavorable, and the canal project was abandoned.

ATREBATES, ȧ-trēb'ȧ-tēz *or* ăt'rē-bā'tēz, or ATREBATII, ăt'rē-bā'shī-ī (Lat.). A people of Belgic Gaul, whose name survives in the name of the old province of Artois. In a confederation against Julius Cæsar they furnished 15,000 troops. There was once a colony of them in Britain, in Berkshire and Wiltshire.

ATREK, ȧ-trĕk'. A river of Persia (Map: Persia, F 2). It rises in the northeastern part of the country, near Kuh Rizeh Mountain (9700 feet), and, flowing west, forms part of the boundary between Russian Central Asia and Persia. It falls into the Caspian Sea, at Hassan-kuli Bay, after a course of over 300 miles.

ATREUS, ā'trōōs (Gk. *Ἀτρεύς*). In Greek legend, son of Pelops and Hippodamia, grandson of Tantalus, and brother of Thyestes. In the *Iliad* there is no trace of the terrible feud between the brothers. This legend develops later, perhaps under the influence of Dorian hostility to the Achæan rulers of the Peloponnesus, and is told in many forms. The main features are as follows: Atreus married Cleola, by whom he was the father of Pleisthenes; his next wife was Aërope, by whom he had Agamemnon and Menelaus; his last wife was Pelopia, daughter of his brother Thyestes. The main story of Atreus begins in blood, he and Thyestes being induced by their mother to kill their step-brother Chrysippus, the son of Pelops and the nymph Axioche. After the murder the perpetrators fled to Mycenæ, where the King, Eurystheus, was their nephew. Eurystheus lost his life in war with the Heraclidæ, and Atreus succeeded him as King of Mycenæ. Thyestes seduced Atreus's wife Aërope and stole the golden lamb which was the gift of Hermes. Atreus expelled Thyestes, who sent Atreus's own son Pleisthenes to kill him (Thyestes had brought Pleisthenes up as his own son); but the father slew the son without recognizing him. Then Atreus prepared a great revenge. Professing to be reconciled to Thyestes, he invited him to Mycenæ, killed the sons of Thyestes, and served them as a banquet for their father. In the midst of the meal Atreus showed the heads and hands to Thyestes, who, struck with horror, cursed the house of Atreus and fled, while the sun turned its face from the scene. Thyestes went to Sicyon, and there found his daughter Pelopia, whom he violated without recognizing her. She was then married to Atreus, who was also ignorant of her parentage. Her child by Thyestes was exposed, but rescued and brought up by Atreus, who named him Ægisthus. Later Atreus sent Agamemnon and Menelaus in search of Thyestes, whom they brought back to Mycenæ; whereupon Atreus imprisoned him and sent Ægisthus to kill him. Ægisthus having been recognized by his real father, Pelopia became aware of the dreadful truth and killed herself, while Ægisthus slew Atreus, who was offering sacrifice on the seashore. In later times the great domed tombs at Mycenæ were pointed out as the treasuries of Atreus and his sons; the largest is still popularly called the "Treasury of Atreus." See ATREUS, TREASURY OF.

ATREUS, TREASURY OF. A famous subterranean structure at Mycenæ, so called on the authority of Pausanias. It is also popularly called the "Tomb of Agamemnon." It is the largest of the vaulted tombs called "bee-hive" tombs from the method of vaulting in which the arch is formed by projecting horizontal layers of stones narrowing to the top. The building consists of a circular chamber, 50 feet wide and high, connected with a small square room, both covered by the material removed in the process of building. It is approached by an entrance passage of masonry, 115 feet long, leading to a deep doorway richly ornamented.

ATRI, ä'trē (anciently, *Hadria*). An episcopal city in the province of Teramo, Italy, 8 miles from the Adriatic and from Mutignano, which is on the Bologna-Brindisi Railway, and 79 miles south of Ancona. The cathedral has interesting frescoes, and a fifteenth-century painting of the Madonna adoring the Child. The campanile is over 200 feet high. There are a few ruins of ancient walls and buildings, and south of the city are grottoes probably once used as prisons. Manufactures include silk, soap, and licorice. Pop. (commune), 1881, 19,642; 1901, 13,488; 1911, 14,043.

ATRIPLEX (Lat., from Gk. *ἀτράφαξυς, atraphaxys*, the orach). The name of a genus of plants of the family Chenopodiaceæ. The species are numerous and are found in nearly all tropical and temperate climates. Many of them are weeds, but a number have come into notice as valuable forage plants for the hot alkali regions of Australia and California. For this purpose *Atriplex semibaccata* and *Atriplex leptocarpa* are among the most promising. They are commonly known as saltbushes, because they grow in saline regions, where no other valuable plant will survive.

ATRIUM (Lat. a hall; literally, dark-room, from *ater*, black, dark, referring to the smoke from the stove or hearthstone. See below). In Roman architecture, the one large apartment of the primitive Italic and Roman house; the general room which served for kitchen, dining room, reception and sleeping room. In it was the hearthstone, and the nuptial couch remained there as a symbol, even after the addition of bedrooms around it. As the Roman house became more sumptuous, small

rooms were multiplied around this central hall, which remained immediately opposite the entrance, and then took the name also of *cavædium*. There were different kinds of atria: (1) the earliest kind, with the solid roof (*atrium testudinatum*); (2) next, the Tuscan atrium (*tuscanicum*), which became the national type before the close of the Republic, with a square opening (*compluvium*) in the centre for admitting light. The roof sloped inward, so that rain water flowed into a basin (*impluvium*) beneath the opening. With the enlargement of house and atrium came (3) the tetrastyle atrium (*tetrastylum*), with four columns supporting the roof around the central opening; and finally, with the further sumptuousness of the times of Cicero and Augustus, came (4) the Corinthian atrium, where the four columns are multiplied into a real colonnade; and in this form the atrium is indistinguishable from a peristyle court, a private cloister. There was another early kind of atrium, used especially for winter apartments, in which the roof slanted upward toward the centre, like our roofs, instead of downward, and shed the water instead of collecting it (*displuviatum*). The patrician and richer equestrian houses of the late Republic and Empire usually had two atria—first, the old-fashioned kind (1; 2), for the transaction of business, and in front of it the shops; and beside and beyond it, the *alæ* and *tablinum;* then a peristyle atrium, with columns, with rooms opening on to it, where the family life was carried on. The later atria were beautifully decorated with frescoes and sculptures, vases and fountains. The best-preserved atria of all kinds are in the houses of Pompeii. The term was also sometimes used of religious or public buildings, in the form of courts, such as the Atrium Vestæ, attached to the house and temple of Vesta, and the Atrium Libertatis, which contained the first library founded in Rome.

In Christian architecture the atrium was a larger columnar or arcaded open court in front of the basilical churches, used for meetings or promenades, and even for *agapæ* and fairs. In the centre stood the fountain for ablutions. In it gathered the penitents who were not allowed in the church. These *atria* went out of use in the early Middle Ages. Those at Parenzo (sixth century), Sant' Ambrogio, Milan (ninth century), San Clemente, Rome (eleventh and twelfth centuries), and in the cathedrals of Capua and Salerno are the best preserved. The Mohammedans adopted the atrium with its fountain as an indispensable feature of all their mosques. In the monastic architecture of the early and Middle Ages the cloister was evidently the atrium moved from the front to the side of the church and reserved for the use of the monks. See CLOISTER.

ATROPATENE, ăt'rō-pă-tē'nē (Gk. Ἀτροπατήνη). The ancient name of the mountainous Persian province of Azerbaijan, or Adarbaijān, to the west of the Caspian Sea. Its name is said to be due to Atropates, whom Alexander placed over the district in 328 B.C. In Pahlavi the name appears as Ataro-patakan. It belonged to the Kingdom of Armenia from 149 B.C. to 428 A.D. The principal city of the province is Tabriz. The second city, Urumiah, on the lake of the same name, is of great antiquity.

ATROPHY (Gk. ἀτροφία, *atrophia*, want of nourishment; from ἀ, *a*, priv. + τροφή, *trophē*, nourishment). A morbid condition of animal or vegetable life, resulting in deficient nutrition and consequent wasting either from disease or disuse. A familiar example is the atrophy of certain groups of muscles in infantile spinal paralysis or cerebral palsies. The term is not applied to the mere withholding of the requisite supply of nutriment, but to the condition produced by various diseases that affect the body. See NUTRITION; DIGESTION, ORGANS OF; DYSPEPSIA; HYPERTROPHY.

ATROPINE (derived from *Atropos*), or DATURINE, $C_{17}H_{23}NO_3$. An alkaloid prepared from the deadly nightshade (*Atropa belladonna*). The plant contains the alkaloid *hyoscyamine*, which is readily converted into atropine on addition of potash to the juice. The atropine thus produced is extracted by shaking the alkaline liquid with chloroform. The chloroform layer is removed and evaporated, leaving a residue which is extracted by means of dilute sulphuric acid and subsequently precipitated with potassium carbonate. The precipitated alkaloid is recrystallized from alcohol. Atropine itself is insoluble in water; its sulphate, however, is readily soluble and is commonly used in medicine to produce dilatation of the pupil of the eye, also as an antispasmodic in whooping cough. It is also used as a remedy for seasickness. It acts as a narcotic, and is exceedingly poisonous, half a grain of it being positively fatal. The symptoms of atropine poisoning are: rapid pulse, dry and flushed skin, dryness of the throat, etc. In cases of atropine poisoning, energetic stimulation of the skin and a hypodermic injection of pilocarpine and stimulants are recommended, after using the stomach pump. The principal physiological effect of atropine is reduction of the excitability, and eventually paralysis of the motor nerves, resulting in inability to move. See BELLADONNA; ALKALOIDS.

ATROPOS (Gk. Ἄτροπος, the unturnable, the undivertible, the inflexible, unbending, from ἀ, *a*, priv. + τρέπειν, *trepein*, to turn). One of the *Moeræ*, or *Parcæ*, the Fates—who severs the thread of man's life. In late art she is represented with a cutting instrument or a pair of scales or a sun-dial. See PARCÆ.

ATRYPA (Gk. holeless, from ἀ, *a*, priv. + τρῦπα, *trypa*, a hole). A name applied by Dalman in 1827 to a group of fossil brachiopods, the shells of which were by him supposed to be without a foramen in beak of the ventral valve. Under the early diagnosis the genus held a large number of species of various internal structure and exterior ornamentation, which ranged throughout all geological formations from the Ordovician to the Cretaceous. More recently the generic term has been restricted to those forms closely allied to the original species, *Atrypa reticularis* of Linnæus, which Dalman used as the type of his genus. The best-known species of the restricted genus is this *Atrypa reticularis*, with its depressed ventral valve and its calcified brachial spires directed toward the centre of the swollen dorsal valve, which species is of interest by reason of its exceedingly long period of existence. It appeared in the earliest Silurian time, and with various modifications, characteristic of particular ages through which it lived, it continued to the end of Devonian time. Its life period is exceeded by that of only one other fossil, *Leptæna rhomboidalis*, and the study of its variations in time and

space is of the greatest interest as affording an excellent example of the manner of evolution of new species; many of its varieties having continued to evolve along distinct lines until they became entirely unlike, in a specific sense, the original form from which they separated. See, for illustration, BRACHIOPODA.

ATSINA. See GROS VENTRE.

ATSUTA, ät-sōō'tä. A town of Japan in the prefecture of Aichi (Map: Japan, E 6). It is situated in the southern part of Honshiu, 4 miles by rail from Nagoya, of which it is practically a suburb. It contains a number of Shinto temples, erected in the seventh century A.D., and modeled after the famous temples of Ise. In one of them is treasured the famous sword which forms part of the Imperial regalia of Japan. Pop. (latest report), 1898, 24,941.

ATTACAPAN. See ATAKAPA.

ATTACHÉ, ä'tä'shā' (Fr. attached). A subordinate or assistant attached to the suite or company of a superior officer. In modern usage the term is practically confined to subordinate members of an embassy or legation. Military and naval attachés are officers of these two services accompanying the diplomatic representative of their country, with a special view to observing conditions and movements of interest to the military or naval administration at home.

ATTACH'MENT (Fr. *attachement*, from *à*, Lat. *ad*, to + Bret. *tach*, Eng. *tack*, a nail). The legal process under which a sheriff or like officer takes a person or property into custody. Also the proceeding under such a process. An attachment against the person was used most frequently, either to compel the appearance of a defendant in an action, or to secure the attendance of a delinquent witness or juror, or to bring before a court one guilty of contempt. It was, and still is, employed in England as a process for the enforcement of decrees or orders in equity. It was rarely so used in common-law actions, because a judgment creditor who resorted to it forfeited his right to go against the debtor's property. In this country the seizure of the person of a debtor in a civil action is made generally under an order of arrest, or an execution against the person. Attachment of the person for contempt of court is common, however, in this country.

The attachment of property is regulated by statute. It is not accorded to the creditor in an ordinary action for the recovery of a debt. To entitle him to this process he must show, generally, that the debtor is a non-resident of the State in which he asks for the process, or has left it with intent to defraud his creditor, or conceals himself or his property with like intent, or that he has removed, or is about to remove, from the State in order to defraud his creditors. In such cases the property is to be attached and taken into the custody of the law, so that it may be applied to the plaintiff's claim, if that is subsequently reduced to a judgment. An attachment is looked upon by our courts as a harsh and extraordinary remedy, one not known to the common law, and as a rule they are disposed to put a strict construction upon the statutes which authorize it. In admiralty, a vessel or other property against which a suit *in rem* has been instituted may be attached when the circumstances would not warrant an attachment in a State court. An attachment is spoken of as *domestic*, when it is employed against the property of a resident of the State in which it issues; as *foreign*, when the owner of the property seized is a non-resident, who evades the personal service of a summons in the action. Consult Drake, *Treatise on the Law of Suits by Attachment in the United States* (Boston, 1891), and the works referred to under ARREST; EXECUTION; FOREIGN ATTACHMENT.

ATTACK' (Fr. *attaque*, the same in derivation as ATTACHMENT). A military operation against an enemy. It may apply to any action which brings one body of troops in battle in contact with another, but is more generally applied to a distinct military operation by which an enemy's position is assailed. Smokeless powder, magazine rifles, machine and rapid-fire guns, improved breech-loading field and horse artillery guns, scientifically trained and more intelligent troops, have practically reduced the method of attack to a science. While there is in every system of tactics a clearly defined outline of "attack formation," its actual order or method will depend altogether on the general character and contour of the ground to be fought over and the military genius of the officer in command. Generally speaking, the attacking infantry force is divided into three bodies—firing line, supports, and reserves. Before the beginning of the actual attack, a reconnaissance is generally made by the cavalry and horse artillery, and the position and strength of the defending forces discovered, together with all other information possible. If the defending forces have been compelled to occupy or have made the mistake of selecting a position which is open to attack on one or both flanks, the attack will be so arranged as to threaten them on the flanks as well as in front, a feint being made to cover the real point of attack, which will be made wherever the defenders develop the greatest weakness. Any commanding eminence will be seized if possible by the attacking force, the heaviest ordnance placed there, and the defenders' position thoroughly shelled. Artillery using "indirect" fire from concealed positions prepares the way for the modern attack, firing over the advancing infantry. Once the infantry is within the artillery zone of fire, or actual contact with the defenders is made, cavalry cease to be much of a direct factor. The necessity frequently arising of reinforcing some distant part of the firing line, however, has, among other causes, brought into existence mounted infantry. (See CAVALRY and MOUNTED INFANTRY.) These troops have the mobility of cavalry, are practically infantry, and can reinforce speedily in circumstances that would be generally impossible to a marching infantry regiment. Mounted infantry, however, is not recognized as a permanent arm of the military service, but is called into being to meet the needs of a particular campaign. Mounted infantry was first employed by General Miles of the United States army. He transformed the fifth infantry into mounted infantry during operations against the Nez Percés Indians.

The extended battle front made necessary by modern arms makes the handling of troops under fire both difficult and dangerous. The firing line is extended, followed by its supports, who are in as close a formation as circumstances will admit, while the reserves are still farther behind. The casualties of the firing line are made up from the supports. In the final charge,

which is made by the firing line, reinforced by the entire supports and whatever of the reserve circumstances have rendered necessary, the defenders' position is rushed with the bayonet. In the event of failure the reserves cover the retreat of the charging line, carrying on the advance if possible, or in any event covering the *point d'appui*. If successful, the reserve force completes the final rout of the defenders, prevents their reorganization, and, assisted by the cavalry (who are harassing the fleeing troops on the flanks and endeavoring to head them off), try to secure their guns, transport, stores, and munitions of war.

The modern attack is the point in which all minor "actions" merge, the successful carrying out of which is frequently the decisive blow of the campaign. The danger and losses incurred in such an undertaking will depend largely on the skill the defenders have shown in their selection of a position, or the extent to which nature has favored them. A recent example is the successful attack on the Spanish lines at Santiago, Cuba, by the American forces under General Shafter, in the Spanish-American War of 1898, an action where the Spaniards had every advantage of position and cover. Examples of good and bad positions may be found in the Anglo-Boer War of 1899–1902. Ladysmith, whose defense was necessary on account of the valuable stores located there, sustained one of the most terrible sieges of modern times. The position (which was forced upon the British General White) was directly under the fire of the Boer artillery, and could have been taken eventually had the Boers been as skillful as they were courageous. The position chosen by the Boers at the battle of Modder River had every possible natural advantage and was very cleverly selected. One of their flanks and their front were protected by a swift-flowing and swollen river, which afforded few if any fording places, while the other flank rested on an impassable range of mountains. Their front also had a practically impregnable character, owing to the steep kopjes. Held by trained troops, the position would have been impregnable, as the British had to advance along an open plain and were exposed to the formidable fire of the Boers. The position was eventually taken, after repeated failures, with terrible losses. The more recent war between the Balkan allies and Turkey presented numerous instances of determined attacks upon fortified places which were defended with fanatical valor. For an account of the influence of modern weapons and tactics upon methods of attack, see narrative of Russo-Japanese War describing Japanese attacks on Port Arthur. See BATTLE; TACTICS, MILITARY.

ATTACK. In music, a technical term meaning the spirit and style with which a performer, singer, or musical organization begins a phrase.

ATTAIN'DER (OF. *ataindre*, to accuse, convict). At common law, the legal extinction of all civil rights as a consequence of a judgment of outlawry for a capital offense, or of a judgment of death for treason or felony. It did not follow upon conviction, but only upon final judgment, for, says Blackstone, "after conviction only, there is still a possibility of the accused's innocence. Something may be offered in arrest of judgment, or the indictment may be quashed, or he may be pardoned, or allowed the benefit of clergy. But when judgment is once pronounced, both law and fact conspire to prove him completely guilty. Then it is clear beyond all dispute that the criminal is no longer fit to live, but is to be exterminated as a monster and a bane to human society, and the law sets a note of infamy upon him, puts him out of its protection, and takes no further care of him than barely to see him executed. All his civil rights are extinct, for by an anticipation of his punishment, he is already dead in law." The first consequence of attainder, therefore, was the forfeiture of all the victim's property. This forfeiture, in the case of lands, related back to the time when the crime was committed, so as to avoid all intermediate sales and incumbrances. In the case of goods and chattels, attainder had no such retroactive effect. But common-law attainder did not stop with the forfeiture of the condemned criminal's estate. It produced "corruption of blood, both upward and downward, so that the attainted person could neither inherit property from his ancestor" nor retain that of which he was in possession, nor transmit it to an heir, nor be the medium through which descent was legally traceable. These consequences of attainder have been modified in England by statute. The forfeiture or escheat of real estate was limited to cases of attainder for treason or murder by 54 Geo. III, chap. 145; and by 33 and 34 Vict., chap. 23, attainder and corruption of blood were abolished, while forfeiture and escheat were limited to judgment of outlawry.

The Constitution of the United States provides that "The Congress shall have power to declare the punishment of treason; but no attainder of treason shall work corruption of blood, or forfeiture, except during the life of the person attainted" (Art. III, Sec. 3). Similar provisions are embodied in some of the State constitutions. In other States, not only the corruption of blood, but all forfeitures of property consequent upon criminal judgments against the owners, are abolished. The United States Supreme Court has declared that the constitutional provision quoted above was introduced for the benefit of the children and heirs alone. It was a declaration that the children should not bear the iniquity of the fathers. Accordingly, if a traitor's property is confiscated by the United States, no interest is left in him that he can convey by deed, and his heirs take the inheritance at his death. Attainder consequent upon legislative enactments will be considered under BILL OF ATTAINDER. Consult: Blackstone, *Commentaries on the Laws of England;* Stephen, *New Commentaries on the Laws of England* (18th ed., London, 1903); and the authorities referred to under CRIMINAL LAW; FORFEITURE; CONSTITUTIONAL LAW.

ATTAINDER, BILL OF. See BILL OF ATTAINDER.

ATTAINT', WRIT OF (for derivation, see ATTAINDER). A proceeding in the nature of an appeal from a judgment entered upon the verdict of a jury. Under this writ a jury of 24 was summoned to determine whether or not the first jury had given a false verdict. As jurors were sworn to find the truth, a finding by the second jury, "made up of knights or other more considerable persons than the first," that the latter had rendered a false verdict, operated not only as a reversal of the verdict, but subjected the attainted jury to severe punishment for perjury. After the right of jurors to return a verdict according to their own consciences was

established by Bushel's case in 1670 (6 State Trials, 99), and motions for new trials came into use, this proceeding was seldom resorted to. In 1757 Lord Mansfield said: "The writ of attaint is now a mere sound in every case." It was abolished in 1825 by Act of Parliament (6 Geo. IV, chap. 50, sec. 60) except as to jurors guilty of embracery. Consult Blackstone, *Commentaries on the Laws of England* (Oxford, 1765–68), and Thayer, "Trial by Jury and its Development" in his *Preliminary Treatise on Evidence at the Common Law* (Boston, 1898).

AT'TALE'A (named from the gorgeousness of its growth; see ATTALUS III). A genus of palms, comprising about 25 species, natives of the tropical parts of South America. They have in general lofty cylindrical smooth stems, but there are some stemless species. The leaves are large and pinnate. The fruit has a dry fibrous husk, inclosing a nut with three cells and three seeds. The leaves of some species are much used for thatching and are woven into hats, mats, etc. The nuts of *Attalea excelsa* and of *Attalea speciosa* are burned to dry the india-rubber obtained from the *Siphonia elastica*, which acquires its black color from their smoke. The leafstalks of *Attalea funifera*, which is found in the southern maritime provinces of Brazil, and there called Piassaba, yield a fibre much used for cordage. The ropes made of it are very strong, and extremely durable in salt water. The Piassaba palm of the northern parts of Brazil, however, is totally different, and much of the Piassaba fibre imported into Great Britain is obtained from it. The fruit of *Attalea funifera*, known by the name of Coquilla nut, is as large as an ostrich's egg and supplies a kind of vegetable ivory used for making umbrella handles, etc. The fruit of *Attalea compta*, the pindóva or indajá palm, is of the size of a goose's egg, and the kernels are eatable. It is a stately and beautiful tree, with a wide-spreading crown. *Attalea cohune* is a native of Honduras, where the oil of its fruits is used for soap making and is exported for the same purpose.

AT'TALI'A (Gk. Ἀτταλία, *Attalia*). A city of ancient Pamphylia, on the south coast of Asia Minor, the modern *Adali*, near what is left of the river Catarrhactes, as it flows into the sea at the head of the Gulf of Adalia. It was founded by Attalus II, King of Pergamum (159–38 B.C.). In Roman times it was an important seaport, being located on the great trade and military route connecting the northwestern districts of Asia Minor with its southern coast. The Apostle Paul sailed from Attalia to Antioch in Syria, on his return from his first missionary journey (Acts xiv. 25). Unlike many of its neighbors, Attalia has maintained its relative importance to the present time.

AT'TALUS (Gk. Ἄτταλος, *Attalos*). Uncle of Cleopatra, the wife of Philip II of Macedon, and general under Philip. At Philip's wedding he insulted Alexander, the son of Olympias, and thereby helped bring about a separation between father and son. After the death of Philip he undertook to oppose Alexander, but was finally killed by the latter's order.

ATTALUS, FLAVIUS PRISCUS. Prefect of Rome under Honorius, and later for one year (409–10) Emperor of the West. He was the first to be raised to that office solely through barbarian influence, being proclaimed by Alaric and his Gothic army after the second surrender of Rome, when Honorius was deposed. The barbarians set Attalus up at Ravenna, whence he sent a message to Honorius commanding him to leave the throne, retire to a desert island, and cut off his feet. But Alaric soon wearied of him, and he was deposed. After Alaric's death Attalus remained with Ataulphus, as a musician, and in 413 helped to celebrate the nuptials of Ataulphus and Placidia. Ataulphus put Attalus forward again as a rival emperor during the insurrection of Jovinus (414), but he was taken prisoner and brought to Honorius, who inflicted on him a part of the sentence he had written for the Roman Emperor; he cut off his thumb and forefinger and banished him to the island of Lipari.

ATTALUS I, called SOTER (269–197 B.C.). King of Pergamum from 241 to 197 B.C. Just before he became king, or in the first year of his reign, he gained a decisive victory over the Galatians, and by 226 B.C. he had made himself master of the whole of Asia Minor west of Mount Taurus. He soon, however, lost most of his conquests. Later he became an ally of Rome against Philip V of Macedon. Attalus was a wise and just ruler and a friend of the arts and sciences.

ATTALUS II, surnamed PHILADELPHUS (220–138 B.C.). King of Pergamum. Before coming to the throne he gained distinction as a brave and able military leader and was on several occasions sent as ambassador to Rome. He succeeded his brother Eumenes, 159 B.C. He founded Philadelphia in Lydia, and Attalia in Pamphylia, and was a generous patron of the arts.

ATTALUS III, called PHILOMETOR (171–133 B.C.). The son of Attalus II and Stratonice, wife of Eumenes II. He was adopted while still a boy by Eumenes. He became King of Pergamum in 138 B.C. As a king he is known to us chiefly for the extravagance of his conduct and the murder of his friends and relatives. On the other hand, he is represented as a dilettante in literature and art. He was sunstruck while supervising the erection of a monument to his mother and died of fever. His will made the Roman people his heirs, whence his name became proverbial for munificence and splendor.

AT'TAR OF RO'SES, or **OTTO OF ROSES.** The volatile oil of the petals of some species of rose. It is a nearly colorless or light yellow crystalline solid at temperatures below 80° F., liquefying a little above that temperature. It is imported from the East, where, in Syria, Persia, India, as well as in Turkey and Bulgaria, roses are cultivated to a considerable extent for the sake of the attar. In recent years it has also been prepared on a considerable scale in the northern European countries. The oil has been obtained from several species of rose. The *Rosa centifolia* is cultivated in western Asia; the *Rosa damascena* is cultivated in Bulgaria. To procure the attar the rose petals are usually distilled with about twice their weight of water, and the distillate is exposed to the cool night air in open vessels, from which the thin film of attar is skimmed with a feather in the morning. One part, by weight, of the oil is obtained from 3000 parts, by weight, of rose petals. Attar is said to have been first procured by what may be called an accidental distillation, rose petals having been exposed with water to

the heat of the sun, and to have been found floating on the surface of the water; and it is still sometimes obtained in India by such a process. It is said to be also obtained by dry distillation of rose petals at a low temperature. During the distillation of rose petals a small quantity of a solid volatile oil comes over (solid oil of roses, see below), which crystallizes and floats on the water in the receiver, and which is sometimes called *English oil of roses*. Attar of roses is not unfrequently adulterated with sandal-wood oil, oil of rhodium, geranium oil, etc. It is much used for making hair oil, a drop of it being enough to impart a pleasant odor to a considerable quantity. It is also used in making lavender water and other perfumes. The odor of attar itself is too powerful to be altogether pleasant. Attar of roses is a mixture of two substances, the one solid at ordinary temperatures and the other liquid. The solid oil of roses (rose camphor, stearoptene of oil of roses) possesses no odor, is insoluble in alcohol, but soluble in ether. It is composed of carbon and hydrogen. The liquid oil of roses, called *rhodinal* (eleoptene of oil of roses), is a very fragrant liquid, to which the attar of roses is indebted for its delicious perfume, and consists of carbon, hydrogen, and oxygen. Its composition is represented by the formula $C_{10}H_{18}O$, and it is believed to be identical with citral. The principal use to which attar of roses is put is as a perfume. Milk of roses and lavender water owe their fragrance to the presence of the attar. A good receipt for oil for the hair is olive oil, colored by alkanet, and scented by a few drops of attar, and this is very generally sold under the name of attar of roses. Medicines are occasionally perfumed by attar of roses, and it is sometimes added to unguents and spirit washes. See PERFUMERY.

ATTAVANTE, ät'tȧ-vän'tȧ (1452–c.1518). A Florentine miniaturist, perhaps the greatest illuminator of the Italian Renaissance. He was born at Castel Fiorentino, of a noble Florentine family. His master in the miniaturist's art is unknown, but he was influenced by contemporary Florentine painters, by Verocchio, and especially by Domenico Ghirlandajo. He passed his life in Florence, where the great book lovers of the day, the Medici, Duke of Urbino and Matthias Corvinus, King of Hungary, vied with each other in the possession of his works. He is last mentioned in 1517 and died soon after that date. His principal works are the illuminations of a missal now in the cathedral of Lyons (1483), another in the Royal Library of Brussels (1485) upon which the stadtholders of the Spanish Netherlands once took oaths of fealty; and Capella, *De Nuptiis Mercurii et philologiæ* (with graceful mythological illustrations) in the library of St. Mark's, Venice. Other great libraries of Italy, especially the Laurentian of Florence, abound in his works, which are also to be found at Vienna and Paris. The cathedrals of Florence and Prato possess beautiful antiphonaries. Although lacking in depth of feeling, Attavante's work is unequaled in beauty of ornament and freshness of color. Consult the articles "Attavante" in Bradley, *A Dictionary of Miniaturists* (London, 1887), and "D'Ancona" in Meyer and Thiemes, *Allgemeines Lexicon der bildenden Künstler*, vol. ii (Leipzig, 1908).

ATTEMPT'. An act, done with intent to commit a crime, and tending, but failing, to effect its commission, is punishable as an attempt to commit that crime. In England it has been held that the act must have been such that, if no interruption had taken place, the intended offense would have been committed, and therefore that one who, with intent to steal, put his hand into another's empty pocket was not guilty of an attempt. Such is not the law in this country. The emptiness of the pocket prevented a theft, but the attempt to commit a theft was complete. See the works mentioned under CRIMINAL LAW.

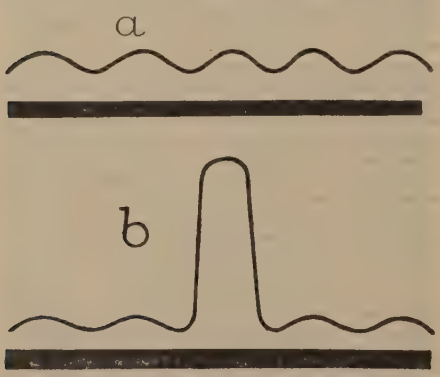
ATTEN'TION (Lat. *ad*, to + *tendere*, to stretch, reach out, to direct one's self, strive). The problem of attention is distinctly a problem of modern psychology. It is, of course, possible, now that the study of attention has been systematically undertaken, and its part problems discriminated, to find the germs of a psychology of attention in the descriptive works of the eighteenth century, to say nothing of still older treatises; just as it is possible, after Darwin, to find the germs of an evolutionary theory of life as far back as the old Greek philosophers. None the less the analysis and measurement of the attentive state are an achievement of the second half of the nineteenth century; and if there were no other justification for the much-abused phrase "the new psychology," we have its sufficient warrant in the addition of this vast area of previously unexplored territory to the psychological domain. Attention, which in the psychologies of the Associationist School, down to and including the monumental works of Bain, is either wholly neglected or passed over with a few general remarks, now forms the subject of a large monographic literature, has a chapter of its own in the text-books of the science, and holds the foremost place in many recent psychological systems.

We shall best understand the nature of the attentive consciousness, and of the problems which it sets for solution, if we set out from a concrete instance. Suppose that the mail brings me the latest popular novel, a book that I have for some time wished to read, and that I have heard constantly discussed by my friends. I know that I ought to work at other things, but I succumb, after a struggle, and sit down to the open book. At first I read hesitatingly and with effort; my neglect of duty still forces itself upon me from time to time, and I find the early chapters of the book difficult to follow. Presently, however, I become interested; later still, I become absorbed, oblivious to everything save the fortunes of the hero and heroine. I read on until the book is finished, and then wake up, almost with a start of surprise, to the business of the real world. What has happened, that is of psychological moment, during this experience?

In the first place, the general state or condition of my whole consciousness has changed. In the older psychologies the phrase "state of consciousness" is used as the equivalent of what is now termed, more correctly, "mental process"; ideas and emotions and desires were referred to as "states of consciousness." What is here meant is something very different. We speak of the "state" of consciousness, in strict usage, in the sense in which we speak of the state of the roads, as good or bad; or of the state of a man's affairs, as flourishing or embarrassed; or of the state of his health, as robust or shattered. Now it is clear that the state or disposition of consciousness, in discursive thought or reverie, differs from its state, understood in

this way, in concentrated attention. In the former case all the ideas which constitute the consciousness are on the same level, of the same mental value; in the latter, some ideas (those held at the focus of attention) are super-eminently "robust" or "flourishing," while the ideas not attended to are depressed, relegated to the background. Here, then, is a matter that requires accurate analysis. Secondly, there is a marked difference of mental experience, as the distracted, thwarted attention with which we begin the reading of the novel passes into the rapt and absorbed interest with which we continue to read. We are attentive in both cases; but if we are to judge by what we "feel," we can hardly give the same name, without qualification, to the two states of consciousness. In other words, there seem to be various forms or kinds of attention. Thirdly, the change of conscious state which comes with the concentration of attention brings with it a characteristic change of bodily attitude. We should all recognize a picture or statue that portrayed the scout (i.e., the attitude of visual attention), or the eavesdropper (the attitude of auditory attention). These attitudes naturally give rise to certain characteristic groups of organic sensation—of sensations from skin and muscle, tendon and joint; and we shall therefore expect to find such sensations playing a constant and important part among the sense processes that form the background of the attentive consciousness.

1. We will take up these topics in order, beginning with attention as a state of consciousness. What are the essential features of the attentive state? (*a*) The ideas attended to are more clear and distinct than the ideas simultaneously present, but neglected by the attention, or, as we may say, attended from. The



a represents an inattentive, and *b*, an attentive consciousness. In *a* are five ideas, all proceeding at equal levels. In *b*, the third idea is being attended to, and the height of its wave is increased, while the other waves are depressed.

processes at the focus of attention are readily discriminated; the ideas of the background are obscure. (*b*) If the ideas attended to are intrinsically weak, they are strengthened or intensified by attention. A faint sound or light is rendered louder or brighter as we attend to it. No such intensification is observable in the case of ideas whose stimuli are intrinsically strong. (*c*) If the ideas attended to are fleeting and transient, they can be lengthened, made more durable, by attention. No such lengthening is observable in the case of ideas whose stimuli are stable and permanent. Lastly, (*d*) the ideas attended to are more valuable for the general mental life than are the ideas attended from; they are more easily and certainly revivable, in memory or imagination. It is a commonplace of education that if we wish a child to remember something, we must make him attend to it. This fourth characteristic is, evidently, of a different order from the three preceding. It is a result or after effect of the others, and more especially of (*a*).

As to the physical basis of these changes in consciousness, it has long been known that certain nervous impulses within the central nervous system have the power of inhibiting or arresting other impulses; thus, excitation of the vagus (pneumogastric, or tenth cranial) nerve inhibits the beating of the heart (Weber). Now we can account for some of our observed phenomena by a theory of inhibition. When, e.g., a weak mental process is strengthened, or a transient process lengthened, we may well suppose that the effect is due, not to any positive reinforcement or temporal extension of the process in question, but simply to the simultaneous arrest of other and conflicting excitations within the nervous system. Attention, that is to say, allows the weak or transient process to come to its full intensive and temporal rights in consciousness by keeping down other nervous impulses whose tendency is still further to weaken or curtail that process. Attempts have been made, in the same way, to explain the growth of clearness and distinctness in the leads attended to by assuming an inhibition of conflicting ideas; so that the clearness of the attentive state would represent the normal or natural clearness of the idea, the clearness which it can attain when its development is not hindered by rival ideas. Physiologists, however, have recently discovered that, just as certain nervous impulses may arrest other impulses, or block paths of nervous discharge, so may certain impulses reinforce others, or open up paths of nervous discharge; the negative fact of inhibition is paralleled by the positive fact of facilitation. There seems to be no reason why we should not avail ourselves of this discovery for our theory of attention. The clearness of the idea attended to would then depend partly upon the arrest of conflicting ideas, but partly also upon an actual enhancement of the focal idea by the reinforcing nervous impulses. Such a view accords better with the observed mental phenomena than does the view which regards all the aspects of the attentive state as symptoms of neural inhibition. On the question of the primary seat of the inhibitory and facilitating impulses, no more can at present be said than that it is, probably, to be sought in the "association centres" of the cerebral cortex. See NERVOUS SYSTEM.

Two special questions arise out of the foregoing discussion. We may ask, in the first place, how long the state of attention continues, for how long a time an idea or group of ideas may remain poised at the apex of conscious clearness. And we may ask, secondly, how large the group of ideas attended to may be; inquiring now into the range of attention, as we have before inquired into its duration. Both questions have been submitted to the test of experiment. It has been found (*a*) that the sensations aroused by "nominal" stimuli, i.e., by stimuli which can hardly be seen or heard or felt, or barely be discriminated from other coexistent stimuli, are

not continuous but intermittent. Suppose that we look attentively at a faint gray patch on a white surface, or listen attentively to the faint hiss of a gas flame. If the attention remains steady, the gray and the hiss (other things being equal) will also remain steadily in consciousness. If, on the other hand, the attention fluctuates, there will be moments when the gray and the hiss undergo a loss of clearness; and since they are, at the best, only just visible and just audible, the loss of clearness will mean a loss of existence: the gray will merge into the white and the hiss will cease to be heard. Now the second alternative is realized. The gray appears, and is washed out, and appears again, at intervals of a few seconds; and so with the sound of the flame. If, then, we may take these results at their face value, attention is intermittent, and a single "pulse" or "wave" of attention lasts for only five or six seconds. It is doubtful, however, whether other things *are* equal, and whether the fluctuation of sensation is not rather due to variation in the state of the sense organ. Opinion is still divided, but the present tendency is toward a peripheral rather than toward a central explanation of the phenomena. The question of the normal duration of attention must therefore be left open. (*b*) The range of attention is most easily determined by the aid of visual stimuli. A number of letters, e.g., chosen at haphazard and set in a space that falls well within the observer's range of vision, are shown upon a screen for so short a time that wandering or roving of the attention from letter to letter is prevented. Under such conditions it is possible to grasp, by a single "act" of attention, some five or six separate impressions. If short and familiar words are exhibited, in place of the mixed letters, some four or five of these will be grasped by the attentive consciousness. The number of discriminable ideas present at the same time with the four or five focal ideas in the background of consciousness cannot, in the nature of things, be accurately ascertained. See CONSCIOUSNESS.

The physical basis of an intermittence of attention might be sought in the mode of functioning of the nerve cell. The cell is said by physiologists to "discharge." We may interpret the term literally, for the nerve cell is a storehouse or reservoir of nervous energy, and gives off this energy when the appropriate stimulus arrives, not continuously or piecemeal, but all at once, by way of explosion. Now an exploded cell must be recharged before it can function again, and the period of recharging may perhaps correspond to the periods of disappearance of the pale gray and the faint hiss of which we have spoken. In explanation of the limited range of attention, we can say no more than that the small group of ideas comprised within it represents the available energy of the total cortex, as directed upon the given stimuli; the fact of limitation must be considered as an ultimate fact of the psychophysical organization.

2. We pass to the question of the various forms or kinds of attention. It may be said at once that there is but one attention. The essential features of the attentive state are, always and everywhere, as we have just described them. The differences between one bit of attentive experience and another are differences, first, in the determination or motivation of attention; and secondly, in the sense processes which are set up by the attentive attitude. We deal now with the determinants of attention. (*a*) There are certain stimuli and forms of stimuli which command our full and immediate attention. Thus, very intensive stimuli compel us to pay regard to them. However interesting our novel may be, we shall start up, automatically and unhesitatingly, if a gun is fired outside of the window of our room. We have no choice but to attend to the sudden, loud sound. Intensity, suddenness, novelty, movement—all these properties of stimuli are attention-compelling. The moving bird that flits across the landscape; the moving voice that rises and falls to the more stationary orchestral accompaniment; the moving stimulus in the field of touch—these things hold our attention whether we will or no. There is good physiological reason for the power of such stimuli, inasmuch as all alike are fitted by their attention-compelling properties to exert a marked influence upon nervous substance. There is also good biological reason for their efficacy. An animal so constituted as to leave unnoticed the sudden and novel and moving features of its surroundings would soon pay the forfeit of its neglect with life. This "primary passive attention," or "involuntary attention," is, then, a heritage from earlier and less secure conditions of living. Our ancestors could not have survived without it, and it persists, ingrained in our nervous constitution, even though in civilized communities the reason for its continuance has largely disappeared. (*b*) This single and masterful determination of attention, however, cannot persist unchanged. The organism grows in complexity; its sense organs multiply. And this means that there may be rival claimants, so to speak, for the favors of attention. Suppose that eye and ear are simultaneously called upon—the eye by a moving object in one direction, the ear by an intensive sound proceeding from a different quarter. There will, evidently, be doubt and conflict, of a piece with the doubt and conflict that are set up by the occurrence of a number of potential motives to selective action. (See ACTION.) Furthermore, as the retrospective functions develop, and the mind is stocked with memories, each of the would-be determinants of attention will form a centre of association; ideas will cluster round it, some to help and some to hinder. So we reach the stage of "active" or "voluntary attention"—the sort of attention that we give to a new game of skill that we are learning, or a new problem that we are seeking to solve. Here the attention is divided; no single set of ideas receives a full measure of it; there is effort and struggle and misdirection of energy. Again, however, attention cannot persist, unchanged, at this level. If the struggle be continued active attention passes, inevitably, into (*c*) "secondary passive attention." Just as the selective action slips back, with repetition, into a secondary reflex, so does active attention presently fall under the exclusive dominance of some one of the rival determinants. We begin the novel voluntarily, in face of conflicting duties. As we read we grow absorbed in the story. What is this "absorption" but a reappearance of primitive attention upon a higher plane of mental development? The attention-compelling property of the successful stimulus is no longer intensity or novelty, but something much more subtle. It is the relation of the stimulus in question to the whole content of consciousness. As soon as our mind is set for the plot of a novel, and all intruding ideas

have been banished, the incidents, as they come, have full sway over us; we are prepared for them, ready to receive them; they fit in with our mental trend and tendency. Every trained mind is thus dominated by the objects which appeal to its training; the poet, by works of the creative imagination; the physician, by the details of a new treatment; the painter, by an effect of color upon the landscape; the zoölogist, by the forms of animal life. We can never transcend the dictates of the primary passive attention; the most absorbed reader, the most abstracted thinker, starts at the sound of the gun. But our intellectual life, when it has reached the stage of achievement, is in the main a life of secondary passive attention. From the educational point of view the stage of active attention is a stage of waste, of non-attainment; mastery comes with secondary passive attention. But then, there is no road to this last save through active attention: work comes before play. The child must be led to work in order that his play, in adult life, may be of the highest possible service to society.

3. Little need be said of the sense processes that are aroused by the bodily attitude of attention, the strains and pressures that come to consciousness from eye or ear, as the attention is visually or auditorily directed. Some psychologists, envisaging attention as a purely motor phenomenon, have laid much stress upon these muscular adjustments; and there can be no doubt that they help to induce and to maintain the attentive state. But while this is true, it seems to be equally certain that the sensations which proceed from the adjustments are merely secondary characteristics of the attentive consciousness. As Kuelpe puts it, they are consecutive, not constitutive. They contribute largely to the experience of effort in active attention. And it is interesting to notice, as Fechner and James have done, the change of direction which this effort undergoes, according as the object of attention belongs to the world of things or to the world of thought. In the former case it is a straining outward; in the latter, a strained retraction or withdrawal inward. Further study of the sensations, however, throws no new light upon the mechanism of attention.

Bibliography. W. James, *Principles of Psychology* (New York, 1890); O. Kuelpe, *Outlines of Psychology* (London, 1909); W. Wundt, *Grundzüge der physiologischen Psychologie* (Leipzig, 1911); Th. Ribot, *La psychologie de l'attention* (Paris, 1889); E. B. Titchener, *Experimental Psychology* (New York, 1901); *Psychology of Feeling at Attention* (New York, 1908). See APPERCEPTION; and (for the relation of attention to affection) WILL. See also PSYCHOLOGICAL APPARATUS.

ATTERBOM, ät'tĕr-bōm, PER DANIEL AMADEUS (1790–1855). A Swedish poet. He was born at Åsbo. As a student he fell under German literary influence, and was a founder of the *Musis Amici*, a student society which, under the name of *Aurora League*, helped to emancipate Swedish literature from the dominance of French academic tradition, through its organs, *Phosphorus* (1810–13), *Poetic Calendar* (1812–22), and *Swedish Literary News* (1813–24). The Aurora League counted among its members S. Hedborn, W. Palmblad, and other men of equal distinction. Broken in health by overstudy, Atterbom visited Germany and Italy in 1817–19, where he met Schelling and Thorwaldsen. On his return he became (1820) instructor to the Crown Prince Oscar, and (1828) professor of philosophy at Upsala. In 1839 he was made Academician. He wrote critical literary essays, *Swedish Seers and Poets* (*Svenska Siare och Skalder*, Upsala, 1841–43); a collection of lyrics, *The Flowers*, in which he introduced the sonnet to Swedish poetry; an unfinished but exquisite fairy drama, *The Blue Bird* (*Fogel Blå*); and the very popular romantic drama, *The Isle of Blessedness* (*Lycksalighetens Ö*, 1823). He possessed rare poetic gifts, but introduced into his verses metaphysical and religious speculation. His *Collected Poems* appeared in 1854–63 and his *Works* in 1859–70.

AT'TERBURY, FRANCIS (1662–1732). Bishop of Rochester. He was born at Middleton Keynes, near Bedford, England, March 6, 1662, and educated at Westminster School, London, from which, in 1680, he passed to Christ Church, Oxford. In 1687 he gave proof of that ready controversial talent which distinguished him through life, in a reply to a pseudonymous attack on Protestantism by Obadiah Walker, Master of University College, under the name Abraham Woodhead, and in the same year received holy orders. In London his rhetorical powers soon won him reputation. He became lecturer of St. Bride's (1691), a royal chaplain, and minister of Bridewell. In 1698 a temporary sensation was created in the learned world by the appearance of the *Hon. Charles Boyle's Examination of Dr. Bentley's Dissertations on the Epistles of Phalaris and the Fables of Æsop*, in which he defended the Epistles, now known to be forgeries. This clever but shallow and malicious performance was in reality composed chiefly by Atterbury, who had been the young gentleman's tutor at Christ Church. In 1700 he distinguished himself in a controversy with Dr. Wake and others regarding the powers and privileges of convocations. Atterbury's zealous and caustic defense of the ecclesiastical against the civil authority procured him the thanks of the lower house of Convocation and the degree of D.D. from Oxford (1701); also the archdeaconry of Taunton. In 1704 he was promoted to the deanery of Carlisle, on which occasion he subjected himself to just obloquy by attempting to procure an alteration in the date of his predecessor's resignation, which happened to interpose a temporary obstacle to his appointment. In 1707 he was made a canon of Exeter; in 1709, preacher at the Rolls Chapel; in 1710 he was chosen prolocutor to the lower house of Convocation, and in the same year he had the chief hand, according to the common belief, in drawing up the famous defense of Dr. Sacheverell; in 1712 he became Dean of Christ Church, where, however, his turbulent and combative spirit had meanwhile involved him in so many controversies that there was no peace until he was removed; in 1713 he was made Bishop of Rochester and Dean of Westminster. It was supposed—not unreasonably—that Atterbury aspired to the primacy; but the death of Queen Anne extinguished his hopes in that direction. His known character and Jacobite leanings made him no favorite with George I. In 1715 he refused to sign the bishops' declaration of fidelity, and some of the most violent protests of the peers against the government measures proceeded from his reckless pen. His deep complicity in a succession of plots for the restora-

tion of the Stuarts brought down upon him at length the charge of treason, and in August, 1722, he was committed to the Tower. A bill of pains and penalties was brought into the House of Commons, and passed in the Lords by a majority of 83 to 43. Atterbury, who had defended himself with great ability, was deprived of all his ecclesiastical offices, incapacitated from holding any civil or spiritual office in the King's dominions, and condemned to perpetual banishment. The people generally considered him a martyr. In June, 1723, he quitted England for France, and after a short stay at Brussels, finally settled at Paris, where he died Feb. 15, 1732. In his exile he maintained a constant correspondence with his friends and took an active part in the abortive conspiracies of the Jacobites. His fame as a writer is founded on his sermons, and his letters to Pope, Swift, and others; as a letter-writer, indeed, he has seldom been surpassed. Consult his *Memoirs and Correspondence*, ed. by F. Williams (London, 1869); his *Life*, by Beeching (London, 1909).

ATTERBURY, William Wallace (1866—). An American railway official, born at New Albany, Ind. He graduated from Yale University in 1886 and in the same year began railway work as an apprentice in the Altoona shops of the Pennsylvania Railroad. He was rapidly promoted, until in 1896 he was appointed general superintendent of motor power on the Pennsylvania lines east of Pittsburgh and Erie. The general management of these lines he undertook in 1903. Six years later he became fifth vice-president of the Pennsylvania Railroad, with special charge of transportation, and then in 1911 fourth vice-president. He was made a member of several learned and scientific societies. In 1913 he served as one of three members of a board of arbitration appointed to adjust firemen's demands.

ATTERSEE, ät'tĕr-zā, or **KAMMERSEE,** kăm'mĕr-zā. A lake in the southwestern part of Upper Austria, situated in long. 13° 30′ E., 1525 feet above the sea. It is over 11 miles long, from 1 to 2 miles in breadth, and occupies an area of 17 square miles. It is surrounded by mountains, and the scenery is remarkable for its picturesqueness. A number of health resorts are situated on the shore. The lake is well stocked with fish. It has been navigable by steamers since 1869.

AT'TESTA'TION (Lat. *ad*, to + *testis*, a witness). The verification in writing of the execution of deeds and wills by witnesses. Hence the clause at the end of these instruments, which immediately precedes the signatures of the witnesses, is called the attestation clause. See Deed; Will; Witness.

ATT'FIELD, John (1835–1911). An English chemist, born in Hertfordshire. He was professor of practical chemistry to the Pharmaceutical Society from 1862 to 1896. He contributed numerous articles on chemical topics to *Brande's Dictionary* and to the *English Cyclopædia;* was co-editor of the *British Pharmacopœia* in 1885 and editor in 1898; he is the author of *A Manual of Chemistry, General, Medical, and Pharmaceutical* (1898), and a large number of scientific papers.

AT'TIC (properly an adjective, from Gk. *Ἀττικός*, meaning 'in the chaste Attic style'). A term in architecture, employed to designate a low story rising above the wall cornice that terminates the main elevation of a building, or a low story at the top of a building. In classic architecture it designates a decorative story above an entablature, as in the case of Roman

TO THE GLORY OF THE AMERICAN NAVY
AND IN GREETING TO OUR ADMIRAL
AGRATEFUL CITY RELYING ON THEIR VALOR
HAS BUILT THIS ARCH MDCCCCXCIX

ATTIC OF THE TEMPORARY DEWEY ARCH, NEW YORK.

triumphal arches, where the dedicatory inscription was in the centre of the attic.

ATTIC. Pertaining to Attica, characteristic of the people of Athens, or Attica. From the preëminence of Athens in Greek literature, from the fifth century B.C., the Attic dialect became the usual literary language and exercised a powerful influence in the *κοινή, koinē*, or "common" form of Greek, which developed after the time of Alexander the Great. In the first and second centuries A.D. a revival of Attic took place among the so-called Atticists, of whom Dionysius of Halicarnassus and Lucian are conspicuous representatives. The tragedians, and perhaps Thucydides, seem to preserve traces of a somewhat older form of Attic dialect than that used by writers of the fourth century B.C. Sophocles was called "the Attic bee," from the sweetness of his compositions; the nightingale was the "Attic bird," because Philomel was the daughter of a king of Athens; Xenophon was styled the "Attic muse" for eloquence in composition. "Attic salt" indicates pungency of wit. In architecture the word is used (*a*) as an adjective to designate a type of base used in the Ionic and sometimes in the Corinthian order, consisting of two tori separated by a scotia (see Molding); (*b*) as a noun, to designate a supplementary story above the main cornice, interposed between it and the roof; and (*c*), in more colloquial usage, either as a noun or adjective, to designate the space within a high-pitched roof, whether used as a garret or divided into habitable rooms.

AT'TICA (Gk. *Ἀττική, Attikē*, earlier, *Ἀκτική, Aktikē*, from *ἀκτή, aktē*, headland, promontory, coastland). The eastern extremity of the mainland of Greece. It forms a triangular peninsula extending to the southeast into the Ægean Sea, washed on the southwest by the Saronic Gulf, and on the northeast by the strait separating it from Eubœa. On the north it is separated from Bœotia by Mount Cithæron (4620 feet) and its eastern continuation, and on the west from Megaris by a low range of hills. The soil of Attica is thin and poor and the supply of water scanty, while the character of the coast, with its numerous harbors and adjacent islands, tended to attract the inhabitants to the sea. The climate and the purity of the air have always been celebrated. Though Attica was always dependent on imported grain, the natural resources were considerable. Mount Pentelicon yielded an abundant supply of fine white marble, and Hymettus blue marble. The silver mines of Lau-

rium, at the southern end of the peninsula, were a valuable property of the Athenian state. The olive was of great importance in Attica; the fig, too, flourished there. Hymettus was famous for its honey. Attica is much broken up by mountain ridges, and there are only two large plains, the Athenian, surrounded by Mounts Hymettus (3370 feet) on the southeast, Pentelicon (3640 feet) on the northeast, Parnes (4634 feet) on the north, and Ægaleos on the west; and the Thriasian, around Eleusis, in the southwestern portion. The principal rivers, the Cephissus and Ilissus, both in the Athenian plain, are mere winter torrents, dry in summer, when no rain falls for four months. In the modern administration Attica forms one of the nomes of Greece.

The ancient Athenians claimed that their ancestors were *autochthones*, "sprung from the soil," and it is certain that Attica does not show the same evidences of invasion that are found in other Greek states. Thucydides declares that Attica had naturally remained in the hands of the same people, since its soil was too infertile, comparatively, to offer attraction to invaders. (See AUTOCHTHONES.) It is also certain that the Athenians were a branch of the Ionic division of Greek-speaking peoples. It seems clear that originally Attica was inhabited by a number of independent clans, bound together in a loose confederacy, which was changed, either by a gradual process or, more probably, by an Athenian king, into a real unity under the lead of Athens. This union was attributed in Athenian legend to Theseus, and was so thoroughly accomplished that the history of Attica is only that of Athens. Eleusis alone seems to have preserved an independent position until a comparatively late date. The villages, or *demes*, were reorganized by Clisthenes (509 B.C.), who divided them among his 10 tribes so that each tribe contained demes from the plains, the mountains, and the coast, thus destroying the last traces of local parties and completing the centralization of the Athenian state. Consult: Curtius and Kaupert, *Karten von Attika* (Berlin, 1881–97); Leake, *The Topography of Athens and the Demi of Attica* (London, 1841); Chr. Wordsworth, *Athens and Attica* (London, 1869); J. G. Frazer, *Pausanias's Description of Greece*, vol. ii, v (London, 1898); E. A. Gardner, *Ancient Athens*, chap. i (New York, 1902). See also ATHENS; ELEUSIS; GREECE; HYMETTUS; MARATHON; PHALERUM; PIRÆUS.

ATTICA. A city in Fountain Co., Ind., 70 miles (direct) northwest of Indianapolis, on the Wabash and the Chicago and Eastern Illinois railroads (Map: Indiana, B 2). It manufactures proprietary medicines, bricks, and bridges. Attica was settled in 1827 and was first incorporated in 1867. It was chartered as a city in 1905 by a general law, which provided for a mayor, elected quadrennially, and a unicameral council. The electric light plant is owned and operated by the municipality. Pop., 1890, 2320; 1900, 3005; 1910, 3335.

ATTIC MUSE, THE. A name given to Xenophon (q.v.), because of his style and because of the appreciation of and enthusiasm for the noble and beautiful which marked his character.

ATTIC SALT (Lat. *Sal Atticum*). A poignant, delicate wit, peculiar to the Athenians. In like phrase, the ruder Roman wit is called *Italian vinegar* (*Acetum Italicum*).

ATTICUS, TITUS POMPONIUS (109–32 B.C.). A Roman litterateur. He was born six years before Cicero. His excellent education, during which he enjoyed the companionship of Torquatus, the younger Marius, and Cicero, developed, at an early age, a love of knowledge, which was increased during his stay in Athens, where he remained many years (86–65), aloof from political distractions. It was through his stay in Athens that he won the cognomen Atticus. After 65, when he returned to Rome, he still devoted himself chiefly to study and the pleasures of friendship, and refused to take any part in political affairs. Yet he was by no means without influence on public matters, as he lived on terms of familiar intercourse with several leading statesmen, regardless of their political leanings, and freely gave his counsel, which was generally sound and wholesome, while it was always benevolent. He was a man of great wealth, having been left a large inheritance by his father and his uncle, which he greatly increased by judicious mercantile speculations. His mode of life was frugal. When he was informed that a disorder under which he was laboring was mortal, he voluntarily starved himself. Among his personal friends Cicero held the first place. The *Annales*, a chronicle of Roman history, written by Atticus, were highly commended by his contemporaries. They were especially valuable on account of containing genealogical histories of the old Roman families. He also wrote a history in Greek of Cicero's consulship. Atticus was one of those men (not uncommon either in ancient or modern times) in whom fine culture and a fortunate social position had highly developed the faculty of good taste. He had no creative genius, but was possessed of such delicate discernment that he could detect the flaw which would have been invisible to Cicero. Every author was anxious to secure his favorable opinion. None of his writings has been preserved. He had a large library and a force of slaves engaged in copying and publishing the writings of his contemporaries, among them Cicero. His biography is found in Cornelius Nepos; and many facts concerning him in Cicero's *Epistles to Atticus*.

ATTICUS HERO'DES, TIBERIUS CLAUDIUS. 1. A rich Athenian who lived at the end of the first and beginning of the second century A.D. His father was found guilty of treason and his property confiscated; but Atticus found a rich treasure in a house, and the Emperor permitted him to keep it. He rose to high honor under Trajan and Hadrian, and was twice Consul. 2. Son of the preceding, born about 101 A.D. at Marathon. Carefully trained by the best teachers, he became a noted rhetorician, and at Rome numbered among his pupils M. Aurelius and L. Verus. In 143 he was Consul, but soon afterward returned to Athens. To the wealth inherited from his father he added by a marriage with Annia Regilla. He spent his money liberally in adorning the city of Athens, where he built a stadium of Pentelic marble, and the Odeum (a music hall), whose ruins still stand to the southwest of the Acropolis, in memory of Regilla. He also built an aqueduct and exedra at Olympia, a stadium at Delphi, a theatre at Corinth, at Thermopylæ arrangements for sulphur baths, and at Canusium in Italy an aqueduct. He contemplated a canal across the Isthmus of Corinth, but gave it up because Nero had tried and failed. He restored several of the partially ruined cities of Greece, where inscriptions testified the public gratitude to him. For

some reasons the Athenians became his enemies, and he left the city for his villa near Marathon, where he died (177). He wrote many works, but nothing of his writing is known to exist.

ATTILA, ăt'tĭ-lâ (Ger. *Etzel;* Hung. *Ethele,* conjectured to have been originally a title of honor). A King of the Huns, the son of Munzuk, a Hun of the royal blood. In 434 A.D. he succeeded his uncle, Roas, as chief of countless hordes scattered over the north of Asia and Europe. His brother, Bleda, or Blödel, who shared with him the supreme authority over all the Huns, was put to death by Attila in 444 or 445. The Huns regarded Attila with superstitious reverence; Christendom held him in superstitious dread, as the "scourge of God." He was believed to be armed with a supernatural sword, which belonged to the Scythian god of war and which must win dominion over the whole world. It is not known when the name "scourge of God" was first applied to Attila. He is said to have received it from a hermit in Gaul. The Huns as a race were regarded in the same light; in an inscription at Aquileia, written a short time before the siege of that city in 452, they are described as *imminentia peccatorum flagella* (the threatening scourges of sinners). The Alani, Ostrogoths, Gepidæ, and many of the Franks fought under his banner, and in a short time his dominion extended over the people of Germany and Scythia—i.e., from the frontiers of Gaul to those of China. In the first years of his reign Honoria, the granddaughter of Theodosius II, because of an intrigue with an officer of the palace, appealed to Attila for help, and offered herself to him in marriage. Though he did not marry her, he used her appeal as one of the grounds of his attacks on the Empire. In 447, after an unsuccessful campaign in Persia and Armenia, he advanced through Illyria and devastated all the countries between the Black Sea and the Mediterranean. Those inhabitants who were not destroyed were compelled to follow in his train. The Emperor Theodosius II collected an army to oppose the inundation of the barbarians, but in three bloody engagements fortune declared against him. Constantinople owed its safety solely to its fortifications and the ignorance of the enemy in the art of besieging; but Thrace, Macedon, and Greece were overrun; 70 flourishing cities were desolated, and Theodosius was compelled to cede a portion of territory south of the Danube, and to pay tribute to the conqueror, after treacherously attempting to murder him. In 451 Attila turned his course to the west, to invade Gaul, but was here boldly confronted by Aëtius, leader of the Romans, and by Theodoric, King of the Visigoths, who compelled him to raise the siege of Orleans. He then retired to Champagne, and in the wide plain of the Marne—called anciently the Catalaunian Fields—waited to meet the enemy. Here the army of the West, under Aëtius and Theodoric, encountered the forces of the Huns. The engagement is known in history as the battle of Châlons. Both armies strove to obtain the hill of moderate height which rises near Mury and commands the field of battle; and after a terrible contest the ranks of the Romans and their allies, the Visigoths, were broken. Attila now regarded victory as certain, when the Gothic prince, Thorismond, immediately after his father had fallen, assumed the command and led on the brave Goths, who were burning to avenge the death of Theodoric. Their charge from the height into the plain was irresistible. On every side the Huns were routed, and Attila with difficulty escaped into his encampment. This, if old historians are to be trusted, must have been the most sanguinary battle ever fought in Europe; for it is stated by contemporaries of Attila that not fewer than 252,000 or 300,000 slain were left on the field. Attila, having retired within his camp of wagons, collected all the wooden shields, saddles, and other baggage into a vast funeral pile, resolving to die in the flames rather than surrender; but by the advice of Aëtius, the Roman general, the Huns were allowed to retreat without much further loss, though they were pursued by the Franks as far as the Rhine. (See AËTIUS.) In the following year Attila recovered his strength and made another incursion into Italy, devastating Aquileia, Milan, Padua, and other cities, and driving the terrified inhabitants into the Alps, the Apennines, and the lagoons of the Adriatic Sea, where they founded Venice. The Roman Emperor was helpless, and Rome itself was saved from destruction only by the personal mediation of Pope Leo I, who visited the dreaded barbarian, and is said to have subdued his ferocity into awe by the apostolic majesty of his mien. This deliverance was regarded as a miracle by the affrighted Romans; and old chroniclers relate that the Apostles Peter and Paul visited the camp of Attila and changed his purpose. By 453, however, Attila appears to have forgotten the visit of the two beatified apostles, for he made preparations for another invasion of Italy, but died of hemorrhage on the night of his marriage with the beautiful Ildiko (or Hilda). His death spread consternation through the host of the Huns. His followers cut themselves with knives, shaved their heads, and prepared to celebrate the funeral rites of their King. It is said that his body was placed in three coffins, the first of gold, the second of silver, and the third of iron; that the caparison of his horses, with his arms and ornaments, was buried with him; and that all the captives who were employed to make his grave were put to death, so that none might betray the resting-place of the King of the Huns.

The Gothic historian Jornandes describes Attila as having the Mongolian characteristics—low stature, a large head, with small, brilliant, deep-seated eyes, and broad shoulders. There can be little doubt that circumstances conspired, in the case of Attila, to give a certain largeness to his barbaric conceptions, which made him a most formidable foe to the civilization of Europe. Consult: Gibbon, *Decline and Fall of the Roman Empire* (London, 1854–55); Thierry, *Histoire d'Attila* (Paris, 1874); *The Cambridge Mediæval History,* vol. i (New York, 1911). See HUNS.

ATTIN. See ATTIS.

ATTIRET, ä'tē'rā', JEAN DENIS (1702–68). A French painter. He was born at Dôle, studied painting in Rome, and at 30 entered the Jesuit Order. He was sent as a missionary to China, where he became court painter to the Emperor Kien Lung, whose military exploits against the Tatars he treated in 16 historical paintings. These were reproduced in France by Cochin in the form of engravings. Attiret painted more than 200 portraits of Chinese court officials and was the founder of a European school of painting at Peking. The title of mandarin was offered to him in 1754 but refused.

AT'TIS, also written **AT'TYS, A'TYS,** and **AT'TIN** (Gk. Ἄττις, Ἄττυς, Ἄτυς, and Ἄττιν).

A Phrygian and Lydian divinity, worshiped in the temple of Cybele in common with this goddess. The myth of Attis is told in various ways. The form of the story given by Ovid (*Fasti*, iv, 223–372) is this: Attis was a beautiful shepherd beloved of Cybele, who imposed upon him the vow of chastity. Having broken his vow, he was made insane by the goddess, in which condition he unmanned himself. When, in consequence thereof, he attempted to kill himself, Cybele changed him into a fir tree, and decreed that henceforth her priests should be eunuchs. The myth represented the successive death and regeneration of nature, due to the changes of the seasons. The cult of Attis was native to Phrygia, but at an early date it spread into other parts of Asia Minor and the Greek islands. Traces of it appear at Athens as early as the fourth century B.C., and it was introduced at Rome, probably in conjunction with the cult of Cybele, in 204 B.C. After the official recognition of the cult by the Emperor Claudius the festival of Attis was celebrated in March with great pomp. The story of Attis is the subject of a remarkable poem by the Roman poet, Catullus. Consult: J. G. Frazer, *Adonis, Attis, Osiris* (1906); G. Showerman, *Great Mother of the Gods* (Madison, Wis., 1901); and the editors of Catullus lxiii, especially R. Ellis.

ATTIUS, ăt'tĭ-ŭs, or **ACCIUS,** ăk'shĭ-ŭs, LUCIUS (c.170–90 B.C.). A Roman tragic poet. He exhibited his first play at the age of 30, continuing from that time till his death his literary labors. He was perhaps the greatest of the Roman tragic writers. He wrote about 40 tragedies, of which only about 750 lines are extant. He composed also *Annales*, mythological histories in hexameter verse, *Didascalia*, a history of Greek and Roman poetry, and a work called *Pragmatica*, treating of literary history. He wrote also on agriculture. The extant fragments are edited by Ribbeck, *Tragicorum Romanorum Fragmenta* (Leipzig, 1897). Consult the monograph by Boissier, *Le poète Attius* (Paris, 1857).

AT'TLEBORO. A town in Bristol Co., Mass., 32 miles southwest of Boston; on the main line and on branches of the New York, New Haven, and Hartford Railroad (Map: Massachusetts, E 4). It comprises several villages and contains a public library, an almshouse, a State armory, and the Attleboro Home Sanitarium. The town manufactures jewelry, buttons, silverware, cotton goods, cotton-goods machinery, yarn, carriages, leather, coffin trimmings, and shuttles. There are also extensive bleacheries and dyehouses, and gold and silver refineries and smelters. The government is administered by annual town meetings. The water works are owned and operated by the municipality. Pop., 1900, 11,335; 1910, 16,215; 1920, 19,731. Settled in 1669, and originally a part of Rehoboth, Attleboro (named from Attleborough, England) was incorporated as a separate town in 1694. Consult J. Daggett, *A Sketch of the History of Attleborough* (Boston, 1894).

ATTLMAYR, ät'tl-mīr, FERDINAND (1829–1906). An Austrian naval expert. He was born at Hall, in the Tyrol, served with distinction in the navy, and in 1866 became professor at the Imperial Naval Academy of Austria. He produced a number of valuable works, principally on naval tactics, among which the following are the most important: *Die Elemente des Internationalen Seerechts* (1872); *Studien über Seetaktik und den Seekrieg* (1878); *Handbuch der Oceanographie und maritimen Meteorologie* (1883); *Ueber maritime Kriegsführung* (1884); *Der Krieg Oesterreichs in der Adria, 1836* (1896); *Ueber Maritime Strategie und Seekriegsrecht* (1901); *Das International Seerecht* (1903–04).

ATTORNEY, ăt-tûr'nĭ (OF. *atorne;* Low Lat. *attornatus*, turned to). A person upon whom authority has been conferred to act for another. If the authority is conferred by a letter or power of attorney, he is called an *attorney in fact*, or an agent (q.v.). If he is authorized by law to represent persons employing him in legal proceedings, he is called an *attorney at law.* In the latter sense it was confined in England, until recently, to lawyers practicing in the common-law courts. Those practicing in equity courts were called solicitors (q.v.), while admiralty lawyers were known as proctors (q.v.). The Judicature Act of 1873 declared that all persons theretofore admitted as attorneys, solicitors, or proctors should be called solicitors of the Supreme Court, and that all persons thereafter admitted should have the same name. Accordingly, attorney at law is an obsolete term in England.

In this country, on the other hand, it is used as the general designation of the practicing lawyer, without regard to the court in which he exercises his functions and without regard to the nature of those functions—whether they are those performed, on the one hand, by the English attorney, solicitor, and proctor, or, on the other, by the barrister (q.v.), counsel, and advocate. The qualifications of an attorney at law and the mode of his admission to the bar are fixed by statutes and by court rules. He is required, generally, to pursue a course of study, either in a law school or in the office of a practicing lawyer, to pass an examination, and to present credentials of a good moral character. His admission is by an order of the court, which has the force of a judicial determination of his fitness and of his authority as an attorney and counselor. Upon this determination he becomes an officer of the court, subject to its control and responsible to it for misconduct. He is not a public official, nor is he the possessor of a mere favor or indulgence, revocable at the pleasure of the court or of the Legislature. The order of the court admitting him as an attorney clothes him with a right which can be taken from him only by a judgment of the court, after an opportunity to be heard, for moral or professional delinquency. As a rule, only citizens who have attained the age of 21 years are admitted to the bar. In some States women are declared ineligible as attorneys at law, but the present tendency in this country is to hold them eligible. It is usual for State and Federal courts to admit to their bar, without an examination or formal certificate of character, persons who have practiced as attorneys of the highest courts of their respective States for three years or more.

Upon admission, the attorney is required to take an oath that he will demean himself, as an attorney and counselor of the court, uprightly and according to law, and that he will support the constitution of the State and of the United States. Toward his client the attorney stands in a fiduciary position. The client confides in him, and he is bound not to betray this confidence, but to observe the utmost good

faith in all matters connected with their relations. Moreover, he is bound to use reasonable care and skill in giving advice to his client and in conducting legal proceedings in his behalf. He is entitled to reimbursement by his client for all proper expenditures on the latter's behalf, and to a fair compensation for his services, in the absence of a special agreement on that point. The better to secure him in this right, the law accords him a lien on the client's papers or property which come into his possession in his professional capacity.

While an attorney is bound to his client to act with all reasonable skill and zeal in advancing the latter's interests, he is also under a duty toward third persons to act lawfully. No amount of zeal in his client's behalf will justify him in engaging, knowingly, in an unlawful act, such, for example, as instituting a suit which he knows is malicious and without probable cause. In conducting a litigation he may take a good deal of latitude; he may say much which is derogatory to the reputation of others; but, in this country, his remarks are not absolutely privileged; they must be pertinent to the subject-matter of the litigation. If they are not pertinent and are defamatory, he will be liable to an action for defamation (q.v.). Consult Weeks, *Treatise on Attorneys and Counselors at Law* (San Francisco, 1892). See BAR; BARRISTER; LAWYER.

Attorney-General. In England the chief law officer of the crown, and, by reason of his office, the titular head of the bar. As the legal adviser of the crown and of the various governmental departments, and as a cabinet minister, he possesses great authority and dignity. His salary is £7000 per annum, and he is not allowed to engage in private practice. The Attorney-General of the United States is the chief law officer of the Federal government and a member of the President's cabinet. His duties are prescribed by statute, and his annual salary is $8000. Each State has a similar officer, as has each crown colony of Great Britain. *Attorney-General to the Prince of Wales* is the officer in whose name the Prince, as Duke of Cornwall, may sue and be sued in matters connected with that duchy.

Attorney, Letter or Power of. An instrument authorizing a person to act as the agent or attorney of the person granting it. A general power authorizes the agent to act generally for the principal. A special power limits the agency to particular things. A power of attorney may be by parol or under seal. The attorney cannot execute a sealed instrument that will bind his principal unless his own power is given under seal. Grants of this nature are very strictly construed. Authority given to one person cannot be delegated by him to another, unless expressly set forth in the original grant. The death of the principal at once cancels a power of attorney. All conditions in the power must be strictly observed to render the attorney's action legal. Consult the works referred to under the title AGENT.

Attorney, Warrant of. The written authority to an attorney at law to appear in a litigation for the maker. The production of such authority is rarely required by the courts. The term is applied also to the written authority given by a debtor to an attorney named by the creditor to confess judgment for the debt. It is often attached to and made part of a promissory note. In some States it renders the note non-negotiable, but in most jurisdictions it does not affect the negotiability of the note.

ATTORNMENT, ăt-tûrn'ment (for derivation, see ATTORNEY). The formal recognition, by a tenant, of the grantee of the freehold as his landlord. This doctrine, which has played an important rôle in the modern law of landlord and tenant, had its almost forgotten origin in the feudal system of land tenure. The intimate character of the relationship of lord and freehold tenant in this system required not only that the lord should choose his own tenant, but the correlative right of the tenant to choose his own lord. The tenant was the first to gain the right to alienate his freehold, and thus to impose upon his lord a tenant, not of the latter's choice (Statute *Quia Emptores*, 18 Edw. I, 1290 A.D.), but the right of the tenant to refuse his assent to the conveyance of the landlord's estate in the premises, and thus to render his grant ineffectual and incomplete, not only continued 400 years longer, but was extended by analogy to the common, non-feudal relations of landlord and tenant. Accordingly, it was the law of England and of the English colonies in America until the Statute of 4 Anne, chap. 16, 1705 A.D., that an owner of lands subject to a lease for life or years could not make an effectual grant of his reversion (q.v.), or estate as landlord, without the assent of the tenant in possession. This assent might be manifested by words, by agreement in writing, by the payment of rent or of a nominal sum, and was called an attornment, or turning to, submission to, the new landlord. Without such attornment the grantee of the reversion was not entitled to the rents and services of the tenancy, nor could he enforce against the tenant any covenant or condition on which the lands were held. The statute above referred to, however, dispensed with the necessity of attornment in all ordinary cases of conveyance of his estate by the landlord, making such conveyance good and effectual from its date, the tenant becoming *ipso facto* tenant of the grantee upon the terms of the existing lease, and such is now the law everywhere in the United States.

Under the old law it was possible for a tenant, by attorning to a stranger, virtually to dispossess, or disseize, his landlord, and thus put him to an action to recover possession of his lands. This extraordinary and wrongful effect of an attornment was also done away with by the Statute of Anne (sec. 10), and the tenant estopped to deny his landlord's title (see ESTOPPEL), unless the attornment be made with the landlord's consent, or in consequence of a judgment or decree of a court, or to a mortgagee after the mortgage has been forfeited. The exceptions are still a part of the law, and, under them, the doctrine of attornment is an important part of the modern law of landlord and tenant. It should be added that, though a tenant is, in the ordinary case of an alienation of the freehold by his landlord, no longer protected by the necessity of making an attornment, he does not become liable on the obligations of his lease to the new landlord until notified of the transfer. Consult: Kent, *Commentaries on American Law* (Boston, 1896); Taylor, *Treatise on the American Law of Landlord and Tenant* (9th ed., Boston, 1904); Tiffany, *The Law of Landlord and Tenant* (St. Paul, 1910). See LANDLORD AND TENANT.

ATTRAC'TION (Lat. *attractio*, a drawing

together, from *ad*, to + *trahere*, to draw). The phenomenon that takes place when two or more bodies belonging to the same system, but separated from contact with one another, tend to approach each other as the result of a condition of stress. Attraction is seen in the case of celestial bodies, the earth and a falling body, electrified bodies, and a magnet and a piece of iron or steel. Gravitational attraction varies as the product of the masses, and inversely as the distance separating them, or, in other words, follows the "Law of Inverse Squares." Attraction is the same in nature as repulsion, but is opposite in direction, the former being considered to be a negative force in that it tends to diminish the distance between the bodies, while the latter is considered positive in that it tends to make this distance greater. It plays an important part in the discussion of many physical phenomena and will be found treated at considerable length in GRAVITATION; ELECTRICITY; MAGNETISM.

AT'TRIBUTE (Lat. *attributum*, from *ad*, to + *tribuere*, to ascribe). 1. In painting and sculpture, a symbol associated with a figure to describe and emphasize its meaning in a religious, mythological, or allegorical sense. No period of art has been without attributes, but they have been most important at times when art has been less able to give character to the figures themselves, so that they can be recognized without the help of the accompanying attributes. The brush is the attribute of the painter; the stylus, of the scribe; the crown, of royalty; wings, of genii and angels. These are class attributes. In mythology the cow is the attribute of Hathor (Egypt); the tiger, of Ishtar (Assyria); the club, of Hercules; the trident, of Poseidon or Neptune (Græco-Roman). In Christian art the gridiron is the attribute of St. Lawrence; the lamb, of St. Agnes; the keys, of St. Peter. Attributes differ from emblems (q.v.) and symbols in having no value apart from their figures. 2. In logic, a mark or quality considered as giving character to an object of thought. (See LOGIC.) It is a term much used in Christian theology to denote some characteristic of the Divine nature, such as omniscience.

ATTRI'TION. See CONTRITION.

ATTU, ät'tōō, or **ATTOO.** The westernmost island of the Aleutian group and of the United States land areas in America, lat. 52° 58′ N., long. 172° 66′ E. (Map: Arctic Regions, A 4). Upon it is a small village, with less than 100 native families. Highest elevation, 3084 feet. Excavations have thrown much light on the material culture of the early Aleuts.

AT'TUCKS, CRISPUS. The first man killed in the "Boston Massacre" (q.v.), March 5, 1770. He was a half-breed Indian, or a mulatto, of Framingham, Mass., born about 1720. By some he is said to have been a quiet on-looker; by others, a ringleader in the disturbance. A monument to him stands on Boston Common. Consult the *American Historical Record* for 1872, and Kidder, *History of the Boston Massacre* (Albany, 1870).

ATTYS. See ATTIS.

AT'WATER, WILBUR OLIN (1844–1907). An American chemist and pioneer in agricultural experiment station work. He was born at Johnsburg, N. Y., and graduated at Wesleyan University, Middletown, Conn., in 1865, received his doctor's degree from Yale University in 1869, and afterward studied physiological and agricultural chemistry at the universities of Leipzig and Berlin. He was professor of chemistry at Tennessee University, at Maine State College, and at Wesleyan University. He organized and was the first director of the pioneer state agricultural experiment station in this country at Wesleyan University in 1875, and was likewise the first director of the Office of Experiment Stations of the United States Department of Agriculture, upon its organization in 1888. In the latter capacity he largely established the policies of the office and its lines of future work, including the founding of *Experiment Station Record* and the first farmers' bulletin. From 1887 to 1902 he was also director of the Storrs (Connecticut) Experiment Station, during which time important studies were made in chemistry and other lines related to agriculture and in human nutrition. In 1894 he became chief of the nutrition investigations of the United States Department of Agriculture, and coöperated with many of the experiment stations and the Carnegie Institution in comprehensive investigations of human nutrition. With Rosa, Benedict, and others he developed special forms of bomb and respiration calorimeters with which exact and fundamental studies of the metabolic changes in the human body were conducted. He wrote a large number of articles on physiological and agricultural chemistry, notably *An Experimental Inquiry Regarding the Nutritive Value of Alcohol*, in vol. viii of the National Academy of Science publications; and the following bulletins of the Office of Experiment Stations of the United States Department of Agriculture: Nos. 21, *Methods and Results of Investigations on the Chemistry and Economy of Food;* 28 (with Woods), *The Chemical Composition of American Food Materials;* 45 (with Langworthy), *A Digest of Metabolism Investigations;* and 44, 63, 69, 109, and 136 (with Benedict et al.), *Experiments in the Metabolism of Matter and Energy in the Human Body.*

AT'WILL, EDWARD ROBERT (1840–1911). An American clergyman. He was born at Red Hook, N. Y.; graduated at Columbia College in 1862 and at the General Theological Seminary, in New York City, in 1864. He entered the ministry of the Protestant Episcopal church, and after service in New York, Vermont, and Ohio, became Bishop of West Missouri in 1890.

AT'WOOD, CHARLES B. (1849–95). An American architect, noted principally as the designer of W. H. Vanderbilt's house on Fifth Avenue, New York, and as Chief of Design of the World's Fair in Chicago, where the Art Building (now the Columbian Museum) and Peristyle Court were his personal work.

ATWOOD, GEORGE (1746–1807). An English mathematician and physicist. He was born in London, and graduated at Trinity College, Cambridge, with high honors in 1769. Subsequently he was appointed fellow and tutor. He received the degree of M.A. in 1772 and was elected a member of the Royal Society in 1776. Through the influence of William Pitt he was appointed to a position in the customs service, where he performed a number of important mathematical calculations connected with the revenue. The apparatus known as Atwood's machine (q.v.) was described in his *Treatise on the Rectilinear Motion and Rotation of Bodies, with a Description of Original Experiments Relative to the Subject* (1784). He also wrote *A Descrip-*

tion of the Experiments Intended to Illustrate a Course of Lectures on the Principles of Natural Philosophy (1776), and *An Analysis of a Course of Lectures on the Principles of Natural Philosophy* (1784), as well as a number of papers on mathematical subjects, published for the most part in the *Philosophical Transactions*. For one of these he received the Copley Medal in 1796.

ATWOOD, Isaac Morgan (1837–1917). A Universalist clergyman, born at Pembroke, N. Y. He became a Universalist minister in 1859 and was the president of the Canton (N. Y.) Theological School and professor of theology from 1879 to 1899. In 1898 he became general superintendent of the denomination in the United States and Canada. His publications embrace: *A Glance at the Religious Progress of the United States* (1874); *Walks about Zion* (1880); *Revelation* (1893); *Balance Sheet of Biblical Criticism* (1896). He edited *The Latest Word of Universalism* (1879); *A System of Christian Doctrines* (1900).

ATWOOD, Julius Walter (1857—). An American clergyman, born at Salisbury, Vt. He was educated at Middlebury College, General Theological Seminary, and the Episcopal Theological School at Cambridge. He was ordained deacon in 1882 and priest in 1883 of the Protestant Episcopal church. He was rector at Ipswich, Mass.; Providence, R. I.; Columbus, Ohio; and Phœnix, Ariz. From 1907 to 1911 he was Archdeacon of the Diocese of Arizona, and in the latter year he was consecrated Bishop of Arizona. In addition to sermons and addresses, he is author of *The Spiritual Influence of John Greenleaf Whittier* (1893).

ATWOOD'S MACHINE. An instrument for illustrating the relations of time, space, and velocity in the motion of a body falling under the action of gravity, invented by George Atwood (q.v.). It is known that a body falling freely passes through 16 feet in the first second, 64 feet in the first two seconds, 144 feet in the first three seconds, and so on. Now, as these spaces are so large, it would require a machine of impracticable size to illustrate the relations just mentioned. The object of Atwood's machine is to reduce the scale on which gravity acts without in any way altering its essential features as an accelerating force. The machine, which may be modified in its actual construction, consists essentially of a pulley, *P* (see the cut), moving on its axis with very little friction, with a fine silk cord passing over it, sustaining two equal cylindrical weights, *p* and *g*, at its extremities. The pulley rests on a graduated wooden pillar, which is placed in a vertical position by leveling screws. Two stages, *A* and *B*, slide along the pillar and can be fixed at any part of it by means of clamps. One of these stages, *A*, has a circular hole cut in it, so as to allow the cylinder, *p*, to pass freely through it; the other is unbroken and intercepts the passage of the weight. A pendulum, chronograph, or other device is used with the machine to measure time. The weight of the cylinders, *p* and *g*, being equal, they have no tendency to rise or fall, but are reduced, as it were, to masses without weight. When a bar is placed on *p*, the motion that ensues is due only to the action of gravity upon it, so that the motion of the whole must be considerably slower than that of the bar falling freely. Suppose, for instance, that *p* and *g* are each 7½ ounces in weight, and that the bar is 1 ounce, the force acting on the system—leaving the friction and inertia of the pulley out of account—would be 1-16 of gravity, or the whole would move only 1 foot in the first second, instead of 16. If the bar be left free to fall, its weight or moving force would bring its own mass through 16 feet the first second; but when placed on *p*, this force is exerted not only on the mass of the bar, but on that of *p* and *g*, which is 15 times greater, so that it has altogether 16 times more matter in the second case to move than in the first, and must, in consequence, move it 16 times more slowly. By a proper adjustment of weights the rate of motion may be made as small as we please, or we can reduce the accelerating force to any fraction of gravity. Suppose the weights to be so adjusted that under the moving force of the bar or circular weight the whole moves through 1 inch in the first second, we may make the following simple experiments: *Experiment I.*—Place the bar on *p*, and put the weight in such a position that the lower surface of the bar shall be horizontally in the same plane as the 0 point of the scale, and fix the stage *A* at 1 inch. When allowed to descend, the bar will accompany the weight, *p*, during 1 second and for 1 inch, when it will be arrested by the stage *A*, after which *p* and *g* will continue to move from the momentum they have acquired in passing through the first inch. Their velocity will now be found to be quite uniform, being 2 inches per second, illustrating the principle that a falling body acquires, at the end of the first second, a velocity per second equal to twice the space it has fallen through. *Experiment II.*—Take, instead of the bar, the circular weight, place the bottom of *p* in a line with the 0 point, and put the stage *B* at 64 inches. Since the weight accompanies *p* throughout its fall, we have in this experiment the same conditions as in the ordinary fall of a body. When released, the bottom of the cylinder, *p*, reaches 1 inch in 1 second, 4 inches in 2 seconds, 9 inches in 3 seconds, 16 inches in 4 seconds, 25 inches in 5 seconds, 49 inches in 7 seconds, and 64 inches and the stage in 8 seconds—showing that the spaces described are as the squares of the times. *Experiment III.*—If the bar be placed as in Experiment I, and the stage *A* be fixed at 4 inches, the bar will accompany the weight, *p*, during 2 seconds, and the velocity acquired in that time by *p* and *g* will be 4 inches per second, or twice what it was before. In the same manner, if the stage *A* be placed at 9, 16, 25, etc. inches, the velocities acquired in falling through these spaces would be respectively 6, 8, 10, etc. inches —2 inches of velocity being acquired in each second of the fall. From this it is manifest that the force under which bodies fall is a uniformly accelerating force, i.e., adds equal increments of velocity in equal times. By means of the bar and the stage *A*, we are thus enabled to

remove the accelerating force from the falling body at any point of its fall and then determine the velocity it has acquired.

Atwood's machine will be found described and explained in almost any treatise on physics, and complete directions for performing the experiments are given in Glazebrook and Shaw's *Practical Physics* (New York, 1893). See GRAVITATION.

A'TYS. See ATTIS.

AUBANEL, ō'bȧ'nĕl', THÉODORE (1829–86). A French author. He was the son of a printer of Avignon and, while following his father's profession, sought, throughout a period of 30 years, to bring about a regeneration of the language and literature of the troubadours of Provence, to which end he long collaborated with Mistral, Roumanille, and other *félibres*. (See FÉLIBRIGE.) He was called by some of his more enthusiastic admirers, "the Petrarch of France." He is best known by his poems *La Miòugrano entreduberto* (Paris, 1860). A drama of his in five acts, entitled *Lou pan dòu pecat*, was performed with great success at Montpellier in 1878. See PROVENÇAL LANGUAGE; PROVENÇAL LITERATURE.

AUBE, ōb. A central department of France, occupying the southern part of the old province of Champagne, and a small portion of Burgundy (Map: France, N., K 4). The eastern part belongs to the basin of the Aube; the western to the basin of the Seine. Area, 2327 square miles. Pop., 1896, 251,435; 1906, 243,670; 1911, 240,755. The climate is mild, moist, and changeable, but on the whole healthful. A great portion of the area is arable land, producing grain, hemp, hay, vegetables, and wine. There are deposits of limestone, marl, and potters' clay. Cotton weaving is the leading manufacture, of which industry the centre is Troyes, the capital.

AUBE. A right tributary of the upper Seine (Map: France, N., J 4). It rises on the plateau of Langres, in the department of Haute-Marne, and falls into the Seine near Pont-sur-Seine, after a course of 154 miles, for a small part of which it is navigable. It is used for the transportation of coal, lumber, and grain.

AUBE, HYACINTHE LAURENT THÉOPHILE (1826–90). A French admiral. He was born at Toulon; entered the navy in 1840; served with distinction in the colonies, and was in charge of some coast defenses during the Franco-German War. In 1879 he was appointed Governor of Martinique, and on his return to France in 1881 was made a rear-admiral. His appointment to the ministry of the navy and to the rank of vice-admiral followed in 1886. Aube was a strong advocate of the torpedo system. He was a voluminous writer, some of his more important works being: *De la marine française* (1873); *La guerre navale et les ports militaires de la France* (1879); *Italie et Levant* (1884); *Marine et colonies* (1885). Most of his writings have been collected under the titles *Entre deux campagnes* and *A terre et à bord*.

AUBÉ, JEAN PAUL (1837–1916). A French sculptor. He was born at Longwy (Meurthe-et-Moselle), and studied with Duret and the elder Dauban at the Ecole des Beaux-Arts. Among the numerous statues and other works executed by him are the following: "Dante Alighieri" (1880), at Paris; "Général Joubert à Rivoli," at Bourges; "Gambetta," in the Place du Carrousel, Paris; "Bailly," a bronze statue in the Luxembourg Garden; a portrait statue, and "France and Russia," a decoration—both in the Luxembourg.

AUBENAS, ōb'nȧs'. A town of France in the department of Ardeche, on an eminence near the river of the same name, 24 miles southwest of Privas (Map: France, S., J 4). In the vicinity are several extinct volcanoes. The town has a fifteenth-century church, a chateau of the thirteenth and sixteenth centuries, and a flourishing trade in silk. Pop., 1901, 8362; 1911, 7206.

AUBER, ō'bȧr', DANIEL FRANÇOIS ESPRIT (1782–1871). A famous French operatic composer. He was born at Caen, Normandy, and died in Paris. His father, an amateur painter and violinist of some note, was a dealer in prints who sent him to England to learn the trade. But his love for music soon asserted itself, and in 1804 he returned to Paris, where his musical compositions soon attracted attention. His concertos for the 'cello and violin were performed with great success by Lamare and Mazas respectively. In 1811 a resetting of an old libretto, *Julie*, to the accompaniment of six stringed instruments, won the admiration of Cherubini at a performance by amateurs. Cherubini then gave Auber instruction in composition, and part of a mass written about this time is preserved as the prayer in *La muette de Portici*. Auber's one-act opera, *Le séjour militaire* (1813), was a dismal failure, and the discouraged composer did not again tempt fortune until his father's death left him without means of livelihood. His next work, *Le testament et les billet-doux* (1819), was not successful, but *La bergère châtelaine* (1820), a comic ŏpera in the Rossinian style, was enthusiastically received, and the composer's fame increased with subsequent works, which followed in rapid succession (over 40 in all) until his very death. *Le maçon* was produced at the Paris Opéra Comique (1825) and is one of the stock pieces of the German opera houses today. *La muette de Portici* (or *Masaniello*, also *Fénella*), 1828, is his most serious opera. The author of sparkling music of the light order here sounded broader and deeper emotions and produced strongly dramatic contrasts. *Fra Diavolo* was performed in 1830 and has remained his most popular work. Other operas that maintained their popularity for almost half a century are: *Le philtre* (1831); *Le cheval de bronze* (1835); *Le domino noir* (1837); *Le lac des fées* (1839); *Les diamants de la couronne* (1841). Although the last-mentioned work was followed by 14 other operas, none of these attained real success. On the contrary, they show a gradual and steady decline of the composer's powers. He was chosen to succeed Gossec at the Academy in 1829, became director of the Conservatoire in 1842, and was appointed court chapel master by Napoleon III in 1857. Auber is deemed the founder of what the French call *grand opéra;* Rossini's *Guillaume Tell* (1829), Halévy's *La juive* (1835), and Meyerbeer's *Robert le diable* (1831) and *Les Hugenots* (1836) show the influence spread by *La muette de Portici*. The formal structure, the musical individualization of conflicting ethnographical or religious elements, the stirring mass-effects, the local color in the orchestra brought to a high state of perfection, and the pageantry of these works, are all derived from Auber. In *opéra comique*, too, Auber occupies a prominent place. For external polish, captivating melody, brilliant orchestration, dash, and Parisian chic, his music re-

mains unexcelled. Consult A. Kohut, *Auber* (Leipzig, 1895), and C. Malherbe, *Auber, biographie critique* (Paris, 1911).

AUBERGE ROUGE, L', lō'bârzh'rōōzh ('The Red Inn'). A striking psychical romance by Balzac (1831), based on the psychic suggestion of a murder, for which the suggester is executed while the actual murderer enjoys the fruits of the crime. The story involves the questions of comparative guilt and innocence, atonement, and the proper use of the wealth gained by the wrong-doing.

AUBERLEN, ou'bĕr-len, KARL AUGUST (1824–64). A German theologian. He was born at Fellbach, near Stuttgart, studied at Tübingen, and became professor of theology at Basel in 1851. As a youth he was influenced by Baur, but later he adopted the conservative views of Beck and Rothe. He is still remembered by his *Prophecies of Daniel and the Revelation of St. John, viewed in their Mutual Relation; with an Exposition of the Principal Passages* (Basel, 1854; 2d ed., 1857; Eng. trans., Edinburgh, 1856); *The Divine Revelation, An Essay in Defense of the Faith* (2 vols., Basel, 1862–64; Eng. trans. of vol. i, 1867); "The Old Testament Dispensation and the Heathen World"; "The Resurrection and Ascension of Jesus Christ" (lectures) in the volume entitled in English *Foundations of Our Faith* (1862; Eng. trans., 1863; 2d ed., 1868), and his commentary on Thessalonians in Lange (Bielefeld, 1864; Eng. trans., 1868). The English translation of the *Divine Revelation* contains a brief memoir.

AUBERT, ô'bâr', JEAN LOUIS (1731–1814). A French author, born at Paris. He first attracted attention by his *Fables*, which were published in the *Mercure de France* and favorably regarded by Voltaire. He was professor of French literature at the Collège Royal from 1773 to 1784, and from 1774 to 1786 editor of the *Gazette de France*. He was one of the leading journalists of his time. His works were collected as *Fables et œuvres diverses* (1774).

AUBERT, LOUIS FRANÇOIS MARIE (1877—). A French composer. He was born Feb. 15, 1877, at Parame. His musical talent manifested itself very early and was carefully cultivated by his artistic parents. At the age of nine he entered the Conservatory at Paris, where he studied the piano under Diemer and Fauré, and composition under Lavignac. His musical style is strongly influenced by Debussy. He wrote several collections of songs, a Fantaisie for piano and orchestra (1901), and an opera, *La Forêt Bleue* (1906), which was produced in America by the Boston Opera Company (1913).

AUBERVILLERS, ô'bâr'vē'yâ'. One of the northern suburbs of Paris (Map: Paris and vicinity). There are manufactures of chemical products, glass, rubber, perfumes, and beer. In 1905 was erected here the large Hospital Claude-Bernard, for contagious diseases. Pop., 1896, 27,000; 1906, 34,000; 1911, 37,558.

AUBIGNAC, ô'bē'nyâk', FRANÇOIS, ABBÉ D' (1604–76). A French dramatist and critic, born in Paris. His real name was Hédelin, but he is better known as the Abbé d'Aubignac, from the abbey conferred on him by Richelieu. He was chosen by Richelieu to be the tutor of his nephew, but is described as having been excessively pedantic and conceited. Chief among his compositions are a prose tragedy, called *Zénobie*, and a tedious work on the *Pratique du théâtre*, based on Aristotle. He was one of the first to raise the modern question in regard to the authorship of the Homeric poems.

AUBIGNÉ, ô'bē'nyâ', THÉODORE AGRIPPA D' (1552–1630). A French Huguenot soldier, militant poet, historian, and statesman. He was born near the town of Pons in Saintonge. As a child he was a brilliant classical scholar. He early embraced the Huguenot cause, was captured, condemned to death, escaped, and in 1563 was present at the siege of Orleans, where his father was killed. His guardian sent him to Geneva to escape persecution. He studied under Beza, but in 1567 enlisted under Condé, and later served Henry of Navarre as soldier and sometimes over-candid counselor. After Henry's assassination Aubigné fell into disfavor and in 1620 sought refuge at Geneva, whence he superintended the fortifications of Bern and Basel. In spite of his storm-tossed life, he had found time to produce much of value to literature and to contemporary history. His *Histoire universelle, 1550–1601*, published at Amsterdam (1616–20), was officially burned in France, as was also his autobiographical *Histoire secrète*, on its appearance in 1731. These are very valuable, but bitterly satirical, as is his controversial *Confession catholique du Sieur de Sancy* and *Les aventures du baron de Fœneste* (1617), one of the earliest realistic novels of the seventeenth century. His greatest work, begun while recovering from a wound (1577), is a group of satirical poems, *Les tragiques* (1616), which are sombre and unexcelled descriptions of the horrors of religious warfare. They are divided into "The Miseries," "The Princes," "The Gilded Chamber" (i.e., the courts), "The Fires," "The Words," "The Vengeances," and "The Judgment," where the Huguenot, oppressed on earth, cites his persecutor before the bar of God at the Resurrection. The 9000 verses are a strange mingling of beauty and chaos, often reckless, sometimes obscure, but with passages of a fierce inspiration, a brilliant imaginative enthusiasm, that have earned immortality, both for their own sake, as the noble utterance of an offended conscience, and as a true expression of the faith, courage, restless searching of spirit, presumption, and pride, that characterized the movement in which he bore a conspicuous part. He is a striking figure, writing with the style of Rabelais and the spirit of Henri Estienne (see STEPHANUS) in the days of Malherbe and Richelieu, without elegance, clearness, precision, or composition, but with the energy born of the Renaissance and the Reformation. An almost universal scholar in the learning of his time, Aubigné was never a pedant. For that he was too sincere, intense, earnest; and, even in bitterness, he strove to be just. Thus his History presents the mind of his epoch, even when it distorts the facts. His complete *Works* have been edited by Réaume and Caussade, 6 vols. (1873–93), the *Tragiques* by Lalanne (1857) and Reade (1872); *Histoire universelle*, by Ruble (1886–97). Consult: Morillot, *Discours sur la vie et les œuvres d'Agrippa d'Aubigné* (Paris, 1885); Salis, *Agrippa d'Aubigné* (Heidelberg, 1885), and a *Life* in French by G. Guizot, *Agrippa d'Aubigné* (Paris, 1890); also Macdowell, "Agrippa d'Aubigné" in *Henry of Guise and other Portraits* (New York, 1898), and Rocherblave, *Agrippa d'Aubigné* (Paris, 1910); id., *La vie d'un Héros* (ib., 1913).

AUBIGNÉ, MERLE D'. See MERLE D'AUBIGNÉ.

AUBIN, ô'băn'. A town of France in the department of Aveyron, on the Orleans Railway (Map: France S., G 4). There are extensive coal and iron mines in the vicinity, and the town contains an old church, dating from the twelfth century, and a ruined castle. Pop., 1896 (of commune), 9781; 1901, 9973; 1906, 9986; 1911, 9574.

AUBREY, ą'brĭ, JOHN (1626–97). An English antiquary. He was a diligent collector of old documents and left some valuable works of his own. He published only one book, called *Miscellanies* (1696; 5th ed., 1890), but several of his works were afterward edited and published by others. Among these were *Natural History and Antiquities of Surrey* (1719) and *Letters written by Eminent Persons of the Seventeenth and Eighteenth Centuries* (1813). The latter gives much biographical matter concerning English poets. Consult his biography, by J. Britton (London, 1845), and the essay of Professor Masson in the British *Quarterly Review*, vol. xxiv (London, 1857).

AUBRIOT, ô'brē'ô', HUGUES (d. 1382). A mayor of Paris. He was born at Dijon; was appointed Treasurer under Charles V and afterward became mayor and Governor of Paris (1364), in which capacity he organized several of the greatest public works of the city. He laid the corner stone of the Bastile, built Le Petit Châtelet, the Pont Saint-Michel, and several quays along the Seine, and completed the fortifications begun by Etienne Marcel. After the death of Charles V he was accused of heresy and sentenced to perpetual captivity in the Bastile, but was liberated by the Mailletons soon afterward. His statue adorns the façade of the Hôtel de Ville in Paris. Consult Eugène Déprez, *Hugo Aubriot, Præpositus Parisiensis et Urfanus Prætor, 1367–81* (Paris, 1902).

AUBRY, ô'brē', CHARLES MARIE BARBE ANTOINE (1803–83). A French jurist, born at Zabern, Alsace. He was assistant judge of the tribunal at Strassburg in 1870, and councilor of the Court of Cassation in Paris from 1872 to 1878. He became a commander of the Legion of Honor in 1878. He was one of the most highly esteemed French writers on jurisprudence of his century and was widely known also for his articles on legislation and a translation of Goethe's *Faust*. His principal work is the *Cours de droit civil français, d'après la méthode de Zachariæ*, 8 vols. (Paris, 1869–76).

AUBRY DE MONTDIDIER, ô'brē' *de* mon'dē'dyā'. A French knight who lived during the reign of Charles V, and, according to tradition, was assassinated in the forest of Bondy by his comrade, Richard de Macaire, in 1371. The latter was suspected of the crime because the dog belonging to the deceased Aubry invariably displayed toward him the most unappeasable enmity. Macaire was therefore required by the King to fight with the animal in a judicial combat, which was fatal to the murderer. This tale was afterward, under the titles of *Aubry's Dog, The Wood of Bondy, The Dog of Montargis*, frequently acted, the dog always gaining the greatest share of applause. It was called *The Dog of Montargis*, because Charles VIII had the fight between the dog and Macaire depicted over a mantel in his chateau of Montargis. As late as 1816 a melodrama based on the legend found great favor on the European stage. After being performed with success at Vienna and Berlin, it was to be played at the Weimar theatre of which Goethe was the manager; but the poet resigned his office before the dog made his début. Consult Guessard, *Macaire* (Paris, 1866).

AUBURN, ą'bûrn. A town in Lee Co., Ala., 59 miles east by north of Montgomery, on the Western Railway of Alabama (Map: Alabama, D 3). It is the seat of the Alabama Polytechnic Institute, opened in 1872, and has a Carnegie library. Pop., 1890, 1440; 1900, 1447; 1910, 1408.

AUBURN. A city, and the county-seat of Placer Co., Cal., about 36 miles northeast of Sacramento, on the Southern Pacific Railroad (Map: California, D 4). It contains a library, and a county high school. Gold, granite, potters' clay, and limestone are found in the adjacent region; mining, fruit growing, and general agriculture are the leading industries. Auburn was first settled in 1848. Pop., 1900, 2050; 1910, 2376.

AUBURN. A city, and the county-seat of De Kalb Co., Ind., 23 miles by rail north by east of Fort Wayne; on Cedar Creek, and on the Vandalia, the Lake Shore and Michigan Southern, and the Baltimore and Ohio railroads, Fort Wayne and Northwestern Railway Company (Map: Indiana, D 1). It carries on a trade in grain, live stock, hay, onions, etc.; and manufactures carriages and wagons, automobiles, cycle cars, brass, ice, clothing, handles, buggy-bodies, excelsior, lumber, gas engines, windmills, etc. The county buildings and the Eckhart public library, the Y. M. C. A. building, and City Hall are the principal features of interest. There are municipal water works and electric light plant. Pop., 1890, 2415; 1900, 3396; 1910, 3919.

AUBURN. A city, and the county-seat of Androscoggin Co., Maine, 34 miles north of Portland, on the Maine Central, and Grand Trunk railroads (Map: Maine, B 4). It has extensive manufactures of lumber, boots and shoes, boxes, and cotton goods, abundant water power being supplied by the Androscoggin and Little Androscoggin rivers. The city has a public library and owns and operates its water works. In the vicinity are many points of interest, notably Lewiston Falls, Lake Auburn, and Poland Springs. Auburn was settled in 1786 and first incorporated in 1842. The charter of 1869 provides for a mayor, elected annually, and a bicameral council, which controls all important appointive offices. Pop., 1890, 11,250; 1900, 12,951; 1910, 15,064; 1920, 16,985.

AUBURN. A city, and the county-seat of Nemaha Co., Neb., 74 miles south of Omaha, on the Chicago, Burlington, and Quincy and the Missouri Pacific railroads, and on the Nemaha River (Map: Nebraska, J 4). The city is in a fertile agricultural region and has fruit and corn canning industries. The water works and city-lighting system are owned by the municipality. Pop., 1900, 2664; 1910, 2729.

AUBURN. A city, and the county-seat of Cayuga Co., N. Y., 26 miles southwest of Syracuse, on the New York Central, the Lehigh Valley, and the New York, Auburn, and Lansing railroads; and on the outlet of Owasco Lake (Map: New York, D 5). It has good water power and extensive manufactures of agricultural implements, woolen goods, carpets, iron, shoes, engines, pianos, rope, etc. Auburn is the seat of the Auburn Theological Seminary (Presbyterian) (q.v.), incorporated in 1820; of a State prison, a large stone structure with provision for 1200 convicts, and a prison for

women. It also contains a women's industrial and educational building, the home and a fine statue of William H. Seward, a library, an armory, and a county courthouse. The city is governed by a mayor, elected biennially, and a city council. The mayor has the power of appointing heads of important departments—street, charities, fire, police, and health; the council has elective power in minor offices. The annual expenditures of the city are about $550,000, the main items being $38,000 for the police department, $52,000 for the fire department, and $154,000 for schools. The water works are owned and operated by the municipality. Auburn was founded by Capt. John L. Hardenbergh in 1792, and called Hardenbergh's Corners until 1805, when it was made the county-seat and received its present name. In 1815 it was incorporated as a village and was chartered as a city in 1848. Auburn is a popular summer resort on account of the many lakes in its vicinity. Pop., 1900, 30,345; 1910, 34,668; 1920, 36,192. Consult H. Hall, *The History of Auburn* (Auburn, 1869), and J. H. Monroe, *History of Auburn* (1913).

AUBURN. The name of the place celebrated in Goldsmith's *Deserted Village* and commonly identified with Lissoy, County Westmeath, Ireland. Here the poet's father had a parish, and here the poet spent his boyhood.

AUBURN THE'OLOG'ICAL SEM'INARY. An American Presbyterian seminary at Auburn, N. Y., founded in 1818 by the Synod of Geneva and incorporated in 1820. In 1913 the endowment was $790,000. The productive funds amount to $776,000 and the annual income to nearly $76,000. The library contains 34,720 volumes and 13,000 pamphlets. The course is three years and is designed primarily for college graduates. In 1913 the faculty numbered 11, and the students 57. President, Rev. George B. Stewart, D.D., LL.D.

AUBUSSON, ō'bụ'sôn'. A town, capital of an arrondisement of the same name in the department of Creuse, France (Map: France, S., G 3). This town, which is picturesquely situated on the Creuse River 20 miles southeast of Gueret, has long been noted for its manufacture of carpets, an industry which employs about 2000 hands. Pop., 1901, 6949; 1911, 7211.

AUBUSSON, PIERRE D' (1423–1503). Grand Master of the Order of St. John of Jerusalem. He was born of a noble French family. At the age of 12 or 13 he distinguished himself, under Albert, Duke of Austria, in fighting against the Turks in Hungary. In 1444 he took part in the campaign of the Armagnacs against the Swiss. Disgusted at the disgraceful failure of this expedition, due to the heroism of the Confederates at "the German Thermopylæ," he went to Rhodes and entered the Order of St. John. He distinguished himself in fighting pirates and on diplomatic missions. In 1476 he was elected Grand Master. In 1480 he defended Rhodes successfully against Mohammed II. He was a very able diplomat, and enriched and strengthened his order. In 1489 he was made a cardinal. He has been called "the shield of the Church," because his great aim was to form a league of Christians against the infidels. In 1501 he seemed on the point of accomplishing his purpose and was appointed commander in chief of the forces to be furnished by the Pope, the Emperor of Spain, and the kings of Castile, Portugal, Hungary, and France. But the alliance had no effect on account of the jealousies of the participants. Aubusson died in 1503. Consult Streck, *Pierre d'Aubusson* (Chemnitz, 1872).

AUCASSIN ET NICOLETTE, ō'kȧ'săN' ā nē'kō'lĕt'. A naïve romance in Old French, celebrating the love and adventures of the young couple whose names form the title. Even by the casual reader of the present day the story will be found to possess a singular charm. The author never forgets that he has a tale to tell, and the human interest always predominates. For its time, the narrative is remarkably direct, and its artlessness has all the virtue of consummate art.

AUCH, ōsh. The capital of the department of Gers, in the south of France, situated on a hill near the river Gers, 42 miles west of Toulouse (Map: France, S., E 5). Auch is the seat of an archbishop, and possesses numerous statues, a library, and a museum of natural science. Its highest point is crowned by a cathedral famous for its stained-glass windows, begun by Charles VIII and completed by Louis XIV. It has an active trade in woolen and cotton goods, fruits, wine, and brandy. Pop., 1901, 13,939; 1906, 13,526; 1911, 13,638. In ancient times Auch was called Elimberrum; at a somewhat later period it took its name from the Ausci, whose chief town it was. In the eighth century it became the capital of Gascony.

AUCHENIA, ą-kē'nĭ-ȧ, **AUCHENIIDÆ,** ą-kĕn-ĭ'ĭ-dē. See LAMA.

AUCHMUTY, ŏk'mụ-tĭ *or* ą'mụ-tĭ, SIR SAMUEL (1756–1822). A British general, son of Rev. Dr. Samuel Auchmuty. He graduated at King's (Columbia) College in 1775 and entered the British army the next year. He was in the battles of Brooklyn and White Plains and served in three campaigns. He served in India (from 1783 to 1796), in Egypt (1800), and in South America, where, in February, 1807, he took by assault the fort and city of Montevideo. He was advanced to the rank of major-general in 1808 and two years afterward was appointed commander-in-chief at Madras. The next year he reduced the Java Settlements. In 1813 he was made a lieutenant-general and was for a time commander in chief in Ireland, where he died.

AUCHTERARDER, ouK'tẽr-är'dẽr. A village in Perthshire, Scotland, about 15 miles southwest of Perth (Map: Scotland, E 3). Cotton weaving, and the manufacture of woolen cloth and agricultural machines are the leading industries. Pop., 1901, 3159; 1911, 3175. The village was involved in the events leading to the disruption of the Church of Scotland and the formation of the Free Church, in 1843. Consult *The Auchterarder Case* (Edinburgh, 1842).

AUCKLAND, ąk'land. The northern provincial district of New Zealand (q.v.).

AUCKLAND. The chief town of the province of Auckland (area, 25,750 square miles; pop., 1911, 265,000) and the northern half of North Island, New Zealand, built on the shores of the beautiful Waitemata harbor, which opens out of the Hauraki Gulf, in lat. 36° 50′ S. and long. 174° 50′ E. (Map: New Zealand, N. I., B 3). Waitemata harbor affords splendid accommodation for shipping and has large docks. At dead low water, springtides, there is 36 feet. North Island at this point narrows to an isthmus 6 miles across, and on the western side there is a second harbor, the Manukau, whence

vessels trade up and down the west coast. From Waitemata harbor steamers leave regularly for Australia, South Africa, Great Britain, America, and the Pacific islands, and trade valued at $40,000,000 annually passes through this port. Auckland is 1315 miles from Sydney, 1650 from Melbourne, and 5440 from San Francisco, and it is the first and last Australasian port of call of the Oceanic mail liners from San Francisco to Sydney. The industries comprise shipbuilding, rope making, sugar refining, and trade in kauri gum and lumber. There are, besides, various agricultural, pastoral, and manufacturing industries. The imports include textiles, machinery, sugar, tea, and hardware. The city was the capital of New Zealand until 1865, when the more centrally situated Wellington was made the capital. There are many fine public and business buildings, a complete electric tram system, a university, which includes an excellent school of mines, and a very fine public library, which houses the magnificent Grey Library bequeathed to the city by the late Sir George Grey, K.C.B., and which includes many rare and some unique manuscripts. The climate is equable and the city is a favorite resort. Pop. (with suburbs), 1901, 67,226; 1906, 82,101; 1911, 102,676.

AUCKLAND, George Eden, Earl of (1784–1849). An English statesman, son of William Eden, Baron Auckland. He was educated at Christ Church, Oxford, and Lincoln's Inn. On the death of his elder brother in 1810, he succeeded to his brother's seat in the House of Commons. He was President of the Board of Trade from 1830 to 1834 and First Lord of the Admiralty in 1834 and 1835. In the latter year he was appointed Governor-General of India. But he was suspended in 1841 because of his Afghan war policy. In 1846 he became First Lord of the Admiralty, holding that cabinet office until his death. He was created Earl of Auckland in 1839.

AUCKLAND, William Eden, Baron (1744–1814). An English diplomat. He was educated at Oxford, and called to the bar in 1768. In 1772 he was appointed Under Secretary of State and afterward filled the posts of a lord of trade, a commissioner to treat with the insurgent Colonies of North America (1778), and Chief Secretary to the Lord Lieutenant of Ireland. Pitt sent him as a special commissioner to France to conclude a commercial treaty with that country (1786). Afterward he served as Plenipotentiary in Spain, Ambassador to Holland and Postmaster-General. In 1793 he was enrolled in the British peerage. He was the author of the *Principles of Penal Law* (1772), *Remarks on the Apparent Circumstances of the War* (1795), and several pamphlets. Consult *The Journals and Correspondence of William, Lord Auckland,* ed. by his son, the Bishop of Bath and Wells (4 vols., 1860–62).

AUCKLAND ISLANDS. A group of islands 200 miles south of New Zealand, lat. 50° 31′ S., long. 166° 19′ E. (Map: World, Western Hemisphere, P 2). It consists of the large island of Auckland (330 square miles) and a few smaller ones. They were discovered in 1806, and settled by the British in 1849, but are uninhabited at present. The New Zealand government maintains a station on Auckland Island for the relief of shipwrecked sailors.

AUCTION (Lat. *auctio,* increase, public sale by increased bids, from *augere,* increase). A public sale of property to the highest bidder. Ordinarily the property offered for sale is described, and the conditions in accordance with which it will be sold are announced, before bids are invited. Each bid is an offer, the auctioneer's acceptance of which is indicated by his knocking down the property to the bidder. Until the bid is thus accepted it may be withdrawn; but when thus accepted a contract is formed between the seller and the buyer, containing as a part of its terms all statements and conditions publicly made to the bidders on the seller's behalf. An auction should be fairly conducted on both sides. There should be no puffing, or bidding by dummies, in the interest of the seller, nor should he be allowed to bid unless he has stipulated for that right in the conditions of the auction, or the right is accorded to him by statute, or by an order of court having control of the sale. On the other hand, any concerted action by bidders for stifling the sale is illegal and may warrant the auctioneer in refusing to accept bids; it may even entitle the seller to avoid a sale.

The conduct of auctions is regulated, with a good deal of care, by modern statutes, in England and in many of our States. Not infrequently sham auctions are declared to be criminal offenses. As a rule, an auctioneer must have a license, either from the State or the municipal authorities. While engaged in bringing the property to a sale, he is the agent of the seller only. His power to bind the principal, and the principal's authority over him, as well as their respective duties to each other, are determined by the general principles of agency. As soon as the sale is made, he becomes an agent of the purchaser, as well as of the seller, for the purpose of making a memorandum of the sale which will satisfy the statute of frauds. This agency does not continue, however, beyond a reasonable time for the performance of that duty. The auctioneer has a lien on his principal's goods in his possession, and on the proceeds from their sale, to the extent of his commissions and expenses. Because of this interest in the property, he may sue in his own name for the purchase price, or for the wrongful conversion of the property by a third person. If he sells without disclosing his principal, he may be sued by the purchaser for any breach of the contract. Even though he names his principal, he will not always escape liability, though he follows strictly the principal's directions. If, for example, he in good faith sells property as that of the principal and turns the proceeds over to the latter, he will be liable for a conversion to a third party who owned and was entitled to possession of the property.

In a "Dutch auction" the property is offered at a high price, which the auctioneer lowers gradually, until a price is named which is accepted by the bidder. Here the offer is by the auctioneer and the acceptance by the bidder. An auction sale "by inch of candle" is when the biddings are to be kept open only while a stipulated length of candle burns. These two forms of auction are practically obsolete in England and the United States. Consult Bateman, *Treatise on the Law of Auctions* (1st Amer. ed., Boston, 1883; 7th Eng. ed., London, 1895); also the works referred to under Agent.

AUCTION BRIDGE. Auction follows the parent game of Bridge (q.v.) in most particulars. The cutting, dealing, honor count, 30

points to a game, grand slam and little slam are the same as in Bridge, except that grand slam counts 100 points and little slam 50 points. If the dealer wins his first bid, the play is as in Bridge. The value of each trick over six in Auction is changed as follows: clubs are worth 6 points, diamonds 7 points, hearts 8 points, spades 9 points and no trumps 10 points. Regardless of the declaration, the deal passes regularly from left to right.

Auction differs from Bridge in awarding the declaration to the bidder who contracts to win the highest game score on the deal. If two players bid to win an equal number of points, the declaration goes to the one contracting to take the greater number of tricks, i.e., one offering to win 2 spades worth 18 points is counted overcalled by another bidding 3 clubs also worth 18 points, because it is obviously more difficult to take three odd tricks than to win two odd.

In counting, only the declarer can score game points. If he fails to make his contract, his adversaries score only in the honor column, which does not help them toward winning game or rubber. Successful adversaries take 50 points for each trick the declarer falls short of his contract, no matter what suit he has bid. Doubling raises the value of each undertrick to 100 points, redoubling increases it to 200 points, and so on. For keeping his contract, the declarer receives a bonus of 50 points in his honor score and 50 points for each trick over his contract. Winning the rubber adds 250 points to the honor column of the successful partners. Consult: Work, *Auction Developments* (1918), and Whitehead, *Auction Bridge* (1921); Elwell, *Principles, Rules, and Laws of Auction Bridge* (New York, 1910);

AUCTIONEER. See AUCTION.

AUCUBA, ą'kû-bȧ (Jap. *aoi, aoka,* green + *ba,* leaf). A genus of plants of the family Cornaceæ, containing 4 or 5 species, all in eastern Asia. The only cultivated species is *Aucuba japonica,* an evergreen shrub resembling a laurel. The leaves, however, are pale green, curiously mottled with yellow. It is diœcious, produces its small purple flowers in summer, and ripens its bright scarlet berries in March. It is a native of China and Japan and is grown in Europe and America as an ornamental shrub. It is propagated by cuttings of half-ripened wood or by seed. A number of varieties, mostly with variegated leaves, are in cultivation. The plant is tolerant of smoke and dust.

AUDÆUS, AUDIUS (or, according to his native Syriac name, UDO). The founder of an anthropomorphic religious sect in Mesopotamia, called the Audians, which flourished during the fourth and fifth centuries. He commenced by accusing the regular clergy of worldliness, impure morals, etc., and is said to have opposed to their manner of life a strict asceticism, until his conduct seemed dangerous to the welfare of the Church, when he was excommunicated. His disciples, who were very numerous, now clung more closely to him, and he was elected their bishop. In 338 A.D. he was banished to Scythia, where he instituted a kind of rival church, and where he died about 370 A.D. He is said to have held that the language of the Old Testament—e.g., Gen. i. 27, literally interpreted—justifies the belief that God has a sensible form. From this belief the sect was sometimes called Anthropomorphites. See ANTHROPOMORPHISM.

AUDE, ōd. A southeastern maritime department of France (Map: France, S., G 5). It comprises a portion of the old province of Languedoc. Area, 2449 square miles. Pop., 1896, 310,513; 1906, 308,327; 1911, 300,537. The southern part of Aude is mountainous, but the greater portion of it belongs to the valley of the lower Aude and the canal of Languedoc. The climate is warm but variable. The mountains are composed of granite, while the soil of the plains is chiefly calcareous, and about the coast—where salt and soda are procured—is extremely fertile, producing cereals, olives, fruits, and wines. Aude is rich in iron and coal, which it exports, and has mineral springs. The manufactures are numerous and varied. Capital, Carcassonne.

AUDE (anciently, Lat. *Atax*). A river in the south of France, rising in the East Pyrenees, in the department of Pyrénées-Orientales (Map: France, S., H 5). It flows north as far as Carcassonne, where it turns east and enters the Mediterranean near Narbonne. It is about 130 miles long.

AUDEBERT, ōd'bâr', JEAN BAPTISTE (1759–1800). A French naturalist and painter, born in Rochefort. In Paris he soon won success as a miniature painter. His love of natural history and his skill in painting birds and animals secured him employment in this field. For the purpose of making sketches he visited Holland and England in 1800. That year he produced his *Histoire naturelle des singes* ('Natural History of Monkeys'), a large folio, with 63 colored plates, remarkable for their truth and beauty. After his death two more volumes appeared, which were even more excellent than the first. They were his books on humming birds, and on woodpeckers and birds of paradise (1802).

AUDHUMLA, ou-DHŌŌM'lȧ. According to the myths of the Scandinavian cosmogony, the name of the cow upon whose milk the giant Ymir subsisted. She licked the frost of the icy abyss, Ginnungagap, and forth sprang Buri, the father of Borr and grandfather of Odin.

AUDIFFRET-PASQUIER, ō'dē'frȧ'pȧs'kyā', EDME ARMAND GASTON, DUC D' (1823–1905). A French statesman, born in Paris. In 1862 he inherited the title of Duc de Pasquier from a granduncle. During the reign of Napoleon III he was identified with the Orleanist opposition and under the presidency of Thiers was one of the Moderate Conservative Party. In 1875 he was chosen President of the National Assembly, which he had entered in 1871, and though he had been an avowed supporter of the Bourbon restoration, he then accepted the Republic. He was the first life Senator elected by the Assembly (1875); was President of the Senate from 1876 to 1879, and in 1878 was elected to the French Academy.

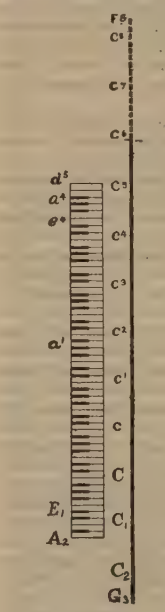
AU'DIOM'ETER (hybrid form, from Lat. *audire,* to hear + Gk. *μέτρον, metron,* measure). An instrument for the measurement of hearing, invented by Prof. D. E. Hughes, of London, in 1879. It consists of a battery, a microphonic key, two primary coils mounted at the extremities of a graduated bar, a secondary or induction coil which moves along the graduated bar, and a telephone, the terminals of which are connected with the terminals of the induction coil. The battery is connected with the microphonic key and the two primary coils, and the telephone is held at the ear of the person whose hearing is being tested. The amount of sound

can be gradually increased by moving the induction coil from the centre toward the larger of the two primary coils, and diminished by moving it toward the centre, the position at which it disappears being noted.

AU'DIPHONE (hybrid form, from Lat. *audire*, to hear + Gk. *φωνή, phōnē*, sound). An instrument to assist the hearing of persons whose auditory nerve has not been entirely destroyed. One variety of audiphone consists of a thin sheet of ebonite rubber, hard vulcanite, fan-shaped, and having strings leading from the outer edge to the base of the handle, so that it may be brought to different degrees of convexity. When the outer edge is pressed against the upper front teeth and the convex side is outward, sound vibrations are conveyed to the auditory nerve through the teeth and bones of the head. This instrument has been generally abandoned in favor of the ear trumpet, and of the modern electric hearing devices built on the same principle as the telephone.

AUDI'TA QUERE'LA (Lat. the complaint having been heard, from *audire*, to hear, and *querela*, complaint). A form of action which lies for a defendant against whom judgment has been rendered (and who is therefore in danger of an execution), to restrain or prevent the execution, on account of some matter occurring after judgment, amounting to a discharge, as payment or release of the debt for which judgment was given. Blackstone describes it as an action of a high remedial character, in the nature of a bill in equity to be relieved against the oppression of the plaintiff, invented to protect a party who has a good defense, but is too late to make it in the ordinary forms of law (*Comm.* iii, 406). The modern practice of the courts in granting summary relief upon motion, in cases of such oppression, has generally superseded this form of remedy, but it may still be employed in many States of the United States where complete justice cannot be done in this summary manner. See EXECUTION; JUDGMENT; SUPERSEDEAS; ARREST OF JUDGMENT.

AUDITION, ą-dĭsh'ŭn, **AU'DITORY SENSA'TION** (Lat. *audire*, to hear). Our sensations of hearing fall into two great groups, as sensations of tone and sensations of noise. The former are musical, smooth; the latter, abrupt, rough, and harsh. The physical stimulus of auditory sensation is the vibration of some material body that is transmitted to the ear under ordinary conditions by a wave movement of the air particles, a to-and-fro motion in the direction in which the sound travels (longitudinal vibration). If the wave movement be that of a simple sinusoidal curve (pendular vibration), the resulting sensation is a simple tone. If the wave movement be cut short at a very early stage of its progress, or if the air be disturbed by a mere shock or concussion, we have the sensation of simple noise. The tone of a tuning fork, standing upon its resonance box, is practically a simple tone; the pop of a soap bubble is an instance of a simple noise. The musical tones of ordinary experience are doubly complicated; they consist of a number of simple tones, sounding together, and are further accompanied by complex noises. The tone emitted by a violin string, e.g., contains a half-dozen different simple tones, which may be discriminated under proper conditions (see CLANG-TINT), as well as the scraping noise that arises from the drawing of the bow across the string. The noises of every-day life (crash, thump, clatter) are similarly complicated; they consist of a number of simple noises, among which a tonal element may often be distinguished.



AUDITION.

The series of tonal qualities. The keyboard of a grand piano extends from the A_2 of 27½ vs. to the c^6 of 4224 vs. The range of audition is approximately from the G_3 of 12⅝ vs. to the f^8 of 45,056 vs.

The series of simple tonal qualities forms what is technically termed a continuous one-dimensional manifold; i.e., tones may be arranged along a single line, or scale, within which every term is separated by insensible gradations from the terms next preceding and following. Music employs less than 100 discrete tones, lying between the *e* of 41¼ and the *d* of 4752 vibrations in a second. The range of hearing is much wider, extending, under favorable circumstances, from the *g* of 12⅝ approximately to the *f* of 45,056. The lower limit is determined by means of giant tuning forks, of vibrating strips (*lamellæ*) of steel, or of weighted wire forks; the upper limit by miniature tuning forks, by small steel cylinders, and by an adjustable piston-whistle (Galton's whistle) actuated by a rubber bulb. Between these extreme limits the ear can distinguish no less than 11,000 tonal qualities, or more than 100 times as many as are employed by orchestral music. So acute is our discrimination of tones that, in the middle region of the musical scale, two tones will be judged as different by a trained observer whose vibration rates differ by but 0.2 vibrations in a second. Measurements of this sort require a delicate apparatus, which has usually taken the form of a series of tuning forks, whose pitch can be varied at will by the movement of a rider along their prongs, or of a series of reeds, very carefully tuned to minute differences of pitch, sounding under wind pressure.

The psychology of the simple noises is as yet incomplete. There seems to be no doubt that noises show differences of quality or pitch more or less resembling those of tones. The crack of a pistol is "higher" than the roar of a cannon; the snap of a large soap bubble is "deeper" than the snap of a small one. Experiments have been made in which the sound of a tuning fork is cut off from the observer's ear before the prongs have executed two complete wave movements; the sound in such a case is not a tone, but a noise. The results seem to indicate that we can distinguish between 500 and 600 simple noises, or that there are about 20 times fewer noise than tone sensations. This statement, however, requires confirmation. It has recently been suggested that there are two ultimate types of simple noise: the snap

(electric spark, soap bubble, curtained sound of fork) and the hiss; but no classification of hisses by pitch or quality has been attempted.

A word must be said about two striking phenomena of auditory sensation—beats and combination tones. 1. If two tones whose vibration rates are slightly different are sounded together, the resulting sound is not smooth, but "wavy"; it fluctuates in intensity, according as a hill of the one curve coincides with a hill or with a valley of the other. Thus two tones of 100 and 101 vibrations in the 1 sec. beat once in the 1 sec.; tones of 100 and 102 beat twice; and so on. Beats can be counted up to about 5 in the 1 sec., and can be heard separately up to about 60; beyond this limit the beating complex merely sounds harsh and rough. In certain cases the two beating tones give rise to a third—intermediate—tone which carries the beats. 2. If two tones are sounded together, various extra-tones are generated, whose vibration rates stand in definite relations to the vibration rates of the primary tones. Most important, theoretically, are (*a*) the first difference tone and (*b*) the summation tone. The pitch number of the former is equal to the difference between the vibration rates of the two generators. Thus tones of 300 and 400 vs. produce a first difference tone whose pitch number is 100. The pitch number of the latter is equal to the sum of the vibration rates of the generators; thus tones of 300 and 400 vs. produce a summation tone of 700. It was formerly thought that the difference tone is a beat tone, and that the summation tone is due to the presence of overtones in the primaries; but the difference tone, unlike the beat tone, cannot be obtained by the superposition of pendular vibrations. While it is true that a few instruments, like the harmonium, produce objective difference tones, due to secondary vibrations of the sonorous body, most difference tones are subjective, occasioned within the mechanism of the ear itself. The summation tone is apparently produced in the same way as the difference tone.

Sensations of sound appear to have developed from general bodily sensations of jar or tremor. (See STATIC SENSE.) The first auditory sensation proper is, probably, the noise; this theory is borne out by facts of genetic psychology as well as by the circumstance that, for our own ears, the physical stimulus of noise is an imperfect tonal stimulus; the sensations are different in kind, but their exciting causes differ only in degree. The ruling theory of audition, that of Helmholtz, maintains that tonal sensations are set up by the vibration of the cross fibres of a triangular membrane stretched between the bony walls of the cochlea of the internal ear. This "basilar" membrane represents, in miniature, the arrangement of a harp, or of the backboard of an upright piano; the long strings are tuned to the bass tones, the short strings to the treble tones. The external air wave strikes the drumskin of the ear, is transmitted inward by the chain of auditory ossicles, and arouses a wave movement in the endolymph of the internal ear. The motion is taken up by that basilar fibre which is "tuned" to its particular rate; the motion of the fibre excites the hair of a sensory cell resting upon it; and the nervous impulse passes from this cell along the auditory nerve to the brain. An overlying membrane, the "tectoria," acts as damper, to bring the vibrating hair to rest again. The details of the theory, as amended by Hensen, Exner, and Ebbinghaus, afford a fairly satisfactory explanation of the details of auditory sensation. We have seen that there are some 11,000 tonal qualities. It has been found that the basilar membrane consists of 16,000 to 20,000 cross fibres—more than enough to serve as the basis of these sensations. The qualities of noise we may suppose to be mediated by the simultaneous jarring of a number of adjacent basilar fibres. Beats are accounted for on the hypothesis that the incoming air wave sets in vibration not only the basilar fibre which is specifically attuned to it, but (in a lesser degree) the neighboring fibres as well. If, then, two fibres that lie near together within the membrane are set swinging by two waves of but slightly different rates, the fibres lying between these two will also be affected, and affected by both stimuli. There is, consequently, interference of the two wave motions in this narrow intermediate strip of membrane, and the intermediate tone (which carries the beats) is aroused. Combination tones were explained by Helmholtz as due to asymmetrical vibrations of the conductive apparatus (ossicles and membranes). Ebbinghaus has restored them to the cochlea by two simple and natural extensions of Helmholtz's principles. He supposes (*a*) that a simple wave movement of the endolymph excites a limited number of adjacent fibres, and thus a number of hair cells; and that the cells are not so sharply differentiated in function but that all alike (though in varying degrees) can mediate the same tonal sensation; and (*b*) that a given wave motion excites not only its own particular basilar string, but also (within certain limits) the strings that are attuned to its harmonic undertones. Thus a stimulus of 600 vibrations in the 1 sec. would, perhaps, excite the strings attuned to 599.6, 599.8, 600, 600.2, 600.4; and the cells lying upon these strings would all alike give the tone 600 in sensation. Moreover, the stimulus 600 would excite not only the 600-string, but also the strings that respond directly to stimuli of 300, 200, 150, 120, etc. These assumptions afford an easy explanation of the phenomena in question. We may add that the Helmholtz theory has received confirmation on the pathological side by the discovery that, in certain individuals, the hearing of tones is abrogated over a definitely circumscribed portion of the scale (tonal gap), or is abrogated in general, but retained over a similarly circumscribed area (tonal island)—facts that accord admirably with the functions ascribed hypothetically to the strings of the basilar membrane. Vivisectional experiments on dogs seem to show that excision of the tip of the cochlea (where the membrane is widest) produces a deafness to bass tones; but the confirmation of this is required.

In spite of its explanatory powers, the Helmholtz theory has never lacked opponents. Various objections have been urged against it; as, that the theory, in assuming that the ratio of width of the two ends of the basilar membrane is about 1: 12, greatly overstates the triangularity of the membrane; that the membrane is too closely woven for its radial fibres to vibrate, even in small batches, not to speak of the separate vibration of single fibres; that the structures of the cochlea are too minutely small for the strings to act as resonators to the deep

tones which audition can distinguish; and so on. Hence a number of theories have arisen which reject the idea of resonance altogether, and assume that the basilar membrane vibrates in one piece. Waller's theory, which we may take as typical of this direction of thought, is formulated as follows: the basilar membrane is "a long, narrow drumhead, repeating the complex vibrations of the membrana tympani." It "vibrates in its entire area to all sounds (although more or less in some parts than in others), giving . . . acoustic pressure-patterns between the membrana tectoria and the subjacent field of hair cells. In place of an analysis by consonation of particular radial fibres, . . . varying combinations of sound give varying pressure-patterns, comparable to the varying retinal images of external objects." No one of these opposing theories has been worked out in any conspicuous detail. (See EAR; ACOUSTICS; PSYCHOLOGICAL APPARATUS.) Consult: Helmholtz, *On the Sensations of Tone* (Eng. trans., London, 1895); Ebbinghaus, *Grundzüge der Psychologie* (Hamburg, 1897–1902); Waller, *Introduction to Human Physiology* (New York, 1891); Titchener, *Text-Book of Psychology* (New York, 1910).

AU'DITOR (Lat., hearer, from *audire*, to hear). At common law, an officer appointed by the court in the action of account to take and state the items of debit and credit between the parties to the action, determine the balance due, and report to the court.

Similar officers were appointed in chancery, who were more usually known as masters in chancery. (See MASTER IN CHANCERY.) As the common-law action of account fell into disuse, courts of common law ceased to appoint auditors; but under modern statutes, the law courts have power to appoint officers exercising quasi-judicial functions in the taking of accounts, taking of evidence, trial of issues, etc., variously known as auditors, commissioners, or referees. (See COMMISSIONER; REFERENCE.) Their reports, when filed and confirmed, form the basis of the judgment rendered by the court. The powers and duties of such officers are, in general, limited and defined by the statutes authorizing their appointment.

The term "auditor," as now employed, however, more commonly has reference to a class of persons, usually expert accountants, who have increased in numbers to meet the demands of the growing importance and complexity of industrial and financial affairs, and who perform the service of examining and stating the accounts of government departments, corporations, and private concerns. Many of our large cities, as well as the State and general governments, have official auditors (called, in New York City, commissioners of accounts) as a part of the regular administrative machinery; and the same is true of many of the larger industrial corporations. Private auditors are ordinarily subject to no legal regulation, except such as is imposed by the contract under which they are employed, and the general obligation to exercise a reasonable degree of skill, care, and caution. A higher degree of skill is required of a professional auditor than of one who does not hold himself out as an expert; such skill, in fact, as is exacted of all strictly professional men. In some of the States of the United States a class of public accountants, licensed and registered by the State, is recognized by statute. For the law as to auditors under the English Companies' Acts and other statutes, consult Pixley, *Auditors: Their Duties and Responsibilities* (7th ed., London, 1896).

AU'DITORY, or EIGHTH, NERVE. According to the older nomenclature, the *portio mollis* (because it is soft, having no sheath or neurolemma) of the seventh pair. The nerve of hearing. The superficial origin of this nerve is from the ventrolateral surface of the medulla immediately behind the transverse fibres of the pons. Two distinct bundles of fibres can be distinguished in it; one (the cochlear division), passes to the outer side of the restiform body, or inferior peduncle of the cerebellum, while the other (the vestibular division) passes to the inner side of the restiform body. The fibres take their deep origin in the gray matter of the fourth ventricle. The fibres of the cochlear division of the nerve terminate in Corti's organ, situated in the cochlea. The fibres of the vestibular division of the nerve terminate in the hair cells of the *crista* and *macula acustica* in the vestibule and semicircular canals.

The auditory nerve leaves the cranial cavity, in company with the facial nerve, through the internal meatus. At the bottom of the meatus the two divisions of the nerve separate, the vestibular branch passing to the vestibule and semicircular canals, the cochlear branch passing to the cochlea. Within the meatus the auditory nerve is connected by one or two filaments with the facial. See EAR.

AUDLEY, ad'li. A manufacturing town in Staffordshire, England, 4½ miles west of Newcastle-under-Lyne. The most noteworthy building is a church built in the time of Edward II. Pop., 1891, 12,600; 1901, 13,700; 1911, 14,776.

AUDLEY, or AUDELEY, SIR JAMES DE (c.1316–69.) An English knight. In 1346 he went to France in the retinue of Edward III and the Black Prince, and in 1350 participated in the naval combat with the Spaniards off Sluys. At the battle of Poitiers (Sept. 19, 1356), he fought with signal valor at the forefront of the English army until overcome by wounds. For his bravery he received an annuity from the Black Prince, who also in 1362 appointed him Governor of Aquitaine. Later he became Great Seneschal of Poitou. He was one of the original knights-companions of the Order of the Garter, instituted by Edward III.

AUDLEY, THOMAS, BARON AUDLEY OF WALDEN (1488–1544). An English Lord Chancellor under Henry VIII. He was chosen Speaker of the famous "Long Parliament" in 1529, was made a knight and Keeper of the Great Seal in 1532, and became Lord Chancellor in 1533, succeeding Sir Thomas More, at whose trial he presided. He also conducted the trials of Bishop Fisher, of the supposed accomplices of Anne Boleyn, and of the paramour of Queen Catherine Howard. Throughout his public life he was little more than a tool in the hands of the King and his minister, Cromwell.

AU'DOE'NUS, JOANNES. See OWEN, JOHN (c.1560–1622).

AUDOUIN, ō'dụ'ăN', JEAN VICTOR (1797–1841). A French naturalist, born in Paris. With Dumas and Brongniart he began the *Annals of Natural Science* in 1824, and with Milne-Edwards made researches on crustacea and annelida. He was professor of entomology in the Museum of Natural History in Paris and in 1838 became a member of the Academy of Sci-

ences. He was also the founder and first President of the Entomological Society. He investigated, at the request of the government, the injuries done to vine and silk culture by insects, and contributed a great number of reports and papers on this subject. He also contributed the part on insects in Cuvier's *Règne animal*.

AUDRAN, ō'drăn', Edmond (1842–1901). A French composer. He was born at Lyons; studied music in Paris, and in 1861 followed his father, a teacher at the Conservatory of Marseilles, to that city, where he became choral director at the church of St. Joseph. He returned to Paris in 1881, and collaborated with MM. Chivol and Duru on a number of comic operas, of which the following are the most important: *La mascotte* (1881), a great success; *Olivette, le grand mogol* (1884); *Miss Helyett* (1890), and *La poupée*.

AUDRAN, Gérard, or Girard (1640–1703). The most important member of a family of French engravers and painters. He was born at Lyons; studied under his father and uncle and at Rome under Carlo Maratti, and acquired a high reputation by an important series of engravings of biblical subjects and of Pope Clement IX. He was recalled to France by Colbert, and appointed engraver to Louis XIV. His best-known work is a series of engravings illustrating the battles of Alexander, after the paintings of Lebrun. Others reproduced Mignard's decorations of the ceiling of the royal apartment at Versailles, and the cupola of the church of Val de Grace, a skillful combination of etching and line engraving, and are the very best work of their kind. He published a work entitled *Les proportions du corps humain* (1683).

AUDREY, ą'drī. 1. A shepherdess in Shakespeare's pastoral comedy, *As You Like It*. Her relations, as the untutored child of nature, with Touchstone, the motley of a court, form some of the most diverting scenes of the play. 2. A character in Jonson's comedy, *A Tale of a Tub*.

AUDREY, Saint. See Ethelreda.

AUDUBON, ą'dų-bon, John James (?1780–1851). An American naturalist. He was born at Mandeville, in Louisiana, then a Spanish colony, probably in 1780, and died Jan. 27, 1851. This date of his birth, however, is merely a tradition and probably he was born some years before. His father is said to have been a French naval officer, who owned estates in Santo Domingo; his mother, a Spanish creole. His childhood and youth were spent in France, where he was educated, and where he was given instruction in drawing by the painter David. In 1798 he came to America and settled on a farm on the Perkiomen River, near Philadelphia. His father had acquired the property during the Revolutionary War and now gave it to him. Here he lived 10 years, collecting and sketching birds, and applying himself otherwise merely to field sports and social enjoyment. In 1808 he married Lucy Bakewell, the daughter of a neighbor, an Englishman, and at once migrated to the West. After passing 10 years in a vain effort to establish himself in business in Kentucky and Louisiana, and finally losing all his property, he was reduced to supporting himself by drawing portraits and even teaching dancing and fencing. This came about from his persistent inattention to business, which was constantly neglected, as he acknowledges in his autobiographic memoranda, for the sake of pursuing his studies and drawings in natural history, or merely for the pleasures of hunting, fishing, and wandering in the woods. No deepening of his difficulties could cure him of his heedlessness or cause him to forego any opportunity to add to his knowledge or series of drawings of birds.

In 1824 his projects were forwarded by a visit to Philadelphia, where he first became known to the intellectual society of the country and his abilities were recognized. Two years more of painting, teaching, and study, aided by his wife, enabled him to go to England to try to carry out his long-cherished plan of publishing his drawings of birds in a complete series of life-sized colored figures. He interested a sufficient number of subscribers to enable him to begin in London, in 1827, the publication in folio parts, at two guineas each, of his *Birds of America*, which excelled anything of the sort then extant. About five were then issued annually until its completion, in 1838, in 87 parts, containing 435 plates, giving 1065 figures. A complete good copy (of which about 175 sets are supposed to be in existence, 80 of which are in America) is now worth about $2000. No reading matter accompanied these plates, but this was prepared later, and published in Edinburgh, from 1831 to 1839, in five successive volumes, entitled *Ornithological Biography*, the technical part of which was prepared by William McGillivray. Several editions and reprints, with reduced drawings, were made subsequently, of which the most important was the octavo edition of 1844, entitled *Birds of America*. A complete account of these combined works, and of all Audubon's other ornithological writings, is given in the appendix to Elliott Coues's *Birds of the Colorado Valley* (Washington, 1898). The years from 1830 to 1842 were spent in almost incessant travel in all accessible parts of the United States and Canada in search of new materials, or else in Europe, attending to the publication and sale of his great work. In 1842, however, Audubon purchased an estate on the bank of the Hudson River, now included within the city of New York, where a beautiful home was established for himself and his sons, Victor and John Woodhouse, and their families. In 1843 Audubon made a fruitful journey to the upper Missouri River region, the results of which were included in the first octavo edition of his *Birds of America* (1844). Thenceforth he devoted his energies mainly to the preparation of a standard work on American mammals, for which his sons not only collected much material, but for which John drew half of the colored plates; while John Bachman contributed technical and other parts. It was published in New York as Audubon and Bachman's *Quadrupeds of North America*, the first volume dated 1846 and the last 1853–54.

Audubon failed rapidly after 1847, gradually lost the use of his mind, died in 1851, and was buried in Trinity Cemetery, New York, close to his home woods, which now form a beautiful district called Audubon Park. As a man he was endowed with a hardy and most attractive frame, a winning disposition, and a brilliant, poetic mind, animated by untiring enthusiasm. He was not learned in science, nor an artist in any broad sense of the term; but his work has been a source of immense pleasure and inspiration.

The best and fullest biography of him is by his granddaughter Maria R. Audubon, entitled *Audubon and his Journals*, with zoölogical and

other notes by Elliott Coues (2 vols., New York, 1897). A previous *Life of John James Audubon, the Naturalist* (New York, 1869) was written by another relative, Lucy Audubon. Still earlier is Buchanan's *Life and Adventures of J. J. Audubon* (2d ed., New York, 1864), which contained many errors and was not approved by his family.

AUDUBON SOCIETY. See ORNITHOLOGICAL SOCIETIES.

AUE, ou'*e*. A town in the circle of Zwickau, Saxony, Germany, at the confluence of the Mulde and the Schwarzwasser, 18½ miles southeast of Zwickau by rail. It is a railway junction, the seat of a district court, and a busy industrial centre. It has five public buildings, and its institutions include a *real-schule*, and technical schools in connection with the tin and lace-making industries. Aue's manufactures include furniture, working tools, cardboard, tobacco pipes, and sheet-metal ware, and there are iron foundries, machine shops, breweries, and cotton mills. Pop., 1900, 15,230; 1910, 19,360.

AUE, au'*e*, HARTMANN VON (c.1170–c.1215). One of the best court epic poets of German mediæval classical literature. Born the vassal of a Swabian Herr von Aue, he was well educated, and took part in one of the Crusades (1189 or 1197?). More or less under the influence of the French poet Chrestien de Troyes, he wrote the following very popular epics: *Erec* (10,135 lines), which introduced the Arthurian romances into Germany, and which is apparently one of his earliest works, having as its theme woman's devotion; *Iwein* (8166 lines), the poet's most finished work as to form, which surpasses its French source in tenderness of feeling and in its light, happy style, and treats a similar theme from another point of view; *Gregorius* (3752 lines), a mediæval "Œdipus," given a happy ending; and *Der arme Heinrich* (1520 lines), his most popular work and the only one based on a German legend—a simple poem of great charm, which seeks to glorify both the self-sacrifice of woman and the moral fibre of man. He also wrote lyrics in the style of the day. There are many excellent editions of his works.

AUENBRUGGER, ou'*en*-bru'gĕr, **VON AUENBRUGG,** ou'*en*-brug, LEOPOLD (1722–1809). A Viennese physician, born in Gratz, Styria, who introduced the method of percussion diagnosis in diseases of the chest. He published the results of his important investigation in a treatise entitled *Inventum Novum ex Percussione Thoracis Humani Interni Pectoris Morbos Detegendi* (1761), which marks an epoch in the modern history of medicine. The book attracted little attention until it was translated and illustrated by Corvisart in 1808. He also wrote two treatises on insanity.

AUER, ou'ĕr, ALOYS, RITTER VON WELSBACH (1813–69). An Austrian printer. He was born at Wels, in Upper Austria, and was trained in a printing establishment of his native town to be a compositor. During his scanty leisure moments he studied French, Italian, English, and other languages, in which he underwent an examination in 1835 and 1836 before the University of Vienna. In October, 1837, he was appointed professor of Italian in the Gymnasium of Linz, in Upper Austria. In 1839 he set out on his travels through Germany, Switzerland, France, and England, collecting materials for his favorite art. From 1841 to 1864 he was director of the Imperial printing office at Vienna, which under his management became one of the largest establishments of the kind in Europe. He was prolific in typographical inventions and made known a photographic discovery, "spontaneous impression," in *Die Entdeckung des Naturselbstdrucks* (1854); published *Die Sprachenhalle oder das Vaterunser in 608 Sprachen*, with Roman types (1844); *Das Vaterunser in 206 Sprachen*, with their national alphabets (1847); *Die Buchschriften des Mittelalters* (1852); *Geschichte der K.-K. Hof- und Stadts-druckerei in Wien* (1851), etc. See NATURE PRINTING.

AUER, LEOPOLD (1845—). A violinist, born at Veszprim, Hungary, and educated at the Conservatory of Budapest and at Vienna. From 1863 to 1865 he was concert master at Düsseldorf, and from 1866 to 1868 he held the same position at Hamburg, under Stockhausen. Afterward he became professor at the Conservatory of St. Petersburg and violin soloist to the Russian court. From 1887 to 1892 he was director of the symphonic concerts given by the Imperial Musical Society of Russia. He came to be considered one of the foremost violinists of the day, his playing being characterized by extraordinary technical skill, depth of conception, and remarkable beauty of tone. His concert tours were very successful. In 1895 he was raised to the rank of the hereditary nobility. He is, moreover, not only one of the greatest teachers, but undoubtedly he has trained more artists who subsequently attained world-wide renown than any other teacher. Elman and Zimbalist are among his pupils.

AUERBACH, ou'ĕr-bäg, BERTHOLD (1812–82). A German novelist born at Nordstetten. He was the founder of the contemporary German "tendency novel," in which fiction is used as a means of influencing public opinion on social, political, moral, and religious questions. Auerbach was of humble Jewish parentage, but had a liberal education at Tübingen, Munich, and Heidelberg, and was a close student of Spinoza, whose complete works he translated (1841; 2d ed., 1871). Spinoza's philosophy can be traced in the ethics of his novels of the higher social life. His life was uneventful, though imbittered at the close by the growth of German anti-Semitism. His best-known works are *Das Judentum und die neueste Litteratur* (1836); a semi-biographical novel, *Spinoza* (1837); *Dichter und Kaufmann* (1839); *Der gebildete Bürger* (1842), an attempt to popularize philosophical subjects; *Schwarzwälder Dorfgeschichten* (1843), his first great success, widely translated, and expressing with a sympathetic realism the memories and scenes of youth. This was followed in the same field by the hardly less charming second series of *Village Tales* (1846), *Barfüssele* (1856); *Joseph im Schnee* (1861); *Edelweiss* (1861); a third series of tales, *Nach dreissig Jahren* (1876), *Der Forstmeister* (1879), and *Brigitta* (1880). Meantime he had written a mass of now insignificant journalistic work, and, among other novels, *Auf der Höhe* (1865; Eng. trans., 1889, etc.), a philosophic romance, blending peasant life and character with that of the higher circles in a royal capital and country-seat. This was an attractive exhibition of doctrinaire ethics and established his reputation in spite of errors in construction and style. *Das Landhaus am Rhein* (1869) was

similar but less successful, and *Waldfried* (1874) sought vainly to draw literary inspiration from German unity and the French war. The rest of his 40 volumes are negligible. All Auerbach's longer work is overweighted with philosophy and a leaden humor. He is best in emotional situations and the sentiments of simple natures; excellent in description, but weak in the management of plot. Still, *Auf der Höhe* has enough inherent reality to triumph over its faults, is still read and worth reading. Auerbach's talent appears to best advantage in the *Dorfgeschichten* and in such modest stories as *Barfüssele*, *Edelweiss*, and *Brigitta*. The best edition of his *Works* is that of 1892–95 (18 vols.). Consult: Zabel, *Berthold Auerbach* (Berlin, 1882); E. Lasker, *Berthold Auerbach, ein Gedenkblatt* (1882); A. Bettelheim, *B. Auerbach, der Mann, sein Werk* (1907).

AUERBACH'S KEL'LER. A Leipzig wine cellar and tavern, which occupies much the same place in the hearts of Goethe-lovers that the London "Cheshire Cheese" holds in the hearts of the admirers of Dr. Johnson. It is associated with the early life of the German poet, who in his student days was a regular *habitué* of it, and it is supposed to be the original of the tavern scene in the drama of *Faust*.

AUERSPERG, ou'ĕr-spĕrk, Adolph Wilhelm Daniel, Prince (1821–85). An Austrian statesman. He served in the army from 1841 to 1860 and attained the rank of major. In 1867 he entered political life as a member of the Bohemian Diet, being elected by the Liberal land proprietors, and in 1868 became a member for life of the Upper Chamber of the Austrian Reichsrat. He was Governor of Salzburg from 1870 to 1871, and proved in that position, as well as in his subsequent political life, a stanch supporter of the constitution. From 1871 to 1879 he was the head of the Austrian ministry, as such succeeded in carrying out the electoral reform, securing direct elections to the Lower Chamber of the Reichsrat, and in strengthening the political entente with Hungary.

AUERSPERG, Anton Alexander, Count von (known to literature as Anastasius Grün) (1806–76). An Austrian statesman and poet. He was born at Laibach (Carniola), studied at Gratz and Vienna; through his verse became distinguished as a Liberal; and when 26 years old was made Imperial Chamberlain. He was elected to the German preliminary Parliament in 1848 and subsequently to the National Assembly in Frankfort. Under the Constitution of 1861 he was appointed by the Emperor a life member of the *Herrenhaus*, the Austrian upper house, where he continued prominent in opposition to the Feudal-Clerical and Slovenian parties. He was similarly active in 1861–67 in the diets of Carniola and Styria. His first noteworthy and best non-political poem was *Der letzte Ritter*, a cycle of romances (1830; new ed., 1885), eulogizing Maximilian I (and his times) in the metre of the *Nibelungenlied*. With *Spaziergänge eines Wiener Poeten* (1831; 7th ed., 1876), an attack upon the Metternich régime, he attracted great attention. Chief among his further publications are the epics *Die Niebelungen im Frack* (1843) and *Der Pfaff vom Kahlenberg* (1850); translations of popular Slovenic songs; *Volkslieder aus Krain* (1850), and *Robin Hood* (1864), an excellent adaptation of the English ballad material. His poetry is eminently contemplative and at times overburdened with the author's reflections. In its assertion of freedom it was influential during the political controversy of the time, and it still may be read for a number of genuine lyrics. His *Gesammelte Werke* were edited by L. A. Frankl (5 vols., Berlin, 1877); certain of his letters were published as *Briefwechsel mit L. A. Frankl* (Berlin, 1897) and a selection of his *Politische Reden und Schriften* appeared in Vienna in 1906. Consult Schatzmayer, *Anton, Graf von Auersperg* (2d ed., Frankfort, 1872), and Radics, *Anastasius Grün und seine Heimat* (Stuttgart, 1876).

AUERSPERG, Carlos, Prince (1814–90). An Austrian statesman. On the advent of the new constitutional era, in 1861, he became a member of the Upper Chamber of the Reichsrath. As a representative of the Liberal landed proprietors in the Diet of Bohemia, and afterward as president of the Austrian House of Peers, he took a conspicuous part in defending the constitutional system against clerical and feudal reaction and in establishing the unity of the Empire. He presided over the Austrian ministry in 1868 and subsequently was a zealous supporter of the Liberal cabinet, at the head of which was his brother Adolph.

AUERSTÄDT, ou'ĕr-stĕt. A village in Saxony, 25 miles northeast of Weimar. Here Davout won a great victory over the Prussians under the Duke of Brunswick on the same day (Oct. 14, 1806) that Napoleon defeated their main army at Jena. The battle was fought in a mist, between 48,000 Prussians and 30,000 French. The Prussians lost one-half of their army, while Davout's loss amounted to 7000 men. Consult Lettow-Vorbeck, *Der Krieg von 1806 und 1807*, vol. i, *Jena und Auerstädt* (Berlin, 1891).

AUF DER HÖHE, ouf dĕr hē'*e*. See Auerbach, Berthold.

AUFFENBERG, ouf'*e*n-bĕrk, Joseph, Baron von (1798–1857). A German dramatist, one of the less successful imitators of Schiller. He was born at Freiburg, where he first studied law, but soon began to write dramas. He became president of the committee of the Court Theatre at Karlsruhe several years afterward. The following are a few of his more important dramatic works: *Pizzaro* (1823); *Ludwig XI in Peronne; Der Löwe von Kurdistan; Alhambra; Das Nordlicht von Kasan*. The third edition of his complete works (22 vols.) was published at Wiesbaden in 1855. Consult E. L. Stahl, *Joseph von Auffenberg* (Hamburg and Leipzig, 1910).

AUFRECHT, ouf'rĕkt, Theodor (1822–1907). A German philologist and Sanskrit scholar. He was born at Leschnitz and was educated at the University of Berlin. He early devoted himself to Oriental research, and at the age of 25 published a treatise on Sanskrit accent (Bonn. 1847). In collaboration with Kirchhoff, he issued *Die umbrischen Denkmäler* (1849–51), and with Adalbert Kuhn he founded the *Zeitschrift für vergleichende Sprachforschung* (1852). In 1862 he was appointed professor of Sanskrit and comparative philology at the University of Edinburgh. He left Scotland and accepted a professorship at Bonn, resigning his position in 1889. Among Dr. Aufrecht's many contributions to linguistic science, the most important are an edition of the *Rigveda* in Roman letters (2d ed., Bonn, 1877), *Ujjvaladatta's Commentary* on the *Unadi-Sutra* (a Sanskrit lexico-

graphical work), *Aitareya Brahmana* (1879); *Catologus Catalogorum, An Alphabetical Register of Sanskrit Works and Authors* (Leipzig, 1896–1903), and *Katalog der Sanskrit-Handschriften der Universitäts-Bibliothek in Leipzig* (Leipzig, 1901).

AUGARTEN, ou'gär-ten (Ger. *Aue,* meadow + *Garten,* garden). A park in Vienna, once noted for its musical associations. Mozart, in 1782, was instrumental in starting concerts there, and it has been the scene of many musical first nights. It was opened in 1775 by Joseph II and is laid out in the old French style.

AUGE, ą'jė. See TELEPHUS.

AU'GEAS, or **AUGEI'AS** (Gk. *Αὐγέας, Αὐγείας, Augeas, Augeias*). The son of Helios, Eleios, or Poseidon, and Hyrmina or Iphiboë. He was King of Elis and renowned for his wealth in oxen, of which he fed 3000 head in his stables. The cleansing of these stables, from the accumulations of years, in a single day, was one of the labors imposed on Hercules by Eurystheus. The hero bargained with Augeas for a tenth of the oxen as his reward, and then turned the rivers Alpheus and Peneus through the mass of ordure, thus accomplishing his promise. When Augeas refused to pay the stipulated wages, a war ensued and Augeas was slain by Hercules. The fable of the Augean stables serves as an allusion to political corruption. See HERCULES.

AUGEREAU, ôzh'rō', PIERRE FRANÇOIS CHARLES, DUKE OF CASTIGLIONE (1757–1816). A marshal and peer of France. He was born at Paris, of humble parentage, and after serving some time in the French carabineers, he entered the Neapolitan service, in which he remained until 1787, when he settled in Naples as a fencing master. With other French residents he was banished from that city in 1792 and immediately volunteered in the French Revolutionary army. In less than three years he was made general of a brigade. In Bonaparte's Italian campaign of 1796 he greatly distinguished himself in the field and in council. He took an active part in the battles of Millesimo, Ceva, Lodi, Castiglione (from which he received his title), Roveredo, and Bassano. In 1797 he was appointed to the command of the Army of the Rhine; but within a few months the Council of Five Hundred, not liking the spirit he displayed there, made him commander of the Tenth Division, at Perpignan. This post he resigned in 1799, when he was elected to the Council of Five Hundred. In 1800 he received the command of the army in Holland and was active in several engagements. In 1804 he was made a marshal. He fought at Wetzlar, Jena, Eylau, in Italy (1809), in Spain (1810), and at Leipzig (1813). During the campaign of 1814 he disappointed the expectations of Napoleon, who had placed great trust in him. Mistrusted by the restored Bourbons, he lived in retirement on his estate till his death in 1816. His character was far from admirable; he was rough, cruel, and selfish; he plundered shamelessly and bought plunder at reduced rates from his men. But he was a brilliant leader and a fearless soldier in the field.

AU'GERSHELL. The general English name of gastropod mollusks of the family Terebridæ, suggested by their elongated, sharply pointed spiral form, and solid substance (see Plate of ABALONE, ETC.). They appear by their dentition to be related to the cones and pleurotomes, but otherwise are very distinct, having a very small body and short siphon, proportionately, with the foot short and rounded in front and elongated behind, tipped with a small operculum. They are carnivorous, and the eyes in many species are almost invisible and in all are borne upon minute stalks. More than 200 species are known, most of which are inhabitants of the tropical seas and of the South Pacific. The shells are slender, acuminate, sometimes several inches in length, and often very solid, with flat whorls ornamented with spiral sculpturing, and usually variegated with red, brown, and orange spots and stripes. They occur all the way from the shore to rather deep water, creeping on the bottom in search of prey. The history of the family goes back to the Miocene period.

AUGER. See BORING MACHINERY.

AU'GERWORM'. The larva of the British goat moth (q.v.).

AUGIER, ô'zhyâ', EMILE (1820–89). Probably the greatest French dramatist of the nineteenth century. When comedy was in danger of being stifled between the vaudeville of Scribe and the sensational drama of the Romanticists, he, with the younger Dumas, raised it to a more vigorous, realistic life, and a truer contemporary morality than it had known since Molière. Augier was born at Valence, Sept. 17, 1820, and at first practiced law; but he inherited from his grandfather, Pigault-Lebrun, a prolific though mediocre novelist, a bent for literature, and wrote, while still in a notary's study, *Charles VII à Naples,* which was a failure. *La ciguë,* acted in 1844, showed promise and was approved by Ponsard. It achieved success and decided the dramatist's career. It was a Greek play, graceful, witty, and like *Le joueur de flûte,* written also at this time, though not acted until 1850, it pleads, in easy verse, the cause of the courtesan redeemed by love, which his later prose dramas eloquently condemn. *L'aventurière* (1848) presents the same theme in a French setting and was rewritten to suit his later position in 1860. He was still feeling his way, and is next found collaborating with Alfred de Musset in *L'habit vert* (1849), a trifle, and, like *Le postscriptum* (1869), a failure. Then, with *Gabrielle* (1849), begins Augier's second manner. In this "domestic drama" he becomes the champion of average, conventional ethics, allaying the calculations of interest to the language of sentiment, as the Romanticists had never done. From this position *Diane* (1852) shows a momentary recoil, *Philiberte* (1853) a slight advance, and *La pierre de touche* (1853) a decided progress, thanks, perhaps, to the collaboration of Sandeau, who also furnished the plot for *Le gendre de M. Poirier* (1885), Augier's first great drama, thought by many the greatest since Beaumarchais's *Mariage de Figaro.* It is a model comedy of manners, its comic force resting wholly on the interplay of characters, every one of whom is drawn to and from the life, without idealism and yet with no touch of bitterness, such as is felt in Augier's *Ceinture dorée* (1855), a satire of conventional marriage and the stock exchange, foreshadowing his great series of social satires that begins with *Les effrontés* (1861).

Progress toward sterner ethics may be noted in *Le mariage d'Olympe* (1857), which earned Augier his election to the Academy. *La jeunesse* (1858) is insignificant, but *Les lionnes pauvres* (1858) contains, in the cold, cowardly, and perverse Séraphine, Augier's greatest female charac-

ter, and verges on tragedy in the dread of destiny that it rouses at the close. *Un beau mariage* (1859) completes the cycle of "domestic dramas," and *Les effrontés* (1861) turns to the corrupting of society through the struggle for unearned wealth. Here Vernouillet is the typical speculator, and Giboyer the typical venal wit, who, in *Le fils de Giboyer* (1862), becomes a hardly disguised portrait of the clerical journalist, Louis Veuillot (q.v.). In no drama of Augier's is the interest more unflagging, the irony more caustic, and the dialogue more sparkling, than in this triangular struggle between a decaying aristocracy, a vain plutocracy, and the unscrupulous exploiters of both. The dramas that follow hardly reach this height. *Maître Guérin* (1864) is a fine study of the tricky country lawyer; *Paul Forestier* (1868) is insignificant; *La contagion* (1866) and *Lions et renards* (1869) elaborate the theme of *Les effrontés*, and show in Estrigaud a type of the Parisian *blagueur*. After the Franco-German War Augier wrote the patriotic but prosaic *Jean de Thommeray* (1873), *Madame Caverlet* (1876), dealing with divorce, and *Les Fourchambault* (1878), which pushes the illegitimate son to the front and marks by its melodramatic sentiment the beginnings of a reaction from literary naturalism. Augier's style is vigorous, often daring, in its use of new words and even of slang. His moral earnestness makes him at times harsh; but he looked at the world with the honest sympathy of an upright and sincere student of nature. He died at Croissy, Oct. 25, 1889. Consult: Parigot, *Emile Augier* (Paris, 1890); Lacour, *Trois théâtres* (Paris, 1880); Matthews, *French Dramatists* (New York, 1881); Doumic, *Portraits d'écrivains* (Paris, 1894); Gaillard, *Emile Augier et la comédie sociale* (Paris, 1910), and Wells in his *Modern French Literature* (Boston, 1899).

AUGITE, ą'gīt. See PYROXENE.

AUG'MENTA'TION, IN HERALDRY. See HERALDRY.

AUGMENTATION. In music, the repetition of a theme in such a manner that each note is increased to double its original value. Augmentation occurs most frequently in the fugue, but also has its value in the free style of writing. For augmentation of intervals, see INTERVAL.

AUGSBURG, ougz'bŭrk (Lat. *Augustus*, the Roman Emperor who built it + Ger. *Burg*, fort, stronghold; anc. *Augusta Vindelicorum*, Augusta of the Vindelici). Capital of the Bavarian government district of Suabia and Neuberg, situated in lat. 48° 21′ N., long. 10° 54′ E., 39 miles west-northwest of Munich by rail (Map: Germany, D 4). It is situated about 1600 feet above sea level on a point of land formed by the junction of the Wertach and Lech rivers, and has a mean annual temperature of about 45° F. It consists of the inner town and six suburbs, and in spite of the fact that its ancient fortifications have been removed, and their place taken by broad avenues and squares, the town still presents a distinctly mediæval appearance, the Jacober Strasse, a continuation of the Barfüssergasse, being rich in buildings of the sixteenth and seventeenth centuries. The main thoroughfare is the handsome Maximilianstrasse, lined with numerous interesting buildings. Several of the churches are fine Gothic structures, notably the cathedral, begun in 995 as a Romanesque basilica, but altered in the fourteenth century to the Gothic style, with fine bronze doors, old stained-glass windows, and several altarpieces by Holbein the Elder. Among the others may be mentioned the church of St. Anna, dating from the fourteenth century, with several valuable altarpieces; and the beautiful memorial chapel of the Fugger family; the two churches (Roman Catholic and Protestant) of St. Ulrich, the former being particularly rich in ornamental metal work; and the church of the Holy Cross, dating from the twelfth century. The most notable of the secular buildings is the handsome Renaissance Rathaus, built in 1615–20, by Elias Holl, and containing the famous so-called Golden Hall, one of the finest in Germany; the former palace of the prince-bishops in which in 1530 the Augsburg Confession was presented to the Emperor; and the Fugger House, with rich frescoes, illustrating the history of the town. There is a royal picture gallery, containing a number of paintings belonging to the old German school as well as several specimens of early Dutch masters. There are also a number of learned societies, a city library with 200,000 volumes, and a collection of archives containing many valuable documents relating to the early history of Germany. The town is celebrated for its numerous beautiful fountains. It contains a fine theatre, opened in 1877, and publishes six daily newspapers. Charitable and benevolent institutions are numerous, and some of them were founded in the beginning of the thirteenth century. Augsburg increased considerably in industrial importance during the nineteenth century. It contains large cotton and woolen mills, and machine shops, and manufactures acetylene gas, paper, chemicals, jewelry, and leather. Pop., 1890, 75,523; 1900, 89,109; 1910, 102,487, mostly Roman Catholic.

Augsburg was founded about 14 B.C. It was laid waste by the Huns in the fifth century, by Charlemagne in the eighth, and by Welf of Bavaria in the eleventh; it rose each time only to greater prosperity. In 1276 it became a free city of the Empire, and reached the summit of its prosperity toward the end of the fourteenth century. About this time (1368) its aristocratic government was set aside for a democratic constitution, which lasted for 170 years, till the aristocracy, favored by Charles V, regained the ascendency. At the time of the Reformation it was one of the most flourishing cities of Europe, preëminent in commerce, manufactures, and art. By the side of Nuremburg it was an emporium of the trade between northern and southern Europe, and its merchants were princes whose ships were in all seas. (See FUGGER, WELSER.) It was also the centre of German art, as represented by the Holbeins, Burgkmair, Altdorfer, and others. Many diets of the Empire were held in Augsburg, and the leading events of the Reformation are associated with its name. (See AUGSBURG CONFESSION.) The discovery of America, and of the road to India by the Cape, together with its sufferings during the Thirty Years' War, destroyed the town's prosperity. It lost its freedom with the abolition of the German Empire in 1806 and was incorporated with Bavaria. Consult: *Die Chroniken der schwäbischen Städte, Augsburg* (Leipzig, 1865–96); Lewis, "The Roman Antiquities of Augsburg and Ratisbon," in vol. xlviii, *Archæological Journal* (London, 1891); Werner, *Geschichte der Stadt Augsburg* (Augsburg, 1900).

AUGSBURG CONFES'SION. The chief credal statement of faith in the Lutheran church.

Its history is the following: With a view to an amicable arrangement of the religious split that had existed in Germany since 1517, Charles V, as protector of the Church, had convoked a diet of the Empire, to meet at Augsburg, on April 8, 1530, and had required from the Protestant States a brief summary of the doctrines in which they differed from the Catholic church. The Elector John, of Saxony, therefore, in March, called on his Wittenberg theologians—Luther, Melanchthon, Justus Jonas, and Bugenhagen—to draw up articles of faith. They took as a basis, in so far as pure doctrine was concerned, articles signed at the Colloquy of Marburg (Oct. 1–4, 1529) with the Zwinglians, substituting a strictly Lutheran one on the Lord's Supper, which had been adopted at Schwabach shortly after (October 16). These doctrinal articles, supplemented and with a practical part newly added, were laid before the Elector at Torgau (March, 1530). The Diet of Augsburg was opened June 20, 1530; but Melanchthon had arrived there on May 2, and on the way had begun the famous Confession. This he finished in Augsburg, using as material the articles mentioned and various other papers, besides frequently consulting with Luther, who stayed at Coburg; since, being under the Imperial ban, he was technically an outlaw, and could not safely attend the Diet. The document was first entitled an *Apology*, as if Lutheranism was on the defensive. It was also originally intended to be merely the reply of the Elector of Saxony, but it was so shaped as to be acceptable to all the princes and cities that had accepted Lutheranism in their Confession of Faith. It was a work of infinite labor and reflected the highest credit on Melanchthon. Luther heartily indorsed it. At last, on Saturday, June 25, 1530, it was formally presented to the Emperor in the private chapel of the Episcopal Palace, where the Diet met. It was in both Latin and German and was read aloud in German. But neither original was ever seen again by the Protestants, and both have probably perished.

The Augsburg Confession consists of these parts: I. Preface to the Emperor Charles V. II. Chief Articles of Faith: (1) Of God; (2) Of original sin; (3) Of the Son of God; (4) Of justification; (5) Of the ministry of the Word; (6) Of new obedience; (7–8) Of the Church; (9) Of baptism; (10) Of the Lord's Supper; (11) Of confession; (12) Of repentance; (13) Of the use of sacraments; (14) Of ecclesiastical order; (15) Of ecclesiastical rites; (16) Of civil matters; (17) Of Christ's second coming to judgment; (18) Of free-will; (19) Of the cause of sin; (20) Of faith and good works; (21) Of the worship of saints. III. Articles in which are recounted the abuses which have been corrected. (22) Of both kinds in the Lord's Supper; (23) Of the marriage of priests; (24) Of the mass; (25) Of confession; (26) Of distinction of meats; (27) Of monastic vows; (28) Ecclesiastical power. The document was signed by the Elector of Saxony, the two Dukes of Lüneburg, the Duke of Saxony, the Margrave of Brandenburg, the Landgrave of Hesse, the Prince of Anhalt, the Senate and Magistracy of Nuremberg, and the Senate of Reutlingen.

Melanchthon, not looking upon the Confession as binding, began shortly after to make some alterations in its expressions; at last, in 1540, he published a Latin edition (*Confessio Variata*), in which there were important changes and additions. This was especially the case with the article on the Lord's Supper, in which, with a view to conciliation, he endeavored to unite the views of the Lutherans and Calvinists. This gave rise subsequently to much controversy. Orthodox Lutheranism repudiated the alterations of Melanchthon and long continued to subject his memory to great abuse; though it is clear that Melanchthon and his adherents contemplated no substantial departure in doctrine from the original Confession. Consult Jacobs, *The Book of Concord* (Philadelphia, 1882) for the Augsburg Confession, its documents, and full discussion; Schaff, *Creeds of Christendom*, text in vol. iii, history in vol. i (New York, 1884). The text is also published in pamphlet form by the General Synod of the Lutheran Church in the United States (Philadelphia).

AUGSBERG IN'TERIM. See INTERIM.

AUGUR. See AUGURIES.

AU'GUR, CHRISTOPHER C. (1821–98). An American soldier. He graduated at West Point in 1843, served as aid-de-camp to Generals Hopping and Caleb Cushing during the Mexican War, and took an active part in the campaign against the Oregon Indians in 1856. He was appointed brigadier-general of volunteers in 1861, was severely wounded at Cedar Mountain (Aug. 9, 1862), was promoted major-general in the same month, and subsequently commanded the departments of Washington (1863–66), of the Platte (1867–71), of Texas (1871–75), and of the Gulf (1875–78). In 1886 he retired from the military service. Consult E. P. Augur, *The Augur Family* (Middletown, Conn., 1904).

AUGUR, HEZEKIAH (1791–1858). One of the pioneers of American sculpture. He was born in New Haven, Conn., the son of a carpenter, in whose workshop he developed his remarkable talent for wood carving. At his father's wish he became successively a cobbler, grocer's clerk, and a merchant, until the bankruptcy of his firm. He then kept a fruit stand, all the time executing wood carvings for his own pleasure. Finally, several inventions, including a machine for making worsted lace, another for carving piano legs (by a process still in use), and the well-known bracket saw, relieved him from financial stress and enabled him to devote the rest of his life to his beloved art. On the advice of Professor Morse, president of the National Academy of Design, he took up sculpturing in marble. His marble bust of Chief Justice Ellsworth is in the United States Supreme Court, Washington, and his principal production, the so-called group, really two statues, of "Jephtha and his Daughter" is in the Trumbull Gallery, Yale University. With all their defects, due to lack of technical training, these statues show remarkable ability and cause deep regret that the sculptor had not been born at a time and under circumstances more propitious to the arts. Consult E. P. Augur, *The Augur Family* (Middletown, Conn., 1904).

AU'GURIES and **AUS'PICES** (cf. Lat. *augur, augurium, auspex, auspicium*). These terms are familiar to every reader of Roman history, and are, besides, so frequently employed in English in a secondary and metaphorical sense, that a vague notion of their original meaning is caught up even by those who know nothing of classical antiquities. As, however, the entire religious and political life of the early Romans was deeply penetrated by the influence of their sacred superstitions, and as among these augur-

ies and auspices held a prominent place, a clear conception of what they were is a matter of considerable moment.

Like most primitive nations, the Romans believed that every unusual occurrence had a supernatural significance, and contained, hidden in it, the will of Heaven regarding men. To reveal or interpret this hidden will, as relating to some definite matter, was the privilege of the *augur*, whose name is probably contracted from *avi-ger* (cf. *avis*, 'a bird'), though the meaning of the second element is not clear. The augur was also called, in early times, *auspex*, 'observer of birds' (cf. *avis*, and *specio*, 'look at'), but this name fell into disuse. The augur must be distinguished from the *pontifex*, who directed the religious ritual; also from the *haruspex*, and other prophets, who predicted future events. It was the duty of the augur to determine whether the gods were propitious to a course of action already determined or in progress. Private augurs seem to have existed in the early days; but we are best informed about the public augurs—interpreters of Jupiter Optimus Maximus, as Cicero calls them. The origin of the *collegium augurium*, or 'college of augurs,' is lost in the myths of early Rome; but it is known that, by the Ogulnian law of 300 B.C., five of the nine public augurs must be plebeians, and it seems probable that the original number was three, representing the three early tribes. For more than 200 years the number continued the same, till Sulla, in 81 B.C., increased it to 15. Until 103 B.C. the vacancies seem to have been filled by the college itself; but at that date a more complicated process was introduced, whereby the candidates were nominated by the college, and elected at an assembly of 17 tribes chosen by lot from the 35. Under the Empire this election was transferred to the Senate, but in general vacancies seem to have been filled by the mere recommendation of the Emperor. The last-known augur, L. Ragonius Vetustus, is mentioned in an inscription of 390 A.D. The rank of the augurs was high, and the position was sought by the leading men of the state. It was held for life, and was not inconsistent with the holding of other religious and civil offices. The augurs were one of the four great priestly colleges ranking after the *pontifices*, but before the *decemviri* and *flamines*. They had special seats at the games and a regular income from public lands. Their insignia were the *lituus*, a staff free from knots and with curved head, and the *trabea*, a form of the toga with crimson border and crimson stripes. The augurs solemnly *inaugurated* the new augurs and the flamines, and possibly other officials, inquired about "the safety of the Roman people" at certain definite times, and consulted the gods regarding the harvest. In historic times their most important function was taking the *auspices* in connection with almost any action of the state. This rapidly became a mere religious fiction, to be used to promote or prevent action, according to the wishes of the ruling powers.

Auguries might be of two kinds: (1) "sought" (*impetrativa*), where the observer asked the gods for the sign desired; (2) *oblativa*, where they were unexpected. The modes of divination employed by the augurs, aside from the examination of the entrails of the sacrificial victims, which was done commonly by the *haruspices*, were five in number: (1) *augurium ex cœlo;* (2) *ex avibus;* (3) *ex tripudiis;* (4) *ex quadrupedibus*, and (5) *ex diris*. The first, relating to the interpretation of the celestial phenomena, such as thunder and lightning, falling stars, etc., was held to be of supreme significance, especially in state matters. Thus lightning seen from the left was favorable. The second related to the interpretation of the noise and the flight of birds. It was not every bird, however, that could be a sure messenger of the gods. Generally speaking, those "consulted," as it was called, were the eagle, vulture, crow, raven, owl, and hen. The first two belonged to the class of *alites* (cf. *ala*, 'a wing'), or birds whose flight revealed the will of the gods; the last four to the class of *oscines* (cf. *cano*, 'to sing'; the first element is akin to *omen*, 'a sign'), whose voice revealed the divine will. These two modes of augury were the oldest and most important, though the latter passed almost out of use in historic times. The appeal to the birds was the one most frequently made by ordinary persons. Of the other three, the auguries *ex tripudiis* were taken from the feeding of the sacred chickens. Grain was thrown before the sacred chickens, kept in a cage; if the birds ate readily, without allowing any grains to fall from their mouths, the omen was favorable. The auguries *ex quadrupedibus* were derived from four-footed animals within the limits of a "temple" marked for the purpose (see below); the auguries *ex diris* (a vague kind of augury), from any accidents or occurrences during the taking of the omens. These were usually unfavorable and required the abandonment of the undertaking. Such *dirœ*, e.g., the stumbling of a general's horse, might also occur outside of the "temple," and must be obeyed. They fell within the class of *auspicia oblativa*. Their interpretation was the task, usually, of the pontifices rather than of the augurs.

The ground on which the augur stood was solemnly set apart for the purpose, and was called a *templum*, a 'temple.' Between midnight and dawn, usually, the augur took a wand, and marked out the heavens into four regions—*front, rear, right, left*. According as the signs appeared in one or the other of these divisions were the auspices favorable or unfavorable. Signs in the east were, to the Romans as to the Greeks, favorable. The Roman augur, facing *south*, found signs on his *left* favorable: hence the Latin word *sinister*, 'left,' properly means 'favorable.' The Greek augur, on the other hand, facing *north*, found signs on his *right* favorable. The Roman poets frequently adopt the Greek point of view (along with the Roman), and so use *dexter*, 'right,' 'on the right,' in the sense of 'favorable,' and give to *sinister* the meaning of 'unfavorable,' an interesting perversion of meaning which has persisted in its English derivative 'sinister.' How vast the political influence and authority of the augurs must have been is seen from the fact that almost nothing of any consequence could take place without their sanction and approval. The election of every important ruler, consul, dictator, or prætor, every civic officer, every religious functionary, was invalid if the auspices were unfavorable. No general could lawfully engage in battle unless the auspices were first taken, while the Comitia of the Centuries could be dispersed at a moment's notice by any member of the augural college on the ground of an unfavorable omen.

We have employed the two terms, "auguries" and "auspices," as synonymous. But a slight difference is perceptible between them; not the

augurs only, but the chief magistrates of Rome, held the "auspices," while the "auguries" were exclusively in the possession of the former; but the mode of divination and the end to be obtained by it seem to have been the same in both cases, though in the field the method *ex tripudiis* was most common, because of its simplicity.

The right of taking the auspices in war was confined to the commander-in-chief, and any victory gained by a legate was said to be won under the auspices of his superior, and the latter alone was entitled to a triumph. Hence has originated the very common phrase in our language, "under the auspices" of some one, which usually denotes nothing more than that the person alluded to merely lends the influence of his name. Consult: Bouché-Leclercq, *Histoire de la divination dans l'antiquité* (Paris, 1881–82); Wissowa, "Augures" and "Auspicium," in Pauly-Wissowa, *Realencyklopädie der klassischen Alterthumswissenschaft* (Stuttgart, 1896).

AU'GUST. See MONTH.

AUGUST, ou'gust, EMIL LEOPOLD (1772–1822). Duke of Saxe-Gotha and Altenburg. He succeeded his father, Ernst II, in 1804. He was a great patron of science and art, and founded the famous Chinese Cabinet in the Museum of Gotha. He wrote a series of songs and idyls entitled *Kyllenikon, oder Auch ich war in Arkadien* (1805).

AUGUST, FRIEDRICH WILHELM HEINRICH, Prince of Prussia (1779–1843). A general of infantry and inspector-general and chief of cavalry. He was born at Friedrichsfelde and was a nephew of Frederick the Great. He rendered conspicuous services during the Napoleonic War, but was captured at Prenzlau and sent to France, where he was detained as a prisoner of war for 13 months. He fought in the battles of Dresden, Kulm, Leipzig, Montmirail, and Paris, and his famous brigade repeatedly decided the victory. As commander of an army corps, he captured most of the important fortresses on the northern frontier of France in 1815. He is said to have been deeply enamored of Mademoiselle Récamier, whom he had met during his captivity in France at the house of Mademoiselle de Staël and whom he would have married but for political and religious reasons.

AUGUS'TA. See AGOSTA.

AUGUSTA. A city, and the county-seat of Richmond Co., Ga., on the Savannah River, 221 miles from its mouth, at the head of navigation, altitude from 140 feet above sea level in the main business section to about 450 feet at the highest residential section; lat. 33° 28′ N., long. 81° 54′ W., by rail 132 miles northeast of Macon, 138 northwest of Charleston, S. C., 83 southwesterly from Columbia, and 17 from Aiken. There is also an electric line to Aiken, which eventually is to be extended to Columbia. Two foot bridges and two railroad bridges span the river, which is about 300 yards wide.

Augusta is the greatest cotton-manufacturing centre in the Southern States, the second largest interior cotton market. It received over 550,000 bales in the season of 1911–12. It has many warehouses, one with a capacity of over 100,000 bales. The Augusta Canal, which furnishes from the river the city's water supply and about 12,000 horse power for manufactures, is 9 miles long, 150 feet wide, and 11 feet deep. The cost of its construction, including its enlargement, was about $1,500,000. It is under municipal operation, and Augusta is said to be the only city in the Union where the net income from its public-service properties—water works and power plant—pays the interest charges on its entire debt and the salaries of its officials.

A recently established hydro-electric plant will furnish 30,000 horse power, and the completion of another that is contemplated will add greatly to this. To protect the city from overflows from the river a levee was being built in 1914, upon the construction of which about $3,000,000 was to be spent. A barge line has been established for the carriage of freight by the river, thus giving an all-water route to and from Eastern markets. This, and nine railroads, give Augusta great commercial advantages.

Besides its numerous and extensive cotton factories, from which it gets its name of "the Lowell of the South," Augusta has sash, door, and blind factories, flour mills, wagon works, iron works, brickyards, lumber plants, etc. The principal structures being erected in 1914 were the Empire Life Insurance building, the Augusta Chronicle building, the new government building, for the post office and United States court. A handsome granite building for the Citizens and Southern Bank was erected in 1913.

Augusta has seven banks—the Georgia Railroad Bank, Citizens and Southern, Planters Loan and Savings, Augusta Savings, National Exchange, Merchants, Union Savings—the total capital, surplus, and undivided profits aggregating about $4,500,000; total deposits, nearly $10,000,000. All are members of the Augusta Clearing House Association.

The chief educational institutions are the Medical College, Richmond Academy, Tubman High School (with excellent library), Houghton Institute, Summerville Academy, Sacred Heart College, St. Joseph's and St. Mary's and Sacred Heart academies. Paine College, supported by the M. E. Church, South, is for the training of negro teachers and preachers; Haines Normal and Industrial (or "Lucy Laney") School, and Walker Baptist Institute are negro schools conducted by negro teachers. The public-school system is well supported. There are several commercial schools, two public libraries, a good Y. M. C. A. building; and two daily newspapers—the *Chronicle* (morning), and the *Herald* (evening). The former is the oldest newspaper in the South.

The Medical College, a part of the State University, was incorporated in 1828. The University Hospital, a splendid new edifice, combining two preëxisting institutions in one, and the Wilhenford Hospital for Children, stand on the Medical College grounds (formerly the Orphan Asylum grounds). The Pine Heights Sanatorium (North Augusta) and the Margaret Wright Hospital are excellent private institutions. Among the charitable institutions are the Orphan Asylum, and Widows' Home; and there is an Associated Charities organization.

Richmond Academy is the oldest existing chartered school in Georgia and one of the oldest in the Southern States. Its statutory creation dates from 1783, its organization from 1785.

The Merchants' and Manufacturers' Association and the Georgia-Carolina Fair Association are leading business organizations, the latter holding an annual fair. Among the patriotic and social societies are Colonial Dames, Daughters of the American Revolution, Daughters of the Confederacy, Commercial Club, and Country Club. The golf links of the Country Club are very popular with Augusta's winter visitors.

The city government is composed of a mayor, whose term is three years, and 18 councilmen, three from each ward for a term of three years, one-third being elected each year. The mayor appoints the superintendents of canal and water works, and of streets and drains, the nominations to these positions being subject to confirmation by the town council, whilst other offices are filled by popular election. The police force numbers 91, officers and privates, and there is a finely equipped fire department. Both police and fire departments are governed by a civil-service board. Pop., 1860, 12,493; 1880, 21,891; 1890, 33,300; 1900, 39,441; 1910, 41,040; 1920, 52,548. The city limits have been enlarged since 1910, and the population was estimated at the close of 1913 to be about 50,000.

Augusta was founded in 1735 by Oglethorpe, the founder of the Colony of Georgia, and was named for the daughter-in-law of George II. It is finely laid out, with broad, beautifully shaded streets, and it is one of the most popular winter resorts in the United States. From its beginning it was a great mart for the white settlers and the Indians of that region, and a meeting place for conferences and negotiations between them. It was an important military post before and during the Revolutionary War, and some of the most stubborn and heroic fighting of that war took place there and in the surrounding regions of Georgia and South Carolina. It was captured twice by the British forces, and recaptured finally in 1781 by the Americans under the command of General Pickens and Lieut.-Col. Henry Lee, father of Robert E. Lee. Fort Cornwallis, where the main British force was posted, stood where now stands St. Paul's Church. Fort Grierson, with a smaller British force, stood at Hawkes' Gully, only half a mile away. Not far from there is "Meadow Garden," the home of George Walton, a signer of the Declaration of Independence. A monument to him and the other Georgia signers stands on Greene Street. There are monuments on the same street to the poets Richard Henry Wilde, Paul Hayne, Sidney Lanier, Father Ryan, and James R. Randall, and one to Col. Samuel Hammond, a Revolutionary soldier. On Broad Street there is an imposing monument to Confederate soldiers, with marble statues of Generals Lee, Jackson, Walker, and Cobb, and crowned with one of a private soldier, heroic size. A bronze statue has been erected in Barrett Plaza to Patrick Walsh, a former mayor and United States Senator. The Southern Confederacy's powder works were located at Augusta, and their tall chimney still stands to mark the site.

For a while during and after the Revolution Augusta was the capital of Georgia, and it was there that the Federal Constitution was ratified by that State in January, 1788.

AUGUSTA. The capital of Maine, and the county-seat of Kennebec County. It is situated mainly on the west bank of the Kennebec River, 45 miles from its mouth and 74 miles by rail southwest of Bangor (Map: Maine, C 3); is on the Maine Central Railroad, and has connection by steamer with Portland (from which it is 62 miles distant), Boston, and other important cities. It has excellent water power—the Kennebec Dam, 17 feet high and nearly 600 feet long. The most extensive products are lumber, cotton goods, pulp, and paper. Augusta is built on ground rising considerably above the river level, and contains several imposing buildings—the State House, built of granite, and affording a beautiful view from its dome; the City Hall, post office, State Insane Asylum. The city has also a soldier's monument, two hospitals, and two libraries—the Lithgow Library (public), of 8000 volumes, and the State Library, of 60,000 volumes, located in the Capitol. The administration is vested in a mayor and a bicameral council, with the usual subordinate officials. Though trading stations were established here very early, the permanent settlement of the city dates from 1754, when the Plymouth Company built Fort Western. Settlers began to come in 1762, and the place was known as Cushnoc (from the Indian village formerly situated there) until 1771, when it was incorporated as Hallowell. From part of Hallowell a new town was created in 1797, called Harrington at first, and then Augusta. It became the capital of the State in 1831 and was incorporated as a city in 1849. Pop., 1880, 8665; 1890, 10,527; 1900, 11,683; 1910, 13,211; 1920, 14,114. Consult North, *History of Augusta* (Augusta, 1870).

AUGUSTA (Lat. fem. of *Augustus*, majestic, venerable). An honorary name bestowed upon women of the Roman Emperor's household as their greatest possible distinction. Livia was the first to receive it. It was sometimes even given to the Emperor's concubines. See CONSTANTINE; AUGUSTUS.

AUGUSTA, *Ger. pron.* ou-gus'tä, MARIE LUISE KATHARINA (1811–90). Queen of Prussia and German Empress, the daughter of Charles Frederick, Grand Duke of Saxe-Weimar. She was brought up at the court of her grandfather Charles Augustus, where she was intimately acquainted with Goethe. On June 11, 1829, she married William, Crown Prince of Prussia, afterward the Emperor William I. She was admired for her culture and beloved for her benevolence.

AUGUSTA IULIA GADITANA. See CADIZ.

AU'GUSTA'LIA. Games in honor of Augustus, held on August 1, September 23 (the birthday of Augustus), and October 3–12.

AU'GUSTA'NA COL'LEGE AND THE'OLOG'ICAL SEM'INARY. Founded at Chicago, in 1860, by the Augustana Synod of the Evangelical Lutheran Church. It removed to Paxton, Ill., in 1863, and to Rock Island in 1875. The institution is co-educational except in the theological department. The library contains 20,000 volumes. The number of students distributed among the various departments is as follows: Theological, 90; collegiate, 136; academic, 188; business, 157; and music and art, 283. President, Gustav Andreen, Ph.D.

AUGUS'TAN AGE. The period of highest literary activity in Rome, under the patronage of Augustus and his adviser Mæcenas. At that time the Latin language was in its perfection, and men of letters were held in the highest honor. It was the period of Vergil, Horace, and Ovid. The term "Augustan Age" is also extended to apply to other periods of literary brilliancy, as the age of Addison, Swift, and Steele, in England, and Louis XIV's reign in France.

AUGUSTAN BAND, THE. See AUGUSTUS' BAND.

AUGUSTAN HIS'TORY (Lat. *Historia Augusta*). The usual title of a collection of biographies of Roman emperors and usurpers from Hadrian to Numerianus (117–284 A.D.), written by six authors, late in the third or early

in the fourth century. The six *Scriptores Historiæ Augustæ* are Ælius Spartianus, Julius Capitolinus, Ælius Lampridius, Vulcacius Gallicanus, Trebellius Pollio, and Flavius Vopiscus. The memoirs are important for matters of fact, in spite of later interpolations and forged documents, but their literary character is poor. A great deal of curious anecdote and much unauthenticated scandal are collected in these lives. The best edition is by H. Peter (Leipzig, 1884); there is an old translation by Bernard (London, 1740). Consult: H. Peter, *Die Scriptores Historiæ Augustæ* (1892); C. Lécrivain, *Etudes sur l'histoire Auguste* (1904); E. Kornemann, *Kaiser Hadrian und der letzte grosser Historiker von Rom* (1905); O. Schulz, *Das Kaiserhaus der Antonine und der letzte Historiker Roms* (Leipzig, 1907).

AUGUSTA TAU'RINO'RUM. Anciently, the capital of the Ligurian Taurini; the modern Turin.

AUGUSTA TREV'IRO'RUM. The modern Treves (Ger. Trier); in ancient times the capital of the Treviri.

AUGUSTA VINDEL'ICO'RUM. The name bestowed by Augustus upon the chief seat of the Vindelici; the modern Augsburg.

AUGUSTE, ou-gus'te, **VICTORIA** (1858—). German Empress and Queen of Prussia. She was born at the castle of Dolzig, the eldest daughter of Frederick, Duke of Schleswig-Holstein-Sonderburg-Augustenburg, and of Princess Adelheid of Hohenlohe-Langenburg. She was married to Prince William of Prussia—afterward William II of Germany—Feb. 27, 1881. She became known as a patroness of many charitable enterprises and published a book entitled *Erinnerungsblätter an die Palästinafahrt* (1898), which contains a record of her memorable journey through Palestine in company with Emperor William in 1898. Consult E. Evers, *Auguste Viktoria* (3d ed., 1897).

AU'GUSTINE—often called AUSTIN—SAINT (?–604 or 613). First Archbishop of Canterbury. He was originally a monk in the convent of St. Andrew at Rome and became its prior. In 596 he was sent, along with other monks, by Pope Gregory I, to convert the Anglo-Saxons to Christianity and establish the authority of the Roman see in Britain. They got as far as Aix in Provence and there, testified by the reports they heard about the wildness of the Britons, desired to turn back and dispatched Augustine to Rome for permission to do so; but Gregory sent him with a firm but kindly letter to rejoin his company and ordered them to continue on their journey. At the same time he wrote to the Frankish clergy and rulers to share in the enterprise. So, in the spring of 597, Augustine and about 40 companions landed on the Isle of Thanet, in the extreme southeast of England, but at what point is uncertain. The missionaries were kindly received by Ethelbert, King of Kent, whose wife, Bertha, daughter of Charibert, King of Paris, was a Christian, and had Liudhard, Bishop of Senlis, in her suite as chaplain. A residence was assigned to them at Canterbury, then called Durovernum, where they devoted themselves to monastic exercises and preaching. The conversion and baptism (Whitsunday, June 2, 597) of the King contributed greatly to the success of their efforts among his subjects.

In 597 he went to Arles, by direction of the Pope, and was there consecrated Archbishop of Canterbury and Metropolitan of England. On his return he dispatched a presbyter and a monk to Rome to inform the Pope of his success and obtain instruction on certain questions. Gregory's directions with regard to the propagation of the faith are admirable. Thus, instead of destroying the heathen temples, Augustine was recommended to convert them into Christian churches, by washing the walls with holy water, erecting altars, and substituting holy relics and symbols for the images of the heathen gods. Augustine's subsequent efforts to establish his authority over the native British church were not so successful as his missionary labors, owing apparently to his lack of tact. He died in Canterbury, May 26, perhaps 604, though the year is not certain and is sometimes placed as late as 613. His body was removed to the cathedral of Canterbury in 1091. Bede's *Historia Ecclesiastica Gentis Anglorum* is the great authority for the life of St. Augustine. Consult all the documents, in Latin and English, in A. J. Mason, *The Mission of St. Augustine to England* (Cambridge, 1897). The celebration of the 1300th anniversary of Augustine's landing brought out in London in 1897 several volumes upon him—e.g., by E. W. Benson, Father Brou, S.J., G. F. Browne, W. E. Collins. Consult also J. A. Cooke, *Early Churches in Great Britain Prior to the Coming of Augustine* (London, 1897); Stanley, *Historical Memorials of Canterbury* (New York, 1892).

The site and remains of St. Augustine's monastery were purchased in 1844 by Mr. Beresford Hope, by whom they were presented to the Archbishop of Canterbury in trust, for the erection of St. Augustine's Missionary College, at Canterbury, in connection with the Church of England. This institution was incorporated by royal charter in 1848.

AUGUSTINE, SAINT (Lat. *Aurelius Augustinus*) (354–430). Bishop of Hippo, in north Africa, the greatest of the Latin Fathers and one of the most eminent doctors of the Western church. He is called Aurelius Augustinus by Orosius and Prosper of Aquitania. From his autobiographical *Confessions*, and from the biography written by his friend Possidius, we gather the most important facts of his life. He was born in Tagaste, a town in Numidia, Nov. 13, 354, and died in Hippo, Aug. 28, 430, during the siege of that town by the Vandals. His father, Patricius, was a pagan (afterward converted), but his mother, Monica, was a devoted Christian, who labored long and earnestly for her son's conversion and who has been canonized by the Church. Augustine was brought up to be a rhetorician and studied at Tagaste, Madaura, and Carthage. From about the age of 16 until shortly before his conversion, he lived in concubinage, which, along with other youthful irregularities, he afterward bitterly lamented (cf. his *Confessions*, bk. iii). One of the greatest obstacles to his conversion was this state of concubinage, against whose bondage he struggled for a long time in vain; he seemed to be sincerely and deeply attached to the object of his passion, to whom he was faithful for many years. By her he had one son, whom he named Adeodatus ('the gift of God').

The perusal of Cicero's *Hortensius* awakened Augustine to a more serious view of life, and he became an earnest seeker after truth, but experimented with several systems before finally entering the Christian church. For nine years he was a follower of Manichæism (q.v.), a Per-

sian dualistic philosophy then widely current in the Western Empire. With its fundamental principle of conflict between two opposing world powers, symbolized by light and darkness, good and evil, Manichæism seemed to Augustine to correspond to the facts of experience and to furnish the most plausible hypothesis upon which to construct a philosophical and ethical system. Moreover, its demands upon novices (*auditores*) were not strict enough to cause great uneasiness of conscience; witness Augustine's petition recorded in his *Confessions* (viii, 17), "Lord, make me pure and chaste—but not quite yet!" He never advanced to full membership, not becoming one of the *perfecti*. After nine years he abandoned this system, failing after diligent inquiry to find in it the solution of his greatest difficulties. His next stage of development was skepticism.

About this time (383) Augustine left Carthage for Rome. His mother, almost heartbroken at his secret flight, took ship and followed. He did not remain long in the capital, but went on to Milan as a teacher of rhetoric, where he fell under the influence of the Neo-Platonic philosophy, which has so often carried serious thinkers over from doubt to faith, and where he also met the great Bishop Ambrose, who at that time was the most distinguished ecclesiastic in Italy. Augustine presently found himself attracted once more toward Christianity, and asking what answer it had to give to the problems of life. At last, one day, he seemed to hear God saying to him, "Take and read." He turned to the Scriptures and read the words, "Put ye on the Lord Jesus Christ, and make not provision for the flesh, to fulfill the lusts thereof" (Rom. xiii. 14). This decided the question. Augustine resolved to embrace Christianity and to believe as the Church believed. With his natural son he was baptized by Ambrose on Easter Eve, 387. His mother, who had rejoined him in Italy, was rejoiced at this answer to her prayers and hopes. She died soon afterward at Ostia on the return journey to Africa with Augustine.

The remaining 43 years of Augustine's life were devoted to the service of the Church. He returned to Africa, was made presbyter in 391, and Bishop of Hippo in 395, which latter office he held until his death. It was a period of political and theological unrest, for, while the barbarians pressed in upon the Empire, even sacking Rome itself, schism and heresy also threatened the Church. Augustine threw himself into the theological conflict, not from inclination, but from a sense of duty. With voice and pen he waged war, and usually he conquered. The whole of Western Christendom has entered into the fruits of his victories. Besides the Manichæan controversy, Augustine was engaged in two great theological conflicts. One was with the Donatists (q.v.), who held that the purity of the Church forbade receiving back any who had denied Christ under persecution. This Puritan theory Augustine did not share. In the course of this discussion he developed his ecclesiastical and sacramental theories. The other was with the Pelagians, followers of a British monk who disliked the idea of absolute predestination, and related to such doctrinal questions as man's primitive state, the fall, freedom of will, and depravity. In the course of this conflict, which was long and bitter, Augustine developed his theories of sin and grace, of divine sovereignty and predestination. Augustine's doctrine can be treated from two sides, the ecclesiastical and the theological. The Roman Catholic church has found special satisfaction in the former; Catholic and Protestant theology alike are based on the latter. Both Calvin and Luther were close students of Augustine.

He taught that the true Church was characterized by four qualities—unity, holiness, catholicity, and apostolicity. Outside this Church there could be no salvation. It alone was the "ark of safety" in which a perishing world must take refuge through submission to its authority. Convinced of the indispensable necessity of church membership, Augustine finally came to believe it right to coerce the intractable; it was the duty of the Christian state to "compel them to come in." The force doctrine, so repellant to our modern ideas and so fraught with evil in the history of religion, may be found clearly stated by Augustine in his Ninety-third Epistle (408), where he cites the Parable of the Wedding Feast in support of his position, and also in the proceedings of the Synod of Carthage, held in the year 411, which is commonly said to have ended the Donatist schism. Augustine's doctrine stood between the extremes of Pelagianism and Manichæism. Against Pelagian naturalism he held that death came into the world as the result of sin, and that man is saved by divine grace; against Manichæism he vigorously defended free will. A misunderstanding of his position on grace and free will often arises from neglecting to consider that he is at the same time an ardent defender of human freedom against Manichæan fatalism, and the champion of divine grace against the theory of complete human independence.

Augustine was an energetic controversialist, as we have seen. He was also a powerful preacher; but his sermons, owing partly to the great difference between their style and method and that to which we are accustomed, and partly to their fanciful interpretation of Scripture, often disappoint the modern reader. The editors have accepted 363 sermons as genuine, among a much larger number which bear his name. In his great apologetic work, the *City of God*, Augustine appeared in the rôle of seer, unfolding the meaning of the past and the secrets of the future with abundant learning and marvelous fertility of imagination. Ten of the 22 books into which this long work is divided are devoted to refuting the pagan notion that the worship of the gods insures prosperity in this life or in the life to come. The remaining 12 trace the origin, progress, and destiny of the two cities—one of God, the other of this world—with the final triumph of the former, which is the Christian church. Thirteen years of Augustine's busy life (413–426) were occupied with this sublime attempt to construct a Christian philosophy of history. In 428, shortly before his death, Augustine wrote the *Retractions*, in which he registers his final verdict upon the books he had previously written, correcting whatever his maturer judgment held to be misleading or wrong.

The *Confessions* were written in 397; the *Epistles*, of which there are 270 in the Benedictine edition, are variously dated between 386 and 429. Among other important works may be noted his treatise *On Free-Will* (388–395); *On Christian Doctrine* (397); *On Baptism: Against the Donatists* (400); *On the Trinity* (400–416); *On Nature and Grace* (415); and *Homilies* upon several books of the Bible. The Benedictine edi-

tion of Augustine's works is still authoritative (11 vols., Paris, 1679–1700, reprinted in Migne's *Patrologia Latina* and elsewhere); but it is safe to predict that the standard edition will be that now in process of publication under the auspices of the Vienna Academy (in the *Corpus Scriptorum Ecclesiasticorum Latinorum*). The most important of Augustine's works may be read in English in the *Nicene and Post-Nicene Fathers*, first series, edited by Philip Schaff (8 vols., New York, 1886–88). The *Soliloquies* are translated by Cleveland (Boston, 1910). Separate translations of the *Confessions* are numerous, e.g., by W. G. T. Shedd (Andover, 1860) and Charles Bigg (London, 1900). F. R. M. Hitchcock, *St. Augustine's Treatise on the City of God* (London, 1900), is a convenient abstract of the complete work. Consult: "Augustine," in Smith and Wace, *Dictionary of Christian Biography* (London, 1887); Farrar, *Lives of the Fathers*, vol. ii (Edinburgh, 1889); Harnack, *History of Dogma*, Eng. trans. by Neil Buchanan, vol. v (Boston, 1898); Cunningham, *St. Austin and his Place in the History of Christian Thought* (London, 1885); and Harnack, *Augustine's Confessions*, Eng. trans. (London, 1901). For an unfavorable view of Augustine, see A. V. G. Allen, *Continuity of Christian Thought* (Boston, 1894).

AU'GUSTIN'IANS, or AU'GUSTINES. The name given to several religious bodies in the Roman Catholic church. Although St. Augustine never framed any formal rule of monastic life, one was deduced from sermons attributed to him, and was adopted by as many as 30 monastic fraternities, of which the chief were the Canons Regular, the Knights Templar (see TEMPLARS, KNIGHTS), the Begging Hermits, the Friar Preachers or Dominicans (q.v.), and the Premonstratensians (q.v.). The *Canons Regular of St. Augustine*, or *Austin Canons*, appear to have been founded or remodeled about the middle of the eleventh century. Their discipline was less severe than that of monks, but more rigid than that of the secular or parochial clergy. They differed from the monks in being all clericals. They lived together, having a common refectory. Their habit was a long cassock, with a white rochet over it, all covered by a black cloak or hood, whence they were often called Black Canons. In England, where they were established early in the twelfth century, they had about 170 houses at the time of Henry VIII's dissolution of the monasteries, the earliest, it would seem, being at Nostell, near Pontefract, in Yorkshire. In Scotland they had about 25 houses; the earliest, at Scone, was founded in 1114, and filled by canons from Nostell; the others of most note were at Inchcolm, in the Firth of Forth, St. Andrews, Holyrood, Cambuskenneth, and Inchaffray. In Ireland they had 223 monasteries and 33 nunneries.

The *Begging Hermits, Hermits of St. Augustine*, or *Austin Friars*, one of the four great mendicant orders, were a much more austere order, renouncing all property and vowing to live by the voluntary alms of the faithful. They are believed to have sprung from certain societies of recluses who, in the eleventh and twelfth centuries, existed especially in Italy without any regulative constitution. At the instigation, as is alleged, of the rival fraternities of Dominicans and Franciscans, Pope Innocent IV, about the middle of the thirteenth century, imposed on them the rule of St. Augustine, whom they claimed as their founder. In 1256 Pope Alexander IV placed them under the control of a superior or president, called a "general." In 1287 a code of rules or constitutions was compiled, by which the order long continued to be governed. About 1570 Friar Thomas of Jesus, a Portuguese brother of the order, introduced a more austere rule, the disciples of which were forbidden to wear shoes, whence they were called *discalceati*, or "barefooted friars." At the time of the dissolution of the monasteries of Henry VIII they had 32 houses in England. Omitting the discalced brethren the order has to-day 19 provinces throughout the world, 60 monasteries, 275 foundations, and 2050 members. In the United States there are 200 associates.

The degeneracy of the order in the fourteenth century called into existence new or reformed Augustinian societies, among which was that Saxon one to which Luther belonged. After Luther had abandoned the order, and entered upon his course of opposition to the Catholic church, he did not spare his denunciations of his former brethren. After the French Revolution the order was wholly suppressed in France, Spain, and Portugal, and partly in Italy and southern Germany. It has diminished even in Austria and Naples, but is still powerful in America.

The name of Augustinians was given also to an order of nuns who claimed descent from a convent founded by St. Augustine at Hippo, of which his sister was the first abbess. They were vowed to the care of the sick and the service of hospitals. For the English Augustinians consult: Clark, *Customs of the Augustinian Canons* (Cambridge, Eng., 1897); *Augustinian Priories of St. Giles and St. Andrew at Barnwell, Cambridgeshire, Observances there* (London, 1897); Allin, *The Augustinian Revolution in Theology*, edited by J. J. Lias (London, 1911).

AUGUS'TODU'NUM. See AUTUN.

AUGUSTOWO, ou'gus-tô'vô, or **AUGUSTOW.** A town of Russian Poland, in the government of Suwalki, capital of a circle of the same name, on the Netta, a feeder of the Bug, 138 miles northeast of Warsaw (Map: Russia, B 4). It was founded by Sigismund Augustus, King of Poland, in 1557. It has fisheries and lumber interests, manufactures cloth, and there is considerable trade in horses and cattle. Pop., 1885, 10,300; 1897, 12,700.

AUGUS'TULUS, ROMULUS. The last Emperor of the western portion of the Roman Empire. His name was Augustus, but the diminutive title under which he is universally known was given him by the Romans on account of the essential pettiness of his character. He was the son of Orestes, a Pannonian of birth and wealth, who rose to high rank under the Emperor Julius Nepos, whose favor he repaid by stirring up the barbarian troops in the pay of Rome to mutiny against him. On the flight of the Emperor, Orestes conferred the vacant throne on his son, Augustulus (476 A.D.), retaining all substantial power in his own hands. Orestes, failing to conciliate the barbarians, who had helped him against Nepos, with a grant of the third of the lands of Italy, was besieged in Pavia by a large force under the command of Odoacer, and on the capture of the town was put to death. Augustulus yielded at once. Being of too little consequence to be put to death, he was dismissed to a villa near Naples, with an annual pension of 6000 gold *solidi*. His after fate is unknown.

AUGUS'TUS (by birth GAIUS OCTAVIUS; after his adoption by Cæsar, GAIUS IULIUS CÆSAR OCTAVIANUS; by decree of the Senate, in 27 B.C., AUGUSTUS) (63 B.C.–14 A.D.). The first Roman Emperor. He was the son of Octavius and Attia (daughter of Julia, the youngest sister of Julius Cæsar). He was born Sept. 23, 63 B.C. The Octavian family came originally from Velitræ, in the country of the Volsci, and the branch from which Augustus descended was rich and honorable. His father had risen to the rank of senator and prætor, but died in the prime of life, when Augustus was only four years old. Augustus was carefully educated in Rome under the guardianship of his mother and his stepfather, L. Marcius Philippus. At the age of 12 Augustus delivered a funeral oration over his grandmother; at 16 he assumed the *toga virilis*. The talents of the youth recommended him to his grand uncle, Julius Cæsar, who adopted him as his son and heir in 45 B.C. At the time of Cæsar's assassination (March 15, 44), Augustus was a student under the celebrated orator, Apollodorus, at Apollonia, in Illyricum, where, however, he had been sent chiefly with a view to gain practical instruction in military affairs. On learning of Cæsar's murder, he returned to Italy, and at his landing at Brundisium was welcomed by deputies from the veterans there assembled; but, declining their offers, he chose to enter Rome privately. At this time he received a copy of Cæsar's will and learned that he had been named by Cæsar as his heir, and had been adopted by him in his will. The city was at this time divided between the two parties of the Republicans and the friends of Marcus Antonius, who was Consul; but the latter had, by adroit manœuvres, gained the ascendency and enjoyed almost absolute power. Augustus was at first haughtily treated by the Consul, who refused to surrender the property of Cæsar. After some fighting, known as the Mutinensian War, which ended in the defeat of Antonius by the forces of the Senate, and his flight across the Alps, Augustus, who had made himself a favorite with the people and the army, succeeded in getting the will of Julius Cæsar carried out. He found an able friend and advocate in Cicero, who had at first regarded him with contempt. The great orator, while imagining that he was laboring in behalf of the Republic, was in fact only an instrument for raising Augustus to supreme power. Presently Decimus Brutus, having assumed control in Gallia Cisalpina, ordered Augustus to oppose Antony; when Octavianus refused to do this, the Senate turned against him, and Octavianus, in self-defense, entered into secret negotiations with Antony. Finally, on receipt of an order from the Senate to fight Antony and Lepidus, he refused and, advancing to Rome, demanded and secured for himself the consulship. When Antonius returned from Gaul with Lepidus, Augustus joined them in establishing a triumvirate, Nov. 27, 43 B.C. He obtained Africa, Sardinia, and Sicily; Antonius, Gaul; and Lepidus, Spain. The Eastern provinces were in control of Brutus and Cassius. The power of the triumvirs was soon made absolute by the massacre of those unfriendly to them in Italy, and by their victories at Philippi over the Republican army, commanded by Brutus and Cassius. After the battles of Philippi the triumvirs made a new division of the provinces—Augustus obtaining Italy, Antony, the East, and Lepidus, Africa. The Perusian War, excited by Fulvia, wife of Antonius, seemed likely to lead to a contest between Augustus and his rival, but was ended by the death of Fulvia, and the subsequent marriage of Antonius and Octavia, sister of Augustus. Shortly afterward, the claims of Sextus Pompeius and Lepidus having been settled by force and fraud, largely through the aid of Agrippa, the Roman world was divided between Augustus and Antonius, and a contest for supremacy began between them. While Antonius was lost in luxurious dissipation at the court of Cleopatra, Augustus was industriously striving to gain the love and confidence of the Roman people and to damage his rival in public estimation. At length war was declared against the Queen of Egypt, and at the naval battle of Actium (q.v.), 31 B.C., Augustus was victorious and became sole ruler of the whole Roman world. Soon afterward Antonius and Cleopatra ended their lives by suicide. The son of Antonius, by Fulvia, and Cæsarion, son of Cæsar and Cleopatra, were put to death; and in 29 B.C., after disposing of several affairs in Egypt (which had now become part of the Roman Empire), Greece, Syria, and Asia Minor, Augustus returned to Rome in triumph, and, closing the temple of Janus, proclaimed universal peace.

His subsequent measures were mild and prudent. To insure popular favor, he abolished the laws of the triumvirate, adorned the city of Rome, and reformed many abuses. At the end of his seventh consulship he proposed to retire from office, in order that the old republican form of government might be reëstablished, but he was ultimately induced to retain his power. Hitherto, since Cæsar's death, the Consul had been named Octavianus (Octavian); but now, in January, 27 B.C., the title of *Augustus* (from Latin *augeo*, 'to increase': it means 'exalted,' 'sacred,' or 'consecrated') was conferred on him. In the eleventh consulship of Augustus (23 B.C.), the tribunitian power was conferred on him for life by the Senate. Republican names and forms still remained, but they were mere shadows. Augustus was in all but name absolute monarch. In 12 B.C., after the death of Lepidus, he had the high title of Pontifex Maximus, or high priest, bestowed on him. The nation surrendered to him all the power and honor that it had to give.

After a course of victories in Asia, Spain, Pannonia, Dalmatia, Gaul, etc., Augustus (9 A.D.) suffered the greatest defeat he had sustained in the course of his long rule, in the person of Quintilius Varus, whose army was totally destroyed by the Germans. (See ARMINIUS.) This loss so affected Augustus that for some time he allowed his beard and hair to grow as a sign of deep mourning, and often exclaimed, "O Varus, restore to me my legions!" From this time Augustus confined himself to plans of domestic improvement and reform, and so beautified Rome that it was said, "Augustus found Rome a city of brick, and left it a city of marble." He also founded cities in several parts of the Empire. Altars were raised by the grateful people to commemorate his beneficence; and, by a decree of the Senate, the name Augustus was given to the month Sextilis. Agrippa and Mæcenas were his friends and counselors.

Though surrounded thus with honor and prosperity, Augustus was not free from domestic trouble. The abandoned conduct of his daughter Julia was the cause of sore vexation to him. He

had no son, and Marcellus, the son of his sister, and Gaius and Lucius, the sons of his daughter, whom he had appointed as his successors and heirs, as well as his favorite stepson Drusus, all died early. Age, domestic sorrows, and failing health warned him to seek rest, and to recruit his strength he undertook a journey to Campania, but his infirmity increased, and he died at Nola (Aug. 19, 14 A.D.), in the seventy-seventh year of his age. According to tradition, shortly before his death, he called for a mirror, arranged his hair neatly, and said to his attendants: "Have I played my part well? If so, applaud me!" Augustus had consummate tact and address as a ruler and politician, and could keep his plans in secrecy while he made use of the passions and talents of others to forward his own designs. The good and great measures which marked his reign were originated mostly by Augustus himself. He encouraged agriculture, patronized the arts and literature, and was himself an author; but only a few fragments of his writings have been preserved. Horace, Vergil, and other celebrated poets and scholars were his friends. His was the Augustan Age of literature. His death threw a shade of sorrow over the whole Roman world; the bereaved people erected temples and altars to his memory, and numbered him among the gods. For ancient accounts of Augustus' life, see the biography by Suetonius, especially as edited by E. S. Schuckburgh (Cambridge, 1896), and the Monumentum Ancyranum. (See ANGORA.) Consult: Gardthausen, *Augustus und seine Zeit* (Leipzig, 1891–1904); Beulé, *Auguste, sa famille et ses amis* (Paris, 1867); and Boissier, *La religion romaine*, vol. i (Paris, 1883); E. S. Schuckburgh, *Augustus* (London, 1903); J. B. Firth, *Augustus Cæsar* (New York, 1903).

AUGUSTUS, APOTHEOSIS OF. A famous cameo in the Cabinet des Medailles et Antiques at Paris. It is cut on a sardonyx, measuring nearly a foot in height, and is the largest cameo known. It contains 26 figures of great Romans, and formerly was thought to represent a triumphal procession of Joseph in Egypt.

AUGUSTUS, ARCH OF. A triumphal arch with three openings, erected in honor of Augustus in the Roman Forum in 20 B.C., in commemoration of the restoration of the eagles and prisoners captured by the Parthians from Crassus in 53 B.C. It was destroyed by workmen about 1540, the foundations alone being discovered in 1888 between the temples of Cæsar and of Castor and Pollux. Consult Hülsen-Carter, *The Roman Forum* (Rome, 1906).

AUGUSTUS, FORUM OF. The second of the imperial fora at Rome, founded by Augustus. It was surrounded by massive walls and colonnades and was adorned with statues of distinguished men of the Republic. In the centre of the forum stood the temple of Mars Ultor, commemorating the battle of Philippi, and the vengeance exacted by Augustus from Cæsar's murderers, and dedicated 2 B.C. An entrance arch and portions of the walls and of the temple still remain. Consult S. B. Platner, *The Topography and Monuments of Ancient Rome* (New York, 1911).

AUGUSTUS, MAUSOLEUM OF. An imposing circular structure of white marble, 280 feet in diameter, erected by Augustus in 28 B.C. in the Campus Martius at Rome. It was surmounted by a cone of earth covered with evergreen trees, and crowned by a colossal bronze statue of Augustus. On the sides of the entrance, on the south, stood two obelisks, now in the Piazza del' Esquilino and the Piazza del Quirinale. On the outer wall, on each side of the entrance, were copies of decrees in honor of those interred in the mausoleum, and the Res Gestæ of Augustus, of which we have a copy in the Monumentum Ancyranum. (See ANGORA.) The first burial in the vaults was that of the young Marcellus in 28 B.C., the last that of Nerva in 98 A.D. During the Middle Ages the cone of earth was removed and the top transformed into a hanging garden. The structure was later used as a stronghold, a bull ring, and a circus. The brick shell is still visible.

AUGUSTUS, RES GESTÆ (exploits) OF. See ANGORA; AUGUSTUS, MAUSOLEUM OF.

AUGUSTUS (1526–86). Elector of Saxony, the son of Duke Henry the Pious and of Katherine of Mecklenburg. He was born at Freiburg, then the seat of his father's court. While still a youth, he spent some time at Prague, and there formed an intimate friendship with Maximilian, afterward Emperor Maximilian II of Germany. In 1548 he married Anna, daughter of Christian III of Denmark, who was universally popular on account of her devoted adherence to Lutheranism and her fine character. After the death of his brother Maurice, in 1553, Augustus succeeded to the electorate. His rule is chiefly noticeable as bearing upon the history of the newly established Protestant church. In 1555 he was instrumental in bringing about the Peace of Augsburg. Augustus first used his utmost influence in favor of the Calvinistic doctrine; but later he adopted the Lutheran tenets and persecuted the Calvinists. By his skillful internal administration he raised his country far above the level of any other in Germany, introducing valuable reforms both in jurisprudence and finance, and giving a decided impetus to education, agriculture, manufactures, and commerce. He wrote a book on the management of orchards and gardens and commanded that every newly married pair should, within the first year of their marriage, plant two fruit trees. The Dresden Library owes its origin to him, as do also some of its collections. In January, 1586—the Electress having died the year previous—Augustus married a young princess of Anhalt, but died a month after. Consult Falke, *Geschichte des Kurfürsten August von Sachsen* (Leipzig, 1868).

AUGUSTUS I, FREDERICK (1670–1733). Elector of Saxony and King of Poland (as such styled Augustus II), commonly called the Strong. He was the second son of the Elector John George III and of the Danish princess, Anna Sophia, and was born at Dresden. In youth he traveled over a great part of Europe and tasted the pleasures of the different courts. When, in 1694, he succeeded his brother George as Elector, instead of turning his arms against France, according to previous arrangement, he undertook the command of the Austro-Saxon army against the Turks in Hungary. After the battle of Olasch, in 1696, he returned to Vienna and set himself up as a candidate for the throne of Poland, vacated by the death of John Sobieski. Bidding higher than Prince Conti for the crown (10,000,000 Polish florins), and adopting the Catholic faith, he was elected King by the nobles, and was crowned at Cracow, on Sept. 15, 1697, as Augustus II of Poland. On ascending the throne he promised to regain for his new

kingdom the provinces that had been ceded to Sweden. He joined Peter the Great in his war against Charles XII, but his forces were repeatedly overthrown by the Swedes. The crown of Poland was wrested from him, and Stanislas Leszczynski was made King in his place. Augustus was forced to sign the ignominious Peace of Altranstädt in 1706, in which he abandoned his claims to the Polish throne. However, on receiving intelligence of the defeat of Charles XII at Pultowa, in 1709, he declared the Treaty of Altranstädt annulled, marched with a powerful army into Poland, of which he again became master, and renewed the war with Sweden, which continued till the death of Charles XII at Frederikshald, in 1718, led first to a truce and eventually to a peace with that kingdom. Meanwhile a confederation of Polish nobles had been formed against the Saxons and fought against them with much success, till, in 1716, through the armed intervention of the Czar, a compact was made between the Poles and Augustus by which the Saxon troops left the kingdom. The King now found himself obliged to employ conciliation, and the splendor of his dissolute court soon won the favor of the Polish nobles, who followed his example but too closely. Saxony had bitter cause to regret the union of the crowns. Its resources were shamefully squandered on the adornment of the capital, Dresden, on the King's mistresses, his illegitimate children, and the alchemists who deluded him with hopes of the elixir of life. Augustus supported the fine arts as ministering to luxury, but did little for the cause of science. Despotic in principle, though easy in temper; ambitious as well as luxurious; reckless alike in the pursuit of war and pleasure, death overtook him in the midst of projected festivities. On his way to the Warsaw Diet, gangrene of an old wound set in, and he died Feb. 1, 1733, and was buried at Cracow. By his wife he left an only son, who succeeded him. The most celebrated of his numerous illegitimate offspring was Maurice of Saxony (Marshal Saxe). Consult Desroches de Parthénay, *Histoire de Pologne sous le roi Auguste* (Hague, 1733–34).

AUGUSTUS II, Frederick (1696–1763). Elector of Saxony and King of Poland (as such styled Augustus III). He was the son and successor of Augustus the Strong. Though carefully educated by his mother in the Protestant faith, he adopted Catholicism in 1712 while on a journey through Italy. In this step he was probably influenced by his ambition for the crown of Poland. After succeeding his father in the electorate in 1733, he was chosen King of Poland by a part of the nobility. Aided by Russia and Austria, he triumphed over the rival claims of Stanislas Leszczynski, supported by Louis XV, and was unanimously proclaimed three years later as Augustus III. He left all the cares of government to his favorite, Brühl, who ruined Saxony to minister to the pleasures of his King. In 1740 he opposed Maria Teresa in the hope of gaining territory for Poland, but in 1742 he joined Austria against Frederick of Prussia, but their armies were defeated in 1745, and Augustus had to flee from his capital. He made peace with Frederick and recovered Saxony. In the Seven Years' War Augustus, as the ally of Austria, suffered the loss of his army at Pirna (1756); his country was overrun, his state papers fell into Frederick's hands, and he himself had to flee to Poland, where his popularity, never very great, was much diminished by his recent reverses in Saxony. After the Peace of Hubertsburg (Feb. 10, 1763), Augustus returned to Dresden. He died Oct. 5, 1763. His son, Frederick Christian, succeeded him in the electorate, and Stanislas Poniatowski became King of Poland. Augustus was a spendthrift, like his father, and spent immense fortunes in beautifying his capital, Dresden. Consult Ruthière, *Histoire de l'anarchie de Pologne* (Paris, 1819).

AUGUSTUS' BAND—better termed the Augustan Band (Gk. Σπεῖρα Σεβαστή, *Speira Sebastḗ*, Lat. *Cohors Augusta*). One of the cohorts of provincial troops stationed in Syria during the Roman rule. It is questioned whether it was named Sebaste after the honor title of the Emperor or after the geographical title of Samaria, which was at that time called Sebaste and where the cohort may have been recruited. It did not belong to the legionary forces, which formed the heart of the Imperial army, and consisted only of Roman citizens, but to the auxiliaries, which were recruited from the natives of the provinces in which they were stationed, and consisted of those who did not, generally speaking, possess citizen rights. From the reference in Acts xxvii. 1 it was evidently located in Cæsarea, which, after the deposition of Archelaus (5 A.D.), became the residence of the Procurator of Judæa, incorporated at that time into the enlarged province of Syria.

This band differed from the Italian band (Gk. Σπεῖρα Ἰταλική), mentioned, in Acts x. 1, as stationed at the same place, in that the latter was evidently composed of Roman volunteers who had been recruited in Italy.

AUGUST WILHELM, vĭl'hĕlm, Prince of Prussia (1722–58). Founder of the present reigning line of the Hohenzollerns. He was born in Berlin, the second son of King Frederick William I and a brother of Frederick the Great. Although a man of winning personality, he lacked the independence and decision of character of his elder brother. Appointed by Frederick (in 1757) commander of the Army of Kolin, he revealed such a lack of military ability in conducting the retreat from Bohemia that he was deprived of his command, whereupon he retired permanently to his castle at Oranienburg. The accusation brought by him against Frederick in the well-known *Relation über den Feldzug von 1757*, which at first proved so damaging to the reputation of the great commander, was disproved by the publication in 1887 of the *Politische Korrespondenz Friedrichs des Grossen*. As Frederick died without issue, he was succeeded by the son of August Wilhelm, who assumed the title of Frederick William II.

AUK, ąk. A name applied collectively to a family of Arctic diving sea birds, Alcidæ, in the order Alciformes, which includes the birds known as guillemots, murres, lomvias, puffins, and auklets. All belong in the north polar regions, taking the place of, and in many ways closely paralleling, the Antarctic penguins. They are particularly numerous upon the Alaskan and Siberian coasts. Some species, however, dwell considerably south of the Arctic Circle, and others formerly did so. Their nearest relatives are the grebes and loons, and by some taxonomists all are included in the single order Pygopodes. They differ from the former by the presence of well-developed tail feathers and lack of lobes upon the toes, and from the loons by the absence of a hind toe. They are thickset, stout birds, only a few living species exceeding a foot

in length; the legs are set so far back that the birds seem to stand on their tails, and are able to move about on land only with difficulty and awkwardly, while the feathers of the wings and tail are so short that flight is feeble and secondary to the use of the wings as paddles for swimming under water, where they progress with remarkable speed and endurance. The sea is their real home, where they obtain their food by diving and pursuing fishes; and their plumage, in adaptation to these conditions, is exceedingly dense and lustrous, and the skins are extensively utilized by the Eskimo in the making of light clothing. The colors are usually black, brown, or dark lead color above, and white beneath, but in the nuptial season bright colors and a variety of ornamental crests, plumes, and appendages to the bill appear temporarily. The bill in the auks (especially the puffins) is exceedingly compressed, and often has a knife-like culmen, and deep, thin under mandible. An interesting feature of this extraordinary kind of beak is that, in the breeding season, among the puffin group of the family, the beak becomes considerably increased in size, and various appendages may be added about its base, varying with the species, while it glows with bright colors; but as the season passes, and the semi-annual molt of feathers begins, these excrescences and the plates about the base scale off, and the gay colors disappear. Consult Stejneger, *Bulletin United States Nat. Museum*, No. 29, illustrated (1885); and *Harriman Alaska Expedition*, vol. ii (New York, 1902).

Auks migrate in autumn from their most northerly haunts and from all frozen coasts to the open spaces of sea, where they spend the winter afloat or on the drifting ice. With the opening of spring they resort in enormous numbers to the coasts of the northern oceans wherever rocky cliffs confront the sea; and they take possession of niches and ledges as breeding places, sometimes in tens of thousands, each affectionate pair preëmpting and defending a little home space. Only a single egg is laid, which is large for the size of the bird, conical in outline, and is constantly watched and warmed by the parents alternately. No nest whatever is made, but the egg is held upon the webbed feet and kept warm between the thighs. (Selous, *Bird Watching*, London, 1901.) These eggs are marbled and blotched with a great variety of colors. Accounts differ as to how the young get down to the water, and it is probable that various methods of carrying are employed, while some seem simply to throw themselves or be tumbled off the ledge into the sea. Foxes and various animals raid these hosts wherever accessible, and the natives of the Arctic regions depend largely upon them for food, securing both birds and eggs in great numbers and preserving them for winter food. Similarly the eggs are considered an important resource of the non-civilized inhabitants of the Aleutian and Kamtchatkan coasts, southern Greenland, and the Hebrides. Three species of the North Atlantic deserve particular mention:

The GREAT AUK, or Garefowl (*Plautus impennis*), which is now extinct, but within historic times was an inhabitant of the North Atlantic coasts as far south as the Hebrides and the Gulf of Newfoundland. It was as large as a goose, and black and white in colors. It is fully described under EXTINCT ANIMALS and GAREFOWL, and is illustrated on the Plate of AUK, ALBATROSS, ETC. Consult Grieve, *The Great Auk* (London, 1885).

The LITTLE AUK (*Alca* or *Alle alle*) is the smallest of the tribe, not larger than a robin, black above and white beneath, and occurs in vast numbers throughout the Atlantic Arctic region, and southward in winter sometimes as far as New York and the Great Lakes. See DOVEKIE.

The RAZOR-BILLED AUK (*Alca torda*) is 15 to 18 inches in length, black and white (in summer head and neck snuff-brown), has a bill of remarkable height and sharpness, and breeds as far south as the coast of New Brunswick. See RAZOR-BILL; GUILLEMOT; PUFFIN.

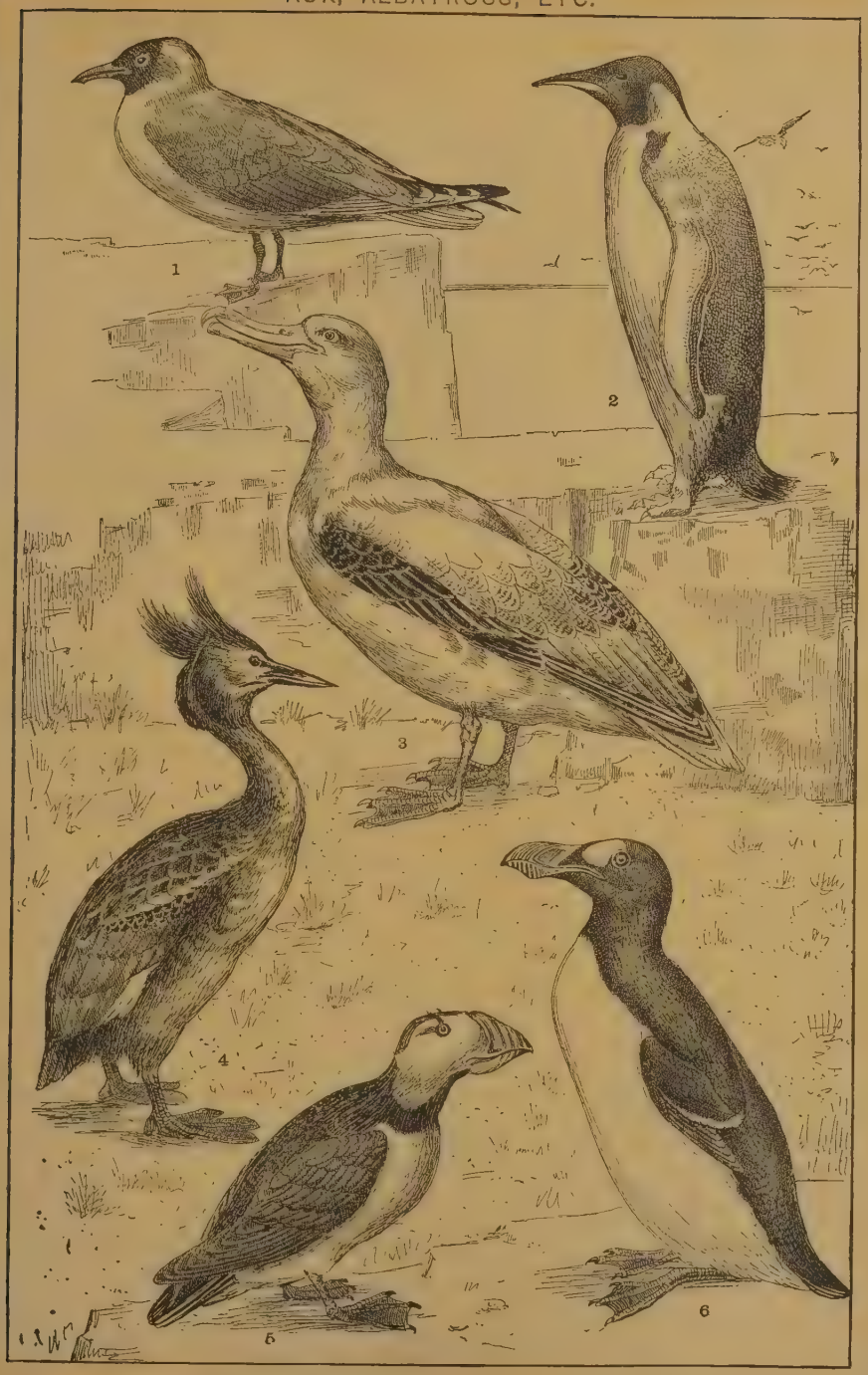
AULARD, ō'lär' (FRANÇOIS VICTOR) ALPHONSE (1849—). A French historian born at Montbron (Charente). In 1886 he was appointed to the newly established chair of history of the French Revolution at the Sorbonne. He served as president of the *Commission supérieure des Archives;* of the *Société de l'histoire de la Révolution*, and of the *Mission laïque française*. In his earlier years Aulard was professor in numerous lycées and faculties of letters throughout France. He wrote: *Les orateurs de l'assemblée constituante* (1882); *Les orateurs de la législative et de la convention* (1885); *Le culte de la raison et le culte de l'être suprême, 1793–1794; Essai historique* (1892); *Etudes et leçons sur la révolution française* (1893–97); *Paris pendant la réaction thermidorienne et sous le Directoire* (1898–1902); *Paris sous le consulat* (1903–04). He edited *La société des Jacobins* (6 vols., 1889–97) and *Recueil des actes du comité de salut public* (after 1890). Later works and those undated include: *Histoire politique de la révolution française, origines et développement de la démocratie et de la république, 1784–1804* (1901); *La révolution française et les congrégations: exposé historique et documents* (1903); *Taine, historien de la révolution française* (2d ed., 1908); *Napoléon Ier et le monopole universitaire: origines et functionnement de l'université impériale* (1911); *Danton* (a monograph in the *Collection Picard*); with L. M. M. A. Debidour, *Notions d'histoire générale et histoire de France depuis l'antiquité jusqu'à nos jours*, and *Polemique et histoire*. In 1913 was published the seventh series of *Etudes et leçons sur la révolution française*.

AULD LANG SYNE, ąld lăng sīn (Scottish, old long since). A Scottish popular song, corresponding to the National Anthem of England or our own "America." Songs bearing this name have been known since the seventeenth century. The newest version, the one most commonly sung nowadays, has but little in common with its numerous earlier prototypes. Musical historians have not yet agreed upon either the authorship of the verse or the composer of the tune. The former is generally attributed to Robert Burns (who, however, credits it to an old minstrel); the latter has very many claimants, among them one George Thomson, who included it in a collection of Scottish airs published in 1799. This was the first time the song was fitted to what are believed to be Burns's words. Consult *Grove's Dictionary of Music and Musicians* (New York, 1910).

AULD REEKIE (Old Smokey). 1. A name given by the Scotch to Edinburgh. 2. A Scottish nickname for the devil.

AULD ROBIN GRAY. A pathetic ballad, published anonymously in 1772, by Lady Anne

AUK, ALBATROSS, ETC.



1. BLACK-HEADED GULL (Larus ridibundus).
2. KING PENGUIN (Aptenodytes longirostris).
3. WANDERING ALBATROSS (Diomedea exulans).
4. CRESTED GREBE (Colymbus cristatus).
5. TUFTED PUFFIN (Lunda cirrhata).
6. GREAT AUK, OR GAREFOWL (Plautus impennis).

Barnard, who had written it two years before, in her twenty-first year, but who did not acknowledge it until two years before her death, in 1825. She afterward wrote a sequel to the ballad, in which "Auld Robin" dies, Jamie returns from the sea, and the two lovers are happily united. The characters in the ballad are said to have been real persons. "Auld Robin" was a Scottish shepherd, and "Jamie" was Sir James Bland Burges, who wished to marry Lady Margaret Lindsay, a sister of Lady Barnard. The author's original purpose in writing the ballad is said to have been to raise money for an old nurse.

AU'LIC COUN'CIL (Lat. *aulicus*, Gk. *αὐλικός*, *aulikos*, from Gk. *αὐλή*, *aulē*, hall court). One of the two highest courts of the Holy Roman Empire, coördinate with the Imperial Chamber. Originating during the later Middle Ages as a paid Council of the Emperor, it was organized in its later form by Maximilian I in 1497, as a rival to the Imperial Chamber, which the Diet had forced upon him. It seems to have been at first employed principally in preparing business matters regarding the crownlands and the Empire generally, in order to expedite the decisions of the Imperial Chamber. It soon, however, began to assume or acquire higher functions. Later, the states submitted important grievances to its independent consideration; but it did not receive a fixed constitution before 1559. At the Peace of Westphalia, 1648, its powers were greatly limited, but in 1654 it was formally recognized as the second of the two supreme courts, equal in dignity to the Imperial Chamber, and the highest court of appeals in the Empire. It was composed of a president, a vice-president, a vice-chancellor, and 18 councilors, who were all chosen and paid by the Emperor, with the exception of the vice-chancellor, who was appointed by the Elector of Mainz. Of the 18 councilors, six were Protestants, whose votes, when they were unanimous, were an effective veto, so that a religious parity was to some extent preserved. The councilors were divided into two classes, barons and counts, and jurists. The seat of the Aulic Council was at the Imperial residence, i.e., at Vienna. The Council held aloof from politics, but under its jurisdiction were placed: (1) all matters concerning the reserved rights of the Emperor; (2) all questions of appeal on the part of the states from decisions in favor of the Emperor in minor courts; (3) whatever concerned the Imperial jurisdiction in Italy. On the death of the Emperor the Council was dissolved and had to be reconstructed by his successor. It ceased to exist on the extinction of the Holy Roman Empire in 1806. Consult Herschenhahn, *Geschichte des kaiserlichen Reichshofraths* (Mannheim, 1791–93).

AULICH, ou'lĭk, Ludwig (1792–1849). A Hungarian general, born at Pressburg. Upon the outbreak of the Hungarian Revolution of 1848 he served as lieutenant-colonel in an Austrian infantry regiment, which afterward swore allegiance to Hungary. As colonel of the regiment he fought against the Servians at St. Tamás, allied with the Austrian army under Schwarzenberg. As general of the Second Hungarian Army Corps he contributed greatly to the victories achieved over Prince Windischgrätz and was received in Pesth as the hero of the day. Upon the resignation of Görgei he became Minister of War, but was delivered over to Austria by the Russians upon the conclusion of peace, and was hanged with 12 other generals.

AU'LIS (Gk. *Αὐλίς*). Anciently, a small port in Bœotia, on the Euripus, famed for its temple of Artemis, but in itself a place of little importance. It was the traditional gathering place of the Greek fleet before the Trojan War and was the scene of the sacrifice of Iphigenia (q.v.).

AULNAY DE CHARNISÉ, ô'nâ' de shär'nē'zā'. See Charnisé.

AULNOY, or **AUNOY**, ô'nwä', Marie Catherine, Comtesse d' (1650–1705). A French author, chiefly remembered for her *Contes des fées*, popular fairy tales (1698), in successful imitation of Perrault. Many of the stories have been translated into English. She wrote also *Mémoires de la cour d'Espagne* (1690), and several novels, of which *Histoire d'Hippolyte, Comte de Douglas* (1690), is the best.

AULON. The Greek name for Avlona. See Valona.

AULOS. A Greek wind instrument similar to the clarinet and oboe (qq.v.).

AULYE-ATA, or **AULIE-ATA**, ou'lyâ ä'tà. The chief town of a district, and fortress in the territory of Syr-Darya, Russian Turkestan, on the Talas River. The town is picturesquely situated in a hilly region, 5700 feet above the sea, on the way from Tashkent to Verniy. Fruit raising is the chief industry, and there is trade in leather, cattle, and horses. Pop., 12,000, including a considerable number of Russians.

AUMALE, ô'mâl' (through *Aubmarle*, *aubemarle*, Eng. *Albemarle*, from ML. *Albamarla*, white marl, clay). A town in France, 37 miles northeast of Rouen (Map: France, N., G 3). Here, in 1592, in a battle between the Spaniards and French, Henry of Navarre was wounded. Pop., in 1911, 2412. Consult Semichon, *Histoire de la ville d'Aumale* (Paris, 1862). The manufacture of glass and steel is the chief occupation of the modern town. Aumale was the name of a county in the early part of the sixteenth century, belonging to Claude of Lorraine, son of René II. Claude was created Duc de Guise and became the head of that famous house.

AUMALE, Charles de Lorraine, Duc d' (1556–1631). An ardent partisan of the League in the politico-religious wars which devastated France in the latter half of the sixteenth century. After the murder of his uncle, the Duc de Guise at Blois, in 1588, he divided with the Duc de Mayenne the leadership of the League. He was defeated at Senlis by the Duc de Longueville and shared in the disasters of Arques (1589) and Ivry (1590). He held out for the League in Amiens until the populace expelled him; when he suddenly allied himself with the Spaniards, who had invaded Picardy, refused the royal pardon, and delivered over to the enemy several places in his possession. For this he was impeached, condemned, and sentenced to be broken alive on the wheel (1595). His property was confiscated, but he himself escaped. He died in exile at Brussels.

AUMALE, Claude I, de Lorraine, Duc d' (d.1550). The son of René II, Duc de Lorraine. For his bravery at the battle of Marignano, in 1515, and his loyalty after the disaster at Pavia, Francis I made him Duc de Guise.

AUMALE, Claude II, de Lorraine, Duc d' (1525–73). A son of Claude I. He was a bitter enemy of the Huguenots and of their leader,

Coligny. He acted as Governor of Burgundy, fought at Metz in 1552, was present with Guise at the taking of Calais in 1558, and participated in the battles of Dreux, Saint-Denis, and Montcontour during the Civil War. He was killed at the siege of La Rochelle in 1573.

AUMALE, Henri Eugéne-Philippe, Louis d'Orléans, Duc d' (1822–97). The fourth son of Louis Philippe, King of the French. He was born at Paris and was educated at the Collège Henri IV, where he showed a good deal of talent. When 17 years of age he entered the army, soon distinguished himself by his bravery, and passed rapidly through the various grades of rank. In 1843 he commanded a subdivision of the French army in Algeria and performed some brilliant exploits in his campaign against the famous Abd-el-Kader. In 1844 he directed the expedition against Biskra and in 1847 succeeded Marshal Bugeaud as Governor-General of Algeria, in which capacity he received the surrender of Abd-el-Kader. After the Revolution of 1848 he resigned and withdrew to England, where he devoted himself to literature. On the outbreak of the Franco-German War he was refused permission to serve in the French army, but in February, 1871, was chosen a member of the Assembly by the electors of the department of Oise and in December took his seat, the members of his family having been allowed to return to France. In 1873 he was made general of division and presided over the council of war that tried Marshal Bazaine. He subsequently held other military commands, but in 1886, on the passage of the Expulsion Bill, he was debarred from the army and withdrew to England. Not long after this it was learned that he had given the Château of Chantilly, with its magnificent collections, to the Institute of France, of which he had been a member in 1871, the Institute to hold the bequest in trust for the French nation. The decree of banishment was revoked in 1889. He died, May 7, 1897, at Zucco, in Sicily. His wife, Marie Caroline Auguste de Bourbon, daughter of Leopold, Prince of Salerno, whom he married in 1844, died in 1869, and in 1866 and 1872 he lost his two sons. Two volumes of his *Histoire des Princes de Condé* were published in 1869. His pamphlet, *Lettre sur l'histoire de France* (April, 1861), excited a sensation by its attacks upon Napoleon III and Prince Napoleon. Among other publications is his *Les institutions militaires de la France* (1867).

AUNE, ōn. The French cloth measure corresponding to the English *ell*. Both words are derived from the Lat. *ulna*. The English ell = 1¼ yards = 45 inches; the French *aune usuelle* (or *nouvelle*) = 1⅛ meters = 47¼ inches English. The old *aune* was a little shorter.

AUN'GERVILLE, Richard. See Bury, Richard de.

AUNOY, Countess d'. See Aulnoy.

AUNT PHIL'LIS'S CAB'IN. A story by Mary H. Eastman (1852), a reply to *Uncle Tom's Cabin*.

AURA (Lat., Gr. *αὔρα, aura,* air, breeze). A term anciently used to denote an ethereal vapor emanating from volatile substances; literally, "aura" signifies a vapor or emanation from a body which it surrounds like an atmosphere. Pelox first used the term over 20 centuries ago in connection with epilepsy, because he believed the paroxysm began as a "spirituous vapor in the veins of the extremities and ascended to the head," thus producing unconsciousness. The spiritualists apply the word to a supposed mysterious light associated with the presence of a spirit form. In electricity "aura" means 'the air current caused by the discharge of an electric spark.' Medically the *aura epileptica* is a curious and often indescribable sensation which at times precedes an epileptic seizure. The most common manifestation is that of an indefinable sensation beginning at the pit of the stomach and rising to the head,—the epigastric aura. Instead of this the aura may take the form of roaring in the ears, flashes of light before the eyes, or a bitter or metallic taste in the mouth. In a few epilepties the aura assumes the character of a brief state of mental exaltation. See Epilepsy.

AURAM'IN. See Coal-Tar Colors.

AURANGABAD, ou-rŭn'gâ-bäd' (*Aurungzebe* + Hind., Pers. *abad,* abode, dwelling, town). A city of Hyderabad, India, on the Dudna, an affluent of the Godavari, 234 miles east of Bombay by rail and 67 miles northeast of Ahmednagar (Map: India, C 5). It has a considerable trade in grain, and mills cotton. Its notable monuments comprise the great mosque, the mausoleum of Aurungzebe's wife, and the ruins of the palace or citadel. The five sculptured caves of Ajanta are in the district of Aurangabad. The city was founded in 1620; under Aurungzebe it became the capital of the Deccan and a city of great importance. After the transference of the capital to Hyderabad its importance declined, and its population has decreased from 100,000 to less than 25,000.

AURANGZIB. See Aurungzebe.

AURAN'TIA, ą-răn'shī-ą. See Coal-Tar Colors.

AU'RATES. The salts of auric acid (q.v.).

AURELIAN, Wall of. A massive wall begun by Aurelian in 271 A.D. as a defense against the barbarians, and completed under Probus in 280. It was repaired and strengthened by gate towers built over a century later under Arcadius and Honorius. It was about 54 feet in height and over 12 miles long. The wall was built in great haste and includes the remains of buildings and garden walls, some with statues in their original niches. This method of construction has made possible the recovery of a number of statues and frescoes on the walls of houses filled in instead of being demolished in the hurry of building. Existing structures such as the strong supporting wall built round the Horti Aciliorum on the Pincian Hill, aqueduct arches, and tombs, such as the well-known Pyramid of Cestius, were incorporated in the wall. A covered way near the base of the wall is provided with loopholes toward the outer side and an arcade on the inner side. Towers to the number of 381 were connected with this passage and with the battlements above; the passage ran all around the wall, to facilitate the movement of troops. The course of the wall followed the line of octroi, or customs barrier. A large part of the wall is still in a more or less perfect state of preservation, but all traces of its course along and beyond the Tiber have disappeared. Much has been learned from a study of the stamped bricks used in the construction of this wall (see *Supplementary Papers of the American School of Classical Studies in Rome,* vol. i). Consult Lanciani, *Ruins and Excavations of Ancient Rome* (Boston, 1897), and Platner's *Topography and Monuments of Ancient Rome* (Boston, 1911).

AURE'LIA'NUS, Lucius Domitius (c.212–275 A.D.). One of the most powerful of the later Roman emperors. He was of humble origin. Enlisting early as a common soldier, he rapidly distinguished himself and held the highest military offices under Valerianus and Claudius II. On the death of Claudius (270 A.D.) Aurelianus was elected Emperor by the army. He began his reign by continuing the war with the Goths which Claudius had begun; he drove them across the Danube. This success he followed by vigorous and successful opposition to the barbarian Iuthungi and Allemanni, whom he expelled. Thereafter he commenced the erection of a new line of fortified walls around Rome, which were not completed till the reign of Probus (276). Their ruins still mark the boundaries of Rome in the time of Aurelian. Finding that the province of Dacia (now Transylvania and Wallachia) could not be maintained against the assaults of the Goths, he surrendered it, on certain conditions, and strengthened the frontier of the Roman Empire by making the Danube its boundary. He next turned his attention to the East, where the renowned Queen of Palmyra, Zenobia (q.v.), had extended her sway from Syria to Asia Minor and Egypt. Aurelianus defeated her in two battles and besieged her in Palmyra, from which she attempted to escape when she saw defiance would prove unavailing. She was, however, taken prisoner. Soon afterward the city surrendered and was treated leniently. Shortly after Aurelianus had departed, a new insurrection took place. He returned in 273 and gave the splendid city up to destruction. Aurelianus was again called to the East by a rebellion in Egypt, instigated by Firmus, a merchant of Seleucia, of great influence, whom he speedily overthrew. In 274 Tetricus, who had held imperial power in Gaul since before the death of Gallienus, finding himself unable to wield it, surrendered it to Aurelianus. By restoring good discipline in the army, order in domestic affairs, and political unity to the Roman dominions, Aurelianus merited the title awarded to him by the Senate, "Restorer of the Roman Empire." He fell as the victim of a conspiracy among his officials during his campaign against the Persians (275). His life by Vopiscus forms part of the Augustan history (q.v.). (See Aurelian, Wall of.) Consult L. Homs, *Le règne de l'empereur Aurelien* (1904), and *The Cambridge Mediæval History*, vol. i (New York, 1911).

AURELIAN WAY. A military road leading from Rome along the coast to Pisa, extended in 109 B.C. to Genoa and under Augustus into Gaul.

AURE'LIUS, Marcus, surnamed Antoninus (121–180 A.D.). A Roman Emperor. He was born at Rome, April 21, 121, the son of Annius Verus and Domitia Calvilla. His original name was Marcus Annius Verus. On his father's death he was adopted by his grandfather, who spared no pains to render him preëminent in every art and science. His fine qualities early attracted the notice of the Emperor Hadrian, who used to term him not *Verus*, but *Verissimus*, and who conferred high honors on him, even while he was yet a child. When only 17 years of age, he was adopted, with Lucius Ceionius Commodus Verus (commonly known as Lucius Verus), by Antoninus Pius, the successor of Hadrian; and Faustina, the daughter of Antoninus, was selected for his wife. His name henceforth was Marcus Ælius Aurelius Antoninus (Ælius he derived from Hadrian's family; Aurelius was the original name of Antoninus Pius). In the year 140 he was made consul; and from this period to the death of Antoninus, in 161, he continued to discharge the duties of his various offices with the greatest promptitude and fidelity. The relation which subsisted between him and the Emperor was of the warmest and most familiar kind. On his accession to the throne he strikingly illustrated the magnanimity of his character by voluntarily sharing the government (which Antoninus had left, in his last moments, and the Senate offered, to him alone) with young Lucius Verus, to whom Aurelius gave his daughter Lucilla in marriage. Toward the close of 161 the Parthian War broke out, and Lucius was sent to the frontiers of the Empire to repel the incursions of the barbarians; but, intoxicated with the enervating pleasures of the East, he obstinately refused to go beyond Antioch, and intrusted the command of the army to his lieutenant, Avidius Cassius, who gained several brilliant victories. Lucius returned to Rome in 166 and enjoyed a triumph to which he had no real claim; for all the great achievements of the war were accomplished by his officers, while he was reveling in the most extravagant licentiousness.

In the meantime Marcus Aurelius had distinguished himself by the prudence and energy with which he administered affairs at home. A formidable insurrection had long been preparing in the German provinces; the Britons were on the point of revolt, and the Chatti (Hessians) were waiting for an opportunity to devastate the Rhenish provinces. Within Rome itself raged a pestilence, believed to have been brought home by the troops of Lucius; frightful inundations and earthquakes had laid large portions of the city in ruins, destroyed the granaries, and thus created almost universal distress, which stimulated to an incalculable degree the terror which the citizens entertained of their savage enemies. To allay the popular perturbation, Marcus resolved to go forth to the war himself. Hecatombs were offered to the offended gods, and the Roman legions set out for the north. Marcus and Lucius were, for the time, completely successful. The pride of the Marcomanni and the other rebellious tribes inhabiting the country between Illyria and the sources of the Danube was humbled, and they were compelled to sue for peace in 168; in the following year Lucius died. The contest was renewed in 170 and may be said to have continued with intermissions during the whole life of the Emperor. Although fond of peace, both from natural disposition and philosophic culture, he displayed the sternest rigor in suppressing the revolts of the barbarians; but, in order to accomplish this, he had to enroll among his soldiery vast numbers of gladiators and slaves, for his army had been thinned by the ravages of the plague. His headquarters were Pannonia, out of which he drove the Marcomanni, whom he subsequently all but annihilated as they were crossing the Danube. The same fate befell the Iazyges; but the most famous as well as the most extraordinary of all his victories was the miraculous one which he gained over the Quadi (174), and which gave rise to copious discussion among Christian historians and others. Dio Cassius's account is that the Romans were perishing of thirst in the heat of summer, when

suddenly the cloudless sky darkened and abundant showers fell; as the soldiers were taking advantage of the water thus unexpectedly supplied to them, the barbarians attacked them and would have cut them to pieces, had not the barbarians themselves, bewildered by a storm of hail and fire, been vanquished by the Romans. That some extraordinary phenomenon occurred is evident, for there is a letter of Aurelius still extant in which he commemorates the event; and he was a man incapable of uttering a falsehood, not to mention that there was an entire army living to disprove the statement if untrue. The effect of this remarkable victory was instantaneously and widely felt. The Germanic tribes hurried from all quarters to make their submission and obtain clemency; but the practical advantages that might have resulted from this were nullified by a new outbreak in the East. Though suffering from failing health, he was obliged to leave Pannonia. Before long, however, he learned that Avidius Cassius, who had rebelled against him in Asia and had seized the whole of Asia Minor, had perished by assassination. The conduct of Marcus Aurelius on hearing of his enemy's death was worthy of the sublime virtue of his character. He lamented that the fates had not granted him his fondest wish—to have freely pardoned the man who had so basely conspired against his happiness. Like Cæsar in similar circumstances, but in a more purely humane spirit, he received the head of his murdered adversary with feelings quite opposite to what had been anticipated, rejecting the bloody gift with all the loathing of a benevolent nature and even shrinking from the presence of the murderers. On his arrival in the East he exhibited the same remarkable magnanimity. He burned the papers of Cassius without reading them, so that he might not be at liberty to suspect any as traitors; treated with extreme gentleness the provinces which had rebelled; disarmed the enmity and dispelled the fears of the nobles who had openly favored his insurgent lieutenant. While he was pursuing his work of restoring tranquillity, Faustina died in an obscure village at the foot of Mount Taurus; he paid the most lavish honors to her memory. Dio Cassius and Capitolinus charge her with gross infidelity and various crimes and blame Aurelius for giving no heed to her wrongdoing.

On his way home he visited lower Egypt and Greece, displaying everywhere the noblest solicitude for the welfare of his vast Empire, and drawing forth from his subjects, who were astonished at his goodness, sentiments of the profoundest admiration and regard. At Athens, which this Imperial pagan philosopher must have venerated as a pious Jew did the city of Jerusalem, he showed a catholicity of intellect by founding chairs of philosophy for each of the four chief sects—Platonic, Stoic, Peripatetic, and Epicurean. No man ever labored more earnestly to make that heathen faith which he loved so well, and that heathen philosophy which he believed in so truly, a vital and dominant reality. Toward the close of the year 176 he reached Italy and celebrated his merciful and bloodless triumph on December 23. In the succeeding autumn he departed for Germany, where fresh disturbances had broken out among the restless and volatile barbarians. He was again successful in several sanguinary engagements; but his originally weak constitution, shattered by perpetual anxiety and fatigue, at length failed, and he died, either at Vienna or at Sirmium, on March 17, 180, after a reign of 20 years. In his honor his son Commodus erected the Antonine Column (q.v.).

Marcus Aurelius was the flower of the Stoic philosophy. It seems almost inexplicable that so harsh and crabbed a system should have produced as pure and gentle an example of humanity as the records of pagan history can show. Perhaps, as a modern philosophic theologian suggests, it was because Stoicism was the most solid and practical of the philosophic theories, and the one which most earnestly opposed itself to the rapidly increasing licentiousness of the time, that the chaste heart of the youth was drawn toward it. At 12 years of age he avowed himself a follower of Zeno and Epictetus. Stoics were his teachers—Diognotus, Apollonius, and Junius Rusticus; and he himself is to be considered one of the most thoughtful teachers of the school. Oratory he studied under Atticus Herodes and Cornelius Fronto. With Fronto he long corresponded. His love of learning was insatiable. Even after he had attained the highest dignity of the State, he did not disdain to attend the school of Sextus of Chæronea. Men of letters were his most intimate friends and received the highest honors, both when alive and dead. His range of studies was extensive, embracing morals, metaphysics, mathematics, jurisprudence, music, poetry, and painting. Nor must we forget that these were cultivated not merely in the springtime of his life, when enthusiasm was strong and experience had not saddened his thoughts and when study was his only labor, but during the tumults of perpetual war, and the distraction necessarily arising from the government of so vast an Empire. The man who loved peace with his whole soul died without beholding it, and yet the everlasting presence of war never tempted him to sink into a mere warrior. He maintained, uncorrupted to the end of his life, his philosophic and philanthropic aspirations. After his decease, which was felt to be a national calamity, Roman citizens everywhere, and many others in distant portions of the Empire, procured an image or statue of him, which more than a hundred years after was still found among their household gods. He became almost an object of worship and was believed to appear in dreams, like the saints of subsequent Christian ages.

There is one feature in his character, however, which it would be dishonest to pass over—his hostility to Christianity. He was a persecutor of the new religion, and, it is clearly demonstrated, was cognizant, to a certain extent at least, of the atrocities perpetrated upon its followers. Numerous explanations have been offered of his conduct in this matter. The most popular one is that he for once allowed himself to be led away by evil counselors; but a deeper reason is to be found in that very earnestness with which he clung to the old heathen faith of his ancestors. He believed it to be true and to be the parent of those philosophies which had sprung out of the same soil; he saw that a new religion, the character of which had been assiduously, though perhaps unconsciously, misrepresented to him, both as an immoral superstition and a mysterious political conspiracy, was secretly spreading throughout the Empire, and that it would hold no commerce with the older religion, but condemned it, generally in the strongest terms. It was, therefore, compara-

MARCUS AURELIUS

FROM THE BUST IN THE BERLIN MUSEUM

tively easy, even for so humane a ruler, to imagine it his duty to extirpate this unnaturally hostile sect. John Stuart Mill finds in this tragic error of the great Emperor a most striking warning against the danger of interfering with the liberty of thought.

In 177 Aurelius published his first edict against the Christians, and the persecution lasted during this and the following year. The aged Polycarp was burned at the stake at Smyrna, and St. Cecilia was martyred at Rome (Sept. 16, 178), while large numbers perished in the furious persecution at Lugdunum (Lyons), in Gaul. Athenagoras of Athens, a Christian philosopher, addressed to the Emperor a defense (*Apologia*) of the Christians, still extant, which did not avail to check the martyrdom.

Aurelius was the author of a beautiful ethical work, known now as the *Meditations*, though Aurelian himself gave it a different name. It is written in Greek, and is the finest product of the Stoic philosophy. The work is not a systematic treatise, but a series of communings, worked out at widely different times, amid public business or when battles were imminent. It has been edited by Stich (Leipzig, 1903); translated by Long (London, 1862, 1900), Rendall (London, 1897), and (in selections) by Smith (London, 1899). Consult: Watson, *M. Aurelius Antoninus* (1884); Farrar, *Seekers after God* (London, 1868); Renan, *Marc-Aurèle* (Paris, 1881; translated, London, 1888); Dill, *Roman Society from Nero to Marcus Aurelius* (London, 1904); E. Vernon Arnold, *Roman Stoicism* (London, 1911). For the correspondence with Fronto, consult Robinson Ellis, *Correspondence of Fronto and Marcus Aurelius* (Oxford, 1904), and M. Dorothy Brock, *Studies in Fronto and his Age* (Cambridge, 1911).

AURELIUS, Marcus, Statue of. A fine bronze equestrian statue in Rome, which, during the Middle Ages, stood near the Lateran, and was removed in 1538 to its present commanding position on the Capitoline Hill. Its preservation is probably due to the fact that it was popularly believed to be the statue of Constantine, the first Christian Emperor. In 1347, when Rienzi was chosen to the tribuneship, wine and water were caused to flow from the nostrils of the horse. The pedestal is the work of Michelangelo, and was cut from a column of the temple of Castor and Pollux.

AURELIUS VICTOR, Sextus (fl.360 A.D.). A Roman historian. He wrote *De Cæsaribus*, a collection of brief biographies of the emperors from Augustus to Constantius. According to his own account, contained in that work, he was appointed by Julian Governor of a division of the province of Pannonia, and, by Theodosius, city prefect. He is also generally identified as the Aurelius Victor who was Consul with Valentinian, 373.

AURELLE DE PALADINES, ô'rĕl' de pâ'-lâ'dĕn', Louis Jean Baptiste d' (1804–77). A French general. He entered the army in 1824, served in Algiers in 1841–48, won distinction in the Crimean War, and became a general of division in 1855. He was not in active service at the outbreak of the Franco-German War, but received a command after the battle of Sedan, organized the Army of the Loire, and drove Von der Tann-Rathsamhausen from Orleans, winning the first victory for France. He was repulsed in an attack upon the army of Prince Frederick Charles, was beaten by the Grand Duke of Mecklenburg at Artenay, and was soon afterward removed from his command, though he subsequently commanded the National Guard in the department of the Seine. He was chosen a member of the National Assembly after the armistice and in 1875 was elected a life Senator. He wrote *Campagne de 1870–71; la première armée de la Loire* (1872).

AU'REOLE (Lat. *aureola*, golden, sc. *corona*, crown). The glory which radiates from the body of a transfigured, divine, or other supernatural being in representations of Christian art. It differs from the nimbus (q.v.), which radiates from the head only, in being an emanation of light from the entire body. It is of various shapes—circular, oval, or egg-shaped, quadrilobed and lozenged. Sometimes, as in enthroned figures of Christ, there is a double aureole—one around the upper, and the other around the lower part of the body. The aureole is of two kinds; circumscribed or diffused, according as the rays of light, as they flare outward, end in an encircling band or melt into space. These rays are sometimes straight, sometimes flamboyant. The aureole was of later origin than the nimbus; it was not used until after the eighth century and was generally abandoned by Renaissance painters of the fifteenth century. It was used almost exclusively around figures of Christ, the Trinity, and the Virgin Mary.

AUREUS, ą'rē-ŭs, or Denarius Aureus (Lat. golden, from *aurum*, gold). The oldest standard gold coin of Rome, first coined 207 B.C. Its weight varied from 1-30 to 1-72 of a pound, but its average weight was 121 grains, and its value about $5.00. Consult G. F. Hill, *A Handbook of Greek and Roman Coins* (London, 1899). See Numismatics, *Roman Coins*.

AU'RIC AC'ID (Lat. *aurum*, gold). A name formerly given to gold peroxide, a brown-black powder which is obtained by precipitating the auric chloride with alkalies. It combines with basic radicals to form salts, which are called *aurates*, as ammonium aurate, which is the scientific name for fulminating gold.

AU'RICHAL'CITE. A carbonate of calcium and copper, occurring in powdery crusts of a light-blue to greenish-blue color, usually on malachite and azurite (q.v.), of which it is an alteration product. It is found at Chessy, France, in the Clifton district of Arizona, and in the province of Sonora, Mexico.

AU'RICLES (Lat. *auricula*, dimin. of *auris*, ear). Two cavities of the heart. See Circulation.

AURIC'ULA (Lat. dim. of *auris*, ear, so named on account of a fancied resemblance of the leaves to the ears of an animal), *Primula auricula*. A plant of the same genus with the primrose, little grown in America, but valued in England for the fragrance and beauty of its flowers. The auricula is a native of the Alps and other mountains of the middle and south of Europe and sub-alpine situations in the same countries. It is found also on the Caucasus and the mountains of Syria. It grows in shady and moist places. In the wild state it has comparatively small flowers, of a simple yellow color, on short stalks, forming an umbel. It has been greatly improved by cultivation. Red, pink, crimson, apple-green, and mulberry are the chief colors which the different varieties exhibit. More than 1200 varieties have been cultivated, and new ones are from time to time raised from

seed. Some of them are entirely of one color, others of two or more; some are delicately shaded, and some variegated. The flowers of desirable varieties are large and almost round, with the white or yellow eye of the centre distinct, and its color does not mix with the ground color. The scape must be tall, and the full umbel of erect flowers rise entirely above the leaves. The green margin adds much to the beauty of many varieties. The auricula blooms in April and May, and often also a second time at the end of autumn. It succeeds best in a rich, light soil. The finer varieties are cultivated in pots. They ought, previous to flowering, to stand in an airy, sunny situation. They are propagated by offsets, generally in the latter part of August. When auricula is to be raised from seed, care ought to be taken to select the finest flowers, which are encouraged to ripen their seeds by exposure to sun and air. They ought to be protected from heavy rains by hand-glasses placed over them. The seed is sown either in autumn or spring, usually in boxes placed under shelter or in a slight hotbed.

AURICULAR CONFES'SION. See CONFESSION.

AU'RIFA'BER (Lat. for family name Goldschmied). German Protestant theologians and reformers.—1. ANDREAS (1514–59). A friend of Melanchthon; born in Breslau. He received the degree of M.A. at Wittenberg University in 1534. He taught in the philosophical faculty; then was school principal. He took up medicine and was body physician to Duke Albert of Prussia for 10 years. In 1542 he returned as professor of medicine to Wittenberg and after 1545 was ducal body physician at Königsberg and professor in the university, although his instruction was much interrupted by the diplomatic journeys on which he was sent by the Duke. He was an ardent defender of Osiande (q.v.) (1498–1552), whose daughter was his second wife. As an Osianderian he was bitterly attacked by the ultra-conservative Lutherans, whose leader (Flacius) dubbed him "dog-doctor," because he had issued a book upon the treatment of canine diseases. He died at Königsberg, Dec. 12, 1559. His writings were chiefly medical.—2. JOHANNES (1517–68). A brother of Andreas, and, like him, a friend of Melanchthon; born at Breslau, Jan. 30, 1517. He received the degree of M.A. at Wittenberg University in 1538 and became professor at Rostock in 1550. After a varied and fruitful activity (chief author of the Mecklenburg Church Ordinances, 1551), he became professor of theology at Königsberg in 1554, resigned in 1565, and died at Breslau, Oct. 19, 1568. He also was involved in the Osiander strife which wrought up the theologians of that time.—3. JOHANNES (c.1519–75). A zealous friend of Luther; born in the county of Mansfeld, Saxony, and educated at Wittenberg. He became tutor to the young Count Mansfeld and in the war of 1544 was with the army as chaplain. He lived with Luther as his secretary (1545) and was present at Luther's death, Feb. 18, 1546. He was a furious critic of Melanchthon. After being for some years court preacher at Weimar, he was compelled to flee to Eisleben (1561), and there began those Lutheran publications which have given him fame. In 1566 he was appointed minister of the Lutheran church at Erfurt, holding the place until his death, Nov. 18, 1575. He began, in 1540, collecting Lutheran MSS., and by 1553 had 2000 letters of Luther's; the same year he shared in the 12-volume German and Latin edition of Luther which appeared in Jena in 1556. He issued two volumes of Luther's letters (1556–65); also a supplement to the Jena edition and the *Works* in 1564–65 (2 vols.). In 1566 he issued his famous *Tischreren und Colloquia Dr. M. Luthers.*

AURI'GA (Lat. *auriga*, charioteer, driver), or THE WAGONER. A northern constellation lying immediately to the east of Perseus. Its chief ornament is α Aurigæ or Capella (q.v.), a star of the first magnitude. On Feb. 1, 1892, a remarkable *nova*, or new star, was discovered in the foot of Auriga by Anderson of Edinburgh, although it had been recorded photographically on negatives taken at Harvard on Dec. 10, 1891, but had remained undetected. At its brightest it showed as a star of about the fourth magnitude, and remained visible to the naked eye for about a month, afterward becoming rapidly invisible. The double character of its spectrum during the early stages led to the hypothesis of a grazing collision between two bodies rushing past each other with the enormous relative velocity of 550 miles per second as the cause of the outburst, but the hypothesis was not substantiated, and it appears more likely that the birth of the star was due to some stupendous explosion. After remaining invisible for nearly four months the star mounted again to the tenth magnitude, but its spectrum was found to have undergone a remarkable change, having become assimilated to the nebular type. It has since reverted to its stellar character and is now of the thirteenth magnitude. The three stars, ε, ζ, and η Aurigæ, which are situated about 5° southwest of Capella, were known to the ancients as the "Kids." Vergil refers to them as *pluviales Hœdi*, and Horace as *insana sidera*, because their heliacal rising in October was supposed to portend stormy weather.

AU'RIGNA'CIAN. See PALEOLITHIC PERIOD.

AURIGNY, ō'rē'nyĕ'. See ALDERNEY.

AURILLAC, ō'rē'yȧk' (probably from Aurelius, the Roman Emperor). A town of France, capital of the department of Cantal (Auvergne), situated in a pleasant valley on the banks of the Jordanne, about 269 miles south of Paris (Map: France, S., G 4). It is said to owe its origin to a Benedictine monastery founded in the ninth century by St. Géraud. The streets are wide but irregular, and are kept clean by streams supplied by a reservoir and by a canal from the Jordanne. Neighboring quarries supply slate. The principal buildings are the churches of Notre Dame and St. Géraud; the castle of St. Etienne, now occupied by a normal school; the theatre; former college buildings which now contain a small museum; and the grain market. There are monuments to the French philanthropist M. de Montyon and General Delzons. Paper, jewelry, copper utensils, umbrellas, leather, and lime are the chief industrial products. The English, in the fourteenth and fifteenth centuries, often besieged the town, and it was taken and pillaged during the religious wars in the sixteenth century. Pope Sylvester II, whose statue is to be seen at Aurillac, was born there, as was the infamous Carrier of the French Revolution. Pop., 1901, 17,459; 1906, 17,772; 1911, 18,036.

AU'RIN (Lat. *aurum*, gold), $C_{19}H_{14}O_8$. A coloring substance used in the manufacture of

lacquers. It is obtained in the form of beautiful green needles, by the action of sulphuric and oxalic acids on carbolic acid at 130°–150° C. Reducing agents transform it into a colorless substance known as leucarin, $C_{39}H_{18}O_8$. Owing to the difficulty of fixing it, it is not much used as a dye, though its solution in alkali has a beautiful fuchsine-red color.

AURISPA, ou-rē'spȧ, GIOVANNI (c.1369–1460). A distinguished Italian humanist of the fifteenth century, born at Noto, in Sicily. In 1418 he went to Constantinople for the purpose of learning Greek; after some years he returned to Italy, bringing with him 238 manuscripts of ancient Greek authors, among them Pindar, Callimachus, Æschylus, Sophocles, Plato, and Procopius. On his return he lived at Venice and later held the chair of Greek literature at Bologna. Through Niccolò de' Niccoli he was called to Florence as teacher of Greek, but cut short his stay and soon removed to Ferrara. In 1438 the Greek Emperor, John Palæologus, called him to assist in the council called by Pope Eugene IV, at Basel; the latter made Aurispa his secretary in 1441, which office he held for six years. He died at Ferrara in 1460. Of his many translations the following only have been published: Hierocles' *Liber in Pythagoræ Aurea Carmina, Latinitate Donatus* (Padua, 1474); *Philisci Consolatoriæ, etc.* (Paris, 1510). Many other translations remain in manuscript in Italian libraries. Consult Voigt, *Die Wiederbelebung des klassischen Alterthums*, vol. i (Berlin, 1893), and Symonds, *Renaissance in Italy*, vol. ii (London, 1877).

AUROCHS, ą'rōks (MHG. *ūrohso*, from *ūr*, AS. *ūr*, Eng. *owre*, wild ox + *ohso*, ox). The European bison or wisent (*Bos bonasus* or *Bison europæus*). The name "aurochs" is also sometimes applied to the urus, the ancient wild ox of Europe (*Bos primigenius*), the supposed progenitor of our domestic cattle. See BISON and Plate of BISONS.

AURO'RA. A city in Kane Co., Ill., 39 miles west of Chicago, on the Fox River, and on the Chicago and Northwestern, the Chicago, Aurora, and De Kalb, the Chicago, Milwaukee, and Gary, the Elgin, Joliet, and Eastern, the Aurora, Elgin, and Chicago, and the Chicago, Burlington, and Quincy railroads (Map: Illinois, D 2). It is an important manufacturing place, producing extensively carriages and wagons, silver-plated ware, wheel scrapers, motor cycles, grindstones, sashes and blinds, etc. It has also machine shops, smelting works, stove works, brass foundries, cotton mills, and railway repair shops. The city is the seat of Aurora College, has a Carnegie library, and owns and operates its water works and electric light plant. It was settled in 1834 and incorporated in 1837. Under a charter of 1887 the government is vested in a mayor, elected for two years, and a city council. Other officers also are elected by the people. Pop., 1860, 6011; 1890, 19,688; 1900, 24,147; 1910, 29,807; 1920, 36,397.

AURORA. A city in Dearborn Co., Ind., 29 miles west by south of Cincinnati, Ohio, on the Cleveland, Cincinnati, Chicago, and St. Louis, and the Baltimore and Ohio Southwestern railroads, and on the Ohio River (Map: Indiana, E 3). It has a public library and an attractive park. The leading manufactures include foundry and machine-shop products, tools, furniture, wheels, barrels, buggies, flour, brick, and coffins. There is a considerable trade in hay, grain, and tobacco. Aurora was settled in 1819 and was chartered as a city in 1848. Pop., 1900, 3645; 1910, 4410.

AURORA. A city in Lawrence Co., Mo., 30 miles southwest of Springfield; on the Frisco Lines and the St. Louis, Iron Mountain, and Southern railroads (Map: Missouri, C 5). The principal industries are fruit growing, and lead and zinc mining. There are also foundries, flour mills, publishing houses, marble works, a canning factory, etc. A considerable water power is obtained from dams in the White River. Pop., 1890, 3482; 1900, 6191; 1910, 4148.

AURORA. A city, and the county-seat of Hamilton Co., Neb., 110 miles (direct) west by south of Omaha; on the Burlington and Missouri River Railroad (Map: Nebraska, G 3). It is in a farming and stock-raising region and has brick works and flouring mills. The water works are owned by the municipality. Pop., 1890, 1862; 1900, 1921; 1910, 2630.

AURORA. A village in Cayuga Co., N. Y., 16 miles by rail southwest of Auburn; on Cayuga Lake, and the Lehigh Valley Railroad (Map: New York, D 5). It is a beautiful residential town, in the centre of a fertile agricultural region, and is the seat of Wells College for Women, founded 1868, Wallcourt, a school for girls, and Somes School for Boys. Town meetings are held every other year to elect officers. About 2 miles north of Aurora is the site of the Jesuit Mission to the Cayuga Indians in 1656. Aurora was settled in 1789, principally by emigrants from Connecticut. Pop., 1905, 623; 1910, 693.

AURO'RA (Lat. *Aurora*). The Roman goddess of the dawn, or "morning redness," counterpart of the Greek Eos. According to Hesiod, she was the daughter of Hyperion and Thia, sister of Helios and Selene, and wife of the Titan Astræus. Zephyrus, Boreas, Notus, Hesperus, and the other stars were her children. She rises in the east from Oceanus, or, in another story, from the couch of Tithonus, and her rays are the first indication of the coming of Helios (the sun). In legend Aurora appears chiefly as the abductor of beautiful youths, Tithonus, Orion, and Cephalus, the hunter. By Tithonus she became the mother of Memnon, and by Cephalus of Phaëton. In the earlier poets Aurora is never more than the early morning, and Euripides first identified her with Ἡμέρα, *Hēmera* ('the day'). In art she appears as present at the death and burial of Memnon, as carrying away her favorites, and as a goddess of light, either as a winged maiden, or as rising from the sea in a chariot with winged horses, preceding Helios.

AURORA, also called "The Triumph of Apollo," a renowned ceiling painting by Guido Reni in the Casino Rospigliosi at Rome. Aurora precedes the chariot of the sun god, scattering flowers in his path. The fresco is notable for its coloring and is the greatest work of the painter. For illustration, see RENI, GUIDO.

AURORA BO'REA'LIS (Lat. northern dawn or light). A luminous phenomenon seen during the night time in the heavens, most frequently in Europe, to the north of the observer's zenith, but sometimes covering the whole sky. By connecting together the statistics from all possible observers, Fritz was able to show that there is in the Northern Hemisphere a belt of greatest frequency. The centre of this belt passes through the southern part of Hudson's

Bay, a little south of Cape Farewell and Iceland, through North Cape, Norway, over the mouth of the Lena River, over Point Barrow, Alaska, thence to the centre of Hudson's Bay. Observers who are north of this belt see the aurora more frequently to the south than to the north, and also see it less and less frequently the farther north they go; observers who are south of the belt see the aurora to the north of them, but see it less frequently as they are nearer to the equator. A similar rule obtains in the southern hemisphere. There can be no doubt that the aurora is the result of a discharge of electricity through the atmosphere. It has been supposed that since a very thin atmosphere, such as that remaining in a glass jar or receiver of an air pump, converts the short bright electric spark into a lengthened delicate discharge, analogous to the aurora, the existence of the aurora itself necessarily implies a very thin atmosphere, and that therefore its light must emanate from a region 50 or 100 miles above the earth's surface. In order to explain the aurora, Arrhenius has recently advanced a theory based upon the discharge by the sun of electronegative ions. Such ions, caught in the earth's magnetic field, would be carried toward the magnetic poles and nearer to the earth's surface. On arriving at the lower layers of the atmosphere, they would part with their energy, giving rise to a discharge in appearance like that of a vacuum tube. As regards the height of the aurora above the earth's surface, several methods have been devised for calculating it; but it appears certain that the definite features that we see in the aurora light are perspective phenomena, and that the calculation of their height cannot be safely made by the method of simultaneous observations at two stations and measured altitudes and azimuth. In fact, the argument for the existence of the auroral light quite close to the earth's surface is too strong to be ignored. The character of this light is partially determined by means of the spectroscope, which establishes the fact that it comes from luminous particles of vapors or gases. The most prominent line of its spectrum is a yellow line, nearly identical with the yellow line known as the air line of the atmosphere. The special lines of the auroral spectrum apparently belong to the nitrogen.

The auroræ present a variety of interesting optical phenomena that may generally be analyzed into component parts; viz., long, slender beams of light, usually yellow, but sometimes green, purple, violet, or rose. These beams are, by observation, ascertained to be approximately parallel to the free magnetic needle; by their association together they appear to form cylindrical bars, waved surfaces, rich drapery, and small clouds of light. Inasmuch as the slender beams are parallel to each other, it can easily happen that an observer may be so located as to see some of them end on; these will be scarcely visible. Other beams near by will appear greatly foreshortened and pointing directly to the vacant centre. Those at a distance will appear less foreshortened, but also pointing toward the centre. There is thus formed a so-called corona, or circlet, or rays surrounding the central region. Observation has shown that its position corresponds very closely to that point in the sky toward which the free magnetic needle would point. It is therefore common to say that auroral beams are parallel to the magnetic needle; and this fact suffices to assure us that the aurora is composed of luminous magnetic matter acted upon by the so-called earth's magnetism, but, more properly, by the magnetic field surrounding the earth, just as is the compass needle.

Bibliography. The literature relative to the aurora borealis is very extensive and widely diffused. Excellent general summaries of our knowledge are: Fritz, *Das Polarlicht* (Leipzig, 1881); Angot, "Aurora Borealis," *International Scientific Series*, vol. 81 (London, 1896); Lemstrom, *L'aurore boréale* (Paris, 1886). The largest collections of observations arranged in the order of date will be found in the works of: Lovering, *On the Periodicity of the Aurora Borealis* (Boston, 1873); Fritz, *Verzeichniss von Beobachtungen des Polarlichtes* (Vienna, 1873); Rubenson, *Catalogue des aurores boréales observées en Suède* (Stockholm, 1879–82). The reports of the various international expeditions for the observation of meteorology and magnetism in the polar regions during 1881–83 fill about 30 volumes, of which one-fourth treat of the aurora. Information concerning the aurora is also contained in the reports of the polar expeditions of Nansen, Duc d'Abruzzi, Scott, and Drygalski. The pioneer work in this line was that done by the French *Expédition du Nord* (1838–42), whose volumes on auroras were prepared by Bravais and Martius. The question of the altitude of the aurora has been reviewed by C. Abbe in an article under that title published in *Terrestrial Magnetism* (Baltimore, 1900).

AURORA LEIGH, lē. A novel in blank verse, by Elizabeth Barrett Browning, which tells of the childhood of a young girl; the death of her Italian mother; her return to her father's English home; her gradually passing despair in her new surroundings; her love for her cousin, Romney Leigh; her melancholy disillusions, and her final marriage with him. Written during Mrs. Browning's early married life in Florence, it was published in 1856. She subsequently wrote of this poem that it was "the most mature of my works—the one in which my highest convictions of work and art have entered."

AURUNCI. See Ausones.

AURUNGZEBE, ą'rŭng-zēb', or **AURANGZIB** (Hind. ornament of the throne). The last great Emperor of the Mogul dynasty in India. He was born in November, 1618, and died March 3, 1707. He was the third son of Shah Jahan, and in religion he was a bigoted Sunni, one of his additional titles being Mohi-eddin, 'reviver of religion.' He was set by his father over the Mogul Deccan, while his elder brothers, Dara and Shuja, resided respectively at Agra, with the court, and in Bengal. The youngest brother of Aurungzebe, named Murad, was Viceroy of Gujarat. In 1657 Shah Jahan fell seriously ill, and a contest for the throne was immediately begun by his sons. Aurungzebe, by a mixture of duplicity and fanaticism, outwitted his brothers, the two elder of whom he murdered, and made his father a prisoner in his own palace of Agra, and kept him so until the death of the latter, possibly by foul play, in 1665. The usurper assumed the title of Alamgir, or 'conqueror of the world.' The reign of Aurungzebe, which began in 1658, was troubled, almost as soon as it had begun, by the opposition of a Mahratta chieftain, a

daring freebooter from the mountains of Konkan, named Sivaji. Treachery was employed against this wily foe in vain, for he remained independent until his death, in 1680. A religious war against the Rajah of Udaipur, which dragged on for several years, resulted unsuccessfully for Aurungzebe, who was forced to abandon his military operations in Rajputana in 1682 on account of an abortive rebellion of his son Akbar. Between 1682 and 1689, however, Aurungzebe conquered the sultans of Bijapur and Golkonda and thereby brought the Moguls into touch with the English at Madras. The closing years of Aurungzebe's long reign were full of sorrow, and it is noteworthy that he alone, of all the Mogul emperors, forbade the composition of any history of his reign. Despite the external pomp and ceremony the Mogul Empire was tottering to its fall. The treachery of Aurungzebe alienated Mohammedan Shiites from him, while his religious bigotry won for him the undying hatred of the Hindus, whose faith he had insulted and had endeavored to exterminate. Consult Stanley Lane-Poole, *Aurungzib* (London, 1893); *Ruská at-i-Alamgiri, or Letters of Aurungzebe*, translated from original Persian into English by Jamshid H. Billimoria (London, 1908); T. N. Sarkan, *Anecdotes of Aurangzib* and Historical Essays (London, 1912); id., *History of Aurangzib* (London, 1913).

AUSABLE (ą-sā'b'l) **CHASM.** A narrow gorge, 2 miles long, worn by the Ausable River, in the State of New York, in the hard quartz sandstone of the Potsdam formation, popular for its scenic attractions. The rocks of the neighborhood are traversed by numerous faults or lines of displacement, along which lines the hard rocks have been to some extent crushed and broken. The river has taken advantage of these lines of weakness and has worn its zigzag course to a depth, in places, of 175 feet along the almost vertical fault planes, thus affording an excellent example of the relation between faults and lines of drainage.

AUS'CULTA'TION (Lat. *auscultare*, to listen). A mode of exploration—by listening—of the condition of the heart, the lungs, the pleura, the œsophagus, certain arteries and veins, the abdominal organs, the gastro-intestinal tract, and the gravid uterus. Diseases, especially those of the heart and lungs, may be detected by listening to the sounds produced in the cavity of the chest. This is done either by the unassisted ear (immediate auscultation) or by the aid of a simple sound-conveying instrument, the stethoscope (q.v.) (mediate auscultation). The normal sounds produced by respiration and the beating of the heart are readily distinguished by the trained ear from the several abnormal sounds indicating disease. Auscultation is one of the most important means of diagnosis. Hippocrates observed the friction sound in dry pleurisy as well as succussion in pyopneumothorax. Auenbrugger of Vienna, in 1761, introduced percussion, and Piorry of France invented the pleximeter. Both probably appreciated some of the facts of auscultation. But Laënnec, in 1816, was the first to demonstrate the great value of auscultation and to introduce it into general use. Raynaud, in 1829, and Collin, in 1831, added respectively to our knowledge of pleuritic friction and pericardial friction. (See PERCUSSION.) According to the views, however, then generally held by physicians, the sounds produced by auscultation and percussion were capable of directly revealing the nature of diseases. In 1839 Skoda, in his *Abhandlung über Auskultation und Perkussion*, demonstrated that those sounds were only manifestations of peculiar physical states in the body. Being directly produced by certain diseases, those states, and not the sounds caused by them, must be considered as the true symptoms from which the character of diseases can be inferred. Consult Cabot, *Physical Diagnosis* (New York, 1912), and Le Fevre, *Physical Diagnosis* (New York, 1905).

AUSGLEICH (ous'glik) **OF 1867,** THE. The written agreement which created the dual monarchy of Austria-Hungary out of the Empire of Austria and the Kingdom of Hungary. This agreement, or treaty between two equal states provides for a unique form of government. Each state retains its own Parliament, courts, administration, and constitution; but for both of them there is provided but one flag, ruler, and, in certain specified cases, one common policy. A common administration is provided for finance, foreign affairs, and war. Furthermore, for the purpose of guiding and controlling the common government in these three particulars and for providing joint legislation, two legislative bodies are elected—one Austrian, one Hungarian—termed "Delegations." These bodies have equal power; they meet alternately in Vienna and Budapest, and before them for approval must be laid the proposals of the common ministries. The powers of these delegations are severely limited, and the Ausgleich itself, which provides for their existence, cannot be legally changed in any way except by international agreement between the two sovereign powers of Austria and Hungary.

AUSONES, ą'sō-nēz (*Αὔσονες*, Gk. form of the name *Aurunci*). A hardy mountain tribe of ancient Italy, south of Rome, probably of Oscan stock, which in historical times dwelt on the coast between the rivers Volturnus and Liris; the Romans called them Aurunci. From 340 to 295 B.C. they fought the Romans, but they were completely subdued and their territory was given to Cales and Suessa Aurunca. The name "Ausonia" was later given to all the lands of the non-Latin tribes of central Italy, and finally by the poets it was used as synonymous with Italy itself.

AUSONIA. See AUSONES.

AUSO'NIUS, DECIMUS MAGNUS (c.310–394 A.D.). The most conspicuous Roman poet of the fourth century A.D. He was born at Burdigala (Bordeaux) about 310. His father was a man of considerable importance, having been at one time honorary prefect of Illyricum, and he appears to have taken care that the young Ausonius should receive an excellent education. Many amiable female relatives fostered and probably flattered the talents of the boy. After finishing his curriculum at Tolosa (Toulouse), he returned to Burdigala, where, after practicing for a short time at the bar, he turned his attention to literature (c.334) and soon distinguished himself as a professor of oratory. Many years later he was appointed by Valentinian tutor to his son Gratian, afterward quæstor, and by Gratian, Prefect of Latium, and subsequently Consul of Gaul (379). On the death of Gratian (383), Ausonius retired from public life to his estate at Burdigala, where he occupied himself with literature and rural pursuits until the time

of his death. The question whether or not Ausonius was a Christian has occasioned much controversy. He probably conformed to Christianity, but with a sort of pagan indifference. His works include translations of Greek eclogues, a collection of 150 epigrams, epistles in verse and prose, 20 so-called idyls and other descriptive pieces, which were admired in their day, and of late have once more come to be read with appreciation for their love of nature. But though destitute of the highest poetic quality, Ausonius occasionally displays a certain neatness and grace of expression, which show that in a better era he might have proved a greater poet. Besides these, he also wrote a panegyric on the Emperor Gratian, full of bombastic adulation. His best-known poem, *Mosella*, on the river of that name, contains many charming bits of description and some strikingly modern touches. The best edition of the text of Ausonius is that by Peiper (Leipzig, 1886). The *Mosella* has been edited with translation and commentary by De la Ville de Mirmont (Paris, 1889). Consult: Dill, *Roman Society in the Last Century of the Western Empire*, especially bk. ii, chap. iii (London, 1899); Mackail, *Latin Literature* (New York, 1896); J. K. Wager, *Questiones Metericæ Imprimis ad Ausonium Pertinentes* (Leipzig, 1907); A. Delachaux, *La latinité d'Ausone: étude lexicographique et grammaticale* (Lausanne, 1909).

AUSPICES. See AUGURIES.

AUSSEE, ou-sā' (Ger. *aus*, from + *See*, lake). A market town of Styria, Austria, situated at the southwest end of the crownland, at an elevation of 2135 feet (Map: Austria, C 3). Its mountain air, pine woods, and salt baths have made it a popular bathing place and health resort. The chief products are wood carvings and rock salt. In the vicinity are situated the three mountain lakes of Alt-Aussee, Grundl-See, and Toplitz-See, famous for their beautiful scenery. Pop., 1900, 1566; 1910, 1600.

AUSSIG, ou'sĭk (from Bohem. *Oustí nad Labem*, river mouth over Elbe). A flourishing manufacturing town of the Austrian crownland of Bohemia, about 455 feet above sea level, situated on the left bank of the Elbe, at its junction with the Biela, about 69 miles northwest of Prague, and 9 miles from the Saxon frontier (Map: Austria, D 1). Its notable public buildings are the Stadthaus, and the town church, supposed to date from 826, containing a fine painting of the Madonna, by Carlo Dolce, presented by Israel Mengs, whose son, the famous artist, Raphael Mengs, was born in Aussig. The town's affairs are administered by a municipal council of 36 and an executive board of eight members. The leading industrial establishment is a chemical factory employing upward of 1500 workmen, the largest in Austria. There are also manufactures of glass, pottery, woolen and cotton goods, and a considerable trade in grain, fruit, wood, mineral water, and coal, especially the latter, which is loaded on river barges and shipped down the Elbe. The town is an important station on the direct railway line from Dresden to Prague and one of the stations of the Elbe Steamship Line. It has two harbors on the river. Pop., 1890 (largely German), 24,000; 1900, 37,300; 1910, 39,255. Aussig was destroyed in 1426 by the Hussites and was taken by the Swedes, under Baer, in 1639.

AUS'TEN, JANE (1775–1817). A novelist whose books, if not startling or imposing, are held by the best judges to stand, despite their limitations, with the best work in English fiction. She was born Dec. 16, 1775, at Steventon, Hampshire, where her father was rector. Her education was better than that of the average country-bred girl of her time, and to a familiarity with contemporary English literature she added a knowledge of French and Italian. The English squirearchy and the upper professional classes, especially in the country, provided her with material for a series of novels peopled by characters astonishing in their vitality, who dwell in the memory as securely as those of Scott or Thackeray. Her touch is unfailingly creative, and by virtue of her method and material she is the mother of the modern novel in much the same sense in which Scott is the parent of the modern romance. Scott's praise of her is not less discriminating than generous, when he writes: "That young lady had talent for describing the involvements, feelings, and characters of ordinary life, which is to me the most wonderful I ever met with. The big Bow-Wow Strain I can do myself, like any now going; but the exquisite touch, which renders ordinary commonplace things and characters interesting from the truth of the description and the sentiment, is denied to me." In Miss Austen's portraiture there is a fine irony that gives her work a wonderful zest and tang. Her books, thanks to her style and to her art of observing, selecting, and combining, prove that from the daily round and common tasks of a quiet and uneventful life perennially delightful fiction can be made, which may bid fair to appeal as strongly to other times and peoples as to our own. Her first published novel, *Sense and Sensibility*, appeared in 1811, to be followed between that year and 1816 by *Pride and Prejudice*, *Mansfield Park*, and *Emma*. Miss Austen died July 24, 1817, and it was not until the year after her death that two of her books appeared in print. These were her last novel, *Persuasion*, and *Northanger Abbey*, which had been written in or before 1797. Neither her *Letters* (published 1884) nor the few literary fragments that complete her work are of any strong interest. For the latter, see *Lady Susan*, a story in epistolatory form, and *The Watsons*, conveniently accessible in the collected works of Jane Austen (Boston, 1898). The important books about her and her work are: J. E. Austen Leigh, authorized *Life* (London, 1870); S. F. Malden, *Life* (London, 1889); Goldwin Smith, *Jane Austen* (New York, 1890); W. H. Pollock, *Jane Austen: Her Contemporaries and Herself* (New York, 1899); Constance Hill, *Jane Austen: Her Home and her Friends* (New York, 1902); G. E. Mitton, *Jane Austen and her Times* (London, 1905); J. H. and E. C. Hubback, *Jane Austen's Sailor Brothers* (London, 1906); W. D. Howells, *Heroines of Fiction* (New York, 1902); Austen-Leigh, *Jane Austen: Her Life and Letters; A Family Record* (New York, 1913); Cornish, in *English Men of Letters Series* (London and New York, 1913).

AUSTEN, PETER TOWNSEND (1852–1907). An American chemist; born at Clifton, Staten Island, N. Y. He received his education at the School of Mines of Columbia University, studied chemistry in Germany, and took his doctor's degree at the University of Zürich, Switzerland. In 1876 he returned to the United States and was made instructor in chemistry at Dartmouth College. In 1877 he was appointed professor of

chemistry at Rutgers College and during the following 10 years was engaged in teaching in that college and in the New Jersey Scientific School, serving also as State chemist of New Jersey. In 1887 he resigned his chair, and during the next six years devoted his attention exclusively to industrial work. In 1893 he resumed his career as a teacher and was made professor of chemistry at the Brooklyn Polytechnic Institute, where he remained until 1898. In 1899 he became the president of the Austen Chemical Research Company. Dr. Austen published a large number of interesting papers in applied chemistry, patented several valuable manufacturing processes, and wrote: *Kurze Einleitung zu den Nitro-Verbindungen* (Leipzig, 1876), and a translation of Pinner's *Repetitorium der organischen Chemie*, under the title *An Introduction to the Study of Organic Chemistry* (New York, 1883).

AUS'TER. The Latin name of the dry south or southwest wind, the modern sirocco, called *vóros, notos*, by the Greeks. The name is connected with the root of *uro*, to burn.

AUSTERLITZ, ous'tĕr-lĕts ("the east town on the Littawa"; from Ger. *Ost*, East). A town in Moravia, about 12 miles east-southeast of the town of Brünn (Map: Austria, E 2). It stands on the Littawa and has a population (1900) of 3703. Austerlitz is celebrated as the place where Napoleon I defeated the combined forces of Austria and Russia, under the command of their emperors (Dec. 2, 1805). The capitulation of the Austrian General Mack at Ulm on Oct. 17, 1805, had been followed by the French occupation of Vienna on November 14; but though Napoleon held the capital of the enemy, his forces were inferior to the allied army of Austrians and Russians under Kutusoff and Prince Lichtenstein, which was assembled around Olmütz and threatened a junction with another army under the Austrian archdukes and a force from Prussia. Napoleon determined to strike at the Allies before the expected junction could be effected. He moved northward from Vienna and at Austerlitz came in touch with the Allies, who had advanced to meet him. The latter, numbering some 84,000 men opposed to the 70,000 French, attacked in five columns, aimed in oblique order against the French right, their intention being to concentrate on that wing, outflank the enemy, and cut off their communication with Vienna. Napoleon, seeing their purpose, conceived the bold design of permitting the enemy to gain a temporary success over his right wing, which would allow him in turn to concentrate his forces against their weakened centre, and, having broken that, to take them in the rear. The plan was admirably executed. At 8 o'clock on the morning of December 2 the left wing of the Allies, consisting of three Russian columns, advanced across a country of frozen marshes, assailed Davout, who held the fords of the Goldbach, forced the passage of that stream, and compelled the French to retreat for some distance; with the aid of reinforcements, however, Davout was able to hold his own, as indeed Napoleon had planned. Meanwhile heavy masses of French under Soult had been hurled against the centre of the Allies, comprising the fourth Russian column, under Kutusoff; and after a sanguinary conflict the latter was overwhelmed. Lannes, too, on the left of the French, succeeded in driving back the allied right under Bagration. The victorious French troops were then swung upon the rear of the left of the Allies, and of the unhappy three columns the third was entirely crushed, while the others were shattered into fragments. The battle became a rout, and as the remnants of the Allies fled across the river the French artillery broke the ice and thousands of fugitives were drowned. The Allies lost 35,000 men in killed, wounded, and prisoners, while the French loss was only 7800. As a result of the battle, Austria was forced to sign the Treaty of Pressburg on Dec. 26, 1805. In the military career of Napoleon no other event, probably, stands out so brilliantly as Austerlitz, because of his numerical inferiority, the audacity of his plan, the precision with which it was executed, and the completeness of the victory. The glory of Austerlitz—spoken of, sometimes, as the battle of the three emperors, from the presence of the Russian and Austrian emperors in the field—made even the disaster at Trafalgar seem of little consequence.

AUSTERLITZ, The Sun of. A term applied to anything which augurs good. It is an allusion to the sudden appearance of the sun which brightened the overcast dawn just before the battle of Austerlitz, and which Napoleon accepted as an auspicious omen for the French.

AUS'TIN. A city, and the county-seat of Mower Co., Minn., 100 miles south of St. Paul, on the Chicago, Milwaukee, and St. Paul, and the Chicago Great Western railroads, and on Red Cedar River (Map: Minnesota, E 7). It is the seat of the Southern Minnesota University, and has three parks. Among the prominent buildings are the Carnegie library, central high school, county courthouse, State armory, post office, and St. Augustine's Church (Roman Catholic) and Methodist Episcopal Church. The city is surrounded by fertile prairie land, the products of which are principally live stock, butter, corn, barley, flax, and grass seeds. It exports extensively and has meat-packing establishments, flouring mills, brick and tile works, foundry, railroad shops, cement works, creamery, machine and steel works, roller mills, broom and brush factories, etc. Settled in 1854, Austin was incorporated as a village in 1868 and in 1873 was chartered as a city. The government is administered under a charter of 1903, which provides for a mayor, biennially elected, and a city council. The city owns its water works and electric light plant. Pop., 1900, 5474; 1910, 6960; 1920, 10,118.

AUSTIN. The capital of Texas, and the county-seat of Travis County, about 145 miles west by north of Houston, on the north bank of the Colorado River, which, in its lower course, is navigable for steamboats, and on the Houston and Texas Central, the International and Great Northern, the Missouri, Kansas, and Texas, and the Austin and Northwestern railroads (Map: Texas, D 4). It is about 40 feet above the river in the lower portion and gradually rises to an elevation of 120 feet. It is well laid out with wide and shaded streets. Capitol Square (10 acres) contains the Capitol building, of red Texas granite, which cost $3,500,000, and, next to the National Capitol at Washington, is the largest State Capitol in the United States. Other prominent structures are the State land office, county courthouse, and the buildings of the University of Texas (coeducational), opened in 1883. There are also the Confederate Home; a State asylum for the insane; an institution for the blind; an institution for the deaf and

dumb; an institution for the deaf, dumb, and blind (colored); a school for defectives; St. Edward's College; Southwestern Presbyterian Theological Seminary; Tillotson Institute (colored); Samuel Huston College (colored); several seminaries and academies, monuments, hospitals, etc. Two fine bridges span the river, and in 1893 a great dam, one of the largest in the world, was built 2 miles above the city, to provide water and power. It was carried away by a flood in 1900 and rebuilt at a cost of $1,720,000. It forms a lake 26 miles long and develops 6000 horse power. (See DAMS AND RESERVOIRS.) The export trade in agricultural produce, live stock, cotton, grain, wool, and hides is very large; and an extensive wholesale trade in harness and leather goods, groceries, dry goods, drugs, etc., is carried on. The manufactures include cotton-seed oil, lime, planed lumber, mantels, chili powder, mattresses, trunks, brooms, farm machinery, bricks, wire fence, gasolene engines, building materials, carriages, cement blocks, cigars, soap, and candles. The commission form of government, providing for a mayor and four councilmen, was adopted in 1909. The water works and electric light plant are owned and operated by the city. Austin, originally called Waterloo, was first settled in 1838, and in the following year was named after Stephen F. Austin (q.v.); incorporated and made the capital of the Republic of Texas in 1839; and later became the permanent capital of the State. The first free school in Texas was established here in 1871. Pop., 1900, 22,258; 1910, 29,860; 1920, 34,876.

AUSTIN, ALFRED (1835–1913). An English poet, born May 30, 1835, at Headingley, near Leeds. He graduated at the University of London in 1853 and was called to the bar in 1857, but abandoned law for literature. He became editor of the *National Review* in 1883. He was made Poet Laureate of England in 1896. Among his many volumes of verse are *The Seasons; A Satire* (1861); *Savonarola,* a tragedy (1881); *English Lyrics* (1890); *The Conversion of Winckelmann and Other Poems* (1897); *Songs of England* (new ed., 1900), and *A Tale of True Love and Other Poems* (1902), dedicated to President Roosevelt. Austin attracted some notice in 1870 by an essay entitled *The Poetry of the Period,* in which he severely criticised Tennyson, Browning, and other Victorians. As a critic he was original and interesting, and although he had not the imagination of the poets whom he attacked, he wrote some graceful verse. He also published *The Garden that I Love* (1894; 2d series, 1907), and *In Veronica's Garden* (1895) —two pieces in prose interspersed with short poems; *Haunts of Ancient Peace* (1902; new ed., 1908); *A Lesson in Harmony* (1904); *The Door of Humility* (1906, 1907); *Sacred and Profane Love* (1908); *The Bridling of Pegasus,* which the author called "prose papers on poetry" (1910); *Love Poems* (1911). Consult his *Autobiography* (2 vols., 1911).

AUSTIN, JANE GOODWIN (1831–93). A novelist who dealt with Colonial New England. The more noteworthy of her romances are *Fairy Dreams* (1860); *Moonfolk* (1874); *Mrs. Beauchamp Brown,* her best-known book (1880); *A Nameless Nobleman* (1881); *The Desmond Hundred* (1882); *Nantucket Scraps* (1882); *Standish of Standish* (1889); *Betty Alden* (1891); *David Alden's Daughter and Other Stories* (1892).

AUSTIN, JOHN (1790–1859). The most distinguished of English writers on jurisprudence. He was born at Creeting Mill, in Suffolk, England, on March 3, 1790. At the age of 16 he entered the army and served as a subaltern in Sicily and elsewhere for five years. Resigning his commission, he returned to London and took up the study of law, and in 1818 was called to the bar. In 1820 he married Miss Sarah Taylor, of Norwich, a gifted woman, to whose devotion, courage, and steadiness of purpose he was indebted for the few but remarkable achievements of his life. In the same year he went to live in Westminster and was a welcome member of the circle to which belonged Jeremy Bentham and James and John Stuart Mill, and many others of the foremost minds and characters in England. But his great social and conversational gifts did not bring him success at the bar, a natural infirmity of will and deficiency of courage being aggravated by weakness of constitution and frequent attacks of fever and debility. Accordingly he retired from practice in 1825, and the following year, upon the establishment of the University of London, he received the appointment of professor of jurisprudence in that institution.

This was before the period of the scientific study of the law in England, and her lawyers had not yet become aware of the existence of the science of jurisprudence. Hence his unrivaled powers of analysis and classification received scant recognition and his work resulted in disappointment and apparent failure. To prepare himself for his task, he went to Bonn, then the principal seat of juristic learning in Europe, and spent the winter reading and studying under Niebuhr, Brandis, Schlegel, Arndt, Welcker, and Mackeldey. Returning in the spring of 1828, he began his lectures at University College. His earnestness and enthusiasm were not adequate to render his precise and accurate definitions and his profound and refined reasoning attractive to the professional students of law, and it soon became evident that there was no demand for the scientific teaching of jurisprudence. The number of his students dwindled to a mere handful. Unfortunately no provision was made for the chair of jurisprudence beyond class fees; and in the absence of students Austin, in 1832, was reluctantly compelled to resign his appointment. In the same year he published his *Province of Jurisprudence Determined,* a work at the time little appreciated by the general public, so that the slight success it met with did not encourage him to undertake other publications on the subject. In the estimation of competent judges, however, it placed its author in the highest rank among writers on jurisprudence. In 1833 he was appointed by Lord Brougham a member of the criminal-law commission. The post was not much to his taste, as he did not believe that the public received any advantage from such bodies, in the efficacy of which for constructive purposes he put no faith.

In 1836 he and his friend and pupil, Sir George Cornewall Lewis, were appointed commissioners to inquire into the laws and usages, the administration and state of government of the island of Malta, a congenial task which was performed with remarkable ability and thoroughness. But again his health broke down, and in 1838 he returned to England, only to be ordered abroad by his physicians. The next 10 years were spent on the Continent, but the Revolution of 1848 drove him back to England. He then

settled at Weybridge, in Surrey, where he lived until his death in December, 1859. His lectures on the principles of jurisprudence had remained in manuscript and were left by him in a fragmentary and imperfect state. It is due to the intelligence and zeal of his widow that they were subsequently collected and arranged for publication and in 1863 given to the world under the title *Lectures on Jurisprudence, Being the Sequel to "The Province of Jurisprudence Determined,"* of which latter she had published a second edition in 1861. On this work his fame now rests.

Austin's great merit consists in the remarkable clearness and penetration of his analysis of legal conceptions. He was the first English writer to attach precise and intelligible meaning to legal terms, as well as the first systematic writer on law in the English language. With an adequate knowledge of the principles and methods of Roman and English law, he combined an extraordinary talent for classification and definition. Fragmentary and incomplete as it was, his work revolutionized the science of jurisprudence and became the text-book of the school of analytical jurists that has dominated the legal thought of the nineteenth century in England and America. His doctrines have had but little influence elsewhere, however, the continental jurists adhering with singular unanimity to the classification and conceptions of the Roman law. Indeed, even in the Anglo-Saxon world, a reaction has lately set in against the Austinian conceptions of law and politics, owing to the enlarged knowledge of human society and the historical spirit which have so profoundly modified the thought of our generation. Austin's limitation of the conception of positive law to the commands of a sovereign, and his restriction of sovereignty to an external political authority, have been especially subjected to criticism. They are, however, reasserted and strongly defended by his most distinguished disciple, Prof. Thomas E. Holland, in the latest edition (1900) of his *Elements of Jurisprudence*, and by W. Jethro Brown in *The Austinian Theory of Law* (Boston, 1910). For the opposite view Sir Henry S. Maine's works may be consulted, especially *Early Law and Custom* (London, 1883), and *Early History of Institutions* (London, 1875). The pathetic story of Austin's life is related by his widow in her introduction to the second edition of his *Province of Jurisprudence Determined* (London, 1861); and John Stuart Mill has included a sympathetic but just and discriminating criticism of the man and his work in his volume *Dissertations and Discussions* (4 vols., London, 1875). See JURISPRUDENCE; LAW; SOVEREIGNTY.

AUSTIN, JONATHAN LORING (1748–1826). A diplomatic agent of the United States in Europe during the Revolutionary War. He was born in Boston, graduated at Harvard in 1766, and engaged in trade at Portsmouth, N. H. In 1775 he entered the American army as a major, and for a time was one of General Sullivan's aids. He also served as secretary of the Massachusetts Board of War, and in October, 1777, was sent to Paris by Massachusetts to announce to Franklin and his associates the news of Burgoyne's surrender at Saratoga. Franklin soon afterward sent him on a singular secret mission to England, where he met many members of the Opposition and furnished them with much information concerning American affairs. The trip was full of incident, and, says one of Franklin's biographers (Morse), "brings to mind some of the Jacobite tales of Sir Walter Scott's novels." He carried dispatches to Congress from the United States Commissioners in Paris early in 1779, and in January, 1780, was dispatched to Europe to secure loans for Massachusetts in Spain and Holland, but failed in his mission and was captured and held for a short time by the British. Late in 1781 he returned and subsequently held various State offices of more or less importance.

AUSTIN, MARY HUNTER (1868—). An American author and playwright, born at Carlinville, Ill., and educated at Blackburn University. For 17 years she made a special study of Indian life in the Mojave Desert, and her publications set forth the intimate knowledge she thus acquired. She is the author of *The Land of Little Rain* (1903); *The Basket Woman* (1904); *Isidro* (1905); *The Flock* (1906); *Santa Lucia* (1908); *Lost Borders* (1909); *Christ in Italy* (1912); *The Lovely Lady* (1913). Her play, *The Arrowmaker*, dealing with Indian life, was produced at The New Theatre (New York) in 1911.

AUSTIN, OSCAR PHELPS. An American statistician, born in Newark, Ill., and educated in the public schools. The earlier years of his life were spent in journalism, and he served as reporter, editor, and Washington correspondent for metropolitan dailies. Subsequent to making a special study of statistics, he was appointed (1898) chief of the Bureau of Statistics of the Department of Commerce and Labor. This position involved the editing and compilation of most of the important statistical documents prepared by the bureau during a period of about 14 years. When the Bureau of Statistics was abolished, and merged in the Bureau of Foreign and Domestic Commerce in 1912, Mr. Austin became its assistant chief. In 1903–14 he was professor of commerce and statistics at George Washington University, and in 1914 became statistician of the foreign trade department, National City Bank, New York. He wrote on the commerce of nations, or of continents, comparisons of colonial systems, submarine telegraphs, canals, manufacturing systems, and national debts. Mr. Austin was statistical editor of the second edition of the NEW INTERNATIONAL ENCYCLOPÆDIA.

AUSTIN, SARAH TAYLOR (1793–1867). An English translator and author, the wife of John Austin. She was born at Norwich, a member of a family remarkable for the men and women it has produced distinguished by literary and scientific ability. She spent several years abroad, enjoying the friendship of many eminent persons in continental society. She translated, from the German: *Characteristics of Goethe*, by Falk, and others, with notes (1833); *The Story without an End*, by Carové (1834), and Ranke's *History of the Popes* (1840). Though Mrs. Austin did some original work, as *Germany from 1760 to 1814*, she is chiefly known as an excellent translator. Consult the London *Athenæum* for Aug. 17, 1867.

AUSTIN, STEPHEN FULLER (1793–1836). An American pioneer and politician, known as the founder of the State of Texas. He was born in Wythe Co., Va., the son of Moses Austin, who originally, from Connecticut, projected the Texan colony which was finally established in 1821 by his son, on the site of the present city of Austin. The latter, by his energy, ability, and hardihood, made the experiment a success; and other colonists settled in the vicinity, until the Americans became so numerous that they held a

convention in March, 1833, to form a separate State government. Without heeding the Spanish population they agreed upon a plan, and Austin took it to the City of Mexico to obtain its ratification; but a revolution there prevented a hearing, so he wrote advising the Texans to form the State government without waiting for the consent of the Mexican authorities. This cost him three months' imprisonment and a longer surveillance; but in 1835 he returned to Texas and took command of the small Revolutionary army. In November he went as commissioner to the United States and endeavored to obtain the recognition of Texas as an independent State. He returned in 1836 and was made a candidate for the presidency of the lately established Republic of Texas. Samuel Houston, who defeated him for this office, chose him his Secretary of State, but Austin died suddenly on Dec. 27 of the same year. Consult Yoakum, *History of Texas* (New York, 1856), and Wooten, *History of Texas* (2 vols., Dallas, 1899), which contains many hitherto unpublished documents concerning the Austins and their work.

AUSTIN, WILLIAM (1778–1841). An American lawyer and author, born in Massachusetts. In addition to *Letters from London* (1804), *An Essay on the Human Character of Jesus Christ* (1807), and several minor works, he published the legendary tale of "Peter Rugg, the Missing Man," in the *New England Galaxy* (1824–26). Consult *Literary Papers of William Austin*, with a biographical sketch (Boston, 1890).

AUSTIN FRI'ARS. A monastery in old London, on Broad Street, built by the Earl of Hereford and Essex in 1253–54 and holding the tombs of various historic characters. After the dissolution of the monasteries by Henry VIII in 1536–38, which included the confiscation of 173 Augustinian houses, Austin Friars became a Dutch church under a grant of Edward VI. The building suffered various alterations, the spire being razed and the nave walled up. The Dutch residents of the city still worship there. See AUGUSTINIANS.

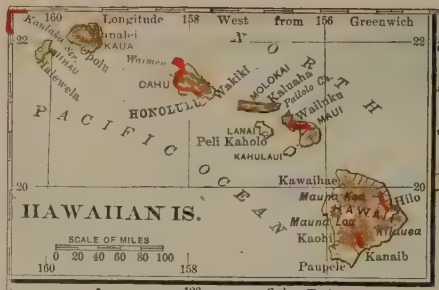
AUSTRALASIA, ąs'tral-ā'shȧ *or* -zhȧ (Neo-Lat. Southern Asia, from Lat. *australis*, southern + Asia). A geographical term of rather loose application, used by some British geographers to denote all the islands of the southern Pacific, including Australia, New Guinea, New Zealand, Melanesia, and Polynesia; while most writers in America and the European continent confine it to Australia, Tasmania, and New Zealand.

AUSTRA'LIA (Neo-Lat. Southland, from Lat. *australis*, southern). The island continent lying southeast of Asia and the East Indies. It is situated wholly within the Southern Hemisphere, between lat. 10° 50′ and 39° 10′ S., and between long. 112° 52′ and 153° 34′ E. Roughly its shape is that of a hexagon with two reëntrant sides. The greatest length is along the middle parallel, at about 25° S., and is nearly 2400 miles; while the greatest breadth, which is in the eastern part, in long. 143° E., is about 1900 miles. Its area is 2,946,700 square miles, slightly less than that of continental United States. In common with the two other southern continents, South America and Africa, Australia is compact in shape, its coast having few large indentations or projections. Only at three places are there sharply defined large peninsulas: (1) Arnhem Land and (2) York Peninsula, in the north, which inclose the largest indentation of the continent, the Gulf of Carpentaria; and, in the south, the smaller (3) Eyre and York peninsulas, inclosing Spencer Gulf, and the peninsula which, with the York Peninsula, incloses St. Vincent Gulf, on which Adelaide lies. The great inward bend on the south side of the continent, corresponding to the two reëntrant sides of the hexagon to which Australia was compared in shape, is known as the Great Australian Bight. Owing to its compact mass the centre of the continent is at least 550 miles from the nearest coast and the "coast-distant" region (i.e., at least 375 miles from the nearest coast) occupies a relatively larger area than does the analogous region in the larger continent of Europe (17 per cent as against 15½ per cent). As regards its world relationships Australia may be defined as the southern end of the Afro-Eurasian land mass, being connected with the Asiatic continent by means of the island bridges, as it were, of Indonesia and New Guinea. The fact that these islands rest upon a continental platform, together with the faunal and floristic evidence, points to the existence of a former land connection with Asia. To the north this transition is established by the shallow Arafura Sea, which connects Australia with New Guinea, while in the south Tasmania, inasmuch as it lies upon the same continental platform (Bass Strait, average depth, 200 feet), must be counted as belonging physically to Australia. While the continent thus faces land masses to the north, it looks out upon an immense waste of water to the west and south. To the east lies the Pacific, island-dotted, to be sure; but the aggregate land area of its islands is negligible. Thus, on three sides Australia stands aloof. Prior to the development of interoceanic communication such isolation meant stagnation.

Topography and Hydrography. Of all the continents Australia presents the least relief. Except for a narrow mountainous belt in the east, its surface consists mainly of an extensive tableland and a lowland. Nowhere does it attain high altitudes; 95 per cent of its surface lies below 1500 feet, and three-quarters lie between 600 and 1500 feet. Its mean elevation, 1150 feet, is less than that of any other continent save Europe (1000 feet). Its highest altitude is only 7350 feet, attained by Mount Kosciusko.

From east to west, Australia may be divided topographically into (1) the Eastern Mountains, (2) the Central Lowlands, and (3) the Great Plateau Region.

The Eastern Mountains accompany the whole east coast in a belt convex to the east from York Peninsula in the north almost to the mouth of the Murray in the south. This belt has an average width of 150 miles and is the only continuous mountain region in the continent. It consists of plateau-like masses on which are superimposed mountain ranges; these masses are separated from each other by deep gaps. The mountain belt slopes gradually down to the lowlands on the west, while it has an abrupt descent toward the sea. At the base of the seaward slope lies a narrow coastal plain which is divided into compartments by transverse spurs from the main axis of the mountains. Taken as a whole, the eastern mountain belt increases in altitude from north to south. It may be roughly divided into two sections: (1) the Queensland Highlands, and (2) the Southeast Highlands, the transverse Macpherson Range south of Brisbane being considered the line of


Longitude 160 158 West from 156 Greenwich
22
20
Kauai
Niihau
Waimea
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OAHU
HONOLULU
Wakiki
MOLOKAI
Kaluaha
Pelekc
Waikiki
MAUI
LANAI
Peli Kaholo
KAHULAUI
NORTH PACIFIC OCEAN
Kawaihae
Maupa Kea
Maunu Loa
Kaohi
Hilo
Kilauea
Kanaib
Paupele
HAWAIIAN IS.
SCALE OF MILES
0 20 40 60 80 100
160
158

AUSTRALASIA
AND
MELANESIA
SCALE OF MILES
0 100 200 300 400 500 600 700 800 900 1000
Longitude 110 A 120 B 130 C
Mozambique
Cape Town
INDIAN OCEAN
AUSTRALIA
WESTERN AUSTRALIA
SOUTH AUSTRALIA
NORTHERN TERRITORY
Great Victoria Desert
Great Sandy Desert
Great Australian Bight
TIMOR SEA
ARAFURA SEA
JAVA SEA
FLORES SEA
BANDA SEA
CORAL SEA
PAPUA
NEW GUINEA
SUNDA IS.
MALAY
ARNHEM LD.
GULF OF CARPENTARIA
TORRES STRAIT
PERTH
Freemantle
Albany
Geraldton
Northampton
Port Hedland
Broome
Derby
Wyndham
Kununurra
Darwin
Port Darwin
Port Essington
Alice Springs
Coober Pedy
Ayers Rock
Woomera
Adelaide
Port Augusta
Port Pirie
Port Lincoln
Whyalla
Ceduna
Eucla
Kalgoorlie
Esperance
Norseman
Laverton
Meekatharra
Carnarvon
Exmouth
Onslow
Roebourne
Cossack
Condon
Wyndham
Halls Creek
Fitzroy
Derby
Broome
Cockburn
Kimberley District
Mt. Wollaston
Mt. Hawker
Mt. Woodcock
Mt. Muller
Mt. Macpherson
Mt. Russell
Central Mt. Stuart
Mt. Stanley
Mt. Powell
Mt. Floral
Mt. Henry
Mt. Daniel
Mt. Humphries
Mt. Margaret
Mt. Morris
Mt. Fanny
Mt. Gascoyne
Mt. Gould
Mt. Murchison
Mt. Welcome
Mt. Magnet
Mt. Barlee
Mt. Robinson
Mt. Churchman
Mt. Jackson
Mt. Gordon
Fitzgerald Peaks
Arid C.
Recherche Arch.
Nullarbor Plain
Eastern Plains
Eastern District
Great Victoria Desert
Great Sandy Desert
Great Australian Bight
Timor Sea
Arafura Sea
Java Sea
Flores Sea
Banda Sea
Coral Sea
Sunda Is.
Malay
Arnhem Ld.
Gulf of Carpentaria
Torres Strait
Perth
Freemantle
Albany
Geraldton
Northampton
Port Hedland
Broome
Derby
Wyndham
Kununurra
Darwin
Port Darwin
Port Essington
Alice Springs
Coober Pedy
Ayers Rock
Woomera
Adelaide
Port Augusta
Port Pirie
Port Lincoln
Whyalla
Ceduna
Eucla
Kalgoorlie
Esperance
Norseman
Laverton
Meekatharra
Carnarvon
Exmouth
Onslow
Roebourne
Cossack
Condon
Wyndham
Halls Creek
Fitzroy
Derby
Broome
Cockburn
Kimberley District
Mt. Wollaston
Mt. Hawker
Mt. Woodcock
Mt. Muller
Mt. Macpherson
Mt. Russell
Central Mt. Stuart
Mt. Stanley
Mt. Powell
Mt. Floral
Mt. Henry
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Arafura Sea
Java Sea
Flores Sea
Banda Sea
Coral Sea
Sunda Is.
Malay
Arnhem Ld.
Gulf of Carpentaria
Torres Strait

SAMOAN IS.
SCALE OF MILES
0 10 20 30 40 50
SOUTH PACIFIC OCEAN
Longitude from Greenwich
Savaii
Upolu
Tutuila
Manua Is.
Rose I.
Swains I.
Fanuatapu
Nuulua
Leone
Pago-Pago
Aunuu
Tau Is.
Rose I.
Swains I.
Fanuatapu
Nuulua
Leone
Pago-Pago
Aunuu
Tau Is.
EQUATOR
GREENWICH I.
NEW GUINEA
BISMARCK ARCHIPELAGO
NEW IRELAND
NEW BRITAIN
SOLOMON ISLANDS
BOUGAINVILLE I.
GUADALCANAR
MALAYTA I.
SANTA CRUZ IS.
NEW HEBRIDES
NEW CALEDONIA (Fr.)
NOUMEA
LOYALTY IS.
FIJI ISLANDS
(To Gt. Britain)
(To France)
CORAL SEA
TASMAN SEA
NEW ZEALAND
NORTH ISLAND
SOUTH ISLAND
AUSTRALIA
NEW SOUTH WALES
VICTORIA
TASMANIA
BRISBANE
SYDNEY
CANBERRA
MELBOURNE
HOBART
Great Barrier Reef
TROPIC OF CAPRICORN
Lima
Valparaiso
D from 150 E Greenwich 160 F 170 G
D East 150 E from 160 F Greenwich 170 G 180 H

division. In the north, in the York Peninsula, the Queensland Highlands are represented only by low granitic ridges. To the south the highlands expand to a width of 300 miles; they do not constitute a compact mountain region but consist of numerous ramifying ridges which culminate in the Bellenden Ker Mountains (5440 feet). For some 1200 miles the Queensland Highlands are flanked by the Great Barrier Reef, the coral-overgrown outer margin of the continental platform. Within this wall, which lies some 30 to 75 miles from the coast, is an inland sea averaging some 20 fathoms deep. The Southeast Highlands consist mainly, from north to south, of the mountain masses of the New England Range, the Blue Mountains, the Australian Alps, and, bending around to an east-west trend, the Victorian Highlands. The New England Range is for the greater part over 3000 feet in height; it culminates in Ben Lomond, 5000 feet. To the south it is separated by various gaps, mainly the depression of the Hunter River valley, from the Blue Mountains. The steep cliff wall with which the Blue Mountains break off to the east long presented an insurmountable barrier to the western march of settlement. The Goulburn Gap, which contains Lake George, the largest lake of New South Wales, separates the Blue Mountains from the Australian Alps to the south. This massif is the highest mountain mass in Australia; it culminates in Mount Kosciusko, 7350 feet. Its name is hardly appropriate, as its forms are rather those of rounded domes than of Alpine crags. However, the higher altitude, with its greater precipitation, makes for considerable snowfall, snow sometimes remaining almost all the year on the sheltered slopes. The moraines and smaller lakes and tarns due to former glaciation also give a touch of Alpine character. To the east the Victoria Highlands abut immediately on the Kosciusko massif; here they attain hardly inferior altitudes (Mount Hotham, 6100 feet; Mount Feathertop, so-called from its snow cap, 6300 feet; Mount Bogong, 6500 feet). To the west the Victoria Highlands gradually decrease in height, where they bear the name of the Grampians (3500 feet) until they strike the coast at Mount Gambier in 38° S. lat. and 141° E. long.

The second topographical division of Australia, the Central Lowlands, lies between the Eastern Mountains on the east and the Great Plateau Region on the west and extends across the continent from the Gulf of Carpentaria to the south coast. It may further be subdivided into (1) the Darling-Murray basin, (2) the region with interior drainage, and (3) the lowland surrounding the Gulf of Carpentaria. The first is separated from the second by a divide which runs southwesterly from the Eastern Mountains in 25° S. lat., to the coast at Adelaide. Different parts of this range are known as the Grey Range, the Stanley Range, and the Adelaide Range. The common boundary between the second and third divisions is the east-west divide separating the interior drainage from the drainage of the Gulf of Carpentaria.

The Murray-Darling basin, which occupies about one-seventh of the whole continent, contains the only large river system of Australia. Its longest member, the Darling, with its source streams, the Condamine and Barwan, rises on the inner slopes of the Eastern Mountains in the latitude of Brisbane and flows southwest into the Murray, which, together with its tributaries, the Lachlan and Murrumbidgee, heads in the Eastern Mountains south of the latitude of Sydney, and flows west and then south until it empties into the Indian Ocean. This drainage basin, as large as that of the Danube, does not attain an importance commensurate with its size. Although its source streams are well fed, the limestone region through which the rivers flow in the lowland, and the progressive decrease of rainfall and increase of evaporation to the west rob the streams of the greater part of their supply. Only 25 per cent of the precipitation of the Murray drainage basin and 1½ per cent of that of the Darling basin ultimately reach the sea.

The region with interior drainage is characterized by the lack of outlet of its rivers. This is due to the extreme aridity of the region. Its drainage channels, whose condition is generally that of dry river beds, have their origin in the Great Plateau Region, in the divide to the Gulf of Carpentaria and in the Eastern Mountains, whence they flow convergingly southeast, south, and southwest as the Finke River, the Georgina River, and Cooper Creek, respectively, and empty (when they carry water) into Lake Eyre. Lake Eyre is the largest lake of the continent; having no outlet, it is saline. It lies 35 feet below sea level. To the south it is continued by the depression containing Lake Torrens—likewise without outlet—and Spencer Gulf; this depression is probably a rift valley, or structural trough. It is bounded on the east by the north-south trending Flinders Range. Additional lakes without outlet are Lake Gairdner, west of Lake Torrens; Lake Blanche, north of the Flinders Range; and Lake Frome, on the eastern flank of its northern end.

The lowlands surrounding the Gulf of Carpentaria are tropical in character. They consist mainly of the drainage basin of the Leichhardt, Flinders, Gilbert, and Mitchell rivers.

The third topographical division of Australia, the Great Plateau Region, occupies the remainder—about 54 per cent—of the continent. Its average elevation is about 1000 feet. Along its western edge, near the coast, it contains a belt of higher land, while its eastern border, adjoining the Central Lowlands, is flanked by east-west trending ranges of considerable height. Mainly on the score of climatic differentiation the Great Plateau Region may be subdivided into three parts: (1) the tropical region of the north coast, (2) the temperate region of the southwest tip of the continent, and (3) the desert region of the interior. The tropical region includes the Kimberley district, a region of greater elevation culminating in the King Leopold Range and drained by the Fitzroy and Ord rivers, and Arnhem Land, also higher than the plateau surface, drained by the Daly and Roper rivers. The temperate region rises gradually from the interior to the west coast, where it breaks off to the sea in the escarpment of the Darling Range. It is characterized by an annual rainfall of over 10 or 15 inches. The interior desert region is the culminating expression of the aridity of the continent. For the greater part it has the appearance of a limitless, slightly undulating surface, broken here and there by low, bare ridges. The surface is strewn with rock fragments; the characteristic vegetation is spinifex grass. Toward the west coast the land rises; this section is drained to the sea by the Murchison, Gascoyne, Ashburton, and Fortescue rivers. On the

eastern border of the plateau region are the east-and-west trending ranges mentioned above, among which the system of ranges known as the Macdonnell Range (summit, 4800 feet) and the Musgrave Range (summit, 5200 feet) are the most important. To the south the plateau region with its desertic conditions breaks off abruptly at the sea, making the coast of the Great Australian Bight inaccessible and inhospitable.

Climate and Rainfall. Australia lies within the region of the southeast trades and the high (atmospheric) belt. It is thereby predisposed to a warm, dry climate; this tendency is emphasized by its compact mass, which does not allow oceanic influences to penetrate far into the interior. Its extent through 30° of latitude (10°–40° S.) naturally makes for a great variety of climate; broadly speaking, the continent belongs to three zones as defined by the July (southern winter) and the annual isotherm of 68° F.: (1) the tropical zone, which includes York Peninsula, Arnhem Land, and the Kimberley district; (2) the semi-tropical zone, which includes the middle zone of the continent up to a line excluding the southwestern tip, the southern part of South Australia and New South Wales and all of Victoria, and (3) the warm temperate zone which includes the last-named regions.

In a region so extensive very great varieties of climate are naturally to be expected, but it may be stated as a general law that the climate of Australia is milder than that of corresponding latitudes in the Northern Hemisphere. During July, which is the coldest month in southern latitudes, one-half of Australia has a mean temperature ranging from 40° to 64° F., and the other half from 64° to 80°. During December the temperature ranges from 50° to above 95°, half of Australia having a mean temperature of 83°. The region possessing a mean summer temperature in excess of 95° F. is the interior of the Northern Territory of South Australia, north of the 20th south parallel; and the whole of the country, excepting the seaboard, lying between the east meridians of 120° and 140° and north of the 25th south parallel, has a mean temperature in excess of 90° F. On the other hand, the Pacific slopes of New South Wales are remarkable for the salubrity. The climate of the great plains of Queensland, New South Wales, and northern Victoria, in spite of the heat of part of the summer, is eminently healthy. In Victoria the heat is generally less intense in summer and the cold greater in winter than in New South Wales. Melbourne, in lat. 37° 50′ S., has a mean temperature of 57.3°, and therefore corresponds to Bathurst in New South Wales, Washington in the United States, and Madrid, Lisbon, and Messina, in Spain, Portugal, and Sicily respectively; but with this difference—the variation between summer and winter temperatures is less at Melbourne than at any of the cities just cited. It is a rare thing for Melbourne summer heat to exceed 85° or the winter temperature in the daytime to fall below 40°. The mean temperature of Brisbane, during the first, second, and last months of the year is about 76°, while during the sixth, seventh, and eighth it averages about 60°. However, the winter in Rockhampton, farther north, averages 65° with a summer heat almost to 85°, while at Townsville and Normanton, still farther north, the average temperature is increasingly higher. In this respect the southern portions greatly resemble the coast of Italy, the coldest months being June, July, and August, during which the temperature is very agreeable, ranging between 52° to 54° F.; but the climate of the Northern Territory is exceedingly hot, except on the elevated tablelands. In the southern and early settled parts of Western Australia the mean temperature is about 64°, with a maximum of 106°, and a minimum of 39°. But although for three months of the year the heat is very great in the daytime, the nights and mornings are almost always cool.

The rainfall of Australia varies as greatly as its climate. In New South Wales, the parent state, it ranges from an annual average of 64 inches at Port Macquarie, on the north coast, and Kiandra, in the Monaro district, to 9 inches at Milparinka, in the trans-Darling country. The coastal districts average about 42 inches per annum; on the tableland the mean rainfall is 32 inches, but in the western interior it is as low as 20 inches, while at the ten stations in the far west the average was only 14 inches. The average rainfall of Sydney during 42 years was 50 inches, while during 1901 a fall of 40 inches was recorded. During the year 1900 the rainfall at Melbourne amounted to 28.09 inches, the second highest total during the preceding decade, while for a long series of years it averaged 25.58 inches, with an average of 131 days during the year on which rain fell. At Echuca, during 1900, the number of inches of rain recorded was 15.8, while at Portland it was 32.82, and at Wilson's Promontory, 42.8. The average rainfall of Queensland is high, on account of its situation within and near the Tropic of Capricorn. Along the northern coast it ranges from 60 to 70 inches per annum. At Brisbane 50.01 inches is the average of 35 years, and even on the plains of the interior from 20 to 30 inches fall every year. During 1900, 34.41 inches of rain fell in Brisbane —the number of wet days being 110. On the whole, the weather of South Australia is remarkably dry. At Adelaide there are, on an average, 120 rainy days per annum; during 60 years the mean rainfall was 20.88 inches per annum, while farther north the quantity recorded was considerably less. The country is, however, naturally healthful, and in evidence of this it may be mentioned that no great epidemic has ever visited this state. Notwithstanding the great heat experienced by Europeans in the Northern Territory, it is a fact worthy of notice, also, that the malarial fevers which are so troublesome to the pioneers throughout almost the whole of the northern parts of Australia, partially, and in some cases wholly, disappear after the land has been settled and consolidated by stock. The rainfall in the extreme north, especially in January and February, is exceedingly heavy. The average annual rainfall in the coast districts is about 63 inches. Western Australia has practically only two seasons, the winter, or wet season, which begins in April and ends in October, and the summer, or dry season, which comprises the remaining six months of the year. During the wet season frequent and heavy rains fall, and thunderstorms with sharp showers occur in the summer. The extremes of drought and flood experienced in the other states are almost unknown in Western Australia, but during the summer months the northwest coast is sometimes visited by hurricanes of great violence. At Perth, in 1900, the rainfall was 36.61 inches, and rain fell on 124 days. Observations extending over a

period of 22 years show an average rainfall at Perth of 33 inches. In the northern parts of Western Australia the heat is excessive, though the dryness of the atmosphere makes it preferable to most tropical climates.

Geology. The Eastern Mountains are composed mainly of Silurian beds, with, however, large areas of Carboniferous formation, while in the neighborhood of Sydney, New South Wales, and Ipswich, Queensland, are large areas of what are probably Jurassic beds. Throughout the range intrusions of granite are abundant. The Darling Range, on the west coast, is composed of more recent beds, probably Jurassic. East of this range, stretching far into the interior, the country is overlaid irregularly with granite, and the same rock appears in many, if not most, of the mountain ranges of the interior, breaking through the Tertiary and Cretaceous beds which floor the plains and plateaus of this region. The distribution of these last two formations in the interior may be broadly characterized by the statement that the interior portions of Queensland and New South Wales are underlain mainly by Cretaceous beds, while the interior of Western and South Australia is mainly covered with Tertiary formations. There are, however, considerable tracts in the interior which are covered by older rocks. Thus, in the southern part, north of Spencer Gulf and the Gulf of St. Vincent, is a large area of Paleozoic beds extending inland as far as Lake Eyre, while from the head of the Gulf of Carpentaria an area of the same age extends southward. Tasmania is composed mainly of Silurian strata; Carboniferous and Jurassic beds and older crystalline rocks appear, however, both in the interior and on the east coast. Gold-bearing rocks and other valuable mineral deposits are widely disseminated throughout Australia.

There are no active volcanoes on the continent, but there are several areas of extinct volcanoes. They are very numerous in the State of Victoria in the southeast, where they have had much to do with shaping the present conformation of the land. There are but few in New South Wales, although outflows of basalt through low vents were numerous and extensive in that colony during Tertiary times. In Queensland the volcanic area is extensive, especially in the interior. In South Australia is the well-known volcanic group which has Mount Gambier for its central figure.

Flora. A brief description of the vegetational provinces of Australia may be helpful as an introduction to the discussion of its flora. We may distinguish between seven provinces. 1. The tropical forest occupies the whole northern and east coast from Arnhem Land nearly to the latitude of Brisbane. It is a fairly open, deciduous forest of the drier monsoon type. The equatorial type of forest is found only in tracts with sufficient ground water. Mangroves fringe the coast here and there. 2. The wet summer evergreen forest occupies the seaward slopes of that section of the eastern mountain belt designated the Southeast Highlands. (See *Topography; Drainage.*) It belongs to the luxuriant moist type of warm temperate countries, with tall eucalyptus as the dominant feature. 3. The dry summer evergreen forest covers the Victorian Highlands, the southern end of the Flinders Range on the east shore of St. Vincent Gulf and the southwestern tip of the continent. It belongs to the Mediterranean type of evergreen vegetation. 4. Practically the whole Darling-Murray basin between the Eastern Mountains and the Flinders Range, except adjacent to the lower course of the Murray, is steppe. The *hinterland* of the western part of the Great Australian Bight belongs to this formation. 5. Savanna occupies a belt roughly 300–400 miles wide across the whole northern part of Australia from the Kimberley district east to the southern part of the Queensland Highlands. As far as Arnhem Land it reaches the coast; from here eastward it lies on the inner side of the tropical coastal forest. 6. That part of the Great Plateau Region which is not occupied by the vegetations already described or by desert is the home of the scrub. This most typical of Australian plant formations consists of a dense mass of low trees and shrubs which, in its impenetrability, has been one of the greatest obstacles in the exploration of the interior. 7. Finally, the desert occupies most of the plateau between 120° and 133° E., included between the savanna on the north and the scrub on the south, and detached areas occur northeast of Macdonnell Range and north of Lake Eyre.

The flora as a whole is very distinctive, and, moreover, is of two very marked and characteristic types. That of the moist east and north coasts is tropical in its luxuriance, and that of the interior, and the south and west coasts, is characteristic of the desert. Upwards of 12,000 species of plants are found, of which number not less than 7000 are peculiar to the continent. The leaves of many of the plants are of tough, fibre-like consistency, and some of them are needle-shaped; thus rapid evaporation is prevented, for they do not expose as much surface to the heat rays as do the broad-leaved plants. The foliage is somewhat monotonous after the manner of regions where specific types prevail. Australia possesses a great extent of territory in which the soil would produce a rich vegetation if only the proper watering could be accomplished.

Eastern and northern Queensland, with its moist tropical climate, produces a dense plant growth of Indo-Malayan character, such as tree ferns, bamboos, palms, and canes, with numerous parasitic plants and orchids. The palm and the pandanus (of the screw-pine family), with their aërial roots and palmy branches, are distinctive forms of this section. The bottle tree also, with its curious shape, deserves mention. The grass tree is also found in the eastern Australian region. In Victoria the vegetation is almost tropical in its richness in the mountain regions, but on the plains is somewhat sparse, the trees growing in park-like clumps. Here the eucalyptus reaches its greatest height (exceeding 400 feet), tree ferns present their wonderful growth, and numerous small ferns aid in giving a peculiar aspect to the vegetation. Fan palms and acacias flourish. Grass and salt bushes are distinctive types of lowland flora. In the great central region known as South Australia and the Northern Territory there is a sparse vegetation, the scrub or mallè being general, together with sedges, grasses, etc., as well as the grass tree, thorny plants, and a stunted growth of eucalyptus. Thickets of the paper-bark tree also occur. This growth (known as the "bush") is impenetrable by man in some regions. On the coast are found mangroves.

In July (midwinter) the following vegetation conditions prevail: in northern Australia, along the borders of the Gulf of Carpentaria, the

vegetation is tropical in character with no cessation of the growing period. To the south of this, all along the northern part of the continent, is a less rich tropical vegetation with a cessation during the dry season. In the southern part of the east coast and the eastern and western parts of the south coast are evergreen trees and a bushy growth, with a short period during which vegetation is at a standstill. In the remainder of the continent are grass lands, bushy steppes, and desert areas in which the vegetation rests at this time of year (the winter time of the Southern Hemisphere). In January (midsummer) on the north coast the narrow strip of rich tropical vegetation suffers no interruption in growth, and in the belt of less rich tropical vegetation to the south of it vegetation is in its full development during the rainy season. The vegetation in the southeastern and southwestern parts is much restricted by the summer drought. In the interior the steppes have their summer verdure in regions where there is sufficient rain, but in the southwest the principal season of growth is from September to October, during the southern spring.

Fauna. The animal life is more peculiarly isolated than is that of any other great region of the globe. This is due to the fact that the destruction of the connection of Australia with Asia, although belonging to a relatively recent geological period (late Cretaceous or early Tertiary) happened at a relatively remote time in the biological time scale, before the larger orders had reached an advanced stage of development or had been able to reach Australia.

Of the non-aquatic mammalia only two of the orders found on the other continents are represented, the bats and the rodents. The others have their places taken by the two orders peculiar to Australia, the marsupials or pouch mammals, and the Monotremata or egg-laying mammals. There are six families of marsupials which include about 30 species. They differ greatly in form, in appearance, and in habits, resembling wolves, marmots, weasels, squirrels, flying squirrels, and jerboas, and feeding on flesh, insects, roots, fruits, honey, leaves, and grass. The flesh eaters are the native cats, rats, and mice, which are common to the continent, and the larger species, the so-called tiger of Tasmania. The insect eaters are the bandicoots or bandicoot rats. The root eaters are the wombats, all large burrowing animals. The fruit eaters are the native bear, a sloth-like creature, three varieties of opossums, the flying opossums, and the flying squirrels. The grass eaters are the kangaroos, of which there are numerous genera; the large kangaroos, the small kangaroos, the rock wallabies, and the hare kangaroos. The Monotremata, the egg-laying mammals, are the Ornithorhyncus and the spiny ant-eater; the former of which, with its otter-shaped body and duck bill, is regarded as the most curious of existing mammalia. It is not certain that the dingo, or wild dog, is a native of Australia, although he is a characteristic mammal at the present time. Among the bats are some which attain great size and are called flying foxes, and which feed on fruits; others of smaller size live on insects. The bird fauna has numerous species. Among the larger birds are the emu, the eagle, and the black swan. The lyre bird is remarkable for its peculiar plumage. Paradise birds, cockatoos, parrots, paroquets, snipe, quail, pigeons, ducks, plovers, falcons, honeysuckers, scrub birds, mound makers, shrikes, weaver finches, kingfishers, frogmouths, and flower peckers are all abundant.

The reptiles of Australia are less distinctively peculiar than the birds and mammals. No families of snakes are confined to this continent, but there are some peculiar genera of Pythonidæ and Elapidæ, to which latter family fully two-thirds of the snakes of Australia belong. These are poisonous; so that Australia has more poisonous snakes in proportion to the total number than has any other region. In eastern Australia about half the snakes are poisonous, but in other parts the ratio is not so high. The number of species increases very rapidly from the southern part toward the northern with the increase in temperature. Lizards are numerous; three of the eight families occurring being peculiar to Australia. Tailed amphibians are not found in Australia, but 11 families of toads and frogs are present. There is only one family of fish peculiar to the waters of Australia, but many genera are found there which do not occur elsewhere. Australia is relatively poor in insect life. The butterflies are by no means numerous; in South Australia there are less than 35 species, although in Queensland there are over 100. This continent is much richer in beetles than in butterflies, the longicorns being especially abundant.

Mineral Resources. There are few countries in the world which are endowed with such a diversity of large mineral deposits as Australia. The total area of the Commonwealth in square miles is 2,974,581, while its population, according to the decennial census of April 3, 1911, is 4,455,005 (exclusive of full-blooded aboriginals), or 1.49 persons per square mile. The total value of the mineral production to Dec. 31, 1911, was £784,706,891.

This total of £784,706,891 is shared by the states as follows: New South Wales, £216,146,025 (of which coal, £65,427,673, gold, £58,760,846, silver and lead, £56,476,104); Victoria, £293,462,072 (of which gold, £289,663,989); Queensland, £99,726,118 (of which gold, £73,739,851); South Australia, £29,761,866 (of which copper, £27,285,052); Western Australia, £107,569,275 (of which gold, £103,850,486); Tasmania, £35,176,277 (of which tin, £11,429,499, copper, £9,816,537); Northern Territory, £2,865,258 (of which gold, £2,043,017). The total value of mineral production in 1911 was £23,480,211, compared with £23,215,191 in 1910 and £23,045,162 in 1909.

The present position of Australia, commercially, is largely due to the discovery of gold, the development of the other industries being, in a country of varied resources, a natural sequence to the acquisition of mineral wealth. The first definite record of the discovery of gold in Australia is a note by James McBrien, assistant surveyor, in a field book which he used while making a survey of the Fish River (New South Wales) between Rydal and Bathurst. The note is dated Feb. 15, 1823. Mention is also made in the early records of New South Wales of several other finds, but it was left for Count Strzlecki (in 1839), and the Rev. W. B. Clarke (in 1841) to demonstrate its existence in payable quantities, which was further substantiated by E. H. Hargraves' discovery in April, 1851, of Lewis Ponds and Summer Hill Creek. The first discovery of gold in Victoria was probably that made by W. Campbell at Clunes in March, 1850. In July, 1851, it was

announced that L. J. Nichel had found gold in the Yarra Ranges, and James Esmond in the Pyrenees Mountains. A few months thereafter many other noted fields in Victoria were opened up, and the gold fever took possession of Australia. The first find in South Australia is believed to have been in 1846, and in Tasmania in 1849. The rush to Canoona, in Queensland, took place in 1858, and though it turned out a failure, it led to the opening of payable fields about the time (1859) of the severance of that territory from New South Wales. Gold appears to have been found in Western Australia as early as 1848, but the first gold field, Kimberley, was not proclaimed until 1886, and the second, Yilgarn, not until 1888. In September, 1892, Bayley made his famous discovery at Coolgardie, and gold production progressed by leaps and bounds until 1903; since then, though the gold mines of Western Australia continue to be the richest in Australasia, their output has gradually declined. It was in 1903 that the maximum output of the Commonwealth was obtained, £16,294,684, of which the share of Western Australia was £8,770,719; the other states obtained their greatest yields as follows: New South Wales, £2,660,946, in 1852; Victoria, £12,214,976, in 1856; Queensland, £2,871,578, in 1900; South Australia (not including Northern Territory), £76,025, in 1904; Tasmania, £327,545, in 1899; Northern Territory, £111,945, in 1881. In the Commonwealth the total gold raised up to the end of 1911 was valued at £536,196,981. The value of the gold produced in each state in 1911 and from the beginning of mining to the end of that year is shown in the following table:

State	In 1911	To end of 1911
New South Wales	£769,353	£58,760,846
Victoria	2,140,855	289,663,989
Queensland	1,640,323	73,739,851
South Australia	15,000	892,810
Western Australia	5,823,075	103,850,486
Tasmania	132,108	7,245,982
Northern Territory	30,910	2,043,017
Commonwealth	£10,551,624	£536,196,981

The first discovery of silver in Australia was probably in 1839 in New South Wales, and the Wheal Gawler mine, near Glen Osmond, South Australia, opened in 1841, was probably the first silver mine worked in the Commonwealth. Silver has since been discovered in all the states, either alone or in the form of sulphides, antimonial and arsenical ores, chloride, bromide, iodide, and chloro-bromide of silver, and argentiferous lead ores, the largest deposits of the metal being found in the last-mentioned form. The largest silver mines are in New South Wales, the output of the other states being comparatively small. Up to 1882 the quantity of silver won was very limited, but in that and the following year extensive discoveries of the metal—associated principally with lead—were made in various parts of New South Wales, notably at Broken Hill and Silverton. The Broken Hill field extends over 2500 square miles of country, and has developed into one of the principal mining centres of the world. The lode is the largest yet discovered, and varies in width from 10 to 200 feet. The yield, including the silver lead locally produced and the concentrates exported, of the Broken Hill mines alone, from their inception to Dec. 31, 1911, was over £64,600,000, and the dividends and bonuses paid to the end of that year amounted to £14,554,185. The mine output of silver and lead in the Commonwealth to the end of 1911 was valued at £65,849,880.

Copper in Australia was first discovered at the Kapunda mine in South Australia in 1842. From 1846 copper mining may be said to have been one of the leading industries of that state, the output to the end of 1911 amounting to £27,285,052; for the year 1911 the output was valued at £332,500. In 1911 Queensland held first rank as a copper-producing state, with an output of £1,151,351; Tasmania was second, with £408,649. The production of the Mount Lyell mine in Tasmania has declined in recent years. The output in the Commonwealth to the end of 1911 amounted to £59,149,716, and in that year £2,564,278. The fluctuation in the market value of this metal was for some time a check to the industry, and many of the low-grade mines were compelled to close down.

Tin was first discovered, in New South Wales, probably in 1851. It exists in all the states, but Tasmania contains the richest deposits—the Mount Bischoff being the most celebrated tin mine in Australia. Queensland and Western Australia also possess rich deposits. The value of the tin won in Australia up to Dec. 31, 1911, was £30,227,626, and in that year £1,209,973 (£513,500 in Tasmania, £307,847 in Queensland, and £307,089 in New South Wales).

Iron is distributed throughout the Commonwealth, but want of capital has to a great extent interfered with the progress of the industry. In New South Wales extensive deposits of this ore exist in the Mittagong, Piper's Flat, Goulburn, Queanbeyan, and Port Stephens districts, and at Carcoar and Cadia.

Among the other metals and metalliferous minerals found in the various states may be mentioned aluminium, antimony, bismuth, manganese, platinum, tellurium, lead, mercury, molybdenum, titanium, wolfram, nickel, cobalt, chrome iron or chrome ore, zinc ores, and radioactive ores. The zinc in New South Wales is usually associated with silver, lead, and copper. For many years attention was directed by the

MINERAL PRODUCTION OF THE AUSTRALIAN COMMONWEALTH IN 1911

State	Gold	Silver and lead	Copper	Tin	Zinc	Coal	Total (incl. other)
New South Wales	£769,353	£2,652,548	£590,102	£307,089	£1,414,890	£3,167,165	£9,405,301
Victoria	2,140,855	.....	2,088	3,417	.....	301,142	2,463,865
Queensland	1,640,323	23,460	1,151,351	307,847	.....	313,998	3,658,738
South Australia	15,000	.....	332,500	.....	.....	.....	473,604
Western Australia	5,823,075	15,002	78,118	55,220	189	111,154	6,105,853
Tasmania	132,108	253,361	408,649	513,500	.....	26,214	1,349,497
Northern Territory	30,910	.....	1,470	22,900	.....	.....	59,353
Commonwealth	£10,551,624	£2,767,276	£2,564,278	£1,209,973	£1,415,169	£3,919,673	£23,480,211

Broken Hill mines of New South Wales to the production of a high-grade zinc concentrate from the sulphide ores, but with only fair success. This difficulty was, however, overcome by the dry magnetic separation plant. The zinc output of New South Wales in 1911 amounted to £1,414,980, almost the entire production of the Commonwealth.

Coal was first discovered in New South Wales in 1797, at Coalcliff, on the coast to the north of Wollongong. Later in the same year Lieutenant Shortland discovered the Hunter River, with the coal beds situated at its mouth. It was not, however, until 1826 that coal mining really began. Coal is also mined in Queensland, Victoria, Tasmania, and Western Australia, but the quantity is small compared with the output of New South Wales, which to the end of 1911 was valued at £65,427,673, while that of the Commonwealth was £74,151,686. The total produced in 1911 was 10,550,127 tons, valued at £3,920,672.

The name "kerosene shale" has been applied to a variety of torbanite, cannel, or boghead mineral which occurs in a number of localities in New South Wales. The name "kerosene shale" is, however, an unsatisfactory one, because the mineral has little or none of the character of shale. The output of shale from the mines of this state in 1911 was valued at £36,980.

Of the other non-metalliferous substances, the gems and gemstones take first place. They have been discovered in various parts of Australia, but systematic search has been made principally for the diamond and the noble opal. Diamonds are found in New South Wales, Queensland, and South Australia, but only in the first-named state have any attempts been made to work the diamond drifts, the output to Dec. 31, 1911, being £118,407. Noble opal to the value of £1,295,100 was won in New South Wales from 1890 to 1911. Other gemstones, including the sapphire, emerald, oriental emerald, ruby, amethyst, garnet, chrysolite, topaz, onyx, and zircon, have been found in the various states, but they are not mined to any extent. Plumbago exists in New South Wales and Western Australia; bitumen in Victoria and New South Wales; elacterite, or elastic bitumen, in New South Wales and South Australia.

Common rock salt has been found in rock crevices in several parts of New South Wales, but is not known to exist in quantities sufficiently large to be of commercial importance. Large quantities of salt are obtained from the salt lakes in South Australia.

Marble is found in many parts of New South Wales, Victoria, South Australia, and Tasmania. In the former state quarries have been opened up in several districts, and some very fine specimens of stone obtained.

Limestone is mined in New South Wales and is largely used for the manufacture of hydraulic cement, as well as for fluxing purposes in smelting works. Limestone is also mined in Queensland, South Australia, Tasmania, Victoria, and Western Australia, but is used mainly for fluxing purposes. The production of Portland cement in New South Wales in 1911 was valued at £315,569 (not included in figures given for total mineral output).

Agriculture. In the western half of Australia, save at favored points along the coast, the rainfall is too scant to justify cultivation. The value of the rain is greatly lessened, moreover, by the fact that it falls in torrents and is mostly carried away at once by the watercourses. Surface streams for irrigation are not plentiful, but there is an unusually large number of subterranean currents; many artesian wells have been bored, particularly in South Australia and western New South Wales and Queensland, and numerous localities have thus been brought under successful cultivation. But as yet most of the western half of Australia lies untouched, while most of the eastern half resembles the western plains of the United States half a century ago, being given over entirely to grazing.

This eastern region has proved second to none anywhere in adaptability to sheep raising. Even the forest areas afford excellent pasturage; and the winters are so mild as not to interfere with grazing the year round. The only serious drawback is an occasional drought. For several years Australia has led the world as a wool producer, and her sheep have been her greatest source of wealth. The highest number of sheep ever reported was in 1891, when the total amounted to 106,421,068, the share falling to New South Wales alone being 61,831,000. Owing to prolonged drought the number fell to 72,040,211 in 1901, and 53,668,347 in 1902. Since then there has been a marked recovery, and at the end of 1911 the number of sheep in the Commonwealth was 93,003,521. Sheep are raised mainly for their wool, the total production of which (in the grease) amounted to 543,495,000 pounds in 1891, 509,902,000 pounds in 1901, 522,062,000 pounds in 1905, and 768,572,533 pounds in 1911. The breed of sheep is steadily improving, as is shown in the increase of the average weight of clip per sheep from less than 4 pounds in 1861 to a little over 7 pounds in 1905, about one-half pound more than in the United States. Formerly little or no mutton was exported, due to the breed of sheep being too valuable as a wool producer and the distance from European markets. But with the improvement of the crossbreeds, which are grown for table use, and the discovery and application of a process of cold storage of the meat for transportation, an export trade has been established which is assuming considerable dimensions.

Cattle are no less favored by the Australian climate than sheep. Queensland and New South Wales are the great cattle-raising states, the former having 42.89 per cent of the total in 1911 and the latter 26.93 per cent. The number of cattle in the Commonwealth increased from 3,724,813 in 1865, to 11,767,488 in 1895. By 1900 the number fell to 8,640,225, but increased to 11,744,714 in 1910 and 11,828,954 in 1911. The exportation of cold-storage beef is much greater than of mutton and is constantly increasing. Dairy farming has been carried on in Australia from a very early period in its settlement, but its mercantile importance began with the manufacture of butter by machinery in the early eighties. Originally the butter factories were mostly private concerns, but they have been superseded by factories owned coöperatively by the farmers. This transformation was largely due to government aid and encouragement. Thus New South Wales engaged the services of a dairy expert, and caused the importation of representative dairy breeds from England. Improved methods of shipping the product have greatly aided the industry. In 1904 there were 1,551,000 dairy cows in the Commonwealth, and in 1911 2,120,659; in the latter year 211,577,745 pounds of butter and 15,886,712 pounds of cheese

were produced, by far the greater part in New South Wales and Victoria. The raising of swine, which is carried on largely in connection with dairy farming, is a big industry and is yearly growing. Horses are bred mainly for local purposes. In 1905 their total number in the Commonwealth was 1,674,790 and 2,279,027 in 1911.

During the decade preceding 1891, in which there was a remarkable growth in sheep raising, land cultivation increased but slightly; but in the subsequent decade the increase was enormous. A change from the pastoral to the agricultural stage was taking place, similar to the transformation on the western plains of the United States. The rate of increase of cultivated land from 1861 to 1901 was twice that of the increase of population; and the area under crop increased from 8,812,463 acres in 1900–01 to 12,107,017 in 1911–12.

ACREAGE OF PRINCIPAL CROPS AND TOTAL ACREAGE, 1911–12

State	Wheat	Oats	Corn	Barley	Potatoes	Vines	Fruits	Sugar cane	Hay	Green forage	Total
New South Wales	2,379,968	70,943	167,712	10,803	43,079	8,231	48,385	13,907	651,866	211,693	3,628,513
Victoria	2,164,066	302,238	18,223	53,541	47,692	24,093	59,985	.....	860,205	75,177	3,640,241
Queensland	42,962	557	153,916	1,634	7,688	1,371	16,817	130,376	61,299	93,049	526,388
South Australia	2,190,782	107,881	97	40,643	7,412	23,986	23,214	.....	521,182	33,673	2,965,338
Western Australia	612,104	77,488	29	3,654	2,705	2,821	18,194	.....	344,032	5,021	1,072,653
Tasmania	37,208	57,583	.....	6,081	21,818	.....	27,868	.....	77,466	5,627	270,000
Northern Territory	2	.....	19	.....	.....	58	13	.....	18	19	375
Federal Cap. Ter.	742	167	69	.....	69	.....	48	.....	2,220	181	3,509
Commonwealth	7,427,834	616,857	340,065	116,466	130,463	60,602	194,524	144,283	2,518,288	424,440	12,107,017
1910–11	7,372,456	676,688	414,914	108,424	151,515	59,114	185,156	155,542	2,258,405	374,862	11,893,838

PRODUCTION, 1911–12

State	Wheat	Oats	Corn	Barley	Potatoes	Wine	Sugar cane	Hay
	bushels	bushels	bushels	bushels	tons	gallons	tons	tons
New South Wales	25,080,111	1,152,827	4,606,547	129,008	75,040	850,210	147,799	726,933
Victoria	20,891,877	4,585,326	792,660	1,024,584	119,092	983,423	.....	1,032,288
Queensland	285,109	5,783	3,637,562	15,369	13,087	57,358	1,534,451	94,553
South Australia	20,352,720	1,349,480	1,490	702,855	22,668	2,921,597	.....	605,239
Western Australia	4,358,904	961,385	401	37,011	9,312	162,559	.....	299,695
Tasmania	659,615	1,504,633	.....	148,009	62,164	.....	.....	107,684
Northern Territory	20	.....	400	.....	.....	.....	.....	40
Federal Cap. Ter.	7,991	2,337	795	.....	126	.....	.....	1,600
Commonwealth	71,636,347	9,561,771	9,039,855	2,056,836	301,489	4,975,147	1,682,250	2,868,032
1910–1911	95,111,983	15,428,456	13,044,081	2,226,368	399,851	5,866,049	2,000,758	3,175,851

In the three leading agricultural states—New South Wales, Victoria, and South Australia—wheat in 1911–12 constituted 65.59, 59.45, and 73.88 per cent, respectively, of the total area under crop. Only in Queensland and New South Wales is there sufficient rainfall to assure a crop of corn. The increase in wheat has been proportional to that of the total cultivated area, yet wheat is not a universally successful crop. In places droughts are frequent, and in many localities a long unbroken succession of the one crop has impoverished the soil. The average yield per acre for the Commonwealth has increased; it was 8 bushels in 1899 and about 12 bushels in 1909, while for the 10 years ended in 1912 the average was 10.48 bushels. Sugar cane is already by far the foremost crop of Queensland and is important in New South Wales. Australia now produces nearly all the sugar it needs. Wine, especially in Victoria and South Australia, is an important product. The cultivation of cotton has been tried in Queensland, but without marked success. Coffee and bananas are successfully grown on the coast of Queensland, and all kinds of temperate-zone fruits farther southward; while the orange, lemon, and fig thrive along almost the whole of the eastern shore line, even as far south as Victoria. The part of the land so far cultivated is but a minute portion of that which is available. Against the disadvantage of remoteness from the world's market, it has the advantage of producing fruits at a season when there is no competition from northern countries.

The different state governments have sought to encourage the development of the crown lands, and the state laws have been adapted to the nature and possibilities of the land and the varying desires and financial conditions of the settler. The terms for acquiring new lands include various kinds of conditional purchases, the instalment plan being in vogue. Sometimes residence is exacted. Certain lands may be acquired by annual lease. (For a more detailed statement, see articles on the different states.) All the states encourage suitable immigration. The various agents-general in London do their utmost to place before the inhabitants of the British Isles the advantages offered by Australia.

Manufactures. The establishment of a Commonwealth tariff, Oct. 4, 1901, gave to the Australian manufacturer the whole of Australia for a market instead of his own state, with the result that manufactures increased considerably. A successful effort has been made to establish the manufacture of iron, and large works are in operation at Lithgow, New South Wales. Many other industries, too, are showing great activity, notably boot manufacturing, Australia now making nearly all the boots and shoes her people require.

The progress of the manufacturing industry in Australia is somewhat irregular even in the more advanced states. The majority of the manufactories may be classified as domestic industries—i.e., industries naturally arising from

the circumstances of the population, or connected with the treatment of perishable products; but there is nevertheless a fair number of firmly established industries of a more complex character.

The value of the output of manufacturing industries (including the value of the raw materials) was as follows in 1907 and 1911:

State	1907	1911
New South Wales	£37,231,012	£54,346,011
Victoria	29,693,634	41,747,863
Queensland	11,209,515	15,675,662
South Australia	8,923,004	12,580,851
Western Australia	.....	5,311,086
Tasmania	.....	3,525,087
Commonwealth	.....	£133,186,560

The value of the output in 1911 was made up as follows: Raw materials used, £79,041,576; fuel and light, £2,752,950; salaries and wages, £27,531,876; all other expenditure, interest, and profits, £23,860,158.

In 1911 there were 14,455 manufacturing establishments in the Commonwealth, employing (an average number of) 311,772 hands.

Railways. One of the most serious problems with which Australia has had to contend is inland transportation. Being an almost riverless continent, she is mainly dependent on artificial systems. These must largely precede civilization and open up the country for industrial development. The construction of railways through uninhabited or sparsely settled regions necessitated an enormous cash outlay in the face of a light estimate of immediate returns and an uncertainty as to the ultimate outcome. This burden and responsibility were assumed by the government itself. It has sought to further the development of the country and at the same time reap the benefits of the growth occasioned by the construction, ownership, and management of its own railways. As a result, in 1912 only 1779 miles of railway remained in private hands. The cost of construction and equipment of government railways, aggregating 16,898 miles, up to June 30, 1912, was £160,557,160. After the interest and running expenses have been paid, the balance, if any, goes to the consolidated revenue fund; on the other hand, if there is a deficiency it is met from the ordinary state revenue.

Victoria, in 1883, and subsequently South Australia, New South Wales, and Queensland, took the control of the railways out of the hands of the minister of railways or public works, and vested it in special commissions or commissioners. The government administration of railways has not been entirely free from grave faults and wasteful undertakings, yet it has advanced the settlement of the country in a way that could never have been expected from private enterprise. Thus, not only have cheap passenger and freight rates been secured, but new industries have been fostered by special freight rates, and various emergencies have been met, such as the transportation of sheep to watering places in times of drought. The employees enjoy an eight-hour law and receive comparatively high wages. For the year ended June 30, 1912, the gross revenue on government lines was £19,101,000, the working expenses £12,471,000, and the percentage of working expenses to gross earnings 65.29. The following table shows the total railway mileage, for government lines June 30, 1912, for private lines Dec. 31, 1911 (*a*, government lines; *b*, private lines available for general traffic; *c*, total open for general traffic; *d*, private lines used for special purposes only; *e*, grand total):

State	*a*	*b*	*c*	*d*	*e*
New South Wales	3,832	141	3,973	125	4,098
Victoria	3,622	14	3,636	37	3,673
Queensland	4,266	346	4,612	21	4,633
South Australia	1,939	...	1,939	58	1,997
Western Australia	2,598	277	2,875	555	3,430
Tasmania	496	166	662	39	701
Northern Territory	145	...	145	...	145
Commonwealth	16,898	944	17,842	835	18,677

The mileage in 1912, the estimated population per mile, and the area (in square miles) per mile are shown below:

State	Mileage	Pop.	Area
New South Wales *	4,098	457	78.1
Victoria	3,673	372	24.1
Queensland	4,633	137	145.3
South Australia	1,997	216	196.0
Western Australia	3,430	105	339.4
Tasmania	701	287	39.6
Northern Territory	145	23	3,602.7
Commonwealth	18,677	260	166.7

* Including Federal Capital Territory.

Telegraphs and Telephones. The telegraph and the telephone systems are in the hands of the government, and progress in their development has been very rapid. The first telegraph for public use was established in 1854, from Melbourne to Williamstown. In 1871 there were about 11,500 miles of line, exclusive of railway telegraphs; in 1881, 25,470 miles; in 1901, 41,951 miles; in 1911, 44,013 miles of line, with 97,053 miles of wire. There are now north and south and east and west lines across the continent. A cable connects Darwin with Java, and through that with the European cables; another connection is made through a wire extending from Broome, Western Australia, to Banjuwangy. There is also the Pacific cable which connects Southport, Queensland, and Norfolk Island, thence to Fiji, Fanning Island, and Vancouver. The states on the mainland are all connected by electric telegraph, and Tasmania and New Zealand are connected to Australia by submarine cable.

Under the Wireless Telegraphy Act of 1905 the Postmaster-General has the exclusive privilege of establishing wireless-telegraphy stations within Australia; he is empowered, however, to grant licenses for the establishment and use of such stations. The first official wireless station was opened at Melbourne in February, 1912. Up to the end of 1912 the Commonwealth government had given approval for the erection of 19 stations, at or near the following localities: Port Moresby, Thursday Island, Cooktown, Townsville, Rockhampton, Brisbane, Sydney, Gabo Island, Melbourne, Hobart, Mount Gambier, Adelaide, Esperance, Perth, Geraldton, Broome, Roeburne, Wyndham, and Darwin. It was expected that all of these stations would be in operation by the end of June, 1913. Even-

tually the number of stations is to be increased to 32.

Commerce. Producing raw material so largely and manufactured products so little, Australia has an enormous foreign trade, exceeding all other countries in her per capita production and all except Belgium in the per capita value of her trade. One of the results of a federal tariff has been an increase in manufactories and the number of hands employed. Still so marked has been the increase in production, the external trade has increased and not diminished. The total oversea shipping entered and cleared at the ports of the Commonwealth is stated at 52,414 tons in 1831, 1,149,476 in 1861, 4,726,307 in 1891, 6,541,991 in 1901, and 9,984,801 in 1911. In 1911 the entrances aggregated 4,993,220 tons (of which 3,159,738 from British countries), and the clearances 4,991,581 (of which 3,215,158 to British countries); the percentage of British (including colonial) shipping was 74.18, and of foreign shipping 25.82. The interstate shipping entered and cleared in 1911 amounted to 23,167,747 tons, of which 6,528,328 were credited to New South Wales, 6,193,082 to Victoria, 4,313,759 to South Australia, 2,682,159 to Western Australia, 1,695,828 to Queensland, 1,623,716 to Tasmania, and 130,875 to Northern Territory.

The development of Australian foreign commerce may be seen in the following table, wherein are indicated total imports; domestic exports, or exports of Australian produce; re-exports, or exports of foreign produce; total exports:

	Tot. imp.	Dom. exp.	Reëxp.	Tot. exp.
1901	£42,433,810	£47,741,776	£1,954,396	£49,696,172
1907	51,809,033	69,816,500	3,007,747	72,824,247
1908	39,799,273	62,118,903	2,192,155	64,311,058
1909	51,171,896	62,843,711	2,475,125	65,318,836
1910	60,014,351	71,836,195	2,654,955	74,491,150
1911	66,967,488	76,205,210	3,277,048	79,482,258
Specie and bullion included in figures above:				
1901	£934,864	£14,423,298	£846,921	£15,270,219
1907	1,834,200	9,713,190	1,474,270	11,187,460
1908	1,190,352	13,526,398	663,822	14,190,220
1909	1,056,375	7,580,158	1,100,126	8,680,284
1910	1,331,960	3,587,201	1,048,076	4,635,277
1911	1,969,581	10,403,796	1,643,290	12,047,086

The principal classes of imports, with values for 1911, are as follows (in parentheses is shown the value of imported products of the United Kingdom): Apparel, textiles, etc., including boots and shoes, £17,840,496 (£11,462,927); manufactures of metals, including machinery, £14,211,581 (£8,507,499); paper and stationery, £2,831,808 (£1,651,715); drugs, chemicals, fertilizers, etc., £2,178,600 (£896,921); alcoholic liquors, etc., £1,920,824 (£1,138,158); jewelry, timepieces, fancy goods, £1,755,583 (£611,355); leather and manufactures thereof and substitutes therefor, including rubber (excluding boots and shoes), £1,586,503 (£544,583); metals unmanufactured and partly manufactured, mainly pig iron and bar and rod iron (excluding specie and bullion), £1,519,133 (£928,172); earthenware, cements, glass, etc., £1,228,122 (£553,817); foodstuffs of animal origin, £816,915 (£266,740). The foregoing imports aggregate £45,889,565, of which the value of £26,561,887 represents produce of the United Kingdom, £5,106,062 of Germany, £4,894,909 of the United States, and £1,868,774 of France. The total imports (less specie and bullion) in 1911 amounted to £64,997,907, of which £32,365,588 (49.80 per cent) produce of the United Kingdom, £9,007,065 (13.68 per cent) of the United States, £6,363,248 (9.79 per cent) of Germany, £2,268,692 (3.49 per cent) of France, and £1,141,075 (1.75 per cent) of Belgium. In respect of point of shipment, 60.28 per cent of the imports in 1911 came from the United Kingdom, 11.93 per cent from the United States, and 6.82 per cent from Germany.

Of Australian produce, exported to the value of £76,205,210 in 1911, the more important classes of exports are: Animal substances, £29,714,471 (exclusive of animal foodstuffs, £9,015,505); vegetable foodstuffs, £11,910,303; metals unmanufactured, ores, etc., £10,674,748; specie, £8,210,595; oils, etc., £2,234,884. The exports of wool in the grease in 1911 were 578,823,623 pounds and of scoured and washed wool 71,770,640 pounds, the total valued at £26,071,193. The export of wheat was 55,147,840 bushels, and of flour 175,891 tons, representing 8,794,550 bushels of wheat.

Total imports and total exports in 1911 amounted to £66,967,488 and £79,482,258, respectively. Direct total imports from and direct total exports to the United Kingdom were valued at £39,499,011 and £35,309,982 (58.98 and 44.42 per cent); United States, £7,747,991 and £1,464,155 (13.45 and 1.84); Germany, £4,437,153 and £6,642,012 (6.63 and 8.36); Belgium, £2,007,557 and £6,111,943 (3.00 and 7.69); France, £614,045 and £8,180,084 (0.92 and 10.30).

Banks. The banks number 23, most of which have numerous branches throughout the Commonwealth, the total number of banking establishments in 1912 being 2043. The paid-up capital June 30, 1912, was £28,647,884, with reserved profits amounting to £12,419,733; total liabilities, £152,218,589 (deposits £149,806,597); total assets, £165,771,256 (specie and bullion, £28,686,012). The savings banks are either government or quasi-government institutions. Their number, including branches and agencies, at the middle of 1912, was 1941; depositors, 1,736,004 (1,258,689 in 1907); deposits, £66,956,778 (£42,098,289 in 1907). The average amount per depositor in savings banks in 1912 was £38 11s. 4d., and per head of population, £14 8s. 4d. Of the deposits, £25,361,338 were in New South Wales and £19,662,465 in Victoria.

Government. The Commonwealth of Australia is a federal state under the supreme authority of the crown of Great Britain, and was so constituted on Jan. 1, 1901, by the union of the British colonies of New South Wales, Victoria, Queensland, South Australia, Western Australia, and Tasmania. The provisions of the federal constitution will be found treated in detail under AUSTRALIAN FEDERATION.

Defense. The Australian states have always been opposed to the maintenance of a standing army; the principal ports are protected by fortifications, and forts have been constructed at King George's Sound and Thursday Island. On June 30, 1912, the strength of the Commonwealth military forces was 23,696, comprising: permanently employed, 2234; citizen soldiers, 21,127; volunteers, 121; and area officers, 213. Infantry numbered 10,148; light horse, 5613; field artillery, 1626; garrison artillery, 1954; and engineers, 1206. In addition to the 23,696, there were land forces to the number of 146,352, including 92,277 "senior cadets," and rifle clubs numbering 50,621 men. Total land forces, 168,048.

By an agreement of 1903 (subsequently amended), Australian naval defense has been maintained by ships of the Imperial navy, consisting of one first-class armored cruiser, three second-class cruisers, and five third-class cruisers. To take the place of this squadron it was decided in 1909 to create a naval force Australian in character. By June, 1912, three destroyers, each of 700 tons' displacement, were in commission. The battle cruiser *Australia*, commissioned in 1913, has a displacement of about 19,200 tons, 26 knots' speed, an 8-inch armor belt amidships, and a 4-inch belt at the ends, and an armament of 8 12-inch and 16 4-inch guns, and 5 torpedo tubes. The second-class cruisers *Sydney* and *Melbourne* arrived in Australian waters in 1913, while a third cruiser of the same class, the *Brisbane*, was under construction. In 1913 the British Admiralty presented the Commonwealth with the cruiser *Pioneer*. While on the Australian station the warships are under the exclusive control of the Commonwealth in time of peace, but pass under Imperial control if required for war purposes. A navy yard is maintained at Sydney, and a naval college is to be established on federal territory at Jervis Bay. On June 30, 1912, the naval forces numbered 4969, of whom 3983 were reserves.

Finance. The different state governments of Australia have ventured farther into the industrial field than any of the older governments of the world, in consequence of which their annual revenues and expenditures attain a disproportionately large figure. The consolidated revenue of the Commonwealth increased from £11,296,985 in 1901–02 to £15,019,034 in 1907–08 and £20,548,520 in 1911–12; while the expenditure in 1907–08 was £6,162,129 and in 1911–12 £14,724,097. Per capita expenditure in the latter year, £3 4s. 6d. About two-thirds of the revenue is derived from customs. The surplus of revenue over expenditure is apportioned among the states. The Commonwealth debt, contracted in 1911 and 1912, amounted at the middle of the latter year to £6,371,847.

The total state revenues increased from £34,867,646 in 1907–08 to £41,278,034 in 1911–12, while the expenditure rose from £32,502,163 to £40,858,581. Per capita expenditure of the states in the latter year, £8 18s. 10d. Revenue and expenditure, respectively, of the several states in 1911–12: New South Wales, £15,776,816 and £15,277,001; Victoria, £10,009,796 and £9,999,342; Queensland, £5,989,347 and £5,965,692; South Australia, £4,450,739 and £4,450,739; Western Australia, £3,966,673 and £4,101,082; Tasmania, £1,084,663 and £1,064,725. The gross public debt June 30, 1912, £277,124,095; sinking funds, £5,701,767; net debt, £271,422,328; net debt per capita, £58 10s. 3d. Of the total net debt the share of New South Wales was £99,398,654; Victoria, £59,605,685; Queensland, £47,053,186; South Australia, £31,118,574; Western Australia, £23,364,790; Tasmania, £10,881,489. For further financial details of the states, see separate articles.

The foreign indebtedness of Australia appears still greater when the fact is considered that British capital has been put into private undertakings within the states to an enormous extent.

Population. The estimated population of Australia at the end of 1788, the year of the first settlement, was 859 (not including aboriginals); at the end of 1800 it was 5217; in 1825 it had increased to 52,505; in 1840, 190,408; in 1850, 405,356; in 1860, 1,145,585; in 1870, 1,647,756. The census of 1881 showed a population (exclusive of full-blooded aboriginals) of 2,250,194 (with a masculinity, i.e., number of males per 100 females of 117.35); census of 1891, 3,174,392 (115.89); census of 1901, 3,773,801 (110.14); census of April 3, 1911, 4,455,005 (107.99). The increase per cent in the decade ended with 1860 was 182.61; 1861–70, 43.84; 1871–80, 35.43; 1881–90, 41.22; 1891–1900, 19.48; 1901–10, 17.52. The population by states in 1901 and 1911 was as follows:

State	Sq. miles	Pop. 1901	Pop. 1911
New South Wales	309,460	1,354,846	1,646,734
Victoria	87,884	1,201,070	1,315,551
Queensland	670,500	498,129	605,813
South Australia	380,070	363,157	408,558
Western Australia	975,920	184,124	282,114
Tasmania	26,215	172,475	191,211
Northern Territory	523,620	.....	3,310
Federal Cap. Ter.	912	.....	1,714
Commonwealth	2,974,581	3,773,801	4,455,005

The total population at the census of 1921 was 5,426,008.

The foregoing table does not include full-blooded aboriginals. Such of these as were living in a civilized or semi-civilized condition in proximity to whites were enumerated at the 1911 census and numbered 19,939. The total number of aboriginals is unknown, but a general opinion that it was about 150,000 long prevailed. Recent estimates, however, place the total at less than 100,000. Thus, in his report of June, 1910, the Queensland chief protector of aborigines estimates the total at 74,753, distributed as follows: New South Wales, 6897; Victoria, 256; Queensland, 20,000; South Australia (including Northern Territory), 20,600; Western Australia, 27,000. It is believed that the aboriginals are gradually decreasing in number. The last aboriginal in Tasmania died in May, 1876.

The immigrant races consist mainly of natives of the United Kingdom and their descendants. The population of Australian born has in recent years increased rapidly, and at the 1911 census, out of a total of 4,424,537 persons whose birthplaces were specified, 3,667,672, or 82.90 per cent, were Australian born, while of the remainder, 591,729, or 13.37 per cent, were natives of the United Kingdom, and 31,368, or 0.72 per cent, were natives of New Zealand; i.e., 96.99 per cent of the population were born either in Australasia or the United Kingdom. The other birthplaces most largely represented were: Germany, 32,990 (0.75 per cent); China, 20,775 (0.47); Scandinavia (Sweden, Norway, and Denmark), 14,706 (0.33); Polynesia, 3410 (0.08); British India, 6644 (0.15); the United States, 6642 (0.15); and Italy, 6719 (0.15). The total population of Asiatic birth was 36,442 (0.82 per cent), of whom 3474 were born in Japan.

The 1911 census showed 1,409,823 persons under 15 years of age, 2,854,753 persons 15 and under 65, and 190,429 persons 65 and over. The number of males was 2,213,035; females, 2,141,970. Persons never married numbered 2,783,543; married, 1,469,622; widowed, 191,743; divorced, 4500; not stated, 5597.

According to religion the population was classified as follows in 1911: Church of England, 1,710,443; Presbyterian, 558,336; Methodist,

547,806; Baptist, 97,074; Congregational, 74,046; Lutheran, 72,395; Church of Christ, 38,748; Salvation Army, 26,665; Seventh-Day Adventist, 6095; Unitarian, 2175; Protestant (undefined), 109,861; Roman Catholic, 921,425; Greek Catholic, 2646; Catholic (undefined), 75,379; others, 31,320 (total Christian, 4,274,414); Hebrew, 17,287; Confucian, 5194; Mohammedan, 3908; Buddhist, 3269; pagan, 1447; others, 5680 (total non-Christian, 36,785); indefinite, 14,673; no religion, 10,016; object to state, 83,003; unspecified, 36,114; total, 4,455,005.

According to occupation the 1911 census classified the people as follows: Professional, 144,611; domestic, 201,366; commercial, 286,687; transport and communication, 157,391; industrial, 562,337; primary producers, 586,148; indefinite (of independent means), 23,055; dependents, 2,449,986; unspecified, 43,424; total, 4,455,005. The primary producers included 284,700 persons engaged in agriculture; pastoral pursuits, 151,864; hunting, 4793; fisheries, 7805; forestry, 24,405; water conservation and supply, 6780; mining and quarrying, 105,804; total, 586,148. The dependents included 2,441,047 persons dependent on natural guardians, 8587 supported by voluntary and state contributions, and 352 under legal detention; total, 2,449,986.

The population of Australia has shown an excessive tendency to accumulate in the capital cities. In every state the population of the capital far outnumbers that of any other town therein and ranges between 21 and 46 per cent of the entire population of the state. The 1911 census shows that, out of a total population of 4,455,005, 1,694,400, or 38.05 per cent, were in the six capital cities and suburbs. This immense proportion of metropolitan population, implying a deficiency of primary producers in agriculture, indicates an imperfect economic development. As compared with Australia's 38.05 per cent, in New Zealand the percentage of the population of the capital (Wellington) on the total for the Dominion was 7.01. Population of the capital cities and their suburbs, with percentage on total of state (1911): Sydney (N. S. W.), 629,503 (38.19); Melbourne (Vic.), 588,971 (44.82); Brisbane (Qld.), 139,480 (23.03); Adelaide (S. A.), 189,646 (46.06); Perth (W. A.), 106,792 (37.86); Hobart (Tas.), 39,937 (20.87). Darwin, capital of Northern Territory, had 958 inhabitants, or 28.94 per cent of the total.

The statistics of town population as returned by the 1911 census, relate first to localities as defined by the residents therein and second to local government areas. No clearly defined boundary exists for a "locality," and the population given represents the number of persons who returned themselves as belonging thereto; a "local government area" is a district having fixed limits and incorporated for municipal purposes. The following figures show town population, first as a "locality" and second as a "local government area," April 3, 1911: Sydney (N. S. W.), 107,133 and 112,921; Melbourne (Vic.), 38,293 and 103,593; Prahran (Vic.), 25,489 and 45,367; Adelaide (S. A.), 32,981 and 42,294; Richmond (Vic.), 38,559 and 40,442; Perth (W. A.), 31,300 and 35,767; Brisbane (Qld.), 17,715 and 35,491; North Sydney (N. S. W.), 32,764 and 34,646; South Brisbane (Qld.), 21,332 and 34,478; Fitzroy (Vic.), 34,141 and 34,283; Brunswick (Vic.), 32,201 and 32,215; Balmain (N. S. W.), 31,961 and 32,038; Broken Hill (N. S. W.), 30,953 and 30,972; Marrickville (N. S. W.), 25,993 and 30,653; Bendigo (Vic.), 17,883 and 28,539; Hobart (Tas.), 27,505 and 27,526; Newtown (N. S. W.), 26,427 and 26,498; St. Kilda (Vic.), 25,499 and 25,334; Hawthorn (Vic.), 24,353 and 24,450; Redfern (N. S. W.), 24,275 and 24,427; Paddington (N. S. W.), 24,150 and 24,317; Leichhardt (N. S. W.), 24,139 and 24,254; Port Adelaide (S. A.), 3386 and 24,015; Essendon (Vic.), 10,087 and 23,740; Footscray (Vic.), 21,933 and 23,643; Unley (S. A.), 4397 and 23,773; Ballarat (Vic.), 38,686 and 22,017.

Immigration. The discovery of gold has done more than any other factor to attract immigration from abroad and from one state to another. An illustration of this is the remarkable development of Victoria in the decade following 1850 and of Western Australia from 1891 to 1901. The assistance rendered to immigrants by the state governments has been of importance, the states having borne the expenses in whole or in part of 725,983 immigrants up to the end of 1911. The conditions for acquiring land have been most favorable. The net immigration, or excess of arrivals over departures, has been as follows: 1861 to 1865, 31,762; 1866–70, 47,714; 1871–75, 40,326; 1876–80, 83,869; 1881–85, 148,367; 1886–90, 95,917; 1891–95, 15,660; 1896–1900, —945; 1901–05, —7177; 1906–10, 37,999; 1911, 46,695; total, 540,187. From 1861 to the end of 1911 the excess of arrivals over departures was 246,591 in New South Wales, 191,498 in Queensland, 126,404 in Western Australia, and 16,524 in South Australia; while in Victoria, Tasmania, and Northern Territory, there were excesses of departures over arrivals numbering respectively 32,195, 7626, and 1096. Australia is not so attractive as formerly to European settlers, while at the same time the Australians discourage Asiatic and other colored immigration. The immigration of Pacific Islanders ceased by law after March 31, 1904, and all agreements for their employment terminated on Dec. 31, 1906, when all Pacific Islanders found in Australia were deported. As the result of federal legislation limiting and ultimately excluding Kanaka labor in the cane fields, it has been found that it is quite possible to carry on the cultivation of sugar cane with white labor.

Religion. In the first days of Australian settlement the Church of England was the only church recognized and aided by the government. Later, state aid was extended to the Roman Catholics, Presbyterians, and Wesleyans, and offered to certain other denominations, which refused to accept it. The Church of England, which greatly outnumbers the others in all the states, has six dioceses in New South Wales, five in Victoria, four in Queensland, three in Western Australia, and one each in South Australia, Tasmania, and New Guinea. There is a General Synod, which convenes every five years. The Roman Catholic church has seven dioceses in New South Wales, four in Victoria, two dioceses and one vicarate in Queensland, two dioceses in South Australia, two dioceses and one vicarate in Western Australia, one diocese in Tasmania, and a vicarate in New Guinea. Formerly the Wesleyan Methodists, Primitive Methodists, and the United Methodist Free Church were all separate bodies. They are now united under the name of the Methodist Church of Australasia. For statistics of population by religion, see *Population.*

Education. In the early days of the states, education was provided for by state-aided religions, by organizations of various denominations, and by tuition fees exacted from the pupils. In time education was made secular and free. In Tasmania nominal fees are still charged, yet not required in cases of inability to pay. Religious instruction is provided for in state schools, but only outside of regular school hours. It is given by a clergyman instead of by regular teachers and is subject to the desire of parents. The Roman Catholics, however, maintain their own schools, in all the states, in which the teachers are members of the various religious orders. Education is compulsory in all the states, and the strict enforcement of the law in late years has produced a marked improvement in the attendance. The following table shows the number of state and private schools, pupils, and teachers, and the expenditure on state school maintenance in 1911:

State	State schools	Teachers	Enrollment	Average attendance	Maintenance	Private schools	Enrollment
New South Wales	3,125	5,980	223,603	160,776	£1,048,584	756	60,968
Victoria	2,061	5,155	204,086	146,464	834,276	587	55,898
Queensland	1,232	2,733	91,624	70,194	351,942	141	16,100
South Australia	736	1,241	55,662	38,724	198,979	176	11,650
Western Australia	495	1,043	34,969	29,448	187,301	123	9,000
Tasmania	381	816	28,821	18,130	84,317	114	7,138
Northern Territory	3	3	85	60	629	1	50
Commonwealth	8,033	16,971	638,850	463,799	£2,706,208	1,898	160,794
1901	.....	.....	638,478	450,246	1,816,296	.....	124,485

High schools and grammar schools are maintained by the states and a number of scholarships are available in the various universities for the successful pupils. Throughout the Commonwealth there are a large number of colleges, providing secondary education, some of which are subsidized by the states, and the majority maintained by the various denominations. Technical education is now given in all the capitals and in most of the larger towns, and some of the technical colleges are amongst the finest educational establishments in the Commonwealth. University instruction is partly supported by the states. Sydney University was opened in 1851, Melbourne in 1855, and Adelaide in 1876. The University of Tasmania was founded at Hobart and Launceston in 1890. In 1911 a university was opened at Brisbane (Queensland) and in 1913 one at Perth, Western Australia.

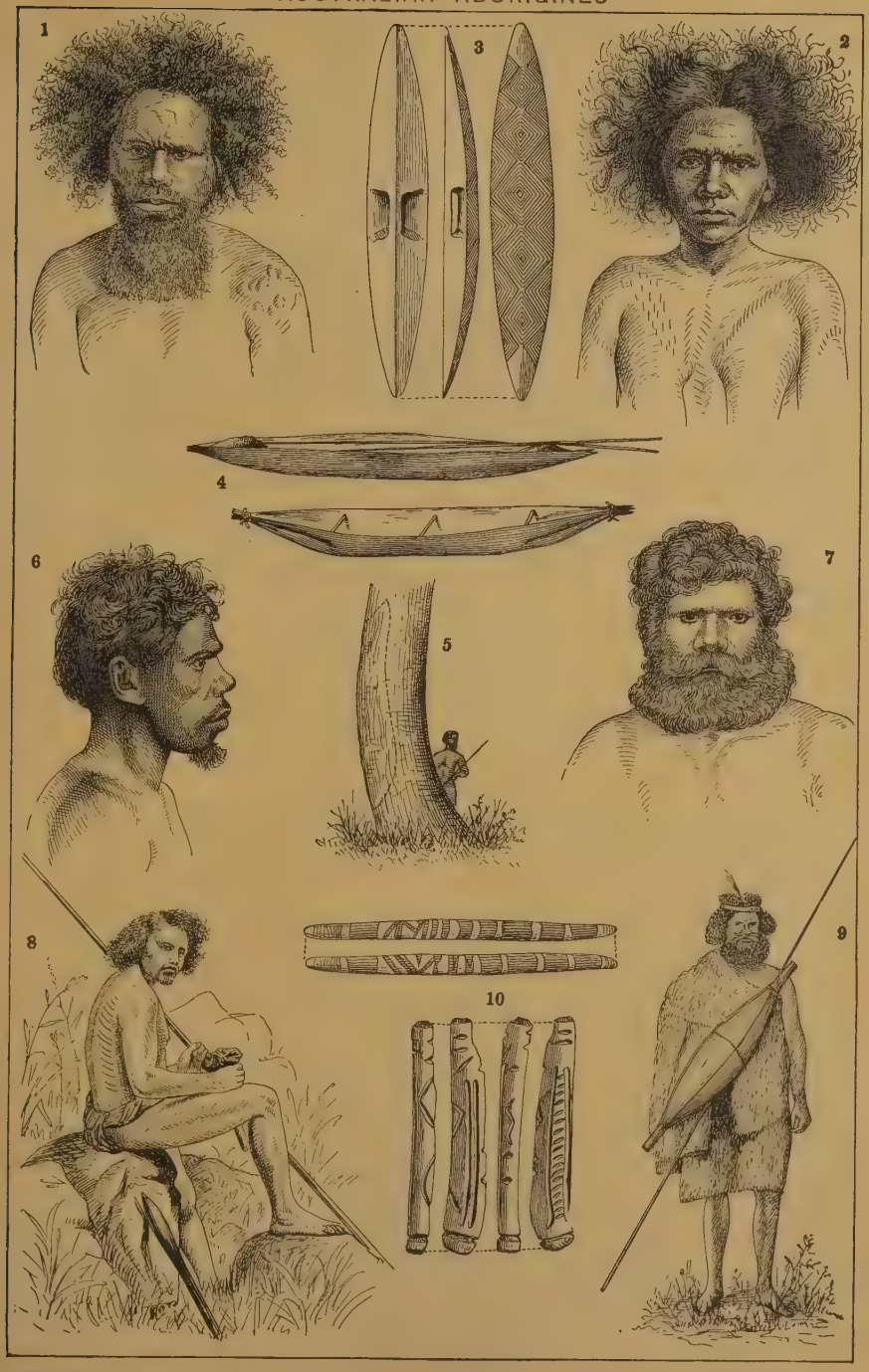
State Activity and Social Conditions. Especial interest attaches to Australia because of the wide scope of its state activities. In this respect Australia excels the older countries of the world, a number of its governmental ventures not having been elsewhere attempted, being generally held to be without the proper province of the state. It is, therefore, being closely watched, and the results attained are destined to have a far-reaching influence. The most important of these activities comprehend the construction, ownership, and control of railways and tramways; the construction and maintenance of highways; the surveying of all country roads; the ownership and control of telegraph and telephone lines as a part of the postal system; government savings banks, state banks; irrigation, including the boring of numerous artesian wells; supplying watering places for cattle and water to mines; assisting agriculture by granting reduced freight rates on government railways in the transportation of seeds and implements, or of cattle in time of drought; appropriating large sums for the furthering of agriculture in various other ways, such as the extermination of injurious animals and insects.

The states have also advanced loans to farmers and granted bounties to producers of butter and cheese and to fruit growers, etc. The paying of bounties is not limited to agriculture. They are liberally resorted to in all cases where it is believed that a new industry or a useful departure may be thus established. South Australia manufactures wine and also runs a cyanide plant. Western Australia has state batteries for treating the ores from her mines. New South Wales, Victoria, and South Australia have cold storage for perishable exports. Tasmania exports timber. Old-age pension systems adopted by New South Wales, Victoria, and Queensland were superseded July 1, 1909, by an act passed by the Commonwealth Parliament providing for old-age pensions throughout Australia. The number of pensions existing June 20, 1912, was 79,071. A Commonwealth act effective from Oct. 10, 1912, provided for an allowance of five pounds to every white woman who gives birth to a child. Claims for such allowance were granted to the number of 59,169 from Oct. 12, 1912, to April 26, 1913. The municipal activities have been very limited compared with those of the state.

Titled aristocracy and hereditary class distinctions are recognized in Australia as elsewhere in the British Empire. The British crown confers honors on public men and has initiated the practice of creating local baronetcies, which are hereditary class distinctions. There are no 'poor rates,' but the government often finds employment for the able-bodied. Numerous hospitals are maintained by the government. State aid is given to private philanthropic institutions, and there are a number of charities wholly supported by private philanthropy.

The Aborigines. The Australian aborigines, whom most ethnologists would rank as a separate race of mankind, are middle-sized, the average stature of Central Australian males being 166.3 cm.; they are less strongly and massively built than the European generally, long-headed, with depressed nose and wide nostrils, large mouth, thick lips, etc.; features suggesting now the Negroid, now the Caucasian type. The color of the skin is dark, running all the way from a yellowish tint to a pronounced chocolate-brown. The hair, with which the Australians are well provided on body and face, is black and straight or wavy generally, sometimes curly, but never woolly. Beneath an apparent physical unity all over the continent lurks considerable variation, which, like the ensemble of the Australians, may in part be due, as Ratzel

AUSTRALIAN ABORIGINES



1. MAN OF NEW SOUTH WALES.
2. WOMAN OF NEW SOUTH WALES, showing scar-tattooing.
3. A SHIELD, front, back and side views.
4. BARK CANOES.
5. TREE, showing outline of canoe on bark, before cutting.
6. MAN OF QUEENSLAND.
7. MAN OF SOUTH AUSTRALIA.
8. MAN OF NORTH AUSTRALIA, with spear, axe and club.
9. NATIVE OF VICTORIA IN ORDINARY ATTIRE.
10. MESSAGE STICKS.

holds, to poor nutrition (the common condition of man in this habitat) and in part to prehistoric and historic race-intermixture with primitive South Asiatics, Malays, Papuans, etc. Huxley (1870) believed that one of the earliest races of prehistoric Europe was Australoid in type, and other ethnologists down to Keane (1896), Giuffrida-Ruggeri, and Schoetensack (1901) consider the Australians on somatic evidence related to the men of Spy and Neanderthal, in Quaternary Europe.

Linguistically the Australians present great internal variation. According to Father Wm. Schmidt's recent researches, the homogeneity formerly assumed to characterize all Australian languages prevails only in the southern half of the continent, where there is great uniformity, both in grammar and vocabulary. On the other hand, the very much smaller area extending from Roebuck Bay in the west to Cape Flattery in the east, and nowhere including territory south of the twentieth degree south latitude, except in the Arunta district, is occupied by tribes whose languages are not at all related to those of the southern group. Indeed, these North Australian languages differ very considerably from one another, revealing no lexical resemblance and very few grammatical ones. Even a classification based on the most general phonetic traits must recognize three distinct linguistic groups. So far as outside relations of Australian languages are concerned, a remote connection with Papuan tongues seems possible, while any affinity with the Malayo-Polynesian stock is out of the question. Sociologically, the most noteworthy things are the complicated marriage systems, the numerous and elaborate initiation ceremonies for youth, the corroboree-dance, and the totem system, recent study of which has shed much light upon primitive religion. In the way of inventions, their methods of tree climbing, the boomerang and the throwing stick, the waddy (club), their message sticks (with the beginnings of writing), and shamans' staffs, are to be mentioned. Their ground and tree drawings, rock pictures, etc., are of great interest. Pottery is unknown, and few of the rudiments of agriculture are present. The case against the Australians as a degenerate race is not made out. See TASMANIA.

Exploration. The fact that the earliest known manuscript maps of Australia are the work of French cartographers would suggest that French navigators were the first to visit those coasts. In 1521 there were indications of a southern continent on maps drawn by La Salle and the German Schöner. Ten years later the land mass begins to take more definite shape on the map of Orontius Finæus, of Provence, and by 1542, on the maps of Jean Rotz, the outline begins to conform distinctly to what we now know as Australia. There are, however, no other surviving records of voyages to that region, and it is practically certain that the Sieur de Gonneville and Capt. Jean Parmentier, the only Frenchmen who are known to have sailed the eastern seas thus early (1529), did not go beyond Sumatra. It is probable that the maps were drawn from information obtained from Portuguese sources, although the earliest extant account of a voyage which may have reached to Australia, that of the pilot Gaetan, was made in 1545.

The first authenticated voyage to Australia was made by the Dutch in 1606, although there are good reasons for thinking that five years earlier (1601) Manoel Godinho de Eredia, a learned and skillful Portuguese navigator, who had been commissioned by the Viceroy Ayres de Saldanha to verify reports derived from the Malayans of a large land toward the south, saw the continent. There is, however, no uncertainty about the voyage of the Dutch yacht, the *Duyfken* or *Dove*, which sailed from Bantam, in Java, Nov. 18, 1605, and coasted southward from New Guinea along the west side of the York Peninsula in the Gulf of Carpentaria to Cape Keerweer or Turnagain (14° S.). As he was back at Banda, in the Moluccas, in June, 1606, the commander of the *Duyfken* is supposed to have made the first recorded observation of the Australian coast about March of that year. Later in this same year Luys Vaez de Torres, who commanded one of the ships in a Spanish squadron which had been ordered from Callao, Peru, to make exploration in the eastern seas, became separated from the other vessels and continued his voyage westward, touching the east end of New Guinea, and then passing through the strait to which his name has been given. He touched the north coast of Australia at several points, but, finding only an unsafe shore and savage natives, he did not follow it far. During the next 30 years the Dutch pursued the exploration of the west coast of Australia with as much industry as the Portuguese had displayed in exploring that of Africa a century and a half earlier. In 1616 Dirk Hartog, in the *Endraaght*, discovered the land which is named after his ship, and the cape and roadstead to which his own name has been given. Jan Edels left his name on the west coast in 1619, and in 1622 the ship *Leeuwin* or *Lioness* reached the point on the west coast to which its name is still attached. Five years later Peter de Nuyts sailed along the south coast, and the same year Carpenter, in the Dutch service, entered the Gulf of Carpentaria. Abel Jansen Tasman was sent out from Batavia in 1642 to investigate the real extent of the Southern Land. Going wide of Cape Leeuwin, he hit upon the land to which he gave the name of the Governor-General at Batavia, Van Diemen's Land, which is now more generally known as Tasmania. Tasman kept on, and by sailing east proved that there was no connection between this land, which he supposed joined with the Australian continent, and the greater continent about the southern pole. He touched New Zealand and then returned to Batavia, having settled many of the geopraphical problems regarding this part of the world. Two years later Tasman probably continued his explorations in the neighborhood of the Gulf of Carpentaria, and, it was at this time that the name "New Holland" was given to the continent. This name continued to be the one most commonly used until the middle of the nineteenth century, when the name "Australia," probably first suggested by Matthew Flinders in his *Voyage to Terra Australis*, began to supplant it.

Capt. James Cook, commanding the *Endeavour*, was sent to Tahiti to observe the transit of Venus on June 3, 1769. This successfully accomplished, he continued to New Zealand, passing through the strait which bears his name. On April 19, 1770, he reached a land hitherto unknown to the map makers, and the naturalist of his party, Joseph Banks, found in the neighborhood of their anchorage so many specimens of plants entirely new to science that they named

the place Botany Bay. Cook coasted north, almost losing his ship on the Great Barrier Reef, but by keeping inside along the coast until he had passed Endeavor Strait he proved that this land was distinct from New Guinea. He gave the name of New South Wales to the land he had coasted, from some resemblance that he saw to the shores about the English Swansea. Returning to England, Cook was sent out again in 1772 to continue his explorations. Cook's reports led to talk of settling the southern continent and claiming it for England. In 1788 Captain Phillip landed some convicts at Botany Bay, nine miles from Sydney, and from this time on the English have steadily stretched out along the coasts and inland. In 1797 a naval surgeon named Bass started south with six men in a whaleboat from Port Jackson and proved the existence of open water, now called by his name, between the continent and Tasmania. One of Bass's companions, two years later, sailed eastward from Cape Leeuwin along the southern coast. At Encounter Bay he met a French ship and named the spot from the incident. He proceeded as far as Port Phillip. The Australian coast line was all practically determined when, in 1822, Capt. P. P. King completed his five-year voyages of investigation of the river mouths of the continent.

The successful exploration of the interior began with Lawson, Blaxland, and Wentworth's journey across the Blue Mountains of the east coast in 1813, to the fertile plateau beyond. The next year Evans discovered the Lachlan and Macquarie rivers and penetrated the Bathurst plains. Captain Sturt, in 1818–29, succeeded in dispelling the notion which had gained currency of a great inland sea, but in its place he substituted the more discouraging one of a vast lifeless desert. This seemed to be confirmed when, in 1847, the German, Leichhardt, who had previously crossed overland from New South Wales to Port Essington, in North Australia, started to traverse the continent from Queensland to Western Australia, and was never heard of again. In 1860 Burke and Wills, with an outfit furnished by the colony of Victoria, successfully crossed the eastern portion of the island from north to south, and between 1858 and 1862 John M'Douall Stuart performed the much more difficult feat of crossing from south to north, near the middle, in order to trace a course for the telegraph line which was erected shortly afterward. Between 1868 and 1874 John Forrest penetrated from Western Australia as far as the central telegraph line, and Ernest Giles did the same from the north between 1872 and 1876. These two routes were joined in 1897, when Daniel Carnegie successfully accomplished the journey by the direct route from the Coolgardie gold fields in the south to those of Kimberley in the north. Other expeditions under Gosse and Warburton in 1873 and H. V. Barclay in 1878 added materially to the knowledge of the country west of the central telegraph line. Lake Eyre was explored by Gregory in 1901–02, and in the latter year the continent was traversed from Fowler Bay in the south to Cambridge Bay on the north coast by Maurice and Murray. See Australian Federation; War in Europe.

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AUSTRA'LIAN ALPS. See AUSTRALIA, *Topography.*

AUSTRALIAN ASH. See FLINDERSIA.

AUSTRALIAN BAL'LOT. See BALLOT.

AUSTRALIAN BEECH. See GMELINA.

AUSTRALIAN FED'ERA'TION. On Jan. 1, 1901, the five Australian colonies of the United Kingdom, together with Tasmania, united to form a federal state under the name of the Commonwealth of Australia. The movement toward federation had its beginnings as early as 1849, though the first successful step toward consolidation was not made till 1883. The union of the Australian colonies was favored by the fact that in the main they possessed a homogeneous population, with the English-speaking race predominant, and almost identical political institutions. Economic differences were exceedingly acute between the colonies of New South Wales and its southern and highly developed industrial neighbor Victoria, on account of the latter's having adopted protection as a fiscal policy against the exports of the parent state. Nevertheless, this and other economic differences between different sections of the continent could not, and in the end did not, prove an insuperable obstacle toward the attainment of an object which so many other causes united to favor. As the result of a measure adopted by a convention at Sydney in November, 1883, the first important advance toward federation was made in 1885, when, on August 14, the Federal Council of Australasia was created by act of the Imperial Parliament. There were five colonies represented, Victoria, Queensland, Tasmania, Western Australia, and Fiji. New South Wales, South Australia, and New Zealand did not join. This body was endowed with certain limited powers in minor legislation, but in its very nature it was merely an advisory body, possessing no authority to impose its will upon the different colonies. It held eight meetings; and naturally ceased to exist with the inception of the Commonwealth. Its usefulness had died long before. In March, 1891, a National Convention, assembled at Sydney, declared in favor of Australian union and laid down the principles upon which the new Commonwealth should be based, the fundamental idea being that of a federal government with ample powers over foreign affairs, customs, and public defense, but circumscribed in its scope by the provision that all powers not expressly granted to the central government remain vested in the states. No definite result followed the action of the convention until January, 1895, when a conference of colonial premiers, meeting at Hobart, drafted an Enabling Act providing for the election of delegates to a Constitutional Convention, and the act was submitted to the legislatures of the various colonies.

On March 22, 1897, the Constitutional Convention met at Adelaide, whence it adjourned to Sydney and finally to Melbourne, completing its work on March 17, 1898. The constitution as drafted was submitted to the people of the colonies, and was adopted by a majority vote of nearly five to one in Victoria, of two to one in South Australia, and of over four to one in Tasmania. In New South Wales 71,595 votes were cast in its favor, and 65,228 votes against it; but as the Legislature had stipulated that a minimum of 80,000 votes or about one-third of the total electorate should be necessary for ratification, the constitution was declared rejected. In the above four colonies the vote for federation stood 219,712 to 108,363 against it. Queensland and Western Australia took no action in the matter. After certain changes demanded by New South Wales had been effected in the constitutional draft, the instrument was once more submitted to the people in 1899, and though opposition was still strong, the Federalists won by a vote of 107,420 to 82,741 in New South Wales, and by increased majorities in the other colonies that had previously taken action. Queensland also ratified the constitution. The total vote was 377,988 to 141,386, the majority being 236,602, as compared with 111,349 at the first vote. Early in 1900 the constitution was submitted to the Imperial Parliament at Westminster, and was adopted with but a single modification, to be noted hereafter. By the statute of 63 & 64 Vict. chap. 12 (which received the royal assent July 9, 1900), the five colonies which had ratified the constitution were merged into the new Commonwealth of Australia, with the provision that Western Australia should be admitted to the Commonwealth on ratifying the constitution. Western Australia ratified the constitution July 31, 1900, by a vote of 44,800 to 19,691. On Sept. 17, 1900, Queen Victoria signed the proclamation declaring that on and after Jan. 1, 1901, the people of New South Wales, Victoria, Queensland, South Australia, Western Australia, and Tasmania, should be united in a federal commonwealth, under the name of the Commonwealth of Australia. And on Jan. 1, 1901, the new Commonwealth was proclaimed in the capitals of the former colonies, now known as original states.

The constitution of Australia is modeled obviously upon that of the United States, in that it

is based upon the principle formally stated, that all powers not delegated to the central government are reserved to the states. During the process of constitution making, this principle encountered great opposition from those who favored a strongly centralized state, modeled upon the constitution of Canada. The legislative power of the Commonwealth is vested in a Federal Parliament composed of the sovereign of Great Britain, a Senate, and a House of Representatives. The sovereign appoints as his representative the Governor-General, who may summon, prorogue, and dissolve Parliament, which must meet, however, every year. The Senate is composed of six members from each of the states, elected at large for a term of six years. The members of the House of Representatives are chosen for three years and must comprise, as nearly as possible, twice the number of senators, but no state may have less than five members in the lower house. For the first Parliament New South Wales was apportioned 26 seats; Victoria, 23; Queensland, 9; South Australia, 7; Western Australia, 5; and Tasmania, 5; total, 75. (In 1913 the total number of seats remained the same, but New South Wales had 27 and Victoria 22.) Parliament has the power of increasing the membership of either house, but no state may be deprived of its absolute or proportionate representation without its consent. The qualifications for an elector to either house of Parliament are the same as those for an elector to the lower house in the different states. In defining the scope of the Federal Parliament the framers of the constitution did not show themselves so ardently in favor of state rights as to grudge it the exercise of wide powers. Profiting, on the contrary, by the experience of the United States in the matter of the conflict of state laws, and influenced, too, by the opposition of those who advocated a strongly centralized government, they included within the jurisdiction of Parliament such subjects as divorce, bankruptcy, and corporations, and prepared the way for the absorption of the colonial railways by the federal government. Closely summarized, the exclusive powers of Parliament are as follows: (1) Taxation, both direct and indirect, borrowing money on the public credit, currency, coinage, and legal tender; (2) defense; (3) the regulation of foreign and interstate commerce, including navigation, shipping, and interstate railroads, and the granting of uniform bounties on the production and exportation of goods (but each state may grant bounties for the encouragement of the mining industry); (4) banking and insurance carried on in more than one state; (5) bankruptcy, copyright, patents, trademarks and corporations; (6) marriage, divorce, parental rights and guardianship; (7) census and statistics, weights and measures; (8) external affairs, immigration and emigration, quarantine, the influx of criminals, naturalization, and the control of any race, other than the aborigines, requiring special legislation (this referring to the important question of Chinese and Japanese coolie labor); (9) posts, telegraphs, and telephones; (10) astronomical and meteorological observations, coast service, and fisheries; (11) industrial arbitration in questions involving more than one state, invalid and old-age pensions; (12) the service of criminal and civil process, and the establishment of judicial comity among the states; (13) the control of the railways for the purposes of national defense, the permanent acquisition of the railways with the consent of the states involved, and the construction of new railways; (14) finally, all legislation incidental to the execution of powers specifically delegated. Any state law that is in conflict with a law passed by Parliament, acting within its jurisdiction, is void.

Legislation may be initiated in either house, but money bills must originate in the House of Representatives. The Senate has no power to amend an appropriation bill, but may reject such measure. In case of a deadlock between the two houses lasting more than three months, as when the Senate persists in rejecting a bill repeatedly passed in the lower house, or in adding amendments which that house refuses to accept, recourse is had to a dissolution and to a general election, and if the deadlock continues in the new Parliament the two houses meet in joint session and decide the matter by a majority vote. The executive power is vested in a Governor-General, nominated by the crown, and in a council of not more than seven salaried ministers, appointed by the Governor-General and responsible to Parliament, of which they must be members. The judicial power is vested in a Federal Supreme Court known as the High Court of Australia, exercising original jurisdiction in cases involving treaties with other nations, or the representatives of foreign nations, or cases to which the Commonwealth is a party, or a state, or the residents of different states. It hears appeals from the minor federal courts and from the supreme courts of the states. No appeal may be taken from the decision of the High Court to the British Privy Council on questions involving the limits of the constitutional powers of the Commonwealth or of the different states, unless the High Court certifies that the question is one which ought to be determined by the Sovereign in Council. In all other cases, appeals lie to the Privy Council, subject to the rules of procedure established by the Australian Parliament.

The rights of the states are affirmed in the clause reserving to them all powers not delegated to the federal government. Their present constitutions continue in force, their laws are judicially recognized, and their territorial integrity and political influence are guaranteed by the provision that no amendment altering the boundaries of a state or reducing its absolute or proportional representation in Parliament is valid without the consent of the state; whereas an ordinary amendment to the constitution may be passed by a majority of both houses of Parliament, and ratified by the people of a majority of states, constituting at the same time a majority of the whole body of electors in the nation. New states may be carved out of one or more of the original states with their consent, and Parliament may prescribe conditions for the admission of new states into the union.

The Australian constitution, like the Constitution of the United States, upon which it is modeled, is the result of compromise between the principles of loose federalism and centralization. The former was undoubtedly favored by the great majority of people, but met with strong opposition from the powerful labor element, which was especially influential in New South Wales and Victoria, and succeeded in defeating the constitution at the first referendum.

The Commonwealth has been regarded by many students of politics as a step toward complete

Australian independence. The veto power lodged in the crown and the right to appoint the Governor-General of the Commonwealth are of only little importance as binding ties between the mother country and Australia, in view of the British theory of the relations of the executive toward the legislature. Practically the only bond between Australia and the Empire is the right of appeal from the courts of the Commonwealth to the Sovereign Council. In the constitutional draft submitted to the British Colonial Secretary, it was provided that no appeal should lie to the Privy Council except in cases involving the interests of some other part of the Empire. The British Colonial Office insisted upon the modification of this clause, and in the final act it was given the form already described. It is generally conceded, however, that in practice the tendency would be to restrict the exercise of the right to appeal to the utmost.

On Jan. 1, 1901, the birth of the new Commonwealth was signalized by appropriate ceremonies at Sydney. The Earl of Hopetoun was the first Governor-General, and he intrusted the formation of the first federal ministry to Sir Edmund Barton. The elections to Parliament were fought out on the tariff issue, and resulted in a majority for the Protectionist government. Parliament was opened on May 9 at Melbourne, which was designated as the temporary capital until the selection of a site for a federal district within the boundaries of New South Wales. A narrow policy of immigration was initiated in 1900 by the enactment of a law aiming at the absolute exclusion of Asiatics and the practical exclusion of European contract labor. After a prolonged struggle a tariff bill of protective character was passed in 1902. In the same year the Earl of Hopetoun was succeeded as Governor-General by Baron Tennyson, who in 1904 made way for Baron Northcote. Baron Northcote was succeeded in 1908 by the Earl of Dudley, who was succeeded in 1911 by Baron Denman. The parliamentary elections of December, 1903, which left the Protectionist and Free Trade parties about equally balanced, showed a remarkable growth of the Labor party, which stands practically for a modified socialism and the principle of a so-called "white Australia"—i.e., the complete exclusion of non-European races and a jealous restriction of the right of entry into the country. Sir Edmund Barton resigned in 1903, and there followed a rapid alternation of ministries based on changing combinations among the three parties. From April to August, 1904, the Watson Labor ministry was in power. The rigorous enforcement of the "white Australia" policy and the immigration laws, and the socialistic nature of much of the legislation of the ensuing period, brought a certain amount of strain into the relations between the Commonwealth and the Imperial government. The federal government was charged by the English press with pursuing a selfish policy in the matter of restricting population. A project formulated in 1905 by General Booth, head of the Salvation Army, for the colonization of 5000 English families in Australia, was soon abandoned on the ground that the Commonwealth had failed to lend any encouragement to the scheme. The Reed free-trade ministry, which was in office at the beginning of 1905, after an ineffective anti-socialist campaign, was defeated by a combination of the Labor and Protectionist parties, and a ministry of the latter character under ex-Premier Deakin succeeded. In view of the close relationship existing between the government of Great Britain and Japan, the government in December, 1905, carried an amendment to the immigration law permitting the temporary admission of Asiatic tourists, students, and merchants; the contract labor clause was also modified. In 1909 the Commonwealth and New South Wales entered into an agreement for the surrender to and acceptance by the Commonwealth of an area of about 900 square miles to constitute a federal territory wherein should be built the permanent federal capital. A proclamation was issued, Dec. 5, 1910, vesting the territory in the Commonwealth on and from Jan. 1, 1911. Most of the territory is in the Yass-Canberra district; a few square miles are at Jervis Bay, where several small acquisitions were made by the Commonwealth subsequent to the original cession; the total area ceded was stated in 1913 at 912 square miles. Work on the capital city, Canberra, was begun in 1913; the site is 204 miles from Sydney, 429 from Melbourne, 912 from Adelaide, 929 from Brisbane, and about 123 (or 96 by another route) from Jervis Bay. Pending the completion of Canberra, Melbourne continued the temporary capital of the Commonwealth. Consult Garran, *The Coming Commonwealth* (Sydney, 1897); Quick, *The Annotated Constitution of the Australian Commonwealth* (Sydney, 1901); Turner, *First Decade of the Australian Commonwealth* (New York, 1911).

AUSTRALIAN GUM TREES. See EUCALYPTUS.

AUSTRALIAN LIT'ERATURE. Australia was not claimed for Great Britain until 1770, and the first settlements were penal. Then followed the sheep farmers and, on the discovery of gold in 1851, a horde of adventurers. By 1859, Australasia (Australia, Tasmania, and New Zealand) consisted of seven independent colonies. The period of national unity did not begin until 1901, when these states, except New Zealand, were federated under the name of the Commonwealth of Australia. Young Australia has not had time to develop a varied and mature literature of her own. She is just emerging from a position like that in which the United States found itself about a century ago—from the imitative period. Her first writers, who came midway in the nineteenth century, were Englishmen or Scotsmen bred at the public schools and at the universities, some of whom returned to the land of their birth; while several contemporary writers, though in some instances born in Australia, have settled in London. Hence by Australian literature in general we can mean no more than English literature inspired by the life and scenes in this island of the South Seas.

The early settlers carried out with them little volumes of their favorite poets, and in the loneliness of bush life began to write lyrics in imitation. Indeed, there is hardly an English or American poet of the nineteenth century whose voice has not been echoed in Australia—Wordsworth, Byron, Tennyson, Browning, Poe, and many others. But as time has gone on, Australian verse has more and more forgotten its models and has assumed local color. Its themes are taken from incidents of the town and the bush. The poets sing of the "burning wastes of barren soil and sand," or, in another mood, of "the sunlit plains extended" and "the won-

drous glory of the everlasting stars," or, as Kipling writes, "the thin, tin crackling roofs." Of the Australian singers of the nineteenth century, the earliest was Barron Field, Judge of the Supreme Court of New South Wales, who published at Sydney, in 1819, *The First Fruits of Australian Poetry*. Among succeeding verse makers were W. C. Wentworth, author of *Australasia;* J. D. Lang, Sir Henry Parkes, and Lionel Michael, author of *Songs without Music* (1857). A new period for Australian poetry began with Adam Lindsey Gordon and Henry Clarence Kendall. Gordon, born in the Azores, in 1833, educated at Oxford, emigrated to South Australia, in 1851, taking leave of England in lines imitated from *Childe Harold*. He became a horse dealer, horse trainer, and the best steeplechase rider in the colonies, as well as the strongest of the first generation of Australian poets. His life was particularly pathetic, and he died by his own hand, in 1870. Gordon published three volumes: *Sea-Spray and Smoke-Drift* (1867), *Ashtaroth* (1867), and *Bush Ballads* (1870). In his sporting poems and narratives, based on his own wild experiences, we first get at the heart of Australia. The horse and the rider he glorified in ballads that have the ring of Scott and Macaulay. The Byronic influence never left him. His despair reaches intense expression in *Whither Bound?* Kendall was born at Ulladulla, New South Wales, in 1842. There, in the lonely bush, he passed his boyhood. His life was saddened by an inherited love for drink, which he mastered only after years of struggle. He died near Sydney, after spending a year in a madhouse, in 1882. His first volume, *Songs and Poems* (1862), was followed by *Leaves from an Australian Forest*, containing his best work, and *Songs from the Mountains*. Of less force than Gordon, Kendall, "the national poet," sang with great beauty of the Australian hills, streams, and forests, in poems like "September in Australia," "The Hut by the Black Swamp," and "A Death in the Bush." He was the purest and most spontaneous poet of the group to which he belonged. The early Australian poets were an ill-fated race, who, after checkered, necessitous, and tumultuous lives, sank most of them untimely into early graves. An exception was Alfred Domett (1811–87), a successful and prosperous man, who rose to be Premier of New Zealand. Robert Browning, an early friend, joined Tennyson and Longfellow in praise of his work. He is said to be the subject of Browning's poem, "Waring." He is most favorably known by *Ranolf and Amohia* (1872), a narrative poem on a Maori subject. Charles Harpur (1812–68) was preëminently the poet of the bush, and has incomparably caught its atmosphere of weird melancholy in his poems, of which several volumes were published between 1835 and 1868. Include with Gordon, Kendall, Domett, and Harpur, James Brunton Stephens (1835–), author of *Convict Once* (London, 1871), and many other poems, and the giants of Australian song are named. More recent verse compares favorably with most of what is being produced in England and America. It lacks, however, the simplicity, sincerity, and force of the older poets who voiced the wild and melancholy moods of their often ill-starred lives. The older singers cultivated literature "on a little oatmeal"; the later singers are better groomed, more presentable, and more prosperous,—often civil servants, editors, professors, or men of affairs, and their verse, if less moving, is more ambitious and elegant. Everywhere journalism is the stepping-stone to literature, and a vigorous journalism is characteristic of Australia. All the state capitals have great dailies, some of them as wealthy and as prosperous as the great English newspapers, and in their columns most of the writers, especially those still to be mentioned, have made their start. The younger school of the later nineteenth and early twentieth centuries owes much to a brilliant journalist, devotedly Australian, Mr. J. F. Archibald (1858–), of whom it is but right to speak in any account of present-day Australian literature. Ceaselessly urging upon his compatriots the choice of home scenes, themes, and characters for verse and story, he has been studious in helping and encouraging young literary aspirants, and many of the most talented writers of the day have first advanced under his ægis. Among more than 100 poets, recently dead or still at work, may be mentioned, somewhat arbitrarily perhaps, D. B. W. Sladen (1856–), author of several volumes of poems, a critic who has done good service to Australian literature, and a prolific miscellaneous writer; Edward Dyson (*Rhymes from the Mines*, 1896); Charles Allan Sherard (*A Daughter of the South*, 1889); Alexander Sutherland (1852–); E. B. Loughran (*'Neath Austral Skies*, 1894); J. B. O'Hara (*Songs of the South*, 1891); William Gay (*Sonnets*, 1896); George Gordon McCrae (1833–), noteworthy for poems based on aboriginal legends, and a man of marked originality; W. P. Reeves (1857–); Will Ogilvie (1869–); Col. Kenneth Mackenzie; Bernard O'Dowd (1866–); Roderick Quinn (1869–); and Edwin J. Brady (1869–), a writer of seasongs. Victor Daley (1858–1905), by his *At Dawn and Dusk* (1897), represents a cosmopolitan element and expresses various moods that have nothing distinctive of his country about them. The two leading versifiers of to-day, judged by the wide circulation of their books, are Henry Lawson, only less known than Gordon and Kendall, and author of *While the Billy Boils*, etc., and A. B. Patterson (1864–), whose *Man from Snowy River* (1895) and other books are redolent of the drover's track and the wanderings of the swagman. The women of Australia vie with their brothers for poetic laurels, nearly a quarter of the Stevens *Anthology* (see below) falling to their share. Certainly not the least of these, and perhaps the best, is Miss Louise Mack, who voices the Australian woman's attitude toward art and life in *Dreams in Flower*, and elsewhere. Other women, slightly earlier or later in time, are Miss Werner, Miss Castilla, Miss Jessie Mackay, and Miss Ethel Turner, the last named distinguished for child poems fine in form and feeling.

In Australian fiction—and the same is true of the earlier poetry—there was, until late in the nineteenth century, nothing distinctively native, save the subjects chosen—no different set of literary values, moods, or views of life. English eyes, nerves, and technique were, however, at work upon new material; and environment was subtly differentiating the colonial character from the home product. Australian literature to-day is presenting this new type of man, responsive to his new surroundings—less reverent, free from conventionality, less socially deferential than his British forebears, full of the zest of life, gay and buoyant on the whole, though sometimes embittered by pioneer hardship, hardy, brave, a

little ruthless, with a freakish, wild, exaggerated humor, and a rapid wit that recall similar American traits. The earlier novelists had little distinctive literary personality; there was always the overshadowing presence of Dickens, Charles Reade, Bret Harte, or another. Before 1901 Australia had produced some 300 published volumes of novels and tales, not to mention unnumbered productions of the same kind that never survived newspaper appearance. Now more than 100 prose writers, mostly of fiction, are at work. The earliest novels appeared at Sydney from 1840 to 1850; they were melodramatic, with the escaped convict or the bushranger for hero. In a like capacity the gold digger appeared in the next decade to rival the picturesque cut-throat. At this time some passable work was done in fiction by Miss C. H. Spence, but Henry Kingsley, brother of Charles Kingsley, who went to the gold fields in 1853, and published *The Recollections of Geoffrey Hamlyn*, perhaps the best Australian novel written to the date of its appearance (1859), was really the father of Australian fiction. B. L. Farjeon's *Grif* (1869) is another notable novel, depicting Melbourne night life with a vividness worthy of Dickens. In 1870 (rewritten, and published in London, 1874) appeared what may be called a classic of Australian fiction, Marcus Clarke's powerful *For the Term of His Natural Life*, sole survivor of a host of convict novels, and the most lasting record in fiction of the convict system. Lord Rosebery has called it "the most terrible of all novels." It has been translated into several modern languages. Marcus Clarke (1846–81), primarily remembered for this novel, may here have parenthetical notice on the score of his excursions into general literature, which gave him a singular distinction in his day and country.

To return to fiction, bush ranging found its best chronicler in Charles Alexander Browne, better known by his pen-name, "Rolf Boldrewood." He was born in London in 1826, and was in turn squatter, magistrate, goldfields commissioner, and the strongest and most mature of Australian novelists. Beginning late in life, he turned the varied wealth of his colonial experience into fiction. His *Ups and Downs* (also called *The Squatter's Dream*) presented the life of the sheep breeders. It was *Robbery under Arms* (Sydney; London, 1888) that made and established the author's reputation, and can claim to be at once something like a work of art and a vivid, faithful transcript of the scenes, incidents, and temper of the wild, early days. There followed well-nigh a score of other full-size novels by this wonderfully fertile octogenarian, reflecting many sides of local life and character—the bush, the diggings, rural and urban scenes, in which are introduced all the representative social types. So true are his stories that they constitute an invaluable sociological museum; so vivid and lively are they that they are sure to be long read with delight. A. B. Peterson is novelist as well as poet, and in *An Outback Marriage*, published in the nineties, is of those who, if they abandon the bushranger, still keep to the bush. The tragedy and farce of the life there, its loves and jealousies, its illicit relations, and haphazard morals and manners, are reflected in the book just named. No better account of station life in the heart of Australia can be found than is afforded by this novel, though a score of good kindred stories are at hand. The vivid and rather crude pictures of the relations of Polynesians and whites, and of other phases of South Sea Island life, by Louis Becke (1857–) will repay attention. They are for the most part stirring novels of adventure, some written in collaboration with the journalist, Walter Jeffrey, in the Stevenson or Conrad style, such as *By Reef and Palm* (1896), *Pacific Tales* (1897), *Wild Life in the Southern Seas* (1897), and *The Mutineer* (1899). Guy Boothby gained wide popularity with *The Beautiful White Devil* (1896) and *Dr. Nikola* (1896). Among present-day Australian novelists none has a greater vogue than Arthur Hoey Davis ("Steele Rudd"), whose picture of the Queensland small farmer is probably true, if not flattering, to that class the colony over. This author may be called the first of Australian humorists, a humorist of the broadest type. As in England and the United States, so in Australia, some very fine work in fiction has been done by women. Ada Cambridge (Mrs. G. F. Cross) is, perhaps, best known. At the age of 26 (1870) she went to Australia with her husband and has lived there ever since, mostly in the bush districts of Victoria. In *The Three Miss Kings* (1891) she conceived the notion of depicting the life of three girls, brought up in a bush home, and their subsequent career. Mrs. Cross has also succeeded admirably with the problem-novel, and now some dozen works of fiction stand to her credit. Mrs. Campbell Praed, born in 1851, a native of Queensland, has published about 25 novels. In their stern and pessimistic outlook they resemble the work of Hall Caine, Mrs. Dudeney, and Thomas Hardy. A typical novel of hers is *Longleat and Koorabyn* (1887), Madame Couvreur, better known by her pen-name, Tasma, lived many years in Victoria. She returned to England in 1879, and 10 years later published *Uncle Piper of Piper's Hill*. She wrote two other good Australian stories—*In Her Earliest Youth* (1890) and *Not Counting the Cost* (1895). Miss Ethel Turner, already named among the poets, claims a place here also as the author of delightful "juveniles," notably of *The Seven Little Australians* (1894) and its sequel, *The Family at Misrule* (1895). Australian fiction and literature in general at present lack authors of outstanding distinction and ability. Literary energy and enthusiasm abound; the national and original note grows steadily clearer; and there is rich promise of future achievement.

Consult: Turner and Sutherland, *Development of Australian Literature* (New York, 1898); Byrne, *Australian Writers* (London, 1896); Martin, *Beginnings of an Australian Literature* (London, 1899); Sladen, *Australian Poets, 1788–1888*, an anthology (New York, 1890); *Australian Ballads*, in Canterbury Poets (London, 1885–90); *An Anthology of Australian Verse*, ed. Bertram Stevens (Sydney, 1906); Alfred Buchanan, chapters on literature in *The Real Australia* (London, 1907); *An Austral Garden: An Anthology of Australian Verse* (Melbourne, 1913).

AUSTRALIAN OATS. See RESCUE GRASS.

AUSTRASIA, ąs-trā′shȧ *or* -zhȧ (Med. Lat., from OHG. *ōstar*, eastern), or THE EAST KINGDOM. The name of the eastern possessions of the Merovingians, which extended, roughly speaking, from the boundaries of Thuringia and Bavaria to the rivers Meuse and Scheldt. Metz was its capital and Verdun its most western town. Its population was almost wholly Germanic. The

designation arose after the death of Clotaire I in 561. Under the Carolingians the name disappears. See BURGUNDY; NEUSTRIA.

AUS'TRIA, ARCHDUCHY OF. The nucleus of the Austrian Empire. It lies on both sides of the Danube, from the mouth of the Inn to the borders of Hungary, and embraces the crownlands of Lower and Upper Austria and Salzburg (qq.v.).

AUSTRIA, LOWER. See LOWER AUSTRIA.

AUSTRIA, UPPER. See UPPER AUSTRIA.

AUS'TRIA-HUN'GARY, or, officially, THE AUSTRO-HUNGARIAN MONARCHY (Med. Lat. *Austria,* from Ger. *Oesterreich,* eastern realm + Hungary). The largest European country after Russia since the separation of Sweden and Norway. It forms a compact territory, lying between lat. 42° and 51° N. and between long. 9° 30′ and 26° 30′ E., and is bordered for a shorter distance by the sea than any other great European state. Its coast line comprises the greater part of the eastern shore of the Adriatic, the bulk of the country receding to a great distance from the sea. It is irregularly bounded on the north by Saxony, Prussia, and Russia; on the east by Russia and Rumania; on the south (including Bosnia and the Herzegovina) by Rumania, Servia, and Montenegro; on the southwest by the Adriatic Sea and Italy, and on the west by Switzerland and Bavaria. The former Turkish provinces of Bosnia and the Herzegovina were placed in 1878, by the Treaty of Berlin, under the administration and military occupation of the Austro-Hungarian government, and on Oct. 5, 1908, were formally annexed to the monarchy. Austria is sometimes called Cisleithania, "the country on this side the Leitha" (a tributary of the Danube forming part of the boundary between Lower Austria and Hungary), while Hungary is called Transleithania, "the country beyond the Leitha." The total area of the Austro-Hungarian monarchy is 261,241 square miles, distributed as follows: Crownlands represented in the Austrian Reichsrat (Parliament), 115,831.9 square miles; lands of the Hungarian crown, 125,641.2 square miles (of which Hungary proper 109,216.1 and Croatia and Slavonia 16,425.1); Bosnia and the Herzegovina, 19,767.9 square miles. The maximum length of the monarchy, from east to west, is about 800 miles; maximum breadth, from north to south, about 650 miles. The table above shows the area and the *de facto* population of Austria by crownlands, of Hungary by divisions, of Croatia and Slavonia, of Bosnia, and of the Herzegovina. The population figures are those returned by the censuses of Dec. 31, 1900, and Dec. 31, 1910; for Bosnia and the Herzegovina, however, the figures are those of the censuses of April 22, 1895, and Oct. 10, 1910, and hence the totals given for the monarchy cannot be quite exact. As Bosnia and the Herzegovina were not annexed until 1908, the population of the monarchy as constituted in 1900 was 45,405,267.

Provinces	Square miles	Population 1900	Population 1910
Lower Austria	7,654.4	3,100,493	3,531,814
Upper Austria	4,626.3	810,246	853,006
Salzburg	2,761.9	192,763	214,737
Styria	8,658.4	1,356,494	1,444,157
Carinthia	3,987.0	367,324	396,200
Carniola	3,841.7	508,150	525,995
Triest	36.8	178,599	229,510
Görz and Gradisca	1,126.7	232,897	260,721
Istria	1,913.6	345,050	403,566
Tirol	10,301.7	852,712	946,613
Vorarlberg	1,004.6	129,237	145,408
Bohemia	20,056.6	6,318,697	6,769,548
Moravia	8,579.7	2,437,706	2,622,271
Silesia	1,987.3	680,422	756,949
Galicia	30,307.8	7,315,939	8,025,675
Bukowina	4,031.4	730,195	800,098
Dalmatia	4,954.0	593,784	645,666
Austrian Empire	115,831.9	26,150,708	28,571,934
Right bank Danube	17,201.9	2,923,401	3,084,404
Left bank Danube	12,713.9	2,049,611	2,175,924
Between Danube and Theiss	13,942.5	3,284,233	3,769,658
Right bank Theiss	12,289.2	1,674,241	1,769,681
Left bank Theiss	16,732.8	2,336,104	2,594,924
Between Theiss and Maros	14,009.6	2,054,712	2,141,769
Transylvania	22,318.1	2,476,998	2,678,367
Fiume	8.1	38,955	49,806
Hungary	109,216.1	16,838,255	18,264,533
Croatia and Slavonia	16,425.1	2,416,304	2,621,954
Hungarian Kingdom	125,641.2	19,254,559	20,886,487
Austria-Hungary	241,473.1	45,405,267	49,458,421
Bosnia	16,239.4	1,348,581	1,631,006
Herzegovina	3,528.5	219,511	267,038
Civil population	.....	1,568,092	1,898,044
Military	.....	22,944	33,758
Bosnia and Herzegovina	19,767.9	*1,591,036	†1,931,802
Monarchy	261,241.0	46,996,303	51,390,223

* Census of April 22, 1895. † Census of Oct. 10, 1910.

The population according to the language, or the principal language, spoken was returned as follows at the 1910 census, for the more important languages of Austria and Hungary:

LANGUAGE	AUSTRIA		HUNGARY	
	No.	P. ct.	No.	P. ct.
German	9,950,266	35.58	1,903,357	10.40
Magyar	10,974	.04	9,944,627	54.50
Bohemian, Moravian and Slovak	6,435,983	23.02	.....	....
Slovak	.....	....	1,946,357	10.70
Polish	4,967,984	17.77	.....	....
Ruthenian	3,518,854	12.58	464,270	2.50
Servian and Croatian	783,334	2.80	.....	....
Servian	.....	....	461,516	2.50
Croatian	.....	....	194,808	1.10
Rumanian	275,150	0.98	2,948,186	16.10
Slovene	1,252,940	4.48	.....	....
Italian and Ladin	768,422	2.75	.....	....
Others *	608,062	....	401,412	2.2
	28,571,934		18,264,533	

* Including, in Austria, foreigners, of whom about 300,000 are Magyars.

The figures for Hungary in the foregoing table do not include those of Croatia and Slavonia, which are as follows: Croatian, 1,638,354 (62.5 per cent); Servian, 644,955 (24.6); German, 134,078 (5.1); Magyar, 105,948 (4.1); Slovak, 21,613 (0.8); Ruthenian, 8317 (0.3); Rumanian, 846; other, 67,843 (2.6). For the monarchy (including Bosnia and the Herzegovina) population by language was as follows in 1910: German, 12,010,669; Magyar, 10,067,992; Bohemian, Moravian, Slovak, 8,410,998; Polish, 4,978,959; Ruthenian, 3,998,872; Servian and Croatian, 5,545,531; Rumanian, 3,224,147; Slovene, 1,252,940; Italian and Ladin, 768,422; others (including foreigners in Austria and the military in Bosnia and the Herzegovina), 1,131,693; total, 51,390,223.

Topography. Austria-Hungary is the most mountainous part of Europe excepting Switz-

A
B
C
D
E
10°
12°
11°
16°
1
2
3
4
5
48°
50°
44°
Fulda
Meiningen
Coburg
Bamberg
Bayreuth
Nürnberg
Heilbronn
Ulm
Augsburg
Ravensburg
Constance
Kempten
Füssen
Innsbruck
Landeck
Steinach
Brenner Pass
Reschen
Meran
Bozen
Trient
Riva
Arco
Mt. Tonale
Mt. Adamello
Brescia
Verona
Mantua
Parma
Leghorn
Padua
Venice
Adige
Po R.
Main R.
Danube R.
Inn R.
Lech R.
Isar R.
Salzach R.
Enns R.
Traun R.
Ybbs R.
Drave R.
Save R.
Kulpa R.
Sulm R.
Mur R.
Gulf of Venice
Carnic Alps
Julian Alps
Dinaric Alps
Dresden
Leipzig
Chemnitz
Zwickau
Plauen
Hof
Eger
Karlsbad
Prague
Pilsen
Budweis
Linz
Salzburg
Vienna
Brünn
Graz
Klagenfurt
Villach
Laibach
Trieste
Fiume
Agram
Pola
Zara
Spalato
Ragusa
Cattaro
Lissa
Lesina
Curzola
Lagosta
Cazza I.
Pta. della Planca
Pta. di Promontore
Adriatic Sea
Switzerland
Germany
Austria
Hungary
Bohemia
Moravia
Styria
Carinthia
Carniola
Dalmatia
Croatia
Slavonia
Saxony
Silesia
Tyrol
Salzburg
Upper Austria
Lower Austria
Vienna
VIENNA
AND VICINITY
SCALE OF MILES
0 1 2
Prater
Danube
Danube Canal
Donaukanal
Kaiser Ebersdorf
Schwechat
Simmeringer Haide
Favoriten
Wienerberg
Laaer Berg
Hietzing
Schönbrunn
Penzing
Währing
Hernals
Ottakring
Döbling
Grinzing
Klosterneuburg
Floridsdorf
Jedlersee
Gr. Jedlersdorf
Mühlschüttel
Saulenhaufen
Kaiserwasser
Stadlau
Aspern
Gross Jedlersdorf
Gross Bisamberg
Klein Bisamberg
Gross Enzersdorf
Albern
Kaiserwasser
Brigittenau
Leopoldstadt
Landstrasse
Wieden
Mariahilf
Neubau
Josefstadt
Alsergrund
Währing
Döbling
Hietzing
Meidling
Favoriten
Simmering
Landstrasse
Leopold B.
Kaiser Wasser
Kaiserwasser
Kaiser Ebersdorf
Schwechat
Albern
Simmeringer Haide
Wienerberg
Laaer Berg
Favoriten
Meidling
Hietzing
Schönbrunn
Penzing
Währing
Hernals
Ottakring
Döbling
Grinzing
Klosterneuburg
Floridsdorf
Jedlersee
Gr. Jedlersdorf
Mühlschüttel
Saulenhaufen
Kaiserwasser
Stadlau
Aspern
Gross Jedlersdorf
Gross Bisamberg
Klein Bisamberg
Gross Enzersdorf
Albern
Kaiserwasser
Brigittenau
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Landstrasse
Wieden
Mariahilf
Neubau
Josefstadt
Alsergrund
Währing
Döbling
Hietzing
Meidling
Favoriten
Simmering
Landstrasse
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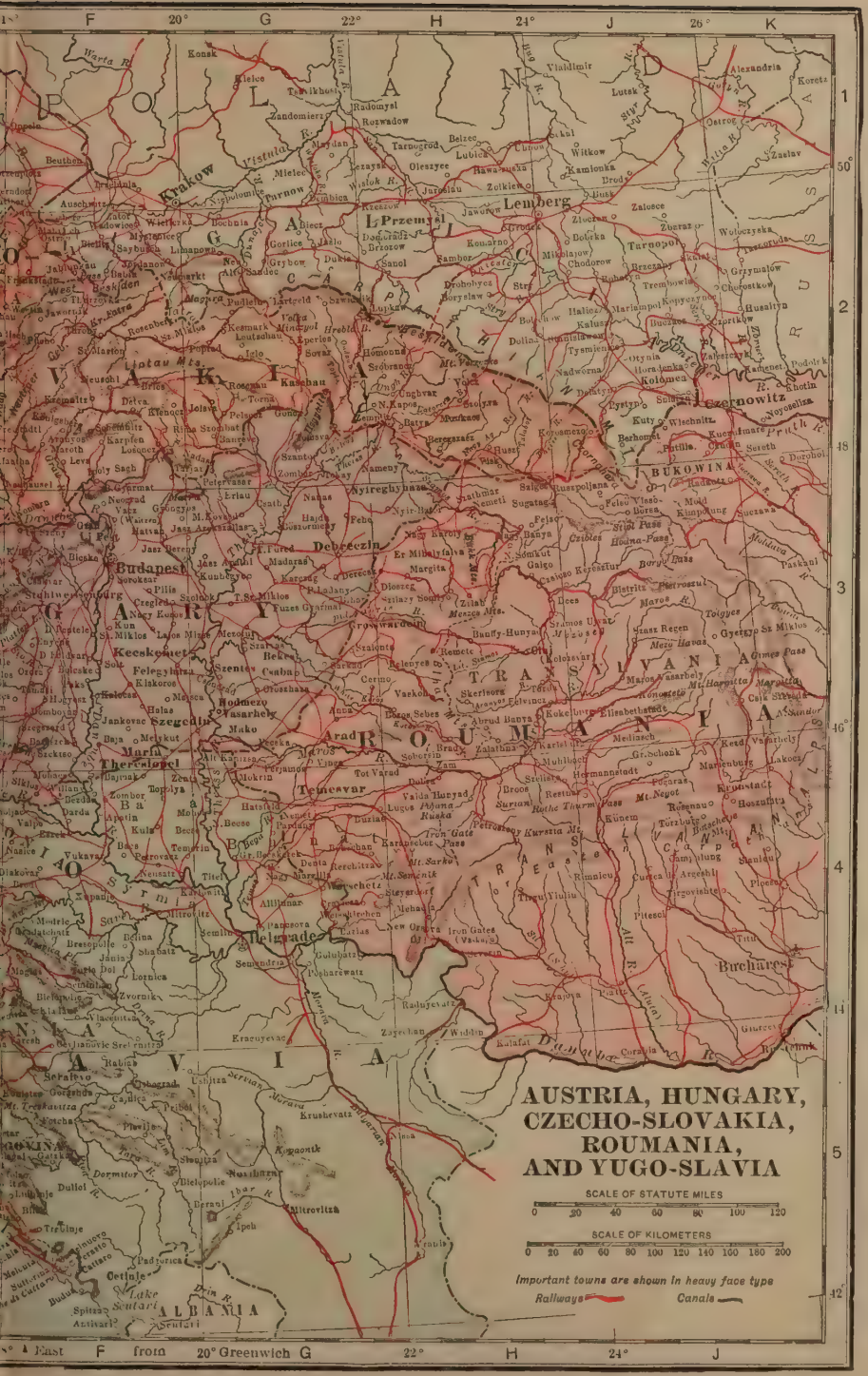
AUSTRIA, HUNGARY,
CZECHO-SLOVAKIA,
ROUMANIA,
AND YUGO-SLAVIA
SCALE OF STATUTE MILES
0 20 40 60 80 100 120
SCALE OF KILOMETERS
0 20 40 60 80 100 120 140 160 180 200
Important towns are shown in heavy face type
Railways
Canals
East from Greenwich
20°
22°
24°
26°
F
G
H
J
K
1
2
3
4
5
46°
48°
50°
42°
POLAND
GALICIA
BUKOWINA
HUNGARY
TRANSYLVANIA
ROUMANIA
SERVIA
BOSNIA
ALBANIA
Cracow
Lemberg
Przemysl
Czernowitz
Budapest
Debreczin
Temesvar
Arad
Szegedin
Marmaros Sziget
Kecskemet
Belgrade
Bucharest
Carpathian Mts.
Transylvanian Alps
Danube R.
Dniester R.
Pruth R.
Theiss R.
Save R.
Drave R.
Vistula R.
Warta R.
Bug R.
Sereth R.
Aluta R.
Iron Gate
Kazan Pass
Rothe Thurm Pass
Predeal Pass
Tömös Pass
Vulkan Pass
Borgo Pass
Tihuta Pass
Ojtoz Pass
Gyimes Pass
Toplitza Pass
Vaskapu Pass
Orsova
Turnu Severin
Craiova
Giurgevo
Rustchuk
Silistria
Varna
Constanza
Kustendje
Sulina
Galatz
Braila
Ismail
Reni
Akkerman
Kilia
Odessa
Alexandria
Lutsk
Vladimir
Brody
Tarnopol
Kolomea
Stanislau
Halicz
Kalusz
Sniatyn
Kuty
Wiznitz
Berhomet
Suczawa
Kimpolung
Jassy
Fokshani
Bistritz
Maros R.
Toplitza
Gyergyo St. Miklos
Mezo Havas
Maros Vasarhely
Mt. Hargitta
Cale Strezii
Elisabethstadt
Kronstadt
Hermannstadt
Fogaras
Rothenthurm Pass
Mt. Negoi
Rosenau
Hoszufalu
Bucsecs
Stanisi
Pitesci
Titu
Tirgoviste
Campulung
Arcesch
Rimnicu
Curtea di Arcesch
Tirgu Jiulin
Petrosseny
Kurtitza Mt.
Karlsburg
Mediasch
Schenk
Muhlbach
Marienburg
Lakocz
Reps
Vasarhely
Szekely Land
Maros R.
Szamos R.
Aranyos R.
Kokelburg
Banffy-Hunyad
Mezo Telegd
Colosvar
Thorda
Szamos Ujvar
Szamos Regen
Gyalu
Nagy Banya
Szinak
Mocsar Mts.
Grosswardein
Belenyes
Remete
Szalonta
Sarkad
Bekes
Szent Miklos
Lajos Mezo
Kun
Kecskemet
Felegyhaza
Kiskoros
Mocsa
Rodmezo Vasarhely
Csongrad
Mako
Arad
Battonya
Nagy Szent Miklos
Temesvar
Lugos
Hatszeg
Petrosseny
Karlsburg
Mt. Sarko
Mt. Semenik
Mt. Sarkanj
Mt. Kopaonik
Mt. Rudnik
Mt. Tresibabitza
Mt. Durmitor
Mt. Orjen
Mt. Lovtchen
Mt. Dormitor
Mt. Trebinje
Mt. Kruschevata
Mt. Javor
Mt. Maglitch
Mt. Kopaonik
Mt. Rogozna
Mt. Golesch
Mt. Schar
Mt. Kom
Mt. Tarabosch
Mt. Rilo
Mt. Olympus
Mt. Pindus
Mt. Tomor
Mt. Lovtchen
Lake Scutari
Lake Ochrida
Lake Prespa
Lake Janina
Lake Ostrovo
Lake Kastoria
Lake Presba
Lake Dojran
Lake Doiran
Lake Tachinos
Lake Butrinto
Lake Ochrida
Lake Scutari
Lake Prespa
Lake Janina
Lake Ostrovo
Lake Kastoria
Lake Presba
Lake Dojran
Lake Doiran
Lake Tachinos
Lake Butrinto

erland. Four-fifths of Austria is 600 feet above the sea. The mountains are comprised in three great systems—the Eastern Alps, the Carpathians, and the Bohemian Highlands. The Alps cover the crownlands of Tyrol, Salzburg, Carinthia, Carniola, Styria, and the parts of Upper and Lower Austria south of the Danube. The mountains, though lower than the Swiss Alps, often rise above the snow line. The eastern spurs of the Alps stretch through Croatia towards the southwestern part of Hungary. The total area of the Austro-Hungarian Alps is estimated at about 40,000 square miles, of which nearly 700 square miles are covered with glaciers. Their highest peaks are in the Rhætian and Noric Alps, which extend from Switzerland to the Danube. The Ortler Spitze, the loftiest summit in Austria-Hungary, rises to a height of nearly 12,800 feet. The Carpathian Mountains, greatly inferior to the Alps in height, describe an immense curve, amounting to two-thirds of a circle, about Hungary, girding it on the north and east, and covering an extensive area in Transylvania. In their broad sweep of above 800 miles, from the Danube at Pressburg back to that river at the Iron Gates, they embrace the vast Hungarian plain, a region more level than the prairies of the United States. The highest peak of the Carpathians is the Gerlsdorfer Spitze, about 8700 feet. Finally, the mountains that edge the western, northern, and eastern edges of Bohemia and Moravia are the connecting link between the mountain systems of Austria-Hungary and the Mittelgebirge or hilly regions of central Europe. At the head of the Adriatic is the remarkable highland region, of limestone formation, known as the Karst. On the borders of Dalmatia and Bosnia is a mountain range which bears the name of the Dinaric Alps. The mountains of Austria-Hungary are famous for their picturesque scenery and abound in caverns, some of them very large. In the Alpine provinces the finest glacier scenery is around Gross Glockner in Carinthia; the finest rock scenery is in the Dolomites. The Adriatic coast land, with its many islands, its bays, and frowning heights, is one of the most picturesque regions in Europe.

Hydrography. Among the rivers of Austria-Hungary, the Danube is the most important, and is second only to the Volga in all Europe, its basin embracing about three-fourths of the total area of the country. It enters Upper Austria at Passau and, crossing Lower Austria in an easterly direction, enters Hungary, which it traverses eastward and beyond the Bakony Forest, then turns abruptly and flows due south to the border of Croatia, where it receives the Drave, then flows again eastward, receives from the north its principal affluent, the Theiss, and from the west the Save, and at the Iron Gates breaks through the southern extremity of the Carpathian range, to descend thence into the great plains of Rumania and Bulgaria. The Danube is a very important factor in the economic life of the country, affording the largest navigable waterway. Besides the Danube there are several large rivers in Austria-Hungary. The Theiss, with its largest tributary, the Maros, collects all the waters of eastern Hungary and delivers them to the Danube at Titel. Two other great tributaries of the Danube, the Drave and Save, collect the drainage of Croatia, Slavonia, Bosnia, Carniola, Carinthia, and a great part of Styria, since the high mountains bordering the Adriatic coast prevent any streams from the interior reaching that sea. The Elbe drains most of Bohemia, while the Dniester traverses eastern Galicia, and the Vistula forms part of the boundary line between Russian Poland and Galicia. The Inn traverses northern Tyrol, and the Adige, the principal river of Austria emptying into the Adriatic, flows through the southern part of that province. The Danube rises in Germany, but the Dniester, the Vistula, the Oder, and the Elbe, whose chief régime is in Germany or Russia, have their sources in Austria-Hungary. The lakes are comparatively few and insignificant. The most important are the Plattensee and the Neusiedlersee, in the western part of Hungary. There are numerous small lakes, especially in the Alps, some of them situated at an altitude of over 7000 feet and famous for their scenery. The uneven surface of Austria-Hungary is not favorable for the construction of artificial waterways, and the canals of the country are few and comparatively unimportant. The Franzens Canal is the longest (137 miles) and connects the Danube with the Theiss. Austria-Hungary is famous for its hot and mineral springs, of which there are over 2800, mostly situated in Bohemia, Hungary, and Transylvania. The most important of them are Karlsbad, Marienbad, and Teplitz (Bohemia). Austria surpasses all other European countries in the number and value of its mineral springs.

Climate. The climate of Austria-Hungary, while generally mild, differs considerably in different localities. The average annual temperature varies from 62° F. in Ragusa, in the southern part of Dalmatia, to 51° in Budapest and 48° at Prague. The northern Carpathians are characterized by very cold winters and cool summers, while in the valleys of Transylvania the winters are very severe and the summers very hot. The mean annual temperature of Vienna is about 50° F. The rainfall is very abundant and at times excessive, in the western part of the country, near the Alps, where in some places the total annual rainfall exceeds 100 inches; it is lowest in Lower Austria, Moravia, and Silesia, averaging about 25 inches per year. The western part of the country receives much more rain than the eastern.

Fauna. The geographical position of Austria as a part of southern central Europe gives it the fauna characteristic of its latitude, and there is little that is locally characteristic or different from that of the neighboring countries. The valley of the Danube forms one of the recognized migration highways for birds, between northeastern Europe and southern Asia; and the river abounds in fish that ascend from the Black Sea, furnishing important fisheries, of which that for sturgeon is notable. The valley regions have been largely denuded of wild animals by the civilization that has occupied them for so many centuries; but in the high Alps the chamois and ibex still survive in considerable numbers under legal protection; and the other high mountains still shelter bears, lynxes, wolves, and representatives of most of the species of smaller animals which originally dwelt there.

Flora. The flora of Austria-Hungary is characterized by great diversity and richness. It may be divided into vertical zones regulated by relative altitude on the mountains, from the fig and grape producing southern valleys to the Alpine summits. In the west the general flora is much like that of southern Germany, but on

the lower Danube and near the Adriatic trees and plants of a warmer climate prevail.

Geology. In its geographical structure Austria-Hungary shows as much variety as in the formation of its surface. Archæan rocks are represented by gneiss, schist, and granite in the Alps, Bohemian Highlands, and Carpathians and are noteworthy for their mineral riches. The Silurian formation underlies a large area in central Bohemia, where are located the celebrated silver mines of Pribram, and is also prominent in the Alps and in Galicia. The Devonian formation occurs in Moravia, Galicia, and the Alps. Carboniferous strata, frequently inclosing coal-beds, are found in central and western Bohemia, in Moravia, Silesia, Galicia, Styria, and Hungary (Eibenthal). Rocks of later age are represented by Triassic, Jurassic, Cretaceous, Tertiary, and alluvial beds, as well as by igneous intrusions. The Tertiary strata are of great economic importance, as they inclose valuable deposits of lignite and salt and also are intersected by igneous dikes that carry the gold and silver ores of Schemnitz, Kremnitz, and Nagy-Bánya. The vast plain of Hungary is covered by Tertiary and Quaternary deposits deeply mantled by loess and alluvium, which give to this granary of the empire its great fertility.

Mining. The mining industry of the monarchy dates centuries back, and some of the mines were worked by the Romans. The mineral deposits are remarkably rich and varied, including many metals, besides precious stones, mineral oil, and useful earths. Gold is found mainly in Hungary, while silver occurs in Hungary and Bohemia, and quicksilver in Carniola. Iron is the most important metallic product of the monarchy, and is worked in Styria, Bohemia, and various parts of Hungary. Copper is found in Salzburg and Hungary; lead is worked especially in Carinthia and somewhat in Galicia and Hungary. The most important and the most common mineral of Austria-Hungary is coal (including lignite). While coal is worked in all the Austrian crownlands except Salzburg and Bukowina, the greater part of the output comes from Bohemia, which produces more than one-half of the mineral products of Austria and nearly one-third of its metal products. Rock salt exists in immense beds on both sides of the Carpathians, in the county of Máramaros in Hungary, in Transylvania, and in Galicia. The salt mines of Wieliczka in Galicia are the most famous in the world. Salt is also made by state salt works by evaporating the water of salt springs, and from the sea water on the coast of the Adriatic. The sale of salt in Austria is a government monopoly. Of other salts, alum, sulphate of iron, and sulphate of copper are the most important. The useful earths include all sorts of clay up to the finest porcelain earth (in Moravia, Bohemia, and Hungary). Of precious and semi-precious stones the most abundant are the Hungarian opal (which passes in commerce as Oriental), Bohemian garnet (the finest in Europe), carnelian, agate, beryl, amethyst, jasper, ruby, sapphire, topaz, etc. In 1885 oil wells of great productiveness were opened at Kolomea, in Galicia, and heavy import duties were soon laid on foreign petroleum. Considerable deposits of zinc, tin, manganese, bismuth, sulphur, arsenic, uranium, nickel, and graphite are also found in the various parts of the monarchy.

The following table shows the amount in metric quintals and the value in thousands of kronen of the principal mining products in Austria in 1905 and 1909:

Products	1905		1909	
	Quintals	1000 kr.	Quintals	1000 kr.
Coal	125,852,628	99,875	137,130,425	141,343
Lignite	226,920,760	100,957	260,437,157	138,685
Iron ore	19,137,819	16,814	24,902,769	22,730
Lead ore	233,383	4,216	205,501	3,499
Silver ore	210,474	3,010	211,017	3,386
Mercury	868,562	2,240	923,373	2,161
Zinc ore	299,828	2,410	339,548	1,988
Graphite	344,160	1,351	407,104	1,581
Copper ore	106,772	565	118,258	819
Gold ore	359,369	758	297,090	594

The total value of the mining products of Austria, as reported for 1905, were 233,145,531 kronen; 1907, 295,486,865; 1909, 317,490,564; 1911, 363,054,000. These figures do not include the value of the salt and petroleum output. Salt production in 1905 amounted to 3,433,747 quintals, valued at 45,579,033 kronen; in 1909, 3,598,006 quintals, valued at 46,740,565 kronen. Petroleum production is limited to Galicia. In 1901 the output was 4,046,000 quintals, valued at 23,010,000 kronen, and 27,072 quintals of ozocerite, valued at 2,572,000 kronen. The combined output in 1905 was 7,973,484 quintals, worth 23,718,999 kronen; in 1909, 20,884,569 quintals, worth 34,928,285 kronen (of which, petroleum 20,863,415 quintals, 32,221,494 kronen).

The more important furnace products in Austria were as follows in amount and value in 1905 and 1909:

Products	1905		1909	
	Quintals	1000 kr.	Quintals	1000 kr.
Pig iron	11,196,136	83,227	14,650,508	117,084
Zinc	93,261	5,283	116,877	5,942
Lead	129,680	4,810	129,412	4,676
Silver (grammes)	38,453,492	3,754	39,002,175	3,256
Mercury	5,198	2,551	5,848	3,170
Copper	8,701	1,508	9,848	1,442
Gold (grammes)	204,292	656	148,439	482

The total value of the furnace products of Austria, as reported for 1905, was 103,205,734 kronen; 1907, 132,807,655; 1909, 137,235,740; 1911, 156,559,000. There were employed in the mines of Austria in 1909 150,209 persons; in the salt works, 6617; in smelting, 8941; in the petroleum and ozocerite industry, 6446.

In Hungary the more important mining and furnace products included in 1911 lignite valued at 77,200,000 kronen; pig iron, 43,848,000; coal, 15,481,000; iron ore, 13,334,000; gold, 10,469,000; and silver, 907,000. In 1908 the lignite output was 70,344,993 quintals, valued at 61,546,000 kronen; in 1910, 75,788,460 quintals, 69,828,000 kronen. Coal, 9,820,169 and 10,851,320 quintals, 12,794,000 and 13,877,000 kronen; pig iron, 5,229,739 and 5,020,558 quintals, 43,556,000 and 40,987,000 kronen. The gold output was valued at 10,787,000 kronen in 1908 and 9,960,000 kronen in 1910. The total value of mining and furnace products rose from 70,948,982 kronen in 1893 to 106,743,742 kronen in 1900, 106,173,334 in 1905, and 152,837,807 in 1910. In addition is the salt output, which in 1908 amounted to 2,475,326 quintals, worth 33,-

924,000 kronen, and in 1910 2,462,056 quintals, 33,950,000 kronen. In 1911 79,336 persons were employed in mining and smelting in Hungary, and 2622 in the salt works.

Agriculture. Rich soil, abundance of water, and a mild climate have combined to make Austria-Hungary one of the foremost agricultural countries in Europe. Its crops are remarkable for their variety, embracing, besides all the common European products, a great many subtropical plants and fruits. The most fertile lands are those in Hungary, Bohemia, Moravia, Lower and Upper Austria, and Galicia.

The distribution of land is stated as follows for 1910, in hectares (1 ha. = 2.471 acres):

DISTRIBUTION OF LAND	AUSTRIA		HUNGARY	
	Ha..	P. ct.	Ha.	P. ct.
Arable land	10,641,996	35.37	13,916,061	42.82
Gardens	377,965	1.26	427,492	1.32
Vineyards	223,077	0.74	309,813	0.95
Meadows, pastures, etc.	7,171,779	23.90	3,191,686 3,977,022	9.82 12.24
Woodland	9,788,080	32.63	8,096,505	27.41
Lakes, marsh, etc.	105,024	0.35	66,254	0.20
Unproductive (untaxed)	1,692,872	5.63	1,701,604	5.24
	30,000,793	100.00	32,496,437	100.00

With the great variety in climatic and topographical conditions of the monarchy, ranging from the sunny slopes of the Adriatic coast land to the snow-clad Alps, and from the vine-clad hills of the Tirol in the west, to the broad, fertile plains of Hungary in the east, the agricultural products of Austria-Hungary offer as great contrasts as can be found between those of any two countries of Europe.

The first half of the table below gives the area (in hectares; 1 hectare = 2.471 acres) sown to main crops, and the second gives the yield (in quintals of 220.46 lbs.) for 1910 and 1912:

PRODUCTS	AUSTRIA		HUNGARY	
	1910	1912	1910	1912
Wheat	1,213,579	1,260,317	3,793,999	3,877,309
Rye	2,060,980	2,032,138	1,137,576	1,240,339
Barley	1,101,525	1,065,903	1,163,090	1,116,740
Oats	1,833,018	1,866,931	1,165,995	1,097,563
Corn	311,773	304,184	2,830,398	2,437,217
S. Beets	253,731	264,456	117,760	175,885
Wheat	15,673,315	18,952,639	49,297,262	50,251,406
Rye	27,671,921	29,748,033	13,155,227	14,411,799
Barley	14,722,147	17,065,756	12,134,360	15,701,907
Oats	20,631,564	24,300,998	10,845,119	11,656,408
Corn	4,416,782	3,885,058	54,229,398	44,882,694
S. Beets	70,618,000	79,237,695	29,222,365	48,366,413

Sown to flax in 1912: 36,739 hectares in Austria, with a yield of 233,752 quintals fibre and 165,235 quintals seed; under vineyards: 224,293 hectares, yielding 3,969,873 hectoliters of wine. Tobacco: 3422 hectares and 56,651 quintals in Austria; 48,527 hectares in Hungary. In Austria (1912) 10,245 hectograms of silkworm eggs placed for hatching yielded 2,185,470 kilograms of cocoons; in Hungary proper, 10,790 hectograms of eggs, 1,151,120 kilograms of cocoons.

The eastern half, or Hungary, serves as the granary of the monarchy, besides exporting considerable quantities of grain to southern Germany and Switzerland. The western half, or Austria, produces everything from wheat to subtropical fruits, but it depends on Hungary for much of its grain supply. Among its chief products are industrial plants, such as sugar beets, hops, potatoes, etc. The varied nature of the two parts of the monarchy may be seen from the foregoing table.

Thus it will be seen that Austria furnishes a little more than one-fourth of the total wheat crop of the country, less than one-tenth of the corn, and less than one-tenth of the tobacco crop. If, in addition to this, it is remembered that even these small figures include the crops of Galicia, which geographically belongs to the eastern half of the monarchy, and whose products of wheat, corn, and tobacco constitute one-third, one-fourth, and two-thirds of the total respective crops of Austria, the latter's share in those crops will be seen to be very small indeed. On the other hand, Austria furnishes nearly three-fourths of the rye crop of the monarchy and about two-thirds of the potato crop, both of which are largely used in the distilleries. Vine growing has shown a decline in Hungary, but the monarchy still holds an important place among wine-producing countries. Horticulture is carried to great perfection, and the orchards of Bohemia, Austria proper, Tirol, and many parts of Hungary produce a profusion of fruits. The chief orchard products of the monarchy, in the order of their commercial importance next to grapes, are plums, peaches, apricots, apples, nuts, almonds, chestnuts, and figs, considerable quantities of which are exported annually. In Tirol, Dalmatia, and southern Hungary olive and mulberry trees are successfully raised and are gaining in area of cultivation. Potatoes are raised everywhere, and in elevated districts are often almost the sole subsistence of the inhabitants. Great quantities of cider are made in Upper Austria and Carinthia and of plum brandy in Slavonia. In Dalmatia oranges and lemons are raised; much more olive oil is imported than is produced in the country.

Stock breeding is largely developed in the Alpine highlands and in the Hungarian plains, in both of which pastures are abundant and the land is best adapted for grazing purposes. In Austria, however, not enough cattle are raised to satisfy the home demand. Sheep breeding in Austria has suffered a great decline from the competition of Australian wool. The breeding of sheep, like that of horses, has been a special object of care to the government. The finer wools are produced, but the greater part of the clip is not of superior grade. The pride of Austro-Hungarian stock breeders is their horses, which are among the finest in Europe, and whose number in the monarchy is second only to that in Russia and Germany. Horse breeding is promoted by "military studs." Besides a number of imperial studs, there are a great many private ones, especially in Hungary.

Live stock in Austria (1910), Hungary (1911), and Bosnia and the Herzegovina (1910): horses, 1,802,848, 2,350,647, and 221,981; cattle, 9,160,009, 7,318,088, and 1,309,922; sheep, 2,428,101, 8,547,042, and 2,499,422; swine, 6,432,080, 7,578,690, and 527,271; goats, 1,256,778, 426,975, and 1,303,068.

Forestry is one of the most important industries in Austria-Hungary. Of the total area of forest in Austria more than two-thirds is under

pines and other trees found in high altitudes, while in Hungary beech and oak predominate, though pines also are abundant. The forests are chiefly situated in the Carpathians, Alps, and other mountains. The administration of the forests and domains belonging to the state is under control of the ministry of agriculture, and includes schools of forestry; and the exploitation of the forests is subject to restrictive regulations. The average annual yield of the forests exceeds 1,050,000,000 cubic feet of timber, over 40 per cent of which is used for manufacturing and building purposes, and less than 60 per cent as fuel. The extensive forests, besides timber, yield a number of secondary products, as tar, potash, charcoal, bark, cork, etc.

The land distribution in Austria-Hungary differs in its several parts. In Galicia, Bukowina, and to a considerable extent in Hungary, where the cultivation of wheat and cattle and sheep raising constitute the chief branches of agriculture, large estates thrive best and occupy from 25 to 46 per cent of the total area under farms. Nearly 87 per cent of the peasants, however, own their farms. But these are often not large enough to yield a living, and their owners depend on employment as day laborers on neighboring large estates. On the other hand, in Dalmatia and southern Tirol, where fruit raising, wine making, and silk culture constitute the chief occupation, small farms are most successful and the peasants are prosperous, owning from 92 to 97 per cent of the land. In the remaining crownlands peasant holdings occupy about three-fourths of the total agricultural area.

Manufactures. The industrial development of Austria-Hungary has advanced rapidly in recent years, and in many cases this has been due to the material support received from the government in direct subventions, reduced freight rates on state railways, and exemption from import duties on certain raw products and machinery. The following are the 11 most important industries in the country, employing more than 100,000 persons each: 1. The clothing industry, with nearly 700,000 workers—less than three-sevenths of whom are employed in Hungary, and the rest in Austria. 2. Manufacture of foods and drinks, nearly 500,000 persons, three-tenths of them in Hungary. 3. The textile industry, nearly 400,000 persons, less than one-tenth employed in Hungary. 4. Building trades, nearly 435,000, over one-fourth of whom are employed in Hungary. 5. Wood working, about 300,000, less than a third of them in Hungary. 6. The iron and steel works furnish employment to 375,000 persons, over one-third of whom are in Hungary. 7. The quarries and potteries keep some 260,000 persons busy, less than one-fifth of them in Hungary. 8. Machine building and tool and implement making give employment to over 200,000, one-third of them in Hungary. 9–11. Finally, the paper, leather, and chemical industries each gives work to between 60,000 and 70,000; less than one-fourth of these are employed in Hungary.

The mere enumeration of the principal industries of Austria-Hungary shows the overwhelming industrial importance of Austria in the monarchy. It is this industrial diversity of Austria and Hungary that makes the monarchy more or less self-sufficient, the two halves depending upon exchange with each other for their material well-being. The chief seats of industry in Austria are Bohemia, Silesia, Moravia, and Lower Austria. In Hungary Budapest is the heart of industrial activity, 40 per cent of the factory population being employed there; yet the number of Budapest's manufacturing establishments is but 10 per cent of the total, which shows that most of the large modern factories and mills of Hungary are located in its capital.

The most important industries conducted on a large scale, and playing a leading part in commercial and financial life, are the textile and iron and steel industries. The maintenance of the textile industries has always been an object of special solicitude with the people of Austria, because it not only furnishes employment, but also affords a market for the wool and flax crops of the country. But although the wool and linen industries are still flourishing, their relative importance is receding before the rapidly growing cotton industry. The raw cotton is imported from the United States and India, and is converted into finished products in the spinning, weaving, bleaching, dyeing, and printing establishments of the monarchy. In 1831 the imports of raw cotton amounted to 12,456,000 pounds; in 1858 they rose to 87,523,000 pounds. Cotton was seriously threatening the very existence of the linen industry, when the breaking out of the Civil War in the United States, with the consequent cotton famine, gave the linen industry a chance to revive. After the war the cotton industry took a new lead, and the imports of cotton jumped to 132,739,000 pounds in 1871, 245,482,200 pounds in 1891, 358,269,500 pounds in 1898, and 479,280,040 pounds in 1907; in 1910, the import was 410,716,980 pounds. The silk industry has also advanced rapidly, owing chiefly to the increased cultivation of the silkworm in Hungary. Formerly the seat of silk manufacture was largely centred in southern Tirol and the neighboring region; now there are large silk-spinning establishments in Szekszárd, Pancsova, and Ujvidék (Neusatz), in Hungary, in which country 107,637 families were engaged in the production of raw silk in 1903, as against only 1059 families in 1879. All of the textile products enumerated constitute an important item of export from Austria-Hungary.

The iron and steel industry is abreast of the times in its methods of manufacture. The production of pig, cast, and wrought iron, Bessemer steel, iron bars, etc., although large, is barely sufficient to cover the home demand on the part of the manufacturers of steel rails, iron plate, steel wire, etc., besides the numerous comparatively smaller manufactures of all kinds of metallic ware. In addition there is the very important machine-building industry, which includes the manufacture of locomotives, agricultural machinery, and all kinds of machinery used in modern manufacturing establishments. Many of these products, however, are produced in quantities inadequate to meet the domestic demand.

The milling industry is still carried on to a considerable extent by small establishments, in which the motive power is wind or water, but there are now thousands of steam mills, most of them in Hungary. Some of them, as those in Budapest, are on a large scale.

In 1890 there were 106,616 distilleries, the great mass being diminutive stills, of which 27,055 were in Austria, and 79,561 in Hungary. In 1898, out of 30,637 distilleries in Austria, only 600 used any kind of machinery, and a simi-

lar proportion held in Hungary. But of the 25,434,000 gallons produced by the 79,010 distilleries in Hungary in 1896, 24,884,000 gallons, or 97.8 per cent of the total product, were turned out by 501 distilleries, or about one-half of 1 per cent of all the distilleries. In 1910 there were 45,384 distilleries in Austria and 62,411 in Hungary. The combined annual production of alcohol is about 60,000,000 gallons. The number of breweries is on the decrease, because the small breweries are crowded out of existence by their new large rivals. In 1865 there were 3143 breweries; in 1880 there were 2217; in 1890, 1859 (1761 in Austria and 98 in Hungary); in 1903, 1513 (1423 and 90); in 1911, 1266 (1183 and 83). The annual output of the Austro-Hungarian breweries is over 550,000,000 gallons and is exceeded only by those of Germany and Great Britain in all Europe.

The beet-sugar industry is one of considerable importance in Austria, as well as in Hungary, and is fostered by the government by a very liberal bounty system. In 1865 there were 147 refineries in the monarchy; the number grew to 215 (198 in Austria and 17 in Hungary) in 1890, and 234 (214 in Austria and 20 in Hungary) in 1898, and the annual output increased from 845,000 tons of sugar in 1890 to nearly 935,000 tons in 1898, which not only covered the entire domestic demand, but also furnished a considerable surplus for export. In 1909 the output in Austria was 1,003,731 tons; in 1910 in Hungary, 333,343 tons. About three-fifths of the Austrian sugar is produced in Bohemia. The sugar industry gives employment to over 90,000 people, of whom about one-fifth are employed in Hungary.

The glass industry is especially developed in Bohemia, whose products are famous and constitute a very important article of export. The pottery products are also of importance and include the most artistic and expensive porcelain and china ware. The chemical industry thrives especially in Bohemia, Silesia, Lower Austria, and Hungary, and its most important products are potash, sulphuric and hydrochloric acids, pharmaceutical goods, and dyestuffs and explosives. The manufacture of paper, carried on extensively, furnishes large quantities for export, giving employment to some 60,000 people. The manufacture of friction matches is carried on extensively in Austria.

The leather industry sprang up at an early date, as a natural outgrowth of the country's enormous stock raising, and has developed to such an extent as to require the importation of considerable quantities of hides from abroad; and yet it is unable to supply the domestic demand for leather, which also has to be imported in great quantities.

The manufacture of tobacco has constituted a government monopoly since 1670. It is carried on in 51 factories, of which 30 are in Austria and 21 in Hungary, giving employment to over 60,000 persons, more than 90 per cent of whom are women. The annual output of the government factories aggregates about 1,875,000,000 cigars, 8,400,000,000 cigarettes, over 435,000 quintals of smoking tobacco, and between 12,000 and 13,000 quintals of snuff. The estimated gross revenue from the tobacco monopoly, according to the budgets for 1912, was 318,258,100 kronen for Austria and 185,267,000 kronen for Hungary.

Transportation. *Railways.*—The first steam railway in Austria, the Kaiser Ferdinand Nordbahn, 8 miles long, was opened in November, 1837; a horse railway—the first ever built in Europe—had existed since 1825. The first steam line was built by a private company, and it was not till 1841 that the government began to construct railways on its own account. In the meantime the great prosperity of the country in the early forties, with its consequent abundance of idle capital seeking investment, stimulated the construction of many private lines and sent up the price of railway shares on the exchanges. The poor crops of 1845, however, and the commercial panic of 1846 which followed, brought ruin to many and left the railways in a pitiful plight. It was in these circumstances that the government determined upon the policy of nationalizing the railways and appropriated over $10,000,000—soon increased to $25,000,000—for buying up the shares of private railway companies; and in less than a year (September, 1847) the government owned a controlling interest in four of the largest railways of the country—the Hungarian, the Lombardo-Venetian, the Gloggnitz, and the Oedenburg railways. The financial straits in which these railways found themselves forced the government to pursue to an end the policy it had once begun and buy out the roads entirely. By September, 1854, the government was in possession of 1100 miles of railways, or practically the entire mileage of Austria. In the following year, however, it suddenly reversed its policy and began to dispose of its acquired lines, and by 1858 the total length of the state lines dwindled down to some 8 miles. This radical change in railway policy, while partly due to official mismanagement under state control, was mainly caused by the government's need of a large amount of ready cash, in order to effect a change in its monetary standard. The following decade was marked by feverish activity in construction, due largely to indiscriminate grants of subventions by the government to private companies. From 1860 to 1870 the length of private lines increased from 1815 miles to 3800 miles, while the proportion of subsidized roads increased from 20 per cent at the close of the fifties to 75 per cent in 1866. In 1873 the Austrian government, partly influenced by the great drain upon its finances caused by the granting of subventions, and partly stimulated by the success of state railway ownership in Germany and in France, made an attempt to return to its former policy. As an initial step in that direction, a law was passed in 1877 conferring on the government the right to take over, with a few exceptions, all the lines which had been receiving a subvention from it or whose payment of interest had been guaranteed by it. The total amount paid out by the government in the form of subventions and guarantees up to 1876 was about $49,000,000. Since 1877 the state has steadily increased its railways, both by construction and by purchase, so that at the beginning of 1905 it owned and controlled over 56 per cent of the total railway mileage, which amounted to 13,425.

The experience of Hungary with its railways has been, in the main, the same as that of Austria, with the difference that the Hungarian government, since the *Ausgleich* of 1867, has pursued the policy of state ownership and control with greater energy. The first steam railway was opened in July, 1846, a line 21 miles

long, from Budapest to Vâes (Waitzen). At the beginning of 1905 the total length of railway lines was about 12,533 miles, of which nearly 73 per cent was owned or controlled by the government. The following table

YEAR	AUSTRIA		HUNGARY	
	State (miles)	Private (miles)	State (miles)	Private (miles)
1850.....	516	325	120	17
1860.....	8	1817	....	1002
1870.....	8	3781	221	1935
1880.....	1221	5867	....	....
1890.....	4129	5359	3533	3440*
1904.....	7614	5130	9149†	1849†

* Including 2000 miles operated by the state.
† 1903.

illustrates the growth of railway lines in Austria and Hungary. At the beginning of 1911 the mileage in Austria was 14,335; in Hungary, 13,087; in Bosnia and the Herzegövina, 1215; total, 28,638.

Merchant Marine and Shipping. Cut off from the sea on all sides except for a small outlet on the Adriatic, Austria-Hungary naturally falls behind all of the leading European countries in her merchant marine. In 1903 this comprised 16,229 vessels of 437,830 tons in Austria, and 466 vessels of 134,229 tons in Hungary. Of these, Austria had 382 steamers of 390,487 tons, and Hungary 128 steamers of 132,483 tons. Austria employed altogether 43,858 seamen, and Hungary 2905. In 1884 the merchant marine of the entire monarchy consisted of 9206 vessels of 324,458 tons, employing 29,358 people. In 1910 190,105 vessels of 28,235,486 tons entered and 189,986 of 28,335,345 tons cleared at Austro-Hungarian ports; as against 85,000 vessels of 11,000,000 tons in 1891. About 90 per cent of these vessels carried the Austro-Hungarian flag, next in the order of importance being those of Italy, Greece, and Great Britain. The most important seaports are Triest in Austria and Fiume in the Kingdom of Hungary. The Danube is navigated by a large number of steamboats throughout the whole of its course in Austria-Hungary, and affords a great outlet to the Black Sea.

Commerce. The lofty mountains surrounding the country on nearly all sides and the small extent of its coast line are great obstacles in the way of development of foreign commerce. On the other hand, the great diversity of natural resources in the monarchy is especially favorable to an active internal trade. For purposes of commerce, Austria and Hungary form a single customs union, maintained by mutual agreement. According to it the commercial relations of the two halves of the monarchy to each other and to foreign countries are exactly the same as in the case of the separate States of the United States; no import or export duties can be levied on goods going from one part of the monarchy to the other, and all duties on foreign goods are uniform throughout the country. Nearly 1,000,000 people are employed in commerce. Eighty-five per cent of the entire foreign commerce is by land.

The following tables show the development of foreign commerce from 1895 to 1910. Imports of merchandise for home consumption, of total merchandise, of coin and bullion, and total imports, in thousands of kronen:

Year	Mdse. home consumption	Total mdse.	Coin and bullion	Total imports
1895....	1,444,986	1,487,052	107,659	1,594,711
1900....	1,696,358	1,748,968	44,898	1,793,866
1905....	2,146,133	2,213,145	55,982	2,269,127
1910....	2,852,852	2,929,734	43,099	2,972,833

Exports of domestic merchandise, of total merchandise, of coin and bullion, and total exports, in thousands of kronen:

Year	Domestic merchandise	Total mdse.	Coin and bullion	Total exports
1895....	1,483,620	1,568,118	50,362	1,618,480
1900....	1,942,003	2,061,705	66,546	2,128,251
1905....	2,243,780	2,390,722	59,533	2,450,255
1910....	2,418,606	2,587,641	80,931	2,618,572

In 1909 and 1910 imports of raw materials, in millions of kronen, amounted to 1604.4 and 1582.3; partially manufactured materials, 435.0 and 476.0; manufactures, 706.9 and 794.6; exports of raw materials, 875.5 and 870.3; partially manufactured, 406.0 and 434.9; manufactures, 1037.4 and 1113.4. In 1911 imports and exports, in the special trade, were valued at 3,191,712,000 and 2,404,304,000 kronen respectively. In that year the larger classes of imports were as follows, in millions of kronen: Cotton, 313.7; coal, 189.0; seeds, 151.6; wool, 146.4; machinery and implements, 119.0; common metals, 119.0; hides (raw), 108.7; coffee, 92.6; cereals, 88.1; iron and iron manufactures, 83.9; leather, 73.0; silk and silk thread, 62.2; silk manufactures, 60.1; jewelry, 59.4; eggs, 57.5; cotton goods, 56.2. The larger classes of exports were: wood, 270.6; sugar, 216.6; cotton goods, 123.5; eggs, 112.6; apparel, etc., 97.8; coal, 94.9; wooden manufactures, 81.4; machinery, 78.2; iron and iron manufactures, 72.5; hides (raw), 72.5; woolen goods, 71.5; glass and glassware, 71.2; metal articles, 60.5; paper and paper manufactures, 60.1.

Special trade in merchandise by countries, in thousands of kronen:

COUNTRY	IMPORTS		EXPORTS	
	1910	1911	1910	1911
Germany.....	1,153,882	1,263,204	1,062,483	1,038,217
United States...	236,920	289,760	81,352	58,452
United Kingdom.	228,534	229,448	224,433	216,279
British India....	214,038	219,739	68,624	51,574
Russia.....	167,212	209,215	90,999	96,100
Italy.....	131,022	141,629	229,390	222,133
France.....	112,376	112,417	76,166	74,955
Switzerland.....	84,732	85,366	104,852	112,096
Rumania.....	52,163	78,150	102,929	123,974
Brazil.....	59,203	75,376	10,762	11,693
Total, including other ...	2,852,852	3,191,712	2,418,606	2,404,304

Commerce between Austria-Hungary and the United States has increased steadily since the end of the nineteenth century.

Following is a table showing figures compiled by the United States Department of Commerce and Navigation:

Year	Imports to the United States from Austria-Hungary	Exports from the United States to Austria-Hungary
1895	$2,125,772	$6,510,319
1900	7,046,819	9,079,667
1901	7,222,650	10,067,979
1902	6,167,127	10,150,601
1903	7,156,688	10,569,929
1904	8,225,282	10,372,689
1905	11,623,746	10,553,204
1906	14,890,019	13,865,433
1907	15,136,185	16,009,629
1908	16,174,738	15,425,659
1909	14,226,703	15,436,387
1910	14,962,731	17,408,910
1911	19,514,787	16,958,099
1912	22,388,930	16,713,794

The chief articles of import from the United States are cotton and some machinery and other manufactured goods, while Austria-Hungary exports to us mainly beet sugar, glassware, pottery, furniture, millinery, jewelry, and beans.

No account of Austro-Hungarian commerce would be complete without some reference to the amount and nature of the commerce between the two halves of the monarchy. The preponderantly industrial activity of Austria and the agrarian activity of Hungary is shown by the fact that in round numbers, 10 per cent of Austria's exports to Hungary is raw material, 12 per cent is unfinished goods, while the balance is finished manufactures. In return Hungary sends her 57 per cent raw materials, 7 per cent unfinished goods, and only 36 per cent finished manufactures.

The raw materials sent from Hungary to Austria consist almost exclusively of animals, cereals, flour, and other foods.

Banking. The banking system of the monarchy is quite simple. It centres in the Austro-Hungarian Bank, with headquarters at Vienna and Budapest, 71 branches in the principal cities of the country and agencies in many other towns. This bank has the exclusive privilege of issuing paper money, and to that extent exercises even a more complete control over the monetary situation of the monarchy than the Bank of England does over that country. It was organized in 1816, under the name of the "Austrian National Bank," and from the beginning was endowed with the great powers it now enjoys. Except for the period lasting from 1848 till the middle of the sixties, when the country's resources were drained to exhaustion by the ravages of the Revolution and foreign wars, it has enjoyed great prosperity during its entire existence and has had a high reputation for stability and sound management. In 1877 it was recognized as the Austro-Hungarian Bank, in order to bring it into conformity with the new political status of the country. The charter of the bank, which expired in 1910, was renewed and extended until 1917. Its capital was increased in 1900 from 180,000,000 kronen ($36,540,000) to 210,000,000 kronen ($42,630,000). Its resources have steadily increased, and in 1912 its assets and liabilities balanced at 3,743,168,000 kronen (note circulation, 2,815,797,000; reserve fund, 28,408,000).

The most important bank next to the Austro-Hungarian Bank is the Austrian Credit Bank for Trade and Industry (*Oesterreichische Credit-Anstalt für Handel und Gewerbe*). Its functions are the same as those of the large private banking houses of the United States; viz., the promotion of all kinds of industrial undertakings, and negotiating state and provincial loans. It was founded in 1855, with an authorized capital of $40,000,000, which was subsequently reduced to $16,000,000, and has branches in the largest cities of the country. Other important banks are: The Lower Austrian Discount Company, organized 1853 ($4,000,000); the Anglo-Austrian Bank, organized 1864, capital $7,000,000; the Austrian Territorial Bank (Länderbank), organized 1880, with $16,000,000, mostly French capital, invested in railways, mines, and foreign loans; the Union Bank; and the General Austrian Mortgage Bank (Bodenkredit-Anstalt), organized 1864. The latter advances loans on real estate by issuing mortgage bonds, which are sold in the open market, so that it practically serves as an intermediary between the real-estate owners and the capitalist who does the actual advancing of money. Nearly all of these banks have branches throughout the country. The Vienna Clearing House (*Giro und Cassen-Verein*), in addition to attending to ordinary clearing-house transactions (see CLEARING HOUSE), performs many other services for banks and business firms.

There are a number of other banks—savings, pawning, mortgage banks, etc. All in all, there were, at the end of 1909, 77 joint-stock and private banks (besides branches and agencies) in Austria, with assets and liabilities balancing at 10,125,119,000 kronen. This comparatively small number is due to the fact that the system of branch banking is in vogue. In Hungary the system of small independent banks is more in favor.

The postal savings-bank system has attained a high development in Austria-Hungary. Besides the savings department proper, in which deposits are accepted for the smallest amounts, there is a check department, in which the minimum deposits are fixed at $40. The use of the post office as a banking institution has proved of inestimable benefit to the business community. The postal savings department has been converted into a gigantic clearing house for the entire country. The number of postal savings banks in Austria increased from 5562 in 1896 to 6913 in 1911; the number of depositors in the savings department proper increased during the same period from 1,174,902 to 2,371,732; and the total deposits at the end of 1911 amounted to 671,197,509 kronen. The number of postal savings banks in Hungary increased from 3983 in 1895 to 4555 in 1911; the number of depositors increased during the same period from 276,565 to 823,251; and the total deposits at the end of 1911 were 116,522,000 kronen. The private savings banks of Austria increased from 488 in 1895 to 669 in 1911; depositors at end of 1911, 4,262,108; deposits, 6,045,174 kronen. Private savings (and some other) banks in Hungary numbered 1984 at the end of 1911, with 1,143,853 creditors and deposits amounting to 3,841,734,000 kronen (exclusive of 867,238,000 kronen on account current).

Education. Owing to the diversity of race and language which prevails in the various crownlands of Austria, the system of public edu-

cation presents many differences. In general, the organization and management of all public institutions of learning in Austria (Cisleithania) are left to the provincial authorities; but these are required to conform to a uniform scheme of instruction established by act of the Imperial Reichsrat and applied by the Minister of Public Instruction. School administration is under the supervision of local, district, and provincial boards, and district and provincial inspectors. The features common to all the crownlands are the division of educational institutions into primary, secondary, and higher schools, and the very low cost at which instruction in schools of all grades is imparted. Characteristic, too, of all the Austrian crownlands is the high degree of excellence which technical education has attained. The care of primary instruction is incumbent on the local communities, and attendance is compulsory at the primary schools between the ages of 6 and 14 (except in Carniola, Istria, Dalmatia, and Galicia, 6 to 12; and in Bukowina, 6 to 13). The course of instruction includes, besides the ordinary branches, the subjects of religion, physical training, and, in the case of girls, domestic science. In 1893 the number of national schools and grammar schools (*Volksschule, Bürgerschule*) in Cisleithania, in which elementary education was imparted, was 18,807, with a teaching force of 67,354 men and women and an enrollment of 3,160,837 pupils. At the end of 1910 there were 23,847 elementary schools (including 1245 private schools), with 108,006 teachers and 4,520,138 pupils; children of school age, 4,818,870.

Above the elementary schools are the *Gymnasia* and the *Realschulen*, offering courses of eight and seven years respectively. The *Gymnasia* prepare for the universities, the *Realschulen* for the technological institutes. For the support of the secondary schools, the state, the provinces, and the larger communes coöperate. In 1896 there were 182 *Gymnasia*, with a teaching staff of 3699 and an attendance of 59,975, and 84 *Realschulen*, with 1579 teachers and 26,429 students. In 1913 the number of *Gymnasia* was 343, and the enrollment 108,838, while the *Realschulen* had increased to 148 in number, with 49,151 students. Universities of Cisleithania, eight in number, supported by the state, are located at Vienna, Prague (two, German and Czech), Graz, Innsbruck, Cracow, Lemberg, and Czernowitz. Each comprises faculties of theology, jurisprudence and political science, medicine, and philosophy. The universities at Vienna and Cracow and the German university at Prague date back to the fourteenth century; and of these the first ranks among the foremost universities of the world, especially as to its faculty of medicine. In 1893 the number of professors and tutors in all these universities was 1140 and the number of students 13,528. In the winter of 1912–13 the combined faculties included 1900 teachers and the students numbered 30,591, of whom 2624, or 8.5 per cent, were women. In 1909–10 there were 49 theological colleges (of which 43 were Roman Catholic) with a total of 1941 students. Of the technological institutions, the most important are the seven state high schools at Vienna, Prague (two), Graz, Brünn (two), and Lemberg; the agricultural high school at Vienna, and mining academies at Leoben and Přibram. In addition, there are numerous schools of agriculture, forestry, and mining, industrial schools, military and naval academies, and schools of fine arts and music. In all, the special schools of Austria in 1909–10 numbered 5721, with 381,702 students. General culture is highest in the German-speaking crownlands (Bohemia included) and lowest among the Slavic races of Dalmatia, Galicia, and Bukowina.

Of learned societies, libraries, museums, and art galleries there is a very great number, the most prominent of which are the imperial academies of science at Vienna, Prague, and Cracow. The Imperial Library at Vienna possesses 900,000 volumes, and the library of the University of Vienna nearly 600,000. The periodical press increased in number from 2137 publications in 1894 to 3149 in 1903.

The educational system of Hungary is similar in its general outline to that of Austria, but differs from it in the greater uniformity of organization, due to the preponderating influence of the Magyar element in the population. The persistent attempt to make Magyar the exclusive language in the public schools has been a marked feature of educational policy in Hungary proper in recent years. Attendance at the elementary schools, grammar schools, and the so-called repetition courses (which three classes comprise the "primary" schools) is compulsory for all children between the ages of 6 and 15, and it is incumbent on all communes to provide, generally with the aid of the state, adequate facilities for elementary instruction. In 1894 the number of primary schools was 16,881, and the enrollment of pupils 2,270,584, or nearly 80 per cent of all children of school age. In 1910–11 there were 19,339 primary schools, with 47,487 teachers and 2,938,091 pupils; children of school age, 3,545,014. The *Gymnasia* and the *Realschulen*, which offer courses of eight years in preparation for the universities and technical schools, are supported by the communes, by the state, or partly by both. In 1894 there were 186 of these secondary schools, with a staff of 3230 instructors and 51,228 students. In 1910–11 there were 187 *Gymnasia*, with 3882 teachers and 63,544 students; and 42 *Realschulen*, with 1020 teachers and 14,072 students. The state maintains five universities, at Budapest, Kolozsvár (Klausenburg), Zágráb (Agram), Pozsony (Pressburg), and Debreczen, each with faculties of theology, law, medicine (except Zágráb), and philosophy. The universities of Pozsony and Debreczen were founded in 1912; the other three had, in 1911, 652 professors and 10,222 students (of whom 422 and 6858 at Budapest). Other institutions included the technical high school at Budapest, with 160 teachers and 1676 students; 49 theological colleges (29 Roman Catholic), 330 and 2153; numerous industrial schools, etc., with 9210 teachers and 143,290 students. The number of pupils in the elementary schools (included above in the primary schools) was 2,159,696. From 1903 to 1911 the number of periodicals increased from 1483 to 2019, of which 1493 were in Hungarian and 153 in German.

Government. The Austro-Hungarian monarchy is composed of the Empire of Austria and the Kingdom of Hungary (and Bosnia and the Herzegovina, former Turkish provinces annexed in 1908); it is a loose union of two independent states. The essential bond between them is their possession of a common ruler; the crown of both is hereditary in the House of Hapsburg-Lorraine, and the Emperor of Austria is at the same time

Apostolic King of Hungary. He is crowned at both Vienna and Budapest. The present dual system was adopted by the *Ausgleich* (agreement) of 1867, when the two countries, while retaining their complete independence in domestic affairs, agreed to establish a common administration for certain matters of state. Also by this *Ausgleich* (which is a general name for several treaties dealing with different subjects adopted at about the same time) Austria and Hungary were constituted a customs union, pledged to a common commercial policy, with a common coinage and system of weights and measures, a joint bank of issue, and a uniform control of monopolies and interstate railways. The departments of state common to both countries are those of finance, war, and foreign affairs, and in the functions delegated to the last two, there is apparent a general tendency to grant as little as possible to the common administration and to keep as much as possible for the national executive. The Minister of Foreign Affairs is charged with the supervision of the Emperor-King's household and with the maintenance of the diplomatic and consular service. The Minister of War is concerned chiefly with the organization and training of the troops, since recruiting and the regulation of the terms of service are left to the two parliaments. The duties of the Minister of Finance are confined to the administration of the customs, the balancing of accounts for the two other ministries, and the administration of the dependent territory of Bosnia and the Herzegovina. The proportion of the common expenses to be borne by the two countries is determined, according to the *Ausgleich*, every 10 years. In 1907 the agreement was renewed for 10 years, providing that the net proceeds of the common customs be applied to the common expenditure, and the remaining expenditure be satisfied by Austria in the proportion of 63.6 per cent and by Hungary 36.4 per cent. The former proportion was 65.6 for Austria and 34.4 for Hungary.

Practically all legislation necessary to render the work of the common departments efficacious, rests with the Austrian and Hungarian parliaments, but the ministries are controlled directly by two bodies known as the delegations, representing the parliaments of the two countries. Each delegation consists of 60 members, 20 of whom are elected by the Upper House and 40 by the Lower House. The delegations assemble at Vienna and at Budapest in alternate years, and deliberate apart, communicating only in writing. If they arrive at no agreement after three interchanges, they meet as one body and vote without debate. Evidently the system of dual government is not only cumbersome, but precarious, in that it depends for its continuance on the mutual good will of two contracting parties, each of whom keeps a jealous watch against the least ascendency on the part of the other. The activity of the common ministries is dependent on concurrent legislation by the Austrian and Hungarian parliaments; a refusal on the part of either to vote its proportion of the common expenses or its quota of troops may instantly paralyze the financial and defensive powers of the monarchy; and that such action is not at all improbable was shown in 1897, when that part of the *Ausgleich* establishing a customs union failed of renewal and was replaced by a reciprocity treaty later.

The Austrian Empire comprises the 17 crownlands represented in the Reichsrat (Parliament) at Vienna. Of these territorial divisions, diverse in race, language, and history, some, like Bohemia, Galicia, and Dalmatia, are titular kingdoms of which the Austrian Emperor is King; some, like Styria, Carniola, Upper Austria, and Lower Austria, are duchies or archduchies; the rest (except the free city of Triest) are variously designated principalities. As a result of this combination of sectionalism, based on ethnographical distinctions, with the personal rule of one man, the Empire partakes at the same time of the character of a federal state and of a centralized monarchy. The element of racial diversity influences also the relations between the crown and the legislative bodies. Parliamentary government, in spite of presenting practically all the outward forms it bears in England, for instance, has not attained anything like full development, for the reason that the various parties in the Parliament have not as yet been able to unite permanently in either supporting or opposing the crown. By playing off the different factions against each other, the Emperor has succeeded in retaining the balance of power, and in making the ministers his servants, though in law they are responsible to the Parliament. At the same time such incidents as the blocking of all legislation for months at a time—a thing which happens frequently in the strife of parties—afford him an opportunity for exercising his extra-constitutional powers in the matter of promulgating ordinances and decrees.

The constitution of Cisleithania is based, among other statutes, on the Pragmatic Sanction of 1713, on the patents of 1860 and 1861, and chiefly on the Fundamental Law of Dec. 21, 1867. It may be suspended at any time by a two-thirds vote of both houses of the Reichsrat. The Emperor is the source of law and justice; he legislates concurrently with the Reichsrat for Cisleithania and with the provincial diets (*Landtage*) for the crownlands. He has the power to make treaties, issue ordinances, grant pardons, appoint officials, and to summon, prorogue, and dissolve the legislatures. Through his ministers he may initiate legislation. In case of necessity he may suspend the constitution and legislate provisionally by ordinance. Every act of his, however, must be countersigned by a minister, and his extra-constitutional decrees must be countersigned by the entire ministerial Council.

The Reichsrat consists of a House of Lords (*Herrenhaus*) and a House of Representatives (*Abgeordnetenhaus*). The House of Lords, or Upper House, consisted in 1911 of 15 members of the Imperial family, 81 persons holding their seats by hereditary right, 5 archbishops and 8 bishops of princely rank, 5 untitled archbishops and 169 life members. The Lower House consists of 516 members, elected (under the law of 1907) by the equal and direct suffrage of all male citizens over 24 years of age. The representation of the different provinces in the Lower House of the Reichsrat is as follows: Lower Austria, 64; Upper Austria, 22; Bohemia, 130; Bukowina, 14; Carinthia, 10; Carniola, 12; Dalmatia, 11; Galicia, 106; Görz and Gradisca, 6; Istria, 6; Moravia, 49; Salzburg, 7; Silesia, 15; Styria, 30; Tirol, 25; Triest, 5; Vorarlberg, 4.

The Reichsrat assembles annually. The con-

sent of both houses is necessary to all treaties relating to commerce or necessitating the imposition of taxes as well as to all statutes and appropriations. Bills may originate in either house, but the annual budget and the recruiting bill fixing the quota of troops for the year must be presented to the Lower House first. Concerning the position of the Reichsrat in respect to the executive, something has been said above; its relation to the provincial diets may be summed up in the statement that the latter are vested with the power of legislation on all subjects not reserved to the Reichsrat, and that the matters so reserved are very numerous, including any interest that may concern two or more crownlands in common. In greater detail, the scope of the Reichsrat includes, in addition to those mentioned, the subjects of customs, coinage, communications, banking, corporations and trade, citizenship, domicile and census, religion and the right of association, the press and copyright, the general policy of public instruction, judicial legislation, and the organization of the executive and judicial departments.

The administrative work of the general government is divided into nine departments, comprising the ministries of the Interior, Finance, Defense, Agriculture, Railways, Justice, Commerce, Instruction and Worship, and Public Works. The heads of the nine departments, together with the premier and a minister without portfolio, constitute the ministerial Council. The civil service in Austria is characterized by its freedom from politics, elaborate automatism, and its marked tendency to intrude on the private life of the citizen. Though the Austrian constitution embodies a comprehensive bill of rights, acts which in their nature are serious limitations of the rights of the citizen are frequently justified as being embraced within the legitimate exercise of the police power. The constitutional restraints on the freedom of speech and of the press, and the right of association, are considerable, and their interpretation is left largely to executive officials.

Provincial Diets and Local Government.—The provincial diets of Cisleithania are in many cases the ancient assemblies, established in the different provinces before they were brought under one rule; the diets, therefore, are the rallying grounds of national parties, and in a way the internal political condition of Austria is affected as much by the attitude of the various provincial legislatures towards the general problems of government as by the relations of parties in the Reichsrat. The diets are unicameral, and comprise (1) the archbishops and bishops of the Roman Catholic and Greek Orthodox churches and the rectors of the universities within the crownland, and (2) the representatives of landed proprietors and the Chambers of Commerce, and the members elected by the rural communities and the towns. The size of the diets varies from 242 members in Bohemia to 26 members in Vorarlberg. The president of the assembly is appointed by the Emperor, who through this officer, as well as through the exercise of the right of prorogation and dissolution, exerts very considerable influence on the legislative bodies. The authority of the provincial assembly extends to questions of local government and local taxation, agriculture and public works, the control of the territorial domains, and the management of secondary schools and charitable institutions. The executive power is vested in a committee (*Landesausschuss*), consisting of a president appointed by the Emperor and a certain number of members elected by the diet.

For administrative purposes, each crownland constitutes a department (*Landesregierung*) under a governor (*Statthalter* or *Landespräsident*) appointed by the Emperor. The *Landesregierung* is subdivided into districts (*Bezirkshauptmannschaften*) and communes (*Gemeinden*). The police, as well as the civil power, is vested in the governor. He presides over the boards of education and of health and controls directly the magistrates of the towns and the heads (*Bezirkhauptmänner*) of the districts. There is no uniform municipal code in Austria, each provincial diet having the power to model the municipal government after its own fashion. But within each crownland there is perfect uniformity of administration except for some of the largest cities, such as Vienna, Prague, etc., which are governed under special charters. The common features of all the municipalities in Austria include a *Gemeindeausschuss*, or municipal council, elected generally for a period of three years by the members of the commune, and a *Gemeindevorstand*, or executive board, elected by the council. This board consists of a small number of men under the presidency of the burgomaster and carries out the decisions of the council.

Justice is administered in the first instance by 962 district courts, which try minor offenses and misdemeanors and hold prisoners for the higher tribunals. For the trial of more serious charges, there are 71 provincial and circuit courts of original jurisdiction. Cases involving severe penalties, or concerned with political and press offenses, are brought before the jury courts. Appeals are taken to the higher provincial courts, 9 in number. The court of last resort is the Supreme Court of Justice and Court of Cassation at Vienna. There are also numerous courts for the trial of special matters, such as commercial, revenue, and military cases. The Court of the Empire at Vienna decides questions of jurisdiction and cases involving conflict of laws. Before the High Court of Administration are brought all controversies between private citizens and public officials.

The *Kingdom of Hungary* comprises Hungary proper and Croatia and Slavonia. (Transylvania was formerly, and is still sometimes, not regarded as a part of "Hungary proper.") The constitution of the Kingdom is based on a series of statutes beginning with the Golden Bull of 1222, the charter of Hungarian liberties. The fundamental law of June 8, 1867, confirmed the sweeping reforms which the Revolutionists of 1848 had effected in abolishing old feudal privileges, extending the suffrage, and reconstructing institutions on a modern basis. Subsequent legislation has modified the constitution only in matters of detail and procedure. The King is bound by the same constitutional limitations as in his Austrian dominions; but, by reason of the greater homogeneity of the Lower House of the Hungarian Parliament, does not exercise so great an influence in its deliberations as over those of the Austrian Reichsrat. As in Austria, decrees must be countersigned by a responsible minister to acquire validity. The Hungarian Parliament is composed of an Upper House—the Table of Magnates—and a

Lower House—the House of Representatives. The Table of Magnates in 1906 consisted of 15 members of the royal family, 38 archbishops, bishops, and other dignitaries of the Roman Catholic and Orthodox Greek churches, 12 representatives of the Protestant churches, 229 hereditary peers, 60 life peers, 17 high officers of state, holding their seats ex officio, and 3 delegates from Croatia and Slavonia. The House of Representatives, which is chosen by the entire male population over the age of 20 (the qualifications being the payment of a small direct tax or the possession of a certain income), consists of 453 members (413 from Hungary and 40 from Croatia and Slavonia), elected for a period of five years. In the parliamentary scheme the Table of Magnates plays an important part. The majority of its members are great landowners, possessing extensive influence in the country, and as such often enter into opposition to the popular chamber. In the Parliament as a whole, the Magyar element is strongly predominant, and of the Magyars it is the gentry, or minor nobility, that make up the bulk of the House of Representatives and are the controlling political power of the country. The establishment of the Magyar supremacy has been steadfastly pursued in all walks of public life, and the Magyar language is the only recognized language in the courts and schools of Hungary proper, in the army, etc. Although the other races combined outnumber the Magyars, the only race that has received recognition from the Magyars is the Slavic race of Croatia and Slavonia. The Hungarian Parliament legislates for Hungary and for all affairs that are common to Hungary and Croatia and Slavonia. For purposes of local legislation—i.e., for such matters as agriculture, education, police, and many features of civil and criminal law—Croatia and Slavonia have a diet consisting of 7 ecclesiastical dignitaries, 26 peers and officers of state, and 90 representatives of the rural communes and towns.

The executive power in the Kingdom of Hungary is vested in a cabinet consisting of 9 ministers and a minister-president. The 9 ministers are those of (1) Finance, (2) Interior, (3) Agriculture, (4) Industry and Commerce, (5) Defense, (6) Justice, (7) Education and Public Worship, (8) Minister for Croatia and Slavonia, (9) Minister *ad latus*—i.e., near the person of the King. The ministers are responsible to Parliament. The chief executive in Croatia and Slavonia is the *Ban*, who stands under the control of the Hungarian ministers. Hungary proper (including Transylvania) is divided into 63 counties, at the head of each of which is a govèrnor (German *Obergespan*), and 27 independent municipalities ("cities with municipal rights," or the "royal free cities"). The counties are subdivided into 111 incorporated towns, governed by magistrates, and 410 presidencies (*Stuhlrichterämter*), and the presidencies are further portioned out into greater and smaller communes. In these ultimate units the representative body is composed, half of deputies, elected by all males over the age of 20, paying a small tax, and half of the highest taxpayers in the communes. The executive power rests with a council appointed for varying terms in the rural and town communes. The presidencies have no legislatures, but are mere administrative divisions.

Local Government. The legislative bodies in the counties are elected by the qualified parliamentary electors of the district, and the *Obergespan* is assisted by a committee or council appointed for 10 years. In the degree of self-government the municipalities rank with the counties. Their representative bodies are created in the same manner as those of the communes, and they have their councils and magistrates. Croatia and Slavonia contain 8 counties, 4 cities with municipal rights, and 13 free cities. The counties are subdivided into communes, rural and urban, similar in their government to those of Hungary proper. The county legislatures are composed of representatives chosen by the parliamentary electors, of committees representing the municipalities and communes, and of the higher county officials.

Justice. In Hungary the tribunals exercising original jurisdiction comprise 458 district courts for the trial of misdemeanors, 76 circuit courts for the hearing of criminal charges and important civil cases, and 15 jury courts for the trial of press offenses. Appeals from the lower courts rest with the 12 Royal Tables of Justice, and in the final instance with the Royal Curia at Budapest, in Hungary, and the Supreme Court of Justice at Agram, in Croatia and Slavonia. There are besides a tribunal of Commerce and Exchange at Budapest, a Court of Admiralty at Fiume, a Central Court of Land Registry, and a Supreme Court of Discipline for military cases.

Finance. The cost of the administration of the "common affairs" of the Austro-Hungarian monarchy is borne by both states in a proportion agreed on by the two parliaments and sanctioned by the Emperor-King. According to the constitution, the agreement is renewable every 10 years. It expired in 1897, without an understanding having been reached. An arrangement, however, was finally effected whereby the proceeds of the common customs were applied to the common expenditure, and the remainder covered by Austria and Hungary in the proportion of 65.6 per cent and 34.4 per cent respectively. In 1907 the agreement was renewed for 10 years by the parliaments, Austria paying 63.6 and Hungary 36.4 per cent of the common expenses after the application of the proceeds of the common customs. Of the total charges 2 per cent is first debited to Hungary on account of the incorporation with it of the former military frontier. In 1905 the common expenditure was 438,070,000 kronen; in 1907, 433,529,000; in 1908, 514,376,000; in 1909, 643,578,000. Net receipts in the two latter years were 169,931,000 and 197,380,000 kronen; the net expenditure for 1908 was satisfied by Austria in the sum of 219,067,000 kronen and Hungary 125,378,000 kronen; for 1909, Austria 283,481,000, and Hungary 162,198,000. The provisional budget for 1913 showed an estimated expenditure of 503,974,188 kronen (of which 404,754,769 for the army and 74,757,210 for the navy); estimated net receipts from customs, 197,704,169 kronen.

In Austria revenue and expenditure have been as follows, in thousands of kronen:

	1907	1908	1909	1910
Revenue	2,253,052	2,388,384	2,883,648	2,895,492
Expenditure	2,209,093	2,373,894	2,795,703	2,901,364

For 1912 the Austrian budget showed a revenue of 2,916,685,263 kronen (2,770,393,164 ordinary, and 146,597,180 extraordinary; expenditure 2,916,685,263 kronen (2,668,097,637 ordinary and 248,007,626 extraordinary). The larger items of estimated revenue were: railways, 822,584,010 kronen; excise, 391,947,100; direct taxes, 379,790,000; tobacco monopoly, 318,258,100; posts and telegraphs, 201,305,500. The larger estimated expenditures for 1912: railways, 637,566,780 kronen ordinary and 124,617,930 extraordinary; finance, 861,085,365 and 5,441,700 (including 505,797,962 for the public debt); common expense of the monarchy, 338,107,811 and 8,080,126; posts and telegraphs, 162,072,820 and 17,211,720; worship and public instruction, 105,117,244 and 8,196,440.

In Hungary revenue and expenditure have been as follows, in thousands of kronen:

	1907	1908	1909	1910
Revenue	1,395,711	1,531,368	1,750,783	2,074,549
Expenditure	1,399,477	1,616,245	1,721,564	1,901,666

In 1910 the ordinary revenue in Hungary amounted to 1,543,102,641 kronen; ordinary expenditure, 1,418,776,584; and total expenditure included 149,444,732 kronen for sinking fund. The budget for 1912 showed revenue 1,852,747,661 kronen (1,667,091,211 ordinary and 185,656,450 extraordinary); expenditure, 1,852,694,998 kronen (including 1,580,378,496 ordinary and 168,877,261 kronen for sinking fund). The larger items of estimated ordinary revenue for 1912 were: railways, 427,000,000 kronen; direct taxes, 287,010,000; excise, 270,000,000; tobacco monopoly, 185,267,000; posts and telegraphs, 95,545,000. The larger estimated ordinary expenditures, 1912: Ministry of Commerce, 430,221,650 kronen; Ministry of Finance, 249,592,018; Hungarian debt, 219,642,197; Ministry of the Interior, 101,112,054.

The public debt of Austria-Hungary is extremely large. By the agreement of 1867 the separate debts of the two countries were consolidated into a common debt of the monarchy. Since 1868 the new debts contracted by the two countries have been kept distinct, and interest paid out of the separate revenues of Austria and Hungary. While the common debt has been somewhat decreased, although very slowly, the separate debts have gone on increasing from year to year, until now they have grown to tremendous proportions, proving a great drain on the resources of the people. In 1887 the total indebtedness of the monarchy exceeded $2,114,000,000; in 1905 it had increased to $2,849,300,000; and in 1912 to about $3,746,000,000. On Jan. 1, 1912, the common debt amounted to 5,179,043,911 kronen. The Austrian debt on the same date was 7,061,628,314 kronen (of which 6,711,294,746 consolidated). Hungarian debt in 1910, 6,245,326,119 kronen (of which 4,083,872,000 consolidated). It should be noted that a considerable part of the Austrian and Hungarian debts has been incurred in the purchase or construction of railways and telegraphs.

Army. Since 1866 the armies of Austria-Hungary have been organized on what is practically a Prussian basis. The dual character of the Austro-Hungarian monarchy has greatly influenced the formation of the imperial army, since each state enjoys its own peculiar constitution and system of representation. Military service is universal in both Austria and Hungary. The forces are organized into the regular or common army, which may be reinforced by the Austrian Landwehr and the Hungarian Honvédség, followed by a Lausturm or levy-en-masse of each state, under the provisions of the Act of July 5, 1912, and earlier laws providing for compulsory service from the nineteenth to the end of the forty-second year. By the new law 2 years instead of 3 are spent with the colors, except in the case of cavalry, and 10 years in the reserve. Both common army and auxiliaries possess an *Ersatz*, or supplementary reserve, which includes conscripts not required for the regular army. Here the men are called out for varying short periods of training annually. The imperial ministry of war is the supreme nucleus of the entire military power. It is divided into 4 sections, which comprise 15 departments, and in which are united the different branches of the personnel of the organization, distribution of troops, administration, etc. Bosnia and the Herzegovina are organized similarly to Austria and Hungary. The yearly contingent of recruits, as provided under the law of 1912, was as follows: for the common army, 159,500 (of which 6000 were for the navy), for the Austrian Landwehr, 26,996; Tirol, 1023; for the Hungarian Honvédség, 25,000, and for the Bosnian troops, 7763, or a total of 220,282 men. From an annual enrollment of about 500,000 in 1912 about 170,000 recruits were put under training. The peace strength as stated in the budget for 1912 was as follows:

Peace strength	Officers	Men
Common army	23,256	313,081
Austrian Landwehr	4,650	45,397
Hungarian Honvédség	4,092	33,329
Bosnian-Herzegovinian forces	406	6,212

The application of the law of 1912 would, it was believed, provide for a war strength as follows:

War strength	Men
Common army	1,360,000
Austrian Landwehr	240,000
Hungarian Honvédség	220,000

In addition there would be the Landsturm, raising the total to over 4,000,000. The infantry is armed with the Mannlicher magazine rifle. The army is divided into 16 army corps, corresponding to appropriate territorial commands, with headquarters as follows: (1) Cracow; (2) Vienna; (3) Graz; (4) Budapest; (5) Pozsony; (6) Kassa (Kaschau); (7) Temesvár; (8) Prague; (9) Josefstadt; (10) Przemyśl; (11) Lemberg; (12) Nagyszeben (Hermannstadt); (13) Zágráb (Agram); (14); Innsbruck; (15) Sarajevo; (16) Ragusa. The following table gives the strength of the army on peace footing for 1912:

PEACE ESTABLISHMENT

COMMON ARMY, AUSTRIAN LANDWEHR, AND HUNGARIAN HONVÉDSÉG

Common army—	Officers, Officials	All other ranks	Horses
Staff and Establishments	6,420	13,302	1,005
Infantry — 102 reg'ts of 4 battalions and 102 depot cadres	10,806	158,194	2,395
4 reg'ts of Tyrolese Jägers of 4 battalions, and 4 depot cadres, and 26 independent Jäger battalions	1,239	16,130	242
4 Bosnian-Herzegovinian reg'ts of 4 battalions and 1 Jäger battalion	441	6,785	42
Total infantry	12,486	181,109	2,679
Cavalry — 42 reg'ts of 6 squadrons and 42 depots	2,049	43,915	40,909
Field artillery (including horse, howitzer, and mountain batteries)	2,339	31,413	16,724
Fortress artillery — 6 reg'ts (14 batt's) and 7 ind. batt's	544	8,149	27
Pioneers (Engineers) 15 batt's	525	8,506	15
Railway and other technical troops	136	1,591	4
Medical corps	106	3,039	....
Train 16 independent divisions and 16 depot cadres	517	5,202	3,895
Total common army	25,172	296,126	65,258
Austrian Landwehr — Infantry, 40 regiments	4,415	37,454	1,737
Cavalry, 6 reg'ts and 5 squadrons	379	3,946	3,155
Artillery, 16 battalions	162	1,964	923
Total	4,956	43,364	5,815
Hungarian Honvédség — Infantry, 28 regiments and depot cadres	3,721	24,063	599
Cavalry, 10 regiments and depot cadres	469	4,517	4,872
Total	4,190	28,580	5,471
Total peace establishment	34,318	368,070	76,544

Weights, Measures, and Money. The metric system is in vogue throughout the monarchy. The monetary system is on the gold basis. The unit of value is the krone (crown)—equal to one-half of the old gulden or florin—and worth 20.263 cents United States money. A krone has 100 heller, the heller being equal to one-half kreuzer, the coin formerly in vogue.

Population. The growth of population from 1850 to 1910 was as follows:

Year	Austria	Hungary	Total
1850	17,534,950	13,191,533	30,726,483
1857	18,224,500	13,768,513	31,993,013
1869	20,394,980	15,509,455	35,904,435
1880	22,144,244	15,695,184	37,839,428
1890	23,895,413	17,463,791	41,359,204
1900	26,150,708	19,254,559	45,405,267
1910	28,571,934	20,886,487	49,458,421

(For figures of population by crownlands, see first table of this article.)

In Austria the 1910 census returned the number of Roman Catholics at 22,530,169 (78.85 per cent of the total population); Greek Catholics, 3,417,223 (11.96); Jews, 1,313,687 (4.60); Greek Orthodox, 666,458 (2.33); Evangelicals (Augsburg), 444,307 (1.55); Evangelicals (Helvetian), 144,379 (0.50); Old Catholics, 21,288. In Hungary (exclusive of Croatia and Slavonia) Roman Catholics numbered (1910) 9,010,305 (49.3 per cent); Reformed, 2,603,381 (14.3); Greek Orthodox, 2,333,979 (12.8); Greek Catholics, 2,007,916 (11.0); Evangelicals (Augsburg), 1,306,384 (7.1); Jews, 911,227 (5.0); Unitarians, 74,275 (0.4). Roman Catholics in Croatia and Slavonia numbered 1,877,833 (71.6 per cent); Greek Orthodox, 653,184 (24.9); Evangelicals (Augsburg), 33,759 (1.8); Jews, 21,231 (0.8); Reformed, 17,948 (0.7); Greek Catholics, 17,592 (0.7). In the monarchy (including Bosnia and the Herzegovina) in 1910, the total number of Roman Catholics was 33,952,368; Greek and Armenian Catholics, 5,453,019; Greek Orthodox, 4,479,357; Evangelicals (Helvetian), 2,766,568; Jews, 2,258,013; Evangelicals (Augsburg), 1,790,304; others and without confession, 790,594 (the last figure includes in Bosnia and the Herzegovina 33,758 military not classified by religion and 612,137 Mohammedans).

In 1910 there were but five cities in Austria-Hungary having a population of over 200,000: Vienna, Budapest, Prague, Triest, Lemberg. The census of Dec. 31, 1910, showed the following populations for the larger cities: in Austria —Vienna, 2,031,498; Triest, 229,510; Prague, 223,741; Lemberg, 206,113; Graz, 151,886; Brünn, 125,737; Czernowitz, 87,128; Pilsen, 80,343; Königliche-Weinberge, 77,120; Žižkow, 72,173; Pola, 70,499; Linz, 67,817; Przemyśl, 54,562; Innsbruck, 53,194; Smichow, 51,791: in Hungary—Budapest, 880,371; Szeged, 118,328; Szabadka (Maria-Theresiopel), 94,610; Debreczin, 92,729; Zágráb (Agram), 79,038; Pozsony (Pressburg), 78,223; Temesvár, 72,555; Kecskemét, 66,834; Nagy-Várad (Grosswardein), 64,169; Arad, 63,166; Hódmezö-Vásárhely, 62,445; Kolozsvár (Klausenburg), 60,808; Ujpest (Neupest), 55,197; Miskolcz, 51,459; Pécs (Fünfkirchen), 49,822; Fiume, 49,806.

Birth and Death Rates. Both show the same tendency to decrease that is so prevalent throughout the civilized world, the former due to increased uncertainty of occupation and greater willingness on the part of the population to check births, and the latter due to improved sanitation and higher standards of living. In Austria the (living) birth rate in 1860 was 38.4 per 1000, death rate 27.0, excess of births over deaths 11.4; in 1870, 40.0, 29.6, and 10.4; in 1880, 38.0, 30.0, and 8.0; in 1890, 36.9, 29.6, and 7.3; in 1900, 37.4, 25.5, and 11.9; in 1909, 33.3, 22.9, and 10.4. The marriage rate was 8.29 in 1900 and 7.54 in 1909. The percentage of illegitimacy in 1890 was 15; in 1900, 13.7; in 1909, 12.3. In Hungary (including Croatia and Slavonia) the (living) birth rate in the period 1891–95 was 41.7, death rate 31.8, and average annual excess of births over deaths, 9.9; in 1896–1900, 39.4, 27.9, and 11.5; 1901–05, 37.4, 26.4, and 11; in 1905, 36.1, 28.1, and 8.0; in 1906–10, 36.8, 25.1, and 11.7; in 1910, 35.6, 23.5, and 12.1. The marriage rate was 8.8 in 1901 and 8.6 in 1910. The percentage of illegitimacy in 1891–95 was 9.0; in 1906–10, 9.7; in 1910, 9.6.

Emigration and Immigration. In the 20-year period of 1879–1898 about 900,000 people emigrated from Austria-Hungary to North and South America, of whom 818,310 went to North America, 41,210 to Brazil, and 25,000 to Argentina. During the five years from 1899 to 1903 the total number of emigrants was 766,168, the greater part (747,638) going to the

United States, and the remainder to Canada, Argentina, Brazil, etc. For 1906 the oversea emigration of Austria and Hungary (and, in parenthesis, of Austria) is stated at 313,167 (136,354); 1907, 386,528 (177,354); 1908, 102,795 (57,734); 1909, 250,530 (129,808); 1910, 267,831 (138,867). The emigrants leave chiefly for the United States—in 1909, 170,191; in 1910, 258,737. Immigration is small and principally comes from Germany, Rumania, and Servia.

Nationalities. The population of the Austro-Hungarian monarchy embraces a greater number of races, distinct in origin and language, than that of any other European country except Russia. The Slavs are the most numerous race, amounting to over 47 per cent of the whole population. Next in order come the Germans (over 23 per cent), then the Magyars (nearly 20 per cent), while the Rumanians (over 6 per cent) occupy the fourth place. The Slavs form the bulk of the population of Bohemia, Moravia, Galicia, Carniola, Dalmatia, Croatia, Slavonia, and the north of Hungary. The Slavs are split up into a number of nationalities, differing greatly in language, religion, culture, and manners; so that their seeming preponderance in the monarchy is lost. These nationalities include the Czechs (the most numerous of all) in Bohemia and Moravia, the Poles in Galicia, the Ruthenians in Galicia and northern Hungary, the Croats and Serbs in Croatia and Slavonia, the Slovaks mainly in northwestern Hungary, the Slovenes in Carniola, Styria, Görz and Gradisca, etc., and the Morlaks in Dalmatia. The Slavs constitute about 59 per cent of the population of Cisleithania, the Germans nearly 35 per cent. Germans are dispersed over the monarchy, predominating numerically in Upper and Lower Austria, Salzburg, Tirol and Vorarlberg, Styria, and Carinthia. The Magyars, or Hungarians proper, constitute slightly less than 20 per cent of the population of the monarchy, less than 55 per cent of that of Hungary proper, and less than 49 per cent of the Hungarian Kingdom. Over 14 per cent of the population of the Hungarian Kingdom consists of Rumanians, who constitute about 55 per cent of the people of Transylvania. In Bukowina the Rumanians constitute over 34 per cent of the population. The other Romanic peoples of Austria-Hungary are the Italians, inhabiting the south of Tirol, Istria, Triest, and Dalmatia; the Ladins, occupying some valleys in Tirol; and the Friauls about Görz, north of Triest. The number of Jews in the monarchy is stated at 2,258,013 (1910), or about 18 per cent of the total Jewish population of the globe. The Gypsies are estimated to number about 100,000. There are more than 10,000 Armenians scattered over the eastern half of the monarchy.

The statutes regulating the relations of state and church insure the sovereign certain rights arising from the dignity of his office, but the law insures religious liberty and the independence of the church from the state. There is no religious test as a qualification for the possession of civil and political rights, and liberty of conscience is secure. The religious bodies have a legal right to manage their own affairs and to possess funds, estates, or endowments for the purposes of worship, instruction, or charity. But they must first secure their legal recognition from the Minister of Ecclesiastical Affairs, which is granted to all sects whose doctrines and practices are not inimical to the laws of the state.

HISTORY

The nucleus of the dual monarchy was that part of the archduchy of Austria that lies south of the Danube and east of the Enns. In the earliest times, what is now the Archduchy of Austria was inhabited by the Taurisci, a Celtic people, and later by the Norici. After the conquest of the latter by the Romans (14 B.C.), the land south of the river became the Roman provinces of Noricum and Pannonia, in the latter of which was the municipal city of Vindobona (Vienna). Tirol formed part of Rhætia. All these boundaries were swept away by the irruption of the northern peoples, and the regions in question were occupied in succession, during the fifth and sixth centuries, by the Boii, Vandals, Suevi, Herules, Gepidæ, Goths, Huns, Longobards, and Avars. After the Longobards had settled in Italy, the Enns came, about 568, to be the boundary between the tribes of German origin and the Avars, a people who had come from the East. The Avars in 788 crossed the Enns and fell upon Bavaria, then part of the Frankish Empire; but Charlemagne drove them back (796) as far as the Raab and brought the district from the Enns to that river under his rule. He sent colonists, mostly Bavarians, into the new province and appointed a margrave over it. As the Franks gradually lost their power, the country was again invaded. It came into the possession of the Hungarians before 900, but was reconquered by Otho I in 955 and reunited with the German realm. See HUNGARY.

In 976 the Emperor Otho II appointed Leopold of Babenberg margrave of the reconquered province, and his dynasty ruled this frontier region of the Holy Roman Empire for 270 years. Their possession came to be known as Oesterreich, or Eastern Realm, a name Latinized into Austria. Under Henry Jasomirgott (1141–77) the Mark above the Enns was annexed to the lower Mark, the enlarged province raised to a duchy, and important privileges were conferred on the new Duke and his heirs. Duke Henry removed his capital from the Leopoldsberg to Vienna. He beautified the city, and began the building of the cathedral of St. Stephen. Under his successors Styria was united with Austria. Under Leopold VI, the Illustrious (1198–1230), the Austrian realm reached a high stage of prosperity. The Babenberg line became extinct with his successor, Frederick, who fell in battle with the Magyars (1246). An interregnum ensued. The Emperor Frederick II treated the duchy as a lapsed fief of the Empire, but claims to its possession were set up while the Empire was distracted by the contests between rival emperors. The states of Austria chose Ottakar, son of the King of Bohemia, as Duke in 1251; he became King of Bohemia in 1253, and in 1261 this powerful monarch made himself master of Styria. He subsequently, in 1269, came by inheritance into possession of Carinthia. Ottakar refused to acknowledge Rudolph of Hapsburg as Emperor, and a war ensued in which he was vanquished. He was compelled to give up Austria, Styria, and Carinthia to Rudolph. The struggle was soon renewed, and Ottakar lost his life in the battle on the Marchfeld (1278). Shortly afterward the Emperor (1282) conferred the duchies of Austria and Styria on his sons, Albert and Rudolph.

Fostered by the Hapsburg family policy, which was maintained for centuries without regard to its effect upon Germany, the power of Austria and the Hapsburgs grew together. Albert, while attempting to subdue the rebellious Swiss, was murdered near Rheinfelden (1308) by his nephew, John of Swabia, whom he had deprived of his hereditary possessions. Frederick the Handsome, one of his sons, was chosen (1314) by a party to the Imperial throne, but the election was contested, and he was defeated (1322) by his rival, Louis of Bavaria. The house of Hapsburg was already so powerful that it excited the jealousy of the German princes. Another of the sons of Albert, Leopold, was defeated at Morgarten (1315) in his attempt to reduce the Swiss cantons which had thrown off their allegiance under Albert I. At last, on the death of all his brothers, Albert II reunited the Austrian possessions. After his death (1358), two sons, Rudolph and Albert III successively followed in the Duchy of Austria. Another son, Leopold, held the other lands, but lost his life at Sempach (1386), in seeking to regain the Hapsburg possessions in Switzerland. From Albert and Leopold were derived the two ducal lines of Austria and Styria (the latter afterward subdivided into the lines of Styria and Tirol). During Albert III's reign, Tirol and other districts were acquired by Austria. After his death (1395) the dukedom was held by his son, Albert IV. Albert V, who succeeded his father in 1404, and who married the daughter of the Emperor Sigismund, was chosen successor to that monarch in Hungary and Bohemia and was at the same time raised to the dignity of Holy Roman Emperor, as Albert II (1438). The Imperial dignity was henceforth uninterruptedly held by the Hapsburgs, with the exception of one brief interval, down to the end of the Holy Roman Empire in 1806. With Ladislas, Albert's son, the Austrian line of the house became extinct (1457), and its possessions went to the Styrian line. To this line belonged the Emperor Frederick III, who made Austria an archduchy, of which he came into full possession after the death of Ladislas and of his own brother, Albert, in 1463.

In 1477 his son, Maxmilian I, married Mary of Burgundy, daughter of Charles the Bold, and thus acquired the opulent provinces of the Netherlands. Becoming Emperor on the death of his father (1493), he gave the government of the Netherlands to his son Philip, added to the Hapsburg patrimony by districts annexed from Bavaria and Venice, and quickly made Vienna an important centre of German art and science. The marriage of the Emperor's son, Philip, with Joanna of Spain placed the house of Hapsburg on the throne of Spain and the Indies. Philip died in 1506; and on the death of Maximilian I, in 1519, Philip's son, Charles I of Spain, more powerful by his hereditary possessions than any other monarch in Europe, was elected German Emperor as Charles V. On account of his large interests outside of Germany, Charles was required by the electors to sign an agreement (*Wahlkapitulation*) to the effect that he would not further the interests of Spain at the expense of the Empire; and this practice was continued with his successors. In 1521 Charles relinquished the sole sovereignty over the bulk of the old hereditary possessions of the house of Austria to his brother, Ferdinand (originally joint possessor with him), the founder of the Austrian branch of the house of Hapsburg, as distinguished from the Spanish. In 1556 Charles V abdicated the Imperial throne of Germany and was succeeded by Ferdinand I. Ferdinand had married the sister of Louis II of Hungary and Bohemia, and after the death of that King on the field of Mohács, where the Turks laid low the power of Hungary, Ferdinand was chosen to succeed him in Bohemia, and was also elected King by a part of the nobles in Hungary. John Zápolya, Waywode of Transylvania, was chosen King of Hungary by the National party, and was supported by Sultan Solyman the Magnificent, who established the Turkish sway over a great part of Hungary, and whose forces laid siege to Vienna in 1529. After contests extending over 20 years, Ferdinand was allowed to retain possession of Upper Hungary on condition of paying an annual tribute to the Sultan. On the death of Ferdinand I, in 1564, his eldest son, Maximilian II, received the Imperial crown, together with Austria, Hungary, and Bohemia; a second son, Ferdinand, received Tirol; a third, Charles, obtained Styria and Carinthia. Maximilian II was fond of peace, tolerant in religion, and a just ruler. He died in 1576, and of his five sons, the eldest, Rudolph II, who had been crowned King of Hungary and of Bohemia, succeeded him as Roman Emperor. Under him the possessions of the Archduke Ferdinand of Tirol, who had married Philippine Welser, the beautiful daughter of an Augsburg burgher, reverted to the other two lines, Ferdinand's children not being considered noble. Rudolph II adhered to the old feudal usages, and was an incapable sovereign, leaving everything to his ministers and the Jesuits. His war with the Porte and Transylvania brought him little credit; and the Protestants of Bohemia, oppressed by the Jesuits, extorted from him a charter of religious liberty. He died Jan. 20, 1612, having already relinquished Hungary, the Archduchy of Austria, and Moravia, in 1608, and Bohemia, in 1611, to his brother Matthias, who succeeded him as Roman Emperor. Matthias concluded a 20 years' peace with the Turks and had his cousin Ferdinand, son of the Archduke Charles of Styria, third son of Maximilian II, chosen King of Bohemia, Hungary, and of the Romans. Bohemia refused to acknowledge the new King, who was a fervent Catholic, and chose the Elector Palatine, Frederick V, the head of the Protestant Union, as King. The States of Austria and the Hungarians were also refractory. Matthias died March 30, 1619, and Ferdinand II became Roman Emperor. Ferdinand conquered Bohemia and suppressed Protestantism there with a relentless hand. The events of the reign of Ferdinand II will be found treated in the article on the Thirty Years' War. Bohemia's right of election of its king and its patent of religious liberty were withdrawn. The war closed (1648) under Ferdinand's son, Ferdinand III (1637–57), a more politic prince and a better financier. At the Peace of Westphalia (1648) Austria had to cede her possessions in Alsace to France. Ferdinand III's son and successor, Leopold I, provoked the Hungarians to rebellion by his severity. Tökölyi received aid from the Porte, and Kara Mustapha besieged Vienna (1683), which was rescued only by an army of Poles and Germans under John Sobieski and Charles of Lorraine, who inflicted a crushing defeat upon the Turks. In 1687 Leopold I forced the Hungarians to make their

kingdom hereditary in the Hapsburg family. Prince Eugene compelled the Porte (1699) to give up the country between the Danube and the Theiss and, in 1718, to cede other important territories to Hungary. On the death of Charles II, the last of the Hapsburg sovereigns in Spain, the Archduke Charles, second son of Leopold I, claimed the crown in opposition to Philip V, grandson of Louis XIV. This led to the war of the Spanish Succession, during which Leopold died, May 5, 1705. He was of sluggish, phlegmatic character and wholly under the influence of the Jesuits.

His eldest son and successor, Joseph I, continued the war. He died childless, April 17, 1711, and was succeeded by his brother, Charles VI. The Peace of Utrecht (1713) secured to Austria the Spanish Netherlands, Milan, Mantua, Naples, and Sardinia (exchanged for Sicily in 1720). A curtailment of territory, however, soon ensued. At the Peace of Vienna (1735), which ended the War of the Polish Succession, Charles VI had to give up Naples and Sicily to Don Carlos of Spain, and part of Milan to the King of Sardinia, receiving only Parma and Piacenza instead. He also lost at the Peace of Belgrade (1739) a great part of the fruits of Eugene's conquests, giving back to the Porte Belgrade and the adjoining Servian territories, as well as the parts of Wallachia and Bosnia that had belonged to Austria. The Emperor conceded all these points with a view of securing adhesion to the Pragmatic Sanction, conferring the succession on his daughter, Maria Theresa, an object to which his whole policy for years had been directed.

With his death (Oct. 20, 1740) the male line of the Hapsburgs was extinct, and Maria Theresa assumed the government. Counter-claimants appeared, and the War of the Austrian Succession broke out. Frederick II of Prussia revived an old claim of the Hohenzollerns to Silesia and conquered it. The Elector of Bavaria, who was supported by the power of France (England taking the part of Austria), assumed the title of Archduke of Austria, was crowned King of Bohemia at Linz and Prague, and elected Emperor as Charles VII (1742). A long period of warfare now followed. The Hungarians rallied to the support of their Queen; Maria Theresa's rival, Charles VII, died; her husband, Francis, Duke of Lorraine, was elected Emperor, and the Hapsburg monarchy remained. But Maria Theresa lost various Italian provinces to Spain, and at the close of the Seven Years' War Prussia retained Silesia. At the death of Francis (1765), his son, Joseph II, became Emperor, and joint-regent with his mother, of the hereditary states. Collateral branches of the house of Austria were planted by the younger sons of Maria Theresa, the Archduke Leopold of Tuscany and the Archduke Ferdinand, who married the heiress of Este (see MODENA). In the first partition of Poland (1772) Austria acquired Galicia and Lodomeria, and Bukowina was ceded by the Porte in 1777. Maria Theresa died on Nov. 29, 1780. Her administration had been distinguished by unwonted unity and vigor, both in home and foreign relations.

Joseph II, now sole ruler, was an active reformer in the spirit of the enlightened despotism of the times, though often rash and violent in his mode of proceeding. He introduced economy into every department, mitigated the censorship of the press, granted liberties and rights to Protestants, abolished 900 convents, and revised the school system. But his reforming zeal and passion for uniformity in the diverse countries composing his scattered realm excited opposition; the Netherlands rose in insurrection, and other disturbances broke out, which hastened his end (1790). He was succeeded in the hereditary Hapsburg dominions, as well as in the German Empire, by his brother, Leopold II, who pacified the Netherlands and Hungary. When the progress of the French Revolution had begun to threaten the political stability of Europe, Leopold entered into an alliance with Prussia against the Republican propaganda, but he died March 1, 1792, before the war began. This was declared by his son and successor, Francis, in the same year. (See FRANCE.) By the treaty of Campo Formio (1797) Austria lost Lombardy and the Netherlands, but received most of the territory of the extinguished Republic of Venice (including Venetian Istria and Dalmatia). The war with France was renewed in 1799 and ended by the Peace of Lunéville (1801). In 1805 Austria engaged in a fresh struggle with Napoleon, who vanquished her forces and those of Russia at Austerlitz, on December 2. In the Peace of Pressburg, December 26, Francis had to give up his Venetian dominions and to cede Tirol to Bavaria. On the establishment of the Confederation of the Rhine, Francis laid down the dignity of Roman Emperor, which his family had held for nearly 500 years. In 1809 Austria once more defied the might of Napoleon, but the battle of Wagram broke her power, and in the Peace of Schönbrunn (Vienna) she had to part with a large portion of the old hereditary dominions of the Hapsburgs.

The humiliating Peace of Vienna was followed (1810) by the marriage of Napoleon with the Archduchess Maria Louisa, daughter of the Emperor Francis; and in March, 1812, Napoleon and Francis entered into an alliance against Russia. This unnatural alliance ceased abruptly, when the Russian campaign of 1812 had broken the power of the French Emperor. In August, 1813, Austria joined the anti-Napoleonic coalition of England, Russia, Prussia, and Sweden. Francis I took an active part, and Austria obtained full indemnity for her losses at the close of the war. In the remodeling of the map of Europe that took place at the Congress of Vienna (1815), Austria was reinstated in the possession of Lombardy, the Venetian territories, Tirol, and the territories wrested from her by Napoleon in 1809. Belgium was constituted part of the Kingdom of the Netherlands. Ferdinand, the Emperor's uncle, was restored to the Grand Duchy of Tuscany, of which he had been dispossessed by Napoleon.

During the period of the Restoration, and until the Revolution of 1848, Austria, her course guided by the subtle and reactionary statesmanship of Prince Metternich, exercised a powerful influence in European affairs. The Holy Roman Empire had ceased to be even a name, but the presidency of the reorganized German Confederation had fallen to Austria, and her policy toward the Germanic States was that of "divide and rule." Austria, Russia, and Prussia were closely allied in the interests of reaction. Every constitutional movement was stifled, and every aspiration toward nationality by the peoples composing the heterogeneous Austrian domains

was rigidly repressed. But under his superficial calm, the internal condition of the Empire was approaching a crisis. The bureaucratic system of government and police supervision produced only irritation and discontent. The strife of nationalities became keener; but the policy of playing these nationalities off against one another no longer succeeded. The Polish insurrection, which led to the incorporation of Cracow with the monarchy (November, 1846), had turned into a frightful rising of the peasantry in Galicia against the nobles. In the meantime the opposition to Austrian rule in Italy and Hungary was becoming uncontrollable, while discontent was rife among the Slavs of Bohemia, and even the states of Lower Austria insisted on some share in the management of the realm. Francis I had been succeeded in 1835 by his son, Ferdinand I, but there was no change of policy. The revolutionary movement was already in full swing in Italy, when the fall of Louis Philippe shook Europe to its foundation (February, 1848). A host of petitions and addresses was followed, March 13, by a popular movement in Vienna, to which the government and military, after a feeble resistance, succumbed. Metternich resigned; the right of citizens to bear arms and the freedom of the press were granted; the Emperor promised to convoke a consultative assembly from all parts of the Empire. At the same time the opposition in Hungary had carried their demand for an independent and responsible ministry, and the Emperor was not in a position to withstand it. On March 18 the insurrection broke out at Milan, and Radetzky, the military commander, was forced to retire on Verona. Venice rose and drove out the Austrians. In Vienna the power passed into the hands of the National Guards and the Students' Legion, the court finding it necessary to take refuge at Innsbrück. An insurrection broke out in Prague, which was repressed with bloody severity by Prince Windischgrätz (June).

The power of Austria began to recover first in Italy. Radetzky thoroughly routed Charles Albert, King of Sardinia, at Custozza (July 25) and reconquered Lombardy. The next success met with was in Croatia. The opposition carried on by the Croats under their *Ban*, Jellachich, to Magyar domination, produced a conflict of nationalities which the Imperial government was able to use in the traditional Hapsburg way. On September 28 the Imperial Commissioner, Count Lamberg, who was sent by the Emperor to dissolve the Hungarian National Assembly, was murdered at Budapest. The Assembly continued its sittings, and appointed Kossuth president of the committee of defense. The advance of Jellachich, who had been made Imperial commander in Hungary, upon Budapest, was successfully met by the Hungarians. On October 6 a bloody insurrection broke out in Vienna. The arsenal was stormed, and the war minister, Latour, murdered; the court fled to Olmütz, a committee of safety was appointed, the armed populace organized, while the Diet wavered between loyalty and revolution. In the meantime the military forces had withdrawn from the capital, and joined Jellachich, in order to meet the Hungarians, who were advancing to the aid of the Viennese. Windischgrätz now approached with an army and declared Vienna in a state of siege. The attack began on October 23, and after a resistance of eight days the city was taken by storm. A number of revolutionary leaders were condemned and shot. The Diet met at Kremsir, in Moravia, and a new ministry was formed, headed by Prince Schwarzenberg. But the vigorous policy thought to be necessary for the restoration of order and advocated by the Archduchess Sophia (mother of Francis Joseph) was foreign to the easy nature of Ferdinand I. The Emperor abdicated, December 2, and his brother, the Archduke Francis Charles, renounced his claims to the throne in favor of his son, Francis Joseph, who was declared Emperor. The Diet, proving intractable, was dissolved in March, 1849, and a constitution was granted providing for two elective chambers and a responsible ministry. The monarchy was reconstituted into a unified realm and the national autonomy of Hungary abrogated. At the same time, in the German National Parliament at Frankfort, Austria opposed the project of a confederated state or an empire under the leadership of Prussia. In Italy, on March 23, 1849, Radetzky inflicted upon Sardinia the decisive defeat of Novara, which was followed by the abdication of Charles Albert. The struggle in Italy was terminated in the following August by the surrender of Venice to the Austrians.

During the winter of 1848–49 the Hungarians had been gathering strength beyond the Theiss to meet the attack of Windischgrätz, who had entered Hungary in December, and whose advance had compelled the Hungarians to evacuate Budapest in January. On the opening of the spring campaign they took the offensive and were at first successful. Windischgrätz was succeeded in command by Welden, but the Imperial cause was not improved. The Diet at Debreczin proclaimed Hungary a republic, with Kossuth as governor; but Russian assistance at last enabled the Austrians to turn the tide. Kossuth resigned the civil and military power into the hands of Görgei, who laid down his arms to the Russians at Világos (Aug. 13, 1849). The surrender of Komorn, in September, completed the subjugation of Hungary, which was treated as a conquered country, and the captured patriots were dealt with by Haynau, who had succeeded Welden, with bloodthirsty rigor.

This completed the subjugation of the nationalities, and the spirit of the restoration soon showed itself. One important fruit only of the revolution remained—the abolition of feudalism. For a time the forms of the constitution of March, 1849, were retained; but the rigorous military government, and the surveillance exercised over the press, showed the real spirit of the new régime. Ultramontane influences were rampant. Finally, Jan. 1, 1852, it was announced that the constitution and the fundamental rights were abolished, trial by jury set aside, and the old press law revived. This was followed by still greater concessions to the clergy. For 10 years Austria persisted in her policy of reaction, undeterred by its paralyzing effect on the economic life of the nation or by the signs of impending revolution.

When the Eastern war broke out (1853–56), Austria's peculiar relations to Russia led her to remain neutral during the contest; but it was an armed neutrality, which silently warned Russia against aggressions on the Danube.

The unceasing movements in Germany and Italy toward national unity finally forced Austria out of her unyielding attitude. The government of Austria in Lombardy and Venetia was far from satisfactory. By means of secret

treaties Austria obtained a predominant influence in Parma, Tuscany, Modena, the States of the Church, and in the Kingdom of the Two Sicilies. That influence was exercised in the interests of despotism, and in opposition to the welfare of the people, whose wishes their rulers, backed by Austrian troops, were enabled to set at defiance. The question of Austria's position in Italy was brought by Cavour before the European Congress at Paris in 1856, but nothing direct resulted from the discussions. Sardinia, after all remonstrances of a peaceful kind had failed, began to arm. Austria demanded her immediate disarmament, on pain of war; but Sardinia, whose army was swelled with volunteers from every part of the peninsula, and who had previously entered into a treaty, offensive and defensive, with France, refused. Austria accordingly commenced hostilities by crossing the Ticino on April 29, 1859. On May 3 France, as the ally of Sardinia, formally declared war against Austria. The Austrian army was overthrown, and on July 11 Francis Joseph and Napoleon met at Villafranca and agreed on terms of peace, the chief condition of which was the cession of Lombardy to Sardinia. (See ITALY.) Immediately after this war the Emperor Francis Joseph began to turn toward schemes of a more liberal internal policy. The constitutional régime inaugurated in 1861 failed, however, to be acceptable to the Hungarians, and the antagonism of the Czechs of Bohemia, as well as of the Poles of Galicia, tended further to paralyze the efforts of the government.

Prussia, which since the Restoration had been content to remain in her subordinate position with regard to Austria in the German Confederation, now entered upon a new and energetic policy after the accession of King William I in 1861 and the calling of Bismarck into the ministry. A steady effort was made to draw the North German States close to Prussia. Austria was entangled in the complications of the Schleswig-Holstein affair (see SCHLESWIG-HOLSTEIN), and in 1864 she found herself involved with Prussia in a war against Denmark for the liberation of the two duchies. The convention of Gastein, in 1865, with respect to the government of the duchies was a makeshift not calculated to relieve the strain on Austria and Prussia. Austria sought to force the hand of Prussia by referring the settlement of the Schleswig-Holstein question to the German Diet. Prussia made a move by occupying Holstein, and the German Diet thereupon summoned the States to mobilize the federal army of execution against Prussia. The latter declared the confederation dissolved, invaded simultaneously Austria and the States that had joined Austria, and in the brief seven weeks' campaign that followed triumphed completely. The victory of the Prussians at Sadowa was followed by the Peace of Prague, which dissolved the old confederation, allowing reorganization without Austria. Italy had been the ally of Prussia, and although the Italian army and navy were defeated at Custozza and at Lissa, Prussia was able to exact the surrender of Venetia by Austria, which thus ceased to be either a German or an Italian power. See GERMANY; SEVEN WEEKS' WAR.

The catastrophe of Sadowa made it evident to the Austrian government that a radical change in the internal constitution of the Empire was necessary. Above all, the demands of Hungary, as formulated by her great spokesman, Francis Deák, had to be met. Under the influence of Chancellor von Beust, Francis Joseph effected a reconciliation with the Magyars on the basis of the restoration to them of their constitutional liberties. This settlement, known as the *Ausgleich* of 1867, established the Austro-Hungarian monarchy on the present dualistic basis. Under the guidance of her able foreign minister, Count Andrássy, Austria-Hungary took an important part in the settlement of the situation growing out of the Russo-Turkish War of 1877–78. The Congress of Berlin allowed her to occupy Bosnia and Herzegovina, which was effected only after a bloody struggle (1878). With the adoption of the *Ausgleich*, parliamentary government in Vienna was firmly established. The dual constitution of the monarchy, however, was far from putting an end to dissensions among the nationalities in the Austrian Empire. The Poles, the Slavs, and the Germans were equally clamorous in their demands for recognition. But concession to any one nationality served only to arouse bitter resentment among the other discordant elements and inspired demands for the official recognition of the local language and the erection of national institutions of learning. Parliamentary government was brought to a standstill for long periods by systematic obstruction. A new question was injected into the political sphere in 1905, when, largely as a result of conditions in Hungary and Russia, a formidable agitation for the establishment of universal suffrage took its rise. National party lines were obliterated for the time in this general movement of the lower classes for political recognition. The government, confronted by the difficulties of the Hungarian situation, yielded, and in 1907 enacted a law which provided for general manhood suffrage. The immediate result in the election of 1907 was a vast influx of new members with socialistic tendencies, a result which in the next succeeding election was yet more marked.

Henceforth Austrian foreign policy was more aggressive: Bosnia and the Herzegovina were annexed, Oct. 13, 1908; a programme of naval expansion was entered upon; and in the settlement of the Balkan imbroglio Austria took a prominent part. Race questions continued in the foreground including Italian irredentism, Czech hostility to the use of the German language in Bohemia, and the plots of the Serbs for the creation of a Greater Serbia. Friction with Serbia extending over many years finally culminated in the *impasse* following the assassination of the Austrian Archduke Ferdinand at Sarajevo in 1914. See WAR IN EUROPE.

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AUSTRIAN LIP. The thick lower lip which was characteristic of the Hapsburgs and survives to some extent to this day among some princes of that dynasty.

AUSTRIAN POLIT'ICAL PAR'TIES. See POLITICAL PARTIES, *Austria-Hungary*.

AUSTRIAN WO'MAN, THE. A contemptuous name for the French Queen, Marie Antoinette, at the time of the Revolution.

AUTEUIL, ō'tē'y'. Formerly a country village at the entrance of the Bois-de-Boulogne, now a western quarter of Paris. It is known as the residence of famous literary men, such as Boileau and Molière.

On the Butte Montemart rise the grand stands of the race course where steeple chases are held from February to December. The *Grand Prix d'Auteuil* ($25,000), on the second last Sunday in June, inaugurates the summer season.

AUTO- (Gk. *aὐtós, autos*, self), a combining form, as the first part of many English words, meaning *self, one's self, by one's self, one's own;* as, e.g., *autobiography*, one's biography, written by one's self; *autograph*, writing in one's own hand; *automobile*, a self-propeller.

AUTOCHTHONES, ą-tŏk'thō-nēz (Gk. nom. pl. *aὐtóχθονες, autochthones*, sprung from the earth itself, from *aὐtós, autos*, self + *χθών, chthōn*, earth). A Greek name for the original inhabitants—not immigrants—of a land, who, according to various local legends, sprang from the earth, rocks, or trees. The Athenians seem to have been especially proud of this name (see ATTICA), as indicating that they had always been in possession of their land, though the statement that the ancient nobles wore a golden cicada in their hair, to show their origin from the soil, seems to be due to a grammarian's misunderstanding of the *τέττιγες* (*tettiges*), which were probably golden spirals used to secure the hair. Some writers also spoke of the Arcadians and the early inhabitants of Italy as autochthones. (See ABORIGINES.) Earth-born *γηγενεῖς* (*gēgeneis*), though not properly autochthones, were the Greek giants, sons of Earth, who fought against the gods, and the Sparti of Thebes, who sprang from the dragon's teeth sown by Cadmus (q.v.). The name "autochthones" is now frequently applied to the original inhabitants of a country, like "aborigines." Consult Preller, *Ausgewählte Aufsätze* (Berlin, 1864).

AUTOCHTHONOUS, ą-tŏk'thō-nŭs (for derivation, see AUTOCHTHONES). A term employed in the sciences of botany, zoölogy, and paleontology to indicate such plants, animals, or fossils as are indigenous to the places in which they are found. In botany and zoölogy the term is opposed to "naturalized." In paleontology such fossils as are of the remains of animals that have lived in the immediate vicinity of the deposits in which they afterward became entombed are said to be autochthonous to those deposits. On the other hand, such fossils as have been entombed in an earlier deposit (*a*) having been autochthonous to it, and through erosion and transportation have become separated from (*a*) and been reëntombed in a second deposit (*b*), are then said to be heterochthonous to the latter deposit (*b*).

AU'TOCRAT OF THE BREAK'FAST-TA'BLE, THE. A serial contribution to the *Atlantic Monthly*, by Oliver Wendell Holmes, in 1857–58. It is the narrative of alleged conversations at the breakfast-table of a Boston boarding house. Dr. Holmes is himself the autocrat and the chief talker, others being allowed to talk simply for the sake of variety. Subsequently published in book form (1858), the work has long been a popular favorite. Its flashes of wit, its excellent philosophy, and its graces of style give its author deserved rank with the most delightful essayists of our literature.

AUTO DA FÉ, ou'tō dä fā (Portug. *auto*, act, from Lat. *actus* + *da*, of the + *fé*, faith, from Lat. *fides*, Sp. *auto de fe*). The name given to the procession or ceremony which used to take place in Spain and Portugal at the execution of those condemned to death by the Inquisition. It was generally held on some great national holiday or in connection with the celebration of a royal marriage, the accession of a king, or the birth of a prince. At dawn the dismal tolling of the great bell of the cathedral gave the signal to begin the drama of the day, for as such it was looked upon by the people, who thronged to it in troops, believing that they did a good work in merely looking on. Men of the highest rank reckoned it prudent to give their countenance to the holy tribunal at these processions, and even grandees of Castile did not disdain to make themselves familiars of the Inquisition. The procession was led by the Dominicans, carrying the flag of their order and that of the Inquisition; next followed the penitents, on whom only penance had been laid; behind them, and separated by a great cross, which was borne before, came those condemned to death—barefoot, clad in the *sanbenito* (a yellow shirt inscribed with a list of the victim's crimes and painted over with pictures of damnation), and wearing a pointed cap on the head; then effigies of the fugitives, and lastly the bones of dead culprits, in black coffins, painted with flames and hellish symbols. The train was closed by the army of priests and monks. The procession went through the principal streets to the church, where, after a sermon on the true faith, the sentence was announced. In the meantime the accused stood before a crucifix, with extinguished torches in their hands. After the sentence had been read to them an officer of the Inquisition gave each one of the condemned a blow on the breast with his hand, as a sign that they were given over by that tribunal to the secular power;

on which a secular officer took them in charge, had them fettered, and taken to prison. A few hours afterward they were brought to the place of execution. If they made profession of the Catholic faith at the last moment, they were so far favored as to be first strangled; otherwise they were burned alive, and with them the effigies of the fugitives and the bones of the dead culprits. As a rule, the King, with his whole court, had to exalt by his presence the solemnity of the awful transaction. The celebration of the auto da fé began as early as 1257, though the death penalty was first imposed in 1481. Between 1481 and 1808 more than 340,000 persons suffered punishment at the auto da fé. Of these 32,000 were burned. Heresy was not the only crime thus punished, as is generally supposed, but all grave sins coming under ecclesiastical jurisdiction. The most elaborate auto da fé took place at Madrid, under Charles II, in 1680. America also has had its autos da fé, Mexico celebrating one as late as 1815—the latest recorded. See INQUISITION.

AUTOG'AMY (Gk. *αὐτός, autos,* self + *γάμος, gamos,* wedding, marriage). Self-pollination, i.e., a transfer of the pollen of a flower to its own pistil. It is the opposite of allogamy (q.v.). See also POLLINATION.

AU'TOGRAPH (Gk. *αὐτός, autos,* self + *γράφειν, graphein,* to write). That which is written in one's own hand. It commonly refers to the signature. A holograph is a writing or inscription entirely in the hand of one person. It is not necessarily in written letters or inscribed characters; an original drawing by Rembrandt or a musical score by Mozart is a holograph. On account of the personal interest with which handwriting is invested, as well as the historical value of documents actually written by famous men, the accumulation of autographs has been a favorite pursuit of collectors from very early times. There were large collections among the Greeks and Romans. One of the Ptolemies bargained with the starving Athenians, giving wheat for the privilege of copying holographs of Æschylus, Sophocles, and Euripides. He returned the copies and retained the originals. Pliny the Elder speaks of seeing in the collection of Pomponius Secundus autographs of famous men written two centuries previously. Among the Chinese also autographs were preserved with great respect in early times. During the sixteenth century, in Europe, rich collections were made, of which one, brought together as early as 1578, is in the British Museum. Even before this, the custom of inscribing autographs merely for collections had been developed, and there had appeared (first in Germany in the fourteenth century) the *Album Amicorum*—an octavo book, bound lengthwise, in which names and sentiments were inscribed. Such books were first used by travelers, who were thus enabled to bring home records of the eminent personages whom they had met during their journeys. Among the Egerton manuscripts in the British Museum is an album dated 1554. Afterward autograph albums came into general use and, indeed, were in fashion until the latter part of the nineteenth century.

The value set upon autographs by collectors has developed a class of dealers all over the civilized world who sell them either privately or at auction. Autographs are described in their catalogues as a.l.s. (autograph letter signed); l.s. (letter signed); d.s. (document signed); a.l.3 (autograph letter, third person); s. (signature cut from document or letter). The high prices paid for good signatures have encouraged forgeries. Sometimes forgeries take the form of fabricating literary matter, as when Chatterton produced the poems of Rowley, or when Ireland "discovered" an original play of Shakespeare. Generally these forgeries purport to be letters or documents written or signed by famous personages. In America and in England there have been several notable forgeries; but perhaps the most remarkable instance of deceit occufred in France. In 1867 M. Michel Chasles, the first geometrician of France, laid before the French Académie des Sciences letters ostensibly by Pascal, Rabelais, Galileo, and others. When seen by experts, these were recognized as forgeries. It was then discovered that Chasles had bought of a certain Vrain Lucas 27,000 pieces, among which were letters of Mohammed to the King of the Franks, Alexander the Great to Aristotle, Judas Iscariot to Mary Magdalen, and others, written in French, on French paper, bearing a *fleur-de-lys* water-mark. A skillful forger selects the guard-folios of old books, washing the ink with a weak solution of muriatic acid, oxalic acid, or an oxalate of potassium, after which the paper is creased and smudged.

The most notable collection of autographs in England is that of the British Museum. The most valuable autograph in this collection is that of Shakespeare, affixed to a deed; his signed will is preserved in Doctors' Commons. The most valuable private collection in England was formed by the late Alfred Morrison. The gems of the collection are considered to be a holograph letter of Americus Vespucius addressed to his father, and a letter of Mary, Queen of Scots, written to Henry III of France, six hours before her execution and confiding to him the care of her son "as much as he deserves it." In the French archives the earliest autograph is a document signed by Thierry III, Sept. 12, 677. One of the largest and most important collections in France was that formed by Benjamin Fillon.

In Germany one of the largest collections was formed by Alexander Meyer Cohn, of Berlin. In the United States the collections of Thacher, Gratz, Gunther, and others, covering both domestic and foreign fields, compare favorably with the best in Europe. In the first of these the kings of England are represented in an unbroken line from Henry V; and the kings of France from Charles V, mostly in holograph form. The finest collection of American autographs was formed by Dr. Emmet and is now in the New York Public Library. It contains the best set of the signers of the Declaration of Independence, including the only known holograph letter of Thomas Lynch, which was sold for over $5000. Dr. Emmet possessed autographs of nearly every member of the Continental Congress from 1774 to 1789.

The value of autographs depends not only upon the degree of fame of the writers, but also to some extent upon the rarity of the signatures. Among the rarest desirable names are those of Da Vinci, Raphael, the younger Bach, Gluck, and Charlotte Corday. Sir Francis Drake, Sir Thomas More, and Milton are exceptionally rare names. Shakespeare is unobtainable. The 29 Columbus autographs are owned exclusively by his descendants. The rarest names among American explorers are those of Champlain, La Salle, and Marquette. Among the signers of the

Declaration of Independence, Lynch, Gwinnett, Hart, Morton, Heywood, and Middleton, somewhat in the order named, are difficult to secure. A good holograph set of the "signers," with no cut signatures, would be worth $25,000. There are not more than 10 or 12 good sets now in private hands. The rarest President is Johnson, with Taylor coming next.

A respectable collection of autographs will contain from 5000 to 10,000 pieces. It is wise, for those who desire to begin a collection, to study the catalogues of dealers published during the last 40 years. Consult Scott and Davey, *Historical Documents* (London, 1891), which contains a bibliography on the subject of autographs. See HANDWRITING.

AUTOGRAVURE, ą'tô-grȧv'ûr. See AUTOTYPE.

AUTO-INTOXICATION. A form of chronic poisoning from the absorption of toxins resulting from disordered metabolic processes in the patient's own body. Auto-intoxication may arise from the altered functioning of certain organs; e.g., uremia from nephritis, or Addison's disease from affections of the suprarenal capsules. But, as commonly used, the term applies to a toxæmia having its origin in the absorption of the poisonous by-products of incomplete digestion in the intestinal tract; and caused by a deficiency, either in quality or quantity, of the digestive secretions, or excessive bacterial fermentation, or both. There is a failure to carry on the digestion, especially of nitrogenous substances, to its completion, and bacterial fermentation, with the generation and absorption of poisonous substances, results. The disorder usually has its beginning in incomplete mastication (people with bad teeth are very prone to suffer from auto-intoxication), overeating, particularly of meats and the so-called "rich" foods, together with a sedentary life. Among a myriad of symptoms which have been traced to or attend auto-intoxication, the following may be mentioned: indigestion, constipation, a depression of spirits, a sallow complexion, anæmia, headache, various neuralgic affections, hemicrania, and nasal catarrh. Many individuals who complain of "malaria" or "biliousness" are really suffering from intestinal poisoning. When symptoms such as the above arise and the cause is not obvious, and when on examination of the urine excessive amounts of indican, urobilin, and phenol are found, a diagnosis of auto-intoxication is reasonably certain.

Cure is often brought about simply by correcting dietic errors, reducing the amount of proteid food, substituting therefor cereals and fruits, and taking exercise in the open air. Metchnikoff fathered the theory that the infirmities of old age were largely due to intestinal auto-intoxication, and introduced the sour-milk treatment on the supposition that the lactic acid bacillus drove out and displaced many of the pathogenic bacteria. This treatment was widely adopted, but fell into disrepute largely because of the unreliability of milk-souring cultures put on the market. Metchnikoff found the Bulgarian bacillus the most potent, and to overcome the disagreeable odor given by this bacillus to milk, combined with it the *Bacillus acidi lactis aerogenes*. Brewers' yeast has been administered with the same end in view; and intestinal disinfectants or antiseptics such as salol, betanaphthol, and creosote are frequently used.

AUTOLYCUS (Gk. Αὐτόλυκος, *Autolykos*). A mythological character who lived on Mount Parnassus, father of Anticlea, the mother of Odysseus. Hermes had given him superior skill as thief and perjurer. Later writers represented him as the son of Hermes, and as possessing the power to metamorphose all that he stole; this led to his contest with the more wily Sisyphus (q.v.), who alone outwitted him, and became, according to one story, by Anticlea father of Odysseus. The contest of wits between two clever thieves is a common folk-tale among many peoples.

AUTOLYCUS (c.330 B.C.). A Greek astronomer and mathematician of Pitane in Æolia. He wrote works on the revolving sphere, Περὶ κινουμένης σφαίρας (*Peri kinoumenēs sphairas*), and on the rising and setting of the fixed stars, Περὶ ἐπιτολῶν καὶ δύσεων (*Peri epitolōn kai dyseōn*). There is an edition, with Latin translation and scholia, by Hultsch (Leipzig, 1885).

AUTOLYCUS. A waggish thief in Shakespeare's *Winter's Tale*, who robs the Bohemian shepherds under cover of selling them trinkets. By his petty villainies he effects the *lusus* of the play.

AUTOMATIC TRAIN STOP. See BLOCK-SIGNAL SYSTEM.

AUTOM'ATISM (Gk. αὐτόματος, *automatos*, self-willed, self-acting, from αὐτός, *autos*, self + μάειν, *maein*, to wish eagerly, to strive). A term variously defined in various departments of knowledge. 1. In philosophy, it is the equivalent of determinism (q.v.). 2. In psychology it is used specifically for the doctrine that the animals are unconscious automata (see ANIMAL PSYCHOLOGY), and also generally to cover all manifestations of involuntary bodily movement —reflex and secondary reflex movement, concomitant movements. (See ACTION.) 3. In pathology it denotes the simulation of voluntary actions by involuntary movements, consequent upon certain forms of brain disease. Consult W. B. Carpenter, *Mental Physiology* (Boston, 1891).

AUTOM'ATON (Lat. from Gk. αὐτόματος, *automatos*, self-moving). A piece of mechanism constructed to represent human or animal figures and actions. The construction of automata has occupied men's attention from very early times. As early as 400 B.C. the invention of a mechanical dove which could fly is credited to the Greek mathematician, Archytas, and there are numerous reports of curious automata having been invented at various times and by various persons from the thirteenth to the seventeenth century, most of which are open to considerable doubt. In 1738, however, it is authentically reported that Vaucanson, a Frenchman, exhibited in Paris an automaton representing a flute player which placed its lips against the instrument and produced the notes with its fingers exactly as a human being does. In 1741 this same mathematician exhibited a flageolet player which with one hand beat a tambourine, and in the same year he produced a duck which swam, dived, ate, drank, dressed its wings, etc., as naturally as its animated companion. Droz, a Swiss, is reported to have invented a sheep which would bleat and a dog guarding a basket of fruit which would bark if any of the fruit was removed, ceasing only when it was replaced. At the London Exhibition of 1851 Maillardet exhibited a bullfinch which fluttered its wings and gave the note of the bird which it represented. Houdin, the famous conjurer,

made a writing and drawing automaton which was operated by clockwork. The chess player of Kempelen was long regarded as the most wonderful of automata. It represented a Turk of natural size, dressed in the national costume, and seated behind a box resembling a chest of drawers in shape. Before the game commenced, the artist opened several doors in the chest, which revealed a large number of pulleys, wheels, cylinders, springs, etc. The chessmen were produced from a long drawer, as was also a cushion for the figure to rest its arm upon. The figure, not being able to speak, signified when the queen of his antagonist was in danger by two nods, and when the king was in check by three. The automaton succeeded in beating most of the players with whom it engaged; but it turned out afterward that a crippled Russian officer, a very celebrated chess player, was concealed in the interior of the figure, and that he used this means to escape from Russia, where his life was in danger. In 1875 Mr. J. N. Maskelyne exhibited an automaton under the name of "Psycho" which represented a seated human figure. To show that the contrivance was not operated by electricity, it was insulated by being mounted on a glass cylinder. This figure moved its head, and from a rack in front of it selected the cards necessary for playing a hand at whist. It would also work out calculations up to 100,000,000, showing the entire total of each calculation by opening a sliding door in a box. Another automaton named "Zoe," similar in appearance to the first and insulated in like manner, was designed by Mr. Maskelyne. This figure would draw the likeness of any person chosen by the spectators from a list of 200 names. Various other automata have been contrived at different times.

In its broad meaning an automaton is any mechanism which, upon receiving an impulse, will perform a certain cycle of motions by itself. In this sense watches and clocks, and particularly such complicated clocks as that in the cathedral of Strassburg, are automata. For the best books relating to automata representing human and animal actions, consult: Brewster, *Letters on Natural Magic* (London, 1834); Houdin, *Secrets of Conjuring* and *Memoirs of Houdin* (London, 1891); Ozanam, *Mathematical Recreations*, trans. by Hutton (London, 1854).

AUTOM'EDON (Gk. *Αὐτομέδων*). A son of Diores; the friend and charioteer of Achilles in the *Iliad*, xvi, 145 ff.; ibid., xvii, 536 ff. After the death of Achilles Automedon became the attendant of his son Pyrrhus.

AUTOMEDON (Gk. *Αὐτομέδων*). The name of two epigrammatists of the Greek Anthology —one an Ætolian, the other a native of Cyzicus; one of the two lived probably in the reign of Nerva, the date of the other is quite unknown.

AUTOMOBILE, ą'tô-mō'bīl *or* ą'tô-mō-bēl' (Gk. *auto*, self, + Lat. *mobilis*, movable). A term applied to a vehicle for use on roads or highways whose propulsive or tractive energy is supplied from a mechanical motor within the body of such vehicle and which should operate independent of any track. It is of French origin and is an adjective used as a noun; in its first uses it was applied only to pleasure vehicles or carriages. The term was created to meet the sudden demand for a word to describe a horseless or self-propelling vehicle, but the make-up was unfortunate, and the word is gradually being supplanted by less indefinite terms. The convenience, economy, capacity, speed, and other advantages resulting from a substitution of mechanical power for animal traction has resulted in an enormous extension of the principle of the motor-propelled vehicle outside of its first uses in pleasure carriages. The commercial uses in carrying freight and passengers in an income-producing or industrial way, have made the term "motor vehicle," "motor car," or "motor truck" much more expressive and correct. The historical development of the motor vehicle will therefore be presented here, and the reader referred for the other divisions of the subject to the article MOTOR VEHICLE. The British never welcomed the term "automobile," but have adopted the term "motor car" for the pleasure vehicle or passenger carriage. American practice and terminology is rapidly turning in the same direction. The idea of the mechanically propelled vehicle for roads is as old as the early days of the steam engine. In 1680 Sir Isaac Newton proposed a steam carriage to be propelled by the reactive effect of a jet of steam issuing from a nozzle at the rear of the vehicle. In 1790 Nathan Read patented and constructed a model steam carriage in which two steam cylinders operated racks running in pinions on the driving shaft. In 1769–70 Nicholas Joseph Cugnot, a Frenchman, built two steam carriages. The larger of these is still preserved in Paris and was designed for the transportation of artillery. The engine of this vehicle consisted of two 13-inch single-acting cylinders, connected by means of pawls to the single front wheel of the wagon. In front of this wheel was suspended a tank-like boiler. In 1784 Murdock, an assistant of James Watt, constructed a model carriage, operated by a "grasshopper" engine, and in 1786 Oliver Evans, of the United States, suggested the use of steam road wagons to the Lancaster Turnpike Company of Maryland. In 1802 Richard Trevithick built a steam carriage, which was exhibited in London, having driven itself 90 miles from Camborne, where it was built, to London. This carriage brings us to the notable period of steam-coach construction in England, which lasted until about 1836.

First Period of Development. The most important of these early labors on the motor vehicle were undoubtedly those of Walter Hancock, an Englishman, and they were carried out during the period between 1824 and 1836. Hancock's first work was the invention of a rather remarkable design of boiler, which reached its final improved form and was patented in 1827. This boiler was first applied to an experimental vehicle which had three wheels, the single wheel in front being the driver and being driven by a pair of direct-acting, oscillating steam cylinders. The frame which carried the steam cylinders and the front wheel was jointed to the main frame of the vehicle so as to permit steering. Many hundred miles were run with this vehicle, which was succeeded by an improved model. This second Hancock steam wagon was named "The Infant." In it the two rear wheels were made the driving wheels. The oscillating cylinders operated directly a counter-shaft carrying a chain wheel and located just back of the rear wheels. From the chain wheel on the counter-shaft a chain drive was carried to a similar wheel on the rear axle. The boiler and other mechanism for motive purposes was carried substantially over the driving wheels. The front wheel was used for steering by being joined to a swiveling frame. The chief objection

to this second vehicle was the trouble experienced from dust and dirt getting into the driving mechanism. The second "Infant" was then built, in which a vertical engine replaced the oscillating steam cylinders of the previous vehicles, and was placed near the middle of the vehicle, between the front and rear wheels. This engine drove a chain wheel with a chain drive extending back to the rear axle. The remaining parts of the vehicle were similar to the corresponding parts in the first "Infant." Hancock next built "The Era" on much the same designs as the second "Infant," and later "The Enterprise," both of which were designed for public traffic as steam-coaches. "The Autopsy," a second "Era," and "The Automaton" followed in rapid succession, and "The Automaton" ran as a coach on regular service between Stratford, Paddington, and Islington for 20 weeks, covering 4200 miles, and carrying 12,761 passengers during this period. Hancock's final motor vehicle was for his personal use.

Contemporary with Hancock, two fellow countrymen, Guldeworthy Gurney and Sir Charles Dance, conducted extensive experiments with a number of vehicles invented and improved by Gurney. For his vehicles Gurney used water-tube boilers and horizontal engines. The engine was placed underneath the body of the vehicle and drove the rear wheels by means of a connecting rod and axle crank, resembling much the driving gear of a modern locomotive. Gurney's water-tube boiler consisted of two cylindrical drums, placed one above the other and running transversely across the vehicle. The tubes connecting these drums were bent into the form of a letter U, placed horizontally, one free end of the U entering the lower drum and the other free end entering the upper drum, the furnace grate being formed by the lower tubes. This boiler was usually worked at pressures of from 70 pounds to 120 pounds. In passing from the boiler to the engine cylinders the steam pipe passed through the furnace casing, thus drying if not somewhat superheating, the steam. The fire was provided with forced draft by a fan operated by a small engine, and the exhaust of the main engine was employed to heat the feed water. Some idea of the size of Gurney's vehicles of the coach type is conveyed by the fact that their weight was nearly 8 tons, that the engine had 9×18-inch cylinders, and that the driving wheels were 5 feet in diameter. Gurney built a number of vehicles smaller than coaches, in some of which he substituted the engine exhaust for the original fan for producing draft. For one of Gurney's coaches Sir Charles Dance devised an improved form of boiler.

While the work of Hancock and Gurney perhaps takes precedence in these early experiments with the steam road vehicle, there were several other inventors who were active. In 1831 two steam carriages were built by William A. Summers and Nathaniel Ogle, capable of carrying from 16 to 18 passengers each. The boiler used in these vehicles was a vertical water-tube boiler with internal smoke tubes. The engines were coupled direct to the driving axle and had $8\frac{1}{2} \times 18$-inch cylinders. In 1834–35 Macerone and Squire ran a steam coach having a capacity for 8 passengers, besides the driver and stoker, and weighing $3\frac{1}{2}$ tons. The boiler was a vertical water-tube boiler and the engines had $7\frac{1}{2} \times 15\frac{3}{4}$-inch cylinders. Among others of this same period who developed inventions relating to steam vehicles were Henry James, Dr. Church, Robert Griffith, and Scott Russell. One after another of these vehicles was abandoned, until in 1836 only those of Hancock were on the road; and soon after these also disappeared from service.

Second Period of Development. With the disappearance of Hancock's steam vehicles about 1836, all practical, continued effort in the development of the motor vehicle ceased until about 1894, when the period of modern development began. What may be called a second period of development occurred, however, about 1860, when Thomas Rickett, A. F. Yarrow, A. Pattison, H. P. Holt, and others built several steam vehicles. Quite generally these vehicles approached the traction engine in character, having heavy boilers and engines and large water and fuel space, but room for only a few, usually for not more than four, passengers. They were, in fact, hardly more than self-moving boilers and engines with a few seats attached.

Modern Period of Development. Turning now to the modern period of development, in 1884 Gottlieb Daimler invented his small high-speed gas engine, followed in 1885 by his invention of a single-cylinder, inclosed-crank and fly-wheel engine. In 1885 the latter engine was applied to a bicycle. In 1886 Carl Benz invented his single horizontal cylinder, water-jacketed engine, which he applied to a three-wheel carriage. In 1889 M. Léon Serpollet invented his water-tube boiler, which he applied to a motor vehicle in 1894. About the same time also electric vehicles began to be developed in France and America. Modern motor vehicles, therefore, may be classified, according to the motive power used, into (1) steam vehicles, in which steam is generated in a boiler receiving heat from the external combustion of a coal, coke, or compressed fuel, or some form of oil, and is supplied to a steam engine; (2) oil or liquid-fuel vehicles, using internal-combustion engines with petroleum, kerosene, gasoline, or naphtha; (3) electric vehicles, using electric motors supplied with current from a storage battery. (See MOTOR VEHICLE.) Other forms of motive power, such as liquid air and compressed gases, have been suggested, but they are not practically employed, because not economically nor commercially successful.

Selden Patent. An important factor in the commercial and industrial history of the motor vehicle in the United States has been the Selden patent. An American patent was granted in 1895 to George B. Selden of Rochester, N. Y. (U. S. Patent No. 549,160). It covered the idea (novel at the time of his original application in 1872) of applying an internal combustion engine to the propulsion of a vehicle. It included the combination of such a motor with a clutch or similar engaging and disengaging device in the train of mechanism by which the motor drove the propelling wheels, and the use of reducing gear by which the propelling wheels could be driven at speeds lower than that of the motor shaft. The patent covered also means for throwing the clutch in and out and for adjusting the gearing. The wording of the claims at so early a stage of the art of making motor vehicles was so broad and inclusive that the existence of such a document gave its originator a dominating power over the industry. No successful motor vehicle could be made or operated without the elements combined in the Selden patent. Hence a powerful association was formed of the licensees under the patent; these

manufacturers agreed for self-protection to uphold the monopoly which it created during its life and to combat infringements by any not in the licensed class. All licensees paid a royalty on each machine sold, although this was not enough to affect the cost of manufacture and sale. The Association of Licensed Automobile Manufacturers (abbreviated into the A. L. A. M.), rallying around the basic patent agreement, were also interlocked on many other matters of commercial policy and technical and engineering development, whereby a wise tendency toward a standardization in non-essentials was secured, and an interchange of knowledge on tests and the properties of materials was made the custom of the industry. Rivals in business drew from this common stock. A mechanical branch was formed along the lines of the societies of engineers, and a testing laboratory was organized. A *Digest of Current Literature* was published weekly, which is still a mine of most valuable information on engineering facts and researches pertinent to the motor vehicle, and a monument to its compiler and editor, Coker F. Clarkson. As time went on, there arose a group of manufacturers who refused to recognize the right of the Selden patent to monopolize the field which it claimed. They insisted on their right to employ mechanical units which were generally in use elsewhere, without payment of royalties to a patent which had combined the same units for a particular purpose and claimed this combination as invention. Selden had also included in his claims a special type of internal combustion motor, in which the heating of the working charge of air and gas was to be effected at a constant temperature and pressure, or in accordance with the philosophy of the Brayton cycle, while the prevailing type of motor-vehicle engines work under the Otto cycle, where the heating is done at neither constant temperature nor pressure nor volume. These manufacturers resisted at law the charge that they were infringers of the patent as it should be properly interpreted, and were led in this contention by Henry Ford of Detroit, Mich., in the suit which resulted. Experts were secured by both parties in suit, and the record is one of the most voluminous in its class, and the litigation most costly. Testimony was taken from 1904 to 1908. The decision of the first trial under Judge Hough was in favor of the validity of the patent, and that those making motor vehicles without license and using the Selden elements were infringers. An appeal was at once taken, and on a retrial, by a decision written by Judge Noyes, the first decision was reversed, and the necessity for a license was denied in 1911. This decision ended the monopoly previously existing, but its good effects continued, and after the life of the patent had ended, an Automobile Board of Trade was organized to have a general oversight of matters of universal interest to the industry, which in turn was superseded by an Automobile Chamber of Commerce, which combines the activities of all the national automobile manufacturers' organizations.

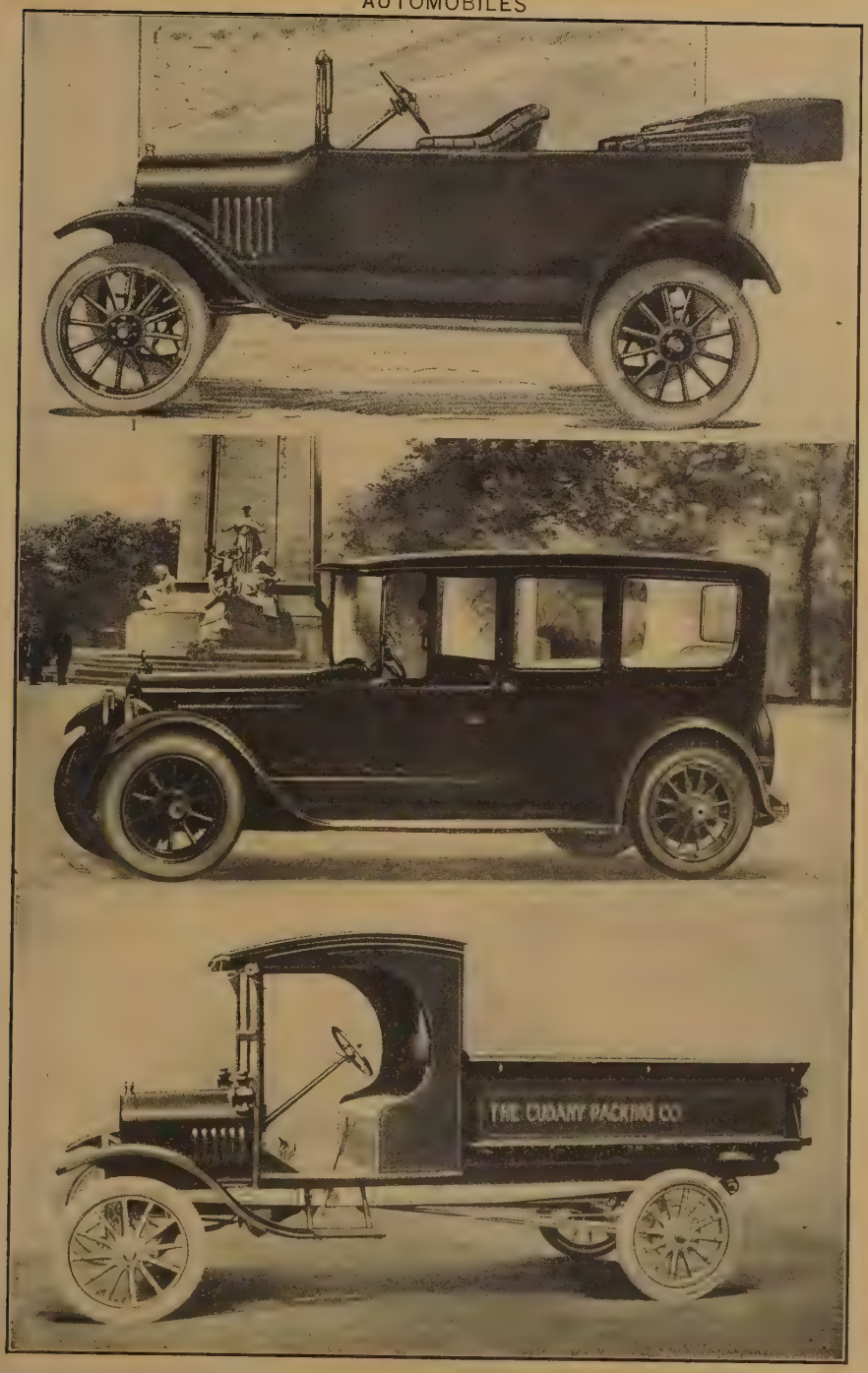
AUTON'OMY (Gk. *αὐτονομία, autonomia*, self-government, from *αὐτός, autos*, self + *νόμος, nomos*, law). The power of self-government possessed by the citizens of the state, or enjoyed within certain limits by the inhabitants of some subdivision of a state, as well as by the members of civil and religious corporations. Autonomy is often used to designate the political condition of ancient Greece, where every town community claimed the right of independent sovereign action. At the present day the term is employed less frequently in the sense of independence than to describe the condition of a country which exercises complete control over its own affairs under the suzerainty of another power. It is in the latter sense that autonomy is used to characterize the status of such territories as Canada.

AU'TOPHYTE (*auto* + Gk. *φύειν, phyein*, to bring forth, generate). A plant (usually a green plant) which is independent, because it is able to obtain all necessary food materials directly from inorganic sources, as from the air and the soil, and subsequently to convert them into food. The dependent plants are either parasitic or saprophytic and are called "heterophytes" (q.v.). See SYMBIOSIS; SAPROPHYTE.

AU'TOPLASTY (Gk. *αὐτόπλαστος, autoplastos*, self-formed, from *αὐτός, autos*, self + *πλάσσειν, plassein*, to form). Any surgical operation for repairing one portion of the body with tissues taken from another part of the same individual. The defect may be due to a lack of development, as in harelip; to injury, as in scalds, burns, or mutilations; or to disease, as in lupus and syphilis. The skin is most frequently employed. It can be used as (1) a flap from the immediate vicinity carried over to the deficient area, but still receiving its original blood supply through a pedicle; (2) by totally separating and transplanting the flap; (3) by removing in small bits (Reverdin's method) or in strips of considerable size (Tiersch's method) only the superficial layers of the skin, and placing these grafts upon the denuded area. Autoplasty was practiced in India centuries ago, and there are references to it by Celsus, and later, by the Calabrian surgeons of the fifteenth century. About this period a favorite method of punishment in Italy and Sicily consisted in mutilation, cutting off the ears, nose, etc., and the Italian surgeons became famous for their skill in restoring members thus lost to their former situation; in fact, so skillful did they become that executioners were compelled to destroy the tissues removed. The subject is discussed in modern surgical treatises under the head of PLASTIC SURGERY.

AU'TOPSY (Gk. *αὐτοψία, autopsia*, a seeing with one's own eyes, from *αὐτός, autos*, self + *ὄψις, opsis*, look, sight). A personal observation. The word is most frequently used to denote the examination of a dead body, for the purpose of determining the cause of death or the alterations resulting from disease or injury. An autopsy is usually held by a medical examiner or coroner, in case of a person found dead, or dying without medical attention, or suspected of having been poisoned or otherwise murdered; or by physicians, in the course of studying diseases, or verifying a diagnosis in an obscure case.

AU'TOSUGGES'TION. Self-suggestion; a man's acceptance, for himself, without command or direction from any other person, of an idea that shall presently issue in action. Autosuggestion may be induced voluntarily or involuntarily—voluntarily, if we fix our attention upon the idea in question and impress it on our minds by attentive consideration; involuntarily, if we are unconsciously influenced by our surroundings. Many persons, e.g., can awake at a certain hour in the morning by suggesting to themselves, the night before, that they will do so; and it is



FORD TOURING CAR
PACKARD TWIN-SIX LIMOUSINE
FORD ONE-TON TRUCK

probable that every one can, with practice, attain some degree of accuracy in such a "setting" of the mental machinery. The mechanism of arousal in these cases is not wholly clear. The cue for waking is, however, in all probability, given either by a definite amount of illumination of the sleeping room by the growing daylight, by certain constant noises of the environment, or by the pressure of water in the bladder of the sleeper. For the possibility of inducing hypnosis by autosuggestion, see HYPNOTISM.

Involuntary autosuggestion often plays an important part in psychological experimentation. It is sometimes desirable to make tests or experiments while the observer is, so far as possible, kept in complete ignorance of the object and arrangement of the investigation. (See PSYCHOPHYSICS.) The whole purpose of the "procedure without knowledge" may, in certain cases, be defeated by autosuggestion. As the work progresses, the observer involuntarily formulates an opinion as to its design—suggests to himself that he is expected to see this, and not that; to judge thus, and not otherwise: so that he is presently observing under a strong self-created bias. The tendency is perfectly well known and can be guarded against. Experimental psychologists have, indeed, classified laboratory observers as "objective" and "subjective" in type, upon the basis of the amount of self-suggestion to which they are liable.

Good instances of autosuggestion are to be found in the literature of suggestive therapeutics. One person is cured by a so-called "electric belt," another is invigorated by a band of unknown material fastened to the ankle, a third reads a faith-cure pamphlet and his rheumatism ceases. It is, however, in the hypnotic and other abnormal phases of mind—the hysterical consciousness, the religious ecstasy, the mind of the individual in the mob—that the phenomena of autosuggestion are most striking. Many phenomena which at their first appearance were regarded as evidence of supernormal powers and manifestations are reducible (fraud and trickery being eliminated) to autosuggestion. To quote from Jastrow: "The transportation of the senses discovered by Pététin (1787), the hypnotized subjects who, in Braid's day (1850), proved the location of the phrenological organs by the appropriateness of their actions when certain portions of the head were pressed; the sensitiveness to magnets and hermetically sealed drugs asserted by Reichenbach (1845), and later by Bourru and Burot (1885), and Dr. Luys's (1890) absurd trifling with puppets, and probably, too, Charcot's sharp differentiation of distinct hypnotic conditions (1882),—one and all furnish illustrations of the subtle possibilities of unconscious suggestion."

Bibliography. J. Jastrow, *Fact and Fable in Psychology* (Boston, 1900); Bernheim, *Suggestive Therapeutics* (Paris, 1889); Lipps, *Zur Psychologie der Suggestion* (Munich, 1897).

AUTOTROPISM. The internal tendency of a plant organ to straighten after it has curved from whatever cause, as from geotropism, heliotropism, etc.

AUTOTYPE (*auto* + Gk. *τύπος, typos,* impression, type). A photographic print obtained by a gelatin process. Gelatin, when mixed with an alkaline bichromate, as that of ammonium or potassium, becomes insoluble after exposure to light, so that if a photograph be made on a gelatin film, only those portions which have been acted on by light will be retained. This fact has been made the basis of several photo-engraving processes. In the so-called autotype process the picture is printed directly from the gelatin, which is mounted on a ground-glass plate. In another process the gelatin film is used as a matrix for a plaster cast, from which in turn an electrotype is made, which then may be used for printing a photo-engraving. In Germany and Austria the word "autotype" is also applied to the ordinary photo-engraving or half-tone print.

AUTRAN, ō'trăN', JOSEPH (1813–77). A French author, born at Marseilles. He first achieved celebrity by an ode dedicated to Lamartine and entitled *Le départ pour l'Orient* (1832). In the collections of verses entitled *Ludibria Ventis* (1838), and *Les poèmes de la mer,* he reveals the influence of classic models. A martial epic, entitled *Milianah,* celebrating the exploits of the French soldiery in Algiers, appeared in 1842, and a tragedy entitled *La fille d'Eschyle,* performed in the Paris Odéon, in March, 1848, met with great success and secured to its author (together with Augier's *Gabrielle*) the famous Montyon prize. (See MONTYON.) In 1868 he became a member of the Academy. His collected works have been published in 8 vols. (Paris, 1875–81).

AUTREFOIS ACQUIT, ō'tr'-fwä'â'kē' (Fr. formerly acquitted), **AUTREFOIS CONVICT,** kôN'vē' (Fr. formerly convicted). The common-law names of pleas in bar to a second indictment for an offense of which the defendant in a criminal prosecution has previously (Fr. *autrefois*) been regularly acquitted or convicted. It is a time-honored principle of English criminal law, that a person who has once been lawfully acquitted or convicted of any offense must not be put in peril a second time for the same offense; and this, notwithstanding the existence of circumstances of aggravation which, if known, would have justified an indictment of a different or more serious crime, or the discovery of fresh evidence not disclosed at the time of the former trial. The fact that there is a substantial variance between the former and the second indictment will not defeat the plea, so long as the original accusation or indictment was sufficient in law to sustain a conviction for the offense subsequently charged. But a previous trial for assault or arson will be no bar to a subsequent trial for murder, manslaughter, or rape resulting from or connected with the offense previously charged. The prior acquittal or conviction pleaded may have been had in any court of competent jurisdiction, domestic or foreign; and the common-law doctrine is not limited, as is generally believed, to capital or other grave offenses. It is in the latter form that it has found expression in the provision of the United States Constitution, that no person shall "be subject for the same offense to be twice put in jeopardy of life or limb" (Amendment V). Similar provisions are found in most, if not all, of the State constitutions. See JEOPARDY.

Autrefois Atteint is a similar plea, attended with the same effects as a former judgment in attainder (q.v.) offered in bar to an indictment or appeal for the same or any other felony. It has become obsolete with the practical abolition of the penalty of attainder. Consult the *Commentaries* of Blackstone and of Kent, and the authorities referred to under CRIMINAL LAW; CONSTITUTIONAL LAW.

AU'TUMN (Lat. *autumnus*). Astronomically, the third season of the year, in the northern hemisphere covering the period from the sun's crossing the equinoctial, at the autumnal equinox, about September 22, till it is on the tropic of Capricorn, at the winter solstice, December 22. Popularly the autumn in America is the three months of September, October, and November; and in England August, September, and October. The American autumn is often considered the most agreeable part of the year. South of the equator the seasons are, of course, reversed, and autumn extends from about March 22 to June 22.

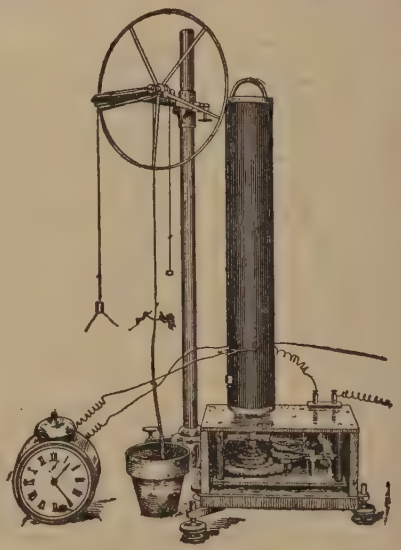
AUTUN, ō'tĕN' (Lat. *Augustodunum,* from Augustus + Gael. *dun,* hill fort; AS. *dun,* hill; Eng. *down*). A town of France, in the department of Saône-et-Loire (Burgundy), picturesquely situated at the foot of Mont-Jeu (Map: France, N., K 6). It is the see of a bishop, and has a cathedral of remarkable beauty, built in the eleventh and twelfth centuries. The spire belongs to the fifteenth century. Autun has a college, a diocesan seminary, several museums, a library, and is a busy manufacturing centre. Cloth, carpets, machinery, furniture, leather, and paper are some of the principal products. Autun arose near the site of the ancient Bibracte, the chief city of the Ædui. Under the Romans it was famous for its school of rhetoric. The town was pillaged by the Saracens in 725 and nearly destroyed by the Normans in 888. There still exist at Autun many ruins of Roman structures; most remarkable are the Roman gates, now called Porte d'Arroux and Porte Saint-André. At the Council of Autun (1094) King Philip I was excommunicated for divorcing his Queen, Bertha. Pop., 1901, 13,605; 1906, 15,479; 1911, 15,498. Consult Lewis, "The Antiquities of Autun," in vol. xl, *Archæological Journal* (London, 1883).

AU'TUNITE. A hydrous phosphate of uranium and calcium, crystallizing in tabular orthorhombic crystals which are lemon-yellow or sulphur-yellow in color. Autunite occurs principally in granitic rocks and is found in Connecticut, North Carolina, and in the Black Hills of South Dakota.

AUVERGNE, ō'vârn'y' (Lat. *Arvernia,* from Gæl. *Ar-fearaun,* high land, from *ard,* high). Formerly a province of south-central France, now included in the departments of Puy-de-Dôme, Cantal, and part of Haute-Loire. The mountains of Auvergne are the highest elevation in the interior of France, with summits over 6000 feet above sea level. They represent former volcanic activity on a grand scale, rising in huge conical peaks, which present a scene of wild desolation. The inhabitants are a simple and laborious people and are accustomed to emigrate each year after the harvest in large numbers to the neighboring regions, or to flock to the great industrial centres of France in search of employment, returning to their homes with their earnings in spring. The region was inhabited in ancient times by the powerful tribe of the Arverni, who ruled over a large part of Aquitania. In the Middle Ages Auvergne was a county. It was permanently united with the French crown in 1532. Consult *La Revue d'Auvergne,* vols. i–xiv (Clermont-Ferrand, 1884–97).

AUWERS, ou'vērs, ARTHUR (1838–). A German astronomer, born at Göttingen. In 1859 he became assistant at the Astronomical Observatory of Königsberg; between 1862 and 1866 he carried on his astronomical work at the Observatory of Gotha and in the latter year was made astronomer to the Berlin Academy of Sciences. In 1878 he became perpetual secretary of the section of physics and mathematics of the Academy. He was chosen on the staff of editors of the *Vierteljahrsschrift* of the German Astronomical Society. Auwers's most important work was in connection with the Venus transits of 1874 and 1882, and he edited the results of German observers, whose work he organized. Among Auwers's numerous other contributions may be mentioned his completion of Sir William Herschel's nebular observation, his heliometric investigations in stellar astronomy, his observations of the proper motion of fixed stars, and the part he took in determining the positions of stars, based on the investigations of Argelander. From 1882 to 1903 he published *Neue Reduction der Bradley'schen Beobachtungen aus den gahren 1750 bis 1762* (3 vols.). In 1903 was printed *Vierzehn unbekannt gebliebene Königsberger Zonen und Catalog von 1309 darin beobachteten sternen für das Aequinoctium 1825.*

AUX'ANOM'ETER (Gk. *αὐξάνειν, auxanein,* to make large, to increase + *μέτρον, metron,* measure). A device for observing or recording the growth of plants during intervals too short



AUXANOMETER.

for direct measurement. The simpler forms of the auxanometer consist of a very light, balanced lever, whose fulcrum is so placed that the length of the long arm is a multiple of the length of the short arm. To the latter a thread from the growing plant is attached. The growth is thus magnified in the ratio of the long arm to the short, usually 10 to 20 times. The long arm traverses a graduated arc, from which its movement may be read, or it may be so placed as to trace its path on a moving smoked surface.

The more elaborate forms consist of a wheel with fine bearings and an accurately balanced rim, about 20 centimeters in diameter, grooved

to carry a thread. The same hub has a smaller wheel with a grooved rim, whose diameter is one-tenth or one-twentieth that of the larger. The wheel is supported on a suitable stand, and the plant to be studied is set beneath it. To the plant a silk thread is attached, carried around the small wheel, and weighted just enough to take up the slack by rotating the hub as the plant grows upward. Over the rim of the large wheel a similar thread is passed, carrying on one end a marker and on the other a counterpoise. The recording apparatus consists of a cylinder driven by clockwork and carrying smoked paper, the marker bearing against the smoked surface. The cylinder may be rotated continuously by clockwork. In that case once in 12 hours the marker describes a spiral line of steep or of low pitch, according to the rate of growth. The best forms, however, release the cylinder by means of an electromagnet, the circuit being closed by a clock, at intervals, when the cylinder is allowed to rotate a short distance (2 to 4 millimeters). This gives a broken line, whose vertical parts represent the growth during the intervals of rotation, and the horizontal parts the distance through which the cylinder turned. A great variety of forms embodying the foregoing principles have been devised and described.

AUX CAYES, ō' kā'. A seaport town of Haiti, situated on the south coast of the island (Map: West Indies, D 3). Its harbor is good and its export trade important, coffee being the principal commodity. It has several domestic industries. In 1816 at this port Bolivar fitted out his expedition to liberate the Spanish colonies in South America. Pop., about 25,000. It is the seat of a United States consular agent.

AUXERRE, ō'sâr' (anciently, *Autissiodorum*). The capital of the department of Yonne, France, on the Yonne, 90 miles southeast of Paris (Map: France, N., J 5). It was originally the see town of a bishop, but the bishopric was abolished by the Napoleonic Concordat, and its fine episcopal palace is used for the prefecture. It is situated on the slope of a hill, in a rich and beautiful district abounding in vineyards. The city is irregularly built; the streets are narrow and dirty; but its aspect from a distance is very imposing, the most prominent feature being the cathedral church of St. Etienne, a remarkably beautiful and imposing structure—one of the most important Gothic buildings in France, which dates from the thirteenth century. The Chapter of Auxerre was once one of the richest in France. The churches of St. Germain and of St. Pierre (sixteenth century) are interesting buildings. There is a curious old clock tower over a gatehouse, "with an ugly skeleton spire of iron bars." The ancient walls of the city have been converted into boulevards. It has a communal college, a hospital in the ruins of the old abbey of St. Germain, a museum of antiquities, and a botanic garden. The principal products are wine, calico, serge, woolen cloths, earthenware, and leather. The Yonne becomes navigable here, and large quantities of Burgundy wines are sent down it to Paris; there is also a considerable export trade in timber and charcoal. Auxerre was a flourishing town before the Roman invasion of Gaul. It successfully resisted the Huns under Attila, who only ravaged its suburbs. Clovis took it from the Romans. After his death it became part of the Kingdom of Burgundy. The English took it in 1359, but it was retaken by Du Guesclin. Charles VII gave it up to the Duke of Burgundy, and it was finally united to the kingdom of France by Louis XI. The Germans bombarded it in 1870. It is the birthplace of the famous Jacques Amyot, once bishop of the see, whose translation of Plutarch is a French classic. Pop., 1901, 16,291; 1906, 20,931; 1911, 21,929. Consult Freeman, "Sens and Auxerre," in vol. xxxix, *Archæological Journal* (London, 1882).

AUXILIARY VERBS. See VERBS; CONJUGATION.

AUXONNE, ō'sŭn' (for Fr. *Au Saône*, on the Saône; ML. *Aussonia*). A French fortress of the second class, in the department of Côte-d'Or, on the Saône, 17 miles southeast of Dijon (Map: France, N., L 5). The town has a sixteenth-century castle, now used as barracks; an arsenal, a school of artillery, a large powder magazine, and the church of Notre Dame, dating from the fourteenth century. Manufactures of cloth, plaster of Paris, bricks, leather, etc., are carried on, and there is a lively trade in these articles as well as in grain, vegetables, and lumber. Pop., 1901, 6135; 1906, 6307; 1911, 6303. The fortress was built by Vauban in 1673.

AUX'OSPORES (Gk. *αὔξειν, auxein*, increase + *σπόρος, sporos*, seed). The peculiar spores of diatoms which increase in size. See DIATOMACEÆ.

AUZOUX, ō'zōō', THÉODORE LOUIS (1797–1880). A French anatomist and physician. He is known as the inventor of the method of making permanent models of anatomical preparations, which are exceedingly important in teaching medicine and are used at present all over the world. He published *Leçons élémentaires d'anatomie et de physiologie* (1839).

AVA, ä'vȧ (for derivation see below). A ruined city of Burma, and repeatedly its capital; the honor having fluctuated at various times between it and Monchobo, Sagaing (on the opposite bank of the river), Amarapura, and Mandalay, the present capital. It stands in lat. 21° 51′ N., 10 miles southwest of Mandalay, on the left bank of the Irrawaddy. The river at this point is about 4000 feet broad, and receives two affluents, which are joined by a canal, rendering the city circumnavigable. The name is a Hindu and Malay corruption of Ængwa or Æan-ua, meaning *fish pond*, as it was built where there were formerly fish ponds, of which some still remain; in official documents it is designated as Ratnapura, i.e., 'City of Pearls.' The city, which was 8 or 10 miles in circumference, is surrounded by walls and ditches and is almost a desert, having been reduced to ruins by an earthquake in 1839. The population, at one time estimated at 50,000, is very small. Several Buddhist temples, with gilded domes, give the city a deceitful appearance of grandeur. Consult Trant, *Two Years in Ava* (London, 1827).

AVA, ä'vȧ, more commonly KAVA (*Piper methysticum*). A plant of the family Piperaceæ, possessing narcotic properties. The ava is a shrubby plant, with heart-shaped, acuminate leaves and very short, solitary, axillary spikes of flowers. It is a native of many of the South Sea islands, where the inhabitants intoxicate themselves with a fermented liquor prepared from its root, or (more accurately) rhizome. The rhizome is thick, woody, rugged, and aromatic. The intoxicating liquor is prepared by macerating it in water. It is often prepared

much as the Indians of the Andes prepared *chicā*, or maize beer—by chewing the root, depositing it in a bowl, straining through coconut husk, and mixing with water or coconut milk, after which fermentation speedily ensues. The taste is unpleasant to those unaccustomed to it. The intoxication is not like that produced by ardent spirits, but rather a stupefaction like that caused by opium. It is succeeded by a copious perspiration. The habitual use of ava is said to cause a whitish scurf on the skin. The leaf of the ava plant is in some places used with the betel nut, instead of that of the betel pepper.

AVADHUTA, ău'vâd-hōō'tà. A member of the mendicant sect of self-torturing Saivites in the south of India. They abandon all worldly restraints and religious observances and have their passions under complete control.

AVAL, ä'vâl. The most important of the Bahrein Islands.

AV'ALANCHE (Fr. *avaler*, to swallow; originally, let fall down, from Lat. *ad*, to + *vallis*, valley). A mass of snow or ice that slides or rolls down the declivities of high mountains and often occasions great devastation. Avalanches are given various names, according to their nature. Drift or powder avalanches (*Staublawinen*) consist of snow which, loose and dry from strong frost, once set in motion by the wind, accumulates in its descent and comes suddenly into the valley in an overwhelming dust cloud. Avalanches of this kind occur chiefly in winter and are dangerous on account of their suddenness, suffocating men and animals, and overturning trees and houses by the wind driven in front of them. Another kind of avalanche resembles a landslip. When the snow begins to melt in spring, the soil beneath becomes loose and slippery, and the snow slides by its own weight down the declivity, carrying with it soil, trees, and rocks. This is also called a landslide and is often the cause of great disasters in mountainous regions. The greatest danger is where elevated tracts of moderate declivity are separated from the valleys by precipitous walls of rock; the softened snow of spring, beginning to roll or slide on these slopes, is hurled over the precipice with fearful force into the valleys. Ice avalanches are those that are seen and heard in summer thundering down the steeps, as those of the Jungfrau. They consist of masses of ice that have become detached from the glaciers in the upper regions, and are most common in July, August, and September. In the mountainous regions of the western United States avalanches are commonly termed "slides," and this term is also used to describe the mountain-side denuded of its vegetation by the avalanche. See LANDSLIP.

AVAL'LENAU, THE (Welsh, of the apple-trees). A poem of uncertain authorship, though accredited to Merlin, notwithstanding reference to events of the twelfth century. Morley quotes Stephens to the effect that the foundation of the poem is the tradition of 140 knights being changed into spirits in the Wood of Celyddon. The significance of the name becomes apparent when it is known that the Celtic heaven is an "island of apples." See AVALON.

AVALLON, ä'vä'lôN' (anciently Aballo). The capital of an arrondissement in the department of Yonne, France, 26 miles southeast of Auxerre (Map: France, N., J 5). It is built on a steep hill of red granite, nearly surrounded by the Cousin. A broad terrace walk, shaded with lime trees, extends around the town, about 500 feet above the bed of the river. The town is generally well built and has broad and clean streets. There are several fine edifices, among which is the church of St. Lazare, remarkable for its handsome Romanesque portals. Manufactures of various kinds are actively carried on, particularly of woolens, pastry, and paper; and there are distilleries, tanneries, glassworks, etc. There is also a considerable trade in wine and the produce of the neighborhood. Avallon is of Celtic origin. It was sacked by the Saracens in 731 A.D., and by the Normans in 843; taken by Charles VII in 1433, retaken by Philip the Good, Duke of Burgundy, in 1455, and pillaged by the troops of the League in 1593. Pop., 1901, 5906; 1906, 5848; 1911, 5900.

AV'ALON, variously written *Avallon*, *Avelion*, and *Avilion* (Welsh *Ynys yr Afallon;* see below). The name of the legendary island to which King Arthur was supposed to have been conveyed after being wounded in his last battle. It has been identified with various places, notably with Glastonbury, in Somersetshire. But it seems clear that in the first instance Avalon was nothing but the Celtic Paradise, or Happy Other-World, the abode of the fairies, which was visited by a number of heroes of Welsh and Irish saga. From it Arthur was expected to return ultimately, healed of all his wounds. The origin of the name is doubtful. *Ynys yr Afallon* is commonly understood to mean the 'Island of Apples,' with reference to the fruit that was often described as growing in the land of the blessed. But it is not to be assumed that the name had this meaning from the beginning. Perhaps it was at first not a local name at all, but rather personal. There is evidence of the existence of Avalloc (Welsh, *Afallach*), a King of the Other-World. Consult J. Rhys, *Studies in the Arthurian Legend* (Oxford, 1891), and F. Lot, in *Romania* (Paris, 1899). For the conception of the Happy Other-World as portrayed in the Irish Saga, consult Meyer and Nutt, *The Voyage of Bran* (2 vols., London, 1895–97).

AV'ALON. A peninsula forming the eastern part of Newfoundland, bounded by Trinity Bay on the north, and Placentia Bay on the south (Map: Newfoundland, G 5). Its coasts are highly indented, forming numerous bays and harbors. It contains the capital, St. Johns, and was the place of the first English settlement in Newfoundland in 1621.

AVALON. A borough in Allegheny Co., Pa., 6 miles by rail west of Pittsburgh, on the Pittsburgh, Ft. Wayne, and Chicago Railroad, and on the Ohio River. It is a purely residential city. Pop., 1890, 804; 1900, 2130; 1910, 4317.

AVALOS, ä'vâ-lōs', FERNANDO FRANCESCO D', MARQUIS OF PESCARA. See PESCARA.

AVARE, L', là'vär' (Fr. The Miser). One of Molière's comedies, based on the *Aulularia* of Plautus, first performed at Paris in 1668. In it the folly and shame of avarice are satirized in the ridiculous situations into which the leading character gets himself. The miser is Harpagon, who keeps his wealth in a casket of gold and rivals his son, Cléante, in the affections of Mariane. Cléante gets possession of the casket and gives his father the choice of it or of Mariane. Harpagon prefers gold to wife, and thus the two young lovers are happily married.

AVA'RIS (Egyptian *Hat-we'ret*, Lake city). A city of ancient Egypt, situated in the eastern part of the Delta; perhaps to be identified with Tanis, the modern Sân. Avaris was the stronghold of the Asiatic Hyksos, or Shepherd Princes, who invaded and subdued a portion of lower Egypt. The princes of Thebes resisted their encroachments, and a prolonged war ensued. Finally, about 1600 B.C., Aahmes I, the founder of the Eighteenth Dynasty, forced the foreigners to take refuge in Avaris, which he closely invested by land and by water. After a long and brave resistance the city was captured, and the Hyksos were driven into southern Palestine. Through this victory the independence of Egypt was secured, and Aahmes united the whole land under his sway. See AMASIS; TANIS.

AVARS, ä'värz, or **AVA'RI.** A tribe of eastern origin, which made its appearance a century later than the Bulgarians in the countries about the Don, the Caspian Sea, and the Volga. One part of them remained at the Caucasus, another part pressed forward (about 555) to the Danube and settled in Dacia. Here they served in Justinian's army and assisted the Lombards to overturn the kingdom of the Gepidæ, and about the end of the sixth century, under the mighty Khan Bayan, they conquered Pannonia. Later they made themselves masters of Dalmatia; pressed devastating incursions into Germany, as far as Thuringia, and into Italy, where they warred with the Franks and Lombards; and extended their dominion over the Slavs living on, and southward from, the Danube, as well as over the Bulgarians as far as the Black Sea. These nations at last rose against them and in 640 drove them out of Dalmatia. Confined to Pannonia, they were subdued by Charlemagne (in 791), and well-nigh extirpated by the Moravians, so that after 827 they disappear from history, those remaining becoming absorbed in the general European population. Keane, in his *Ethnology* (London, 1896), recognizes Avar traces in "the somewhat coarse Mongoloid features" of the so-called "Szeklers" of Transylvania (p. 309). They usually surrounded their settlements with fortifications of stakes driven into the ground, some traces of which, under the name of "Avarian rings," are yet found in the countries formerly occupied by them. The Avars belonged to the same great Finno-Tatar stock as the Huns, Magyars, etc., whose original habitat was somewhere in central Siberia.

AVARS. One of the Lesghian tribes of Daghestan, in the Caucasus, estimated to number about 100,000. They profess Mohammedanism and possess a written language with Arabic characters. They are noteworthy from the fact that the great Lesghian warrior and patriot, Schamyl (d.1871), who led the peoples of the Caucasus in their struggle against Russia, was an Avar. Deniker (1900) classes the Avars-Andi with the Dido, as one of the five great linguistic divisions of the Lesghian stock. Slight Mongolian resemblances, exaggerated by some authorities, do not indicate real relationship. See LESGHIANS; CAUCASUS.

AVARY, ä'vâ-rĭ, MYRTA LOCKETT. An American author and social worker, born in Halifax, Va. For several years after completing her education she did editorial work on various New York magazines and contributed to the secular and religious press. She made special studies in social conditions in New York and became identified with fresh air and settlement work and with various metropolitan charities. She was afterward engaged in sociological and historical work in the South. In addition to contributions to periodicals on sociological subjects, she wrote: *Dixie after the War* (1906); *Joel Chandler Harris and his Home* (1913), and edited *A Diary from Dixie; A Virginia Girl in the Civil War* (1903); *Letters and Recollections of Alexander H. Stephens* (1910).

AVATAR, ăv'ä-tär' (from Skt. *avatāra; ava*, down + *tar*, to pass over). A term which primarily signifies, in Sanskrit, 'a descent,' but is specially applied to the descent of a Hindu deity upon the earth in a manifest shape, either for beneficent or for retributive ends. It is thus almost synonymous in its signification with the Christian term *incarnation*. The word is sometimes rhetorically employed in English literature. The ten avatars of Vishnu (q.v.), who has descended for the good of the earth, are the most famous in Hindu mythology.

AVATCHA, ä-vä'chä. A bay on the southeast coast of Kamchatka in lat. 52° N., affording the best harbor on the coast. Its shore line is 30 miles long. The Avatcha River flows into it, and the town of Petropavlovsk stands on it.

AVATCHA. A volcano, with two craters, on the Kamtchatka Peninsula, in lat. 53° 18′ N. and long. 158° 47′ E. (Map: Asia, P 3). In many respects it resembles Vesuvius. Its larger crater is several hundred yards in circumference, its height is estimated at from 8360 feet to 10,840 feet, and its most violent recorded eruptions occurred in 1827, 1837, and 1855.

AVEBURY, FIRST BARON. See LUBBOCK, SIR JOHN.

AVEBURY, ā'bĕr-ĭ, or **ABURY.** A small village in Wiltshire, England, 25 miles north of Salisbury and 6 miles west by north of Marlborough. It is the site of megalithic structures of ancient date. An earthen rampart 40 feet in height originally inclosed a circle about 1100 feet in diameter, outlined by stones averaging 16 feet in height. Within the large circle were two smaller double circles, with monuments at the centre. An avenue of similar stones led from the outer ring in a southeasterly direction to Silbury Hill, the largest artificial hill in Europe, supposed to be a British barrow. Avebury Circle is popularly conjectured to be the remnant of a Druid temple, but its real date or character has not been ascertained. It gives its name to the title of the scientist, Sir John Lubbock (Lord Avebury). Pop., 1911, 636.

AVEIRO, ä-vĕ'ê-rōō. A seaport and seat of a bishopric in Portugal, in the province of Beira, 31 miles northwest of Coimbra (Map: Portugal, A 2). It is situated at the mouth of the Vouga, on the Rio d'Aveiro, a salt lake or lagoon, extending 5 leagues to the north, is separated from the sea by a narrow bar of sand, and is intersected by numerous canals. It has a brisk export trade in salt, oil, wine, fish, timber, glass, and oranges. Kaolin and quicksilver are mined. Pop., 1911, 11,523.

AVÉ-LALLEMANT, ä'vâ' lä'l'mäN', FRIEDRICH CHRISTIAN BENEDICT (1809–92). A German criminologist. He was born in Lübeck, studied at Jena, became advocate at Lübeck in 1834, and was a police magistrate in that city from 1851 to 1868. His chief work is *Das deutsche Gaunertum* (4 vols., Leipzig, 1858–62), a study of the history of crime in Germany, with interesting researches into the dia-

lect of criminals. Among his other works are *Die Krisis der deutschen Polizei* (Leipzig, 1861) and *Die Reform der Polizei in Hamburg* (Hamburg, 1862). He also wrote a series of detective stories.

AVÉ-LALLEMANT, Robert Christian Berthold (1812–84). A German physician and traveler, brother of Friedrich Christian Benedict Avé-Lallemant. He practiced medicine for many years at Rio de Janeiro. His principal works are *Reise durch Südbrasilien* (2 vols., 1859); *Reise durch Nordbrasilien* (2 vols., 1860); *Fata Morgana* (1872), and *Wanderungen durch die Pflanzenwelt der Tropen* (1880).

AVELLANEDA, ä-vā'lyä-nā'dä, Alonzo Fernandez de. The pseudonym of the author of a spurious second part of *Don Quixote*, published a year before Cervantes's own sequel appeared. The real name of this writer is not definitely known, but his work has been ascribed to 9 or 10 different writers. The appearance of this second part is supposed to have impelled Cervantes to greater industry in completing Don Quixote. See Cervantes.

AVELLANEDA Y ARTEAGA, Gertrudis Gómez de. See Gómez de Avellaneda y Arteaga, Gertrudis.

AVELLANUS, Arcadius. See Mogyorossy.

AVELLINO, ä'vĕl-lē'nō. An episcopal city, and the capital of the province of Avellino, south Italy, on the southern Naples-Benevento Railway, 18 miles south of Benevento (Map: Italy, J 7). The ruins of the ancient Abellinum are nearly 3 miles distant. Near by is the famous convent of Monte Vergine, founded in 1119, on the ruins of a temple of Cybele, and visited every year by tens of thousands of pilgrims, many of whom ascend the mountain barefoot and crawl on their hands and knees from the church door to the altar. Avellino has a market place containing beautiful obelisks, an academy, and a theatre. It has numerous mills and shoe factories and manufactures cloth, hats, and chairs. The country has been famous for chestnuts and hazel nuts since Pliny's time. Pop. (commune), 1881, 20,000; 1901, 23,760; 1911, 23,926.

AVELLINO, ä'vĕl-lē'nō, Francesco Maria (1788–1850). An Italian archæologist, born at Naples. He was educated at Rome, and was professor of Greek literature at the university of his native city, and private tutor of the children of Murat (1809–15). In 1820 he was appointed to the chair of political economy at the University of Naples and afterward to that of institutions and codes. Besides his catalogue of the valuable collection of coins in the Museo Borbonico (1820), of which institute he became director in 1839, he published a large number of writings under the title of *Opuscoli diversi* (1826). He founded the *Bolletino Archeologico Napolitano*.

AVE MARIA, ä'vä mä-rē'ä (Lat. hail Mary, from *avere*, to be well, fare well), also Angelic Salutation. A form of address to the Virgin Mary, expressing honor to her and requesting her intercession; among Roman Catholics in universal and frequent use, generally coupled with the recitation of the Lord's Prayer. The first part, "Hail [Mary], full of grace, the Lord is with thee," is the salutation of the Archangel Gabriel (Luke i. 28) to Mary; the second the address to her of her cousin Elizabeth (verse 42), "Blessed art thou among women, and blessed is the fruit of thy womb"; the prayer which forms the third part, "Holy Mary, mother of God, pray for us sinners now and in the hour of our death," was added in substance in the fifteenth century. The form at present in use appears first c.1514, and probably comes from Italy. The daily use of the whole prayer was ordered by Pope Pius V in 1568. See Rosary.

AVEMPACE, ä'vâm-pä'thâ (Abu Beke Mohammed ibn Jahya, surnamed Ibn Sayigg and Ibn Bajja, which was later given by the scholastics as Avempace). An Arabic philosopher, physician, and poet. He was born in Saragossa toward the end of the eleventh century, and died at Fez in 1138 as a result of poison administered by an envious physician, Abu'l 'Ala ibn Zuhr. At Saragossa he held a high official place, but his philosophical and religious opinions lost him his position. In 1119 we find him in Seville, where he composed his works on logic. From there he traveled to Granada, and then to Fez, where he gained the favor of the Almoravide court. The importance of Avempace lies in the fact that he introduced the Peripatetic philosophy into Andalusia. Besides commentaries on the works of Aristotle, Avempace composed a work mentioned by Averroës, *Fi tadbir al-mutawahhid* ('Conduct of the Individual'), in which he points out methods necessary for the perfection of the individual who lives surrounded by so many hindrances to development. By speculation and intellectual effort, and not by mysticism, as Ghazali taught, man is enabled to reach the divine intellect, of which Avempace teaches the individual intellect is a part. He is said to have rejected the Koran and denied immortality. He wrote works also on medicine and music and composed poems. Consult Brockelmann, *Geschichte der arabischen Litteratur* (Weimar, 1899), vol. i, p. 460.

AVE'NA. See Oat.

AVENARIUS, *Ger pron.* ä'fe-nä'rê-us, Ferdinand (1856–). A German æsthetic philosopher, art critic, and lyric poet, nephew of Richard Wagner, born at Berlin and educated at the universities of Leipzig and Zurich. He devoted himself to the philosophy of art, and in 1887 became the founder of the *Kunstwart*, an art journal of reformatory tendencies, which publication, after many reverses and antagonisms, became the foremost organ of its class. He is the editor of a popular and extensive collection of art reproductions. The poetic works of Avenarius are the idyl *Die Kinder von Wohldorf* (1886; 6th ed., 1910); *Lebe!* (1897, 8th ed., 1909); and the collections entitled *Stimmen und Bilder* (1897; 7th ed., 1910) and *Hausbuch deutscher Lyrik* (10th ed., 1910). His critical works comprise the anthology, *Deutsche Lyrik der Gegenwart* (2d ed., 1884) and *Max Klinger's Griffelkunst* (2d ed., 1907); *Balladen Buch* (1907, 1910); *Das fröhliche Buch aus deutscher Dichter und maler Kunst gesammelt* (1910). For criticism, consult G. Heine, *Ferdinand Avenarius als Dichter* (Leipzig, 1904).

AVE'NA'RIUS, Richard (1843–96). A German philosophical writer. He was born in Paris and studied philosophy at the universities of Zürich, Berlin, and Leipzig. From 1877 until his death he filled the chair of philosophy at Zürich and acted as co-editor of the *Vierteljahrsschrift für wissenschaftliche Philosophie*. His principal original contribution to philosophy was a theory of experience, which is embodied in

his *Kritik der reinen Erfahrung* (2 vols., Leipzig, 1889, 1907). He also wrote on Spinoza's pantheism and on other philosophical subjects. Consult O. Ewald, *Richard Avenarius als Begründer des Empiriokritizismus* (Berlin, 1905), and W. T. Bush, *Avenarius and the Standpoint of Pure Experience* (New York, 1905).

AVENBRUGGER, ä'fen-brug'ër. See AUENBRUGGER.

AVENCHES, å'vänsh'. A village in the canton of Vaud, Switzerland, 7 miles northwest of Freiburg, and 1½ miles south of Lake Morat, on the ancient shore of which it was located (Map: Switzerland, B 2). It is interesting as the Roman Aventicum, the capital of the Helvetii, and its remains include those of an amphitheatre, walls, and a Corinthian column (39 feet high) of a temple of Apollo. This column, celebrated by Byron in *Childe Harold* (3d canto, 65th line), is known as Le Cicognier, from the fact that for centuries storks have used it as a nesting place. Avenches is the German Wiflisburg (castle of Wiflis, a Count of Burgundy of the seventh century). The castle is built on the site of the Roman Capitol, and there is a museum in the amphitheatre. During the Roman period Avenches had 60,000 inhabitants. Pop., 1910, 1802.

AV'ENEL, JULIAN. A character in Scott's novel, *The Monastery*, who has seized Avenel Castle at the opening of the story. He is the uncle of Mary Avenel.

AVENEL, MARY. The daughter of Lady Avenel and, ultimately, the wife of Halbert Glendinning, in Sir Walter Scott's novels, *The Monastery* and *The Abbot*.

AVEN'GER OF BLOOD. In primitive society the person, usually the next of kin of the murdered man, charged with the duty of avenging the crime of murder by slaying the murderer. The legal recognition of this duty and its regulation by law are really the beginnings of a system of criminal law. The crimes with which primitive law concerns itself are crimes of violence—man-killing, wounding, and robbery. Their punishment, however, is not, as with us, a matter for the state, but is left to the injured person or to his kinsman. This legalized right of private vengeance, called the blood feud (see BLOOD FEUD), was, in course of time, mitigated by the doctrine of sanctuary (q.v.), which held the vengeance of blood in abeyance until passions had time to cool and the justification of the deed could be made to appear (see ASYLUM); and by the institution of the wergild (q.v.), whereby the wrongdoer was permitted to commute the natural penalty of his crime for a money payment. This wergild went to the avenger of blood, and the barbarous codes of the early Middle Ages contain elaborate provisions for determining the amounts to be paid and the persons entitled, as avengers of blood, to share in the payment.

The Mosaic law (Num. xxxv.) recognized this institution of primitive society, but placed it under regulations, prohibiting the commutation of the penalty of death for money, and appointing "cities of refuge" for the manslayer who was not really a murderer. (See CITY OF REFUGE.) The Koran sanctions the avenging of blood by the nearest kinsman, but also sanctions the pecuniary commutation for murder. The primitive custom subsists in full force among the Arabs at this day. The hereditary feuds of families, clans, and tribes in barbarous and semi-barbarous countries are survivals of this institution.

AVE'NIO. A Roman town in Gallia Narbonensis, now Avignon.

A'VENS. See GEUM.

AV'ENTINE. The southernmost of the hills of Rome, east of the Tiber. It was included in the city by Servius Tullius, and settled by the plebs in 455 B.C. Of many temples and edifices no traces remain. (See ROME.) Consult Platner, *Topography and Monuments of Ancient Rome* (New York, 1911).

AV'ENTI'NUS, JOHANNES (1477–1534). A German historian, born at Abensberg, Bavaria. His real name was Turmair. He studied at Ingolstadt and at Paris, and taught Greek and mathematics at Cracow and poetry and forensics at Vienna. In 1509 the Duke of Bavaria called him to Munich and intrusted him with the education of his sons. Here he wrote his valuable history of Bavaria (*Annales Boiorum*), which occupied him 16 years. This work was not published until 20 years after his death, and then only with large portions adverse to the Roman Church excised. These, however, were all restored in Cisner's edition (1580). Among his other works are *Chronicon sive Annales Schirenses* (1600) and *Vita Henrici IV* (1518). Consult Döllinger, *Aventinus und seine Zeit* (Munich, 1877).

AVENTURINE, å-vën'tû-rin (from It. *avventurino*, from *avventura*, adventure, chance; refers to its accidental discovery). A transparent to opaque variety of quartz, either red, yellow, or brown, with iridescent spangles of mica, hematite, or other minerals scattered through it. The specimens found at Cape de Gata in Spain have been cut and used as gems; also those found at Glen Fernat in Scotland. A few localities have been reported in the United States. The name "aventurine" is also given to certain varieties of feldspar, as orthoclase and oligoclase, which have the property of reflecting light in various colors from points inside the mineral. The best specimens are from Swedestrand, Norway, and excellent varieties have been found in Statesville, N. C. These are cut and sold as gems, under the name of sunstones. A similar effect was produced by the Venetian glass makers, who are said to have discovered the method of artificially producing this effect by accidentally dropping brass filings into melted glass.

AVENZOAR, ä'vën-zō'ër (ABU'L MARWAN ABD AL MALIK IBN ZUHR) (c.1072–1162). An eminent Spanish-Arabian physician, born at Seville. A close student of such medical works as had been translated from Greek into Aramaic and Arabic, and especially a great admirer of Galen, Ibn Zuhr insisted upon the importance of the experimental method. His remarkable knowledge of anatomy and his careful diagnosis of disease in himself as well as in others led him to propose and to try many experiments. He prescribed the introduction of food into the stomach by a silver tube, and suggested in cases of obstruction tepid baths of nutritive liquids taken by cutaneous imbibation. Ibn Zuhr influenced by his scientific method the great philosopher Averroes (q.v.), who, according to Leo Africanus, attended some of his lectures. A book of his on *The Method of Preparing Medicines and Diet* was translated first into Hebrew (1280) and then into Latin (1490).

AV'ERAGE (OF., Low Lat. *averagium*, pos-

sibly from OF. *aver*, property, cattle; literally, to have, Lat. *habere*). A medium; any medial amount obtained by comparison of a number of specific cases; e.g., three persons have the respective ages 20 years, 30 years, 50 years; their average is ⅓ (20 + 30 + 50) years, or 33⅓ years. The average of two quantities is called their arithmetic mean. (See MEAN.) The process of averaging is of importance in the comparison of statistics, as the average yield of staple products per acre or per year for a period of years, the average monthly shipment of gold to foreign countries, the yearly average of emigration, or the average monthly rainfall. In the case of physical measurements the items are not generally of equal accuracy. Hence the items are given different weights, the process of averaging becoming more complicated, and the method of least squares (see LEAST SQUARES, METHOD OF) is commonly employed.

AV'ERAGE, IN MARITIME LAW. The generic sense of this term in maritime law appears to be: the loss of property while embarked upon a maritime adventure. *Particular average* denotes a loss which is borne by the party whose property is injured or destroyed and towards which others are not bound to contribute. Examples of this are: Carrying away of masts by storm; accidental stranding or collision of the vessel; capture of the ship or cargo by an enemy. *Petty average*, or *customary average*, is applied to certain expenditures, such as pilotage, anchorage, and towage charges in port, which were formerly apportioned among the owners of ship and cargo, but which are now generally provided for in bills of lading.

General average was defined by the International Congress at Brussels in 1888 as follows: "An extraordinary expenditure, or a sacrifice voluntarily made by the captain or pursuant to his orders, for the common good and safety of the ship and cargo." For the adjustment of general-average losses, a body of regulations was adopted by the Association for the Reform and Codification of the Law of Nations, at Antwerp, in 1877, and amended by the Association at Liverpool in 1890. It is known as the York-Antwerp Rules, and is often agreed upon by parties to shipping articles as the measure of their duties and liabilities. In the observance of such an agreement these rules have no binding force upon litigants and are of value only as a careful statement of the views of experts. The law of general average is a part of the maritime law, or law of the sea, as distinguished from the municipal law, or law of the land. It was introduced into English jurisprudence from the Roman law, which, in turn, had adopted its principles from the laws of Rhodes. A person's right to general-average contribution does not depend upon an express contract, although it may be modified by agreement. It rests upon mercantile custom; but a custom so definite and so well understood that every mercantile adventure is entered upon with the actual or presumed knowledge on the part of all interested that the right accompanies, and forms a part of, the transaction. Accordingly some eminent judges have declared that the right now arises from an implied contract.

In order to constitute a case of general average, three things must concur, viz.: 1. "A common danger; i.e., a danger in which ship, cargo, and crew all participate; a danger imminent and apparently inevitable, except by voluntarily incurring the loss of a portion of the whole to save the remainder. 2. There must be a voluntary jettison, or casting away of some portion of the joint concern, for the purpose of avoiding this imminent peril; or, in other words, a transfer of the peril from the whole to a particular portion of the whole. 3. This attempt to avoid the imminent peril must be successful." It will be noticed that this statement of the principles by the United States Supreme Court is not broad enough to include every case where one's property is destroyed for the purpose of saving the property of another. The sole object of the sacrifice must be that of saving a ship, its cargo, and crew from a common peril. If the ship or its cargo is sacrificed to save another ship, or other property not included in the common adventure, it is not a case of general average. Again, if the loss is involuntary, it is not the subject of general average. For example, if a ship is attacked by pirates or by an enemy, anything voluntarily sacrificed by the master of the ship in buying off or getting rid of the assailant is a general-average loss, while anything captured is not. So, if a vessel lying at its dock, or its cargo, is injured or destroyed by local authorities, as incidental to the extinguishment of a fire or the preservation of outside property, it is not a case of general average; but it is such a case if the injury or destruction is authorized by the master, and, therefore, is voluntary. When it is said that the attempt to avoid the peril must be successful, all that is meant is that some portion of the common adventure must be saved from the peril. It is not necessary that the voyage be accomplished, or even that the property saved from the first peril be brought to its destination; its destruction from a second and distinct peril does not affect the general average arising from the first.

There are two exceptions to the rule that sacrifices or expenditures made for the preservation of the whole adventure are made good to the owner of the injured interest by contribution levied on the whole adventure: First, when the loss is due to the fault of the injured owner. Second, when the injured or sacrificed goods were carried on deck; unless such deck cargo was permitted either by the established custom of navigation or by the assent of the owners of the general cargo. The second exception rests upon the general rule of maritime law that the deck of a ship is an improper place for cargo, as its stowage there interferes with the safe navigation of the vessel.

In the absence of a special agreement to the contrary, all the imperiled property saved must contribute to make good the loss of that which was voluntarily sacrificed by the master, or common agent of all. The owner of the sacrificed interest is not reimbursed for his entire loss. On the other hand, he is bound to contribute to his own loss proportionally with his co-adventurers. In other words, the owners of the saved property contribute that percentage of its value which the value of the lost property bears to the value of all that was imperiled. As a rule, the value of a saved interest upon which it must pay contribution is the same as the value upon which it would have received contribution had it been sacrificed. In the case of the ship, this is her fair value to her owners at the time and place of adjustment; in the case of freight, its net value at that time; in the case of cargo,

the market value of the goods at the end of the voyage, less charges for freight, duties, and the like. While the ordinary place for adjusting general-average contributions is the port where the voyage was to end, the adjustment may be made elsewhere, either upon the assent of all parties interested, or by reason of necessity as in case of a disaster which prevents the completion of the voyage. When made in accordance with the law of the proper place, the adjustment is binding everywhere.

While the rules relating to general average were established many centuries before insurance was practiced, they are associated quite closely now with marine insurance. See MARINE INSURANCE, and consult the authorities referred to under INSURANCE.

A'VERELL, WILLIAM WOODS (1832–1900). An American soldier, famous as a cavalry leader during the Civil War. He was born in Cameron, N. Y.; graduated at West Point in 1855; and from 1857 to 1859 was engaged in frontier duty against the Indians. During the Civil War he took part, as first lieutenant in a cavalry regiment, in the first battle of Bull Run; and as colonel of volunteers in the Peninsular campaign; was raised to the rank of brigadier-general of volunteers in September, 1862; and in March, 1863, began the series of cavalry raids for which he became famous. On these raids, in 1863–64, he fought numerous battles and skirmishes, destroyed many miles of railroad, captured large quantities of supplies, and did much to disconcert the Confederates and assist Federal commanders in carrying out their plans of campaign. In March, 1865, he was brevetted brigadier-general, for "gallant and meritorious services" during the war, and major-general for gallantry in the battle of Moorfield, Va., and in May resigned from the service. From 1866 to 1869 he was United States Consul General to British North America. He then became president of a large manufacturing company, and on Aug. 17, 1888, was reappointed captain in the United States army; but retired on the 31st of the same month. He invented a form of asphalt pavement now in general use, the Averell insulating conduits for wires and conductors, and a method for manufacturing cast steel direct from the iron ore in one operation.

AVER'NUS (Lat., Gk. *Ἄορνος, Aornos,* usually derived from *ἀ, a,* priv. + *ὄρνις, ornis,* bird), now LAGO D'AVERNO. A small, nearly circular lake in Campania, Italy, situated between Cumæ, Puteoli, and Baiæ. It is about a mile and a half in circumference and occupies the crater of an extinct volcano. The sulphurous and mephitic vapors arising from the lake were believed in ancient times to kill the birds that flew over it. Owing to its gloomy aspect, it became the centre of many ancient fables of the world of shades. Here was situated Homer's Nekyia, or entrance to the underworld; here the Cimmerians are said to have dwelt—a people who lived in deep caverns, without ever coming into the light of day, and imparted oracles learned beneath the earth; here also were placed the grove of Hecate and the grotto of the Cumæan Sibyl. Agrippa caused the dense woods to be thinned, by which the place lost most of its wildness; he transformed the lake into a naval headquarters, known as the Portus Iulius, which he connected by a canal with the Lacus Lucrinus. By his orders, too, Cocceius constructed the famous tunnel through the mountain to Cumæ. The lake was also connected in ancient times with the Gulf of Baiæ.

AVERROËS, ȧ-vĕr'ō-ēz (ABU 'L WALID MOHAMMED IBN AHMED IBN ROSHD) (c.1126–98). A famous Spanish-Arabian philosopher and jurist, born at Cordova. His father and grandfather had been great jurists. At Cordova he studied theology and philosophy under Tofail and medicine under Ibn Zuhr. By Ibn Tofail he was introduced to Abu Yakub Yusuf, the Caliph of Morocco. Averroës, however, did not stay long in Morocco. In 1169 he was appointed judge in Seville, and then at his native town, Cordova. In 1182 he was appointed physician to the Caliph of Morocco, but again he left to take a judgeship in Cordova. Being accused of doctrines contrary to orthodox Mohammedanism, he was deprived of his office and exiled to Lucena, where he lived in great poverty. Again he was called to Morocco, where he died. He had several sons, one of whom expounded his father's theory of the intellect. Averroës regarded Aristotle as the greatest of all the philosophers; his commentaries on the works of Aristotle (extant in Hebrew and Latin translations) exerted a great influence on the scholastic school in Europe. He opposed the orthodox school, and insisted that the Koran must be explained in the light of reason and not along mystical lines, as had been done by Ghazali (q.v.). The latter's work, *The Destruction of Philosophy,* was answered by Averroës in *The Destruction of the Destruction,* which was translated into Latin by Locatellus (1497–1529). Works of his criticising the positions of Avicenna and Farobi are extant in manuscript. In medicine Averroës sided with Aristotle as against Galen; his medical work, *Colliget,* appeared in Latin (Venice, 1482, 1514). His complete works were published in 1552 at Venice. For more extended bibliography, consult Renan, *Averroès et l'averroïsme* (Paris, 1852, 2d ed., 1860); Brockelmann, *Geschichte der arabischen Litteratur,* vol. i, p. 461 (Weimar, 1899); De Boor, *History of Philosophy in Islam* (Leyden, 1903).

AVERSA, ȧ-vĕr'sȧ. An episcopal city in the province of Caserta, south Italy, 12 miles north of Naples (Map: Italy, J 7). It has a cathedral and monasteries, a famous insane asylum, and an excellent asylum for foundlings. It is famous for *asprino,* a sparkling white wine, and for oil, silk, and fruit. It is near the site of the ancient Atella, whence came the *Atellanæ fabulæ,* coarse farces that in time developed into comedy. The new town was founded in 1029 by the Normans. Pop. (commune), 1881, 21,000; 1901, 23,477; 1911, 23,203.

AVERULINO, ȧ-vā'rōō-lē'nō, ANTONIO. See FILARETE.

A'VERY, ELROY MCKENDREE (1844–). An American author, born at Erie, Mich. He fought in the Civil War and retired with the rank of sergeant-major, graduated at the University of Michigan in 1871, taught in various Ohio schools, and from 1893 to 1897 was a member of the State Senate. Among his many publications are elementary text-books in physics and chemistry, which, in various editions, have been much used in the public schools throughout the United States. He also wrote *Words Correctly Spoken* (1887), *The Town Meeting* (1904), *Elementary Physics* (1906), and *The Groton-Avery Clan* (1911). In 1910 he had published seven of 15 volumes under the title *A History of the United States and its*

People. A monograph on *John Humphrey, Massachusetts Magistrate*, appeared in 1912.

AVERY, SAMUEL (1865–). An American chemist and educator, born at Lamoille, Ill., and educated at Doane College, the University of Nebraska, and Heidelberg. After 1896, with the exception of three years as professor at the Agricultural Experiment Station of the University of Idaho, he served continuously on the faculty of the University of Nebraska until 1908. At that time, when head professor of chemistry, he was appointed acting chancellor, and in the following year was made chancellor. He became known as a popular lecturer on educational subjects, and, besides preparing numerous bulletins of interest to chemists, wrote jointly with H. H. Nicholson *Exercises in Chemistry* (1899).

AVERY, SAMUEL PUTNAM (1822–1904). An American connoisseur and dealer in art. He was born in New York City, where he studied engraving and was extensively employed by leading publishers. He began business as a dealer in art in 1865. In 1867 Mr. Avery was appointed commissioner in charge of the American art department of the Exposition Universelle in Paris. He was a founder, and for long a trustee, of the Metropolitan Museum of Art and was a life member of important scientific, artistic, and educational associations. He founded the Avery Architectural Library at Columbia University in memory of his son, Henry Ogden Avery, an architect of note, who died in 1890. In 1912 Avery Hall, in memory of father and son, was erected on the Columbia campus. Its first floor houses the Avery Library, now rated the richest collection in the country of works on architecture and the allied arts. See COLUMBIA UNIVERSITY.

AVERYSBORO, ā'vēr-ĭz-bûr'ō. A village in Harnett Co., N. C., about 20 miles northeast of Fayetteville. Here, on March 16, 1865, during the Civil War, a Confederate force under Hardee made a stand against Slocum's wing of Sherman's advancing army, but was quickly driven back and during the night retreated upon Smithfield. The Union loss was 77 killed and 477 wounded; the Confederate about 700, including over 200 prisoners.

AVES, ā'vēz (Lat., pl. of *avis*, bird). A class of the phylum Chordata, the birds most distinctly characterized by their exclusive possession of feathers as a covering and by their structural adaptations to flight. See BIRD.

AVES, Los, lōs ä'vās, or **BIRD ISLANDS.** A group of small islands off the north coast of Venezuela, South America, belonging to that republic. They lie east of the Dutch island Buen Ayre and have guano deposits.

AVESNES, ä'vân'. The capital of an arrondissement in the department of Nord, France, on the Helpe, 50 miles southeast of Lille (Map: France, N., J 2). The church of St. Nicholas is a fine building dating from the thirteenth century. Also noteworthy are the Communal College, a public library, and museum. Manufactures of woolens and hosiery are the chief industries. Avesnes was prominent as a centre of conflict during the fifteenth century and was fortified during the reign of Louis XIV according to the system of Vauban. It was bombarded after the battle of Waterloo and for some time was occupied by the allied troops. Pop., 1901, 6217; 1906, 6013; 1911, 5829.

AVES'TA, or **ZEND'-AVES'TA.** The name under which, as a designation, are comprised the bible and prayer-book of the Zoroastrian religion. The Avesta forms to-day the sacred books of the Parsis, or Fire Worshipers, as they are often termed, a small community living now in India or still scattered here and there in Persia. The original home of these worshipers and of their holy scriptures was ancient Iran, and the faith they profess was that founded many centuries ago by Zoroaster (q.v.), one of the great religious teachers of the East.

The Avesta is therefore an important work, as it preserves the doctrines of this ancient belief and the customs of the earliest days of Persia. It represents the oldest faith of Iran, just as the Vedas do of India. It stands as the law of ancient Media, and later of Persia, and apparently also of Bactria. The religion which the Avesta presents was once one of the greatest, and it has left ineffaceable traces upon the history of the world. It flourished fully six centuries before the Christian Era; it certainly became the religion of the later Achæmenian kings, if it was not already the creed of Cyrus, Darius, and Xerxes; but its power was weakened by the conquest of Alexander, and many of its sacred books were lost. It revived again during the first centuries of our own era, but was finally broken by the Mohammedans in their victorious invasion. Most of the Zoroastrian worshipers were then compelled, through persecution, to accept the religion of the Koran; many, however, fled to India for refuge and took with them what was left of their sacred writings. A few of the faithful remained behind in Persia and, though persecuted, they continued to practice their religion. It is these two scanty peoples—perhaps 80,000 souls in India and 10,000 in Persia—that have preserved to us the Avesta in the form in which we now have it.

The designation *Avesta*, for the scriptures, is adopted from the term *Avistāk*, regularly employed in the Pahlavi (q.v.) of the Sassanian time. But it is quite uncertain what the exact meaning and derivation of this word may be. Possibly Phl. *Avistāk*, like the Skr. *Veda*, signifies 'wisdom, knowledge, the book of knowledge.' It may, however, mean 'the law.' The designation *Zend-Avesta*, though made current by Anquetil-Duperron, as described below, is not an accurate title. It arose by mistake from an inversion of the oft-recurring Pahlavi phrase, *Avistāk va Zand*, 'Avesta and Zend,' or 'the Law and Commentary.' The term *Zand* in Pahlavi (cf. Av. *āzaiñti*), as the Parsi priests now rightly comprehend it, properly denotes 'understanding, explanation,' as opposed to the *Avesta* itself, which some maintain signifies 'the unknown' text that needed explanation in order to be understood. It is certain that *Zand* is the name of the later version and commentary of the Avesta texts, the paraphrase which is written in the Pahlavi language. The proper designation for the scriptures, therefore, is *Avesta;* the term *Zend* should be understood as the Pahlavi version and commentary. It is noteworthy that the Greeks never mention the Zoroastrian writings in discussing the Persian faith, while Arabic authors frequently allude to the "Avesta."

Discovery and History of Research of the Avesta.—Of the religion, manners, and customs of ancient Persia which the Avesta preserves to us, we had but meagre knowledge until about

a century ago. What we did know up to that time was gathered from the more or less scattered and unsatisfactory references of the classic Greek and Latin, from some allusions in Oriental writers, or from the later Persian epic literature. To direct sources, however, we could not turn. Allusions to the religion of the Magi, the faith of the Avesta, are to be found in the Bible. The Wise Men from the East who came to worship the Saviour, the babe in Bethlehem, were Magi. Centuries before that date, however, it was Cyrus, the ancient Persian King, whom God called his anointed and his shepherd (Isa. xlv. 1, 13; xliv. 28; 2 Chron. xxxvi. 22, 23; Ezra i. 1–11), and who gave orders that the Jews be returned to Jerusalem from captivity in Babylon. Darius, moreover (Ezra v. 13–17; vi. 1–16), the worshiper of Ormazd, favored the rebuilding of the Temple at Jerusalem, as decreed by Cyrus. Allusions to the ancient faith of the Persians are perhaps contained in Ezek. viii. 16; Isa. xiv. 7, 12. The classical references of Greek and Roman writers to the teachings of Zoroaster, which we can now study in the Avesta itself, may be said to begin with the account of the Persian religion given by Herodotus (450 B.C.). To this account may be added references and allusions, though often preserved only in fragments by various other writers, including Plutarch, "On Isis and Osiris," and Pliny down to Agathias, about 560 A.D. The Armenian writers, Eznik and Elisæus, of the fifth century A.D., also refer to the Zoroastrian religion. After the Mohammedan conquest of Persia we have an allusion by the Arabic writer, Masudi (940 A.D.), who tells of the *Avesta* of Zeradusht (Zoroaster), and its commentary called *Zend*, together with a *Pazend* explanation. The *Abasta* (Avesta) is also mentioned several times by Al-Biruni (about 1000 A.D.). The later Mohammedan author, Shahrastani (1150 A.D.), sketches in outline the creed of the Magi of his day. An interesting reference is found in the Syriac-Arabic Lexicon of Bar-Bahlul (963 A.D.) to an *Avastak*, a book of Zardosht (Zoroaster), as composed in seven tongues—Syriac, Persian, Aramæan, Segestanian, Marvian, Greek, and Hebrew. In an earlier Syriac MS. Commentary on the New Testament (852 A.D.) by 'Isho'dad, Bishop of Hadatha, near Mosul, mention is made of the Abhāstā as having been written by Zardosht in 12 different languages. These latter allusions, though late, are all of them important, as showing the continuity during ages of the tradition of such a work as the Avesta, which contains the teachings of Zoroaster, the Prophet of Iran. All these allusions, however, it must be remembered, are by foreigners. No direct Iranian sources had been accessible.

From this time, moreover, till about the seventeenth century, we find there was little inquiry into the sacred books of the Persians. One of the first series of investigations into the Greek and Roman sources seems then to have been undertaken by a European, Barnabé Brisson, *De Persarum Principatu* (Paris, 1590). The Italian, English, and French travelers in the Orient next added some information as to the religion and customs of the Persians. Among them may be mentioned the works of Pietro della Valle (1620), Henry Lord (1630), Mandelslo (1658), Tavernier (1678), Chardin (1721), Du Chinon. Most important, however, was the work of the distinguished Oxford scholar, Thomas Hyde (1700). It was written in Latin and entitled *Historia Religionis Veterum Persarum*. Hyde resorted chiefly to the later Parsi sources; the original texts he could not use, although an Avesta MS. of the Yasna seems to have been brought to Canterbury as early as 1633. Hyde appealed earnestly, however, to scholars to procure MSS. of the sacred books of the Parsis and aroused much interest in the subject. In 1723 a copy of the Vendīdād Sādah was procured by an Englishman, George Boucher, from the Parsis in Surat, and deposited as a curiosity in the Bodleian Library at Oxford. No one, however, could read the texts. To a young Frenchman, Anquetil-Duperron, belongs the honor of first deciphering them. The history of his labors is interesting and instructive. Happening, in 1744, to see some tracings made from the Oxford MS. and sent to Paris as a specimen, Anquetil-Duperron at once conceived the spirited idea of going to Persia or India and obtaining from the priests themselves the knowledge of their sacred books. Though fired with zeal and enthusiasm, he had no means or aid to carry out his plan. He seized upon the idea of enlisting as a soldier in the troops that were to start for India, and in November, 1754, behind the martial drum and fife, this youthful scholar marched out of Paris. The French government, however, recognizing at once his noble purpose, gave him his discharge from the army and presented him his passage to India. After countless difficulties he reached Surat, and there, in spite of almost insurmountable obstacles, he succeeded in winning the confidence and favor of the priests, with whom he was able to communicate after he had learned the modern Persian. He gradually induced the priests to impart to him the language of their sacred works, to let him take some of the manuscripts, and even to initiate him into some of the rites and ceremonies of their religion. He stayed among the people for seven years, and then, in 1761, he started for his home in Europe. He stopped at Oxford before going directly to Paris, and compared his MSS. with that of the Bodleian Library, in order to be assured that he had not been imposed upon. The next 10 years were devoted to work upon his MSS. and translation, and in 1771, 17 years after the time that he had first marched out of Paris, he gave forth to the world the results of his untiring labors. This was the first translation of the Avesta, or, as he called it, Zend-Avesta (*Ouvrage de Zoroastre*, 3 vols., Paris, 1771), a picture of the religion and manners contained in the sacred book of the Zoroastrians.

The ardent enthusiasm which hailed this discovery and opening to the world of a literature, religion, and philosophy of ancient times was, unfortunately, soon dampened. Some, like Kant, were disappointed at not finding the philosophical or religious ideas which they had looked for; while others missed the high literary value they had expected. They little considered how inaccurate, of necessity, such a first translation must be. Though Anquetil-Duperron had learned the language from the priests, still, people did not know that the priestly tradition itself had lost much during the ages of persecution or oblivion into which the religion had fallen. They did not take into account that Anquetil-Duperron was learning one foreign tongue, the Avesta, through another, the modern Persian; nor did they know how little accurate and scien-

tific training he had had. A discussion as to the authenticity of the work arose. It was suggested that the so-called Zend-Avesta was not the genuine work of Zoroaster, but a forgery. Foremost among the detractors was the distinguished Orientalist, Sir William Jones. He claimed, in a letter published in French (1771), that Anquetil-Duperron had been duped; that the Parsis had palmed off upon him a conglomeration of worthless fabrications and absurdities. In England Sir William Jones was supported by Richardson; in Germany he was supported by Meiners. In France the genuineness of the book was universally accepted, and in one famous German scholar, Kleuker, it found an ardent supporter. He translated Anquetil-Duperron's work into German (Riga, 1776), for the use of his countrymen, especially the theologians, and he supported the genuineness of these scriptures by classical allusions to the Magi. For nearly 50 years, however, the battle as to authenticity still raged. Anquetil-Duperron's translation, as acquired from the priests, was supposed to be a true standard to judge by; little or no work was done on the texts. The opinion that the books were a forgery was gradually, however, growing somewhat less positive. It was the advance in the study of Sanskrit that finally won the victory for the advocates of the authenticity of the sacred books. About 1825—more than 50 years after the appearance of Anquetil-Duperron's translation—the Avestan texts themselves began to be carefully studied by Sanskrit scholars. The close affinity between the two languages had already been noticed by different scholars; but in 1826 the more exact relation between the Sanskrit and the Avesta was shown by the Danish philologian, Rask, who had traveled in Persia and India, and who had brought back with him to the Copenhagen Library many valuable MSS. of the Avesta and of the Pahlavi books. Rask, in a small monograph on the age and authenticity of the Zend language (1826), proved the antiquity of the language, showed it to be distinct from Sanskrit, though closely allied to it, and made some investigation into the alphabet in which the texts were written. About the same time the Avesta was taken up by the French Sanskrit scholar, Eugène Burnouf. Knowing the relation between the Sanskrit and the Avestan, and taking up the reading of the texts scientifically, through his knowledge of Sanskrit, he found at once philological inaccuracies in Anquetil's translation. Anquetil, he saw, must often have misinterpreted his teachers; the tradition itself necessarily must often have been defective. Instead of this less trustworthy French rendering, he turned to an older Sanskrit translation of a part of the Avesta. This was made in the thirteenth century, by the Parsi Neryosangh and was based on the Pahlavi version. By means of this Sanskrit rendering and by applying his philological learning, Burnouf was able to restore sense to many passages of which Anquetil had often made nonsense, and he was thus able to throw a flood of light upon many an obscure point. The employment of Sanskrit introduced a new method. This discovery and gain of vantage ground practically settled the question of authenticity. The testimony, moreover, of the ancient Persian inscriptions deciphered about this time by Grotefend, Burnouf, Lassen, and by Sir Henry Rawlinson, showed still more by their contents and languages, so closely allied to the Avesta, that the work must be genuine. The foundation laid by Burnouf was now built upon by other scholars—Bopp, Haug, Westergaard, Spiegel, Roth, Justi, and later by De Harlez, Mills, Hübschmann, Bartholomæ, and especially Geldner and Darmesteter, in addition to some hardly less-known names, Parsis among them. These scholars, using partly the Sanskrit key for the interpretation and meaning of words, and partly the Parsi tradition contained in the Pahlavi translation, have now been able to give us a clear idea of the Avesta and its contents, so far as the books have come down to us. Upon minor points of interpretation, of course, there are, and always will be, individual differences of opinion.

Contents, Arrangement, Extent, and Character.—The Avesta, as we now have it, is but a small remnant of a once great literature. It has come down in a more or less fragmentary condition; not even a single manuscript contains all the texts that we now have; whatever we possess has been collected together from various codices. All that survives is commonly classed under the following divisions or books: (1) The Yasna, (2) the Vîspered, (3) the Yashts, (4) a collection of minor texts, (5) the Vendîdâd, (6) Fragments. Among these divisions, not counting the Fragments, two groups are recognized. As used in the service of worship, the Vendîdâd, Vîspered, and the Yasna are traditionally classed together for liturgical purposes and form the Avesta proper. In the manuscripts these three books appear in two different forms. If they are kept separate as three divisions, each part is then usually accompanied by a Pahlavi version. On the other hand, since these three books are not recited each as a whole, but the chapters of one book for liturgical purposes are mingled with another, on this account the MSS. often present them in their intermingled form, portions of one inserted with the other, and arranged exactly in the order that they are to be used in the service. In this latter case the Pahlavi translation is omitted, and the collection is called the Vendîdâd Sâdah, or Vendîdâd pure—i.e., text without commentary. The second group, the minor prayers and the Yashts, which the MSS. often include with these, is called the *Khordah Avesta*, or 'Small Avesta.' Of the greater part of the latter there is no Pahlavi rendering. The contents and character of the several divisions may now be taken up in detail.

1. The *Yasna*, 'sacrifice, worship,' is the chief liturgical work of the sacred canon. It consists principally of ascriptions of praise and prayer, and in it are inserted the *Gâthâs*, or 'hymns,' verses from the sermons of Zoroaster, which are the oldest and most sacred part of the Avesta. The Yasna (Skt. *yajña*) comprises 72 chapters, called *Hâ, Hâiti*. These are the texts recited by the priests at the ritual ceremony of the Yasna (*Izashne*). The book falls into three nearly equal divisions. The first part (chap. i–xxvii) begins with an invocation of the god Ormazd and the other divinities of the religion; it gives texts for the consecration of the holy water, *zaothra*, and of the *baresma*, or 'bundle of sacred twigs,' for the preparation and dedication of the Haoma, the juice of a certain plant—the Indian Soma—which was drunk by the priests as a sacred rite, and the offering of blessed cakes, as well as a meat offering, which likewise were

partaken of by the priests. Interspersed through this portion, however, are a few chapters that deal only indirectly with the ritual; these are Ys. 12, the later Zoroastrian creed, and Ys. 19–21, catechetical portions. Then follow the *Gāthās*—literally 'psalms,' or 'songs' (chap. 28–53), metrical selections or verses containing the teachings, exhortations, and revelations of Zoroaster. The Prophet exhorts his followers to avoid the evil and choose the good, the kingdom of light rather than that of darkness. (For the theology of the Gāthās, see ZOROASTRIANISM.) These Gāthās are written in metre, and their language is more archaic than that used elsewhere in the Avesta. The Gāthās, strictly speaking, are five in number, and are arranged according to the metres; they comprise 17 hymns (Ys. 28–34, 43–46, 47–50, 51, 53), and they must have been chanted during the service. In their midst (chap. 35–42) is inserted the so-called Yasna of the Seven Chapters (*Haptanghāiti*). This is written in prose, and consists of a number of prayers and ascriptions of praise to Ahura Mazda, or Ormazd, the archangels, the souls of the righteous, the fire, and the earth. Though next in antiquity to the Gāthās and in archaic language, it represents a somewhat later and more developed form of the religion which in the Gāthās proper was just beginning. The third part (chap. 52, 54–72) of the latter Yasna (*saparō yasnō*) consists chiefly of praises and offerings of thanksgiving to different divinities.

2. The *Vīspered* consists of additions to portions of the Yasna, which it resembles in language and in form. It comprises 24 chapters (called *Karde*, literally, 'sections'), and it is about one-seventh as long as the Yasna. In the ritual the chapters of the Vīspered are inserted among those of the Yasna. It contains invocations and offerings of homage to 'all the lords' (*vīspē ratavō*); hence the name "Vīspered."

3. The *Yashts* (*yešti*, 'worship by praise') consist of 21 hymns of praise and adoration of the divinities, or angels, *Yazatas* (Izads), of the religion. The chief of these are Ardvī-Sūra, the goddess of waters (Yt. 5), the star Tishtrya (Yt. 8), the angel Mithra, the divinity of truth; the Fravashis, or departed souls of the righteous, and the genius of victory, Verethraghna, and of the Kingly Glory (Yt. 19). They are written mainly in metre, have some poetic merit, and they contain much mythological and historical matter that may be illustrated by Firdausi's later Persian epic, the *Shāh-Nāmah*.

4. The minor texts, *Nyāishes*, *Gāhs*, *Sīrozahs*, *Afrīngāns*, consist of brief prayers, praises, of blessings recited daily or on special occasions.

5. The *Vendīdād*, or 'law against the daevas, or demons' (*vīdaēva dāta*), is a priestly code of 22 chapters (*Fargard*), corresponding to the Pentateuch in our Bible. Its parts vary greatly in time and in style of composition. Much of it must be late; some of it even as late, perhaps, as the first or second century of the Christian Era; but much of the material is very old. The first chapter (Farg. I.) is a sort of Avestan Genesis, a dualistic account of creation. Chapter 2 sketches the legend of Yima, the Golden Age, and the coming of a destructive winter, an Iranian flood. Chapter 3 teaches the blessings of agriculture; chapter 4 contains legal matter —breaches of contract, assaults, punishments; chapters 5–12 relate mainly to the impurity from the dead; chapters 13–15 deal chiefly with the treatment of the dog; chapters 16, 17, and partly 18, are devoted to purification from several sorts of uncleanness. In chapter 10 is found the temptation of Zoroaster and the revelation; chapters 20–22 are chiefly of medical character. In the ritual, the chapters of the Vendīdād are inserted among the Gāthās.

6. Besides the above books, there are a number of fragments, one or two among them from the Hādhōkht Nask. There are also quotations or passages from missing Nasks; likewise glosses and glossaries. Here belong the *Nīrangistān*, *Aogemadaēca*, *Vištāsh*, *Yašt*, *Frahang-ī-oīm*, and other fragments. These are all written in the Avesta language and are parts of a once great collection. In Zoroastrian religious literature, though not written in the Avestan language, must also be included the works in Pahlavi, many of which are translations from the Avesta, or contain old matter from the original scriptures.

From the summary given, it will be seen that our present Avesta is rather a prayer book than a bible. The Vendīdād, Vīspered, and Yasna were gathered together by the priests for liturgical purposes. It was the duty of the priests to recite the whole of these sacred writings every day, in order to preserve their own purity and to perform the rites of purification or give remission of sins to others. The solemn recitation of the Vendīdād, Vīspered, and Yasna at the sacrifice might be compared with our church worship. The selections from the Vendīdād would correspond to the Pentateuch when read; the preparation, consecration, and presentation of the holy water, the Haoma juice, and the offering of the Yasna and Vīspered would answer to our communion service; the metrical parts of the Yasna would be hymns; the intoning of the Gāthās would somewhat resemble the Lesson and the Gospels, or even the sermon. In the Khordah Avesta the great Yashts might perhaps be comparable to some of the more epic parts of our Bible; but as being devoted each to some deity and preserving much of the old mythology, they really have hardly a parallel, even in the Apocrypha.

Such, in brief outline, are the contents of our books known as the Avesta to-day; but, as implied above, this is but a remnant of a literature once vastly greater. This we can judge both from internal and from historical evidence. The character of the work itself, in its present form, sufficiently shows that it is a compilation from various sources. This is further supported by the authority of history, if the Parsi tradition, going back to the time of the Sassanidæ, be trustworthy. Pliny (*Hist. Nat.*, 30, 1, 2) tells of 2,000,000 verses composed by Zoroaster. The Arab historian, Tabari, describes the writings of Zoroaster as committed to 12,000 cowhides (parchments); other Arabic references by Masudi, and Syriac allusions to an Avesta, which must have been extensive, have been noted above. The Parsi tradition on the subject is contained in the Rivāyats, and in a Pahlavi book, the *Dēnkart*. The *Dēnkart* (bk. iii) describes two complete copies of the Avesta. These each comprise 21 Nasks, or Nosks ('books'). The one deposited in the archives at Persepolis perished in the flames when Alexander burned the palace in his invasion of Iran. The other copy, it is implied, fell into the hands of the Greeks and by them was translated into the Greek language. From that time the scriptures, like the religion under the Græco-Parthian sway, lived on, partly

in scattered writings and in the memories of the priests, for nearly 500 years.

The first attempt again to collect these writings seems to have been begun under the reign of the last Arsacidæ, just preceding the Sassanian dynasty. Pahlavi tradition, preserved in a proclamation of King Khōsrū Anushirvan, or Chosroes I (531–579 A.D.), says it was under King Valkash that the collection was begun of the sacred writings, as far as they had escaped the ravages of Alexander or were preserved by oral tradition. The Sassanian dynasty (226 A.D.) next came to the throne. This house were genuine Zoroastrians and warm supporters of the faith, and they brought back the old religion and raised it to a height it had hardly reached even in its palmiest days. The first Sassanian monarchs, Artakhshīr Pāpakān (Ardashīr Bābagān, 226–241) and his son, Shāhpuhr I, or Sapor (c.241–272), eagerly continued the gathering of the religious writings, and the Avesta again became the sacred book of Iran. Under Shāhpuhr II (c.309–380) the final revision of the Avesta texts was made by Atūrpāt Māraspend, and then the King proclaimed these as canonical, and fixed the number of the Nasks, or books.

Of these Nasks, 21 were counted, and a description of them, as noted, is found in the Rivāyats and in the Dēnkart; each received a name corresponding to one of the 21 words in the Ahuna Vairya (Honovar), the most sacred prayer of the Parsis. Three groups or classes, moreover, were recognized in subdividing these 21 books: First, the *Gāthā* or *Gāsān* group, a theological series; second, the group of the law, *Dāt;* and third, a miscellaneous class, *Hadha-Māthra,* partly metaphysical. Each of these Nasks contained both Avesta and Zend—i.e., original scripture and commentary. This tradition is too important to be idly rejected. Its contents give an idea of what may have been the original extent and scope of the books of the Avesta. The subjects said to have been treated in the 21 Nasks may practically be described, in brief, as follows: Nask 1 (22 sections), on virtue and piety; 2 (likewise 22 sections), religious observance; 3 (21 sections), the Mazdayasnian religion and its teachings; 4 (32 sections), this world and the next, the resurrection and the judgment; 5 (35 sections), astronomy; 6 (22 sections), ritual performances and the merit accruing; 7 (50 sections before Alexander, 13 then remaining), chiefly political and social in its nature; 8 (60 sections before Alexander, 12 remaining), legal; 9 (60 sections before Alexander, 15 preserved), mainly religious wisdom and advice; 11 (60 sections before Alexander, 6 preserved), religion and its practical relations to man; 12 (22 sections), physical truths and spiritual regeneration; 13 (60 sections), virtuous actions, and a sketch of Zoroaster's infancy; 14 (17 sections), on Ormazd and the Archangels; 15 (54), justice in business and in weights and measures, the path of righteousness; 16 (65 sections), on next-of-kin marriage, a tenet of the faith; 17 (64 sections), future punishments, astrology; 18 (52 sections), justice in exercising authority, on the resurrection, and on the annihilation of evil; 19, the Vīdēvdād, or Vendīdād (22 sections), on pollution and its purification; 20 (30 sections), on goodness; 21 (33 sections), praise of Ormazd and the Archangels.

During the five centuries after the ravages of Alexander much, doubtless, had been lost, much forgotten. The Parsi tradition acknowledges this itself when it says above, for example, that the seventh Nask consisted originally of 50 sections, but only 13 remained "after the accursed Iskander [Alexander]." So says the Dēnkart and so the Rivāyats. Like statements of loss are made of the eighth, ninth, tenth, eleventh Nasks. The loss in the five centuries from the invasion of Alexander till the time of the Sassanian dynasty was but small in comparison with the decay that overtook the scriptures from the Sassanian times till our day. The Mohammedan invasion and the inroads made by the Koran proved far more destructive. The persecuted people lost or neglected many portions of their sacred scriptures. Of the 21 Nasks that were recognized in Sassanian times as surviving from the original Avesta, a single Nask —the nineteenth, the Vendīdād—has come down to us in its full form. Even this shows evidence of having been patched up and pieced together. We can, furthermore, probably identify our present book of the Yasna and Vīspered with the Staot Yasht (*staota yesnya*), or Yasht (*yasnya*), as it is also called. The two fragments, Yt. 21 and 22 (as printed in Westergaard's edition) and Yt. 11, in its first form, are recognized by the MSS. as taken from the twentieth, or Hādhōkht Nask. The Nīrangistān, a Pahlavi work, contains extensive Avestan quotations, which are believed to have been taken from the Hūspāram, or seventeenth Nask. Numerous quotations in Pahlavi works contain translations from old Avestan passages. The Pahlavi work, Shāyast-lā-Shāyast, quotes briefly from no less than 13 of the lost Nasks; the Būndahishn and other Pahlavi books give translations of selections, the original Avesta text of which is lost. Grouping together all the Avesta texts, we may roughly calculate that about two-thirds of the total scriptures have disappeared since Sassanian times.

The present form of the Avesta belongs to the Sassanian period. Internal evidence shows that it is made up of parts most varied in age and character. This bears witness to the statement that during that period the texts, so far as they had survived the ravages of Alexander, and defied the corrupting influence of time, were gathered together, compiled, and edited. The character of the texts, when critically studied, shows the method that must have been adopted. According to the record of Khōsrū Anushirvan (531–579 A.D.), referred to above, King Valkash ordered that all the writings which might have survived should be searched for, and that all the priests who preserved the traditions orally should contribute their share to restoring the original Avesta. These texts, as collected, were reëdited under successive rulers, until, under Shāhpuhr II (c.309–380 A.D.), the final redaction was made. It is manifest that the editors used the old texts as far as possible; sometimes they patched up defective parts by inserting other texts; occasionally they may have added or composed passages to join these or to complete some missing portion. In this respect the textual criticism by means of metrical restoration is most instructive. Almost all the oldest portions of the texts are found to be metrical; the later, or inserted portions, are, as a rule, but not always, written in prose. The grammatical test is also useful; the youngest portions generally show a decay of clear grammatical knowledge. The metrical Gāthās in this respect are remarkably pure.

They are, of course, the oldest portion of the text, dating from Zoroaster himself, despite the view of Darmesteter, who wished to bring the date of their completion down to the first Christian century. The longer Yashts, and the metrical portions of the Yasna, contain much that is very old; in point of time these parts would probably fall but a few centuries later than the Gāthās. The Vendīdād in this respect is most incongruous. Some parts of it are doubtless of great antiquity, though corrupted in form; other parts of it, like the younger portions also of the Yashts, may be quite late. The same is true of formulaic passages throughout the whole of the Avesta, and of some of the ceremonial or ritual selections in the Vīspered and Nyāishes, etc. Roughly speaking, the chronological order of the texts would be somewhat as follows: I. Gāthās (Ys. 28–53), including (II.) the Yasna Haptanghāiti (Ys. 35–42), and some other compositions, like Ys. 12; Ys. 58 in the Gāthā dialect. III. Metrical Yasna and Yashts, Ys. 9–11; Ys. 57, 62, 65; Yt. 5, 8, 9, 10, 14, 15, 17, 19; portions of Vd. 2, 3, 4, 5, 18, 19, and scattered verses in the Vīspered and Afrīngāns, etc. In such cases it is generally, but not always, easy to discover, by style and language, where old material failed and the hand of the redactor came in with stupid or prosaic additions. Considerable portions of our present Avesta, especially the entire Gāthās, we may regard as coming directly from Zoroaster himself; still, additions from time to time must have been made to the sacred canon from his time on till the invasion of Alexander. The so-called copy of the Zoroastrian Bible, which it is claimed was destroyed by that invader, doubtless contained much that was not directly from the founder of the faith, but was composed by his apostles and later followers. The Parsis, however, generally regard the whole work as coming directly from Zoroaster; this is a claim that even the Avesta itself hardly makes. The Gāthās, however, undoubtedly came directly from the Prophet; the Avesta itself always speaks of them as "holy," and especially calls them the "five Gāthās of Zoroaster." We may fairly regard many other portions of the Avesta as direct elaborations of the great teacher's doctrines, just as the Evangelists have elaborated for us portions of the teachings of Christ.

In regard to the locality in which we are to seek the source of the Avesta and the cradle of the religion, opinions have been divided. Some scholars would place it in the west, in Media; others would still maintain that we are to look to the east of Iran, to Bactria, as its source; or again to Afghanistan or Khorassan for the home of the Avestan language. Each of these different views probably has some right on its side, and we shall perhaps not go far astray if we regard the Avesta as coming partly from the east and partly from the west. We know that a number of its scenes may be placed in the east or southeast of Iran; but other scenes are best ascribed to the west, where Zoroaster first appeared. On the question of his original home, see ZOROASTER. The language itself of the texts, as used in the church, became a religious language, precisely as did Latin, and therefore was not confined to any place or time. We may regard the Avesta as having been worked upon from Zoroaster's day down to the time of the Sassanian redaction.

The Pahlavi Version of the Avesta.—To the period of the Sassanian editing of the texts belongs the Pahlavi translation and interpretation of the Avesta. At the date when the texts were compiled and edited, the general knowledge of the language of the Avesta and the understanding of the sacred texts was far from perfect. The preparation of a translation or version became necessary. Accordingly, the great body of the texts was rendered into Pahlavi, the language used by Persia at the time of the Parthian Arsacidæ and the Sassanidæ. The Pahlavi version and interpretation of the Yasna, Vīspered, and Vendīdād, each entire, with some portions of the other texts, has been preserved. We have not yet so thorough an understanding of the Pahlavi version of the old texts as might be wished; but as our knowledge of this translation increases, we shall see more and more its importance. Owing to the somewhat imperfect knowledge of the Avestan texts at the time when the version was made, and owing to the unskillful and peculiar method in which the Pahlavi translation is made, it abounds in numerous errors and inaccuracies. It is often, however, of the greatest value in interpreting allusions, and particularly in giving hints for the meanings of obscure words, and in such matters is our best and only guide. When more fully understood and used in connection with the "comparative method," referring to the Sanskrit, in interpreting the sacred texts, the "traditional method" or native explanation is destined to win great results. The "traditional" and the "comparative" methods must go hand in hand.

Manuscripts of the Avesta.—The oldest manuscript that we possess dates from the middle of the thirteenth century. From that date onward we have a considerable number of codices still extant. They come to us from India and from Yezd and Kerman, in Persia. The Parsi priests, especially the Dasturs, Dr. Jamaspji Minocheherji, and Peshotan Behramji, and their friends have shown princely generosity in aiding western editors by putting valuable MSS. in their possession. It is thus that it was possible for the new edition of the Avesta texts, by Professor Geldner, of Berlin, to be presented in so critical a manner.

The importance of the Avesta lies not alone in the field of philology, ethnology, and early literature, but also in the investigation of comparative religion. Resemblances to Christianity in its teachings become significant when we consider the close contact between the Jews and the Persians during the Babylonian Captivity.

Language of the Avesta.—The language in which the Avesta is written may be best termed *Avestan*, or simply *Avesta*. The designation *Avesta* for the language, as well as the book, is in keeping with the Pahlavi *Avistāk*, which is used both of the tongue and of the scriptures. The term *Avestan*, both for the language and as an adjective, is to be in some respects preferred, in order to distinguish the speech from the work itself. The term *Zend* for the language, as noted above, is a misnomer. The designation *Old Bactrian*, sometimes used for this tongue, has little to recommend it. The language of the Avesta belongs to the Iranian group. With the ancient Persian inscriptions it makes up the Old Iranian division. The later Iranian languages, New Persian, Kurdish, Afghan, Ossetish, Baluchi, Pamir, and other dialects, complete the younger division. The intervening Pahlavi with its Pāzand, and Parsi, does not quite complete the link between the divisions. See IRANIAN LANGUAGES.

The alphabet in which the Avesta is written is far younger than the language it presents. The characters are derived from the Sassanian Pahlavi, which was used to write down the oral tradition when the texts were collected and edited under the dynasty of the Sassanidæ. The writing is read from right to left. What the original Avestan script was we do not know.

Two dialects may be recognized in the Avesta: one, the "Gāthā dialect," or the language of the oldest parts of the Gāthās; the other, "younger Avestan," or the "classical dialect." This latter is the language of the great body of the Avesta. The Gāthā dialect is more archaic, standing in the relation of the Vedic to the classical Sanskrit, or the Homeric Greek to the Attic. Possibly the Gāthā language may also owe some of its peculiarities noticed below to an original difference of locality. The Gāthā dialect was the speech of Zoroaster and his followers. Its grammatical structure is archaic and remarkably pure. The younger Avesta, in its very latest compositions, owing to decay, shows many corruptions and confusions in its inflections. All that is written in metre, however, is old and is generally correct and accurate. Inaccuracies that have crept in we must generally attribute to the carelessness of the scribes. In its forms, as a rule, the Avesta is extremely antique; in general it stands on the same plane as the Vedic Sanskrit, and occasionally, though not often, it shows even more ancient forms.

The language of the Avesta is most closely allied to the Sanskrit, though individually quite distinct from the latter. Together they may be classed as making up an old Indo-Iranian group. Almost any Sanskrit word may be changed at once into its Avestan equivalent, or vice versa, merely by applying certain phonetic laws. As an example may be taken the metrical stanza Ys. 10, 8, in the Avesta:

yō yaθā puθrəm taurunəm
haomәm vandaēta mašyō
frā āpyō tanubyō
haomō vīsāite baēšazai.

'Whosoever kindly welcomes Haoma, even as a tender stripling, to such person Haoma approaches bringing health'—becomes when rendered word for word in Sanskrit:

yó yáthā putrám táruṇam
sómam vandēta mártyaḥ
prá ā́bhyas tanubhyaḥ
sómō višatē bhēṣajā́ya.

In its phonology the Avesta agrees with the Sanskrit in its vowels, but the Avesta shows a greater variety in its *e-* and *o-* sounds instead of *a*. Final vowels, except *ō*, are shortened as a rule. The Skt. diphthong *ē* appears in Av. as *aē, ōi, ē* (final); Skt. *ō* as Av. *ao, ǝu, ō* (final). A striking peculiarity in Av. is the introduction of epenthetic vowels and help sounds, giving rise to improper diphthongs, *bavaiti*, 'he becomes'= Skt. *bhávati;* Av. *haurva-*, 'whole'=Skt. *sárva-;* Av. *vakhǝdhra-*, 'word'=Skt. *vaktra-;* Av. *hvarǝ;* 'sun'=Skt. *svàr*. The Skt. voiceless stops, *k, t, p*, generally become spirants, *kh, th, ph* (i.e., *x, θ, f*) in Av. before consonants. The original voiced aspirates *gh, dh, bh*, became in Av. simply voiced stops *g, b, d*. They are so preserved in the old Gāthā dialect; the younger dialect commonly resolves the latter before consonants and between vowels into spirants *y, s, w*. The sibilant *s* in Skt. initial becomes Av. *h*, as in Greek. Thus, Av. *hapta*, 'seven'=Skt. *saptá*. When internal, Skt. *s* may also appear as *vh*. Thus Av. *vaǝhana-*, 'vesture'=Skt. *vásana-*. Final *-as* of Skt. appears regularly as *-ō*. Thus Av. *aspō*, 'horse'=Skt. *áśvas*. Sanskrit *rt* is often represented by $\overset{\circ}{\text{a}}$. Thus, Av. $a\overset{\circ}{\text{a}}$*m*, 'righteousness'= Skt. *ṛtám*.

The Gāthā dialect regularly lengthens all final vowels. It frequently inserts the anaptyctic vowels: G Av. *fərá* Y Av., *frā*, 'forth'=Skt. *pra*. Original *ns* appears as *ng;* G. Av. *daēvōng* (acc. pl.), Y Av. *daēvān*, 'denoms'=Skt. *dēvān*.

In inflection the Avesta shows nearly the richness of the Vedic Sanskrit. There are three genders—masculine, neuter, feminine; likewise three numbers—singular, dual, plural. The dual is not extensively used. There are eight well-developed cases of the noun and the adjective; the normal endings are: *Sing.*, Nom., *s;* Acc., *-ǝm;* Instr., *-ā;* Dat. *ē;* Abl. *-aṭ;* Gen. *-ō* (*-as*); Loc. *-i;* Voc. ——. *Dual*, Nom., Acc., Voc. *-ā;* Instr., Dat., Abl. *-byā;* Gen. *āṣ;* Loc. *-ō, -yō*. Pl. Nom. Voc. *-ō* (*-as*), *-ā;* Acc. *-ō* (*-as*), *-ā;* Instr. *bī;* Dat. *-byo* (*byas*); Gen. *ąm;* Loc. *-su, -hu, -šva*. The classes of declension agree exactly with the Sanskrit; the method of forming comparison of adjectives likewise corresponds. The numerals answer to Skt. forms, except Av. *aēva-*, 'one,' but Skt. *ēka-*, and Av. *baēvar*, '10,000,' but Skt. *ayúta*. The Av. pronouns closely resemble the Skt., but show also individual peculiarities. Noteworthy is the remote demonstrative Av. *ava, hāo*, 'that, yonder,' contrasted with Skt. *amú, asāu*. The verbal system in Av. and in Skt. is in general identical. The roots are chiefly monosyllabic and are subject to similar modifications in both. In voice, mode, and tense, and in their conjugation system the two languages quite agree. The endings show equal antiquity with the Sanskrit. The primary active endings in Av. are: Sing. 1, *-mi*, 2, *-hi*, 3, *-ti;* Dual, 1, *-vahi*, 3, *-tō, -θō;* Pl. 1, *-mahi*, 2, *-tha*, 3, *-nti*. The Av. possesses like facility with the Skt. in forming words by means of prefixes, and by adding suffixes of primary and secondary derivation. The same classes or compounds may be recognized in both tongues. The rules of Sandhi, or joining together of words in a sentence, so universal in Skt. are almost wanting in Avestan. The Avesta separates every word; the vowels are fully expressed as in Greek, etc., by individual letters. No diacritical points or accents are written in the texts. The metres in which the Gāthās are composed have analogues in the Veda. Almost all the metrical parts of the younger Avesta are in 8-syllable lines. The syntax, however, differs in a number of points from the Sanskrit, and shows certain marked individualities, especially in the later portions.

The best information in general will be found in the contributions by various scholars in Geiger and Kuhn, *Grundriss der iranischen Philologie* (Strassburg, 1895–1904). A new and complete edition of the Avesta texts has been published by Geldner (Stuttgart, 1885–96). The first full editions were by Westergaard (Copenhagen, 1852–54), and by Spiegel (Vienna, 1853–58). The latter is complete only for the Avesta in its narrower sense (Ys. Vsp. Vd.), the Khordah Avesta being omitted; but it gives the Pahlavi version.—Translations: Best for reference is the translation by Darmesteter and Mills in the *Sacred Books of the East* (3 vols., Oxford, 1880

et seq.), and especially the French version by Darmesteter, *Le Zend-Avesta* (Paris, 1892–93); F. Wolff, *Avesta, die heiligen Bücher der Parsen* (Strassburg, 1910).—Lexicons and Grammars: F. Justi, *Handbuch der Zendsprache* (Leipzig, 1864); De Harlez, *Manuel de l'Avesta* (Paris, 1882); Kanga, *Avesta Dictionary* (Bombay, 1899); Bartholomæ, *Altiranisches Wörterbuch* (Strassburg, 1904); Schuyler, Index of *Avestan Fragments* (New York, 1902); Bartholomæ, in *Grundriss der iranischen Philologie* (Strassburg, 1895); Jackson, *Avesta Grammar* (Stuttgart, 1891); Geldner, *Metrik der jüngeren Avesta* (Tübingen, 1877); Reichelt, *Avestisches Elementarbuch* (Stuttgart, 1911).—Readers: Jackson, *Avesta Reader* (Stuttgart, 1893); Reichelt, *Avesta Reader* (Strassburg, 1911).—Literature and Antiquities: Anquetil-Duperron, *Zend-Avesta, Ouvrage de Zoroastre*, etc. (Paris, 1771); Haug, *Essays on the Parsis*, new ed., by E. W. West (London, 1884). See also the introduction of De Harlez, *Avesta* (Paris, 1881); F. Spiegel, *Eranische Altertumskunde* (Leipzig, 1871–78); Sanjama-Geiger, *Civilization of Eastern Iran* (London, 1886); *The Spiegel Memorial Volume*, ed. by J. J. Modi (Bombay, 1908).

AVEYRON, ȧ′vȧ′rôN′. A department in the south of France, named after the river which traverses it from east to west (Map: France, S., G 4). It has an area of 3386 square miles and is one of the most mountainous parts of France, being situated between the highlands of Auvergne and the Cévennes. The principal rivers, of which the Lot alone is navigable, flow through the department from east to west. The climate is healthful, but cold and raw, especially in the north and east. North of the Lot, only rye and oats are grown; in the west grape culture is carried on. Coal is mined at Aubin and Milau, and slate and marble are quarried. Other leading industries include the manufacture of woolen goods, leather, and machinery. Pop., 1896, 386,393; 1901, 382,074; 1906, 377,299; 1911, 369,448. Capital, Rodez.

AVEYRON. A river in the south of France, rising near Séverac-le-Château and flowing west across the department of Aveyron. It receives the Viaur and enters the Tarn below Montauban, in the department of Tarn-et-Garonne. Entire length, 155 miles; navigable for the last 30.

AVEZAC-MACAYA, ȧ′vȧ′-zȧk′ mȧ′kȧ′yȧ′, Marie Amand Pascal d' (1799–1875). A French geographer. He was born at Bagnères de Bigorre and studied law, but after the appearance of his *Essais historiques sur le Bigorre* (2 vols., Bagnères, 1823), devoted himself entirely to geography. He was secretary of the Geographical Society of Paris from 1833 to 1835, and afterward became president of that body, being five times reëlected to the office. The following are his principal works: *Etudes de géographie critique sur une partie de l'Afrique septentrionale* (1836); *Esquisse générale de l'Afrique* (1837); *Description et histoire de l'Afrique ancienne* (1845); *Les voyages d'Améric Vespuce* (1860); *Le livre de Fernand Colombe* (1873).

AVEZZANA, ȧ′vĕt-sȧ′nȧ, Giuseppe (1789–1879). An Italian patriot and politician, born at Chieri, in Piedmont. He was an officer in the Piedmontese army, and for participation in the rising of 1821 was condemned to death, but escaped to Spain, where he fought for the Constitutional party. He was finally made prisoner by the French and deported to Cayenne. He succeeded in making his way to New Orleans and settled at Tampico, in Mexico, where he engaged in trade and took part in the political strife of the times. He received from Santa Anna the command in the three eastern states. Coming to the United States in 1834, he married, engaged in mercantile business with great success, but returned to Italy at the outbreak of the Revolution, in 1848. He was Minister of War of the short-lived Roman Republic, in 1849. After the taking of Rome he went to America. He joined Garibaldi in the Sicilian expedition and was a radical deputy in the new Italian Parliament. At the time of his death he was the active leader of the Irredentists. He died at Rome, Dec. 25, 1879.

AVEZZANO, ȧ′vĕt-sȧ′nō. A city in the province of Aquila, south Italy, 67 miles east of Rome (Map: Italy, H 5). It has a castle belonging to the Barberini. In the office of the estate of Prince Torlonia is a collection of objects found in the Lago di Fucino, the draining of which was attempted in ancient times, but accomplished only in 1875. When the Marsi complained of its frequent overflow, Cæsar elaborated a plan for constructing a channel, 3½ miles long, through Mount Salviano to the Liris (or Garigliano), which, at Capistrello, is 80 feet below the bottom of the lake. At one point the channel was 300 feet underground. The plan was imperfectly executed under Claudius, and improvements were made under Trajan and Hadrian; but in the Middle Ages Frederick II tried in vain to reopen the blocked-up passage. Finally Prince Torlonia, after an expenditure of over $8,000,000, succeeded where his imperial predecessors had failed, and now a road 35 miles long runs around the 42,000 acres of reclaimed ground, which are cultivated in modern fashion. Vine culture and farming are the principal occupations of the inhabitants of the district. Pop. (commune), 1881, 7380; 1901, 9442; 1911, 11,279.

A'VIA'NUS, Flavius. A Roman fabulist, of the end, perhaps, of the fourth century A.D. He published a collection of 42 Æsopic fables in elegiac verse. These were translated into English by Caxton, and published with his *Subtyl Historyes and Fables of Esope* (1483). There are editions by Lachmann (1845) and Ellis (1887). Consult L. Müller, *De Phædri et Aviani Fabulis* (Leipzig, 1875).

A'VIARY. A suitable inclosure, within which living birds may be kept, usually out of doors, in a state of comparative freedom. An aviary is really only a large bird cage and is often seen in warm countries, especially in southeastern Europe, and many exist in England. In the United States, however, the extremes of climate make an outdoor aviary less practical for most private owners, and very few exist. They are increasing, however, and in the vicinity of our larger eastern cities many are erected each year. Indoor rooms devoted to birds are in effect simply large bird cages, and the care of such an aviary is essentially like that of a birdcage; but care should be taken not to put together birds that are not inclined to dwell peaceably with the others. The largest aviary known is the flying cage in the park of the Zoölogical Society of New York. It is a wire cage, supported by a steel-pipe frame, in the form of a Gothic arch, situated among trees, several of which are growing within it; and it measures

153 feet long, 72 feet wide, and 55 feet high. It is the home of herons, gulls, pelicans, and similar large forms, together with many smaller species in summer. Similar smaller aviaries exist for other classes of birds in this, and in the zoölogical gardens of Europe and India, and by the natural conditions and freedom for exercise they afford, have enabled many species to be kept in health and beauty which otherwise would hardly survive continual captivity, and certainly would not breed there as they constantly do in these huge cages.

The chief dangers which must be guarded against in the establishment of an aviary in the United States are heat, cold, rain, mice, owls, and cats. Abundant shade bushes and especially evergreens on the north side will regulate the extremes of sun and bitter winds and will enable the birds to avoid direct drenching rains. The size of the mesh should be as small as possible to keep out vermin, and if the cage cannot be covered at night, all perches should be placed near the centre and as far as possible away from the wire, to enable the birds to avoid direct attack from cats and owls. See CAGE BIRDS and bibliography, and the two monthly periodicals published in England, *The Avicultural Magazine* and *Bird Notes*.

A'VIA'TION. See AËRONAUTICS.

AVICEBRÓN, ä-vē'thä-brōn', SALOMON BEN GABIROL (c.1020–1070). A Jewish poet and philosopher, born at Malaga and educated at Saragossa, where, in 1045, he published a treatise on the correction of customs. His *Fons Vitæ*, or *Sapientiæ*, written in Arabic, was known to the scholastics in the Latin translation of Gondisalvi, and affected the teaching of Erigena, Amaury de Bène, David de Dinan, Roger Bacon, and Giordano Bruno. It was considered the work of a Christian philosopher, and as such his theory of the universality of matter there presented was ably upheld by Duns Scotus, but was severely attacked by Albertus Magnus and Thomas Aquinas. Avicebron belonged to the Jewish school of Jehuda Halevi and Kalis la Sarde, and some of his poems are preserved in the Jewish liturgy. After an unhappy life of wandering, he died at Valencia. Consult Guttmann, *Die Philosophie des Salomon ibn Gabirol* (Göttingen, 1889); Stephen S. Wise, *The Improvement of the Moral Qualities: An Ethical Treatise of the Eleventh Century by Solomon ibn Gabirol* (New York, 1901); M. Wittmann, *Zur Stellung Avencefrol's im Entwickelungsgang der arabischen Philosophie* (Münster, 1905).

AV'ICEN'NA (ABU ALI AL HUSAIN IBN ABDALLAH IBN SINA (980–c.1037). A great Arabic physician and philosopher. He was born at Efsene, a village in the neighborhood of Bokhara, in the month of Safar, in 980. His father held office under the Samanid ruler, Nuh ibn Manzur. Avicenna studied medicine and philosophy at Bokhara, and on account of a cure he received a post in court at the early age of 17. At his father's death Avicenna went to Nasa, Tos, Dahistan, Gurgan, Rai, and Hamadan. At this latter place he gained the favor of Shams al daula and was made vizier; but the opposition of the soldiery compelled him to relinquish this position. Under the successor of Shams al daula, Taga al daula, Avicenna was imprisoned in a fortress, but he managed to escape and fled to Ispahan. Here he spent the remainder of his days as court physician to Ala al daula, whom he accompanied even on his military campaigns. Avicenna led a very arduous life. Although he traveled a great deal, he still found time to write. He died about 1037.

Avicenna is of importance, not only in the history of Arabic medicine and philosophy, but also in the general history of medicine and philosophy. His great work, *Kanun fi'l tibb*, a system of medicine, based on the Arabic translation of the Greek medical works, long held first place both in the Orient and Occident as a text-book in medicine. In the Orient it is still very highly regarded. The work is characterized by systematic classification, sometimes even running to excess. A Hebrew version appeared in 1491. The Arabic text was published in 1593, at Rome, and again at Bulak. A Latin translation by Cremonensis appeared in Venice in 1595. In philosophy Avicenna teaches Aristotelianism, tinged, however, with Neo-Platonic ideas. He tries to reconcile philosophy and religion, an attempt often met with in the later Arabic and Jewish philosophers. His metaphysics appeared in a Latin translation in 1493; his logic in 1495, Venice; 1556, Basel. For an extended bibliography consult Brockelmann, *Geschichte der arabischen Litteratur* (Weimar, 1899); Carra de Vaux, *Avicenne*, vol. i, pp. 452 ff. (Paris, 1900); Wüstenfeld, *Geschichte der arabischen Aerzte* (1840); Ibn Khallikan, *Bibliographical Dictionary* (trans. by De Stone, 1842).

AV'ICU'LIDÆ. A family of large, thin, pseudolamellibranchiate bivalve mollusks, typified by the genus *Avicula*, the wing shells, so called because of their expansive method of growth. The family is numerous in all warm seas and goes back to Devonian times. It includes the pearl oysters and many queerly shaped forms, both fossil and recent, such as the hammer oysters and pinnas. See WING SHELL and Plate of ABALONE, ETC.

AVIENUS, ā'vī-ē'nŭs, RUFUS FESTUS. A Roman poet and official, who flourished during the latter half of the fourth century A.D. He is believed to have been proconsul, first in Africa (366), and afterward in Achaia (372), and was a pagan in religion. The works which have come down to us under his name are *Descriptio Orbis Tarrarum*, which is a Latin paraphrase, in hexameters, of the *Periegesis of Dionysius*, a translation, also in hexameters, of the *Phænomena* and *Prognostica* of Aratus, and a portion, amounting to 702 lines, of a poem called *Ora Maritima*. The last-named piece was a description, in Iambic trimeters, of the coasts of the Mediterranean, Caspian, and Black Seas. His style is superior to that of contemporary writers. The best edition of Avienus is that of Holder (Innsbruck, 1887).

AVIGLIANO, ä'vē-lyä'nō. A city in the province of Potenza, south Italy, on the Foggia-Potenza Railway, 65 miles south of Foggia (Map: Italy, K 7). It stands on a mountain, is surrounded by fir forests, and has marble quarries and mineral springs. Dynamite is manufactured. Pop., 1881, 13,000; 1901, 18,313; 1911, 17,413.

AVIGNON, ä'vē'nyôN' (Lat. *Avenio*, either from *avena*, oats, or from Celt. *avon*, water, referring to the rivers surrounding it). A French town and the seat of an archbishopric in the department of Vaucluse, of which it is the capital. It is situated on the left bank of the Rhône, on a lofty plateau, at a distance of 30

miles from the Mediterranean (Map: France, S., J 5). It presents a most striking appearance upon this wall-girdled height, on the summit of which rises the cathedral, and the impressive mass of the old papal palace; but the streets, as in most walled towns, are crooked, narrow, and often steep; the houses mean and dirty. There are, however, two fine promenades and some pleasant squares. The famous old bridge of Avignon still exists in part. The principal buildings are the venerable cathedral, Notre Dame des Doms, a grand and gloomy Romanesque structure, dating mainly from the time of the Crusades; the papal palace, a Gothic structure of the fourteenth century, with six towers, used for nearly a century as barracks, now a museum; the conservatory of music; the ancient archbishop's palace, now used as a seminary; the Musée Calvet, which contains Roman and other antiquities; and a picture gallery which is one of the best in the provinces. The public library contains 140,000 printed volumes and 32,000 manuscripts, and autographs. Avignon has a lyceum, two theological seminaries, the famous Académie de Vaucluse, and a botanical garden. The industries of the town comprise cotton spinning, paper making, distilling, tanning, the manufacture of agricultural implements, tin, copper, and hardware, chemicals, oil, velvet, taffeta, etc., and there is considerable trade in silk, wine, brandy, olive oil, truffles, grain, and flour; in fact, Avignon is the central wheat market of Provence. Pop., 1906, 48,312; 1911, 49,314. Avignon was a flourishing city under the Romans. Early in the Middle Ages it was part of the Burgundian Kingdom, upon whose dissolution it became a republic or commune, ruled by consuls. The city was the seat of the papal court, from 1309, when Clement V took up his residence there, until 1376, when Gregory XI left it to make Rome once more the papal metropolis. In the period immediately following, the antipopes, Clement VII and Benedict XIII, lived there. The city was the property of the papal see from 1348 to 1791, when it was seized by France. Petrarch, who lived there several years, first saw Laura at Avignon, in 1326. It is the chief seat of the Felibrige Brotherhood, organized about the middle of the nineteenth century to promote the revival of Provençal language and literature. Consult: Müntz, "La cour pontificale d'Avignon," in vol. xxii, *Revue des questions historiques* (Paris, 1899); Peujon, *Avignon; La ville et le palais des papes* (Avignon, 1905); O'Key, *Story of Avignon* (London, 1911).

ÁVILA, ä'vê-lä. A city of Spain, capital of the province of Avila and seat of a bishopric (suffragan to the arch-see of Valladolid), in Old Castile, 53 miles northwest of Madrid (Map: Spain, C 2), on the Adaja River. It stands on the slope of the bleak Castilian hills, surrounded by gray granite walls and castellated towers in perfect preservation, and is one of the most remarkable inland fortress cities in Spain. The walls are 40 feet high and 13 feet thick. There are 86 towers and 9 gates. The city is built largely of granite. There is a cathedral (which is one of the architectural glories of Spain), a military school, a seminary, a hospital, and royal woolen yarn factory. Pop., 1900, 11,885; 1910, 12,060. In the fourth century, the city was called Abula. It is the birthplace of St. Teresa, monastic reformer, and founder of the barefooted Carmelites. Outside the ancient walls, but within the precincts of the city, are the beautiful and interesting churches of Santo Tomás (with its superb marble monument to Prince John, only son of Ferdinand and Isabella, who died in 1497), and San Vicente (with its highly carved marble sarcophagus of the thirteenth century, which serves as a tomb for St. Vincent and his sisters, St. Sabina and St. Christeta, all of whom were martyred by having their heads cut off). Consult: Mélida, "Avila: Iglesias ojivales," in vol. cxxi, *La España moderna* (Madrid, 1899); Wilson, "Avila Cathedral," in vol. lxxxiii, *The Churchman* (New York, 1901); L. Ariz, *Historia de las grandezas de la ciudad de Avila* (Alcalá de Henares, 1607); Picatoste, *Tradiciones de Avila* (Madrid, 1888).

ÁVILA, GIL GONZÁLEZ DE. See GONZÁLEZ DÁVILA, GIL.

ÁVILA Y ZÚÑIGA, ä'vê-lä ê thōō'nyê-gä, LUIS DE (1500–64). A Spanish diplomatist and chronicler of the wars of Charles V, born at Plasencia, in Estremadura. He seems to have stood high in favor with the Emperor, whom he accompanied on his expeditions to Africa and on his campaign against the Schmalkald League, and who intrusted him with embassies to the Popes Paul IV and Pius IV. His *Comentarios de la guerra de Alemaña, hecho por Cárlos V en 1546 y 1547* (written after Charles V had retired to Yuste, where Ávila frequently visited him from his own retirement at Plasencia) is valuable as the record of an observant eyewitness; but its evident spirit of partiality justifies the Emperor's own comment: "Alexander's achievements surpass mine, but he was less lucky in his chronicler." The latest edition is that of Madrid, 1852. The work has been translated into several languages.

AVILÉS, ä'vê-lās'. A seaport of some importance in the province of Oviedo, Spain (Map: Spain, C 1). It is situated 19 miles north by west of the city of Oviedo, at the mouth of the chief branch of the Río de Avilés, which is here crossed by a noteworthy bridge, and is navigable at high water for vessels of the largest size. It has several good squares, handsome buildings, and gardens. In addition to the castle, the two churches, three monasteries, and a hospital, there is a naval academy. Pottery and weaving are the industries of the town. There are copper mines in the vicinity, and a considerable trade is carried on in articles of copper, as well as in coal, which is obtained not far from the town. Pop., 1900, 12,763; 1910, 13,661. The *Fuero de Avilés* (second half of the twelfth century) is the oldest city charter to be drafted in the vernacular. Its exact date is in dispute. Consult A. Fernández-Guerra y Orbe, *Fuero de Avilés* (text and discourse, Madrid, 1865), and for the opposite side, J. Arias de Miranda, *Refutación al discurso del . . . Sr. D. Aureliano Fernández-Guerra y Orbe* (Madrid, 1867). Consult also Baist in Gröber's *Grundriss der romanischen Philologie*, vol. ii, 2, p. 387 (Strassburg, 1897). The city took a prominent part in the War of Independence and in the first Civil War.

AVISON, CHARLES (1710–70). An English composer. He was born at Newcastle, England, where, after having studied in Italy, he became organist in 1736. He wrote an *Essay on Musical Expression* (1752), in which he ranked the French and Italian composers above the Germans, and which created a considerable stir in the musical world of the time. He composed

sets of concertos and sonatas which were very popular. He figures in Browning's *Parleyings with Certain People.*

AVI'TUS, ALCIMUS ECDICIUS (?–c.525). A French ecclesiastic. He became Bishop of Vienne in Burgundy and was of very considerable prominence in the Church at that time. At a conference held in 499 between Arian and Roman theologians, he was the chief representative of the Romans, and by his influence there, together with his subsequent conversion of King Sigismund of Burgundy, did much to check the spread of Arianism in that kingdom and throughout Gaul. He also presided in 517 at the Synod of Epaone, which established 40 canons in definition of the relations of the Church in Burgundy toward the civil power and more especially toward heretics. Of his extant writings, comprising homilies, epistles, and poems, the most important is the didactic epic, *De Spiritalis Historiæ Gestis* (wrongly known as *De Mundi Principio*). His collected works were edited by Sirmond, *Bibliotheca Maximorum Patrum,* vol. ix (1643). Consult: Binding, *Geschichte des burgundischen Königreichs* (Leipzig, 1868); P. N. Frantz, *Avitus von Vienne als hierarch und politiker* (Greifswald, 1908); Henri Goelzer, *La latin de Saint Avit, évêque de Vienne* (Paris, 1909).

AVIZ, ä-vēsh'. An order of knighthood, instituted by Alfonso I of Portugal in the middle of the twelfth century in order to aid in the defense against the Moors. In 1162 the order was organized by the Pope, and soon after the seat was removed to Aviz, which had recently been captured from the Moors and from which it took its present name. From 1213 to 1385 it was practically united with the Order of Calatrava. Later the grand mastership was united with the crown. In 1789 the order was secularized and membership bestowed as a reward of merit either upon natives of the country or foreigners for marked service to Portugal. The order was extended to Brazil in 1823 and has since become recognized as a national order in Brazil. The Emperor was formerly the grand master.

AVLONA. See VALONA.

AVO'CA. A borough in Luzerne Co., Pa., 10 miles northeast of Wilkesbarre, on the Central of New Jersey, the Erie, the Delaware and Hudson, and the Lehigh Valley railroads (Map: Pennsylvania, K 4). It has important coal-mining interests and manufactures silk. Avoca has an opera house, a theatre, and churches of several denominations. Pop., 1900, 3487; 1910, 4634.

AVOCADO, ăv'ô-kä'dô, *Sp. pron.* ä'vô-kä'dô (from Mex. *ahuocatl*), or ALLIGATOR PEAR (*Persea gratissima*). In old times it was known to sailors as "Midshipman's butter." One of a genus of plants of the family Lauraceæ, comprising 100 species or more, all natives of subtropical Asia or America. It is a native of the West Indies and Central America and is the only species of this order cultivated for its fruit. The flowers are green, about half an inch across. The leaves are elliptical, narrow toward the base, about 6 inches long. The fruits vary in shape from oblate, through spherical and pyriform, to long bottle-shaped, and in color from light green to dark green, purple, brown, and red. The flesh of the fruit when properly ripened is of the consistency of firm butter and in flavor somewhat rich and nut-like. The fruit is very unusual in that the flesh has a high fat content, 10 per cent on an average. The water content is 81 per cent, and the carbohydrates 7 per cent. The fuel value is high, 512 calories per pound. In regions where it grows avocado fat is sometimes recovered for industrial uses. It is primarily a salad fruit to be served with salad dressing, but is also used as a dessert with sugar and cream, wine, and lemon or orange juice. In the tropics it is often eaten in soup. It finds a ready sale in the large cities of the United States and is cultivated chiefly in the southern part of Florida, in Hawaii, and in southern California. For illustration, see ALLIGATOR PEAR on ABUTILON Plate.

AVOCET (Fr. *avocette,* Sp. *avoceta,* of unknown origin). A limicoline bird, one of a group of four species. Avocets are united with the stilts in the family Recurvirostridæ and are related to the snipe and sandpipers. Avocets are about a foot and a half in length, with long, very slender wading legs, short webbed toes, and remarkably long, thin, and upcurved bill. They frequent marshes and search shallow water with their sensitive beaks for crustaceans, snails, and

BEAK OF AN AVOCET.

similar small prey. The several species dwell in summer in the temperate parts of both the Old and the New World, migrating to the tropics in winter. They form simple nests upon the ground in marshy places and lay four olive or buff eggs, thickly spotted with dark brown. The principal American species (*Recurvirostra americana*) has whitish plumage, with the wings black, and the head, neck, and breast light cinnamon. It is common in the western States and shot as game. Consult Coues, *Birds of the Northwest* (Washington, 1874).

AVOGADRO, ä'vô-gä'drô, AMADEO, CONTE DI QUADREGNA (1776–1856). An Italian physicist. He was born at Turin and became professor of physics there in 1820. He was the author of a large number of scientific memoirs and first published his celebrated rule in the *Journal de Physique,* in a paper entitled "Essai d'une manière de déterminer les masses relatives des molécules élémentaires des corps, et les proportions selon lesquelles elles entrent dans les combinaisons." See AVOGADRO'S RULE.

AVOGADRO'S RULE. One of the fundamental principles of chemistry. It is usually formulated as follows: Under the same conditions of temperature and pressure equal volumes of gases and vapors contain equal numbers of molecules. It may appear strange, at first sight, that an idea of this nature should be incorporated in the very foundation of an exact science like chemistry. For the very conception of matter as made up of molecules is nothing but an hypothesis; and even if this conception is correct, the number of particles in a given mass of matter could of course never be actually counted. The following considerations, however, will show at once the real significance of Avogadro's rule. An immediate consequence of the rule is, that comparing equal volumes of substances in the

gaseous state, as to weight, composition, etc., is the same as comparing single molecules. Following the rule, chemists have therefore adopted as the standard quantity for investigation, not a unit of weight, but a unit of volume, and have for many years now been comparing, not equal weights of substances, but equal volumes. Now, this practice has led to the acquirement of a stupendous amount of purely empirical information that forms a solid part of the science of chemistry, the original rule merely explaining *why* comparing equal volumes should lead to so many excellent results. If, therefore, the atomic hypothesis should sometime be discarded as no longer necessary, the hypothetical form of Avogadro's rule would of course go with it; but its corollary, the expediency of comparing equal volumes of substances, would still remain a great guiding rule in the science of chemistry.

The rule was originally proposed as an addition to the atomic theory, the purpose being to account for a remarkable general fact then recently discovered by Gay Lussac; viz., that when two gases react with each other chemically, their reacting volumes bear to each other a ratio that can be expressed by small integral numbers. Thus, when hydrogen and chlorine unite to form hydrochloric acid, the volumes of the reacting gases are equal, i.e., their ratio is $1 \div 1$. Similarly, equal volumes of hydrochloric-acid gas and ammonia combine to form sal-ammoniac; i.e., the ratio is again $1 \div 1$. In the formation of water from hydrogen and oxygen, these two gases unite in the simple ratio of $2 \div 1$. Gay Lussac's law holds equally good in the case of gaseous products of chemical decomposition and with regard to the ratios of the volume of a gaseous compound to the volumes of its gaseous chemical components. Thus, 3 volumes of hydrogen and 1 volume of nitrogen are produced by the decomposition of 2 volumes of ammonia. This law, examined from the standpoint of the atomic hypothesis, indicates that some very simple relation must exist between the numbers of particles contained in the reacting volumes of gases. For according to that hypothesis all chemical reactions of substances take place really between their particles. The simplest relation that suggests itself to the mind is expressed by Avogadro's rule; viz., that equal volumes of gases contain equal numbers of molecules. If, then, the reacting volumes of hydrogen and chlorine are equal, it is because every single molecule of chlorine reacts with one single molecule of hydrogen. Although it thus formed a plausible explanation of Gay Lussac's law, the idea, when first advanced by Avogadro in 1811 and resuggested by Ampère in 1814, was not accepted by the scientific world. The scanty stock of experimental knowledge of the time did not warrant the incorporation in science of a general theoretical principle of this nature.

The practical importance of the rule is mainly in the fact that it permits of ascertaining the relative weights of molecules ("molecular weights"), these weights being represented, according to the rule, by the relative weights of equal volumes of substance in the gaseous state. The substance with which all other substances are usually compared is hydrogen, to which chemists assign the molecular weight 2, since its molecule is supposed to consist of two atoms of unit atomic weight (the unit is of course arbitrary and is chosen merely for convenience sake). Comparing equal volumes of hydrogen and oxygen, the latter is found to weigh 16 times as much as the former. The molecular weight of oxygen is, therefore, in accordance with Avogadro's rule, said to be 32. In a similar manner the molecular weight of any other substance in the gaseous state may be ascertained by multiplying the density (i.e., its relative weight with respect to hydrogen) by 2. Thus, the density of ammonia gas being about 8.5, its molecular weight is 17; the density of hydrochloric-acid gas being about 18.25, its molecular weight is 36.5, etc.

Now, equal volumes of ammonia gas and hydrochloric acid combine to form ammonium chloride (sal-ammoniac, NH_4Cl) and nothing else. Both the chlorine of hydrochloric acid and the nitrogen of ammonia represent the smallest relative weights of those elements found in any compound; or, in the language of the atomic theory, hydrochloric acid contains only one atom of chlorine, and ammonia only one atom of nitrogen. Hence, one entire molecule of hydrochloric acid (molecular weight $=$ 36.5) and one entire molecule of ammonia (molecular weight $= 17$) must be combined in one molecule of ammonium chloride; for otherwise the latter compound could not, as it does, contain both chlorine and nitrogen. Consequently the molecular weight of ammonium chloride could not possibly be less than $17 + 36.5 = 53.5$, and hence its density could not, according to Avogadro's rule, be less than $53.5 \div 2 = 26.75$. When, however, ammonium chloride is heated and its vapor studied experimentally, the density is found to be only about one-half as great. This fact was for a long time regarded as proving that Avogadro's rule is incapable of general application, although in most other cases the molecular weights obtained with the aid of the rule were found to agree thoroughly with the chemical behavior of the compounds. But even in the case of ammonium chloride, the exception was finally shown to be only apparent. Pebal and Than, namely, demonstrated that when ammonium chloride is evaporated, it breaks up into its constituents, ammonia gas and hydrochloric acid, the dissociation naturally causing an increase of volume, and hence a decrease of density. As long as the products remain mixed in a vessel, or are allowed to escape together, it is impossible to prove directly that the vapor is a mixture of ammonia and acid, the reaction with litmus paper being of course neutral. But Pebal and Than proceeded as follows: They divided a glass tube into two parts by a porous partition and heated a lump of ammonium chloride in one part of the tube; the ammonia gas produced, diffusing through the partition more rapidly than the hydrochloric acid, soon filled the other part of the tube and showed the ordinary alkaline reaction with red litmus paper (i.e., turned it blue). The case of ammonium chloride thus changed from an exception into an additional indication of the correctness of Avogadro's rule.

The principal arguments in favor of the rule may be briefly summed up as follows:

I. Avogadro's rule furnishes the chief method of ascertaining the atomic weights of the chemical elements, and there are very strong reasons for believing that the atomic weights thus obtained represent the true numbers characterizing the elements. See PERIODIC LAW.

2. The modern theories of the chemical constitution of compounds could not have come into existence and could not be applied in individual cases, if the molecular and atomic weights to which the rule leads were unknown. Avogadro's rule is at the very foundation of those theories; and hence, conversely, the correctness of the theories, as indicated by the numerous triumphs achieved by them for both pure and applied chemistry, is to be considered as strong proof in favor of the fundamental rule.

3. The strongest argument in favor of Avogadro's rule in its hypothetical form lies in the fact that it follows, by mathematical deduction, from the kinetic theory of gases. (See GASES, PROPERTIES OF.) The correctness of this theory, on the other hand, is strongly indicated by the fact that it also leads to those laws of gases which have long been established experimentally.

Avogadro's rule can evidently hold good only in those cases in which the gases or vapors in question behave very nearly in accordance with the laws characteristic of matter in the perfectly gaseous state; i.e., if at constant temperature the volume varies inversely as the pressure, and if under constant pressure the volume varies as the absolute temperature. For if under equal pressures and temperatures different gases did not always occupy equal volumes, then equal volumes could not always contain equal numbers of molecules.

The rule is sometimes spoken of as the law of Avogadro and Gerhardt, the latter chemist having done much toward establishing it on a firm scientific basis. Gerhardt's pupil, Cannizzaro, continued his researches, and finally succeeded in demonstrating to the scientific world its great importance. In 1886 Van't Hoff showed the rule to be applicable not only to gases and vapors, but also to substances in solution, and, as a consequence, the rule is also often referred to, especially by German authors, as the rule of Avogadro-Van't Hoff. Consult: Avogadro's original memoir on the molecular theory, German trans., *Ostwald's Klassiker der exakten Wissenschaften*, No. 8; and Cannizzaro, "Abriss eines Lehrganges der theoretischen Chemie," *Ostwald's Klassiker*, No. 30. See also ATOMIC WEIGHTS; MOLECULES—MOLECULAR WEIGHTS; SOLUTION; CHEMISTRY.

AVOID'ANCE. See BENEFICE.

AVOIRDUPOIS, ăv'ẽr-dû-poiz', or **AVERDUPOIS'** (ME. *aver de peis*, OF. *aveir de peis*, equivalent to ML. *averia ponderis*, goods of weight). The name given to the system of weights and measures applied in Great Britain and America to all goods except the precious metals, precious stones, and medicines.

The grain is the basis of the avoirdupois system as well as of the troy. A cubic inch of water weighs 252.458 grains. Of the grains so determined, 7000 make a pound avoirdupois, and 5760 a pound troy. (See WEIGHTS AND MEASURES.) The avoirdupois pound is divided into 16 ounces and the ounce into 16 drams. A dram, therefore, contains 27 11-32 grains, and an ounce 437½ grains.

TABLE OF AVOIRDUPOIS WEIGHT

27.34375 grains	are	1 dram.	
16 drams or drachms	"	1 ounce	=437½ grains.
16 ounces	"	1 pound	=256 drams=7000 grains.
28 pounds	"	1 quarter	=448 ounces.
4 quarters	"	1 hundredw't	=112 pounds.
20 hundredw't	"	1 ton	=80 q'rs=2240 pounds.

A cubic foot of water weighs 997.14 ounces avoirdupois, or nearly 1000 ounces, which gives an easy rule for determining the weight of a cubic foot of any substance from its specific gravity. Avoirdupois is the weight used in the United States, where, however, in most places, the hundredweight contains only 100 pounds, and the ton, 2000 pounds.

AVOLA, ä'vô-lä. A city in Sicily, 20 miles southwest of Syracuse (Map: Italy, K 11). The chief industries of the town are sugar refining and the manufacture of straw matting. Fine almonds are grown in the vicinity. Pop., 1901, 16,264; 1911, 17,711.

AVON, ā'von (Celt. *avon*, Welsh, *afon*, Gael. *abhain*, *abhuinn*, water, river, probably akin to Lat. *aqua*, water). The name of several rivers in England and Scotland. The more important are: the Upper Avon (93 miles long), which rises in Northamptonshire and flows through Stratford, the birthplace of Shakespeare ("the Swan of Avon"), entering the Severn at the northern boundary of Gloucestershire (Map, England, D 4); the East Avon, which rises in Wiltshire and flows in a southerly direction, entering the English Channel at Christchurch (Map: England, E 6); the Lower Avon, which rises in Gloucestershire, flows through Wiltshire and Somersetshire, and enters the Bristol Channel 6 miles below Bristol.

AVON. A village in Livingston Co., N. Y., 18 miles south by west of Rochester, on the Erie Railroad and the Genesee River (Map: New York, C 3). The village has pea and corn canneries, a bean-shipping plant, and owns its water works. It is noted for its mineral springs. Pop., 1900, 1601; 1910, 2053.

AV'ONDALE. Formerly a city in Jefferson Co., Ala.; now incorporated with Birmingham, which is 2 miles east. Avondale was settled in 1884 and has manufactures of cotton gins and building materials. See BIRMINGHAM.

AVOW'RY (OF. *avouerie*, from *avouer*, to avow, from Lat. *ad*, to + *vocare*, to call). The technical name of the pleading interposed by the defendant to the plaintiff's declaration, or complaint, in an action of replevin (q.v.). By this plea the defendant avowed or acknowledged his seizure of the chattels claimed by the plaintiff, and justified the act by setting up the facts upon which he relied to show that he was entitled to make the seizure complained of. Under modern practice the action of replevin has largely lost its technical character, and its procedure has become assimilated to that of the more common and simple forms of action; but the plea of the defendant, under whatever name, retains substantially the character of the avowry. Consult the authorities referred to under PLEADING.

AVRANCHES, ä'vränsh' (anciently, *Abrincæ*, capital of the *Abrincatui*, a nation of Gaul). An old town in the department of Manche, France, near the left bank of the Sée, 33 miles east of Saint-Malo (Map: France, N., D 4). It is beautifully situated on a high hill, which extends in a long ridge and is ascended by zigzag roads built on terraces. This hill commands a very wide and beautiful view of a finely wooded and cultivated district, with a winding river, which attracts summer visitors in great numbers. There are a public and a botanical garden, and a public library containing among other things several ancient manuscripts. There are considerable manufactures of lace, calico, and cloth, as well as tanneries, machine shops, planing mills,

and breweries. Many of the inhabitants are engaged in fishing, and there is an active trade in farm produce. Pop., 1906, 7360; 1911, 7174. Avranches was formerly a bishop's see, and its cathedral, which was destroyed in 1790, was one of the most magnificent in Normandy. A stone still preserved on its site is said to be that on which Henry II of England kneeled before the papal legate to receive absolution for the murder of Thomas à Becket. It was a place of importance during the Roman period, and some of the old Roman ramparts are still standing. It was afterward a frequent object and scene of strife during the wars between the French and the English. Consult Le Héricher, *Avranchin monumental et historique* (Avranches, 1845–46).

AVUL'SION (Lat. *avulsio*, a tearing off, Fr. *u;* from + *vellere*, to tear away). The sudden transfer by natural forces of a portion of one man's land to the soil of another. The term is applied as well to the result of a sudden change in the course of a boundary river, the reliction or encroachment of the sea, as to an actual tearing away of a portion of A's land and its deposit upon or against the land of B, as the result of a flood. The title to the soil so carried away or transferred is not affected by the physical change in its situation, and the owner is entitled to recover the possession thereof from the person to whose soil it has become annexed. In this respect it differs from accretion, or a gradual and imperceptible addition to the land of a riparian proprietor by the action of the water. (See ACCRETION.) Thus, if the sea permanently recedes so rapidly that the reliction of the water is perceptible in its progress, the case is one of avulsion, and the land exposed continues to be the property of the State, as when it was still covered by the sea. This rule may be varied by custom, however, as in the case of the river Severn, below Gloucester Bridge, which (says Lord Hale) "is the common boundary of the manors of either side, what course so ever the river takes," and in the case of the Missouri River, as to which a similar doctrine has been laid down by the United States Supreme Court, to cover the effect of the rapid current of the river upon the loose soil composing its banks (Nebraska *v.* Iowa, 143 U. S. 359). Even here, however, the court is careful to distinguish the case of the cutting of the new channel above Omaha in 1873, which is described as an avulsion and as leaving the land titles on either side up the stream unaffected. See ALLUVION; RIPARIAN RIGHTS; RIVERS; SEA SHORE.

AWAJI, ä'wä-jē. The largest island in the Inland Sea of Japan, at its eastern entrance, and pertaining to Hiogo Ken. It is 34 miles long, contains 218 square miles, and has a population (1898) of 188,908. In mythology Awaji was the first island created by Izanagi and Izanami; the name in legend meaning 'my shame,' but actually the 'way of Awa.' It is famous for its wonderful scenery and noted for a peculiar grade of pottery.

AWANTIBO, ä'wän-tē'bō, or **ANGWANTIBO,** äŋ'gwän-tē'bō (native name in west Central Africa). A small light-brown lemur (*Perodicticus* or *Arctocebus calabarensis*), also called the Calabar potto, and distinguished by the absence of any visible tail, and by the rudimentary condition of the index finger of the hand, while the thumbs on all the feet are greatly enlarged and separated from the fingers, forming of the feet powerful grasping organs. The animal is rare, and its habits are little known.

AWARD' (OF. *eswarder*, look at, consider, decide, from *es* (Lat. *ex*) + *warder*, observe, guard, from OHG, *warten*, to watch). The formal adjudication of a matter in dispute by arbitration or by referees to whom it has been referred. An arbitration being an extra-judicial proceeding, the award does not have the force of a judgment; but it may, if made by official or judicial referees, be the basis of a judgment, and, if made by private arbitration, it becomes legally binding upon the parties thereto. The submission to arbitration involves an agreement to abide by the result thereof, and thus the award becomes a term of the contract, enforceable as such. In order to be binding, however, it must be consonant with the submission, must be limited to the parties agreeing thereto and to the matters in dispute, and must be final, certain, and specific. See ARBITRATION.

AWATA, ä'wä-tä. A village in the suburbs of Kioto, Japan, famous for its yellow faïence. Awata pottery was invented in the seventh century, is decorated, and by the Japanese is called "Tamago Yaki" ('egg-ware'). It is largely exported to the United States.

AWE, ą, LOCH (Gael. *abh*, water). A lake in the centre of Argyllshire, Scotland, 23 miles long and 1 mile broad (Map: Scotland, C 3). Its surroundings are very picturesque and in some parts even striking. It is covered with numerous wooded islands, and its northern end is shadowed by a rocky mountain chain over 3000 feet high. It is drained by the river Awe, which enters the Loch Etive. Its largest feeder is the Orchy, from the northeast. There are numerous castles on several islands in the loch, some of them dating from the thirteenth century. The loch is traversed by steamers, and there is a railway station on its northern shore.

AWN. See GRAMINEÆ; GRASSES.

AWOMORI, ä'wō-mō'rē. See AOMAORI.

AXAYACATL, ä'chä-yä-kä't'l (Mex. Face-in-the-water) (?–1477). An Aztec chief, styled, in contemporary narratives, Emperor of Mexico. He is reported to have been the father of Montezuma, whom Cortés conquered. About 1467 he led his Aztecs to the conquest of Tehuantepec, and afterward crushed a rebellion that threatened his capital, the City of Mexico. He died suddenly, about 1477. Half a century later the soldiers of Cortés occupied Axayacatl's "palace," which was the large communal dwelling of the section of the tribe to which Axayacatl belonged. In one of the rooms they found an immense treasure of gold and silver in ore and bars, with jewels, and many curious articles of manufacture.

AXE (Ger. *Ax, Axt;* Lat. *ascia;* Gk. ἀξίνη, *axinē*). An instrument used for felling trees and chopping wood. The axe is one of the earliest tools used by man, being found among the relics of the Stone, Bronze, and Iron ages. It was fashioned sometimes of syenite or black sandstone, as by the lake dwellers of Europe; of jade, as by ancient peoples of Asia and Asia Minor and by the modern Maoris; of flint or bone, as by the American Indians; of mixed copper and tin, as by the Romans, ancient Mexicans, and South Americans; of copper, as by the Druids. To this day stone axes are used in some of the South Sea Islands. The American axe usually consists of a head or butt of wrought iron, heated to a white heat, cut to the desired length, and then, after the eye for the handle is punched through,

reheated and pressed between concave dies into proper shape. Again heated, it is grooved on the edge; with borax as a flux, the arched edge piece of steel is inserted, projecting an inch or more; the iron and steel are then welded at white heat, and after it is hammered, ground to a fine edge, tempered and polished, the head is varnished to prevent rust. Forms and weights vary according to the use to which the tool is to be put. For very hard timber the edge is narrow and the whole axe heavy. Common forest axes weigh from 3 to 7 pounds. The handle is generally made of hickory, which is not only strong, but elastic. The pickaxe, used for breaking up hard ground, is not strictly an axe. The hatchet (Fr. *hachette*, a little axe) is for use with one hand only. The "francisca," at one time the national weapon of the Franks, was a hatchet for throwing, and the tomahawk (q.v.) of the North American Indians was, as is well known, used in a similar manner and in hand-to-hand combat. The adze, a tool used for the chipping or rough planing of horizontal surfaces by carpenters, has its blade at right angles to the handle, and so curved that the plane of the cutting edge, as the instrument is swung into contact, is horizontal. Broadaxes, formerly much used for hewing logs into square timbers, are axes with very broad blades, and the cutting edge much less curved than the edge of the regular axe for chopping.

AX'EL, or ABSALON (c.1128–1201). Archbishop of Lund, after 1178, and minister and general of Waldemar I and Canute VI of Denmark. He was descended from a distinguished Danish family and in his youth studied at Paris. Axel distinguished himself by wisdom, uprightness, and valor. He drove the Wendish pirates from the Danish coast, attacked them in their own settlements on the island of Rügen, and annexed the island to Denmark. He defeated the Pomeranian fleet in 1184. In the wise legislation of Waldemar and of his son he had a great part. He promoted learning and art, and to his encouragement we owe the first connected history of Denmark by Saxo Grammaticus. In building a fortified castle for defense against the pirates he laid the foundation of the future city of Copenhagen, then an insignificant village inhabited only by fishermen. Owing to this origin, Copenhagen has sometimes been called Axelstadt. Axel lies buried in the church of Sorö, where he founded a monastery.

AXHOLME, ăks'hōlm, or AXELHOLM (AS. *holm*, island in a river; Eng. *holm*, hill, islet). An island in the northwest of Lincolnshire, England, formed by the rivers Trent, Don, Idle, and Vicardyke. Area about 74 square miles. It incloses various parishes, of which Epworth is the chief. Abundant crops are raised by small landowners. Formerly a marsh which succeeded an ancient forest, it was reclaimed in 1634, after five years' labor, by Vermuyden, a Dutchman, under contract from Charles I. The land became very fertile under Dutch and French Protestant immigrants, the introduction of which antagonized the local peasantry. Litigation which ensued ended in 1691, the natives receiving 10,532 acres and the settlers 2868. The accent and physical characteristics of the settlers exist in the present inhabitants. Pop., 1911, 6815. Consult Peck, *Isle of Axholme* (1815), and Peacock, in *Anthropological Review* (1870).

AX'IL. See LEAF.

AXIM, ä-shēng' *or* ăks'ĭm. A seaport in the British Gold Coast colony, 70 miles west of Cape Coast Castle (Map: Africa, D 4). It was built by Portuguese, and its harbor is the best on the Gold Coast. The town is picturesque, and is an important point because of large exports of mahogany. Gold is found in small quantities. In 1642 it was taken by the Dutch, who in 1872 ceded it, with the whole of their possessions in Guinea, to the English. Pop., 2189.

AX'INITE (Gk. *ἀξίνη, axinē*, axe; referring to its edged crystals). An aluminum and calcium borosilicate, with some of the calcium replaced by varying amounts of iron and manganese, which crystallizes in the triclinic system. It is found in the form of brown, bluish, or yellow crystals, edged like an axe, in various localities in Europe, notably Dauphiné, France, and Scopi, Switzerland, where the crystals are cut into beautiful brown gems. It has been found in the United States near Bethlehem, Pa., and in Maine, but in crystals that are too small for cutting.

AXIN'OMAN'CY (Gk. *ἀξίνη, axinē*, axe + *μαντεία, manteia*, divination). A kind of divination practiced in ancient times by means of an axe. The ancients tell us nothing with regard to its method or its use. See SUPERSTITION.

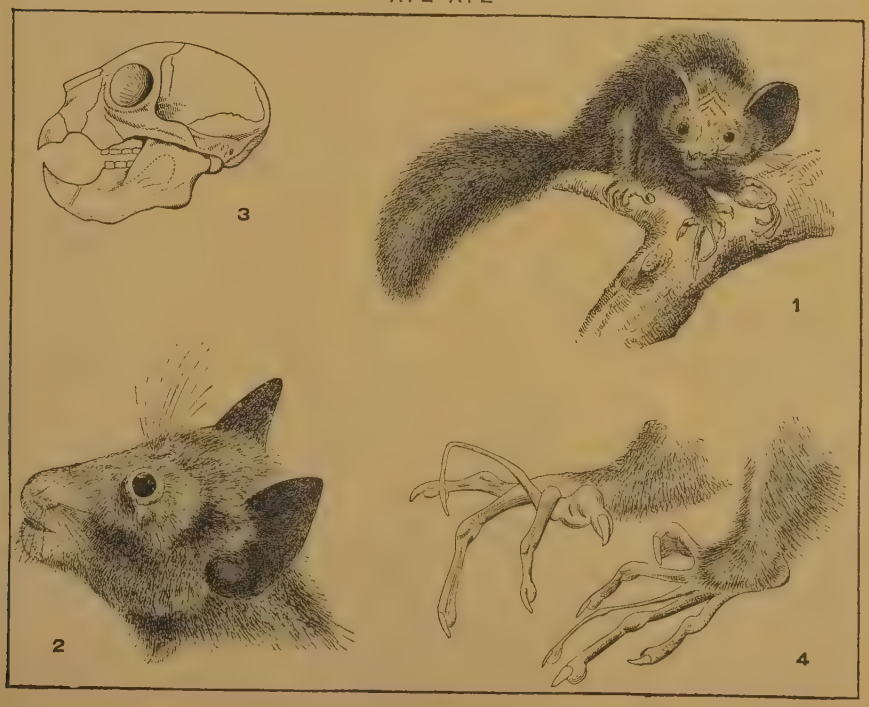
AX'IOM (Gk. *ἀξίωμα, axiōma*, that which is thought worthy, fit, self-evident). A general statement, the truth of which is accepted without proof. Plato probably limited it to geometric propositions, but Aristotle applied it to statements of a more general nature. Euclid followed Aristotle's use of the term, regarding axioms as "common notions" not limited to geometry, and applying the term *postulate* to a premise specifically geometric in character. The early English translators of Euclid failed to consult the most trustworthy sources, and hence the terms *axiom* and *postulate* have come to be confused. Heiberg, the latest and best editor of the *Elements*, has made clear the distinction which Euclid recognized, and has shown that he gave five axioms and five postulates. Euclid regarded as an axiom that, "If equals be added to equals, the sums are equal"; as a postulate that (stated in simpler language than his), "Through a given point only one line can be drawn parallel to a given line." The first statement is general, the second is specifically geometric. Mathematicians formerly sought to limit the list of axioms and postulates to the smallest number upon which the subject in question, as geometry, could be built; the modern tendency is rather to seek a list, however extended, of the really independent properties of space. To the followers of Kant seems due the common definition of axiom as "a self-evident truth," a definition no longer recognized as valid. See A PRIORI; GEOMETRY.

AX'IS (Lat. *axis*, axle). In geometry, a line (usually straight) such that the points of a given figure are symmetrically situated on opposite sides of it; as, for example, a diameter or diagonal of a square, the perpendicular from the vertex to the base of an isosceles triangle, a diameter of a circle or sphere. The axis bisects at right angles the line joining any two corresponding points of the figure. In this connection the axis is called an *axis of symmetry* of the figure. *Axes of coördinates* are the lines of reference from which the coördinates are measured. (See ANALYTIC GEOMETRY.) The *radical axis* of two circles is the line joining their points of intersection; the

AXOLOTL

1. LARVAL AXOLOTL (Ambystoma tigrinum). 2. ADULT FORM.

AYE-AYE



1. AYE-AYE (Chiromys madagascariensis).
2. HEAD IN PROFILE (enlarged).
3. SKULL.
4. RIGHT AND LEFT HANDS, showing attenuated digits.

line is real, even when the circles cut in imaginary points. The *transverse* (or *major*) *axis* of a conic is the diameter which passes through the foci. The *conjugate* (or *minor*) *axis* is the line through the centre perpendicular to the transverse axis.

In physics, the *optic axis* of a lens is the straight line passing through its optical centre and perpendicular to its surfaces. The *axis of a telescope* is the straight line joining the centres of its lenses (objective and ocular). In mechanics, the *axis of rotation* of a body is a straight line about which the body rotates, as the *polar axis* of the earth.

In architecture, axis is either the temporary central line used in making drawings or the imaginary central line of a building. Sometimes buildings have a curved axis, sometimes several have a common axis. The relation of the axis of neighboring monumental structures has always been a matter of careful study in architectural history.

AXIS. The second vertebra of the spinal column, so called because it forms the pivot upon which the first bone (atlas, q.v.) rotates, carrying the skull. A strong tooth-like process extends perpendicularly upward, interlocking with the atlas, to prevent dislocation.

AXIS, IN BOTANY. See STEM.

AXIS (Lat. of unknown origin). A species of deer (*Cervus axis*) abundant throughout India and in many islands of the Eastern Archipelago. One of its Indian names is *chittra*, and by British sportsmen in India it is generally called the spotted hog deer. It was known to the ancients as *axis*. The axis resembles in size and color the European fallow deer; it is generally of a rich fawn color, beautifully spotted with white, nearly black along the back, the under parts snow-white. The horns are slender, sharp-pointed, little branched, and not at all palmated. The female has no horns. The axis frequents thick jungles in the vicinity of water and feeds during the night. It is commonly found in herds of 15 or 20, of which three or four are males. Its sense of smell is remarkably acute, and it is generally very shy and timid, so that sportsmen find it difficult to get within shot. The male, however, sometimes exhibits great courage in defense of the young. It is very easily domesticated, is gentle in its manners, and breeds freely in captivity, so that it is commonly seen in zoölogical parks. See Colored Plate of DEER.

AX'LE (Ger. *Achse*[*l*], dim. of form found in Lat. *axis*). The bar of metal or wood which carries the wheel or wheels of vehicles or of machinery, and around which the wheel or wheels revolve, sometimes with the axle and sometimes upon it. Axles for wagons are made of iron, steel, or wood and are fixed, the wheels revolving around them. Axles of railway cars have the wheels keyed to them and revolve with the wheels, the ends of the axle projecting outside of the wheels, and turning in journal boxes on which the body of the car rests. Railway axles are forged from steel of high quality and have the wheels forced upon a taper wheel fit by hydraulic pressure. The projecting ends or journals are turned and finished smooth. Standard dimensions of axles for cars of different weights have been adopted in the United States by the American Master Car Builders' Association. See SHAFTING.

AX-LES-THERMES, åks'lâ-tĕrm'. A town in the department of Ariège, France, on the Ariège River, about 20 miles southeast of Foix (Map: France, S., F 6). It is situated 2350 feet above sea level, and is a noted health resort because of its warm sulphur springs. There are over 60 of these, and the water is used for drinking and bathing purposes. Each of four bathing establishments is fed by a different group of springs. There is here a hospital founded for leprous soldiers in 1260. Pop., 1911, 1624.

AX'MINSTER (AS. *Axan Mynster*, minster of the [river] Axe). A market town in Devonshire, England, on the Axe, 24 miles east-northeast of Exeter (Map: England, D 6). Axminster was once famous for the manufacture of a superior grade of carpets. The industry has been removed to Salisbury, and the town has now numerous minor manufactories, an iron foundry, and lumber yards. Pop., 1901, 2906; 1911, 3009.

AXOLOTL, åks'ô-lŏt'l (Mex.). Any of several species of larval salamanders of the genus Amblystoma. They inhabit certain lakes of Mexico and the Rocky Mountain region of the United States. Their eggs resemble frogs' eggs, being laid in strings formed by a viscous covering and attached to water plants. They hatch in from two to three weeks. The young axolotl has external bushy gills, much like those that are retained throughout life by the mud puppy (q.v.). It may become sexually mature while still bearing the external gills, and before its life history was known it had been given the name *Siredon lichenoides*. The passage of the axolotl into an Amblystoma first became known to science in 1865 and has since been confirmed. Recent experiments on captive specimens have shown that young axolotls can easily be made to change into the adult form if they are compelled to breathe air more frequently than usual, as when kept in vessels of shallow, poorly aërated water. This metamorphosis can be checked, the shrinking gills then undergoing fresh development, when they will remain axolotls indefinitely. Cutting off the gills produces no effect, as they are quickly renewed. The change involves the loss of the gills, the closing of the clefts, the disappearance of the back and tail fins, and the general broadening of the head. Perpetual submergence or a permanently dry saline shore prevents the transformation in nature, while it is favored by an alternation of wet and dry conditions, such as are found on a wave-washed shore or in slowly drying lakes or ponds. The Colorado form (*Axolotl tigrinum*) delays its metamorphosis for a long time, but it always occurs eventually in nature, while the black Mexican (*Axolotl maculatum*), which is much prized as food by the natives, has never been known to make the change.

AX'STONE. A variety of nephrite of greenish color, which is hard, tough, and more or less translucent. It is found in primitive rocks in Saxony, Greenland, New Zealand, and other South Pacific islands, and is used by the natives for making hatchets, whence its name.

AXUM, or **AKSUM,** åk-sōōm' (Gk. Ἄξουμις, *Aksoumis*, *Axoumis*, *Auxomis*, Lat. *Auxumis*). Once the capital of the Ethiopian kingdom of the same name, now capital of the modern Abyssinian province of Tigré, situated in lat. 14° 7′ N., and in long. 38° 43′ E. Even before the Christian Era Axum seems to have become the capital of an Ethiopian kingdom, whose chief port was Adule, about 100 miles distant, through which it carried on an extensive trade with Egypt and the Roman world. The kingdom

of the Axumites seems to have been gradually extended from the borders of Roman Egypt to the south, as far as the Straits of Bab-el-Mandeb, or even Cape Gardafui, and its kings claimed also dominion over the Homerites (or Himyarites) on the Arabian coast of the Red Sea. These kings were acquainted with Greek culture, as is shown by the inscriptions at Adule and Axum. One of those in the latter place was also written in the Geez language, sometimes called Ethiopic, but in the Sabæan characters used in southern Arabia. Christianity was introduced by Ædesius and Frumentius early in the fourth century, and in 356 A.D. the Emperor Constantius wrote to King Aizanes, asking his assistance against the teachings of Athanasius. The kingdom later lost its power and wealth with the advance of Mohammedanism, which gradually hemmed it in, though the country has always kept its Christian faith. Axum is regarded now as a sacred city by the Abyssinians, and still contains memorials of its greatness in a large number of curious obelisks connected, apparently, with Semitic sun worship, and the remains of an imposing Christian church. The population of the town at present is only about 5000. Consult: Dillmann, *Abhandlungen der Berliner Akademie* for 1879 and 1880; Mommsen, *Provinces of the Roman Empire*, vol. ii (Eng. trans., New York, 1886); Bent, *The Sacred City of the Ethiopians* (London, 1893); Glaser, *Geschichte Arabiens* (Berlin, 1885–90); id., *Die Abessinier in Arabien und Afrika* (Munich, 1895).

AYACUCHO, ä'yä-kōō'chō. A department of Peru, bounded by the department of Junin on the north, Cuzco and Apurimac on the east, Arequipa on the south, and Içа and Huancavelica on the west (Map: Peru, C 6). Area, 18,185 square miles. The surface is mountainous, well watered, and there are pasture lands on which sheep and cattle graze. The soil is well adapted for agricultural purposes and grain, coffee, cocoa, cacao, and cotton are produced. The precious metals, nickel, and cobalt, are mined and, with the chief agricultural products, are exported. Among the chief manufactures are spirituous liquors, hats, and flannel and leather goods. The latest official population figures are for 1896, when an estimate returned 302,469 for the department. Capital, Ayacucho (q.v.).

AYACUCHO (Indian, "corner of death," referring to a bloody battle once fought on this spot). An episcopal city, capital of the department of Ayacucho, Peru, situated 240 miles southeast of Lima, on a small tributary of the Mantaro River, 7900 feet above sea level (Map: Peru, C 6). The town is the seat of a university established in 1677. The surrounding district is chiefly devoted to cattle breeding and agriculture, an active trade in their products being carried on with Lima. The town manufactures wool, hats, and articles of silver. Pizarro founded the town in 1539, calling it San Juan de la Victoria de Guamanga, but the city has been called by its present name since 1825 to commemorate a great victory achieved by General Sucre over the Spaniards on Dec. 9, 1824, on the plateau of Ayacucho. This battle assured the independence of Perú. Pop., 1908, 14,346; 1912 (est.), 20,000.

AYALA, ä-yä'lä, Adelardo López de (1829–79). A Spanish poet and politician, born at Guadalcanal in Badajoz. He studied law at Seville, but later devoted himself to poetry. In behalf of the Revolution of 1868 he composed the Manifest of Cadiz, but on the restoration of the monarchy he reëstablished his relations with his former colleague, Canovas, and became Secretary of the Colonies in the first ministry of Alphonso XII. His writings include: *El hombre de estado* (1851); *Culpa y perdón* (1851); *Los dos Guymanes* (1851); *El tijado de vidrio* (1854); *El tanto por ciento* (1861); *Los comuneros; El nuevo Don Juan* (1863); *Consuelo* (1878). His "Obras completas" were published as the seventh volume of the *Colección de escritores Castellanos* (1881–87).

AYALA, Pedro López de. See López de Ayala, Pedro.

AYAMONTE, ä'yä-mōn'tä. A city of Andalusia, Spain, on the left bank of the Guadiana, near its mouth, where it forms the boundary between Spain and Portugal (Map: Spain, B 4). It is picturesquely situated on the slope and at the foot of a hill. The upper part of the town consists of narrow and irregular streets; those of the lower part are regular and wide. There are three public squares. The principal occupation of the inhabitants is fishing, shipbuilding, and coast trading. Pop., 1900, 7530; 1910, 9471.

AYAPANA, ä'yä-pä'nä. See Eupatorium.

AYE-AYE, äĭ'äĭ' (native Malagasy name; from its cry). A small, brownish, squirrel-like lemur (*Chiromys* or *Daubentonia madagascariensis*), of Madagascar, remarkable for its rodent-like dentition. It is the sole representative of its genus and of the family Chiromyidæ, which, with the family of the true lemurs, forms the sub-order Lemuroidea. It is arboreal and nocturnal in habits, living alone or in pairs in the bamboo jungle, constructing ball-like nests of dried leaves, and feeding on juicy vegetables, such as sugar cane, and upon the grubs of woodborers, to which its slender and curiously distorted fingers (see Plate of Axolotl and Aye-Aye) seem especially adapted. The fact that, until recently, this creature was considered upon the verge of extinction is due partly to its shy, nocturnal character, but chiefly to the superstitious veneration in which it is held by the natives, who object to capturing it. They think that if a person sleeps in the forest the aye-aye will bring him a pillow; if for the head, the person will become rich, if for the feet, he will succumb to the fatal power of the animal. Consult *Knowledge* (London, December, 1901) for an illustrated account of its characteristics.

AYER, âr. A town in Middlesex Co., Mass., 36 miles by rail west of Boston, on the Boston and Maine Railroad (Map: Massachusetts, D 3). It has a public library, tannery, saw mill, machine shop, and factories for vinegar and preserves. The water works are owned by the town. Pop., 1900, 2446; 1910, 2797.

AYESHAH, â-yĕ'shä, or **AISHA,** ä'ĕ-shä. The favorite wife of Mohammed, and the daughter of Abu-Bekr. See Mohammed.

AYLESBURY, ālz'bĕr-ĭ. A market town and the county-seat of Buckinghamshire, England, about 38 miles northwest of London (Map: England, F 5). Aylesbury contains the only convict prison for women in England. It is chiefly an agricultural centre and has an industry in lace making and straw plaiting. Its ducks, raised for the London market, are justly famous. Pop., 1901, 9250; 1911, 11,048. Aylesbury is very ancient, having been taken from the Britons by the Saxons in 571.

AYLESBURY. A breed of large domestic white ducks. See Duck.

AYLESFORD, ālz'fērd. A village in Kent, England, picturesquely situated on the Medway, 39 miles southeast of London. Remarkable ancient remains occur here, comprising an extensive cromlech, or burying place, known as Kits-Coity, and, in the neighboring chalk hills, large circular sepulchral pits. Pop., 1911, 2569.

AYLES'WORTH, ālz'wûrth, Sir Allen Bristol (1854–). A Canadian lawyer and statesman. He was born at Newburgh, Ontario, and was educated at Newburgh Academy and at Toronto University, where he graduated in 1874. He was called to the bar in 1878 and soon became prominent in the legal profession. His knowledge of electoral and constitutional law made him sought as counsel in many cases of public importance. Frequently he appeared in London before the Judicial Committee of the Privy Council, notably in 1904 in behalf of the old Provinces of Canada, when, as a result of the census of 1901, an effort was made to reduce their representation in the House of Commons. In 1903 he was appointed one of the two Canadian members of the Alaska Boundary Tribunal, and, with Sir Louis Amable Jetté, the other member, refused to sign the award of the Tribunal for reasons assigned in the minority report. (See Alaska.) He was elected to the House of Commons in 1905, and in the same year became Postmaster-General in the cabinet of Sir Wilfrid Laurier. In 1906 he was appointed Minister of Justice, an office which he retained until 1911, when he retired from political life. In 1910 he rendered signal service as British agent in preparing the colonial case argued before The Hague Tribunal in the dispute between the United States and Great Britain regarding the Atlantic Fisheries. (See Fishing Laws.) In 1911 he received the honor of knighthood.

AYLLON, ī-lyōn', Lucas Vasquez de (c. 1475–1526). A Spanish adventurer. He came to America, became a member of the Superior Court of Hispaniola (Santo Domingo) and in 1521 sent Gordillo to explore the coast of the present Florida. He himself visited James River and Chesapeake Bay in 1524 and, liking the country, applied for and received a grant to the surrounding territory from Charles V. In 1526 he brought about 600 colonists to the site of Jamestown, Va. (q.v.), and with the help of a large number of negro slaves, probably the first ever employed within the present limits of the United States, endeavored to build a town, which he called San Miguel. Before the end of the year, however, he died of fever, and his colony soon afterward was broken up by sickness, civil strife, and a negro insurrection. Many of the survivors were shipwrecked on their way back to Hispaniola, and only 150 reached their destination in safety. Consult Woodbury Lowery, *Spanish Settlements within the Present Limits of the United States, 1513–65* (New York, 1901).

AYLMER, āl'mēr. The name of two Canadian lakes. 1. Lake Aylmer, 80 miles north of Great Slave Lake, is about 50 miles long by 30 miles broad (Map: British Columbia, H 2). 2. Lake Aylmer, in Wolfe Co., Quebec, lies 69 miles south of Quebec (Map: Quebec, G 5). Its outlet is the St. Francis River.

AYLMER. A village of Elgin Co., province of Ontario, Canada, situated on the Grand Trunk, Michigan Central, and Wabash railways, 12 miles east of St. Thomas (Map: Ontario, D 8). It lies in a productive farming and dairying district, and its manufacturing interests include saw and planing mills, shoe and leather factories, hoop and stave works, scale and pump works, a candy factory, foundries, and a condensed milk factory. Pop., 1911, 2102.

AYLMER. A village in Wright Co., province of Quebec, Canada, on Lake Deschaines, at the foot of steam navigation for the upper Ottawa, and on the Canadian Pacific Railway (Map: Quebec, C 5). It is a favorite summer resort, connected with Ottawa by an electric railway. Pop., 1901, 2291; 1911, 3109.

AYLMER, or Elmer, John (1521–94). An English theologian. He was born at Aylmer Hall, Norfolk; graduated B.A. at Cambridge, 1541, and immediately thereafter became tutor to Lady Jane Grey. In June, 1553, he was made Archdeacon of Stow, but on Mary's accession, October, 1553, he fled the country lest his pronounced Protestantism should bring him into trouble, and lived on the Continent till Elizabeth's accession (1558). In 1562 he became Archdeacon of Lincoln, and in 1576 Bishop of London, in which position he showed a very arbitrary temper and was most unpopular. He died in London, June 3, 1594. His only literary production of note is his reply to John Knox's *Monstrous Regiment of Women*, entitled *An harborowe for faithfull and trewe subjects, against the late blowne blast concerning the government of women* (Strassburg, 1559). For his biography, consult J. Strype (new ed., Oxford, 1820).

AYLMER, Matthew, Lord (c.1643–1720). A British naval officer, born in the county of Meath, Ireland. He entered the navy in 1678 and served until 1688 on the Algerian coast and in the Mediterranean. At the battle of Beachy Head (1690) and at Barfleur (1692) he commanded the *Royal Katherine*. He was made rear-admiral in 1693, vice-admiral in 1694, and admiral in 1698. In the latter year he was sent to the Mediterranean to arrange the treaties with Tunis, Tripoli, and Algiers. He was commander-in-chief of the fleet from 1709 to 1711, and was suspended because of a dubious engagement, but was reinstated upon the accession of George I (1714).

AYLOFFE, ā'lōf, Sir Joseph (1709–81). An eminent English antiquary. He attended St. John's College, Oxford, for a time and at an early age evinced considerable interest in antiquities. In 1731 he was elected a fellow of the Royal Society and in the following year a fellow of the Society of Antiquaries. In 1763 he was made one of the commissioners for the preservation of the state papers, and in 1772 published a valuable work entitled *Calendars of the Ancient Charters and of the Welch and Scottish Rolls now Remaining in the Tower*. He also wrote several useful papers for the publications of the Society of Antiquaries and at the time of his death was engaged on the work known as Gough's *Sepulchral Monuments* (1799), which he had projected.

AYMARÁ, ī'mā-rä'. The name commonly applied to a former confederacy or group of semi-civilized tribes centring in the high plateau about Lake Titicaca, in Peru and Bolivia. They number now, including mixed bloods, more than half a million. At the time of the discovery they were subject to the Incas, but there is considerable ground for the opinion held by some writers that they are themselves the originators of the Inca (Quichua) civilization. Physically they

are distinguished for their great chest development, due to the rarefied air which they breathe. The mysterious cyclopean ruins of Tiahuanaco are within their territory and are probably, in part at least, of Aymará origin, as are possibly also other pre-Incan remains in southern Peru. Much light has been shed upon some of the problems of the Aymará region by the recent archæological and ethnological investigations, of Uhle and Bandelier (consult this author's *The Islands of Titicaca and Coati*, New York, 1910). The language constitutes a distinct linguistic stock, although considerably influenced by Quichua. Consult Middendorf, *Die Aimará-Sprache* (Leipzig, 1891) and Dorsey, *A Bibliography of the Anthropology of Peru* (Chicago, 1898).

AYMON, ā'mon. The surname of four brothers, called respectively Alard, Richard, Guichard, and Renaud, sons of Aymon, or Haimon, Count of Dordogne, who figure among the most illustrious heroes of the chivalric poetry of the Middle Ages. The story belongs to the cycle of romances in which Charlemagne is the central figure. Possibly Huon de Villeneuve, a French poet of the time of Philip Augustus (1180–1223), was the author of the poem entitled *Les quatre fils Aymon;* Ariosto later conferred poetical immortality on the family by the publication of his *Orlando Furioso*, in which Renaud, or Roland, the bravest of the four brothers, plays the most distinguished part. Caxton printed, about 1489, an English translation of the story, and in 1884–85 the Early English Text Society reprinted Caxton's work, under the title *The Four Sons of Aymon.* Tieck, the popular German writer, edited and published the story, but seems to have taken it from a different source. Consult Gautier, *Les Epopées françaises* (Paris, 1880), and Steele, *Renaud of Montauban and the four Sons of Aymon* (London, 1897). Also see ROLAND, THE SONG OF.

AYR, ār. A seaport, summer resort, and the county-town of Ayrshire, Scotland, situated on the Firth of Clyde, at the mouth of the river Ayr, 40 miles south-southwest of Glasgow by rail (Map: Scotland, D 4). Ayr is a clean and well-built town. It is connected by three bridges with the suburbs of Newton-on-Ayr and Wallacetown, which have constituted a part of the city since 1873. A harbor is formed by the estuary of the river and is protected by piers and a breakwater. In 1874 and succeeding years many improvements were added, including the construction of a large wet dock. Flannel, woolen, and leather goods, boots and shoes, and carpets are manufactured, and there are shipyards, lumber mills, and foundries. The coasting trade is considerable, exports including agricultural products, iron, and coal from the Ayrshire collieries, the latter being the most important. A considerable quantity of grain, timber, and manure is imported. At one time much wine was imported from France. The town has an excellent water supply, obtained from Loch Finlas. It owns and operates an electric light plant, and maintains an asylum, a hospital, industrial schools, markets, slaughter-houses, and a cemetery. The race course, owned by the town, is the scene of the "Western Meeting," held each year in September. Part of the tower of the old church of St. John, built in the twelfth century and turned into a fort by Cromwell, is still standing. The neighborhood of Ayr is rich in associations with the poet Robert Burns. About 2 miles to the south is the cottage in which he was born, and a little farther on Auld Alloway Kirk, and the Auld Brig of Doon of Tam o'Shanter fame. Near the river is the Burns Monument, in the style of a classic temple, containing relics of the poet and two excellent figures of Tam and Souter Johnny, by Thom, a native sculptor. Pop., 1901, 28,697; 1911, 32,986.

AYRER, ī'rĕr, JAKOB (c.1560–1605). A German dramatist. He was born at Nuremberg and, next to Hans Sachs, was the most prolific dramatic poet of the sixteenth century in Germany. He wrote, largely under the inspiration of English traveling comedians and in the interest of the Protestant Reformation, more than 100 plays between 1595 and 1605. The *Opus Theatricum* (Nuremberg, 1618) contains 30 of his tragedies and comedies and 36 of his Shrovetide plays and vaudevilles. They were sensational in their effects, coarse in language, pedantic sometimes in form, but they helped to turn the popular religious drama of the sixteenth century to the service of the new spiritual and national life. Consult: Keller, in *Bibliothek des litterarischen Vereins*, vol. lxxvi, and "Select Dramas of Jacob Ayrer," in *Deutsche Dichter des XVI. Jahrhunderts*, vol. clxxxvi, with a valuable introduction by Tittmann (Leipzig, 1868); also Th. Wolff, *Zur kenntnis der Quellen von J. Ayrers Schauspielen* (Berlin, 1875); J. G. Robertson, *Zur Kritik Jacob Ayrers* (Leipzig, 1892). Two of his dramas were translated into English by A. Cohn, *Shakespeare in Germany* (1885).

AYRES, ārz, ALFRED. See OSMUN, THOMAS EMBLEY.

AYRES, BROWN (1856–). An American college president and scientist, born at Memphis, Tenn. After an early education obtained from private schools, he took engineering courses at Washington and Lee University and at the Stevens Institute of Technology. Following two years as a fellow of Johns Hopkins, he was appointed in 1880 professor of physics at Tulane University. This chair he held for 24 years, at various times acting also as dean of the College of Technology, dean of the academic department, and president pro tempore. In 1904 he was chosen president of the University of Tennessee. He became a member of many learned societies and in 1910 was president of the National Association of State Universities. Honorary degrees were conferred on him by several institutions.

AYRES, LEONARD PORTER (1879–). An American educator, born at Niantic, Conn. He received his college and graduate training at Boston, Harvard, and Columbia universities. He began teaching in 1902 as one of the first to carry American ideas and methods to Porto Rico. There he was appointed superintendent of schools in the districts of Caguas and San Juan, and later general superintendent of all the public schools on the island. He was also chief of one of the Porto Rico summer school expeditions to the United States. Having returned to live in this country, he was made head of the division of statistics in the Playground Association of America. Beginning in 1908, he became prominently identified with the work of the Russell Sage Foundation, especially as chairman of the committee in charge of the Backward Children Investigation. In 1908–09 he lectured on education at New York University. His writings on educational subjects, besides reports and contributions to periodicals, are: *A Course of Study for*

the Schools of San Juan (1905); *Medical Inspection of Schools*, with Luther H. Gulick (1908); *Laggards in our Schools* (1909, 1913); *Open Air Schools* (1910); *Seven Great Foundations* (1911); very many of his articles in educational journals have been reprinted, among them, *The Effect of Promotion Rate on School Efficiency* (1913).

AYRES, Romeyn Beck (1825–88). An American soldier. He was born in Montgomery Co., N. Y., graduated at West Point in 1847, and was at once attached to the artillery in the Mexican War. He became a captain in 1861, took part in the first battle of Bull Run, and was chief of artillery in Gen. W. F. Smith's division from October, 1861, to November, 1862, and of the Sixth Army Corps from November, 1862, to April, 1863. He served with the Army of the Potomac in the Peninsular Campaign, and afterward in the battles of South Mountain, Antietam, Fredericksburg, Chancellorsville (where he commanded a brigade), and Gettysburg (where he commanded a division of the Fifth Army Corps). In August, 1863, his division was ordered to New York to aid in suppressing the draft riots. General Ayres afterward took a prominent part in Grant's Richmond campaign, was wounded at the siege of Petersburg, and from August, 1865, to April, 1866, when he was mustered out of the volunteer service, was in command of the Shenandoah valley. At the close of the war he was brevetted brigadier-general and major-general in both the volunteer and the regular service, and afterward, until his death, served on garrison duty as lieutenant-colonel and colonel in the regular army at various military stations.

AYR'SHIRE, ār'shēr. A maritime county in the southwestern division of Scotland, bounded north by Renfrewshire, west by the Firth of Clyde and the North Channel, south by Wigton and Kirkcudbright, east and northeast by Dumfries and Lanark (Map: Scotland, D 4). Area, 1132 square miles. The county is undulating and hilly, the land attaining no great elevation, except a small portion in the north and some considerable tracts in the south and southeast, which are mountainous. It is rich in valuable minerals, especially coal, ironstone, limestone, and freestone, and one-fifth of the population are engaged in the mining industry. Agriculture is in an advanced state, and dairy husbandry is carried to high perfection, the breed of milch cows, of which it rears a great number, are highly esteemed in the kingdom for the quantity and quality of their milk. (For illustration, see Plate of Dairy Cattle under Cattle.) The breed of horses is also excellent. Among the leading manufactures are iron, textiles, and lace. There are valuable fisheries and shipyards on some parts of the coast. The most important towns are Kilmarnock, Stevenston, Ardrossan, Dundonald, and Ayr, the capital. Pop., 1801, 84,200; 1851, 189,860; 1891, 226,386; 1901, 254,400; 1911, 268,337. Consult Paterson, *History of Ayrshire* (Edinburgh, 1863–66).

AYRTON, ār'ton, William Edward (1847–1908). An English physicist and electrical engineer, born in London. After finishing his course at the University College, London, he was appointed to the telegraph service of the Indian government (1868), and in 1873–79 was professor of natural philosophy and telegraphy in the Imperial College of Engineering at Tokio, Japan. In 1879 he was appointed professor of applied physics in the City and Guilds of London Institute, South Kensington, and in 1904 he became dean of the Central Technical College, after 20 years of service there as professor of electrical engineering. He was at various times president of the Mathematics and Physics Section of the British Association, of the Physical Society, and of the Institution of Electrical Engineers. With Professor Perry he invented an ammeter, voltmeter, electric power meter, etc. His works include *Practical Electricity* (rev. ed., 1911).

AYSCUE, āsˈkû, Sir George (?–1671). An English admiral. He was knighted by Charles I, but held no command until 1646. Two years later, the neutrality which the navy had preserved while the Civil War raged on land terminated, and a large part of the fleet set sail for Holland. It was chiefly the influence of Ayscue, who sided with Parliament, that prevented the remainder of the fleet from leaving the English coast, and his services were rewarded by an appointment as admiral. In this capacity he reduced Barbadoes (after a stubborn resistance by the Royalist Governor, Willoughby), Antigua, Nevis, St. Christopher, and the settlements on the Virginia coast (1651). During the following years he was engaged in repeated naval conflicts with the Dutch under Tromp and Ruyter. In 1666 his flagship, the *Royal Prince*, ran aground and was captured. He himself was seized and carried to Holland, where he was paraded through the towns and exhibited to the populace. He returned to England in 1667.

AYSHA. See Ayeshah.

AYTON, āˈton, Sir Robert (1570–1638). A Scottish poet. He was born at the castle of Kinaldie, Fifeshire, and was educated at St. Andrews, where he took the degree of M.A. in 1588. From France, where he went for study, he addressed, in 1603, a panegyric in Latin hexameters to James I. This poem, intended for a somewhat pedantic king, was the making of Ayton's fortune, for he was soon appointed one of the gentlemen of the bedchamber and private secretary to the Queen. These honors were continued by Charles I. Ayton was on terms of familiarity with the most eminent men of his time, poets, wits, and philosophers alike, among them Hobbes and Ben Jonson. He was a poet of slight merit. He has, however, the distinction of being one of the first Scotchmen to write in the English of the court. To him have been without good evidence attributed the originals of two songs by Burns, one of which is "Auld Lang Syne." He died in Whitehall Palace in 1638. Consult Rogers, *Poems*, with memoir (Edinburgh, 1871).

AYTOUN, āˈtōōn, William Edmonstoune (1813–65). A Scottish poet, born in Edinburgh, June 21, 1813. He received his education at the university there, and was called to the Scottish bar in 1840. In 1845 he was appointed professor of rhetoric and belles-lettres in the University of Edinburgh, and after the formation of the Derby ministry in 1852 he was promoted to the shrievalty of Orkney. He married a daughter of John Wilson. During many years Aytoun devoted himself to literary work. His first important work was *The Life and Times of Richard I* (1840)—a subject well treated and singularly in consonance with his romantic na-

ture. He was also a master of caricature and parody, and many of the *Bon Gaultier Ballads* were from his pen. In 1848 he published the popular *Lays of the Scottish Cavaliers and Other Poems*, which established his reputation as a poet of the school of Scott, and were regarded as offsetting the Puritan ballad poetry of Macaulay. Among his subsequent writings are: *Firmilian: A Spasmodic Tragedy* (1854), and *Bothwell* (1856), a narrative poem of considerable length, in the measure and manner of Scott. His edition of the *Scottish Ballads* (2 vols.) appeared in 1858. In the following year he issued, in conjunction with Sir Theodore Martin, translations of various minor poems of Goethe. He was for many years one of the most frequent and brilliant contributors to *Blackwood's Magazine*. Aytoun was distinguished at once as poet and humorist. His poems exhibit a ballad-like simplicity and a fiery flow of narration, while his tales—the best known and appreciated of which are *The Glenmutchkin Railway* and *How I Became a Yeoman*—possess a certain robust humor and farcical abandonment which made them widely popular. Aytoun died Aug. 4, 1865. His life was written by Sir Theodore Martin (London, 1867).

AYUB KHAN, ī'yo͞ob'kän (1855–). The youngest son of Shere Ali, Ameer of Afghanistan. He was Governor of Herat under his father and his brother, Yakub. After Yakub's abdication he actively opposed the English, and on July 27, 1880, he overwhelmed General Burrows's command at Kushk-i-Nakhud, after which he laid siege to Kandahar. General Roberts hastened from Kabul, performing a memorable march, to relieve Kandahar, and on September 1 dispersed the forces of Ayub Khan, who fell back on Herat. In 1881 Ayub Khan captured Kandahar, but he was unable to maintain himself against the new Ameer, Abd-ur-Rahman. After the loss of Herat he went to Persia, where he was under the espionage of the Persian government, acting for the English. During the insurrection of the Ghilzais, in 1887, he formed a conspiracy to capture Herat, but was detected and again driven into exile. Becoming dissatisfied with his wandering existence in Persia, he at last handed himself over to the British agent at Meshed, whereupon the government provided for him as a state prisoner at Rawal-Pindi, in the Punjab.

AYUNTAMIENTO, ä-yo͞on'tä-myän'tō (Sp. from *yuntar*, Lat. *iungere*, to join; cf. *junta*). The name given to communal councils in Spain. Villages of less than 30 inhabitants combine with others of the neighborhood and elect a common council; its number varies from 4 to 48, depending on the size and importance of the community; the members are elected by manhood suffrage and hold office for four years. Every two years the terms of half the members expire. They choose from among their number the *Alcalde*, or mayor, and his subordinates the *tenientes* and control the disbursal of communal revenues as well as the direction of all purely municipal affairs. As a rule, the councils are not free from the interference of the central government. The Ayuntamiento is a very ancient institution, probably dating from Roman times. It gained great prominence in the wars against the Moors, but after an unsuccessful uprising against Charles I in 1521, it lost most of its powers. These were further curtailed under the Bourbons, and in 1815 they were abolished by Ferdinand VIII, only to be reëstablished by the Cortes in 1821. For the next 50 years their power varied with the party in power, but in 1877 they assumed the position which they occupy to-day.

AYUTHIA, ä-yo͞o'thē-ä. A city of Siam on an island in the Menam, about 45 miles north of Bangkok (Map: Siam, D 4). The river is broken up into a network of creeks to whose banks are moored the floating houses in which most of the inhabitants live. Pop., about 50,000. Ayuthia is the chief town of the important agricultural monthon (circle or division) of Krung-Kao and is situated on the main line of the state railway. Its trade consists chiefly in large shipments of paddy to Bangkok and imports therefrom of clothing and other supplies. Founded in 1351, it was the capital of Siam until 1767. The old city is now largely in ruins, which possess great archæological interest; overgrown with vegetation may be discerned bronze statues, sculptured masses, and the remains of palaces, pagodas, temples, and fortifications. In the days of its glory it was 9 miles in circumference, and within its walls were different quarters, in which dwelt foreigners, who came for trade from many countries—Chinese, Malays, Portuguese, Japanese, and various Asiatics. The most conspicuous structure, built in the form of a pyramid and surmounted by a domed spire, is called the "Golden Mount." Ayuthia was destroyed by the Burmese in 1555 and again in 1767. It was also the scene of the missionary labors of the Portuguese, and of a bloody battle between the Dutch and the English—one of the incidents which led to the naval wars of the seventeenth century.

AYVAZOVSKI, ī'vä-zŏf'skē, Ivan Konstantinovitch. See Aivazovski.

AYYUB IBN SHADI, äy-yo͞ob' 'b'n shä'dē (?–1173). The father of Saladin. He was a Kurd and a member of the tribe of Rawadiya. With his two sons he went to Bagdad and thence to Tikrit, which he made his home, and where his body lies in an elaborate tomb surmounted by a cupola. He won high military rank in Syria and Mesopotamia and lived to see his famous son subjugate the Fatimides and establish the Ayyubid Dynasty in Egypt and Syria. This dynasty was called after him, as that established by Muawiya was named after Ummaya and the one founded by Ibrahim ibn al Aghlab was called the Aghlabid Dynasty. That Ayyub, who came with other members of the family to Egypt after Saladin had overthrown the last Fatimid ruler, exercised considerable influence, is shown by the story Ibn Athir tells concerning his public advice in the council to submit to Nureddin, and his private counsel to his son afterward to resist the ruler of Aleppo. See Nureddin-Mahmud.

AZA'LEA (Gk. ἀζαλέος, *azaleos*, dry, so called because supposed to grow best in dry ground). A genus of plants belonging to the family Ericaceæ (heath family). Some botanists unite the genus *Azalea* to *Rhododendron*. One of the species best deserving of notice is *Azalea pontica*, a shrub from 3 to 5 feet high, a native of the countries around the Black Sea, with large obovate or oblong, lanceolate shining leaves and umbellate yellow flowers, which are externally covered with glutinous hairy glands

AZALEAS & RHODODENDRONS

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1 WILD HONEYSUCKLE - PINXTER FLOWER - AZALEA NUDIFLORA
2 FLAME AZALEA - AZALEA CALENDULACEA
3 GREAT LAUREL - ROSE BAY - RHODODENDRON MAXIMUM
4 MOUNTAIN ROSE BAY - RHODODENDRON CATAWBIENSE

and are very fragrant. It covers many mountain slopes, but does not ascend to great elevations, giving place to the more alpine *Rhododendron ponticum*. It is common in gardens and shrubberies in Great Britain, and varies with orange, red, and almost white flowers. The whole plant is narcotic and poisonous. North America abounds in azaleas as well as in rhododendrons, and some of the species have been long cultivated in Great Britain, particularly *Azalea nudiflora* and *Azalea viscosa*, which, with *Azalea pontica*, have become the parents of many hybrids. The former has pink, the latter pure white flowers, of delightful fragrance. *Azalea viscosa* has the flowers covered with glutinous hairs like *Azalea pontica;* but the flowers of *Azalea nudiflora* are nearly destitute of them. Both species abound from Canada to the southern parts of the United States (the latter is sometimes known by the common name of honeysuckle). *Azalea arborescens*, a mountainous species, from 3 to 10 feet high, has large rose-colored flowers. *Azalea calendulacea*, a native of the southern parts of the United States, is described as frequently clothing the mountains with a robe of living scarlet. India and China produce several species of azalea, of which one of the finest is *Azalea indica*, well known as a greenhouse shrub. Its flowers exhibit great brilliancy of colors. Many hybrids exist between it and the more hardy species. Another extremely beautiful species is *Azalea liliflora*, an evergreen introduced from China. The wholesale propagation of azalea plants for winter forcing in greenhouses is an important industry in Holland, Belgium, and parts of Germany.

AZANA. See AIZANI.

AZANCHEVSKY, ä'zân-chyĕf'skê, MICHAEL VON (1839–81). A Russian composer. He was born in Moscow, studied under Richter and Hauptmann at Leipzig, and was director of the Conservatory at St. Petersburg from 1870 to 1876. He was the owner of a noteworthy musical library and was an acknowledged authority in general music. Among his many compositions are a *Sonata in B Minor* for pianoforte and violoncello; a *Fest Polonaise*, for two pianofortes; two trios; two quartets; the Twelfth Psalm; and a concert overture.

AZARA, â-thä'râ, FELIX DE (1746–1811). A Spanish soldier, naturalist, and traveler. He was born at Barbuñales, in Aragon, was educated at the universities of Huesca and Barcelona, obtained a commission in the Spanish army, and rose to the rank of brigadier-general. He was severely wounded in the attack upon Algiers. In 1781 he was appointed one of the commissioners for fixing the boundaries of the Spanish and Portuguese possessions in South America. He did not return to Spain till 1801, when he published an account of his travels in his *Voyage dans l'Amérique méridionale* (1809), and an important work on quadrupeds and birds, under the modest title of *Notes on the Natural History of Paraguay and La Plata* (1802). His *Geografía Física y Esférica de las provincias del Paraguay y Misiones guaraníes*, composed in 1790, remained inedited in the National Library of Montevideo until published by Dr. R. R. Schuller in 1904. Consult also Luís María Torres, *Les études géographiques et historiques de Félix d'Azara* (Buenos Ayres, 1905).

AZARA, JOSÉ, NICOLÁS DE (1731–1804). A Spanish diplomat, born at Barbuñales, Aragon, a brother of Felix de Azara. He studied at the universities of Huesca and Salamanca, and in 1765 was appointed Spanish envoy at the papal court. Here he exercised a very considerable influence, and was concerned with the suppression of the Jesuit Order in 1773 and with the election of Pius VI. Subsequently he was sent on missions to Paris and Barcelona. He was known as a patron of art, edited the works of his friend Mengs, with a biography (1780), and translated (1792) Middleton's *Life of Cicero*. Consult Paul Besques, "La première ambassade de D. José Nicolas de Azara à Paris (mars, 1798–août, 1799)" in *Bulletin hispanique*, vol. iii (1901). Consult also J. Gómez de Arteche, "Reinado de Carlos IV," in the *Historia General de España*, published by the Royal Academy of History (Madrid, 1892).

AZARA'S DOG (or **FOX**). See FOX-DOG.

AZ'ARI'AH (Heb. Yahwe helps). The name of a number of biblical personages, no less than 24 being found. (1) One of these is Azariah the son of Oded, a prophet who, by his exhortation of Asa, King of Judah, is said to have brought about a religious reform (2 Chron. xv. 1–8). Of the same name were at least four high priests at various times, living (2) in the reign of Solomon (1 Kings iv. 2); (3) in the reign of Asa (1 Chron. vi. 10); (4) in the reign of Uzziah (2 Chron. xxvi. 16–20); (5) in the reign of Hezekiah (2 Chron. xxxi. 10). (6) Azariah, of the tribe of Ephraim, was one of four who sided with the prophet Oded when he preached against the Israelites for attempting to make captives of Judah (2 Chron. xxviii. 12). (7) Azariah is the name most frequently used in Kings of Uzziah (q.v.). (8) Azariah, also called Abednego, was one of the three men thrown into the fiery furnace (Dan. i. 11). In addition to these persons mentioned in the Bible, the Assyrian King Tiglath-pileser IV (745–728) refers in an inscription to an Azriyau or Azariah of Yaudi who was long supposed to be identical with the King of Judah known also as Uzziah. It is now held, however, by most scholars that this Azariah ruled over the N. Syrian Yaudi known to us through the Zenjirli inscriptions.

AZAROLE, ăz'â-rōl. See CRATÆGUS.

AZAZEL, ăz'â-zĕl'. A name occurring in connection with the services on the Day of Atonement (Lev. xvi. 8, 10, 26). Two goats were taken by the high priest, one of which was slaughtered, and the other, after the sins of all Israel had been confessed over its head, was led out by some one to the wilderness and thrown over the rocks. The symbolism conveyed by the act is evident. All the sins of the people were handed over to Azazel. This name appears in later writings as the chief of the angels who married human beings and begat of them wicked men (Gen. vi.). In Enoch x. 8 Azazel causes all sin; in lxix, 2 he appears as the last of the 21 angels; in the Sibylline Oracles, ii, 215, the same angel is referred to as Azael. The name means 'God is strong.' Azazel was bound by angels and laid in the desert, at a place, Dudael, identified by Schick with Bet-hududun, a chalky cliff near Jerusalem, to await his punishment. It appears that the rite of Azazel is a remnant of an ancient demon-worship, which was changed and modified for the purposes of the Levitical writers.

AZCARRAGA Y PALMERO, äth'kâ-rä'gà ē pàl-mā'rō, MARCELO DE (1832–). A Span-

ish general and statesman, born in Manila. He received a military education at Madrid, and participated in the movement which established Alfonso XII on the throne (1874). As Under Secretary in the Ministry of War he distinguished himself by his admirable organization of the Cuban forces. He became lieutenant-general, and after sitting in the first Chamber of Deputies under Alfonso XII was made a life Senator. He was Minister of War under Cánovas del Castillo in 1890–92 and 1895–97 and after the assassination of Cánovas in the latter year (August 8) was head of the cabinet till September 30. He was Minister of War under Silvela in 1899–1900, and Premier again from October of the latter year till February, 1901, and from December, 1904, to January, 1905. In 1909 he was President of the Senate. In 1871 he wrote *La libertad de comercio en las Islas Filipinas*, followed by other books on the subject of Spanish colonies. He was admitted to the Order of the Golden Fleece, received the collar of the Order of Carlos III, and was made a Knight Grand Cross of several other Spanish and foreign orders.

AZEGLIO, ȧd-zā'lyō, Massimo Taparelli, Marchese d' (1798–1866). An Italian statesman, author, and artist, the descendant of an ancient and noble Piedmontese family. He early went to Rome and devoted himself to art, winning a reputation in landscape and historical painting. After his father's death, in 1830, he went to Milan and married a daughter of Manzoni. Soon afterward he made his début in literature with the richly colored patriotic novels *Ettore Fieramosca* (1833) and *Niccolò de' Lapi* (1841); Fanfulla, one of D'Azeglio's burlesque characters, has become a proverbial type in Italy. The political affairs of Italy called forth his famous attack upon the papal government, *Degli ultimi casi di Romagna*, in which he urged upon the Italian princes the necessity of a national policy. After the election of Pope Pius IX, D'Azeglio went to Rome, and to him are to some extent ascribed the reforms with which Pius began his government. In the excitement that preceded 1848, he published *Il lutto di Lombardia*, and later took part in the campaign against Austria, both in Lombardy and in Venetia, and was severely wounded at the battle of Vicenza. He felt bitterly the failure of this war and vented his feelings in many polemical articles. On the opening of the Sardinian Parliament he was chosen a member of the Chamber of Deputies, and, after the unfortunate battle of Novara, March 23, 1849, was intrusted by Victor Emmanuel II with the task of forming a ministry. His careful and shrewd policy, especially toward France, dubbed by his enemies that of *playing 'possum* (*far il morto*) won him at the time as many enemies as later it gained him admirers. His unpopularity led in 1852 to the succession of Cavour, who was supported with great loyalty by D'Azeglio, in various foreign posts and with personal advice. At the close of the war, in 1859, D'Azeglio was appointed pro tempore general and commissioner extraordinary (purely military) for the Roman States. D'Azeglio's spiritual evolution has been discerningly outlined by De Sanctis in *Nuovi saggi critici* (Naples, 1898). A character noted for its poise and disinterestedness, D'Azeglio believed that Italian liberty must be accomplished by a series of orderly and progressive steps, for which he worked with a moderation equaled only by his tenacity. He distrusted the more radical notions of the revolutionists and centred his whole policy simply on the expulsion of the foreigner. When independence was accomplished, he felt that his own work was done. He has left a charming story of his own life in *I miei ricordi* (Florence, 1873). Since his death, *L'Italie de 1847 à 1865; correspondance politique de Massimo d'Azeglio* (1866), and other writings have appeared. Consult other biographies by Camerini (Turin, 1861); Giuliani (Florence, 1866); Massari (Turin, 1867); Morozzo (Florence, 1884); also Vismara, *Bibliografia di Massimo d'Azeglio* (Milan, 1878); Déjob, *Un homme d'état spirituel et chevaleresque* (Paris, 1894); and Constance D'Azeglio, *Souvenirs historiques de M. D'A.* (Turin, 1884). Translations: *Ettore Fieramosca, The Challenge of Barletta* (anon., New York, 1850); ib., by C. E. Lester (New York, 1845); *Ricordi*, by Maffei (London, 1868), and in Warner's *Library of the World's Best Literature; Niccolò de' Lapi*, by H. Hallet (New York, 1860).

AZERBAIJAN, ä'zēr-bī-jän' (anciently, *Atropatene*). (See Atropatene.) The most northerly province of Persia, bounded on the south by Persian Kurdistan and Irak, east by Ghilan and the Caspian Sea, north by Russian Armenia, and west by Turkish Armenia and Turkish Kurdistan (Map: Persia, B 2). It has an area of about 40,000 square miles. The surface of Azerbaijan is very mountainous, many of the ranges rising from 7000 to 9000 feet in height. The peak of Savalan (an extinct volcano) reaches an elevation of 13,000 feet. Mount Ararat rises on the northwest border. The chief rivers are the Aras or Araxes, Kara-Su, and the Kizil-Uzen. The salt lake Urumiah, the largest in Persia, is situated in the western part of the province. The climate is not unhealthful, but is very unsteady. The principal products are grain, fruit, flax, hemp, cotton, tobacco, honey, and saffron. The province is very rich in minerals, and especially in marbles. Silver, lead, tin, copper, iron, coal, and oil are found. The population of the province is estimated between 1,500,000 and 2,000,000. The bulk of the natives are physically of the type of the Persians of the Teheran-Ispahan country, but speak a dialect of Turkish. The capital is Tabriz. For further description, see Caucasian; Tatars.

AZEVEDO, ä'zā-vā'dō, Manoel Antonio Alvares de (1831–52). A Brazilian poet, born at São Paulo. He studied law at the university there, and afterward published a volume of poems entitled *Lyra dos vinte annos* (5th ed., 1884), which consists chiefly of elegies and displays a high degree of talent. His *Obras* were first published in 1853; the *Obras completas* which appeared in three volumes in 1863, include, besides poems, a biographical notice by J. Monteiro, prose writings, and the dramatic sketches *Bohemios*, *Macario*, and *Noite na taverna*. Consult F. Wolf, *Le Brésil littéraire* (Berlin, 1863).

AZEVEDO Y ZUNIGA, ä'thā-vā'dō ē thōō'nyē-gȧ, Gaspard de, Count of Monterey (1540–1606). Viceroy of Mexico and Peru (1595–1603). He sent out several expeditions in California and New Mexico for exploration and settlement. Monterey, founded in 1596, and the Bay of Monterey, were named in his honor.

AZILIAN. See Paleolithic Period.

AZIMUTH (Fr. *azimut*, from Ar. *as-sumut*, a way, or point in the horizon). In astronomy,

the azimuth of a heavenly body is the angle measured along the horizon between the north or south point, and the point where a circle passing through the zenith and the body cuts the horizon. Astronomers usually measure astronomical azimuth westward from the beginning at 0°, and returning to it at 360°. Thus, in northern latitudes, where the north pole is elevated, the azimuth is measured from the south point, so that the east point, for instance, has an azimuth of 270°. Navigators and surveyors generally reckon azimuth from the nearest principal point of the compass. Thus, W. 24° S. would mean an azimuth 24° from west in the direction of south; and astronomically this would be simply 66°. See AMPLITUDE.

AZINCOURT, ȧ'zăn'kōōr'. See AGINCOURT.

AZ'OBEN'ZENE, $C_6H_5.N=N.C_6H_5$. A valuable compound of carbon, hydrogen, and nitrogen. It is a red, crystalline substance, insoluble in water, but soluble in alcohol or in ether. When pure, it melts at 68° C. and boils, without being decomposed, at 293° C. It may be prepared by treating nitro-benzene with a solution of stannous chloride in soda, the precipitate thus produced being washed with water and recrystallized from petroleum-ether. By the reducing action of tin and concentrated hydrochloric acid, azobenzene is converted into the substance called benzidine ($NH_2.C_6H_4.C_6H_4.NH_2$), which is extensively used in making the so-called azo dyes. See COAL-TAR COLORS.

AZ'O COL'ORS. See COAL-TAR COLORS.

AZOIC, ȧ-zō'ĭk (Gk. ἄζωος, *azōos*, lifeless, from *a*, *a*, priv. + ζωή, *zōē*, life). A name applied by Sir Roderick Murchison, in 1845, to the old crystalline rocks of the Scandinavian Peninsula, in recognition of the fact that they contain no traces of organic life. Later the name was adopted by both European and American geologists to designate similar rocks that lie at the bottom of the geological column beneath all the fossiliferous rocks of the earth's crust. Eventually a conflict arose between the advocates of the name "azoic" and those who preferred the term "primitive," the conflict being over the theories of origin involved in these names rather than in the use of the names themselves. With a view to terminating this discussion, J. D. Dana proposed, in 1872, the name "archæan," thus avoiding all theory of origin, with the result that the terms "azoic" and "primitive" shortly ceased to be applied by the leading geologists to rock formations. Azoic is, however, still employed in another sense (Dana's *Manual of Geology*, 4th ed., New York, 1896, p. 440), being applied to the second "æon" or great period of time, without organic life, through which the earth passed before the advent of those conditions that permitted the growth of living matter. Rocks of this æon have not as yet been definitely recognized in the earth's crust. For the description of the rocks originally considered as azoic, the reader is referred to the article on PRE-CAMBRIAN FORMATIONS; also to ALGONKIAN SYSTEM; and ARCHÆAN SYSTEM.

AZORES, ȧ-zōrz' (Portug. *Açores*, so called from *açores*, hawks, found there). A group of islands in the Atlantic Ocean, whose nearest point is 830 miles west of Portugal, to which they belong (Map: Africa, B 1). They extend over 400 miles from about lat. 37° to 40° N. and from long. 25° to 31° 16′ W. and occupy an area of 922 square miles. Excluding the uninhabited reefs, the group numbers nine islands, divided into three sub-groups—the southeastern, consisting of the islands of São Miguel, or St. Michael's (297 square miles), and Santa Maria, with Formigas (40 square miles); the central group, embracing the islands of Pico (176 square miles), Terceira (223 square miles), São Jorge (40 square miles), Fayal (64 square miles), and Graciosa (18 square miles); and the northwestern group, consisting of Flores (57 square miles) and Corvo (7 square miles). The entire archipelago is of volcanic origin and very mountainous, the highest volcanic summit being Pico Alto (7612 feet) on the island of Pico. The volcanic origin of the islands is shown by the large number of hot springs scattered all over the group, and by the earthquakes from which the islands have suffered even in comparatively recent times. Streams are abundant. The climate is mild, and snow is seldom seen. The highest temperature is about 86°, but the humidity is often excessive. The islands are popular as a winter resort. The flora resembles that of Spain; of the 478 species found in the islands, 400 are of European origin. The native fauna is limited to the bat and several rodents.

The soil is very fertile, and the mild climate allows of the cultivation of tropical fruits, such as olives, oranges, grapes, and bananas. Agriculture is greatly impeded by the unequal distribution of land, and the emigration of the landless population to British Guiana, West Indies, and South America is steadily increasing. A considerable trade in fruit is carried on with Portugal, England, Brazil, and North America. Oranges, formerly the chief article of export, are now gradually being replaced by pineapples. Imports come chiefly from Great Britain. There are only a few safe harbors, the chief among which is that of Angra, the capital of the archipelago, on the island of Terceira. Administratively the archipelago is considered a province of Portugal and is divided into the three districts of Angra do Heroismo, Horta, and Ponta Delgada. The population (242,613 in 1911) is mainly of Portuguese origin with Moorish and Flemish admixtures. The remainder are negroes, mulattoes, and some settlers from Great Britain.

The discovery of Phœnician coins on the Island of Corvo would indicate that the Azores were visited by Carthaginian traders. They appear on the maps of the mediæval Arabian geographers, and on an Italian map of 1351. They were occupied by the Portuguese under Gonçalo Velho Cabral and others between 1431 and 1461 and were, before that time, uninhabited. In 1466 Alfonso V made a life grant of the island of Fayal to his aunt, the Duchess of Burgundy, and from this circumstance many settlers migrated thither from Flanders. During the next century the islands became a favorite stopping place for the Spanish fleets on their return from America, and in the neighboring waters several sharp encounters took place between the Spaniards and the English sea-rovers. Consult Ray, *The Azores* (Washington, 1892); Brown, *Madeira, Canary Islands and Azores* (Madeira, 1910).

AZ'OTH (Ar. *al*, the + *zāūg*, Pers. *zhīwah*, quicksilver). The panacea of Paracelsus, regarded by his followers as "the tincture of life." See PARACELSUS.

AZ'OTIN (Fr. *azote*, nitrogen, from Gk. *a*, *a*, priv. + ζῆν, *zēn*, to live). A nitrogenous

fertilizer prepared from meat refuse, practically identical with ammonite. See MANURES and MANURING.

AZ'OTU'RIA. A disease of the horse, also known as azotemia, hemoglobinemia, hemoglobinuria, etc. It is characterized by the loss of control of the hind limbs and the passage of ropy, dark, or coffee-colored urine.

The disease almost always occurs in horses which have rested for a day or more, during which time they have been kept on full rations. It is never seen at pasture and rarely under constant work, though the feeding be high. The attack is usually precipitated by taking the horse from the stable and subjecting it to exercise or work. Usually after being driven for half a mile or more the horse suddenly commences to stagger in the hind parts, the feet being raised only slightly from the ground, it knuckles at the pastern, perspires profusely, finally collapses, and cannot get up. When down, the body and limbs are moved convulsively, the pulse and breathing are accelerated, the excitement causes the temperature to rise to 102°–103° F. and the mucous membranes are congested.

The disease can be diagnosed with certainty only by the presence of its two cardinal symptoms: (1) the peculiar muscular affection, and (2) the hemoglobinuria. The affection may be mistaken for spinal meningitis, colic, and fractures, from which it must be differentiated.

While there are several theories as to the cause of the disease, the most tenable seems to be that of an autointoxication. It is believed that, during the functioning of previously rested muscles or in muscles which have worked to excessive exertion, some substance is formed which exerts a toxic action.

The affected animals are generally very uneasy, and in order to prevent further injury to the head and feet chloral hydrate is administered to quiet them. The disease may end fatally in a few hours or days, or recovery may follow, being usually more speedy and perfect if it has set in at an early stage.

Remedial measures which have been recommended include venesection, followed by the injection of a normal salt solution, administration of cathartics, cardiac stimulants, potassium iodide, fomentations of warm water over the loins, electricity to the affected muscles, etc. Attacks may be prevented by regular work or exercise and by the reduction of the grain feed when at rest.

AZO'TUS. Same as Ashdod (q.v.).

AZOV, â'zôf. A fortified town and seaport in the Russian territory of the Don Cossacks, on the left bank of the river Don, about 25 miles east of Rostov, and within 5 or 6 miles of the Sea of Azov (Map: Russia, G 5). The principal industries are fishing and gardening. It carries on an extensive trade in grain, serving as an outlet for the southeastern part of Russia. Pop., in 1885, 16,600; in 1913, about 27,000. The flourishing trading colony of the Greeks, Tanaïs, on or very near the present site of Azov, was conquered by Mithridates (115 B.C.). Then it fell under the successive rule of the Sarmatians, Huns, Khazars, and the Petchenegs. In the tenth century it was captured by the Russian prince Vladimir I. When in the thirteenth century it was taken by the Genoese, Azov became the commercial centre and entrepôt for the Indo-Chinese trade, and the Genoese fortified it by high walls and towers. In 1395 Tamerlane took the town and sacked it. In 1471 the Turks conquered it and called it and the neighboring sea Asak. The closing of the Black Sea by the Turks to all navigation, followed by the discovery of the sea route to India, brought about the speedy decline of the town. In 1696 Peter the Great took it. Captured later more than once by the Turks, it was finally ceded to Russia in 1774, by the Treaty of Kutchuk-Kainardji. In 1855 it was bombarded and greatly injured by an allied English and French squadron.

AZOV, SEA OF. A large gulf of the Black Sea, connected with it by the Strait of Kertch and inclosed by Russian territory (Map: Russia, G 5). Its greatest length is about 200 miles, its average width about 90 miles, and its area is 14,666 square miles of which islands cover 42 square miles. At its northeast extremity it becomes narrow and forms the Gulf of Taganrog. It has some islands, of which Berusch Island is the largest. The shores are mostly low and sandy, with only here and there, especially on the south, a short strip of rocks. Its waters contain very little salt—so little, indeed, that in the neighborhood of Taganrog it is used for drinking. The waters are freshened by the Don and four smaller rivers that empty into it. It is very shallow and but poorly adapted for navigation. The three ports on its shores are Taganrog, Mariupol, and Berdiansk, annually visited by about 2700 vessels, with a tonnage of about 500,000. The sea is remarkably rich in fish. A narrow strip of the sea on the west, cut off from the main body by a long tongue of land and bordering on the Crimea, is called Sivash, or 'Putrid Sea.'

AZPÉITIA, âs-pā'ê-syâ, *Castilian Sp. pron.* âth-pā'ê-tyâ. A district town in the Spanish province of Guipúzcoa, situated on the Urola, a short distance from San Sebastian. It contains interesting remains of ancient buildings, has mineral springs, and a short distance to the west, on the road to Azcóitia, is situated the Loyola Monastery, occupying the site of the house in which the founder of the Society of Jesus, St. Ignatius of Loyola (1491–1556), is said to have been born. Pop., 1900, 6066; 1910, 6692.

AZRAEL, ăz'rā-ĕl (Heb. help of God). In Mohammedan belief, Azrael, also called Izrail, is the angel of death (Koran, surah xxxii, 11), and is often called Malak-al-Maut. It is he who separates the soul from the body, doing this gently or harshly, as the case may be. When a man has been God-fearing, the soul leaves as gently as water from a bag; but the soul of an infidel is drawn out as a hot spit out of wet wool. The angel of death figures also in Jewish literature.

AZ'TEC (from Nahuatl *aztlan,* place of the heron, or the 'Heron' clan). A name frequently used to designate all the ancient semi-civilized tribes of Nahuatlan stock in central and southern Mexico, but properly applying only to a small group of seven cognate tribes occupying the valley of Mexico and its immediate vicinity. According to tradition they had migrated together from the north. The principal tribe fixed its capital at Tenochtitlan, now the City of Mexico, and by successive wars of conquest gradually acquired dominion over nearly all the tribes of southern Mexico, thus building up the Mexican Empire; which flourished for perhaps

two centuries until overthrown by Cortés in 1521. Although possessed of a high degree of culture, perhaps, derived from their predecessors in the country, the Aztecs were distinguished for their cruelty and the bloody character of their religious rites. Some of their descendants, still retaining their ancient language, reside in outlying villages in the neighborhood of the City of Mexico. See CORTÉS; MEXICO; MONTEZUMA; NAHUATLAN STOCK.

AZTEC CLUB OF 1847. A society formed to cherish the memories and traditions of the Mexican War. The club was founded in the City of Mexico, in 1847. Membership proceeds by primogeniture. The members number about 225.

AZUA, å-sōō'å, or **AZUA DE COMPOSTELLA,** dâ kŏm'pō-stĕl'yà. A town in Santo Domingo, in the island of Haiti, on the Bia River, 4 miles from Ocoa Bay, and 60 miles west of the city of Santo Domingo (Map: West Indies, E 3). It has sulphur springs, salt and asphalt deposits, extensive sugar plantations, and the horses of the neighborhood are greatly prized. The province of Azua affords excellent grazing land and abounds in mineral springs. Its population in 1900 was about 50,000. Pop., 2000.

AZUAY, ä'sōō-ī'. A province in the southwestern part of Ecuador, with an area of about 11,150 square miles. The surface is mountainous. Agriculture, cattle raising, weaving, and the making of pottery are the chief occupations of the inhabitants, who are mostly Indians. The cinchona tree is found in abundance on the mountain slopes. Pop., 132,400. Capital, Cuenca.

AZULEJO, ä'thōō-lā'hō (Sp. *azul*, blue; see AZURE). The name given, on account of its prevailing color, to a kind of painted glazed tile made originally by Mohammedan artists in Persia, Egypt, Spain, etc., and used for the decoration of wall surfaces. (See TILES.) Some patterns were repeated century after century, and the Spaniards, who inherited the art of making them from the Moors, modified the designs and colors so slightly that it is not always easy to distinguish a Renaissance from an early mediæval Spanish tile.

AZUNI, âd-zōō'nē, DOMENICO ALBERTO (1749–1827). A distinguished Italian jurist and historian, born at Sassari, in the island of Sardinia. In his youth he began the study of law, devoting himself particularly to the maritime relationships of nations, on which he became a great authority. He was judge of the tribunal of commerce at Nice when that city was occupied by the French in 1792, and then retired to Florence, where in 1795 he published his *Sistema universale dei principi del diritto marittimo dell' Europa*, which appeared afterward in French as *Droit maritime de l'Europe* (trans. by J. M. Digeon, Paris, 1797), and in an English translation by William Johnson (New York, 1806). He was summoned to Paris to act as one of the commissioners for compiling the new commercial code, and in 1807 was appointed president of the court of appeal at Genoa. After the downfall of Napoleon he was made judge of the tribunal at Cagliari, and director of the university library. He also published the following: *Dizionario universale ragionato della giurisprudenza mercantile* (1786–88); *Histoire géographique, politique et naturelle de la Sardaigne* (1802).

AZURE (OF. *azur*, ML. *lazurius*, also *azura* with the loss of *l* due to confusion with the article; from Pers. *lazhward*, azure, *lājaward*, lapis lazuli). The name for blue in heraldry and hence also the blue color in coats of arms.

AZURINE (from the azure color). A variety of one of the European chubs or roach, the rudd, distinguished from the type by the slate-blue color of the back, the silvery white of the abdomen, the whiteness of the fins, and the fact that the iris of the eye is tinged with pale straw color, instead of the red of the rudd or "red-eye." Hence it is frequently called "blue roach," and is known in science as *Leuciscus erythropthalmus*, variety *cæruleus*. It is an inhabitant of the Swiss lakes and of the streams of the continent of Europe generally; and is said to have been introduced into Great Britain by Yarrell. It does not exceed a pound in weight, but is hardy, furnishes good sport for the angler, and breeds readily; nevertheless it has not spread far from Knowsley, the seat of the Earl of Derby, in whose park it was first acclimated. Its flesh is firm and of good flavor. See ROACH.

AZURITE (from its azure color). A basic copper carbonate, containing about 55 per cent of copper and crystallizing in the monoclinic system. It differs in composition from malachite only by containing more carbonic acid and less water. Azurite occurs in sharply defined crystals of a rich dark blue color and in columnar masses and velvet-like incrustations. It is usually found with malachite and other ores of copper, and the specimens from Chessy, near Lyons, France, are noted for their fine crystallization and are called *chessylite*. The azurite from Siberia is frequently cut in Russia into thin slabs and used as veneering for table tops and the like. Crystals of azurite, found in Arizona, are highly regarded as gems, although they are too small to be extensively used and too soft to wear well. Azurite is a valuable ore of copper; it occurs in great quantities in some of the Arizona mines, where it is actively wrought. In the Clifton district it is found in limestone and is accompanied by other ores of copper, including malachite, cuprite, melaconite, and native copper, and by limonite. The Copper Queen Mine in the Bisbee district has produced solid masses of azurite and malachite weighing several tons. The mineral in all cases is probably to be regarded as of secondary origin; i.e., it has been derived from other copper minerals by the natural processes of oxidation and hydration. The original sources of material are copper sulphides, which are still found in the deeper portions of the mines where the weathering agencies have not penetrated. Azurite has also been used as a pigment.

AZYGOS (Gk. ἄζυγος, *azygos*, unwedded, not paired, from *ά*, *a*, priv. + ζυγόν, *zygon*, yoke). A term used in medicine to describe a part or a structure which has no fellow of the opposite side of the body, as the sphenoid bone, certain single veins and arteries. The word is also applied to the muscle of the uvula, which was named the *azygos uvulæ* under the mistaken idea that it was a single muscle with two origins, viz., at the posterior nasal spines of the palate bone, and running thence to the tip of the uvula. It is now known that these muscles occur in pairs. Their function is to raise the uvula. This pair is sometimes called the *azygos Morgagni*.

AZYMITES (*ά*, *a*, priv. + ζύμη, *zymē*, leaven). The opprobrious name given by the Eastern to the Western church, arising from the use by the latter, in the Lord's Supper, of unleavened bread. Michael Cærularius, Patriarch

of Constantinople (1043–59), made this one of his counts against the Western church, and ever since it has been so considered. The Western church retorted with "Pro-zymites," also "Fermentarians."

In the "Longer Catechism of the Eastern Church," prepared by Philaret, approved by the Holy Synod in 1839, and constituting the most authoritative doctrinal standard of the Orthodox Græco-Russian church, question 328 is: "Of what kind should be the bread for the Sacrament?" and the answer is: "Such as the name itself of the bread, the holiness of the Mystery, and the example of Jesus Christ and the Apostles all require; that is, leavened, pure, wheaten bread" (cf. Schaff, *Creeds of Christendom*, vol. ii, pp. 496).

The exact time when the Western church first employed unleavened bread in the Eucharist to the exclusion of the leavened is undetermined and, perhaps, undeterminable; but surely this use can be traced to the ninth century. The canons of earlier councils, e.g., of the Council of Toledo (693) and of Chelsea (787), upon the bread merely prescribe that it should be a specially prepared loaf, but not that it should be leavened or unleavened. Cf. art. "Elements," in Smith and Cheethan, *Dict. Christ. Antiq.*

B

B The second letter in the Græco-Roman alphabet, and the second in all European alphabets derived from it, except the Russian and others which go back to the mediæval Greek. Though the B has retained its position in the Russian alphabet, it has changed its pronunciation from *b* to *v*, a new symbol having been invented for the *b*-sound. The Græco-Phœnician character had a closed loop, which in the Aramaic alphabets opened out, assuming the shape seen in the square Hebrew and the Arabic letter. There were two complete loops in the Greek form, from which was developed the prevalent cursive form B. According to Flinders Petrie (*The Formation of the Alphabet*, London, 1912), the entirely closed form of the letter B begins as early as the twelfth dynasty in Egypt, continued later in the same country, and became the standard form of both Greece and Italy. The minuscule *b* of our alphabet is from the majuscule Latin of the mediæval manuscripts, of which it is a mere simplification. It is found as early as the first century of our era, scratched on the walls of buildings in Pompeii. In time the upper loop was lost, and the letter assumed practically its present form. (For the history of the minuscule *b*, consult Prou, *Manuel de paléographie*, 3d ed., Paris, 1910, p. 50, and Sir E. M. Thompson, *Introduction to Greek and Latin Palæography*, Oxford, 1912). The Hebrew name for the letter is *beth*, 'a house,' because the original pictographic form was the outline of a house or tent. This word appears as *βῆτα*, *bēta*, in the Greek alphabet, and is retained in our word *alpha-bet*. See ALPHABET; LETTERS.

Phonetic Character. B is the voiced or soft labial explosive. According to certain fixed laws, it may interchange with *p*, *v*, or *f*. (See PHILOLOGY; PHONETICS; GRIMM'S LAW.) Thus, Lat. *bibo*, I drink, Skt. *pib-āmi*, Old Irish *ibim*, Cornish *eve*, Breton *eva;* and Gk. *ἐπίσκοπος*, *episkopos*, bishop, AS. *biscōp*, Fr. *évêque;* again (orig. *bh*) Skt. *bhar-āmi*, I bear, Gk. *φέρω*, *pherō*, Lat. *fero*, Eng. *bear*. In Greek and late Latin *b* was softened to *v*, as is the case in modern Greek to-day. During the classical period of Latin the sound was that which we now have. But later it had the sound of *v*, which in many cases passed into French and Italian; for example, Lat. *habere*, It. *avere*, Fr. *avoir;* and Lat. *tabula*, It. *tavola*. In Spanish *b* has a bilabial sound produced by pronouncing *v* with the lips instead of against the teeth. Before *s* or *t*, the *b* in Latin was sounded like *p*, as we know from inscriptions where *pleps* is written for *plebs* and *urps* appears for *urbs*. Thus we have *scripsi* for *scrib-si*, and *opsequor* for *ob-sequor*. The letter *b* is silent now in some words of Latin derivation, like *debt*, *doubt*, and also when excrescent, as in *limb* (AS. *lim*), *lamb*, *thumb*, and the like.

As Abbreviation. B is used also as a symbol and in abbreviations. The Greek *β* denoted 2, and B 2000. In general, it indicates the second of a series, as Company B of a regiment, etc. In chemistry B stands for *boron*, one of the elements. In music B denotes the seventh or "leading" tone of the diatonic scale of C. In nautical language the minuscule *b* signifies a "blue sky." In academic degrees B. is an abbreviation of *Baccalaureus*, *Bachelor*. See ABBREVIATIONS.

BAADER, bä'dēr, BENEDICT FRANZ XAVER VON (1765–1841). A German Roman Catholic theologian and philosopher. He was born in Munich, March 27, 1765, the third son of the court physician to the Elector of Bavaria. His elder brothers were distinguished, Clemens as an author and Joseph as an engineer. Franz studied medicine at Ingolstadt and Vienna, graduating in 1784; assisted his father in medicine, but disliked the profession; studied engineering in the mining districts, and lived five years in England (1791–96), where he became acquainted with rationalistic philosophy, which he thought little less than satanic. The religious speculations of Eckhart, St. Martin, and especially Böhme, were more to his mind. He was a friend of Jacobi, and, for a time, of Schelling. Though deeply interested in philosophy, he kept his engineering practice. On his return from England he was appointed consulting engineer of the Bavarian mines; won the prize of 10,000 gulden for the discovery that Glauber's salt, instead of potash, may be employed in making glass; was ennobled in 1813 for his valuable services, and was superintendent of mines, 1817–20. His first published work was *Fermenta Cognitionis* (Berlin, 1822–24, five parts; sixth part, Leipzig, 1825), in which he combated modern philosophy and recommended that of Böhme. In 1826 he was appointed professor of philosophy and speculative theology in the new University of Munich. Some of his lectures while occupying that chair have been published (*Vorlesungen über spekulative Dogmatik*, Münster, 1828–38). In 1838 he opposed the interference in civil matters of the Roman Catholic church, to which he belonged, for which opposition he was interdicted from

lecturing on the philosophy of religion during the last three years of his life. His criticism of the papacy and his desire to see it abolished no doubt contributed to his being silenced. Baader is considered to have been the greatest speculative Roman Catholic theologian of modern times, and his influence has gone beyond the bounds of his church. He also contrasted Eastern and Western Catholicism, to the detriment of the latter (Stuttgart, 1841); but ere he died he recanted. He died in Munich, May 21, 1841. His works were published in a collected edition (Leipzig, 1851–60, 16 vols.; vol. xv contains his biography, by F. Hoffmann). Consult: J. Claasen, *Franz von Baader's Leben und theosophische Werke als Inbegriff christlicher Philosophie: Vollständiger, wortgetreuer Auszug in geordneten Einzelsätzen* (Stuttgart, 1886–87); Otto Pfleiderer, *The Philosophy of Religion on the Basis of its History*, vol. ii (Eng. trans., London, 1887); for an elaborate article upon his teachings, consult Hoffmann, *Biographie und Briefwechsel* (Leipzig, 1887); Welzer and Welte, *Kirchenlexikon*, vol. i (Freiburg, 1877).

BAAL, bā'al. A word common to the Semitic languages, and signifying 'owner' or 'possessor.' It is applied to the ordinary social conditions. The owner of a house or a field is its *baal*, and similarly the husband is the *baal* to his wife. From such a usage the term came naturally to be applied to the patron deity of a place to whom, in a measure, the place belonged, since he presided over its destinies. This application of Baal is particularly appropriate in the case of people who had reached the agricultural stage, and who would naturally ascribe the ultimate ownership of the fields to the local deity, whose favor was shown by a rich return from the soil. Hence Baal became, among Canaanites and Phœnicians, the general term designating a local deity; and the complement, added to the term, would indicate what particular Baal was meant. Thus we have a Baal of Tyre, of Sidon, of Mount Hermon, of Peor, of Meon, of the Lebanon, etc. Again, a Baal might be distinguished by some special attribute, and this would then be added to the term; as, e.g., Baal-Berith, 'Baal of the Covenant'; and, lastly, we find Baal as a general term for "lord," used as a honorific adjunct to the real name of a deity,—as Baal-Gad,—in which case Gad is the name of a god. There were thus as many Baals as there were towns, or sanctuaries, or objects which have a religious significance. Still, it is natural that certain Baals should become more prominent than others, and it might even happen that one should become the Baal par excellence. Thus in Babylonia, the deity of Nippur, one of the most ancient cities, became identified with Marduk of Babylon, and in consequence of the growing power of this city was finally recognized as the Baal or Bel of Babylonia, and was known to later ages simply as Bel; and again, in the West, the Baal of Tyre, whose name was Melkart, assumed at one time such prominence that his worship was introduced among the Hebrews by Ahab, and he is sometimes referred to in the Old Testament simply as Baal.

Sometimes the Baal idea is not connected with any particular place on earth but with the realms above; this gives rise to such cults as that of Baal-Hamon and Baal-Shamem, which acquire prominence among the Phœnicians and their offshoots. The former is probably the personification of the sun god; the latter is the god who dwells in heaven and bears analogies therefore to the Greek Zeus. In tracing the religious development of ancient nations in general, we must make allowance for this tendency to form conceptions of divine powers which seem to reach out into higher spheres. The Baal worship among the Hebrews, of which we hear so much in the Book of Kings and in the Prophets, represents the adoption on the part of the Hebrews of the Canaanitish cults. In dispossessing the Canaanites, the Hebrews wished to assure themselves of the good will of the numerous Baals; and since fertility of the soil was in the control of the Baals, as the Canaanites believed, the Hebrews, when they became agriculturists on Canaanitish soil, naturally took over the worship of the Baals at the various ancient sanctuaries of the land. In order to reconcile this departure with fidelity to the national deity, Yahwe himself was called Baal, and His name was thus associated with the cults at the altars and sanctuaries, which generally were erected on prominent spots, the so-called "high-places," or in groves. With Elijah, a movement to purify Yahwe's worship of its foreign elements begins, which, taken up vigorously by the prophets of the eighth and seventh centuries B.C., leads to tentative attempts in Judæa, such as the reforms of King Josiah, to stamp out the Baal rites; but it is not until the new conditions brought about by the destruction of the southern kingdom that the hope of the reformers to establish Jerusalem as the only legitimate sanctuary of Yahwe is realized, and in the Persian period a theocracy is established in which the once so popular Baal cult gradually disappears.

BAALBEK, bäl'bĕk. The name of a ruined city in ancient Cœle-Syria, signifying the "city of Baal," the sun-god. The name was converted by the Greeks, during the Seleucidan dynasty, into its Greek equivalent, Heliopolis. It is situated in lat. 34° 1′ N., long. 36° 11′ E., in the plain of Bukâ'a, "at the northern extremity of a low range of bleak hills, about one mile from the base of Antilibanon," in a well-watered and delightful locality, rather more than 40 miles northwest of Damascus. It was once the most magnificent of Syrian cities, full of palaces, fountains, and beautiful monuments. It is now famous only for the splendor of its ruins, which date from Roman times. The most imposing is that of the great Temple of the Sun, which was a rectangular building 290 feet by 160, having its roof supported by a peristyle of 54 Corinthian columns, "19 at each side and 10 at each end." Of these, 6 are yet standing. The circumference of these columns is about 22 feet, and the length of the shaft 58; with pedestal, capital, and entablature, they measure about 80 feet in height. The bases still show the names of Antoninus Pius and Julia Domna. The temple occupies a platform on the Acropolis, about 1000 feet by 450 feet, approached on the east by a broad flight of steps, which lead to a portico. Beyond this is a hexagonal court, through which a large gateway opens into the great square, at the west end of which is the temple, on a lofty stylobate. Except the columns mentioned, little of the great temple, or of the buildings in front of it, is left standing, but the ground is covered with their ruins. The vast size of the stones used in the substructures of the great platform is remarkable, some of them being over 60 feet long and 12 in breadth and thickness. South from the

BAALBEK

GENERAL VIEW OF THE ACROPOLIS

great temple is a smaller one, known as the Temple of Bacchus. It is similar in form, having its peristyle and the walls of its cella still mostly standing. Its dimensions are 227 feet in length by 117 feet in breadth, with 15 columns at the sides and 8 at each end. Both temples, as well as the surrounding structures, were built of limestone, in a richly decorated, somewhat fantastic Corinthian style. Besides these, there stands at the distance of 300 yards from the others a circular building, supported on 8 granite columns of mixed Ionic and Corinthian style. It was once used as a Christian church.

The early history of Baalbek is involved in darkness, but it is certain that from the most distant times it had been a chief seat of sun worship, as its name implies. Augustus made it a Roman colony and placed there a garrison. Baalbek had an oracle held in such high esteem that in the second century A.D. it was consulted by the Emperor Trajan prior to his entrance on his second Parthian campaign. Antoninus Pius (138–161 A.D.) built the great temple which the legend current among the modern inhabitants counts a work of Solomon; Septimius Severus dedicated the two temples. The platform and substructures are, however, of a much earlier date. This temple is said to have contained a golden statue of Zeus, identified with the Sun, which on certain annual festivals the chief citizens of Heliopolis bore about on their shoulders. When Christianity under Constantine became the dominant religion, the temple became a Christian church. In the wars that followed the taking of the city by the Arabs, who sacked it in 748 A.D., the temple was turned into a fortress, the battlements of which are yet visible. The city was completely pillaged by Timur in 1400; in 1517 it came into the hands of the Turks. Both city and temple continued to fall more and more into decay under the misery and misrule to which Syria has been subject ever since. Many of the magnificent pillars were overturned by the pashas of Damascus, merely for the sake of the iron with which the stones were bound together. What the Arabs, Tatars, and Turks had spared was destroyed by a terrible earthquake in 1759. Baalbek is now an insignificant village, with a population of some 2000, of whom more than half are Christians. The Prussian government conducted, in 1902, extensive excavations on the Acropolis.

Consult: Wood and Dawkins, *Ruins of Baalbec* (London, 1757); Cassas, *Voyage pittoresque de la Syrie* (Paris, 1799); Murray, *Handbook for Travelers in Syria and Palestine* (London, 1903); Frauberger, *Die Akropolis von Baalbek* (Frankfort, 1892); W. M. Thomson, *The Land and the Book*, vol. iii (New York, 1886); Baedeker, *Syria and Palestine* (Leipzig, 1898); Puchstein, in *Jahrbuch des deutschen Archäologischen Instituts* (Berlin, 1902); id., *Führer durch die Ruinen von Baalbek* (1905).

BAAL-ZEBUB, bā'al-zē'bŭb. The god of Ekron, according to 2 Kings i. 2 ff., to whom Ahaziah sent from Samaria for an oracle, an act for which he was severely censured by Elijah. Baal means 'lord'; it is not certain what "Zebub" refers to. It has been very generally translated 'fly,' and the god of Ekron understood to be a "lord of flies." Winckler plausibly suggests that Zebub was the name of the hill on which the temple stood in Ekron. The god is possibly referred to in the Assyrian inscription, K 3500, as Ba-al-za-bu (bi-i). See BEELZEBUB.

BAARLE, bär'le, or **BAERLE**, VAN. See BARLÆUS, KASPAR.

BAB, LADY. The name assumed by Kitty, the maid, in James Townley's *High Life below Stairs*. She has an exaggerated idea of her own breeding and never reads any book except "Shikspur." Her pseudonym is taken from the name of her mistress.

BAB, THE. See BABISM.

BABA, bä'bà. A Turkish word (*bābā*), which signifies 'father.' In Persia and Turkey it is prefixed as a title of honor to the names of ecclesiastics of distinction, especially of such as devote themselves to an ascetic life; it is often affixed in courtesy, also, to the names of other persons as Ali-Baba.

BABADAGH, bä'bà-däg' (Turk. *bābā*, father, chief + *dagh*, mountain). A town in the district of Tultcha (Dobrudja), Rumania, situated in a marshy district, 31 miles southwest of Ismail (Map: Balkan Peninsula, G 2). It has five mosques, of which the finest is the one built by Bajazet I, who founded the city. He peopled it with Tatars and named it after a saint, whose monument on a hill near by is a much-frequented pilgrim resort. Through the port of Kara-Kerman, lying a short way to the south, a considerable commerce is carried on with the Black Sea region. Many sheep graze in the district, and Babadagh is a centre for considerable trade in wool. Pop., in 1899 (latest report), 3100.

BABBAGE, CHARLES (1792–1871). An English mathematician and inventor, born near Teignmouth, Devonshire. He early devoted himself to mathematics, particularly its analytical branches, and pursued his systematic education at Trinity College, Cambridge, from which he received his baccalaureate degree in 1814. Two years after graduating he published, jointly with Herschel and Peacock, a translation of Lacroix's *Calculus*, and four years later they published an excellent collection of mathematical problems. Meanwhile the idea of constructing a machine for calculating mechanically various tables of mathematics and astronomy had been ripening in Babbage's mind, and in 1820 he undertook the practical execution of this difficult task. The model of his machine was found eminently satisfactory by the Royal Society in 1823, and the government consented to aid him in carrying out the idea on a large scale. In order to familiarize himself with all the resources of mechanical art, he visited manufactories and machine establishments in Great Britain and in 1827–28 traveled on the Continent. These investigations resulted in a number of highly valuable improvements in machinery and manufacturing processes, and although the completion of his main task was not yet in view, important service was rendered by the publication of his brilliant work, *On the Economy of Manufactures and Machinery*, the first edition in 1832, and several subsequent editions and translations into foreign languages. The government, however, fearing that the construction of his calculating machine was an impossibility, had refused to give him further aid; and thus Babbage was thrown upon his own resources, continuing his work until 1856, but never completing it. Yet the realization of his machine is even now considered as quite possible, and its inestimable value in case it were realized is appreciated by some of the best mathematicians of our time. While mainly de-

voted to his invention, Babbage also made a number of important contributions to pure mathematics. He invented a new and important branch of higher analysis, wrote on the applications of mathematics to questions of insurance and gambling, and did much to raise the standard of mathematical teaching in England. In recognition of his services to science, he was made a member of many learned societies, and from 1828 to 1839 was nominally Lucasian professor of mathematics at Cambridge. He was one of the founders of the Astronomical Society and to his writings was due in great measure the founding of the British Association. The list of his works includes as many as 80 titles, but most of his writings were left uncompleted. Among his works that deserve notice are his excellent *Table of Logarithms* (1827), and the autobiographical *Passages from the Life of a Philosopher* (1864).

BAB BAL'LADS, The. A collection of doggerel verses by W. S. Gilbert, half nonsense, half satire, on various subjects, ranging from the shipwreck of corpulent admirals to the loves of the London "bobby." It was published in London in 1868, but the ballads had previously appeared separately in *Fun*.

BAB'BITT, Irving (1865–). An American scholar and educator. He was born in Dayton, Ohio, and received his university education at Harvard, from which he graduated in 1889, and in Paris, where he studied in 1891–92. After a year as instructor in Romance languages at Williams College he was appointed (1894) instructor in French at Harvard, and later (1902) assistant professor in that department. His publications, besides literary articles in magazines and reviews, include *Literature and the American College* (1908); *The New Laokoön* (1910); *Masters of Modern French Criticism* (1912). Also he edited Taine's *Introduction à l'histoire de la littérature anglaise* (1898); Renan's *Souvenirs d'enfance et de jeunesse* (1902); Voltaire's *Zadig* (1905); Racine's *Phèdre* (1910).

BABBITT, Isaac (1799–1862). An American inventor, born at Taunton, Mass. He became a goldsmith and manufactured at Taunton (1824) the first Britannia ware made in the United States. In 1839 he invented the alloy known as "Babbitt metal" (q.v.). This metal, and also soap, he afterward manufactured extensively.

BABBITT MET'AL. A soft, white, antifriction alloy, invented by Isaac Babbitt in 1839. It is prepared by melting separately 4 parts of copper, 12 parts of tin, and 8 parts of antimony, to which, when it is completely melted, there are added 12 more parts of tin. The antimony is poured into the tin, and then mixed with the copper away from the fire, in a separate pot. The proportions vary somewhat, according to the purposes for which the alloy is intended. For this invention Babbitt received a gold medal from the Massachusetts Charitable Mechanics' Association in 1851 and later the sum of $20,000 from Congress. It was patented in England and also in Russia.

BAB'COCK, James Francis (1844–97). An American chemist and scientific lecturer. He was born in Boston in 1844. After studying chemistry at the Lawrence Scientific School, he established in Boston an analytical laboratory. He was professor of chemistry at the Massachusetts College of Pharmacy and at Boston University and for many years filled the positions of State assayer and inspector of liquors and city inspector of milk. He is known as the inventor of a fire extinguisher and as a scientific lecturer, and has published a number of official reports on sanitary topics.

BABCOCK, Maltbie Davenport (1858–1901). An American Presbyterian clergyman. He was born at Syracuse, N. Y., Aug. 3, 1858; graduated at Syracuse University in 1879 and at Auburn (N. Y.) Theological Seminary in 1882; became pastor of the First Presbyterian Church, Lockport, N. Y., in 1882; of the Brown Memorial Church, Baltimore, Md., in 1887; and of the Brick Presbyterian Church, New York City, 1899. On the very threshold of what promised to be an exceptional career, he died at Naples, Italy, May 18, 1901, as he was on his way home from a trip in the East. After his death his wife and Miss Sanford published some selections from his spoken and written words, including some admirable poems, under the title *Thoughts for Every-Day Living* (New York, 1901); and later appeared *Letters from Egypt and Palestine* (1902). Consult his life, by Robinson (New York, 1904); and Stone, *Footsteps in a Parish* (New York, 1908).

BABCOCK, Orville E. (1835–84). An American soldier, born at Franklin, Vt. He graduated at West Point in 1861 and served in the Federal army throughout the Civil War. He was aid-de-camp to General Banks in July and August, 1861; served in the Peninsular campaign; was chief engineer for the Central District of Kentucky from April to June, 1863, and of the Department of Ohio from January to March, 1864; and, as lieutenant-colonel, was aid-de-camp to General Grant in the Richmond campaign. On March 13, 1865, he was brevetted brigadier-general of volunteers, for "gallant and meritorious services in the field." He afterward continued to serve as Grant's aid-de-camp until 1869, and from 1869 to 1877, during the latter's term as President, was his private secretary. After 1871 he also served as superintending engineer of public buildings. In 1870, as President Grant's unofficial representative, he negotiated with Santo Domingo a treaty of annexation, which, however, was rejected by the Senate. In 1876 he was accused of being implicated in the "Whisky Ring" frauds, but was acquitted on trial. He was drowned at Mosquito Inlet, Fla., on June 2, 1884.

BABCOCK, Stephen Moulton, LL.D. (1843–). An American agricultural chemist, born at Bridgewater, Oneida Co., N. Y. He graduated at Tufts College in 1866 and studied chemistry at Cornell University and at Göttingen University. From 1882 to 1888 he served as chemist to the New York State Agricultural Experiment Station and in 1888 became professor of agricultural chemistry at the University of Wisconsin and chemist to the Wisconsin Agricultural Experiment Station. He also became assistant director of the station in 1901, but retired from all active service in 1913. He investigated especially the chemistry of milk, cheese, and other dairy products, but also worked on the chemistry of silage and the rôle of metabolic water. His best-known service was the invention in 1890 of the Babcock milk-tester for ascertaining the amount of fat in milk, cream, etc. This test is now widely used for the purpose the world over, and has been of the utmost value to the dairy industry. The

Wisconsin Legislature presented him with a bronze medal in 1901 in recognition of this and other services to agriculture, and rewards of merit were granted him by the Paris and St. Louis expositions.

BABCOCK, Winnifred Eaton. See Watanna, Onoto.

BABEL, TOWER OF. The name given to the structure erected in the valley of Shinar in connection with which the confusion of tongues is said to have taken place (Gen. xi.). At a time when all men still formed a single united body and possessed the same speech, they came in the course of their wanderings to this valley, or plain, where they devised a plan of using clay as building material and bitumen as cement. They are represented as the first city builders; but in addition they are fired with the ambition to erect a tower which shall reach to heaven and which, being visible everywhere, shall prevent them from being dispersed over the face of the earth. But this plan arouses jealousy on high. While men are encouraging one another in this great enterprise, the gods in heaven, fearing this encroachment upon their own realm, exhort one another, saying, "Come, to this place, let us go down, and there the speech of all confound, so that no man shall understand the language that his neighbor speaks." They go down and carry out this preventive measure, and, as a consequence, men cease to build the city, and they are scattered in all directions. The name of the place where the confusion of tongues is brought about is called Babel, which is explained as though from a root *balal*, meaning 'to confuse,' whereas in reality Babel signifies 'gate of god,' from *bab*, 'gate,' and *ilu*, 'god.'

The story seems to presuppose the existence of Babylon as an important centre and of a great tower not carried as far up into the sky as had been intended, a cessation of building activities and political weakness in place of earlier power and world-wide ambitions, and an influx of foreign elements, not easily assimilated by the native population, whose multiplicity of speech made common enterprises difficult. There can be no doubt that the *zikkurat*, or temple tower, north of the Marduk temple *E-sagila*, is meant. This structure was called *E-temen-an-ki*, or 'house of the foundation of heaven and earth,' probably because it both celebrated the creative act of Marduk and illustrated by its form and orderly arrangement the heaven and earth created by the god. There may also have been the idea that this was the foundation stone of the whole world structure. Its site has been found by the German explorers. It is now called El Sahan and is nothing but an immense hole in the ground c.330 feet square. A nucleus of brick is still left in the middle of the hole. As late as 1887 this tower was used as a quarry, a vast amount of brick being carried away from it. Included in the walls four inscribed clay tablets were found. The tower itself consisted of six platforms, or stages, and a sanctuary rising on the sixth. The lowest stage was 330 feet in length and breadth and 121 feet in height; the second, 286 feet each side and 66 feet in height; the third, 220 feet each side and 22 feet in height; the fourth, respectively, 187 and 22 feet; the fifth, 154 and 22 feet; the sixth, 121 and 22 feet; and the shrine on top was 88 feet in length, 77 feet in width, and 55 feet in height. It is probable that, as in the case of the tower at Borsippa, each stage exhibited a different color—that dedicated to Ninib black by a coating of bitumen, that to Marduk orange by the employment of brick of this hue, that to Nergal red, that to Shamash golden by a covering of thin plates of gold, that to Ishtar pale yellow by bricks of this color, that to Nabu blue by vitrifaction, and that to the moon a shining white by a covering of silver.

It is not known when the Tower of Babel was built nor by whom. It is likely to be as old as the E-sagila itself. After the destruction of the city by Sennacherib it was rebuilt again especially by Nabopolassar and Nebuchadnezzar, whose foundation tablets refer to "E-temen-an-ki . . . whose top should reach unto heaven." Some scholars think that a Jewish narrator living under Cyrus when they had ceased building the city some time after the fall of Nebuchadnezzar's world empire took these words literally and saw in them evidence of pride and blasphemy punished by the deity. But it is not necessary to descend to so late a period of history for this story and to assume that the author must have lived in Babylon after the deportation of Jews by Nebuchadnezzar. The *zikkurat* had been there since the earliest times; it was not a recent creation. The author looks back into remote antiquity when Babylon threatened to become the mistress of the world. That had been the case in the days of Hammurapi, remembered in Syria as Amraphel, and possibly long before his time. But this glory was in the past, when it was possible for a Hebrew poet to sing the Song of the Tower of Babel. On the other hand, the frank polytheism of the song shows that it is earlier than the great prophetic movement in Israel. The age of Solomon seems most probable. Towards the end of the eleventh century the power of Babylon was at a low ebb. Short-lived dynasties, most of them foreign, tried in vain to restore the prestige of the past. Even the Kassite domination had brought more wealth and influence to Babylon. An Elamite sat upon the throne from 1110 to 1004. All kinds of languages were spoken in the city—Sumerian, Akkadian, Amoritish, Kassite, Hittite, Mitannian, Chaldæan, Aramaic, Iranian. Once the builders on a temple or tower in Babylon had all understood one another; it was no longer so, but a veritable confusion of tongues. It was not necessary for the Hebrew poet to go to Babylonia himself, though he may, of course, have been there, in order to learn or to invent the story of how Babylon lost its power. Nor would he have to dig for some inscribed foundation stone to hit upon the idea that this ancient sky scraper which every traveler would refer to was intended to reach to heaven. A sense of the divisive influence of the difference of language and its tendency to breathe hostility and to frustrate common enterprises is not too advanced for Solomon's time; and it is not impossible that a warning to the great Jewish temple and palace builder was intended. For a description of the tower, see Weissbach, *Das Stadtbild von Babylon* (1904); Koldewey, *Das wiedererstehende Babylon* (1912); for the Song of the Tower in Gen. xi., Schmidt, *The Messages of the Poets* (1911); Gunkel, *Genesis* (3d ed., 1910).

BAB-EL-MANDEB, bäb'el-män'dĕb (Ar. 'gate of tears,' or 'of sorrow'). The strait separating Arabia, at its southwest extremity, from the continent of Africa, and connecting the Red Sea with the Arabian Sea and the Indian Ocean (Map: Asia, D 7). It is bordered

on the east by the Cape of Bab-el-mandeb, which rises to a height of 865 feet, and on the west by the precipitous coast of Africa, which reaches in Ras-Sejan an altitude of 400 feet. The strait is divided by the island of Perim into two channels—the western, 13 miles wide and 185 fathoms deep; the eastern, only about 2 miles in width and from 8 to 12 fathoms deep, but preferred on account of its safe anchorage. The volcanic islets called the "Eight Brothers," lie close to the African coast. The strait derives its name from the perils it offers to small sailing vessels.

BABELSBERG (bä'bels-bĕrk) **PAL'ACE.** A picturesque English Gothic chateau near Potsdam, built in 1835–49, in the midst of a beautiful park. The interior is simple but homelike and contains the study and many personal relics of Emperor William I, with whom Babelsberg was a favorite resort during the summer months.

BABENBERG, bä'bĕn-bĕrk, COUNTS OF. A line of Frankish counts whose ancestral seat was at Castle Babenberg, near the present Bamberg, in northern Bavaria. Poppo of Babenberg was Margrave of Thuringia till 892. His three nephews, Adelbert, Adalhard, and Henry, are celebrated for the desperate feud they carried on against the family of the Conradins, whose territorial acquisitions in Thuringia threatened the ascendency of the Babenbergs. The three brothers perished in the struggle. Luitpold of Babenberg—whose descent, however, from the Bävarian Babenbergs is not conclusively established—received from the Emperor Otho II in 976 the sovereignty over the East Mark. This his descendants ruled as margraves, and, after the Emperor Frederick I erected that territory into the Duchy of Austria (1156), as Dukes of Austria. Leopold III (ruled 1096–1136) refused the Imperial crown in 1125. He was afterward canonized and is the patron saint of Austria. It was one of the Babenbergs, Duke Leopold I (ruled 1177–94), who captured Richard I, King of England, on his return from Palestine and delivered him into the hands of the Emperor Henry VI. Duke Frederick II, the last of the Babenbergs, was killed in battle in 1246. See AUSTRIA-HUNGARY, *History.*

BABER, bä'bĕr, **BABAR,** or **BABUR,** ZAHIR UD-DIN MUHAMMAD (c.1482–1530). The first of the Great Moguls in India, a descendant of Timur and of Genghis Khan. He was barely 12 years of age when he succeeded his father, Omar Sheikh Mirza, in Ferghana, and he soon conquered the entire country between the Jaxartes and the Oxus. Later he was driven from Bokhara by the Uzbegs of Turkestan, and founded a new kingdom in Afghanistan. After making unsuccessful efforts to recover his realm in Turkestan, Baber turned his ambitious designs toward India. The weakness of Ibrahim Lodi, Emperor of Delhi, enabled him to carry out his schemes of conquest. After some preliminary incursions he crossed the Indus at the close of 1525, and in April, 1526, on the plain of Panipat, not far from Delhi, he fought a decisive battle with his enemy, whose army was far superior in numbers. The 100,000 men and 1000 elephants of Ibrahim Lodi were dispersed, Ibrahim himself fled and Baber made his entry into Delhi. In the following month Agra, the second city of the Empire of Delhi, surrendered. In 1527 Baber secured himself in the possession of his new realm by a great victory over the Rajputs. Thus was founded the famous Empire of the Great Mogul, which under Baber's successors rose to extraordinary splendor. Baber's enjoyment of empire in India was short; he died in 1530, having had to contend, during the four years of his reign, with numerous conspiracies and revolts. To the talents of a general and a statesman, which he manifested in his conquests, his improvements of public roads, measuring of lands, adjustment of taxation, postal arrangements, etc., Baber united a taste for science and art. He wrote, in the Chaghatáy Turkish language, the history of his own life and conquests, which was translated into Persian by Abd-ul Rachim, and later from the Persian into English by Leyden and Erskine in 1826. This work, called the *Bábar-Náma,* has been reproduced in facsimile form and edited by Annette S. Beveridge (London, 1905). Baber was succeeded on the throne of Delhi by the eldest of his four sons, Humayun. Consult Caldecott, *Life of Baber, Emperor of Hindustan* (London, 1844), and Stanley Lane-Poole, *Babar* (London, 1899).

BABES IN THE WOOD. A nursery tale, and a ballad of unknown origin, preserved in Percy's *Reliques* and in other collections. Two children are left to perish in the forest by an uncle, who expects to profit by their death.

BABEUF, bâ'bĕf', FRANÇOIS-NOËL (1760–97). A French political agitator, regarded commonly as the founder of revolutionary socialism. He was born at Saint-Quentin, Nov. 23, 1760. He was at first a land surveyor. He became an enthusiastic adherent of the Revolution, and established a paper (*Journal de la Liberté de la Presse*) which, in July, 1794, began its second series of numbers under the title *La Tribune du Peuple.* Absolute equality, communism of land and property, the sovereignty of the masses—these were the ideals for which he stood and which he advocated in violent language. He spoke of himself as Gracchus Babeuf. He proposed to found a national estate upon the confiscated property of the corporations, and to add to this the property of private persons through the abolition of inheritance. Distribution, in the scheme of Babeuf, was to be based on need. His participation as ringleader in a plot to overthrow the Directory and establish a communistic state resulted in his execution in 1797. Consult Ely, *French and German Socialism* (New York, 1883), and Advielle, *Histoire de Babeuf et du Babouvisme* (Paris, 1884). See COMMUNISM; SOCIALISM.

BABI, bä'bê. See BABISM.

BABINE (Athapascan word, 'big lips'). Name applied to Athapascan or Dene Indians, near Babine Lake, British Columbia. They are a branch of the Takulli and comprise the Nataotin and Hwotsotenne.

BABINET, bâ'bê'nâ', JACQUES (1794–1872). A French physicist, born at Lusignan, Vienne. He was appointed professor of physics at the Collège Saint-Louis at Paris and in 1840 was made a member of the Academy of Sciences. To him are due various improvements in the air pump, the hygrometer, and other apparatus. In general, however, he was known less as an investigator than as a clever expositor. His publications include: *Traité de géométrie descriptive* (1850); *Etudes et lectures sur les sciences d'observation et leurs applications* (1855–68); *Télégraphie électrique* (1861).

BAB'INGTON, ANTONY (1561–86). An Eng-

lish Roman Catholic gentleman and conspirator. He was born at Dethick, Derbyshire, October, 1561. At 10 years of age he was left an orphan with a rich heritage and became a page to Mary, Queen of Scots, during her imprisonment at Sheffield. In 1586 he was pursuaded by Ballard and other Catholic emissaries to head a plot to murder Queen Elizabeth, to effect the release of Mary, and to organize a general uprising of the Catholics. Babington's conduct during the plot was foolish and vain. He insisted on keeping up a correspondence with Mary, in the hopes of some token of appreciation from her, and, through these letters, the conspiracy became known to Walsingham, Elizabeth's secretary, who at the right moment arrested Babington and his accomplices. They were condemned and executed by hanging and quartering in London, Sept. 20, 1586. Four months later, Mary, Queen of Scots, was beheaded, mainly on the evidence of a letter approving of the murder of Elizabeth, which she had written to Babington. She denied the authorship, and her friends maintained that the document was written by Walsingham himself, as a trick to implicate and entrap the conspirators; but the truth of this accusation is, at least, doubtful. On the day of his death Babington explained the cipher in which the letter was written; and there is other evidence, alleged to be satisfactory, of Mary's complicity in the plot. Consult *Maria Stuarts Briefwechsel mit A. Babington* (Munich, 1886), and Collier, "Fourteen Notable Traitors," in vol. i, *Illustrations of Early Popular Literature* (London, 1863).

BABINGTON, Churchill (1821–89). An English clergyman and archæologist, born at Roecliffe, Leicestershire. In 1839 he entered St. John's College, Cambridge, and there he held a fellowship from 1846 to 1867, being elected an honorary fellow in 1880. From 1865 to 1880 he was professor of archæology at Cambridge. He became an authority on Greek and Latin antiquities, especially manuscripts, pottery, and coins, of which he had a notable collection. His classical scholarship was demonstrated by his *editio princeps* of the orations of Hyperides that were contained in the papyri discovered in 1847 and 1856 at Thebes. These comprised the speeches *Against Demosthenes* (1850), *On Behalf of Lycophron and Euxenippus* (1853), and the *Funeral Oration* (1858). He found opportunity also to publish many works on botany, ornithology, and conchology, in which subjects he was an authority. He was the author of a *Catalogue of Birds of Suffolk* (1884–86) and *Flora of Suffolk* (1889), and in 1842 prepared the appendixes for the departments of botany and ornithology in the *History and Antiquities of Charnwood Forest* (Potter). Ecclesiastical subjects received their share of his attention, for he published a defense of the clergy in *Mr. Macaulay's Character of the Clergy . . . Considered* (1842), and edited Bishop Pecock's *Repressor of Overmuch Blaming of the Clergy* (1860). In 1885 he brought out an edition of *Benefizio della Morte di Cristo*, a rare book of the period of the Reformation, and in 1858 edited the first two volumes of *Polychronicon*. (See Ranulf Higden.) Besides, he catalogued the classical manuscripts in the library of Cambridge University and contributed to Smith's *Dictionary of Christian Antiquities* and numerous scientific periodicals.

BABIRUSSA, bäb'ī-rōō'sȧ (Malay *bābī*, hog + *rūsa*, deer). An East Indian wild hog (*Babirusa alfurus*), inhabiting Celebes and Buro, called also "horned hog" and "pig deer." It is nearly naked, slender-legged, and active, and feeds upon fallen fruits instead of rooting in the ground. The boar is remarkable for his long, exposed canine teeth. "The tusks of the lower jaw are very long and sharp; but the upper ones, instead of growing downward in the usual way, are completely reversed, growing upward persistently out of long sockets through the skin on each side of the snout, curving backward to near the eyes, and in old animals often reaching 8 or 10 inches in length." It is difficult to understand the use of these teeth, which are not possessed by the sows. A. R. Wallace offers, as explanation, that they probably were once useful and were then kept worn down by constant use, but that changed conditions of life have rendered them unnecessary, and they now develop into monstrous form, as will the persistently growing teeth of beavers and rabbits when distorted so that the opposite teeth do not wear them away.

TUSKS OF BABIRUSSA BOAR.

BABISM, bäb'iz'm. A term applied to the beliefs of a sect in Persia, founded by Mirza Ali Muhammad ibn Radhik, born about 1824, who assumed the name of Bab-ud-Din, i.e., 'gate of the faith.' On returning from a pilgrimage to Mecca in 1843, the Bab appeared in his native city of Shiraz with a new commentary on the Koran, and soon became engaged in controversy with the regular priests, or *mullahs*, who, exasperated by his free criticism of their conduct, obtained an order forbidding him to teach in public and confining him to his house. He taught privately, however, but increased his pretensions, until he declared he was the Nuqtah, 'the point,'—an epithet of Mohammed as well. He thus claimed to be not merely the recipient of a new divine revelation, but the focus in which all preceding dispensations converged. He gained proselytes rapidly. Among these was a woman—a remarkable circumstance in any country of the East—known as Gurrad-ul-Ain ('consolation of the eyes'), because of her surpassing loveliness, which was enhanced by her intelligence and purity. The sect made rapid progress with their new religion, but they were not molested until the accession of Nasr-ed-Din (Nasiru'd-Din) in 1848. At this juncture the Babis, in fear of persecution by the new Shah, arose in rebellion and proclaimed the Bab as a universal sovereign, when a civil war ensued. Hussein, one of the disciples, was made prisoner, after defeating several expeditions sent against him, and was put to death in 1849; and the next year Baliurushi, another leader, was slain in battle. The Bab himself, who had taken no active part in the rebellion, was imprisoned and executed at Tabriz, in 1850, after a long incarceration; but his death did not discourage his followers. They recog-

nized Mirza Yahya, a youth of noble descent, and son of the Governor of Teheran, as his successor, who established himself in Bagdad. An attempt, in 1852, of some zealous Babis to assassinate the Shah led to a terrible persecution in which the beautiful "consolation of the eyes" perished.

The Babi doctrines are essentially a system of pantheism, with additions from gnostic and other sources, and they may be regarded as a development of the mystic or Sufiistic movement against the orthodox Mohammedanism of the Sunnis, which has lasted with great persistence since the first introduction of Islam into Persia. All individual existence is regarded as emanating from the Supreme Deity, by whom it will ultimately be reabsorbed. Great importance is attached to the number 7, as indicating the attributes supposed to be displayed in the act of creation; and to the number 19, which mystically expresses the name of the Deity himself and is, moreover, the sum of the prophets among whom the latest incarnation of the divine nature is conceived to be distributed in the present dispensation, and of whom the Bab himself is the chief. The sacred college cannot become extinct until the final judgment, the death of any of its members being immediately followed by a reincarnation. Moses, Christ, and Mohammed are considered to be prophets, but merely precursors of the Bab and inferior to him. The morals of the sect are good; polygamy and concubinage are forbidden; and the equality of sex is so far recognized that at least one of the 19 prophets must always be a woman. Women join in social intercourse and are freed from many of the degradations to which orthodox Mohammedanism subjects them, such as the extreme facility of divorce on the part of the husband. Asceticism is discountenanced, mendicancy forbidden; abstinence from intoxicating liquors and drugs and tobacco, as well as prohibition of slave dealing, are taught and practiced. The Babis live in outward conformity to the religion of Mohammed. The faith of the Bab has found a few adherents in America.

Consult: Browne, *A Traveler's Narrative Written to illustrate the Episode of the Bab* (Cambridge, 1892); Huart, *La religion de Bab* (Paris, 1889); Andreas, *Die Babis in Persien* (Leipzig, 1896); Phelps, *Life and Teachings of Abbas Effendi* (New York, 1903); Beha-Ullah, *Les Précepts du Béhaisme* (trans. by Dreyfus and Chirazi, Paris, 1906); Mírzá Huseyn, *Le Béyân arabe; le livre sacré du Babysme* (Paris, 1905); Dreyfus, *Essai sur le Béhaïsme* (Paris, 1909).

BABOO, bä'bōō, or **BABU** (Hind. *bābū;* Canarese *bābū,* father). A Hindu title of respect equal to "Mr." or "master" in English, given in India to educated and wealthy natives or persons of distinction, but used nowadays by Anglo-Indians in a slightly disparaging sense, implying merely superficial cultivation, or simply intended to designate a native clerk who writes English.

BABOON, băb-ōōn' (OF. *baboin,* Fr. *babouin,* ML. *babewynus;* cf. Ger. *Pavian;* origin unknown). An African or Arabian cercopithecid monkey of the "dog-faced" genus *Cynocephalus.* Baboons are of large size, covered with long, dark hair, and have very large, brilliantly colored callosities upon the buttocks; but are chiefly distinguished by the elongated, blunt muzzle, with the nostrils in the end, giving the profile a resemblance to that of a dog. This is heightened by the prominence of the canine teeth, which in adult males become most formidable tusks, effective against the largest of their enemies among the wild beasts. This physiognomy, often gaudily colored, is repulsive and fear-inspiring and seems to indicate the fierceness of their character; yet baboons rarely, if ever, have attacked human beings unprovoked. The fore and hind limbs in this group are of similar size, so that they walk easily and gallop swiftly on the ground and move about rocks with extreme agility; they climb trees with greater difficulty, and as a rule keep on the ground and away from forested regions. All the species are gregarious, assembling in large troops, conducted and guarded by the elders, who are exceedingly watchful against danger. They feed mainly on fruits, berries, buds, roots, and the soft wood of certain trees, but vary this fare with insects, grubs, snails, bird's eggs, lizards, etc. By raiding plantations in troops they may do immense damage to crops, ruthlessly destroying more than they eat, and stuffing their capacious cheek pouches full of food to carry away. Such bands are too formidable to be easily driven away by half-armed natives. Baboons are rarely hunted for sport, and still less often captured, though partly domesticable when young; and the ancient Egyptians seem to have trained them to pick fruit, etc. Nevertheless, no monkeys are less tractable or fierce than these; and in the safety of large troops they will resist and sometimes vanquish even the leopard. In fighting they usually stand erect, but otherwise keep always upon all fours. Of the various species the following are best known:

Arabian, or Sacred Baboon, or Hamadryad (*Cynocephalus* or *Papia hamadryas*). This is the great ashy-gray baboon, represented upon Egyptian monuments and supposed to have been the monkey to which divine honors were paid under the name Anubis. The worship of baboons, according to Petrie, was due to the solemn faces of these animals, which gained them credit for great wisdom, and also to their habitual activity at sunrise, leading to the supposition that they were then adoring the sun god. The body was frequently embalmed, and baboon mummies are still found. It lives in Arabia, but more commonly in Abyssinia and the Sudan, where, in open rocky regions, it congregates in herds sometimes numbering 250, and where its habits have been described at length by Sir Samuel Baker. The huge grizzled mane so characteristic of this species belongs to the old males alone. A closely allied species or variety of Abyssinia (*Cynocephalus* or *Papio doguera*) is yellowish-olive in color.

The Chacma (*Cynocephalus* or *Papio porcarius*) of South Africa is even larger, being about the size of a mastiff and exceedingly strong; it is still common on the mountain and sea cliffs of the wilder parts of Cape Colony, going in troops, which might be dangerous to humanity were they not so timid. This species is dark-brown, with long shaggy hair, but without any mane, and the naked part of the face is purplish. The tail is rather more than half the length of the body and is terminated by a tuft of long black hair. Their food is as miscellaneous as that of other species, but they are especially fond of an iris-like bulb known as *ixia,* which they dig and peel before eating. This is the species most often seen in menageries, but all

BABOONS

1. ARABIAN OR SACRED BABOON (Papio hamadryas).
2. MANDRIL (Papio sphinx).
3. CHACMA (Papio porcarius).
4. GELADA BABOON (Theropithecus gelada).
5. ANUBIS BABOON (Papio anubis).
6. DRILL (Papio leucophæus).

the others endure captivity well. Several of them are usually to be seen in the New York Zoölogical Park.

Five other species of baboons are limited in their range to West Africa. One is the olive-green ANUBIS (*Cynocephalus anubis*), which is the species reported by Hanno, about 500 B.C., under the name "gorilla"; another is the edible YELLOW BABOON (*Cynocephalus babuin* or *Papio cynocephalus*); a third the reddish-brown GUINEA BABOON (*Cynocephalus sphinx* or *Papio papia*), long familiar in the hands of showmen, yet almost unknown in its native state; the others are the hideous, short-tailed drills.

The MANDRILL (*Cynocephalus mormon* or *Papio sphinx*) is the largest of all baboons, has comparatively short limbs, a mere stump of a tail carried erect above scarlet callosities, and a massive and powerful body. The head is of enormous size, crested and bearded, and there is scarcely any forehead, while the deeply sunken eyes give a morose expression. The fur about the head, rising into a crest upon the occiput, is greenish black, but the beard is orange-yellow, and between them is a huge nose, vastly swollen on each side, folded into ribs colored light blue and divided and tipped with scarlet. The ugliness of its aspect is borne out by the disposition of this brute, which is one of the most formidable and ferocious creatures of the Gaboon forests. Another West Africa baboon is the DRILL (*Cynocephalus leucophæus*), which is somewhat less in size than the mandrill, and lacks the colors and great swellings of the nose, but is otherwise similar to it.

The GELADA "baboon" is a large maned monkey (*Theropithecus gelada*), of southern Abyssinia, which has the appearance of a black, clipped French poodle, and the habits and temperament of a true baboon. See APE; MONKEY; and Plate of BABOONS. Consult Elliot, *A Review of the Primates* (New York, 1913).

BA'BRIUS. A Hellenistic fabulist. He was probably of Italian origin, as his name and Latinisms indicate, but he seems to have lived in the East, perhaps in Syria. He lived, apparently, in the third century A.D. He worked over, in choliambic metre, a large collection of Æsopic fables. In the later centuries of antiquity and the earlier Byzantine period this compilation was very popular and supplanted all previous collections. Suidas, about the tenth century, possessed the work in 10 books, but his text was more corrupt than that we now have. During the Renaissance and modern times the work existed only in paraphrases and fragments, which were current under the name of *Æsop's Fables*. In 1697 Bentley found in the current fables of Æsop verses which he ascribed to Babrius. Tyrwhitt, in his *Dissertatio de Babrio* (1776), published a number of verses recovered from the prosaic paraphrases of Suidas; and in 1842 a Greek, Minoides Minas, discovered a manuscript in the monastery of St. Laura on Mount Athos which contained 123 fables, arranged in alphabetical order, showing that at least one-third the original collection had been lost. This manuscript is now in the British Museum. Fifteen years later Minas brought out 95 additional fables, which he claimed to have discovered in another manuscript; they are, however, now universally recognized as forgeries. In 1877 Knöll recovered more new fables from a manuscript in the Vatican Library; and in 1891 Van Assendelft secured in Palmyra seven wax tablets containing fables not hitherto known. These are now in the library at Leyden. Of editions the best is by Crusius (Leipzig, 1897); another is by Rutherford (London, 1883). Consult: Conington, *Miscellaneous Writings*, vol. ii (London, 1872); Fusci, *Babriano* (1901); Christoffersson, *Studia de Fabulis Babrianis* (1901).

BABSON, ROGER WARD (1875–). An American statistician, born in Gloucester, Mass., and educated at the Massachusetts Institute of Technology, from which he graduated in 1898. He organized and became president of a statistical organization with branch offices in the largest cities of the United States and in London. In addition, he undertook the publication of *Moody's Manual of Railroad and Corporation Securities*. The Massachusetts Institute of Technology appointed him lecturer on statistics and economics, and as a writer on these subjects several newspapers and weekly journals employed his services. His writings in book form include: *Business Barometers* (1909); *Selected Investments* (1911); *Bonds and Stocks* (1912); *Commercial Paper*, with Ralph May (1912); *The Future of the Working Classes* (1913).

BABU. See BABOO.

BABUR. See BABER.

BABUYAN (bä'bo͞o-yän') **IS'LANDS** (Malay, "pig" islands). A group of islands in the Pacific, forming a portion of the northern part of the Philippine archipelago (Map: Philippine Islands, F 2). They are situated between Luzon and the Batan group, between 18° 40′ and 19° 40′ N. lat. and 121° and 122° E. long. The chief islands are Kamiguin, 65 square miles; Babuyan Claro, 38 square miles; Calayan, 30 square miles; Dalupiri, 20 square miles; and Fuga, 21 square miles. They are of volcanic origin, and indicate comparatively recent activity. Including the Batan group, the population, according to the latest available estimate, was 12,000. The natives, Ibanags or Cagaynes, are the finest races of the Philippines. Tobacco, grain, rice, and tropical products are grown. There are some pineapples and wild grapes. The inhabitants are concerned chiefly with the raising of cattle, hogs, and horses, which, with lard, form the principal articles of export. Musa, on the south shore of the island of the same name, is the most important town.

BAB'YLAS, or **BAB'YLLUS,** SAINT (?–250). A Bishop of Antioch, from about 237 to 250. He refused to admit to public worship the Emperor Philip, who, to obtain the throne, had murdered the young Gordianus. In the persecutions under Decius he was cast into prison and there died. His day in the Roman calendar is January 24, and in the Greek, September 4.

BABYLON (Gk. Βαβυλών, Bab. *Babilu*, Heb. *Babel*, Eg. *B-b-l*, Arab. *Babil*). The capital of Babylonia from the time of Hammurapi (2124–2081 B.C.) to the end of the Chaldæan Empire (539 B.C.). Its Sumerian name was *Ka-dingir-ra*, of which the Akkadian equivalent was *Babilu* (*bab*, 'gate,' and *ilu*, 'god'). It was also called *Tin-tir*, 'grove of life,' and *E-ki*, 'dwelling place.' The ending *on* may be of Greek origin, as in Καρχηδών, *Karchēdōn*, 'Carthage,' or possibly go

back to a local pronunciation, *Bab-ilani*, 'gate of the gods.' In Gen. xi. 9 Babel is explained as derived from *balal*, 'confound,' a name supposed to have been given to the city because the confusion of tongues took place there; but this folk etymology has no scientific value. (See BABEL, TOWER OF.) The ancient site of the city is represented by the villages of Kuwairish and Jimjima, on the eastern bank of the Euphrates, and Sanjar, on the western, as well as by the mounds named Babil, Kasr, Mujelliba, Ishan Amr ibn Ali, Ishan al Aswad, Ishan al Hamra, and Markaz, all on the eastern bank (Map: Turkey in Asia, L 6). Its exact location is 32° 34′ 30″ N. lat. and 44° 23′ 30″ E. long.

The city existed already in the time of Sargon of Agade (c.3790–3750 B.C.), who cleared the land around the *Tuna*-gate, built a palace, introduced the Anunit cult, and seems to have given to the place its Akkadian name, Babilu. For some centuries it must have had a prevailingly Akkadian population, since the Semitic god Nabu appears to have established for himself a position of such strength that it had to be recognized even in later times, when the Sumerian god Marduk had become the chief deity of the city. It is possible that a dynasty from Eridu established itself in Babylon, between the third dynasty of Uruk and Ur Engur of Ur, with Marduk, the son of Ea of Eridu, as its god. The Amoritish dynasty of Sumuabu seems to have come from Sippara. During his successors Babylon grew in importance until in 2094 B.C. Hammurapi's conquest of Larsa made it the capital of all Babylonia. The city was captured by Gandash in 1671, by Tiglath Ninib c.1262, by Tiglath-pileser I (1140–05), by Shalmaneser III in 851, and by Tiglath-pileser IV in 729. It was destroyed by Sennacherib in 689. After razing the palaces, temples, and other buildings, he let loose the waters of the Euphrates through the Arachtu Canal over the city so as to make it uninhabitable. It was rebuilt by Esarhaddon (681–668) and Samassumukin (668–648), but suffered at least partial destruction when Asurbanipal captured it from his rebellious brother. Babylon was enlarged and beautified by Nabopolassar (625–605) and Nebuchadnezzar (605–562). It became one of the capitals of the Achæmenian Empire, and Seleucus I Nicator resided there until he deemed it expedient to remove the seat of government to a place nearer the Mediterranean, and it soon yielded in importance not only to Seleucia and Antioch on the Orontes, but also to the Seleucia that grew up on the Tigris. Babylon was taken by the Parthian King Mithridates VII c.150 B.C., and Ktesiphon became a new formidable rival. The remains of a Greek theatre under the mound Al Hamra show that the city continued to flourish in the Hellenistic period. The Sasanid kings are said to have resided there at times. Even after the founding of Bagdad Babylon remained the capital of a district, as Ibn Serapion testified c.900 A.D. Later it became simply a village. The name remained attached to what at present is the northernmost mound, while the town of Hilla, which now has a population of c.20,000, grew up farther south.

Pietro della Valle, in 1616, recognized the ruins north of Hilla and near Jimjima as those of Babylon. They were visited by Beauchamp in 1784, by Rich frequently between 1811 and 1817, and by Robert Ker Porter in 1818. Layard began the work of excavation in 1850, but he continued only a few weeks; Fresnel and Oppert remained over three years (1851–54), Hormuzd Rassam in 1880 only a short time. The real work has been done by the Deutsche Orient Gesellschaft, under the leadership of Koldewey, since 1899. He was able to trace the outermost wall, showing that the city extended over an area of about 12 square miles, consequently was far smaller than Herodotus (i, 178–187) represents it when he gives it a circumference of 480 stadia, i.e., about 55 miles, and had very nearly the extent assigned to it by Alexander's historians of 90 stadia, or c.10 miles. Very much smaller was the Babylon inclosed within the two oldest walls, the Imgur Bel and the Nimitti Bel, which have been found. Koldewey laid bare the Processional Street, *Aibur-shabum*, the Ishtar Gate, the foundations of two palaces of Nebuchadnezzar, the quays, the Marduk Canal, the great Marduk temple, *E-sagila*, the whole in the ground now called *El Sahan*, where stood the famous Tower of Babel (q.v.), the *E-temen-anki*. Numerous objects of art have been found and a large number of inscriptions from different times. As a result of these excavations, it is now possible to understand the allusions to walls and gates, streets and towers, temples and palaces in the cuneiform inscriptions. No archive has yet been found in any temple or palace of Babylon such as those that rewarded the search of excavators at Sippara, Lagash, and Nippur. The city of Hammurapi's time could not compare in extent and magnificence with the splendid capital of which Nebuchadnezzar is represented as having said, "Is not this Babylon the Great?" It is this city that is coming to light, while little remains from the earlier periods of its history.

Consult: Weissbach, *Das Stadtbild von Babylon* (1904); Winckler, *Geschichte der Stadt Babylon* (1904); Koldewey, in *Mitteilungen der Deutschen Orient Gesellschaft* (1899–1913); id., *Das wiedererstehende Babylon* (1912); King, *A History of Sumer and Akkad* (1910); Baumstark, "Babylon und Babylonien" in Pauly-Wissowa, *Realencyclopädie* (1894–); Herzfeld, article "Babil" in *Enzyklopaedie des Islam* (1911).

BABYLON. A village in Suffolk Co., N. Y., incorporated in 1894; 37 miles east of New York City, on Great South Bay, here crossed by steam ferry to Fire Island and Oak Island Beach, and on the Long Island Railroad (Map: New York, B 3). The village is a popular summer resort, having an admirable beach, and good fishing. The surrounding region is adapted to general farming. Pop., 1900, 2157; 1910, 2600; 1913 (est.), 2650.

BABYLO'NIA (Gk. Βαβυλωνία, Heb. *Babel*, Pers. *Babiru*). The name given by Greek writers to the country whose capital they called Babylon (q.v.). It corresponds to the modern Irak al Arabi (q.v.), including the vilayets of Bagdad and Basra so far as the latter existed in ancient times. On the west the boundary line ran along the Arabian Desert; on the north the country reached to the neighborhood of Bagdad about 33° 30′ N. lat.; on the east the territory spread beyond the Tigris toward the Zagros Mountains; and the southern limit was marked by the Persian Gulf, which, however, extended much farther north than at present, as there has been a constant growth of the land. As a satrapy of the Achæmenian Empire it was called Babiru, corresponding to Babilu, and in an addition to the Book of Jeremiah (l. 28), it is referred to as "the land of Babel." In earlier

times the inhabitants themselves do not seem to have used the same designation for the capital and the country as the Assyrians did in the case of Assur (q.v.). The reason was that, before Babylon became the chief city, other names had already come into vogue. The Sumerians spoke of the region where they dwelt simply as *Kiengi*, 'the land.' It is possible that North Babylonia became known as Akkad after the Semitic Akkadians had established a strong dynasty at Agade (see ACCAD), and that south Babylonia was then referred to as Sumer. At any rate, the whole country was designated as "Sumer and Akkad" in the title of Ur Engur and his successors in the control of Babylonia, whatever their nationality. The Kassites often used the name "Karduniash," and that was also employed by the Hittite King Hattusil in one of the Boghaz Keui letters (see HITTITES). In the Old Testament the designations most frequently used are Shinar and "the land of the Kasdim." As regards the origin of the former there is much difference of opinion. Since Babylon and Accad as well as Erech and Calneh (Nippur?) are assigned to Shinar, the name would seem to include both Sumer and Akkad. If Shinar is derived from Sumer, it must be supposed to go back to a period of Sumerian supremacy previous to Ur Engur, or even Sargon of Agade, when the whole country could be called Sumer, as in the days of Asurbanipal it was called Akkad. On the other hand, Shinar may be identical with the Sangara of the Egyptians and the Sanhar of the Tell el Amarna tablet xxv, 49, but it is not clear where these names originated or what they represented. Consult Landersdorfer, "Das Land Shin'ar," *Biblische Zeitschrift* (1913). The Kasdim are Kaldu, or Chaldæans, and their country, also called *mat tamti* and *mat marrati*, was the southernmost part of Babylonia, on the Persian Gulf. As the last native dynasty was Chaldæan, the Greeks often used the name Χαλδαία, Chaldæa, for the whole country.

Physical Features. Babylonia is an alluvial plain created by the deposits of the Euphrates and the Tigris. The present rate of increase is about a mile in 70 years. It is not known whether it has been uniform in the past. As Mohammerah was on the gulf in Alexander's time, it cannot have varied greatly since then. While it would be hazardous to affirm on this basis alone that no part of Babylonia existed 25,000 years ago, it is not improbable that this is the case. On the other hand, there is reason to believe that almost two-thirds of the present surface of Babylonia had risen above the waters at the time when our earliest inscriptions were written. But each of the two rivers then entered the gulf at a separate mouth; Shatt el Arab did not yet exist. The great fertility of Babylonia was due to a network of canals that was carefully kept up and to the systematic irrigation of the soil. Embankments and trenches are found everywhere, indicating the course of these ancient canals. As the result of long neglect there are to-day large tracts of land that are either swamps or deserts. In ancient times this plain yielded rich returns to the farmer. As long as the annual inundations of the Euphrates and the Tigris were under control, and the waters were properly led to the fields, he could count upon enormous crops. Wheat was the principal product, but barley, millet, and vetches were also cultivated in large quantities. Dates furnished wine, vinegar, and flour for baking; the sap of the date tree gave palm sugar, and ropes were made from the bark. The vine and such fruits as apples, oranges, and pears were also cultivated. Among domestic animals may be mentioned camels, oxen, sheep, goats, horses, and dogs; among wild animals, lions, wild oxen, wild boars, jackals, hares, and gazelles; there was a great variety of birds, and an abundance of fish in the rivers.

Ethnology. The population of Babylonia seems at all times to have been very mixed. We have no means of knowing who first inhabited the strip of land between the two rivers available for settlers in the Neolithic Age. They may have been Semites, Sumerians, Anzanites, or Negritos. De Morgan thinks that Negritos descending from some Pleistocene race were the first to enter the country, but that the first real settlers were the Sumerians (*Les premières civilisations*, pp. 192 ff., 1909). In a careful study of the representations of Sumerians and Akkadians by the ancient artists, Ed. Meyer reached the conclusion that the Akkadians preceded the Sûmerians in Babylonia (*Sumerier und Semiten in Babylonien*, 1907). He based his view partly upon the assumption that Nippur was an Akkadian cult centre, partly on the representation of their gods by the Sumerians with long hair and beard, like Semitic gods, though they shaved their heads and faces themselves. This theory has been accepted by Caetani, *Studi di Storia Orientale*, i, 145 ff. (1911), who modifies it by assuming two Semitic invasions—one before, and another after, the Sumerian conquest, and by Jastrow, *Die Religion Babyloniens und Assyriens*, Vorwort, ix ff. (1912) who emphasizes the coöperation of the two races in developing Babylonian civilization. But Clay has shown (*Am. Journ. of Sem. Lang.*, 1907) that the name of the god of Nippur was always pronounced Enlil or Ellil, not Bel, and Meyer has subsequently (*Geschichte des Altertums*, i, 2, 2d ed., p. 407, 1909), recognized that "Nippur always was a Sumerian cult centre." His arguments from hair, beard, and manner of dress have not been regarded as convincing by Langdon, "Sumerians and Semites in Babylonia" in *Babyloniaca*, vol. ii (1908) and King, *A History of Sumer and Akkad*, pp. 40 ff. (1910). Bearded Sumerians appear upon some of the earliest monuments, and they may well have represented their gods with hair and beard, not because their enemies, the Semites, represented them thus, but because their ancestors made these gods in their own image before they adopted the custom of shaving off the hair and the beard. The theory of De Morgan seems at present most probable, and it is more likely that the Sumerians came down the Adhem and the Diyala from the northeast than that they came by sea from the south. Concerning the ethnic relations of the Sumerians nothing is as yet known. The difference in language cannot be urged against a connection with the Anzanite stratum in Elam or the early population around Lake Van, since widely differing languages of the agglutinating type are found among people of the same racial stock. (See SUMERIAN LANGUAGE.) Whether the setting of the eyes in the finely chiseled heads of the Gudea period indicates a Mongolian origin is uncertain. If the Sumerians descended from the Zagros Mountains in the Neolithic Period, they are likely to have come from some region north of the high plateau of Iran. The Akka-

dians were Semites, entering the land probably from northeast Arabia. The representation of Naram Sin in high relief presents the type very clearly. Amoritish tribes seem to have pushed their way into Babylonia long before Sumuabu (2232–2217). The first dynasty of the city of Babylon known to us was Amoritish. (See AMORITES.) The racial connections of the Kassites are doubtful; but the occurrence of Shuriash (Sanscrit *Svarya*, the 'sun') in Kassite names suggests that there was an Iranian element among them as among the Mitannians (q.v.). Numerous Aramæan tribes occupied the plains east of the Tigris and between the two rivers in the south. (See ARAMÆANS.) Whether the Chaldæans (*Kaldu*, Heb. *Chesed*, *Kasdim*) originally formed one of these cannot be determined, but is suggested by Gen. xxii. 22. The Chaldæan kings of Babylon assumed names compounded with Marduk, Nabu, and Nergal, and had their inscriptions written in Babylonian. We have no inscriptions from Bit Yakin. Elamites (see ELAM), Gutians (see ARRAPACHITIS), Medes, and Jews, at least from 597, when the 10,000 exiles were placed on the river Chebar (Kubaru, the canal of Nippur), and 586 and 581, when several thousand more were deported from Jerusalem to Babylonia, helped to swell the population.

Cities. The chief cities in northern Babylonia were Opis, the seat of the earliest-known dynasty, first called Kesh, then Upi, whence the Opis of Xenophon, situated on the Adhem, near the Tigris, not yet identified with any existing mound; Agade (see ACCAD), not far from Sippara, and possibly identical with Sippara of Anunit, not yet identified; Sippara of Shamash, the modern Abu Habba, on the Euphrates; Dur Kurigalzu, the modern Akarkuf, built in the Kassite period; Cutha (q.v.), the modern Tell Ibrahim, northeast of Babylon; Kish, the modern Tell el Uhaimir, east of Babylon and its twin city Charsagkalama; Babylon (q.v.) north of Hillah; and Borsippa (q.v.), the modern Birs Nimrud, opposite Babylon, west of the Euphrates. In southern Babylonia the most important cities were Nippur, the modern Nuffar on Shatt el Nil; Adab, the modern Bismaya, between Shatt el Hai and Shatt el Kur; Kisurra, the modern Abu Hatab, west of Shatt el Kur; Shuruppak, the modern Fara, a short distance southeast of Kisurra; Umma, the modern Jocha, east of Shatt el Kur; Dur gurgurri, probably the modern Tell Sifr; Uruk, the Erech of the Hebrews, the modern Warka, between Shatt el Kur and the Euphrates; Larsa, the modern Senkera farther south; Lagash, the modern Tell Loh, on Shatt el Hai; Uru, the Ur of the Chaldees, the modern Mukayyar, west of the Euphrates; and Eridu, the modern Abu Shahrein, farther south. The important city of Isin has not yet been identified, nor the northern Charsagkalama, nor Anu; and the ancient names of the cities buried under the mounds of Hamam, Lamlun, Hatra, Hetima, El Jidr, El Hibba, Surghul, Tell Id, Tell Medain, and Tell Lahm have not been discovered.

Excavations. Sippara (see SEPHARVAIM), discovered by George Smith, was excavated in 1881 by Hormuzd Rassam, who secured some 60,000 tablets, among them the famous Nabunaid inscription giving the date of Naram Sin, and in 1902 by Scheil. Excavations were carried on by Rassam at Cutha in 1881 without important results. Oppert and Fresnel undertook for a brief period excavations at Kish in 1852. Most thoroughgoing excavations have been carried on by the Deutsche Orient Gesellschaft under the leadership of Koldewey at Babylon from 1899 to the present time, resulting in the discovery of many inscriptions and objects of art as well as in a greatly increased knowledge of the city as it was rebuilt by Esarhaddon and beautified by Nebuchadnezzar, with its palaces, temples, quays, streets, and walls. Some excavations were undertaken by Rassam at Borsippa in 1881. At Nippur excavations were begun by Layard in 1851. After a tour of reconnaissance by Ward in 1885, the city was thoroughly excavated by Peters in 1888 and 1890, by Haynes in 1893, and by Hilprecht in 1898 and 1900 for the University of Pennsylvania. A very large number of inscriptions were found, numerous objects were obtained, and temples and buildings from different periods examined. Adab was excavated by Banks in 1902–03; Shurrupak, which goes back to Neolithic times, and Kisurra were in part excavated by Koldewey in 1902; Loftus excavated at Dur gurgurri in 1854, at Uruk in 1850 and 1854. Most extensive and systematic excavations were conducted for the French government by De Sarzec at Lagash from 1877 to 1901 with some interruptions, and later by Cros, resulting in the discovery of a temple archive containing about 30,000 inscribed clay tablets, many thousand tablets in other parts of the mound, a vast number of objects of art, among them the remarkable Gudea statues, and an acquaintance with an ancient Sumerian city that had a very long history. Koldewey examined Surghul and its necropolis and El Hibba in 1902, and Hatra in 1912. Taylor conducted excavations at Ur and Eridu in 1854–55. Especially the excavations at Lagash, Nippur, and Babylon have been of great value; but at these places as well as in scores of mounds covering ancient Babylonian cities there is an enormous amount of work yet to be done.

Chronology. Our knowledge of Babylonian chronology is based upon (1) lists of kings and dynasties, (2) chronicles, (3) references to dates of earlier kings by their successors, (4) documents dated in the years of various kings, (5) synchronisms with rulers in other lands, (6) excerpts from the history of Berosus, (7) Ptolemy's *Almagest*, and (8) dates that can be fixed astronomically. We possess at present a number of lists of dynasties and kings with regnal years and the sum total for each dynasty. The most important of these are a list of the dynasties of Opis, Kish, I Uruk, Agade, and II Uruk, published by Scheil in *Comtes rendus de l'Académie des Inscriptions et Belles Lettres*, pp. 606 ff. (1911); a list of the dynasties of Ur and Isin, published by Hilprecht, in *Babylonian Expedition of the University of Pennsylvania*, xx (1906); a list of 10 dynasties of Babylon, published by Pinches in *Proceedings of the Society for Biblical Archæology*, vi. 193 ff (1884), and a list of the first two dynasties of Babylon, also published by Pinches, id., i, 20 ff. (1880). The Babylonian Chronicle, written in the time of Darius I, was published by Pinches in 1884, and is given with a translation in Rogers, *Cuneiform Parallels to the Old Testament* (1912); and valuable data are found in *Chronicles concerning Early Babylonian Kings*, published by King in 1907. Important references

are made to the time when earlier kings reigned, e.g., by Nabunaid, who states that Naram Sin laid the foundation stone of the temple of Shamash in Sippar 3200 years before him, or about 3750 B.C., that Hammurapi lived 700 years before Burnaburiash (1381–1357), consequently in 2081, and that Shagaraktishuriash reigned 800 years before his time, i.e., about 1350; by Ellilnadinbal (about 1140) that Gulkishar reigned 696 years before him (c.1840); by Sennacherib that two images were found when he destroyed Babylon in 689 which had been taken from Tiglath-pileser I 418 years before, or in 1107; and by Asurbanipal that Kudur Nanchundi carried away Nanai from Uruk 1635 years ago, i.e., 2280 B.C. Dated documents, of which there is a very great number, often help to check the figures in the lists. Aside from the invaluable Synchronous History (Peiser and Winckler, in *Keilinschriftliche Bibliothek*, 1889) and the Babylonian Chronicle, it is important for the chronology that Burnaburiash of Babylon was the contemporary of Dushratta of Mitani, Subbiluliuma of Hatti, and Amenhotep III and Amenhotep IV of Egypt, as the Tell el Amarna Letters (q.v.) show; that Kadashman Turgu and Kadashman Ellil of Babylon were the contemporaries of Hattusil of Hatti and Rameses II of Egypt, as the Boghaz Keui tablets show (consult Winckler in *Mitteilungen der Deutschen Orientgesellschaft*, No. 35 (December, 1907); that Sumuabu was a contemporary of Ilusuma of Assyria, Ilumailu, the founder of the second dynasty of Babylon, a contemporary of Hammurapi's son, Samsuiluna, and Kashtiliash I of the third dynasty of Babylon, a contemporary of Eagamil, the last king of the second. Berosus evidently used lists of kings so far back as to the beginning of Sumuabu's reign, and the date he assigns for the first Babylonian dynasty is now recognized as correct; but the principle on which he arranged his dynasties has not yet been found and does not agree with that obtaining in our cuneiform inscriptions. Ptolemy's Canon gives a fixed starting point in the era of Nabunazir (747) and valuable astronomical data. The accuracy of his list of kings is proved by the lunar eclipses he records, as Zech has shown (*Untersuchungen über die Mondfinsternisse des Almagest*, 1851) and the accuracy of the date given by Berosus for the first dynasty is proved by observations of the appearance of Venus made in the twenty-first year of Ammizaduga, as Kugler has shown (*Sternkunde und Sterndienst in Babel*, ii, 2, Heft 1, 1912).

While there are still some kings who cannot be dated and some dates that are not certain, the chronology of the period from 2232 to 539 has been in the main established. As we advance beyond the former date, three problems present themselves. The first concerns the end of the dynasty of Isin. If the conquest of the city by Rimsin of Larsa marks the end, and this conquest is identical with the fall of the city in the seventeenth year of Sinmuballit, then Ur Engur, the founder of the dynasty of Ur, began his reign in 2469, as Ed. Meyer maintains in *Sitzungsberichte der k. preussischen Akademie der Wissenschaften*, p. 1064 (1912). On the other hand, if the dynasty of Isin immediately preceded the first dynasty of Babylon, Ur Engur's date would be 2574. Much speaks in favor of the latter view, but it is by no means certain. The reliability of Nabunaid's date for Naram Sin constitutes the second problem. A textual error of 3200 for 2200 has been supposed; but such an arbitrary change of the document is generally regarded as unmethodical. It has been suggested that Nabunaid's scribes may have based their calculations on the precession of the equinoxes, and reckoned each degree at 100 years instead of 72. The assumption was that there could not have been at the time of Nabunaid lists of kings with their regnal years covering more than 3000 years. Yet it is admitted that very accurate lists must then have existed, going back to Sumuabu, covering over 1680 years, or more than half of the distance; the recently published lists for times earlier than Sumuabu give 1275 years; Hilprecht (l.c.) estimated that there must have been about 135 names before that of Ur Engur in the lost part of the broken tablet, and there is now no reason to suspect any of these to have been mythical. It is extremely improbable that contemporaneous dynasties were counted as successive; in the case of the second dynasty of Babylon the supposition proved mistaken. But an occasional overlapping of dynasties is very probable, though the Babylonian scribes seem to have been aware of this and taken account of it. When new lists of kings and dynasties formerly unknown are thus appearing from time to time, much weight cannot be given to the absence of documents for the centuries between the Gutian conquest and Ur Engur. Ed. Meyer points out that we have not a single tablet or document of any kind for half a thousand years, from 1925 to 1381. Only future discoveries can decide the trustworthiness of Nabunaid's statement, but in the light of recent finds it would seem more correct to accept it tentatively than to assign to Naram Sin arbitrarily a much later date, without any evidence and in the face of a positive testimony likely to be based upon the simple addition of a score of figures. The third problem is connected with the dynasty of Kish, which is given 586 years, but only eight rulers, the first of them a queen credited with 100 years. Some scholars accept only the eight rulers with the 192 years ascribed to them, and besides are inclined to doubt the length of Queen Azag Bau's reign, while others, like Hrozny in *Wiener Zeitschrift für die Kunde des Morgenlandes*, pp. 143 ff. (1912), assume the correctness of the sum total. In favor of Hrozny's view is the fact that we know quite a number of kings of Kish clearly belonging to the period before Sargon of Agade not mentioned in the new list, and among these we should probably count, with Meyer (l.c.), Sargon, Manishtusu, and Urumush. Hrozny, who places Sargon of Agade in 2744, assigns to Unzi, the first King of Opis, the date 3454. If Nabunaid's date for Naram Sin is accepted, Unzi would begin his reign in 4500 B.C.

History. *Dynasty of Opis* (c.4500–4401).—Concerning the history of Babylonia before this dynasty we have no positive information. How long the Sumerians had been in the land, whence they came, whether they were preceded by men of a different race, what degree of civilization they had attained, and to what extent, if any, Semitic tribes had pushed their way into the country as nomads or settlers, can only be matters of conjecture. It is significant that this earliest Sumerian dynasty appears in the northernmost town of Babylonia, east of the Tigris.

The regnal years of the six kings are given in the list. They are Unzi (30 years), Undalulu (12), Ursag (6), Basha Sir (20), Ishuil (24), and Shu Enzu (7).

Dynasty of Kish (c.4401–3815).—The power passed from Opis to Kish, east of Babylon. Only eight rulers are given in the list: Azag Bau, a woman (100 years), Basha Enzu (25), Ur Zamama (6), Zimudar (30), Uziwidar (6), Elmuti (11), Igul Babbar (11), Naniyach (3). Yet the total number of years for the dynasty is 586. This evidently covers the whole period of the power of Kish. The other Sumerian kings of Kish, such as Utug, Mesilim, Alzu, Lugaltarsi, and Urzage, may have belonged to a different dynasty, as certainly did the Semitic kings of Kish, Enbi Ishtar, Sargon, Manishtusu, and Urumush. During this period a number of prominent patesis, priest kings of Ningirsu, reigned at Lagash, such as Enchegal, Badu, Lugalshag Engur, the contemporary of Mesilim of Kish, Urnina and his lineal descendants, Akurgal, Enannatum I, Entemena, and Enannatum II, and later, Lugalanda, Enliltarzi, Emetarzi, and Urukagina. Enannatum, whose deeds are recorded on the Vulture Stele and in other inscriptions, conquered Alzu of Kish, and received from Ellil, the god of Nippur, sovereign power. The same success seems to have crowned the efforts of Lugalkigubnidudu, patesi of Uruk, who was recognized by Ellil, and made Ur his capital, where also Lugalkisalsi and Enshagkushanna seem to have ruled as "kings of Sumer and the land." This may have been the response of the Sumerian south to the establishment of a Semitic family upon the throne at Kish. But Sargon, Manishtusu, and Urumush were conquerors who made their powers felt everywhere in Babylonia and in Elam.

First Dynasty of Uruk (c.3815–3790).—The power of Kish came to an end through Lugalzaggisi. This King was originally patesi at Umma, but took possession of Uruk, was recognized by the Ellil priesthood at Nippur, subdued the north, and made expeditions to Syria, so that he could claim to rule from the Upper Sea (the Mediterranean) to the Lower Sea (the Persian Gulf). He has left a long inscription, recording his victories, copied on a large number of vases.

Dynasty of Agade (c.3790–3593).—Lugalzaggisi was overthrown by the founder of the dynasty of Agade. There can be little doubt that this was Sargon I, King of Accad, who conquered Elam, Mesopotamia, the land of the Amorites, and the Gutians, and built temples in Babylon and Nippur. His son, Naram Sin, fought with Magan in Arabia, the Lulubians, and Bit Aram (possibly an Aramæan people), had a statue erected north of Diarbekr, ruled at Susa, as an Elamitish inscription shows, and may have made a raid on Cyprus. His two successors are unknown; after them came Sargon II, Abaiailu, Iliidinnam, Imiilu, Nannumsharru, Ilulukar, Dudu (21 years), and Shukarkab (15). There were 12 kings; the names of the eight last kings and the long duration of the dynasty have been known only since 1911.

Second Dynasty of Uruk (c.3593–3567).—The passing of the hegemony to Uruk probably represents a Sumerian reaction. The kings were Urnigin (3 years), Urinar (6), Kudda (6), Bashanini (5), Ur Utu (6). They are otherwise unknown. The dynasty was overthrown by a foreign invasion.

Gutian Dynasty (c.3567–?).—The people of Gutium took revenge for their long subjection to Accad and Uruk by ravaging the cities probably under their king, Erridapizir. Whether they ruled from their own capital, Arrapcha, or chose one of the great cities of Babylonia as seat of government, is unknown, as is the duration of the dynasty. It is not impossible that it lasted for centuries, as the Kassite rule at a subsequent period. We have no list of rulers, but Basium, Lasirab, and the last of the kings, Tirikan, are referred to in inscriptions.

Third Dynasty of Uruk (unknown date.)—King Utechegal, of Uruk, freed Babylonia from foreign domination. The dynasty was probably of Sumerian origin. How long it lasted cannot be determined.

Dynasties of Lagash and other Cities (before 2574).—The patesis who succeeded Urukagina (c.3815) in Lagash were apparently weak rulers and for the most part politically dependent. Only about a dozen are known from the long period preceding Gudea, possibly a fourth of the entire number. There may have been many dynasties, Sumerian and Akkadian, in the last half of the fourth millennium and the beginning of the third, which have not yet come to light. Nor is it possible to give the date of the greatest of all Sumerian rulers, Gudea, of Lagash. It is difficult to believe that Lagash in his time recognized the suzerainty of any other city. Gudea, indeed, never uses the title of king and always calls himself simply patesi; but he never alludes to any other king as his sovereign, he conquered Anshan, and sent out expeditions to Syria and Arabia to secure wood and diorite, and may have prided himself upon his patesi title, designating him as priest king of the god Ningirsu, as some of the earlier Assyrian kings did, who called themselves simply isakku of Asur. (See ASSYRIA.) The statues of Gudea give us the best idea of the Sumerian type. His son, Ur Ningirsu, seems to have retained the same power and independence. It is as yet impossible to say how long a time may have elapsed between him and the patesis Urabba, Galukazal, Urlama, Alla, and Arad Nannar, who were contemporaries of the kings of Sumer and Akkad.

Dynasty of Ur (2574–2457).—Under Ur Engur of Ur (18 years) Sumer and Akkad were definitively united, and this union was expressed in the royal title. His descendants were Dungi (58), Bur Sin (9), Gimil Sin (7), and Ibi Sin (25). Of all these kings we possess inscriptions. The patesis of Susa were subject to them, though Ibi Sin was finally taken captive to Susa.

Dynasty of Isin (2457–2232).—The power passed from Ur to Isin, a city which it has not yet been possible to identify. The kings were: Ishbi Ura (32 years), Gimililishu (10), Idin Dagan (21), Ishme Dagan (20), Libit Ishtar (11), Amil Ninib (28), Pur Sin (21), Iterkasha (5), Uraimitti (7), Sinikisha (½), Ellilbani (24), Zambia (3), ... (5), Ea.... (4), Sinmagir (11), and Damikilishu (23). Five of these have left inscriptions. During this period King Kudur Nañchundi plundered the temples of the land of Akkad and carried away the goddess Nanai from Uruk (c.2280), brought back by Asurbanipal 1635 years later. The dynasty seems to be of Amoritish origin. A rival dynasty appears to have been established at Larsa, c.2375, whose founder Gungunu was

recognized by Ishme Dagan's son, Enannatum, priest of Nannar at Ur.

First Dynasty of Babylon, Amorite (2232–1932).—The city of Babylon, mentioned already in the time of Sargon I of Agade, may have played a more prominent rôle in the centuries intervening between the expulsion of the Gutians and the establishment of the kingdom of Sumer and Akkad than our fragmentary sources reveal. An Amoritish chief Sumuabu (2232–2217) founded the first known dynasty of Babylon. His son Sumulailu (2217–2181) greatly extended the power of this city kingdom which maintained itself during his successors Sabu (2181–2167), Apil Sin (2167–2149), and Sinmuballit (2149–2124). The greatest ruler of the dynasty was Hammurapi (2124–2081). At the beginning of his reign he probably recognized the suzerainty of the Elamitish king Kudur Mabuk, and it is not improbable, though it cannot be strictly proved, that he accompanied another Elamitish king, Kudur Lagamar (see CHEDORLAOMER) on a raid into Syria, as is suggested by Gen. xiv. 1 (see AMRAPHEL), some time before 2094, when he succeeded in overthrowing Rim Sin (probably Erim Aku, see ARIOCH), the son of Kudur Mabuk, who had succeeded his older brother Arad Sin as King of Larsa. Already in 2118 he had captured Uruk and Isin, and in 2114 he seems to have made Samsi Adad I of Assyria a vassal. There is no direct evidence that he ruled over either Syria or Elam. He devoted much time to the inner administration of his kingdom, on which his private correspondence with Sinidinnam, a friend and high official, especially throws light. In his famous law book (see HAMMURAPI, CODE OF) he not only vested with his authority many laws of Sumerian origin, already codified in the days of Urukagina, of Lagash, and others of Akkadian origin, but manifestly added many regulations made necessary by the recent development of commerce and industry. His ambition appears to have been to establish justice in the land as a righteous king. Samsuiluna (2081–2043) fought successfully with Ilumailu, a descendant of the old royal family of Isin, but could not prevent him from establishing himself as king in the Sea Country, north of the Persian Gulf. In 2072 he won a victory over a Kassite army. Abeshu (2043–2015) was also unable to subdue Ilumailu. During the reigns of Ammiditana (2015–1978), Ammisaduga (1978–c.1963), and Samsuditana (1963–1932) the power of the dynasty dwindles. The Hittites invade the country and put an end to the Amoritish kingdom, plunder Babylon, and the rival dynasty in the south, having gradually extended its territory, is ready to seize the capital itself.

Second Dynasty of Babylon, from Sheshazag, or the Sea Country (1932–1761; in the south 2079–1711).—It is not improbable that the Hittites established Damkiilishu on the throne of Babylon in 1932, as a Sumerian vassal. He counted his dynasty as beginning with Ilumailu (2079–2019) and therefore including his father Ittiilinibi (2019–1964) and his own reign from the time when he became king in the Sea Country (1964–1928). Ishkigal (1928–1913), Shushi (1913–1886), Gulkishar (1886–1831), Peshgaldaramash (1831–1781), and Adarakalama (1781–1753) followed him. Gulkishar gave a district of Der to Nina c.1850, referred to by Ellilnadinpal 700 years later. In the reign of Adarakalama the Kassite invasion took place. The dynasty was evidently driven back to the Sea Country, where Ekurulanna (1753–1727), Melammakurkura (1727–1720), and Eagamil (1720–1711) continued to rule. The last of these kings was a contemporary of Kashtiliash.

Third Dynasty of Babylon, Kassite (1761–1185).—Whether Gandash (1761–1745) came from the home of the Kassites in the Zagros mountains or from some district in Babylonia occupied by this people at the time, is uncertain. His successors, Agum I (1745–1723), Kashtiliash I (1723–1701), Ushi (1701–1693), Abirattash (1693–c.1670), Tazzigurmash (c. 1670–1655), and Agum II (c.1655–1625), come more and more under the influence of Babylonian culture. Agum II styles himself King of Kashshu, Padan, Alman, and Guti. He recovered from Khana in Mesopotamia the images of Marduk and Zarpanit that had been carried away by the Hittites three centuries before. The names of at least six kings for the period from 1625 to c.1500 have not yet been supplied. Karaindash in the beginning of the fifteenth century entered into a treaty with Asurrimnisesu of Assyria. There may have been two reigns between Karaindash and Kadashmanharbe I, who corresponded with Amenhotep III (1411–1375). Kurigalzu I also exchanged presents with this Egyptian king. Burnaburiash (1381–1356) married Muballitserua, daughter of Asuruballit I of Assyria, made a treaty with Puzur Asur, but referred to Asuruballit II as his vassal in a letter to Amenhotep IV (1375–1350). His son Karahardash was murdered by the Kassites, but their leader Nazibugash (1356–1355) was deposed by Asuruballit II, who placed on the throne Kurigalzu II, another son of Burnaburiash. Toward the end of Kurigalzu's reign (1355–1333) he captured and plundered Susa, recovering the Dungi tablet, and defeated Adadnirari II of Assyria. Nazimaruttash (1333–1307) continued the war with Adadnirari II. Kadashman Turgu (1307–1290) and his son Kadashman Ellil (1290–1284) maintained friendly relations with Hattusil, the contemporary of Ramses II (1310–1244), as some of the Boghaz Keui letters show. (See HITTITES.) Probably in the year 1290 Kadashman Ellil fought with Shalmaneser I (c.1320–1290). Kudur Ellil (1284–1276) and Shagarakti Shuriash (1276–1263) were still able to defend themselves against Tiglath Ninib, but Kashtiliash (1263–1255) seems to have succumbed, and seven of his regnal years probably belong to Tiglath Ninib as the first Assyrian monarch ruling over Babylonia (c.1262–1255). After his murder, Ellilnadinshum (1255–1254), Kadashmanharbe II (1254–1253), Adadshumiddin (1253–1247), and especially Adadshumusur (1247–1217) kept up the struggle, which ended with a definitive victory over the Assyrians. Melishipak (1217–1202) pursued Ninibpileser to the very gates of Assur. Mardukapaliddin (1202–1189), Zamamaiddin (1189–1188) and Ellilnadinahi (1188–1185) are the last kings of the dynasty.

Fourth Dynasty of Babylon, from Isin (1185–1051).—The deliverance from the foreign domination came from Isin. Only a part of the name of the founder has been preserved, Marduk . . . (1185–1168). Two names are missing; then comes Nebuchadrezzar I (c.1160–1140), who conquered Elam and made an expedition into Syria, but was defeated by Asurresisi; Ellilnadinpal I (1140–1117); Mardukna-

dinahi (1117–1105), who won a victory over the Assyrians in 1107; Mardukshapizermati (c. 1105–1095), Adadapaliddin (1095–1073), Mardukahierba (1073–1071), Mardukzer ... (1071–1059), and Nabushumlibur (1059–1051).

Fifth Dynasty of Babylon, from the Sea Country (1051–1030).—Descendants of an earlier royal family in Isin seem to have established themselves in the Sea Country, where there apparently was a considerable Kassite element in the population. Shimashshipak (1051–1033) took possession of Babylon. Eamukinzer reigned only five months, and Kashshunadinahi less than three years (1033–1030).

Sixth Dynasty of Babylon, from Bit Bazi (1030–1010).—The origin of this dynasty is unknown. The three kings were Eulmashshukinshum (1030–1013), Ninibkudurusur (1013–1010), and Shilanimshukamuna (three months, 1010).

Seventh Dynasty of Babylon, Elamite (1010–1004).—The name of the Elamite who captured the throne of Babylon and held it for six years is not given in the list; but another inscription suggests that it may be Eaapalusur.

Eighth Dynasty of Babylon, native (1004–753).—Only a few names have been preserved. Nabumukinpal reigned 1004–978; Shamashmudamik and Nabushumishkun I were contemporaries of Adadnirari III (911–890), Nabupaliddin of Asurnazirpal III (885–860), Mardukbalatsiikbi and Bauahiiddin of Samsi Adad V (825–812).

Ninth Dynasty of Babylon, native (753–732).—The founder is unknown. He was followed by Nabushumishkun II. Why Ptolemy's canon begins with Nabunasir (747–734) has not yet found a satisfactory explanation. Nabunadinzer reigned two years, and Nabushumukin a little over a month.

Tenth Dynasty of Babylon, Chaldæo-Assyrian (732–625).—This appears in the list not so much as a dynasty as a succession of rulers of different dynasties. Seven such dynasties are mentioned; some well-known Assyrian kings are given peculiar names, and the names of the dynasties do not suggest Assyria. Yet no effort to save national pride could quite gloss over the fact that for almost two centuries Babylonia was ruled by Assyrian kings, most of whom belonged to the Sargonid family. Concerning Ukinzer (732–729) nothing is known. Pulu (729–727) is Tiglath-pileser IV; Ulula (727–722) is Shalmaneser V. The Chaldæan Mardukapaliddin maintained himself for 12 years on the throne (721–709), but must yield to Sargon (709–705). Sennacherib succeeded him, but his authority was set aside first for a month in 703 by Mardukzakirshumi, and then for nine months by Mardukapaliddin (703–702). The attempt to rule through Belibni (702–700) having failed, Sennacherib made his son Asurnadinsum king (700–694). But he was carried away as a captive to Elam, and the King of this country appointed Nergalushezib as ruler of Babylon (694–693); he was captured by the Assyrians, and the Chaldæan Mushezib Marduk was proclaimed King (693–689). Sennacherib quelled this insurrection, and in 689 utterly destroyed the city of Babylon. He governed the country himself until his death in 681. Esarhaddon (681–668) pursued a conciliatory policy in Babylonia and rebuilt the ancient capital. He appointed his son Samassumukin as viceregent in Babylonia. Rebelling against his brother Asurbanipal, Samassumukin found himself unable to hold Babylon and threw himself into the flames of his burning palace in 648. From that time to the end of his life Asurbanipal ruled as king in Babylonia under the name of Kandalanu.

The Chaldæan Empire (625–539).—When Asurbanipal died, Nabopolassar (Nabuapalusur) refused to recognize Asuritililaniukin, declared himself independent, and apparently entered into an alliance with Cyaxares of Media and Psammetichus of Egypt against Assyria. Nineveh was saved in 625 by the prompt appearance of Assyria's ally, the Scythian king Madyas, who drove away the Medes and prevented a general defection in Syria or an Egyptian occupation of the land. There seems to have been an understanding between Cyaxares and Nabopolassar that, in the coming division of the Assyrian Empire, Media was to have Assyria proper and her quondam possessions in Asia Minor, while Chaldæa would be free to annex Syria and Egypt. It is not likely that the terms of this deal were officially made known to the court at Sais; but a suspicion of such an agreement may have determined Necho to force the issue in 608. From the standpoint of Babylon he was a vassal of Chaldæa as truly as his grandfather had been of Assyria. After the fall of Nineveh in 606, Nebuchadnezzar (Nabukudurusur), then heir apparent to the throne, met Necho in a battle at Carchemish in 605. He captured Jerusalem in 597 and carried away to Nippur some 10,000 Judæans, and 11 years later was obliged to besiege and partially destroy the city. Though he laid siege to Tyre for 14 years, he was not able to take this city. His Egyptian expedition in 568 seems to have been a mere raid. He was a great builder (see BABYLON) and an energetic administrator. He reigned from 605 to 562, and was followed by his son Amil Marduk (562–560). Nergalsharusur (560–556) was not a descendant of Nabopolassar, but a son-in-law of Nebuchadnezzar, and his son Labashi Marduk was overthrown by Nabonidus (Nabuna'id), who was not a Chaldæan but a native of Babylon. In the beginning of his reign (556–539) the Medes under Astyages attempted to add Mesopotamia to their Assyrian province, but were driven away from Haran by Nabonidus. After the conquest of Media by Cyrus of Anzan in 553, this King occupied himself with Crœsus of Lydia until Sardis fell in 546, whereupon he turned his attention to Babylonia. Nabonidus was a man of sincere piety, who sought by zealous worship of the gods to avert the danger to the state. He rebuilt the ancient temples everywhere in the kingdom, and dug in their foundations for the inscriptions of earlier kings. To the researches of his scribes and the excavations of his officials we are indebted for much information. It is not clear whether Nabonidus removed the images of the gods from other cities to Babylon in order to centralize all worship there or to save them in the capital in case the old sanctuaries elsewhere should fall into the hands of the enemy. As the King failed to attend the great Marduk festivals in Babylon, preferring to live at Tema, and the shrines for the gods brought into the city detracted from the revenues and power of the Marduk priesthood at the Esagila, disaffection and treason naturally set in. The Crown Prince, Bilsharusur (see

BELSHAZZAR) was defeated by the troops of Cyrus at Opis in 539, and in December of that year Gubaru took possession of the city without clash of swords. Nabonidus was permitted to retire into privacy in Carmania; what became of Bilsharusur is not known; Cyrus was solemnly recognized as King of Babylon in 538; he sent back the images to the local sanctuaries; and Babylonia became a province of his empire.

Government. It is possible that the *limmu* institution (see ASSYRIA) once existed also in the city states of Babylonia, as it was preserved in the old city of Shuruppak. But the power at an early time centred in the priestly class, and the patesi, or chief representative of the local deity, became the ruler of the community. In the case of the more important centres a twofold development of the patesiate was possible. It might become a kingship over the whole country, or a large part of it, with the recognized hegemony of the metropolis, or it might become a great religious authority whose recognition was necessary for the exercise of sovereignty. Nippur seems to be an example of the latter development. The patesiate might also remain simply a local position. Conquerors like Sargon of Agade, Hammurapi, Agum II, and the Sargonids evidently attached much significance to the proclamation by the oracle of Ellil at Nippur, or the seizing of the hands of Bel-Marduk in Babylon. To some extent the succession of foreign dynasties in Babylonia must have affected the inner administration. But the existence of a written law undoubtedly tended to give stability to the ordinary forms of governmental procedure. An influential bureaucracy furnished a check on the priestly power, and the prestige of the older sanctuaries no doubt limited the power of the Marduk priesthood in Babylon. While it may not be permissible to infer from the Code of Hammurapi that the state always assumed as much authority in regulating all forms of private business, it is probable that this law gives a fair example of what was generally considered the duty of government in Babylonia.

Art, Science, and Literature. The excavations, notably those at Lagash, Nippur, and Babylon, have revealed some of the characteristics of Babylonian architecture. Temples and palaces were built for the most part with brick and have been so largely destroyed that nothing but the ground plan remains. But from the foundations and parts of sculptural decoration it is possible in a measure to conjecture what the appearance of temples, zikkurats, or temple towers, and palaces must have been. Sculpture reached among the Sumerians a comparatively high degree of perfection. Entemena's Stele of Vultures, the statues of Gudea, and some representations of animals exhibit excellent workmanship. The Stele of Naram Sin shows that the Akkadians rivaled, if they did not excel, their masters, provided Sumerian artists were not employed in this case. We know nothing of Babylonian painting. In the textile arts the fame of Babylon spread to Egypt and Syria in the middle of the second millennium B.C. The Babylonians also excelled in the glazing of tiles, the cutting of precious stones, and the making of seals and gems.

In mathematics they succeeded, even with their imperfect system of notation, in extracting square and cube roots and in dealing with very small fractions. They invented a system of weights and measures that spread far and wide. They made valuable astronomical observations, including that of the phases of Venus; and they divided the ecliptic into degrees, the year into months of 30 or 29 days, bringing the solar and lunar years into harmony by intercalary months, and the day into hours. There is no evidence, however, that they discovered the precession of the equinoxes. It seems to have been an early belief among them that the position of heavenly bodies had something to do with human affairs, and a large number of tablets contain observations and forecasts for the use of astrologers; but the complete system of astrology which passed from Babylonia to Greece was probably a creation of the Chaldæans in the beginning of the second millennium B.C. In medicine a false diagnosis, ascribing the origin of disease to the influence of demons, retarded progress, but much advance was made in surgery, operations on the eye and other organs being mentioned already in the time of Hammurapi. How much was due to the Sumerians, and how much to the Semites, in these various branches of learning, is as yet impossible to determine.

The Sumerians, no doubt, invented the system of writing (see CUNEIFORM INSCRIPTIONS). Only a small part of the inscriptions can be classified as literature in the strictest sense. There are thousands of contracts, magical texts, letters, and dispatches; but there are also many poems, stories, historical inscriptions, and scientific tablets. In Babylonian poetry each verse is divided by a definite number of stressed syllables or beats, and the verses are written in separate lines. Most of the poems are of a religious nature. The stories are well told. There are also commentaries on earlier works, syllabaries, and grammatical paradigms for the use of learners. Many inscriptions are bilingual, in Sumerian and Akkadian.

Religion. The chief gods of the Sumerian pantheon were Anu, the heaven god, of the city of Anu, later at Durilu; Ellil, the god of Nippur; Ea or Ae, the sea god, of Eridu; Ningirsu of Lagash; Shuruppak of Shurrupak; Marduk of Eridu, later of Babylon, the son of Ea; Babbar or Utu, the sun god, of Larsa; Nannar, or Enzu, the moon god of Ur; Tammuz, the brother of Marduk, and lover of Nanai of Uruk; Nergal, the war god, of Kutha; and Zamama of Kish. Among the goddesses mention may be made of Bau and Ninharsag at Lagash; Ninlil at Nippur; Nanai at Uruk; Ereshkigal, the goddess of the nether world; Gatumdag, Ningal, and Ninmach. In remote antiquity Anshar and Kishar, gods of heaven and earth, Lahmu and Lahamu (worshiped at Tell Lahm) seem to have played an important rôle. Some of these gods were adopted by the Akkadians, or identified with gods they worshiped. Shamash of Sippara; Nabu of Borsippa; Sin, identified with Nannar of Ur; Ishtar, identified with Nanai; Ninib, of unknown origin, and his spouse Gula; Anunit of Accad are among these. The Amorites brought in new gods, such as Hadad, Amuru, Dagan, and the goddess Ashirta. Numerous myths were told concerning these divinities and the many semi-divine heroes, such as the stories of the creation of the world through Marduk after his victory over the Chaos-monster Tiamat; of Adapa, or Adama, who just missed immortality by following too closely Ea's advice; of the ten antediluvian

kings; of the deluge from which Utnapishtim of Shuruppak is saved, so similar in its details to the story in Genesis; of Zu, the storm god, who stole from Ellil the tablets of destiny; of Etana, who, seated upon an eagle, ascends to heaven, but is overcome by fear and falls to earth; of Nergal's violent entrance into the lower world and his marriage to Ereshkigal, through which he becomes ruler of the realm; of Ishtar's descent to hell and escape from there; of Gilgamesh, the hero of Uruk, his friend Eabani, their attempt to rescue Nanai from Elam, and the journey of Gilgamesh to paradise, where he hears from Utnapishtim the story of the flood. It is becoming increasingly evident that the Sumerians developed most of this mythical material. Some of the stories deal with the nether world, whither gods may go, and men must. Gods may be sprinkled with the water of life and returned from the realm below, but there is no intimation that men may. A hero like Utnapishtim is regarded as having been translated to a realm of the blest, apparently in the Persian Gulf, and a king like Gilgamesh may go there and return. For ordinary mortals, certainly, there was no hope of anything but the most shadowy existence beyond the grave, involving neither rewards nor punishments. It was important, however, that the dead should be properly buried; otherwise they might appear as ghosts to harass the surviving kinsmen.

There were various classes of priests, soothsayers, diviners, conjurers, exorcists, omen readers, seeking for signs in the entrails of animals, especially in the liver; astrologers, offerers of sacrifices, singers, and temple attendants. Liturgical formulas, prayers, and hymns have come down to us, revealing the intensity and warmth of the religious feeling. Great festivals were held, such as the New Year's Feast, when Marduk was carried in procession to the zagmuk sanctuary and back to his temple, and Nabu came from Borsippa to visit his shrine in the temple of Marduk, and the Tammuz and Ishtar festivals. On the 7th, 14th, 21st, 28th, and also the 19th day of the month sacrifices were offered to give rest to the hearts of the gods and business was generally suspended. Among the hymns that have been found are many that were used on New Year's Day; others that were sung in honor of Shamash, Sin, and Ishtar, and some that were chanted as lamentations over Tammuz and as odes of rejoicing over his return to life.

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BAB'YLO'NIAN ART. The style of art current in the valley of the Tigris and Euphrates, from the beginning of historic civilization until the time of the Median Conquest, in about 500 B.C., during a period of 4000 years or more. Its interest is increasing from the fact that it appears to represent the earliest artistic effort of mankind in many branches, antedating the culture of Egypt by a considerable period. The Babylonian temperament was, like the Egyptian, traditional, and the changes in style were few and conditioned largely by degrees of mastery over technical processes—over materials and implements. It was essentially a religious, priestly art, and its monuments can hardly be appreciated without a knowledge of Babylonian literature, mythology, manners, and customs. So far as can be judged from the very insufficient excavations, the periods of artistic de-

velopment were: 1. The pre-Sargonic era of primitive art, crude, especially in its sculpture, and with imperfect technical attainments. It extends to 3800 B.C. 2. The Age of Sargon, the golden era, distinguished for broad style with exquisite finish and perfection of technique. It lasted from 3800 to 2800 B.C. 3. After the interval of Elamite invasion came the Age of Khammurabic (Hammurabi) (2200–1700 B.C.), the silver era, when Babylon was the centre of Mesopotamian civilization, when art was somewhat more stereotyped and careless. 4. The Kassite Age (from c.1700 to c.1000 B.C.) with gradual complete decadence under a semi-barbarous dynasty, with loss of all reality and life, and final subservience to Assyrian art. 5. The Renaissance, under Nebuchadnezzar, when the ancient style of the best age, that of Sargon, was reproduced as closely as possible (c.600 to 500 B.C.). The researches and excavations that have disclosed what we know of Babylonian art are detailed under BABYLONIA. The Louvre is the only museum in Europe that contains many of the larger works; other collections being confined to terra cottas and carved boundary stones (British Museum, Berlin, etc.), and to engraved stones (Louvre, Bibliothèque Nationale, Paris; British Museum; Le Clercq collection; Metropolitan Museum, New York; etc.). The Museum of Constantinople is beginning, however, to receive a number from the latest excavations of Tel-lo, Babylon, Nippur, etc. The characteristic forms of Babylonian art are its brick architecture, with heavy masses of masonry and small vaulted interiors, with its lack of columns or piers or carved details, and its use of color surface decoration of faïence, fresco, and hangings; its development of the industrial arts, especially of bronze casting, terra-cotta figurines, and reliefs and glyptics, or the cutting of hard and precious stones. Hitherto it is from these small objects, many thousands of which have been found, more than from the few pieces of large statuary and reliefs, that the character and continuity of Babylonian sculpture can be judged. (See GLYPTIC.) The artistic influence of Babylonia was widespread and strong. It is tolerably certain to have been exercised in the formation of Egyptian and Elamite art at a very early date. The comparison of the brick making of the temple pyramids and the statuary of the two countries are among the indications for Egypt. The few researches for pre-Median Elam prove the same thing for sculpture, but excavations have not yet gone deep enough to show what was the primitive Elamite architecture. Then, the Babylonian conquests on the Mediterranean carried Babylonian art to Syria, even to the island of Cyprus, and into Asia Minor among the Hittites. The Phœnicians not only copied it, but carried it westward. Considering that Assyrian art also was substantially a branch of Babylonian, it is clear that Babylonian art was not only supreme throughout western Asia, but bore directly upon North Africa and the Pelasgians and other Ægean peoples and therefore upon early Greek art. Its influence survived it in Persia, and, through it, in the later Oriental art of Parthians and Mohammedans. Even China and India felt it.

Architecture. Architecture as a fine art was first practiced in the valley of the Tigris and Euphrates, in the region we call Babylonia. Here were worked out the earliest forms of religious and civil structures. Everything had to be invented—materials, tools, methods, architectural forms, from the merest details to the broadest compositions. It was the same with the other arts utilized to assist in this development of architecture. The material used was brick, sun-dried and kiln-baked. The obvious reason for this was the absence both of stone quarries and of forests for timber. The tools required were therefore extremely simple; and the forms of ornamentation and composition were conditioned both by the material used and the physical surroundings. The absence of stone for walls and columns and of wood for timbers forced the builders to make their walls thick and their halls narrow, so that they could be spanned by brick vaulting. Thus, at the very beginning the arch and vault were invented—both the false corbel arch with straight courses and the true voussoir arch. Both pointed and round arches were used in barrel vaults. Since the country was very flat, it was difficult to lend impressiveness to buildings. In almost every other country natural eminences could be found, but here artificial platforms had to be constructed to make the buildings bulk large in the landscape. On this immense stage arose solid artificial mounds supporting single buildings or groups. The principal mound was always that of the temple, which was in the shape of an immense stepped truncated pyramid. At Babylon the "Birs Nimrud" is reckoned to have been over 250 feet high. The tower varied in the number of its stories from three to seven. The ascent was made in various ways—either by a continuous inclined ramp around the receding stories, or by a combination of internal staircases through the mass. On the way up were shrines, and the summit was crowned by the principal sanctuary. The chambers, however, were few and small. The stories appear to have been colored differently. In many temples the builders used brick dipped in colored enamel, to signify that each particular story was consecrated to one of the planetary deities. These brick were stuck into the mass of sun-dried brick, and formed both a preservative and a decoration. Moldings were used as well as color. The broad surfaces were broken into panels, often framed by pilasters or groups of palm-stem shafts, and even by series of convex flutings. The sites of nearly all the great Babylonian cities have been located, but natural disintegration has reduced them all to masses so unpromising and shapeless, without traces of construction, as to have discouraged explorers. Now, however, the buildings of Sirpurla, Nippur, and Babylon itself are being brought to light, and something has been done at Lippara, Eridu, Larsa, Ur, and Erech. At Tel-lo (= Sirpurla) the French have unearthed a royal palace dating back to about 5000 B.C., but rebuilt by King Gudêa. Its platform was 12 meters high, 200 meters long, and 50 meters wide, and was reached both by a stairway and by a ramp. The palace itself is an elliptical rhomboid, almost like a barrel. The outer walls are decorated with pilasters and semi-columns. The rooms, 36 in all, are grouped around three courts, presumably, as in the later Assyrian palaces, the centres of the three sections—state apartments, harem, and dependents' quarters. The decoration given to these apartments is unknown. In other sites brilliantly enameled

cones were stuck into the soft bricks to form varied patterns. Far larger and more sumptuous palaces existed in other Babylonian cities, but they have not yet been excavated. Compared with our rapidly growing knowledge of the history, religion, and literature of the Babylonians, our knowledge of their architecture is small. No history of this architecture can yet be written. It would appear as if the reconstructions by the Neo-Babylonian kings, such as Nebuchadnezzar, of the ancient sacred shrines, such as the temples of Babylon and Ur, were substantially in the same style as the original structures built 2000 or 3000 years before. See BABYLON; BABEL, TOWER OF; NIPPUR.

Sculpture and Minor Arts. The use of sculpture in relief and in the round appears contemporary with the earliest architecture. The only group of works in historic sequence yet found is that from the mounds of Tel-lo. Many of these sculptures are carved with historic and dedicatory inscriptions of the rulers which make their date indisputable. There are very crude reliefs of the period c.4500–4000, including the famous battle and funeral scenes of the "Stele of the Vultures"; there are reliefs more delicate in technique and advanced in form, belonging to the age of Sargon and Naramsin (3800–3700); then a series of colossal statues in very hard stone of the time of King Gudêa, a little later, resembling in technique the statues of the ancient Empire of Egypt, though clumsier in proportion than these. Statues, both standing and seated, steles, friezes, carved basins, and other classes of reliefs show that the Babylonians practiced sculpture in more varied form than their successors, the Assyrians; but so far as can be judged by the monuments yet discovered, they never attained the skill of the Assyrians in low relief. There was a greater use of religious and mythological scenes, but the annals of the kings also supplied frequent themes. Of their ability to render genre scenes and animal life, in which the Assyrians were later successful, we can judge only from a few examples, such as some later terra cottas of animals and the seal cylinders. The treatment here is realistic and with good treatment of surfaces, without the sharpness of line and energy of Assyrian work. It is only from the minute sculpture of the cut gems and stones of the cylinders and seals that some idea of the historic development of Babylonian sculpture can be obtained during its course of over 4000 years. Every Babylonian was supposed to wear his seal and use it as his signature on all occasions, impressing it on the soft clay used as the universal writing material. The variety of the scenes carved upon them is wonderful, no two being exactly alike. Large collections of these small works have been made in Europe and America. The largest are those of the Louvre, the Bibliothèque Nationale, in Paris; of M. Le Clercq, also in France; of the British Museum; and of the Metropolitan Museum, New York. Several thousand can now be studied, and they illustrate the mythology, theology, religious rites, manners, and customs of the country better than any other works that have been found. Some are of extremely primitive workmanship, often executed principally with the drill, round holes of various sizes representing heads, shoulders, elbows, hands, hips, knees, and feet, connected often by lines. Others, especially those between the time of Sargon (3800) and Ur-gur (2700), are wonderful in their technique, soft textures, and perfect rendering of detail. Such subjects as the adventures of Gilgamesh—the Babylonian Hercules—the fight of Merodach and the Dragon, or Order and Chaos, and the adoration scene of some patron god, are the most frequent.

Other branches of sculpture are less well represented by discoveries, but sufficiently to prove considerable proficiency on the part of the artists. Precious metals were embossed and chased, as shown in the famous silver cup of Tel-lo, now in Constantinople. Bronze figurines were cast at an early date with considerable skill, many being yielded by the Tel-lo excavations. Terra-cotta sculptures were made from molds in relief and in the round, and afterward finished by hand. A very original form of such work was the building up of large figures in relief, or the round out of separate tiles molded and then enameled in brilliant colors. Recent excavations at Babylon have brought to light an entire royal avenue leading through the city, flanked by colossal lions of this technique. The palace of Sargon at Khorsabad, and the palace at Susa, show that the Assyrians and Persians imitated this branch of art. See BABYLONIA.

The best restorations and descriptions are "La Chaldée et l'Assyrie," vol. ii of Perrot and Chipiez, *Histoire de l'art dans l'antiquité* (Paris, 1884), trans. by Armstrong, *History of Art in Chaldea and Assyria* (London, 1884). A good brief account is given in Babelon, *Manuel d'archéologie orientale* (Paris, 1888), trans. by Voetts, *Manual of Oriental Antiquities* (New York, 1889). The Tel-lo-Sirpurla discoveries are described briefly in Henzey, *Un palais Chaldéen* (Paris, 1884), and fully in De Larzec and Henzey, *Découvertes en Chaldée* (Paris, in course). The best historic and scientific treatment of gems is in Menant, *Les pierres gravées de la Chaldée et de l'Assyrie* (Paris, 1884), and the best series of illustrations and detailed descriptions in Menant, *La collection Le Clercq* (Paris, 1888). For explorations, consult Loftus, *Travels and Researches in Chaldæa and Susiana* (London, 1853), and Peters, *Nippur*, (New York, 1897). Compare also A. H. Layard, *Discoveries in the Ruins of Nineveh and Babylon* (New York, 1853); H. V. Hilprecht, *The Babylonian Expedition of the University of Pennsylvania* (Philadelphia, 1893); id., *Explorations in Bible Lands During the Nineteenth Century* (Philadelphia, 1903).

BABYLONIAN EXILE. The name given to the deportation of Jews to Babylonia by Nebuchadnezzar (604–562 B.C.) and to the period extending from the destruction of Jerusalem in 586 to the first year of Cyrus (538), when permission was granted to them to return to Palestine. The policy of deporting the principal inhabitants of conquered districts, as an effective means of preventing insurrections, was followed by the Assyrian monarchs. Thus Tiglath-pileser IV in 733 carried away parts of the population of Galilee and the country east of the Jordan; and after the capture of Samaria by Shalmaneser V, his successor, Sargon II, in 721 took many captives to Assyria and settled them in Mesopotamia and Media. The kings of the Chaldæan period adopted the same policy, and Nebuchadnezzar carried away Jehoiachin, the

royal household, the princes, and 10,000 men to Babylonia in 597; when Jerusalem was destroyed in 586, a second deportation took place (2 Kings xxv.), and in 581 a third. According to the account in Jer. lii. 28–30, 3023 Jews were carried away in 597; 832 persons from Jerusalem in 586; and 745 Jews in 581. It is evident that the vast majority of the inhabitants remained in the land, even when account is taken of those who went into a voluntary exile in Egypt. Those who were taken to Babylonia were settled in various parts of the country. From the Book of Ezekiel we know that those who were exiled in 597 lived on the river Chebar. This, in all probability, is the canal *Kubaru* mentioned in inscriptions found at Nippur (see Hilprecht and Clay, *Business Documents of Murashu Sons* (Philadelphia, 1898)). Traces of settlements of Jews in Babylonia may be seen in the numerous Jewish names that appear in the so-called contract tablets belonging to the Chaldæan and Persian periods. From these and other sources it is clear that many of the Jews acquired riches in Babylonia, and that, on the whole, they all lived in ease and comfort, if not in prosperity. As all other foreigners, they were allowed the greatest possible freedom and soon adopted the customs of the country. Instead, however, of cultivating the soil, as they had done in their own country, they entered upon commercial life; and this change from agricultural pursuits is perhaps the most significant feature of the Babylonian exile, which profoundly influenced the future fortunes of the Jews. So complete was the assimilation to Babylonian ways of life that when, after the capture of Babylon by Cyrus in 539 B.C., permission was given to the Jews to return to Palestine, only a comparatively small number availed themselves of the opportunity. Some priests and pious Yahwe-worshipers were impelled to take up the pilgrim's staff and to seek for new homes in Jerusalem or other parts of Judæa, now ruled by Sheshbazzar as Persian governor; but their experiences do not seem to have encouraged others to emigrate from Babylonia. Conditions were apparently more favorable there than in Palestine. Hence the response to Ezra's appeal in the time of Artaxerxes I was no more hearty than to that of the so-called Deutero-Isaiah in the days of Cyrus.

The period of the exile was an important epoch in the religious life of the people, both in Babylonia and in Judæa. It was natural that the downfall of Jerusalem should be looked upon as a punishment sent by Yahwe for the sins of the people in not following the injunctions of the law and the teachings of the prophets. Especially was the cause of the prophets strengthened by the catastrophe. It could not be forgotten that they had foretold this doom upon the nation. The event proved them to be true prognosticators of the future. Yet they had been exposed to evil treatment. Their oracles were gathered together, and words of comfort were now added. We owe to this tardy recognition the precious remains of pre-exilic prophecy in Israel and Judah. The new spirit manifested itself also in the collection of the annals and stories of the past and their arrangement and presentation in such a manner as to emphasize what seemed the obvious lesson taught by the prophets, that there was no god like Yahwe, who knew how to reward his people for faithful service, but also how to punish them for disobedience to his will. It was important, therefore, for the future to know exactly what was the will of Yahwe. This gave a strong impulse to the collection of laws and the working out of codes regulating the forms of worship and the conduct of life. Soon after the fall of Jerusalem Ezekiel seems to have felt the necessity of elaborating such a code, based upon, and yet deviating from, the earlier codes. (For the relation of this code to the Mosaic legislation, see PENTATEUCH.) Of fundamental importance for later Judaism were also the ideas of Yahwe as the only existing god, the creation of the world, the election of Israel for service, and the infallible revelation of the future, set forth by the prophet whose words have come down to us in an appendix to the Book of Isaiah (chap. xl.–lv.) and who is supposed by most scholars to have uttered his oracles c.540 B.C., as his references to Cyrus by name and the unrealized hopes centred on this King seem to indicate. (See ISAIAH.) What part of the literature of the time came from exiles in Babylonia and what part originated among the people left in Palestine cannot easily be determined. Some of the earlier elegies in the Book of Lamentations have the appearance of coming from the latter source; and the same is true of the collections of history and ancient law made at this time. Whether the Babylonian Jews built for themselves a temple, as the Egyptian Jews did at Yeb (see ELEPHANTINE PAPYRI), we do not know; but it is by no means improbable, and the religious condition of the exiles in Babylonia is not likely to have been essentially different from that of the exiles in Egypt.

The Babylonian exile is generally regarded as coming to an end in 538 B.C.; and the following period is spoken of as "post-exilic." While there is no reference to an exile of 48 years (586–538) or 59 years (597–538), a 70-year period is often mentioned, probably counted from 586 to 516, when Zerubbabel's temple was dedicated. The completion of this temple, however, did not bring about any return of Jews to Palestine. At some time in the reign of Artaxerxes I (465–425 B.C.) 1496 persons left Babylonia for Palestine with Ezra, according to Ezra viii. 1–14. The bulk of the exiles never returned, but formed a part of what was called the *golah*, or *diaspora*, the body of Jews, voluntarily or involuntarily living away from Palestine, dispersed among the nations.

The name "Babylonish Captivity" is frequently applied in the history of the Church to the residence of the Popes at Avignon, from 1309 to 1376. See PAPACY.

Bibliography. For the history, consult Stade, *Geschichte des Volkes Israel* (Berlin, 1888, vol. ii, pp. 1 ff.); Piepenbring, *Histoire du peuple d'Israel* (Paris, 1898); Kent, *A History of the Jewish People* (New York, 1899); Guthe, *Geschichte des Volkes Israel* (2d ed., Leipzig, 1904); Benzinger, *Geschichte Israels bis auf die griechische Zeit* (2d ed., Leipzig, 1908); also for the special problems connected with the return from the exile, Kosters, *Het Herstel van Israël in het Perzische Tijdvak* (Leyden, 1893); Hoonacker, *Nouvelles études sur la restauration juive* (Louvain, 1896); Cheyne, *Jewish Religious Life after the Exile* (New York, 1898); Meyer, *Entstehung des Judentums* (Halle, 1896); Torrey, *Ezra-Studies* (Chicago, 1910).

BACACAY, bä-kä-kī′. A town of the Philippines, in Albay, on the island of Luzon. It is situated on the south shore of Tabaco Bay, about 11 miles north of Albay, the capital, and grows much hemp. Pop., 1903, 14,214.

BACALAO, bä′kä-lä′ō. 1. A name applied in the West Indies to a grouper (*Mycteroperca falcata*), also called scamp and abadejo, and common in the markets. (See GROUPER.) 2. Formerly this word was applied in Europe to weather-cured codfish. "Among the Greeks the large codfish were called bacchi, from bacchus, a rod . . . by the Iberians the dried cod were called bacalaos from baculeum, a small stick. The rod held by Mercury was called a baculeum" (Brevoort, quoted in Goode's *Fishery Industries*, sec. 1, p. 200, Washington, 1884). The term is used in all the accounts of the early fishing expeditions from Europe to the Banks of Newfoundland and has long survived. A letter from Madrid to *The Remembrancer* (London, 1776), recounting discoveries on the coast of California, mentions the taking there of "cod, known in Spain by the name of *bacallao.*"

BACARRA, bä-kär′rä. A town of Luzon, Philippines, in the province of Ilocos Norte. It is situated on the right bank of the Grande de Bacarra River, 4 miles north of Laoag, and had a population in 1903 of 14,616 (Map: Philippine Islands, C 1).

BACAU. See BAKAU.

BACCAHIRY. See BAKAIRI.

BAC′CANAR/ISTS. See PACCANARISTS.

BACCARAT, bä′kä′rä′. The chief town of a canton, arrondissement of Lunéville, in the department of Meurthe et Moselle, France, on the river Meurthe, 15½ miles southeast of Lunéville by rail (Map: France, N., M 4). It is noted for its extensive plate-glass and crystal factories, an industry established in 1765. Pop., 1901, 6085; 1906, 6996; 1911, 7277.

BACCARAT, bä′kä′rä′ (Fr. of unknown origin). A game of cards, said to be of Italian origin and to have been introduced in France in the time of Charles VIII. The game is played for money between one of the players, who is called the banker, and any number of others. Each of the face or court cards, in all countries except America (where the face cards and tens have no value, and the naturals are 8 and 9), counts 10; in others, according to the number of their spots. Bets having been made, two cards are dealt by the banker to each player, including the banker himself, and if more than one pack of cards is necessary to deal round to all the players, more are used. Each player's aim is to make the value of his cards foot up the total of 9, 19, 29, or as near these totals as is possible. Any player has the privilege of *standing*, or remaining *content* with the two cards dealt to him at the outset by the banker, or he may call for more. When any player has a *natural*—i.e., a sum making 9, 19, or 29—he declares that it wins, and the banker has to pay all who hold hands of higher value than his own, receiving payment from all whose hands are inferior. The principal advantage in the game lies with the office of banker, which in social games is usually determined by cutting the cards. The banker retains his office until defeated by all the players in the same hand, in which event he surrenders the bank to the player winning on the highest hand. Consult Billiard, *Bréviaire du baccara experimental* (Paris, 1883).

BACCELLI, bät-chĕ′lē, GUIDO (1832–1916). An Italian physician and statesman, born at Rome. He studied medicine at the University of Rome, where he later successively filled the chairs of medical jurisprudence, pathological anatomy, and clinical medicine. In 1874 he was elected a member of the Chamber of Deputies and in 1880 was made Minister of Public Instruction. In the latter capacity he projected a thorough reorganization of higher instruction in Italy; but his plans met with decided opposition, in consequence of which he resigned his portfolio in 1884. In 1890 he was made a Senator, and subsequently, from 1893 to 1896 and from 1898 to 1900, again acted as Minister of Public Instruction. In 1901–03 he served as Minister of Agriculture in the Zanardelli cabinet. He became director of the medical clinic in Rome. His published writings include *Patologia del cuore e dell' aorta* (new ed., 4 vols., 1883–87).

BACCHÆ, bäk′kē. 1. A name given to the women companions of Bacchus in his journeys through the East, and to the female participants of the Dionysian festivals. They were crowned with wreaths of vine leaves, wore fawn skins, and carried the thyrsus. 2. A brilliant play of Euripides, abounding in tragic situations and splendid spectacles. See BACCHUS.

BACCHANALIA, bäk′kä-nā′lī-ä. See BACCHUS.

BACCHANTES, bäk-kän′tēz (Lat. nom. pl. pres. p. of *bacchari*, to celebrate the festival of Bacchus). Devotees of Dionysus (Bacchus), both men and women, who engaged in orgiastic worship of the god. See BACCHUS.

BACCHIDES, bäk′kĭ-dēz. One of the comedies of Plautus, presented in 189 B.C. The early scenes are missing, having disappeared about the fifth century A.D. It is one of the best of Plautus's plays, especially in the skillful working up of the intrigue. It gets its name from the two sisters whose fortunes it portrays.

BACCHIGLIONE, bäk′kē-lyō′nĕ. A river of northeastern Italy, rising in the Alps. It flows eastward, traversing Vicenza and Padua, and after a course of 70 miles enters the Gulf of Venice. It is canalized as far as the city of Padua, whence a canal connects it with the town of Este and the river Adige.

BACCHUS, bäk′kŭs (Gk. Βάκχος, *Bakchos*). Also called Dionysus (Gk. Διόνυσος, *Dionysos*) by the Greeks; this name perhaps meant 'Son of Zeus.' A god who originally belonged to the great group of vegetation spirits, whose worship was widely spread among European nations. As such his coming in the early part of the year was received with joy and revelry, while his departure or death was also celebrated at the winter season. In some instances of this sort of worship the old spirit is regarded as dying that the new one may be born, and there is some reason for believing that this feature was also found in the rites of Dionysus. The god never lost his early connection with the flourishing of vegetation and with fruitfulness generally, but he came to be associated more and more closely with the vine and its inspiring produce. His worship was exceedingly widespread and appears in manifold local forms and with large admixtures of foreign elements. Indeed, some of the myths seem to indicate the presence of a god of light as well as a true chthonic deity. There is also much in the worship and legends that indicates a foreign origin for the cult, though there can be no doubt that

many features, such as the satyrs, are purely Greek. So widely different are the stories and so varied the myths in which the god appears, that only some of the more important can be indicated. The common legend of his birth seems to have been that of Thebes. Zeus loved Semele, the daughter of Cadmus; but the jealous Hera induced her rival to beg the god to appear to her in all his splendor. Naturally the mortal was consumed by the thunderbolt; but Zeus saved her unborn child and sewed it in his thigh, whence in due time it was born. In this legend some have seen in Zeus the fertilizing rain-god and in Semele a personification of the earth. The infant was intrusted to Hermes, who delivered him to the nymphs of Nysa. This Nysa cannot be localized; wherever the worship of Dionysus was established, there story set a Nysa, sacred to the god. At Nysa, then, the god discovered and taught the powers of the grape and headed a band of nymphs and satyrs, the so-called Thiasos, with whom he wandered over the earth, communicating his new gift to men, blessing those who received him gladly and punishing his enemies. For the legends have much to tell of opposition to the new worship. So Lycurgus, King of Thrace, drove Dionysus in terror to the depths of the sea, but later perished miserably because of his opposition to the god. The story of Pentheus, King of Thebes, who cast Dionysus into prison, but was himself later torn in pieces by his own mother, Agave, and the Theban women who had been driven by frenzy to celebrate the rites of the god, forms the subject of the *Bacchæ* of Euripides. There is much to indicate that in these stories we have really versions of the death and the return of Dionysus himself. In friendship, on the other hand, Dionysus visits Icarius at Icaria, in Attica; but even here the story ends in death, since Icarius is killed by peasants, who fancy themselves poisoned by his new gift of wine. Another instance of Dionysus' power is furnished by the story of the transformation into dolphins of the Tyrrhenian pirates, who bound him in order to carry him to Italy. It is told in a Homeric hymn and also in the marble reliefs which decorate the choragic monument of Lysicrates in Athens. He took part also in the battle of the gods and the giants. Legend also makes him wed Ariadne when she was abandoned by Theseus on the island of Naxos. The conquering tour of Dionysus was greatly extended under the influence of Alexander's conquests; and the god's subjection of the East and India became a subject of later poets, and is preserved to us in the epic of Nonnus. He even descended to the underworld and brought back to earth his mother Semele. Thenceforth she was worshiped as Thyone, and Bacchus himself as Thyoneus. Bacchus had prophetic power too; his oracle at Delphi was of prime importance.

In art two types prevail. In the earlier period the god is represented as bearded and fully draped, and this type was not unknown in later times, when it was sometimes called "the Indian Bacchus." From the middle of the fourth century B.C. another type steadily gains in popularity, representing the god as a beardless youth, markedly effeminate in appearance, nude or wearing only the fawn skin, or *nebris*. He appears also as an infant, as in the famous statue of Hermes by Praxiteles. The chief attributes of the god are the thyrsus, or rod ending in a pine cone and wreathed with ivy, and the great two-handled drinking cup (the cantharus). He is often accompanied by a panther, and the bull and the goat were closely associated with his worship. He is sometimes represented with the horn of a bull on his forehead. Naturally, as a god of vegetation and the vine, Dionysus was associated with Demeter, Ceres, and the Eleusinian Mysteries, where he bore the name Iacchus. In the mystic worship which grew up in the sixth century B.C., under the name of Orpheus, Dionysus Zagreus played a prominent part, and no doubt Orphic influence helped to produce the confusion of elements which is so marked in all this cult.

In the worship of Dionysus two distinct forms may be traced. The one appears most clearly in the Attic festivals, especially the country Dionysia. It is essentially a joyous but rude and boisterous vintage festival, celebrated by men and abounding in mummeries and coarse jests. Its connection with vegetation and fruitfulness is shown by the phallic procession, which held a prominent place in the celebration. The connection of Dionysus with wine occurs first in Hesiod. (For an account of the Attic Dionysia, see GREEK FESTIVALS.) The other form of Dionysiac worship was highly orgiastic, and was celebrated by women, at the time of the winter solstice, in alternate years; hence it was called the Triateric Dionysia. The celebrants, called in Greek Mainades, or Mænads, wandered among the mountains, indifferent to the cold, wearing fawn skins and carrying the thyrsus and torches, for the chief rites were held at night. The god was said to be lost, and was sought with wild cries. The culmination of the orgy was in tearing in pieces fawns, kids, and other animals and devouring the raw flesh in honor of the god. We hear even of human victims being rent asunder. These rites were thought to be an endeavor to arouse the dead or sleeping god; but it is also clear that originally the slain animal was the god, who was killed to be reborn. It is a common feature of primitive religions for the worshiper to partake of the god, especially if it be a deity connected with vegetation or fertility. Hints of these orgiastic rites appear in Homer. The rites were especially associated with Thebes and Delphi, though we hear that even Athenian women went to Mount Parnassus to join in this fierce and bloody worship. In later times the mysteries celebrated under the name of Dionysus became more and more occasions for intoxication and gross licentiousness.

The *Bacchanalia* were introduced into Rome early in the second century B.C., and at first were celebrated on three days of the year by women only. Later a priestess opened the mysteries to men, introduced evening celebrations, and greatly increased their frequency. The gatherings soon became suspected of gross immoralities; and in 186 B.C. the Senate ordered the consuls to arrest the priests and forbid further meetings of the association throughout Italy. The result of the judicial inquiry was that the majority of the members were sentenced to death, and others to life imprisonment, while by a decree of the Senate all such associations were forbidden in Italy. The decree (*Senatus Consultum de Bacchanalibus*) has been preserved in a single copy, *Corpus Inscriptionum Latinarum*, i, 196–x, 104.

On the vegetation spirits and their worship,

consult Mannhardt, *Wald und Feldkulte* (Berlin, 1875–77). On Dionysus, consult: Roscher, *Lexikon der griechischen und römischen Mythologie*, vol. i (Leipzig, 1884–90); Preller-Robert, *Griechische Mythologie*, vol. i (Berlin, 1894); B. I. Wheeler, *Dionysus and Immortality* (Boston, 1899); Frazer, *The Golden Bough*, vol. ii (1913); Farnell, *Cults of the Greek States*, vol. v (Oxford, 1910); O. Gruppe, *Griechische Mythologie und Religionsgeschichte*, vol. ii (1907).

BACCHUS AND A'RIAD'NE. A painting by Titian, founded on the Greek myth of the marriage of Dionysus to the wife of Theseus, after she had been deserted by the slayer of the Minotaur upon the island of Naxos. The picture hangs in the National Gallery, London. Set in a background of thicket and sedge and ocean, Ariadne is turning away, filled with maidenly confusion, as the leopard-drawn chariot, surrounded by satyrs and mænads, descends, bearing the god. Its date is 1523.

BACCHYLIDES, băk-kĭl'ĭ-dēz (Gk. Βακχυλίδης, *Bakchylidēs*) (c.507 B.C.—?). A Greek poet, born at Iulis, on Ceos, at the end of the sixth century B.C., who flourished between 470 and 460 B.C. He was a nephew and pupil of Simonides and the rival of Pindar, according to well-established tradition. He lived for a time at the court of Hiero I, tyrant of Syracuse, who greatly admired him and whom he celebrated in three of his poems. When exiled from his native town, presumably by political opponents, Bacchylides resided in the Peloponnesus, and records of many of his victories in dithyrambic contests at Athens have been preserved. Some of the poems show intimate knowledge of the Peloponnesus. As the youngest, he was placed last in the list of nine lyric poets deemed worthy of immortality by the canon of the Alexandrian critics, who admired his grace and sweetness. (See ALEXANDRIAN AGE.) Though admired by Horace, and much read till 400 A.D., he finally shared the fate of the canonized lyric poets, whose works, with the exception of Pindar's, were all lost to posterity. Until 1897 only 107 lines were preserved in quotations, the longest one of 12 verses only. In 1896, the British Museum acquired, in Egypt, 200 fragments of a papyrus of Bacchylides. Pieced together by F. G. Kenyon, they formed 1070 lines. Thus 6 poems were recovered practically entire, 8 others with lacunas, and 6 in considerable fragments. Fourteen are *Epinikia*, or Odes of Victory, of which 2 in honor of Hiero and 1 in honor of Pythias of Ægina duplicate odes of Pindar for the same occasions. The remaining 6 are the unique extant specimens of one department of Greek lyric poetry—dithyrambs. Pæans and hymns also occur. One poem (XVII) is the first recovered literary treatment of a subject common on vases—the descent of Theseus to the depths of the sea to prove his sonship to Poseidon. In style he is simple and clear, displaying a love of picturesque detail. Not so powerful, brilliant, or original as Pindar, he is a true and typical Greek poet in his smoothness, grace, and finish. His language has less of the Æolic admixture on the foundation of Doric than is the case with Pindar. The British Museum MS., in fine uncials, belongs to the first century B.C., and the accents and the breathings are generally carefully marked. The text was first edited by F. G. Kenyon (London, 1897), with an introduction and extensive notes. Another edition is by F. Blass (Leipzig, 1898). Consult: Wilamowitz-Moellendorf, *Bakchylides* (Berlin, 1898); Richard Jebb, *Bacchylides* (London, 1905); Angelo Taccone, "Della vita di Bacchilide" in *Bacchylides Epinici* (1907).

BACCIO D'AGNOLO, bät'chô dâ-nyô'lô. See BAGLIONI.

BACCIO DELLA PORTA, dĕl'lâ pôr'tâ. See BARTOLOMMEO, FRA.

BACH, bäg. The name of a family originating in Wechmar, near Gotha, Thuringia, famous in music and presenting the most remarkable instance of hereditary genius in all history. In seven generations there are found to be 49 musicians, 20 of whom, from Veit Bach (died 1619) down to Wilhelm Friedrich Ernst Bach (died, Berlin, 1845), have been more or less prominent musically, and one of them, Johann Sebastian Bach, is one of the great masters of music and the greatest of the Contrapuntal school. Veit Bach was a baker by trade, but devoted much of his spare time to zither playing. The best known of the early Bachs was Johann Christoph, son of Heinrich and a great-grandson of Veit. This Johann Christoph (1642–1703) was one of the important composers and organists of the seventeenth century, far surpassing his German contemporaries. None of his works were published, and many are lost; but his choral compositions (MSS. in the Berlin Royal Library) prove him the forerunner of Johann Sebastian and Handel.

BACH, ALEXANDER, BARON (1813–93). An Austrian statesman. He was born at Loosdorf, in Lower Austria, where his father held a judicial office. At the age of 24 he was made a doctor of laws, and then entered the Imperial service, where he remained for nine years. Although he favored a departure from the absolute system of Metternich, Bach was not prepared to go so far as the Revolutionists of 1848 wished. Popular opposition, in fact, drove him into the conservative ranks. In 1848, and again from 1849 to 1859, he was in the ministry, at first in the department of justice, and later in that of the interior. He stood for a strong and absolute central government, and opposed all measures that savored of liberalism and concession to other nationalities than the German. He however carried out some salutary measures, such as the emancipation of the peasants from their feudal obligations. From 1859 to 1867 he was Ambassador at Rome. Consult Springer, *Geschichte Oesterreichs seit dem Wiener Frieden* (Leipzig, 1863–65).

BACH, JOHANN CHRISTIAN (1735–82). Known as the English Bach. He was the youngest of the sons of Johann Sebastian. After his father's death his older brother, Karl Philipp Emanuel, continued his musical education and turned his interest in the direction of the lighter homophonic style, away from the severe contrapuntal style of the father. In 1754 he went to Italy as Kapellmeister of Count Litta. In Bologna he studied counterpoint with Padre Martini. He was appointed organist of the cathedral at Milan in 1760. All the time his reputation as a composer both of operas and sacred music was steadily growing. In 1762 he settled in London, where in the following year he scored a great success with his opera *Orione*, which procured him the appointment of music master to the Queen. As such he directed, jointly with K. F. Abel, the Bach-Abel Concerts from 1765 until his death. It was his misfortune to have been the son of his great

father, although his works belong to an entirely different school and ought to be judged accordingly. Johann Christian shows great talent, and his works are among the most important of their kind in introducing the reforms of Stamitz (q.v.). Even Mozart acknowledges his indebtedness to this son of Bach. Johann Christian was not only a meritorious but also a very prolific composer. He wrote 16 Italian and 4 French operas, 2 oratorios, an enormous number of instrumental works for many different combinations of instruments, and many pieces for the pianoforte, which instrument had come into great vogue in England since 1760. Consult M. Schwarz, *Johann Christian Bach* (Leipzig, 1900).

BACH, JOHANN SEBASTIAN (1685–1750). The greatest master of the Contrapuntal school of musical composition. He was born at Eisenach, March 31 (Old Style 21), 1685. He came of a Thuringian family, which presented a remarkable example of the principle of heredity. (See BACH.) Bach's father, Johann Ambrosius, was a violin player in the town band of Eisenach. His mother was Elizabeth Lämmerhirt, daughter of a furrier of Erfurt, where Johann Ambrosius had held a position previous to that at Eisenach. The boy was his father's pupil in violin playing until he was nearly 10 years old. After his father's death, in January, 1695 (two months after contracting a second marriage), he went to live with his elder brother, Johann Christoph, a pupil of Pachelbel and organist in the little town of Ohrdruf.

The Bachs held annual family and musical reunions. According to a description given by Bach's son, Karl Philipp Emanuel, to J. N. Forkel, one of Bach's biographers, these meetings opened with a chorale, which was followed by secular songs, until at a convenient pause some one of those present started a catch, in which each joined in proper turn with some humorous phrase, as likely as not hitting at a harmless family or individual failing; thus making a merry ending to the musical exercises of the reunion. The Bachs were a clan of working musicians; and quite as much as the violin lessons received from his father, the musical atmosphere of the Bach household and family traditions must have made their impression on Johann Sebastian. It was the homely life of people in humble circumstances, but it was permeated with music. To think in music was, from childhood, spontaneous—second nature with him. This, together with the scrupulous revision to which in his later years he subjected his earlier works, accounts for the sustained excellence of his vast production.

The Bach clan being so united, it is surprising that Bach's brother at Ohrdruf was moved more to jealousy than admiration by Sebastian's rapid progress. Johann Christoph taught him the clavichord, but kept from him a book containing works by Froberger, Buxtehude, Pachelbel, and others, which the boy coveted. Not to be thwarted, however, he copied the book stealthily and laboriously on moonlit nights, only to be deprived of his copy when it was discovered. The anecdote is wholly in keeping with Bach's devotion to his art. At school, besides his general education, he was trained with the other boys for the church choir and moreover sang at weddings and funerals. In April, 1700, Bach went to Lüneburg, where he was accepted at the school of St. Michael's for the choir of the church. His general education continued at the school; he took his commons at the refectory, and received musical training of much value for his future work, including high services with orchestra, choral singing, organ, and experience with a wider range of music. His fine treble voice, together with his knowledge of violin and clavichord, secured him immediate admittance to the advance matin choir. There was keen musical rivalry between the schools of St. Michael's and St. John's; and when in winter the choirs went through the town streets to sing, separate routes had to be marked out for each, to avoid quarrelsome meetings. As the organ became in time Bach's instrument par excellence, and as he is regarded as its greatest master in composition and as one of its greatest masters in playing, it is interesting to note that his serious study of it began in Lüneburg under George Boehm, a pupil of Reinken and a composer of distinction, who was organist at St. John's Church; which shows that while the musical rivalry between St. Michael's and St. John's was keen, it was also generous. The seriousness with which Bach went about the study of the organ is attested by the fact that he made several journeys to Hamburg to hear Reinken play and profit by his suggestions. Nearly 20 years later, when shortly before Reinken's death Bach played in St. Katherine's Church, Hamburg, an improvised elaboration of the chorale *By the Waters of Babylon*, the "father of North German organists" exclaimed: "I thought this art was dead, but now I see it lives on in you!"

Bach's eagerness to leave nothing undone that would aid his progress in his art was again shown a few years later, when he walked 150 miles from Arnstadt to Lübeck for a brief course of study with the famous organist Buxtehude. Bach had left Lüneburg in 1703, and for a few months was a member of the band of Prince Johann Ernest at Weimar. Chancing to visit Arnstadt, where his grand-uncle, Heinrich, had been organist, and where an organ lately had been installed in a new church, he played on the instrument. Although the trial is not believed to have been official, he was, at 18 years of age (August, 1703), engaged for a position similar to that which his grand-uncle had filled with honor. Bach went to Lübeck in 1705 and remained with Buxtehude three months, deliberately extending his month's leave from his Arnstadt duties for this purpose. Whatever the personal consequences might be, he was determined to derive the greatest possible artistic profit from his contact with the justly famous organist. The result was a great advance in organ technique, especially in new insight into the resources and use of the pedal, in which Buxtehude was a master. Naturally the authorities were displeased at this unceremonious extension of his leave from one month to three; although, with characteristically Bachian honesty of purpose, he pleaded as an excuse his desire "to perfect himself in certain matters touching his art." Further, however, he was rebuked "for that he hath heretofore made sundry perplexing variations and imported various strange harmonies, in such wise that the congregation was thereby confounded." He had returned to Arnstadt in February, 1706. In June, 1707, he accepted the position of organist of St. Blasius's Church at Mühlhausen with the same salary as at Arnstadt, and "the accustomed dues of corn, wood and fish." In October he married his cousin, Maria Barabara, whose

father, John Michael Bach, had been organist at Gehren. June, 1708, he resigned from Mühlhausen to become organist in the Ducal Chapel at Weimar. Conditions at Weimar were such as to quicken Bach's already active musical faculties. The life of the court was decorous, influenced by Duke William Ernest, a man of serious temperament, a patron of arts and letters and wisely active in bringing the music of the Ducal Chapel up to a high standard. He in fact laid the foundation of that culture which made Weimar the centre of German letters in Goethe's time, and gave it a "golden period" of music when Liszt resided there. In addition to his duties in the chapel, Bach played the violin or accompanied on the harpsichord in the Court Orchestra, wearing a Hungarian uniform, in which it is difficult at the present day to realize the appearance of the great master of the Contrapuntal school whose perruqued portrait has come down to us. Bach's growing fame as an organist brought him many invitations to try or inspect organs and to play at various courts. For playing a pedal solo on the organ at Cassel with an agility "which few could equal with their hands" he received from the Hereditary Prince a precious ring which the Prince drew from his own finger.

Bach remained at Weimar nine years. In 1717 he accepted from Prince Leopold of Anhalt-Köthen the office of kapellmeister at Köthen. The Prince, who sang bass and played violin, viola de gamba, and clavichord, warmly welcomed Bach into musical fellowship and made him his companion on various trips. It was the kapellmeister's duty to compose for the instruments on which the Prince played. Accordingly, as Bach's Weimar period is distinguished for his organ compositions, including several of his greatest works for that instrument; so to his Köthen period belong much of his chamber music and works for clavichord and for orchestra. In a general way, it may be characterized as a lighter period in his life—a temporary relaxation in his self-imposed, severe course of artistic development before entering, in 1723, on the final and greatest epoch of his career as cantor of the School of St. Thomas at Leipzig, when he achieved the logical results of a genius trained during 32 years of rigid preparation; a prelude which alone would have been a sure foundation for his fame, had he not later accomplished so much more in larger musical forms. It was during the Köthen period that Bach's first wife died. Of the 20 children born in his two marriages, the two who achieved greatest fame as musicians, Wilhelm Friedemann and Karl Philipp Emanuel, were of the first. His second wife, Anna Magdelena Wülken, whom he married in December, 1721, was a singer at the Köthen Court, and proved herself, both in his domestic and musical life, a helpmeet in the truest sense of the word. Bach's first marriage is known to have been happy, but artistic unions as mutually helpful and felicitous as his second are among the rarities of history.

The post of cantor (or choir master) of the School of St. Thomas in Leipzig was made, through Bach's incumbency of it, one of the most famous in music. The school, which was five centuries old when, in 1723, Bach entered upon his duties, included a choir and a grammar school; and the cantor was supposed to teach in both. Bach, however, assumed the latter duties only when the substitute whom he was allowed to engage was unable to act. Besides teaching the pupils vocal and instrumental music, the cantor had supervision not only of the music in the churches of St. Thomas and St. Nicholas, and in less degree in those of St. Matthew, St. Peter, and St. John, but also of the organists and other musicians of the municipality. He was, in fact, Musical Director of Leipzig. But the actual dignity was not so great as this enumeration of his duties would imply. During nearly his whole incumbency of the post this past master of his art was harassed by the Town Council, to which he was responsible and which sought to undermine his authority.

The result was that Bach found his usefulness as a teacher continually hampered. The Council even went so far as to accuse him of being slack; and this shortly after he had produced one of his greatest works, *The Passion according to St. Matthew*. On another occasion, when he had nine vacancies to fill among the choristers of his school, from which he supplied the various choirs under his supervision, the Council rejected four of those whom he had examined and nominated, and appointed others whom he had rejected. He was assigned a residence in the left wing of the Thomas building and received also the sum of 700 thalers annually. But the Council claimed that he was so unproficient an instructor in music that he must take part in the teaching of the school; and though he avoided this, the Council suspended some of the perquisites of his post. Those who are unfamiliar with Bach's life, or who form an opinion of the Leipzig cantorship from the fame that has come to it through Bach, are apt to imagine that for 37 years he occupied an exalted and congenial position, active as teacher and composer. In point of fact, neither Council nor city appreciated the genius they had within their walls, and not only wholly failed to honor Bach, but even thwarted him in his work. The position of this great man, who was so wholly devoted to his art that the attitude of the Council simply seemed to him "peculiar," and puzzled while it irritated him, was, if not downright pitiable, at least deserving of deep sympathy.

There was a brief respite for him of four years during which Johann Matthias Gesner, who seems to have appreciated the genius of the cantor, was rector of the school. In 1729 Bach was made conductor of the Musical Society—a position which he held until 1736, and his connection with which doubtless accounts for the composition of his secular cantatas. In one of these, *The Contest of Phœbus and Pan*, he took occasion to change the wording of the libretto so as to convey covert satirical allusions to the hostile rector who had succeeded Gesner, and to one Scheibe, a mediocre musician, whose application for a position as organist Bach had rejected, and who, in consequence, showed his ill will in every way possible. When the quarrels which so harassed Bach are analyzed, it appears that the School of St. Thomas suffered from the double government of rector and cantor—the one in matters of general education, the other in music; and that in asserting what he deemed his prerogatives the rector probably went to work more practically than the musician whom his art so deeply engrossed. Moreover, Ernesti, who succeeded Gesner, was a son of the Ernesti who was rector at the time Bach became cantor, so that in a measure he had inherited the

quarrel. How little influence Bach had in the musical life of Leipzig is shown by the fact that while the Society of Musical Sciences made Handel an honorary member, Bach was admitted only as an ordinary member, and even that not until he had sent in a trial canon. Nor when, in 1743, the concerts from which developed the famous Gewandhaus concerts were inaugurated, was his advice sought. Yet to this master, whose qualifications as a teacher the Town Council of Leipzig impugned, pupils flocked from outside, and no musician of the day thought of passing through the town without paying his respects to the cantor. Besides his most eminent pupils, his two eldest sons, the list included men like Krebs, Agricola, Kirnberger, and Altnikol, who became his teacher's son-in-law. His activity as teacher and composer, and, above all, the happiness of his home life, must have offered Bach the needed respite from his worries with the authorities. His wife helped him copy his music. As his pupil she became an apt player on the clavichord; both she and his eldest daughter sang, and there were the sons and pupils from among whom to make up an orchestra in his own household. Bach possessed at his death five instruments of the clavichord family and many stringed instruments. It is likely that his two concertos for three pianos were written for himself to play with his two eldest sons; several of his church cantatas doubtless were written for his wife and daughter, and there can be no question that the opportunity for music in his congenial household greatly stimulated his faculties for composition. Thus at least part of that famous work, *The Well-tempered Clavichord*, had its origin in Bach's desire to give his sons a thorough course of instruction; and the so-called *French Suites* are among the pieces he wrote for his wife while he was teaching her the clavichord. It was Emanuel who, after becoming a kapellmeister in Berlin, brought about, in 1747, the famous meeting between Bach and Frederick the Great. As soon as the King heard of the composer's arrival, he exclaimed, "Gentlemen, old Bach is here!" and Bach, in his traveling clothes, was immediately summoned into his Majesty's presence. The King had 15 pianofortes in different rooms, and on these Bach improvised and developed in various ways a theme proposed by the King. The composer, who was treated with great distinction, wrote as a souvenir of his visit his *Musical Offering*, a series of compositions on the King's theme. Bach's labors were unremitting almost up to his death. His *Art of Fugue*, begun probably in 1749, was barely finished when he set to work at a quadruple fugue planned on a colossal scale and introducing as one of the subjects his own name in German notation (B A C H, corresponding to our B-flat, A, C, and B). An affliction of his eyesight, which soon resulted in total blindness, stopped the work. It was completed entirely in Bach's spirit by Ferruccio Busoni, and performed in 1911, arranged for organ and orchestra. Ten days before he died, his eyesight suddenly was restored for a short time. His blindness returning, he called his son-in-law Altnikol to him and dictated music for the chorale, *When We are in the Depths of Need*. Later, feeling the hand of death upon him, he had Altnikol change the inscription to *Herewith I Come before Thy Throne*. He died Tuesday, July 28, 1750. The only public notice of the event was a brief minute of the fact entered by the Town Council. His widow was allowed to die a pauper; and when St. John's churchyard, where he was buried, became part of a road, early in the nineteenth century, his bones were carelessly transferred. For almost a century the world was ignorant of the resting place of one of its greatest sons. Not until 1894 were the remains discovered by the merest chance in a vault of St. John's Church itself.

Bach is regarded by organists as the greatest composer for their instrument. In the Lutheran church, while the congregation sustained the melody of a chorale, the organist was supposed to vary the harmonies. Bach's skill at this was prodigious. He collected no less than 240 chorales for use in his household; 138 have come down to us in print, besides those found in his church cantatas and other large works. His fame as an organ composer rests chiefly, however, upon his preludes, toccatas, fantasias, and fugues. Among these organ compositions should be mentioned the *Fantasia and Fugue in G minor* ("Giant"), probably played by Bach in 1720 in Hamburg in Reinken's presence; the *D minor Toccata and Fugue* (Doris); the *E minor Fugue* which is built upon chromatic intervals; and the *E flat or St. Ann Fugue;* besides the *Passacaglia in C minor*. No less an authority than Guilmant has expressed the opinion that there has been no progress in organ composition since Bach, because Bach's achievements in that branch are the highest possible, and as modern to-day, both in the technical equipment they demand of the player and in the effect they produce, as when they were composed. Bach's most generally known works probably are the *D minor Toccata and Fugue*, arranged by Tausig; the *Chromatic Fantasia and Fugue* (D minor) for pianoforte, and the *Well-tempered Clavichord* (*Wohltemperirtes Clavier*) —the two former because they are found in the repertory of every great pianist, the last (48 preludes and fugues through all the major and minor keys), because some acquaintance with it is considered indispensable to a pianist's education. Beethoven mastered it at the age of 11. This famous work, composed partly in 1722, partly about 1740, did not see publication until 1799, nearly 50 years after Bach's death, when it was brought out in London. *Art of Fugue*, begun the year before Bach's death, consists of 15 fugues and 4 canons, all written upon one and the same theme in D minor. Besides these there is a fairly long list of other works for pianofortes, including the charming *French Suites* and *English Suites* and the pretty *Inventions*, showing with how light a touch Bach could handle the smaller forms of his school of composition in composing chamber music and for the orchestra. It is notable that while organ playing usually ruins the pianoforte touch, Bach appears to have been equally proficient on organ and clavichord.

Bach's greatest fame among musicians rests on the religious works composed during the Leipzig period of his career. It is noteworthy that these were composed for the Protestant church, the church of St. Thomas being Lutheran; and that, in consequence, their majesty is enhanced by an august severity in keeping with the simpler forms of Protestant worship. Bach has been compared with Milton, and not inaptly, except that the composer could unbend, as witness his *Coffee* and *Peasant's* cantatas and

his ditty upon his tobacco pipe, *The Edifying Reflections of a Tobacco Smoker*, which he composed as a bit of pleasantry for his wife. Of church cantatas he is understood to have composed nearly 300, a complete cycle for five church years. Of these cantatas some 200 are extant. The loss of so many valuable manuscripts is due to the carelessness of his son Wilhelm Friedemann (q.v.). All except about 30 date from the Leipzig period. He greatly developed this form of church music by freer treatment of the instrumental portions, as well as by his mastery of vocal composition. The chorales are especially rich and beautiful. Of the two *Passions* it has been well said that the *St. John Passion* is the perfection of church music; the *St. Matthew* "reaches the goal of all sacred art" (Poole). The latter, composed in 1729, so much overshadows the former that it is always meant when "Bach's Passion Music" is spoken of; and it is a question whether the majority of musicians consider this *Passion* (composed at intervals during 1733–38) or the *B minor Mass* the greatest of Bach's works. Bach also composed an *Ascension Oratorio* (usually classed with his cantatas), an *Easter* and a *Christmas Oratorio*, the latter in six divisions for performance respectively on Christmas and the two days following, New Year's, the first Sunday of the year, and Epiphany.

Bach is one of those masters that cannot be surpassed, because, as Riemann remarks, "in them the musical feeling and art of an entire epoch are, so to speak, embodied." Bach marks the culmination of the polyphonic, contrapuntal style, and at the same time he is one of the most imposing figures of the new homophonic, melodic style. (See POLYPHONY, HOMOPHONY.) He was living at a time when a desire for greater freedom of expression was chafing at the fetters imposed, by the older church modes, when musicians were beginning to employ the more natural modes of major and minor. It was chiefly Bach who decided the final victory of the natural over an artificial, though time-honored system. In the matter of equal temperature of instruments having a fixed intonation (organ, piano) his advocacy and practical employment of the "tempered" as against the "natural" fifth led to the universal adoption of the former. (See TEMPERATURE; TONALITY.) Thus, by means of the circle of tempered fifths, all the scales were brought into close relation, and the possibility of unlimited modulation was given. This wonderful insight into harmonic relations enabled Bach to impart to his works those subtle effects which even now, after 200 years, after the marvels of Beethoven, Chopin, Wagner, Brahms, fascinate the student. Harmonically Bach towers like a giant above his contemporary Handel, and it is no lack of reverence to say that the harmonic basis of Gluck, Haydn, and Mozart seems rather colorless when compared with that of Bach. Moreover, his melodic invention seems as inexhaustible as the resources of his stupendous technical skill. The more one penetrates into those works, the greater becomes one's admiration. With all the great musicians from Mozart down to Richard Strauss the study of Bach has been nothing less than an obsession. His profound study of the Leipzig cantor enabled Wagner to effect that perfect fusion of the characteristics of the polyphonic and homophonic styles which we admire in *Die Meistersinger*—a fusion which Riemann regards as the ideal to be striven for by future generations. But we believe that this noble ideal exists already as a glorious reality in the work of Brahms. Regarded from the standpoint of our present musical development, Bach looms like a colossus; regarded from the standpoint of his own times, he appears superhuman. Because of this towering greatness, not only his contemporaries failed to appreciate him, but three-quarters of a century elapsed after his death before Bach's real position was recognized in wider circles. The undying glory of having been the first to begin an effective propaganda for the spreading and appreciation of this master's works belongs to Mendelssohn. In 1829 he gave in Berlin an inspired performance of the *Passion According to St. Matthew*, just 100 years after the first performance in Leipzig. The colossal work, neglected and forgotten for a whole century, made a profound impression, and the interest thus aroused grew steadily. Until the day of his death Mendelssohn worked indefatigably for the cause of Bach, and it was again due to his efforts that in 1842 the first statue of the great cantor, the *Altmeister*, as he was then and has since been admiringly called, was erected in Leipzig, near the church of St. Thomas. A fine bronze statue was unveiled in 1884 in his native town of Eisenach. After the discovery of Bach's remains in 1894 Karl Seffner made a special study of the skull and modeled a bust. The same artist cast a full-sized statue in bronze, which was unveiled with imposing ceremonies lasting three days, in May, 1908. This statue stands in the open place behind the church of St. Thomas in Leipzig. In 1850 the centenary of Bach's death was celebrated in a fitting manner. The two brothers, H. and R. Härtel, R. Schumann, O. Jahn, M. Hauptmann, and K. F. Becker founded the Bach Gesellschaft at Leipzig for the purpose of publishing the complete works of J. S. Bach. The first volume appeared in 1851, the sixtieth and last in 1900. With the attainment of the original object the Bach Gesellschaft went out of existence. But new manuscripts were found, and many other matters of importance came up, so that in 1903 a new society under the title "Neue Bach Gesellschaft" was organized at Leipzig. This society has been publishing annually a *Bach Jahrbuch* since 1904, and arranged important Bach Festivals in different cities. Of these the most important one was that of 1907 in Eisenach, when the house in which Bach was born, and which had been bought by the society, was opened as a Bach Museum. Great credit is also due to England for its earnest efforts in behalf of the German master. The English Bach Society even antedates the German Bach Gesellschaft by one year. The moving spirits were W. S. Bennett, J. Hullah, and H. Smart. The object was "(1) The collection of the music composed by J. S. Bach, either printed or in manuscript, and of all works relating to him, his family or his music; and (2) The furtherance and promotion of a general acquaintance with his music by its public performance." In 1870 the society was disbanded, and its valuable library presented to the Royal Academy of Music. In France Bach was entirely unknown to the general public until 1905, when G. Bret founded in Paris the Société Bach. For the cultivation of Bach's music in America, see BETHLEHEM MUSIC FESTIVAL.

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BACH, Karl Philipp Emanuel (1714–88). Styled the "Berlin" or "Hamburg" Bach. He was the third son of Johann Sebastian and was born at Weimar. He attended the famous *Thomasschule* and afterward the University of Leipzig. Then he was sent to Frankfort-a-O. to study law. But there he began his career as musician. In 1738 he went to Berlin, where two years later he was appointed chamber musician to Frederick the Great. In 1767 he became kapellmeister at Hamburg, where he passed the remainder of his life. His most ambitious composition is the oratorio of *Israel in the Wilderness.* The greater portion of his numerous works was written for his favorite instrument, the clavier (the piano of that day). His essay on *The True Method of Clavier Playing* was long a standard work, and contains invaluable information on the styles of playing prevalent at the time. It was reprinted in 1906 by W. Niemann. Clementi professed to have derived from Bach his distinctive style of pianoforte playing. Bach's importance rests upon his piano works, which not only materially advanced the technic of playing, but also assisted in spreading the innovations of Johann Stamitz (q.v.), the real father of modern instrumental music. It was through the works of Bach that Haydn became acquainted with Stamitz's ideas, which he developed still further, and thus established the modern sonata form, the highest of the forms of instrumental music. Bach was a most prolific composer, the number of solo pieces for piano amounting to 210, besides 52 concertos, numerous sonatas and songs. In the field of church music he wrote 22 Passions, 2 oratorios, and many cantatas. Consult Bitter, *K. Ph. E. Bach and W. F. Bach* (Berlin, 1868), and M. Flueler, *Die norddeutsche Symphonie zur Zeit Friedrich des Grossen, und besonders die Werke Ph. E. Bachs* (Berlin, 1909).

BACH, Wilhelm Friedemann (1710–84). Known as the "Halle" Bach. He was the oldest of the sons of the great Johann Sebastian, and was born Nov. 22, 1710, at Weimar. He received his entire training from his father, who always regarded him as the most gifted of all his children. From 1733 to 1747 he was organist at St. Sophia's in Dresden, after which he accepted a similar post at St. Mary's in Halle. In this position he remained till 1764, when, because of his irregular habits and addiction to drink, he was dismissed. Afterward he never succeeded in obtaining a position, but drifted about from one city to another until he died in utter degradation in Berlin, July 1, 1784. The manuscripts of a number of his works are preserved in the Royal Library at Berlin. Riemann published a collection of his works for piano, containing concertos, sonatas, fantasies, and a suite. Stradal edited an organ concerto and a fantasy and fugue. All these works show extraordinary talent and a strong individuality. In vol. 43 of the works of J. S. Bach is contained a sonata for two pianofortes, which has subsequently been identified as a work of W. F. Bach. After Johann Sebastian's death in 1750 all his manuscripts were divided between the two sons, W. F. and K. P. E. Bach. While those in the possession of the latter were preserved intact and completely catalogued, the manuscripts given to Wilhelm were almost all lost.

BACH FESTIVAL. See Bethlehem Musical.

BACHARACH, bäc'â-rac. A town of the Rhine province, Prussia, Germany, picturesquely situated on the left bank of the Rhine, at the entrance of the Steeger valley, 8 miles northwest of Bingen. From the tenth to the sixteenth century it was one of the most important wine markets in the Rhine valley. There are slate quarries in the neighborhood, part of which is still given over to vine culture. Its commerce and population have greatly diminished, but it is noteworthy on account of its interesting historical associations and mediæval remains, which include the commanding castle of Stahleck crowning the hill, the old town walls and towers, the fine ruins of the thirteenth-century Gothic church of St. Werner, and a timbered hostelry of the fifteenth century. Bacharach wine had such high repute that by command a cask was annually sent to Rome for Æneas Sylvius (Pope Pius II), and four tuns were accepted yearly by Emperor Wenzel as tribute for the freedom of the town. Through the Steeger valley, often called the Blucher valley, Blucher pursued the French troops after crossing the Rhine, on Jan. 1, 1814. Pop., 1900, 1904.

BACHAUS, Wilhelm. See Backhaus, Wilhelm.

BACHE, bāch, Alexander Dallas (1806–67). An American physicist; born in Philadelphia and was a great-grandson of Benjamin Franklin. He graduated at West Point in 1825, became a lieutenant in the corps of engineers, and remained some time at the Military Academy as instructor. He was employed under Colonel Totten on the fortifications at Newport, where he married Nancy Clarke Fowler. Bache was appointed professor of natural philosophy and chemistry in the University of Pennsylvania in 1828, and was an early member of the Franklin Institute, publishing many valuable scientific papers in its journals. He established the first magnetic observatory in the United States, where the periods of the daily variations of the magnetic needle were fully determined and other interesting observations made. A magnetic survey of Pennsylvania, made by Professor Bache, marks the beginning of the magnetic work since carried on by the United States Coast and Geodetic Survey. In 1836 he became president of the trustees of Girard College, and visited Europe to examine educational systems for the information of the board, who were about to organize that institution. His report, submitted in 1838, was of great value in suggesting improvements in educational methods. Before the college was organized Bache became connected with the public-school system of Philadelphia and developed the system of free education in that city. At the same time he was actively engaged in scientific work, particularly in the examination of meteorological and magnetic phenomena. In 1842 he returned to his professorship

in the university and in 1843 was appointed superintendent of the United States Coast Survey, succeeding F. R. Hassler, the first incumbent of that position. He reorganized and extended the work of the survey and laid the foundations which have brought the service to its present recognized efficiency.

Professor Bache was also a member of the lighthouse board, superintendent of weights and measures, an incorporator and regent of the Smithsonian Institution, vice-president of the United States Sanitary Commission, president of the American Philosophical Society, president of the American Association for the Advancement of Science, a founder and member of the National Academy of Sciences, and associate of many important scientific institutions at home and abroad. He was the recipient of many honors, including the degree of LL.D. from several colleges, and medals from foreign governments and learned bodies. He gave $42,000 to the National Academy of Sciences for the promotion of its work in furthering scientific research. His important works are: *Observations at the Magnetic and Meteorological Observatory of Girard College*, reports on weights and measures, and various essays in the scientific journals and the proceedings of learned societies. Consult Henry, "Memoir of Alexander Dallas Bache," vol. i, *Biographical Memoirs National Academy of Sciences*, reprinted in *Smithsonian Report for 1870*.

BACHE, Benjamin Franklin (1801–81). An American surgeon, great-grandson of Benjamin Franklin. He graduated at Princeton (1819) and at the medical department of the University of Pennsylvania (1823); became a surgeon in the navy (1828); while on leave was for three years professor of natural science and natural religion in Kenyon College; and for some years was fleet surgeon of the Mediterranean, and later of the Brazil squadron. He established at New York a laboratory which supplied the medical department of the navy, and rendered important service to the Union armies during the Civil War, by running the laboratory at his own expense. He was retired with the relative rank of commodore in 1871.

BACHE, Franklin (1792–1864). An American physician and chemist, born at Philadelphia, Pa. He graduated, in 1810, at the University of Pennsylvania; in 1814, at the medical department of the same university. In the latter year he was appointed a surgeon in the United States army. From 1814 until his death he was professor of chemistry at the Jefferson Medical College, and in 1854–55 was president of the American Philosophical Society. He published a *System of Chemistry* (1819); *Introductory Lectures on Chemistry* (1841–52) and other works; and, with G. Wood, prepared a *Pharmacopœia* (1830), which was the basis of the present-day *United States Pharmacopœia* and *United States Dispensatory*. The nineteenth edition of his *Dispensatory of the United States*, a book printed first in 1851, was published in Philadelphia in 1907.

BACHE, Hartman (1798–1872). An American engineer, born in Philadelphia. He graduated at the United States Military Academy and was appointed colonel of engineers in 1863. In 1865 he was brevetted brigadier-general. He was long employed in topographical surveying, and his engineering works included the Delaware Breakwater and the Brandywine Lighthouse. He retired from active service in 1867.

BACHE, René (1861–). An American journalist, born at Philadelphia. He studied at Yale and Harvard universities, and after 1889 devoted himself to journalism and literature. He is known as the contributor of a very large number of popular science articles, widely varying in subject-matter, to such periodicals as the *Technical World*, *Harper's Weekly*, *The Scientific American*, and *The Cosmopolitan*.

BACHE, Sarah (1744–1808). The only daughter of Benjamin Franklin. During the Revolution she was active in collecting clothing and money for the Patriot army, and at one time employed more than 2000 women and girls in making garments for soldiers. She also served in the hospitals and was widely known for patriotism and benevolence. She married Richard Bache, Franklin's successor as Postmaster-General.

BACHELET, bâsh'lâ', Jean Louis Théodore (1820–79). A French historian, born at Pissy-Pôville, Seine-Inférieure. He was educated at the Ecole Normale, and was professor of history in various institutions, including the Lyceum of Rouen, of which city he was appointed librarian. His publications are numerous, among the most important being *La guerre de cent ans* (1852); *Cours d'histoire* (3 vols., 1868–75); and, with C. Dezobry, the *Dictionnaire général de biographie et d'histoire* (12th ed., 1902); besides the *Dictionnaire général des lettres, des beaux-arts, des sciences morales et politiques* (7th ed., 1902).

BACHELIER, bâsh'lyâ', Nicolas (c.1485–c.1566). A French sculptor and architect. He was born at Toulouse and studied under Michelangelo at Rome. He built a church and a palace at Assier, the main entrance of the church of St. Sernin at Toulouse, and other important works. He was among the first to introduce the Renaissance style into France.

BACHELIN, Oliver. See Basselin.

BACH'ELLER, Irving (Addison) (1859–). An American author, born at Pierrepont, St. Lawrence Co., N. Y. He graduated in 1882 at St. Lawrence University (Canton, N. Y.); in 1882–83 was connected with the *Daily Hotel Reporter*, of New York City, and in 1884 was a member of the staff of the Brooklyn *Times*. From 1884 to 1898 he was director of the Bacheller Syndicate for supplying literary material to periodicals and during a portion of that time was also editor of *The Pocket Magazine* and of the *Cosmopolitan*. Subsequently he was on the staff of the New York *World*. Prior to 1900 he had contributed to magazines and the newspaper press poems and sketches and had published two books, *The Master of Silence* (1890) and *The Still House of O'Darrow* (1894). In 1900 his *Eben Holden* achieved a great popular success suggesting that of *David Harum*, less fully repeated in 1901 with *D'ri and I* (originally a serial in the *Century Magazine*). Each of these—the former primarily a character study, the latter a martial romance—finds its setting in northern New York. His later publications include *Darrel of the Blessed Isles* (1903); *Vergilius* (1904); *Silas Strong* (1906); *The Hand-Made Gentleman* (1909); *The Master* (1910); *Keeping up with Lizzie* (1911); *"Charge It"* (1912); *The Turning of Griggsby* (1913).

BACHELOR, băch'ê-lẽr (OF. *bacheler*, Fr. *bachelier*, It. *baccelliere*, *baccelliero*, Portug. *baccilar*, all from ML. *baccalaris*, *baccalarius*, a

holder of a small farm or estate called in Low Lat. *baccalaria*. The latter was probably derived from Low Lat. *bacca* for Lat. *vacca*, cow, and thus meant 'grazing land'). The term was applied to (1) tenants of certain portions of church lands, called *baccalaria*, a fee of an inferior kind; (2) monks who had not yet taken the full vows of monasticism; (3) persons in the probationary stage of knighthood—not esquires simply, but knights who, for lack of means or from nonage, had not yet raised their banner in the field (*levé bannière*); (4) students who had completed the first grade of their university career, in this sense the word was afterward changed to read *baccalaureus;* (5) unmarried men who, because of their solitary condition, were regarded as candidates or probationers for marriage. It is the last meaning that the term "bachelor," at present, most often bears. Regarded as a class in the community, bachelors have formed the subject of legislation from the earliest times. Upon the principle that every citizen is bound to rear up legitimate children to the state, penalties have often been imposed upon male celibates in various countries. In proportion as the interests of the state were regarded above those of the individual, the enforcement of marriage would be made more or less severe. In ancient Sparta it was considered a punishable crime not to marry, or to marry too late in life; and in early Athens celibacy, though not severely punished, was discouraged. At Rome marriage was fostered by positive penalties imposed on unmarried men, and sometimes even on women, as well as by discrimination in favor of heads of families. In the allotment of the Campanian lands by Julius Cæsar portions were granted only to the fathers of three or more children. Under Augustus a law was enacted prohibiting unmarried men below the age of 60 and single women under 50 from taking possession of a legacy; and this prohibition applied even to widows, who, in order to secure their part of the deceased husband's estate, were forced to marry again within two years. There are numerous instances in Great Britain of special taxes being imposed upon bachelors and widows, with a view, however, more to the increase of revenue than for any other object. In France, where the problem of depopulation has been of such serious moment as to threaten the very position of the state among the Great Powers of Europe, frequent attempts have been made to impose taxes upon bachelors, but with very little success. See BACHELOR'S DEGREE.

BACHELOR. See CRAPPIE.

BACHELOR, KNIGHT (Fr. *bas chevalier*). The lowest grade of knighthood, now only bestowed in the United Kingdom. It has frequently been conferred for no weightier service than carrying a congratulatory address to court. See KNIGHT.

BACHELOR OF SAL'AMAN'CA, THE. A novel by Le Sage, published in 1736. Le Sage pretended that it was drawn from an old Spanish MS., but its inspiration need be traced no further back than the ingenious brain of the author of *Gil Blas*. It was his last work.

BACHELORS' BUTTONS. A name commonly applied to a species of *Gomphrena* ('globe amaranth') cultivated from India. Various other plants, both cultivated and wild, are also called "bachelors' buttons," as species of *Ranunculus* ('buttercup'), *Lychnis*, *Polygala*, *Cichorium* ('chicory'), and *Centaurea*.

BACHELOR'S DEGREE. One of the oldest of academic distinctions, the exact significance of which has varied in different countries and in different periods in the same countries. Originally it was not a degree conferred by the university but merely a recognition of a candidate's ability to proceed to a higher degree. During the fifteenth century it became well defined as a minor degree and in general it has been conferred at the close of the first stage in a liberal education and is supposed to indicate that the recipient is proficient in certain fundamental branches. The original form of the degree was Bachelor of Arts (B.A.), and usually it is essential that this degree should be taken before proceeding to the higher degree of Master of Arts, or Doctor of Philosophy. In France there are two forms for the baccalaureate degree—*bachelier ès lettres* and *bachelier ès sciences*. Great Britain, while conservative about the B.A. degree, recognizes also B.Sc., and confers the bachelor's degree in professional courses. So, too, in the United States there are Bachelors of Law (LL.B. or B.L.), Bachelors of Divinity (B.D. or S.T.B.), Bachelors of Medicine (M.B.), etc. Here, too, where academic degrees are but slightly protected by law, many modifications of the baccalaureate degree have been employed to indicate the completion of certain special courses of study. The scientific schools have given the degree of Bachelor of Philosophy (as at Yale, since 1852), Bachelor of Science (as at Harvard, since 1851), and in many places the degree of Bachelor of Letters is conferred upon those whose studies are not scientific or classical, but are based on modern literature. Bachelor of Science (B.S.) is an established degree in almost every college and university, while Bachelor of Philosophy (Ph.B.) and Bachelor of Letters (B.L. or Litt.B.) have in the majority of cases been introduced only to be discarded. The bachelor's degree has also been given in pharmacy, agriculture, music, veterinary medicine, and many other subjects; but there is much opposition to this use of the traditional "baccalaureate," and the tendency is more and more towards its limitation.

BACHER, bäĸ'ẽr, WILHELM (1850–1913). A Jewish theologian and Orientalist, born in Lipto-Szent-Miklos in Hungary. He was educated in the universities of Budapest and Breslau and at the Jewish Theological Seminary of the latter city. In 1877 he became professor and in 1912 director of the rabbinical public schools of Budapest. His works include: *Nizamis Leben and Werke* (1872); *Die Agada der Babylonischen Amoräer* (1878); *Die Agada der Tannaiten* (2 vols., 1889–90; vol. i, 2d ed., 1903); *Die Agada der Palästinensischen Amoräer* (3 vols., 1892–99); *Die Anfänge der Hebräischen Grammatik* (1895); *Ein Hebräisches Wörterbuch aus dem Vierzehnten Jahr-hundert* (1900); *Die Agada der Tannaiten und Amoräer; Bibelstellenregister* (1902); *Aus dem Wörterbuche Tanchum Jeruschalemis* (1903).

BACHERACHT, bä'ĸe-räĸt, THERESE VON. See LÜTZOW, THERESE VON.

BACHET, bȧ'shȧ', CLAUDE-GASPAR, SIEUR DE MÉZIRIAC (1581–1638). A French mathematician and philologist. He was born in Paris and is said to have belonged in his youth to the order of the Jesuits. At the age of 20 he was teaching rhetoric in the College of Milan, but soon afterward settled in Paris, where he became a member of the French Academy from the time

of its foundation (1635). He published some literary works, among which is *Epîtres d'Ovide en vers français, avec des commentaires fort curieux* (Bourg-en-Bresse, 1620; reprinted at The Hague, 1716, with other of his works). In mathematics he was the first in Europe systematically to undertake the solution of indeterminate linear equations, and his commentaries were a point of departure for the work of Fermat in his theory of numbers. Bachet published *Les problèmes plaisants et délectables qui se font par les nombres* (Lyons, 1612; 5th ed., Paris, 1884); *Diophanti Alexandrini Arithmeticorum Libri Sex et de Numeris Rectangulis Liber Unus* (Paris, 1621–70). He also left a manuscript entitled "Elementorum Arithmeticorum Libri XIII (Bibliothèque de l'Institut)," extracts of which were published in the *Bollettino Boncompagni* (1879).

BACHIAN. See BATJAN.

BACHMAN, băk'mân, JOHN (1790–1874). An American naturalist and clergyman. From 1815 until his death he was pastor of a Lutheran church in Charleston, S. C. He was assistant to Audubon and chief author of the work on North American quadrupeds. Among his own works are *A Defense of Luther and the Reformation* (1853) and *Characteristics of Species and Genera as Applicable to the Doctrine of the Unity of the Human Race* (1854).

BACHMUT, bäk-mōōt'. See BAKHMUT.

BACHO, bā'kō. See BACONTHORPE, JOHN.

BÄCHTOLD, bĕk'tôlt, JAKOB (1848–97). A German literary historian, born at Schleitheim, Switzerland. He studied at Heidelberg, Munich, Tübingen, Paris, and London, and in 1872 was an instructor in the gymnasium at Solothurn. In 1888 he became professor of the German language and literature at Zürich. His principal work is *Geschichte der deutschen Litteratur in der Schweiz* (1887–92), and his other important publications include *Deutsche Handschriften aus dem Britischen Museum* (1873) and *Gottfried Kellers Leben* (3 vols., 1894–97). He also published a critical edition of Goethe's *Götz von Berlichingen* (1882); *Iphigenia* (1883); *Dichtung und Wahrheit* (1890–91). He was associate editor, with Vetter, of the *Bibliothek älterer Schriftwerke der deutschen Schweiz und ihres Grenzgebietes.* After his death Vetter published *Kleine Schriften von Jakob Bächtold* (1899).

BACHUONE, bâ-chwō'nâ, ARNOLDO. See VILLANOVANUS, ARNOLDUS.

BACIL'LUS. See BACTERIA; CHOLERA; COLON BACILLUS; TUBERCULOSIS; SERUM THERAPY.

BACIOCCHI, bâ-chō'kê, MARIE ANNE ELISA BONAPARTE. See BONAPARTE, FAMILY OF.

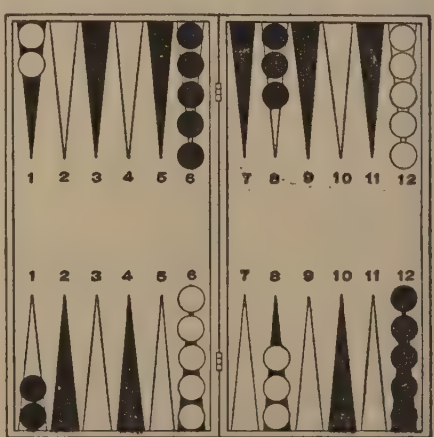
BACK, SIR GEORGE (1796–1878). A famous English Arctic explorer. He was born at Stockport, England. In 1819 and 1825 he accompanied Franklin in his expeditions to the north coast of America. He volunteered to the government to go in search of Captain Ross, who was supposed to have been lost in his attempt to discover the Northwest Passage; and on the 28th of June, 1833, he started from Norway House, a station of the Hudson's Bay Company. After passing a terrible winter with his companions at Slave Lake, he discovered, in 1834, Artillery Lake and the Great Fish River, or Back's River, which he followed to the Frozen Ocean. Being hindered by the ice from proceeding along the coast as far as Cape Turn-again, he returned by the river; but although he had received news of the return of Captain Ross, he continued his explorations in the Northern Sea, and did not return to England until 1835, when he was raised to the rank of post-captain for his services. In 1836 and 1837 he further explored the Arctic shores—the Geographical Society, in the latter year, bestowing its gold medal upon him. Two years afterward he was knighted. He was made an admiral in 1857. He was an able artist and descriptive writer and wrote an illustrated *Narrative of the Arctic Land Expedition to the Mouth of the Great Fish River* (1834–35), and *Perils and Escapes of H.M.S. Terror* (1836–37).

BACK BAY. A former inner harbor of Boston, Mass., drained and filled in (1856–86), laid out in straight and wide streets and squares, and now the most exclusive residential district of the city. In it many of the finest streets, churches, and public buildings are situated, the Public Garden and Copley Square being prominent features.

BACK'BITE, SIR BENJAMIN. A character in Sheridan's *School for Scandal.* He is an emasculated creature, with a vinegary tongue, deeply versed in all manner of evil speaking, lying, and slandering. Crabtree, his uncle, Mrs. Candour, and himself are the leading members of the "school." He affects to be a poet and wit.

BACKER, bäk'ĕr, JAKOB (1608–51). A Dutch painter. He was born at Haerlingen and was a pupil of Lambert Jakobsz at Leuwarden and afterward of Rembrandt at Amsterdam, where he usually resided. Under the latter's influence he painted real masterpieces, such as the "Lady Regents of the Amsterdam Orphan Asylum," still in situ, and the fine "Guild of Archers," in the Town Hall (1642), and some of his portraits. But his art afterward became fashionable and declined. His nephew, ADRIAN BACKER, of Amsterdam (1638–86), was also a successful portrait painter, whose historical subjects are imitations of the Italians.

BACK'GAM'MON. One of the most ancient and widespread dice games, of which three schools survive—the Russian, Turkish, and English. It is sometimes called "tric-trac," though this is properly a distinct variety of the game, and in England was known as "tables" until the seventeenth century. The word "backgammon" has been ascribed to the Welsh tongue, in which it is said to signify "little battle." Strutt as-



BACKGAMMON BOARD.

cribes the term to the Saxon "bac" and "game," —i.e., back game,—so denominated because the performance consists in the two players bringing their men back from their antagonist's table into their own; or because the pieces are sometimes taken up and obliged to go back—i.e., reënter at the table they came from.

The backgammon board consists of two parts or tables, known as the inner or home table and the outer table. Each table possesses 12 points, 6 at each end. The game is played by two persons, each of whom has 15 "men." In beginning the game the "men" are placed on certain points on the tables, directly opposite each other. The game is played with 2 dice, which are common to both players; but each player uses his own dicebox. The throws are alternate. If a player throws "doublets," or both dice of one number, double the number of dots is reckoned; thus, by a throw of 2 aces, the player does not count 2, but 4. Each player counts round from the right hand or ace point of the other. The object of the game is for each player to get all his "men" played round into his own left-hand table, removing them from point to point according to the throws of the dice. In throwing, the number upon each die turned up may be reckoned by itself, or collectively with the number on the other side. Thus, if 4 be thrown by one side, and 6 by the other, one "man" can be advanced 4 points, and another 6 points; or one "man" can be advanced 10 points, always providing that a point is open to suit this movement to it. No point can be moved to if covered by 2 "men" belonging to the adversary. If covered by only one "man," which is called a "blot," then that "man" can be "hit"—i.e., removed from the point, and placed on the bar between the tables, its place being taken by the "man" who has won it. The removal of a "man" to the bars throws a player considerably behind in the game, because the "man" must remain out of the play till the dice turn up a number corresponding to an open point on the adversary's table. There are two kinds of victory—winning the "hit" and winning the "gammon." The party who has played all his "men" round into his own table, and by fortunate throws of the dice has borne or played the "men" off the points first, wins the "hit." The "gammon" may be explained as follows: When you have got all your "men" round to your own table, covering every point, and your adversary has a "man" out, then you are enabled to "bear" or lift your men away. If you can bear all away, so as to clear your table before the adversary gets his "man" placed by a throw on your table, you will win the "gammon." If the adversary has been able to bear one before you have borne all your "men," it reduces the victory to a "hit." Two "hits" are reckoned equal to one "gammon" in playing matches. Consult Pardon and Anderson, *Backgammon and Draughts* (New York, 1889).

BACKHAUS, bäk'hous, Wilhelm (1884–). A noted German pianist. He was born March 26, 1884, at Leipzig. When seven years of age, he received regular piano instruction from A. Reckendorf, and continued with him even during the four years which he spent at the Conservatory of Leipzig (1894–98). After graduation he spent one year with Eugen d'Albert in Frankfurt. His concert career began in 1900, when his extraordinary powers won immediate recognition. In England his appearances created a sensation, so that he was appointed at the age of 21 a professor of piano at the Royal College of Music in Manchester. This position he held only one year, for in that year he competed for and won the much-valued Rubinstein Prize (1905). Thereafter he devoted all his time to concert tours. In 1912 he visited America, where he had to compete with such artists as Busoni, De Pachmann, and Godowsky. Before he reached his thirtieth year Backhaus was generally regarded as among the very greatest of living pianists, his tremendous technic being entirely eclipsed by marvelous tone coloring, wonderful poetic feeling, and supreme intellectual grasp.

BACKLUND, bäk'lund (Johan) Oskar (1846–1916). A Swedish astronomer, born at Lenghem, Sweden. He became lecturer at the University of Upsala (1875), assistant at the Stockholm Observatory (1876), observator at the Dorpat Observatory (1876), adjunct-astronomer at the Observatory of Pulkowa, Russia, and in 1895 its director. In 1887 he was made astronomer of the Academy in St. Petersburg. He spent some years in investigating the progressive decrease in the period of Encke's comet and in formulating a "theory of disturbances." One of his principal publications is the treatise entitled *Observations de Pulkowa* (1888). In 1906 was published *The Development of Celestial Mechanics during the Nineteenth Century.*

BACK RIVER. See Great Fish River.

BÄCKSTRÖM, bĕk'strēm, Per Johan Edvard (1841–86). A Swedish author, born at Stockholm and educated at Upsala. He published several volumes of verse, including *Lyriska Dikter* (1870). His dramas, of which the chief is the tragedy, *Dagvard Frey* (1876; Ger. trans. by Attinghausen, 1879), were long popular. He made translations from Ponsard, Victor Hugo, and others.

BACK'US, Isaac (1724–1806). An American clergyman and author. He was born at Norwich, Conn. He left the regular Congregational body for the Separatists, or New Lights, and these sympathized warmly with the Baptists, whose leader he became, and by his own exertions largely increased the prosperity of the denomination. He was a strong advocate of the entire separation of church and state and went before the Continental Congress in 1774 to ask for the Baptists the same privileges that were granted to other sects. Among his numerous writings, *A History of New England, with Especial Reference to the Denomination of Christians Called Baptists* (3 vols., Boston, 1777–96; reprinted, 2 vols., Newton, Mass.) is the most important.

BACKUS, Truman Jay (1842–1908). An American educator. He was born at Milan, N. Y., graduated at the University of Rochester in 1864, and was professor of rhetoric and English literature at Vassar College from 1867 to 1883. In 1883 he was appointed president of Packer Collegiate Institute (Brooklyn, N. Y.). He was one of the incorporators of the Brooklyn Institute of Arts and Sciences and at one time president of the Headmasters' Association.

BACLER D'ALBE, bà'klăr' dâlb', Louis Albert Ghislain, Baron (1762–1824). A French painter, soldier, and cartographer. He published a *Carte du théâtre de la guerre en Italie* (54 parts, 1802), and rose to be general of brigade under Napoleon, in all of whose campaigns he served. His most noted paintings, "The Battle of Arcola" and "The Battle of

Rivoli," are in the Versailles Gallery. He published *Souvenirs pittoresques contenant la campagne d'Espagne* (1824), a series of lithographic views, and other similar works.

BACOLOD, bä-kō'lōd, or **BACOLOT,** bä-kōlōt. The capital of the province of West Negros (area, 3112 square miles; pop., 231,512) on the island of Negroes, Philippines. It is situated on the west coast and had in 1903 a population of 11,960 (Map: Philippine Islands, D 5). It is 26 miles by water from Iloilo.

BACOLOR, bä'kō-lōr'. The chief town and the capital of the province of Pampanga, Luzon, Philippines (Map: Luzon, D 7). It is situated 33 miles northwest of Manila, with which it is connected by road. It has a telegraph station and is connected by rail and highway with important towns on the island. Pop., 1903, 13,493.

BA-CÓN. A town in the Philippines, in the province of Sorsogon, Luzon. It is situated on the gulf of Albay, about 22 miles southeast of Albay, the capital, in a fertile agricultural district. Pop., 1903, 14,536.

BA'CON, Alice Mabel (1858–). An American writer and teacher. She was born at New Haven, Conn., the daughter of the Rev. Dr. Leonard Bacon. She taught at Hampton Institute from 1883 to 1888, and in 1888–89 at the Peeresses' School, Tokio, Japan, where she wrote *Japanese Girls and Women* (1891) and *A Japanese Interior* (1893). She returned to Hampton Institute in 1890 and founded the Dixie Hospital for the training of colored nurses. In 1900–02 she taught in the Girls' High School, Tokio, Japan, and afterward lectured on Japanese subjects in this country. She wrote *In the Land of the Gods* (1905), and edited *Human Bullets, a Soldier's Story of Port Arthur* (1907).

BACON, Augustus Octavius (1839–1914). An American legislator, born in Bryan Co., Ga. He graduated from the University of Georgia (A.B. 1859; LL.B. 1860); served in the Confederate army during the Civil War; entered upon the practice of law in Macon and became prominent in State politics. For a number of years he was speaker of the Georgia House of Representatives, and several times he served as delegate to Democratic State and national conventions. Elected to the United States Senate in 1894, he was reëlected for six-year terms in 1900, 1907, and 1913—this last time as the first Senator ever chosen by direct vote of the people. Senator Bacon came to be recognized as one of the most eminent lawyers of the Upper House, conspicuous especially for his knowledge of constitutional law. Upon the death of Vice-President Sherman he alternated with Senator Gallinger as president pro tempore of the Senate, and in this capacity presided at the impeachment proceedings against Judge Archbald (q.v.) in 1912. A year later, while he held the chairmanship of the important Foreign Relations committee, his conservative attitude towards troubled Mexican affairs was of great assistance to President Wilson in delaying radical action by Congress. Senator Bacon was made a regent of the Smithsonian Institution and a trustee of the University of Georgia.

BACON, Benjamin Wisner (1860–). An American theologian. He was born at Litchfield, Conn., and graduated at Yale (College, 1881; Divinity School, 1884). After serving in pastorates at Old Lyme, Conn. (1884–89), and at Oswego, N. Y. (1889–96), he was made an instructor in New Testament Greek at Yale Divinity School and became in 1897 professor of New Testament criticism and exegesis. The degrees D.D., Litt.D., and LL.D. were conferred upon him. Besides contributions to the *Hibbert Journal* and to the *American Journal of Theology* (of both of which he was chosen an editor), his writings include: *The Genesis of Genesis* (1891); *Triple Tradition of the Exodus* (1894); *The Sermon on the Mount* (1902); *The Story of St. Paul* (1904); *An Introduction to the New Testament* (1907); *The Founding of the Church* (1909); *The Fourth Gospel in Research and Debate* (1909); *Jesus the Son of God* (1911); *The Making of the New Testament* (1912); *Theodore Thornton Munger* (1914).

BACON, Delia Salter (1811–59). An American author (born at Tallmadge, Ohio), the sister of Leonard Bacon. She wrote *Tales of the Puritans* (1837), and other works of fiction, and in 1857 published in London her *Philosophy of the Plays of Shakespeare Unfolded*, with a preface by Nathaniel Hawthorne. In this book she zealously advocated the theory that Francis Bacon wrote the plays of Shakespeare, a theory afterward exploited by Ignatius Donnelly (q.v.). Though this theory was not original with her, she was the first to give it general currency. Consult Hawthorne, "Recollections of a Gifted Woman," in *Our Old Home* (Boston, 1863), and Theodore Bacon, *Delia Bacon* (Boston, 1888).

BACON, Francis, Baron Verulam, Viscount Saint Albans (1561–1626). A celebrated English philosopher. He was born in London on Jan. 22, 1561. His father, Sir Nicholas Bacon, was Lord Keeper of the Great Seal, and his mother was the learned Ann Cooke, sister of Burleigh's (see Cecil, William) wife. In early childhood Bacon manifested superior powers and an ardent love of knowledge; his precocious intelligence was so great, and his sedateness so remarkable, that Queen Elizabeth took pleasure in calling him her "young lord keeper." In his thirteenth year he was sent to the University of Cambridge, which he quitted after a residence of but two years. On leaving the university in 1576 he went to Paris in the suite of Sir Amias Paulet, the English Ambassador, and during his residence there he is said to have studied statistics and diplomacy. The sudden death of his father in 1579 recalled him to England, where, after failing to procure from the government a provision which would enable him to devote himself to science and literature, he betook himself for several years to the study of law and was admitted to the bar in 1582. Two years afterward he entered Parliament from the borough of Melcombe Regis. In 1584 or 1585 he published a "Letter of Advice to Queen Elizabeth," in which he advocated "that whosoever would not bear arms against all foreign princes, and namely the Pope, that should anyway invade her Majesty's dominions, should be a traitor." In 1586 he became a bencher of Gray's Inn, and in 1589 wrote another letter, this time in defense of Elizabeth's course in church matters. But neither these letters nor the support of the Earl of Essex, whose favor he had won, could counteract the effect produced on the Queen and the Lords by his opposition in Parliament to some taxation measures in which the government was interested. A chance was given him to apologize for this act of antagonism, but he resolutely refused, and thereby lost an opportunity to be-

LORD BACON

FROM AN ENGRAVING BY JACOBUS HOUBRAKEN

come Attorney-General (1594). Another failure to apologize was followed by failure to secure the solicitor-generalship, although he was now supported by both Essex and Burleigh. These facts it is well to keep in mind, because they show a strength of character in striking contrast to the glaring sycophancy of his conduct in later years. When Essex found that he could do nothing for his favorite at court, he presented him with a private estate worth about £1800, and also supported him in a suit for the hand of Lady Hatton, whom Bacon wished to marry for her wealth. Lady Hatton, however, preferred Coke, Bacon's future enemy. In spite of his readiness thus to accept the patronage of Essex, Bacon acted as Queen's counsel against his friend when the latter was brought to trial for his conduct in Ireland. His motives in this matter have been differently interpreted. Some say that, because he was straitened in his circumstances at this time, he was anxious to conciliate the court. Others maintain, with perhaps more justice, that he took this stand as being the only course open to him for securing the least severe sentence possible for his old friend. Essex himself, however, did not concur in this interpretation of Bacon's conduct. The result of this first trial of Essex was that he was set at liberty; only, however, shortly afterward to be tried again—this time for conspiracy. Bacon was now, without doubt, largely instrumental in securing for the crown the verdict against the accused. The merits of the case cannot be discussed here. Bacon asserted that his official position made it necessary that he should ignore ties of friendship; but then perhaps he should not have allowed himself to be put in such a position. Furthermore, the conscientious performance of official duties at the expense of his personal advantage was by no means a conspicuous trait in his character. After the Earl's execution he wrote, at the request of the Queen, *A Declaration of the Practices and Treasons Attempted and Committed by Robert, Earl of Essex*, which was printed by authority, but with so many changes made by another hand that Bacon cannot justly be held responsible for its authorship.

With the advent of the reign of James I, a new opportunity opened to Bacon, and by paying court to the King he made rapid progress. He was knighted in 1603; and in the following year a pension of £60 was attached to his office of learned counsel. In 1606 he succeeded in his ambition to marry a wealthy woman by winning the hand of Alice Barnham. In 1607 he secured the long-coveted solicitor-generalship, and thus came into the possession of what, in money of to-day, would amount to £4000 a year. This appointment Bacon had probably secured by his defense of royal supremacy in a dispute concerning the King's jurisdiction over some border counties. From now on he volunteered much advice to his sovereign, who, however, refused to be guided by him. Bacon's advice was marked by a strange mixture of great wisdom and unworthy trivialities. He showed wonderful insight into the political situation and suggested plans which, if carried out, might have averted much of the trouble that ensued. But James was not a king to listen to suggestions conflicting with his inclinations, while Bacon unfortunately did not possess a character that could give weight to his advice. In the coming struggle Bacon became more and more obsequious. He justified himself in his own eyes by the excuse that he was keeping in touch with the King for the good of his country; but it was now obvious to every patriot that no good would come to his country from the willful King. In 1613 Bacon was appointed Attorney-General; and in this new office he soon became entangled in dispute with Coke on constitutional principles, and made himself obnoxious to the people at large by his unscrupulous cupidity. His subservience to the King, however, served him in good stead for a few more years. In 1617 he was appointed to the position his father had held before him, that of Lord Keeper of the Great Seal, and in the year following he attained the high dignity of the Lord Chancellorship and the title of Baron Verulam. In 1621 he was created Viscount St. Albans. The enjoyment of his new honors was, however, very brief. The storm which had been gathering against the government broke first on Bacon's head. On the assembling of Parliament he was charged with bribery. During the trial he himself confessed to the Lords that "there had been a great deal of corruption and neglect," for which he "was heartily and penitently sorry." On the first of May he was deprived of the Seal, and then followed sentence on him, condemning him to pay a fine of £40,000, to be imprisoned during the King's pleasure, and to be excluded from Parliament and from court. The fine, however, was remitted by the King, and the imprisonment lasted only two days. Some time afterward he was even allowed to appear at court. It seems that he now conceived the hope of reentering political life; but even in those debauched days this was impossible, and he thenceforth devoted himself to literature and science. He died, April 9, 1626, of a cold caught in making an experiment to test the efficacy of snow to preserve flesh.

The first edition of his *Essays* appeared in 1597; his two books on the *Advancement of Learning* in 1605 (this work was afterward treated as the first part of the projected *Instauratio Magna*); his *De Sapientia Veterum* ('Wisdom of the Ancients') in 1609; a revised edition of the *Essays* in 1612, while the final form was given to them in 1625; the *Novum Organum* (so called with reference to Aristotle's *Organon*) appeared in Latin in 1620 and was treated as the second part of the *Instauratio*. The third part of this comprehensively planned work, or at least a section of the third part, appeared in 1622, under the title *Historia Naturalis et Experimentalis ad condendam Philosophiam; sive Phænomena Universi*. Of the other three contemplated parts of the *Instauratio* only two prefaces remain. In 1622 he also published his chief historical work, *History of the Reign of Henry VII*. In 1623 appeared his *De Augmentis Scientiarum*, a Latin translation and extension of his *Advancement of Learning*. His last work, which was published posthumously (1627), was *Sylva Sylvarum*, a book which showed very conclusively that he was not able, in practice, to live up to his scientific theory. The *New Atlantis*, which appeared at the same time with the last-mentioned work, had been written as early as 1617. Besides these, he wrote several minor books and papers. His writings deal with a wide range of subjects, from jurisprudence—which he treated not as a mere lawyer, but as a legislator and philosopher—to morality and medicine. The

Essays are a treasury of rich knowledge of human relations, and the style in which they are written has seldom been equaled by any English writer.

Bacon's reputation as an original philosopher, as an epoch maker in philosophic and scientific thought, was higher a generation or two ago than it is now. Yet his *Novum Organum* has done, perhaps, as much as any other single work toward inculcating into science the spirit of unbiased, accurate, and careful observation and experimentation. In it he maintains that all prepossessions, called "idols," must be abandoned, whether they be the common property of the race due to common modes of thought ("idols of the tribe"), or the peculiar possession of the individual ("idols of the cave"); whether they arise from too great a dependence on language ("idols of the market place"), or from tradition ("idols of the theatre"). These idols once discarded, the seeker after truth must proceed to interrogate nature, not contenting himself with accepting what she has to say of her own accord. He must collect facts, arrange them in order, and then advance to the discovery of the laws that control their workings. This cannot be accomplished by the *inductio per enumerationem simplicem*, or mere inventory of all possible cases of the phenomena under investigation; but negative instances, i.e., cases in which the phenomena are absent, must be examined to discover wherein these instances differ from the affirmative instances—all this with a view to discover the "form" of the phenomena, or their abiding essence. This insistence upon the formal cause has its significance in connection with Bacon's exclusion of final causes or purposes from the domain of natural science. Not that purpose has no existence in the universe. On the contrary, Bacon believed in an overruling Providence with a perverse piety ill in accord with his life. But though religion can imagine the purposes of God, the business of the scientist is to understand the causal sequences of nature as controlled by the essences of phenomena. In ethics Bacon is to be regarded as the forerunner of the English Hedonistic school (see HEDONISM), of which his disciple, Hobbes, is usually regarded as the founder. Bacon's own scientific work amounted to little. It is true that he propounded the theory that heat is a form of motion, but this suggestion seems rather to have been a happy guess than a belief scientifically grounded. He was an opponent of the Copernican system of astronomy, which he regarded as a strange fancy; and he seems to have known nothing of the work of Kepler. His enthusiasm for science was not disinterested, but was due to a belief that "knowledge is power"; that human conditions can best be improved by a more thorough acquaintance with the world in which human life must be lived.

Bacon's collected works were first published by Blackbourne in 1730; another collection, with a life, by Mallet, in 1740; a handsome but ill-arranged edition is that of Montagu in 17 vols. (London, 1825–36); the best is that edited by Spedding, Ellis, and Heath, in 7 vols. (1857–59), with *Life and Letters* (7 vols., ed. by Spedding, 1861–74). A noted review of Bacon's character and works is to be found among Macaulay's *Essays*. For more temperate estimates consult: Fowler, "Bacon," *English Philosophers Series* (London, 1881); Church, "Life of Bacon," *Men of Letters Series* (New York, 1884); Abbott, *Francis Bacon: An Account of his Life and Works* (London, 1885); and John Nichol, *Francis Bacon: His Life and Philosophy* (London, 1888–89).

BACON, HENRY (1866—). An American architect, born at Watseka, Ill. He graduated from the University of Illinois in 1888, and, as winner of the Rotch traveling scholarship, spent two years of study in Europe. From 1885 to 1888 he was in the office of Chamberlin & Whidden in Boston, and from that time until 1897 (with the exception of one year) was with the famous firm of McKim, Mead, & White. He severed this connection to help form the firm of Brite & Bacon. This partnership was dissolved in 1903, and Mr. Bacon began practice alone. He designed many important buildings and was successful competitor for the design of the Lincoln Memorial at Washington (1913). He was made a fellow of the American Institute of Architects and in 1913 a member of the National Institute of Arts and Letters.

BACON, JOHN. See BACONTHORPE, JOHN.

BACON, JOHN (1740–99). A British sculptor, born in London. In 1769 he received the first gold medal for sculpture awarded by the Royal Academy, of which he was soon after made a member. Among his principal works are two busts of George III—one at Christ Church, Oxford, the other in the University Library at Göttingen—and monuments of Lord Chatham in Westminster Abbey and in the Guildhall, of Dr. Johnson in St. Paul's Cathedral, and of Blackstone at Oxford. He made important improvements in the technical methods and processes of architecture and invented an instrument for use in transferring the model form to the marble. Consult R. Cecil, *Memoirs of John Bacon, R.A.* (London, 1811).

BACON, JOHN EDMUND (1832–97). An American lawyer, born at Edgefield, S. C. He graduated at South Carolina College in 1851 and soon afterward was admitted to the bar. In 1858 he was appointed secretary to the United States Legation at St. Petersburg, but resigned to enter the Confederate army, in which he rose to the rank of major. He was sent with Gov. James L. Orr to Washington in 1866 to bring about the restoration of South Carolina to the Union. In 1867 he was elected district judge, but was presently deposed by the Federal departmental commander. He was, in 1886, appointed United States chargé-d'affaires in Uruguay and Paraguay.

BACON, JOHN MACKENZIE (1846–1904). An English clergyman, scientist, and aëronaut. He studied at Trinity College, Cambridge; was ordained priest of the English Church in 1870. He gave up his clerical work in 1889 as a result of the opposition aroused by his publication of *The Curse of Conventionalism: a Remonstrance by a Priest of the Church of England.* From that time on he devoted himself to the study of astronomy and aëronautics. Two eclipse expeditions of the British Astronomical Association—that to Buxar, India, in 1898, and that to Wadesboro, N. C., in 1900—were made under his direction. In 1899 he accomplished the record voyage in English ballooning. In his ballooning he proved that sound travels less rapidly upward than downward, and that the ocean bottom is visible and can be photographed from great heights. He published *By Land and Sky* (1900), which contains narratives of his

ballooning exploits and the results of many of his investigations in meteorology, acoustics, and other subjects; and *The Dominion of the Air* (1902).

BACON, Josephine Dodge Daskam. See Daskam, Josephine Dodge.

BACON, Leonard (1802–81). An American clergyman and writer. He was born at Detroit, Mich.; graduated at Yale in 1820 and at Andover in 1823. From 1825 till his death he was pastor of the First Church in New Haven; from 1866 to 1871, acting professor of revealed theology in Yale, and afterward lecturer on ecclesiastical polity and American Church history. He was one of the editors of the *Christian Spectator,* and later an editor of the *New Englander;* also, for 15 years, one of the editors of the New York *Independent.* Dr. Bacon edited the *Select Practical Writings of Richard Baxter, with a Life of the Author* (New Haven, Conn., 1831); and of his other writings may be mentioned, *Thirteen Historical Discourses on the Completion of Two Hundred Years, from the Beginning of the First Church in New Haven, with an Appendix* (New Haven, Conn., 1839); *Slavery Discussed in Occasional Essays from 1833 to 1846* (New York, 1846), and particularly *The Genesis of the New England Churches* (New York, 1874)—an important volume.

BACON, Leonard Woolsey, D.D. (1830–1907). An American clergyman, born in New Haven, Conn.; a son of Leonard Bacon. He graduated at Yale in 1850, and was pastor of the First Church in Litchfield, Conn., of the New England Congregational Church in Brooklyn, N. Y., and of the First Church in Stamford, Conn. Subsequently he passed several years in Europe, chiefly in Geneva, as student, preacher, and writer; was pastor of the Park Congregational Church in Norwich, Conn. (1878–82), and later of other Congregational and Presbyterian churches. He edited *Luther's Deutsche geistliche Lieder* (New York, 1883), and wrote *A Life Worth Living: Life of Emily Bliss Gould* (1878); *Irenics and Polemics, with Sundry Essays in Church History* (1898); *History of American Christianity* (1898); *Young People's Societies* (with C. A. Northrup, 1900), and *The Congregationalists* (1904).

BACON, Nathaniel (1648–76). An English colonist, famous as the leader of "Bacon's Rebellion" in Virginia in 1676. He was the son of Thomas Bacon of Friston Hall, Suffolk, whose grandfather was cousin to the great Lord Bacon. Nathaniel Bacon was educated as a lawyer and settled in Virginia in 1673, where he obtained two valuable plantations near the present Richmond and afterward was appointed a member of the Governor's Council. His democratic ways made him extremely popular among the colonists, who chose him to lead them against the Indians, in defiance of Governor Berkeley's commands, on the outbreak of the Indian disturbance in 1675–76. He accepted the position and, by placing himself at the head of the colonists and proceeding against the Susquehannocks, brought on what is known as "Bacon's Rebellion." In the midst of his operations against the Indians he was attacked by dysentery, and died on Oct. 26, 1676, his death putting an end to the rebellion. See Bacon's Rebellion.

BACON, Sir Nicholas (1509–79). A distinguished English statesman, father of Francis Bacon. He was born at Chislehurst, graduated at Corpus Christi College, Cambridge, in 1527, and was called to the bar in 1533. He acquired a large property from confiscated monastery lands and in 1546 became Attorney to the Court of Wards and Liveries. He was in favor with Edward VI and, although a stanch Protestant, he escaped persecution under Mary and was even allowed to retain his office in the Court of Wards and Liveries. After the accession of Elizabeth he was Lord High Chancellor and Keeper of the Great Seal from 1558 to his death. As holder of this office he presided over Elizabeth's first Parliament and took a considerable part in the religious discussions preceding the Act of Supremacy. Brother-in-law of Cecil, he, in general, supported his policies, although at times he advocated a more strongly Protestant view. Sir Nicholas was one of those solid and stately Englishmen to whose sagacity, high principles, and firm demeanor his country owed its safety in that critical period when Elizabeth mounted the throne.

BACON, Robert (1860–1919). An American financier and public official. He was born in Boston and received his collegiate education at Harvard, where he graduated in 1880. Soon he became identified with prominent banking houses, first with Lee, Higginson & Co. of Boston, later as a member of the firms of E. Rollins Morse & Bro. and J. P. Morgan & Co. In 1903 he gave up active business life. Known to be a close student of foreign affairs, he was in 1905 made first assistant Secretary of State under Elihu Root, and in the beginning of 1909 succeeded to the cabinet position, upon Mr. Root's entering the Senate. He was appointed Ambassador to France by President Taft and served from 1909 to 1912. In the latter year he was made a fellow of Harvard University. He was also a member of the board of overseers of that institution from 1889 to 1908.

BACON, Roger (c.1214–94). An English monk and philosopher. He was descended from a respectable family, and born at Ilchester, in Somersetshire, about 1214. Through the force of his intellect he raised himself far above his age, made remarkable discoveries in several branches of science, and contributed much to extend the then scanty knowledge of nature. The facts of his life, in the main, must be gathered from tradition and from references in various works. He studied at Oxford and then at Paris, where he received the degree of doctor of theology; and soon after his return to England he entered the order of the Franciscans and settled at Oxford. He carried on active studies and experimental researches, this latter work being done mainly in alchemy and optics. He was so far advanced in his discoveries as not only to arouse the jealousy of his associates and to create doubts as to his orthodoxy, but also to occasion his being accused of dealing in the black art of magic. In 1257, when Bonaventura was general of the Franciscan Order, Bacon was removed from Oxford, and for 10 years confined at Paris without writing materials, books, or instruments. Among those who had heard of Bacon was Guy de Foulques, the Cardinal-Bishop of Sabina, at that time (1264) papal legate in England, and later Pope Clement IV. He desired to see Bacon's writings, but the interdiction of the Franciscans prevented a compliance with his wish. On his accession to the papacy as Clement IV, Bacon wrote to him, expressing his readiness to furnish him with

whatever he desired, and Clement in reply repeated his request to see Bacon's works, despite the Franciscan prohibition. Bacon accordingly prepared his *Opus Majus*, which he sent to the Pope, it is said, by his favorite pupil, John of London, and in which he represented the necessity of a reformation in the sciences through different methods of studying the languages and nature.

The *Opus Majus* was an encyclopædia of all science, embracing grammar and logic, mathematics, physics, experimental research, and moral philosophy, many of these branches being discussed at length in other works. How Clement received these books is not known, as they could only have reached him about the time he was seized with his last illness. For 10 years after Clement's death Bacon was free from open persecution at least. But in 1278 the general of the Franciscan Order, Jerome of Ascoli (later Pope Nicholas III), declared himself against Bacon, forbade the reading of his books, and issued an order for his imprisonment, which was sanctioned by the Pope. This new imprisonment lasted 10 years, and at its conclusion Bacon returned to Oxford. He wrote a *Compendium Studii Theologiæ* (1292) and shortly after died, probably in 1294.

Bacon, although an extraordinary genius, could not rid himself of all the beliefs and errors of his times. He believed in the "philosopher's stone" and in astrology. Many inventions have been credited to him, but some of them were doubtless derived from the study of Arabian scientists. There are in his writings new and ingenious views on optics, e.g., on refraction, on the apparent magnitude of objects, on the great increase in the size of the sun and moon in the horizon. On other subjects, however, he fell into the greatest errors. He made several chemical discoveries, which were wonderful for that time. He knew, for instance, that with sulphur, saltpetre, and charcoal we may produce a substance that would imitate lightning and cause explosions—in other words, gunpowder—but its previous use by the Arabs has since been shown. Mathematics, applied to observation, he considered to be the only means of arriving at a knowledge of nature. He studied several languages and wrote Latin with great elegance and clearness. Deserving of honorable mention are his discoveries of the errors that prevailed in the calendar. He prepared a rectified calendar (1263), of which a copy is preserved in the library of University College, Oxford. On account of his extensive knowledge he received the name of "Doctor Admirabilis." Six of his works were printed between 1485 and 1614, and in 1733 S. Jebb edited the *Opus Majus*. Professor Brewer edited the *Opus Tertium, Opus Minus*, and *Compendium Philosophiæ*, published at London in 1859, and under the title of *Opera Inedita*. Consult Charles, *Bacon, sa vie, ses ouvrages, ses doctrines* (Paris, 1861), and the German works of Siebert (Marburg, 1861) and Held (Jena, 1881).

BACON BEE'TLE. A small dermestoid beetle (*Dermestes lardarius*), known also as larder-beetle, whose whitish-brown, hairy grub devours many kinds of animal substances, such as lard, ham, bacon, old cheese, horn, feathers, leather, furs, etc., and is a pest in museums of stuffed animals. The adult beetle is one-third of an inch long, dark brown with a pale-yellowish band, containing six black dots across the upper half of the wing covers. See DERMESTID BEETLES.

BACON'GO. An African tribe inhabiting the upper Congo valley. They are of fair stature. Their religion is a curious mixture of paganism with Christian customs, introduced by the Portuguese, their chief deity being feminine, and known as Nzambi, i.e., "all-earth mother." They have an apparently lax social organization, with an order of popular guardians of justice analogous to the secret orders of many primitive tribes. Consult Deniker, *The Races of Man* (London, 1900), and A. de Calonne Beaufaict, *Etudes Bakango* (Liége, 1912).

BACO'NIAN CON'TROVER'SY. See BACON, DELIA; SHAKESPEARE - BACON CONTROVERSY; DONNELLY, IGNATIUS; SHAKESPEARE, WILLIAM.

BA'CON'S REBEL'LION. An uprising of the Virginia colonists, particularly of the lower classes, under the leadership of Nathaniel Bacon (q.v.) against the Colonial authorities, represented by Gov. William Berkeley, in 1676. For some time before, taxes had been excessive and unfairly distributed, and Colonial commerce had been greatly hampered and restricted (see NAVIGATION ACTS, THE); the Assembly, since 1661, had been overbearing and wholly subservient to the Governor; and Governor Berkeley himself, besides showing gross favoritism, had exercised a virtual monopoly over the exceedingly profitable Indian trade. These facts combined to arouse a widespread feeling of discontent among the colonists; and this feeling was greatly intensified by the Governor's attitude toward the Indian outbreak in 1675, when he positively refused to take any effective measures to meet the threatened danger, but required, instead, that a certain number of forts be built with money to be raised by taxation. The Governor also prohibited the colonists from making any attacks on the Indians without his express orders. The Indian raids being renewed with especial violence early in 1676, and the forts proving to be altogether useless, 300 colonists assembled in disregard of the Governor's orders, and by acclamation chose Nathaniel Bacon as their leader. Though unable to procure a regular commission, Bacon accepted the position, marched against the Susquehannocks, and completely defeated them. On his return to Jamestown he was arrested, but soon afterward was released on parole. The Governor, however, gave undeniable evidence of double dealing and obstinately refused to sign Bacon's commission. Bacon thereupon marched upon Jamestown, captured it, and not only obtained a satisfactory commission as major-general, but also forced the Assembly to pass, and the Governor to approve, a set of liberal acts which became known as "Bacon's Laws," and which temporarily reformed many of the worst abuses in the colony. Bacon then undertook a second expedition against the Indians, and in the battle of Bloody Run, near the present Richmond, again completely defeated them. The Governor, meanwhile, tried to raise a force hostile to Bacon, and Bacon thereupon marched a second time against Jamestown, which he besieged, captured, and, on September 19, destroyed. On October 26, while marching to meet a hostile force under Major Brent, Bacon died in Gloucester County, of an attack of dysentery. With his death the rebellion ended. Berkeley's bloody revenge upon Bacon's followers elicited from Charles II the famous comment, "The old fool has put to death more people in that naked country than I did here for the murder of my father." The causes

of the rebellion, which is now regarded as having been a forerunner of the Revolution, were misrepresented by the authorities at the time, and were greatly misunderstood by historians until the discovery of many new documents bearing on the subject about 1890. Most of these documents have been published in the *Virginia Magazine of History* (Richmond, 1893–98). Consult an interesting and carefully written article by Edward Eggleston, entitled "Nathaniel Bacon, the Patriot of 1676," in the *Century Magazine*, vol. xl (New York, 1890), and the account in Fiske's *Old Virginia and her Neighbours* (2 vols., Boston, 1897). For Bacon's own statement see *William and Mary College Quarterly*, vol. ix, p. 7.

BA'CONTHORPE, BA'CON, or **BACHO,** bā'kŏ, JOHN (?–1346). An English schoolman and philosopher, styled *Doctor Resolutus*, or "The Resolute Doctor." He was born at Baconsthorpe (Norfolk). He entered the Carmelite Order, took his degrees as doctor of civil and canon law at the University of Paris, and from 1329 to 1333 was provincial of his order in England. He was the greatest of Carmelite scholars and also the chief expositor of the doctrines of the Arabian philosopher Averroës. He wrote more than 120 works, widely read in the Middle Ages. Of them many, including the *Commentaria super Quatuor Libros Sententiarum* (Paris, 1484), were published soon after the introduction of printing. Consult the critical works by H. Aymers (Turin, 1667–69), and Joseph Zagalia (Ferrara and Parma, 1696–1706).

BACOOR, bä'kō-ōr'. A town of Luzon, Philippines, in the province of Cavite. It is situated 9 miles south of Manila, on the south shore of Cavite Bay, and has a good sheltered harbor. (Map: Luzon, E 9). Pop., 1903, 10,925.

BACSÁNYI, bŏ'chän-yē, JÁNOS (1763–1845). A Hungarian patriotic poet. He was born at Tapolcza, May 11, 1763, and died at Linz, May 12, 1845. His historical work, *The Valor of the Magyars*, first brought him into notice in 1785; and the same year he was appointed clerk in the treasury at Kaschau, where he soon after helped to found a periodical called the *Magyar Museum*. Bacsányi was at this time saturated with the spirit of the French Revolution, and the liberal tendency of his poems led to the confiscation of the *Museum* in 1792. Another liberal poem soon afterward cost him his office, while his share in the so-called conspiracy of Abbot Martinovich, in 1794, resulted in two years' imprisonment in Kufstein. In prison he wrote some of his finest elegies. When the French took Vienna in 1809, he was suspected of having translated Napoleon's proclamation to the Hungarians and in consequence was forced to flee to Paris. After the Peace of Paris he was given up to the Austrian authorities, and had Linz assigned to him as a compulsory residence, but was allowed to receive his French pension until his death. Bacsányi exerted an important influence upon Hungarian literature, especially through his æsthetic writings in the *Magyar Museum* and elsewhere. He is remembered as one of the leading spirits of the "Debreczin class," which sought to weld together the best elements of the contemporary rival schools, the classical and the popular, and thus paved the way for the modern academic period. Bacsányi was made a member of the Hungarian Academy in his eightieth year. His *Works* were published by Toldy (Budapest, 1865).

BACTE'RIA (plur. of Neo-Lat. *bacterium*, from Gk. *βακτήριον, baktērion*, dimin. of *βάκτρον, baktron*, staff, stick). A name applied to vegetable organisms, the most minute organisms known. The name was given to the first-discovered of these bodies because of their shape, but is now used to designate this entire class of organisms. Many bacteria are not "little rods" at all, but are round or oval in shape.

The first recorded observation of the bodies we now recognize as bacteria was made about the middle of the seventeenth century by Antony van Leeuwenhoek, a Holland lens grinder, who reported his discoveries to the Royal Society of London in 1683. Continuing his investigations, Leeuwenhoek discovered the presence of bacteria in the mouth and in the intestinal evacuations; and it is interesting to note that there followed these discoveries a germ theory of disease no whit less far reaching, if less accurate, than that which exists at the present day. In 1773 O. F. Müller established two genera, *Monas* and *Vibrio*. Not much progress was made, however, until about 1838, when Ehrenberg and Dujardin included bacteria in their investigations of minute organisms. They referred the forms which they described to the animal kingdom, classifying them among the Infusoria, and placing a large number under the general title of Vibronia. Nor was this surprising. The means at the disposal of these early investigators were extremely crude. They saw these minute moving bodies and considered them animal in nature; for at that time naturalists had hardly begun to realize that animals have no monopoly of motility, though it is now a commonplace observation that the simplest plants exhibit a power of locomotion wholly lost in the higher forms. They were believed to develop spontaneously. Only after the experiments of Cohn was the doctrine of spontaneous generation as applied to bacteria overthrown, and Harvey's law, *Omne vivum ex vivo* ('All life comes from life') accepted as having universal application.

Bacteria are found almost everywhere. They are present in air, water, soil, in most foods and drink, and flourish in the mouth, stomach, and intestines, and the superficial layers of the skin. The rancidity of butter, the putrefaction of cheese, the gamy flavor and high odor of meat, the souring of milk, the mouldiness of stale bread, and many other similar conditions in food, are due to the presence of bacteria. So-called bloody stains on bread, meat, paste, etc., have also been traced to the growth of a brightly colored micro-organism. In sea water phosphorescence is caused by bacteria.

Water, even that which is usually considered pure, contains bacteria in abundance. This is true even of spring water and of water from artesian wells. Stagnant water, and the water of sewers, contain bacteria in immense numbers. The sulphurous springs of the Pyrenees are full of a bacterium (*Beggiatoa*) which accumulates sulphur in its body and is especially abundant in the scum that floats on the surface. Some bacteria, called chromogenic (color-forming) on account of the bright pigment which they produce, sometimes occur in water, and have given rise to superstitious accounts of bloody rain. The red color of stagnant pools in autumn is due to the presence of a micro-organism described by Ehrenberg as "Ophidomonas sanguinea," but now known as a species of *Spirillum*. Water serves as an excellent means for the trans-

portation of bacteria, and many of the epidemics of infectious diseases—typhoid fever, for example—are undoubtedly caused by infection of the water supply.

As already noted, bacteria were at first placed in the animal kingdom. To Cohn (1853) is due the credit of first definitely proving, on the grounds of their structure and life history, the fact that bacteria are plants. Nägeli (1857) confirmed the conclusions of Cohn, correcting certain details, and classifying bacteria not among the algæ, but as a parallel class of fungi. (See SCHIZOMYCETES.) Bacteria are divided into two groups, according as they live on dead animal or vegetable matter, or on living animal or vegetable matter. The former are termed saprophytes, the latter parasites. The great importance of this distinction will appear when it is remembered that when bacteria are living on, i.e., destroying, dead matter, they are doing good. They are decomposing dead animals and plants into their constituent elements, and returning them to the mineral kingdom again to furnish food for plant life. In this way all decay and decomposition take place. But if they live on, i.e., consume, live animals or vegetables, they are doing harm in the sense of destroying life; and it is to this group that all harmful bacteria belong. Bacteria are pathogenic or non-pathogenic, according as they produce disease or not. They are denominated aërobic when they require oxygen for growth, and anaërobic when they thrive best in the absence of oxygen.

Classification. Bacteria are divided, according to their shape, into three main groups: 1. *Bacilli*, or rod-shaped bacteria. These may occur singly, in pairs, or in long threads or strings, but invariably have one diameter greater than the other. 2. *Spirilli.* These are longer than bacilli, but are curved or spiral. They may appear as mere commas; or they may be long, wavy threads, or may occur as very long spirals known as Spirochetæ, or short, thick spirals called Vibrios. 3. *Micrococci.* To this group belong all spherical or nearly spherical forms. The group has many subdivisions, according to the way in which the cocci arrange themselves. They are called Streptococci when they are arranged in rows like a string of beads. When they are in bunches like grapes, they are called Staphylococci. When grouped in pairs, Diplococci; when in fours, Tetrads; when groups of 8 to 16 are arranged as cubes, they are known as Sarcinæ.

Structure and Characteristics. Each bacterium is a single non-nucleated cell of protoplasm surrounded by a cell membrane, and is endowed with the properties which belong to living organisms as such. Bacteria are exceedingly minute. It has been estimated that a single bacterium weighs not more than $\frac{1}{1000000000000}$ of a grain, and that 1500 of the rod-shaped forms placed end to end would about stretch across the head of an ordinary pin. Many bacteria possess distinct powers of motion, due to the possession of long, hair-like appendages or *flagella*, which project from the body of the bacterium, and with a lashing motion propel it through any liquid medium in which it may be. This motility differs greatly in degree for different species and for members of the same species under different conditions. It is confined mainly to the rod-shaped bacteria, but has been observed in a few species of micrococci. Like all living things, bacteria nourish themselves from their surrounding media, taking up external substances as food and building them up into their own cell substance, at the same time giving off waste products. Bacteria multiply by fission or division, or by spore formation. The latter consists in the formation within the bacillus of a clear round or oval body, the spore, which, when fully developed, replaces completely the bacillus. A single bacillus can form but one spore. A single spore produces but a single bacillus. Spores are much more resistant to the methods usually employed for destroying micro-organisms than are the bacilli from which they develop; and it was the failure to destroy spores that kept alive, for so long a time, the theory of spontaneous generation. When bacteria multiply by simple fission they elongate, an indentation appears near the middle, and this is followed by complete division, forming two daughter cells similar to the parent cell. The different species of bacteria preserve their identity as carefully as do the higher vegetable organisms, a given species of bacteria never producing any but the same species. This reproduction of bacteria by fission is, under favorable circumstances, exceedingly rapid—a bacterium reproducing itself in from 15 to 40 minutes. This would, in 24 hours, result in the production of many millions of bacteria from a single individual.

Drying kills many species of bacteria; others simply remain inactive. Cold destroys many bacteria, though some are not killed by low temperatures. The typhoid bacillus can exist for many months frozen in a cake of ice, to become active and dangerous again when the ice is melted and used. Heat, especially moist heat, above a certain point, kills all bacteria; the application of heat to the destruction of bacteria is known as sterilization. Thus, boiling milk or water, or cooking meats or vegetables, destroys any bacteria that may have been present. The same applies to surgical dressings, such dressings being spoken of as sterile, or, because of the absence of infectious material, as aseptic. Certain chemical substances known as germicides, disinfectants, etc., are very inimical to bacteria, e.g., solutions of mercuric chloride, of carbolic acid, etc., and surgical dressings in which such chemicals are used are known as antiseptic dressings.

It is because of the relation of bacteria to certain diseases that these organisms have come to occupy so much general public attention. The parasitic bacteria, in contradistinction to the saprophytic, live upon and destroy living organisms. The disease-producing bacteria are known as pathogenic. Many infectious diseases are positively known to be caused by bacteria, and it is believed that all other infectious diseases are so caused, although the specific germs of measles, scarlet fever, and other diseases remain undiscovered, probably because they are ultramicroscopic. The effects of disease-producing bacteria upon the body tissues may be grouped in three classes: 1. Effects due to the direct local action of the bacteria on the tissues, as the membrane in diphtheria. 2. Mechanical effects, as when a clump of bacteria get into a blood vessel and block it (infectious embolus). 3. Effects due to the production in the body, under the influence of the bacteria, of certain chemical substances which act as poisons to the tissues. These poisons are in solution in

the body fluids, and each is peculiar to the species of bacteria which produces it; e.g., the poison, or toxin, as it is called, of diphtheria is different from the toxin of typhoid fever.

The question presents itself as to why, when bacteria once start to grow on such a good culture medium as the body, do they ever stop growing; or, in other words, why does one ever recover from an infectious disease? Our present belief is that there is produced in the body, as the result of the action of the bacteria, not only a toxin, but another chemical substance, which is antagonistic to the proliferation of the bacteria, and which is known as antitoxin. To the persistence in the body of this antitoxin is ascribed the immunity which a person who has had an infectious disease often has from that disease. Upon this principle is based the well-known diphtheria antitoxin. A fresh culture in bouillon of the diphtheria bacillus is allowed to stand until toxins are formed in the bouillon. It is then strained through a Pasteur filter, and a small amount is introduced into the body of a horse. Some days later a larger dose is given, and then constantly increasing quantities are injected during some months. The animal is thus rendered immune to the action of the toxin, and the fluid part, or serum, of its blood is the antitoxin now so successfully used in the treatment of diphtheria. See DIPHTHERIA; ANTITOXIN; TOXIN.

Bacteria may be grown artificially on various substances which furnish them suitable food. These are known as culture media. Among the more common of these are bouillon and potato. In order to make a medium which is solid at ordinary temperatures, but which may be liquefied by slight heating, gelatin or agar-agar is often added to the bouillon. Thus, if a drop of fluid containing bacteria which we wish to study be added to warm melted gelatin or agar-agar bouillon, the latter may be poured out in a thin layer on a cold plate, where it immediately hardens, thus fixing the bacteria and preventing their moving about in the medium. If the dilution be sufficient to separate the bacteria well, as growth occurs, minute specks are seen dotting the surface of the plate. These are called colonies, and each such colony consists of a single species of bacteria. By taking a bit from one of these spots or colonies and transferring it to some other sterile medium, there results a growth which is free from all life other than the single species of bacteria. This is known as a "pure culture." Many different species of bacteria so closely resemble one another in appearance that they cannot be differentiated by the microscope. Each species has, however, certain peculiarities of growth and development. Thus recourse is often had to cultivation upon different media, where their life histories may be studied and the identity of a particular species determined. For the very careful study of bacteria many different modifications of the culture media have been devised. The medium is sometimes colored by litmus, to show any reaction the growth of the bacteria may produce. Sugar is sometimes added to the medium, which is then placed in a crooked tube closed at one end, so that if the species causes fermentation it may be noted by the collecting of gas at the closed end of the tube. All media are sterilized before using, to destroy any bacteria that may be present. After inoculation the media are kept at room temperature, or more often are placed in an incubator at about blood heat.

For microscopical study, bacteria may be simply placed under a thin glass cover upon a glass slide. They may be studied unstained, but are more often stained in various ways, to render them more distinct or to bring out certain peculiarities. Some of the bacteria, e.g., the tubercle bacillus (see TUBERCULOSIS), depend for their recognition very largely upon their specific reaction to certain stains and can be differentiated only in this way. They are usually studied with an oil-immersion lens of not less than 1000 diameter magnification. See ABSCESS. For history and bibliography, see DISEASE, GERM THEORY OF.

BAC'TRIA. The name given in ancient times to a province or country in Central Asia extending northward from the Hindu-Kush Mountains as far as the river Oxus (Amu or Jihon), and called also Bactriana by classical writers. The exact extent of this land in early times cannot now be determined, but it must have been considerable; and, although barren to the north, its southern regions were rich in pasture lands, which made Bactria famous in antiquity, among other things, for its fine breed of horses. In history it has been the seat of a number of powerful rulers, who are best known as the successors of Alexander the Great in the East. What was formerly Bactria is now included in parts of Afghanistan and Asiatic Russia.

The name of the province or country appears in the Old Persian Inscriptions (Bh. i. 16; Dar. Pers. e. 16; NR. a. 23) as *Bāxtri*, i.e., Bakhtri. It is written in the Avesta *Bāxδi*. From this latter came the intermediate form *Bāxli*, Sanskrit *Bahlīka*, *Balhika*, 'Bactrian,' Armen. *Bahl*, and by transposition, the Mod. Pers. *Balx*, i.e., Balkh. The capital city, Balkh, or earlier Bactra, was situated on the Dargidus or Bactrus (now Dehas). This city seems also to be known in the classics as Zariaspa. In the Avesta (Vendīdād 1.7), and elsewhere, it receives the title "beautiful" (Av. *srīra*), to which the attribute "with banners on high" is appended. This additional designation of the capital of Bactria in ancient times was apparently due to the custom, mentioned by Masudi and Yakut, of pious pilgrims hanging green silk banners from the walls of the temple Naubehar. This latter name has been supposed to refer to a Buddhist "New Cloister" (*nava-vihāra*), as we know that Balkh, in the province of Bactria, was a flourishing seat of Buddhism in the early Christian centuries.

Bactria is supposed to have been originally the centre of a powerful kingdom founded more than 1000 years before the Christian Era and exercising extensive sway throughout Iran. The strongest support for the existence of such a kingdom, antedating the Median rule and the Achæmenian sovereignty of the Persian Empire, will be found in Duncker, *Geschichte des Altertums* (Leipzig, 1878–86). One of the principal arguments brought forward in favor of such a view is the story of the campaign of Ninus of Assyria against a Bactrian king, Zoroaster, as mentioned by Ctesias, and recounted with some variations by Trogus Pompeius (in Justin), Eusebius, and others. The record seems to contain some allusion to Zoroaster, the Prophet of ancient Iran, whose patron was Vishtaspa, and whose death occurred at Balkh, according to Firdausi and others, when the city was stormed

by the Turanians. For this and similar reasons Bactria is often regarded as the cradle of the ancient Magian religion. (See ZOROASTER.) The bearing of all these passages in their historic light is discussed in Jackson, *Zoroaster, the Prophet of Ancient Iran* (New York, 1899). But considerable doubt is attached to the antiquity of the story of Zoroaster's death at Balkh; and so high an authority on Persian history as Justi disclaims the existence of a Bactrian kingdom before the time of Alexander the Great. Yet others may hold a different opinion. However the case may be, there is no doubt that Cyrus subjugated Bactria and made it a Persian province; and Darius in his inscriptions includes Bactria as one of the countries tributary to the Achæmenian power. Herodotus enumerates the forces which Bactria contributed to the Persian invasion of Greece.

From the time of Alexander the history of Bactria becomes clearer and may be followed with more detail. When he conquered the rest of Iran, Bactria likewise fell before his power, and he made Roxana, daughter of the Bactrian ruler Oxyartes, his wife, 327 B.C. On leaving Persia he assigned a strong force of Greeks to occupy Bactria, and it thus became part of the kingdom of the Seleucidæ. About 256 B.C., with the revolt of the satrap Diodotus I, a new Græco-Bactrian kingdom was established, whose power ultimately extended as far as northern India, although in Iran it had to give place to the Parthian sway. The history of this later Græco-Bactrian kingdom has been cleared up in large measure by means of the coins and other antiquities which have been discovered in recent times, especially in Afghanistan. The Greek and later the Prakit devices and inscriptions on these coins give a series of royal names whose succession has been fixed with comparative accuracy.

The inhabitants of ancient Bactria (modern *Balkh*) were closely related to the Persians and shared in, if they did not produce, the old Aryan culture of this region from which sprang Zoroastrianism, the Indo-Bactrian alphabet, etc. It was in this part of the world that ethnologists formerly sought the primitive home of the Aryan stock, but that assumption is now largely abandoned. Nevertheless an early presence of Aryan peoples here is undoubted, and their influence went both east and west. Of recent literature, reference may be made to Biddulph's *Tribes of the Hindoo-Koosh* (London, 1881) and Geiger's *Die Pamir-Gebiete* (Vienna, 1887), besides the numerous studies of Ujfalvy on the Aryans of these regions, contained especially in his *Expédition scientifique française en Russie, en Sibérie, et dans le Turkestan* (Paris, 1878–80) and *Aus dem westlichen Himalaja* (Leipzig, 1884). For references of classical historians and authors, consult McCrindle, *Ancient India as described by Classical Authors* (5 vols., London, 1896). On the general question of the Bactrian kingdom, consult: F. Justi, in Geiger and Kuhn, *Grundriss der iranischen Philologie*, vol. ii (Strassburg, 1896–1904); Gutschmid, *Geschichte Irans* (Strassburg, 1887); Wilson, *Ariana Antiqua* (London, 1841); and especially Rawlinson, *Bactria, the History of a Forgotten Empire* (London, 1912); V. A. Smith, *The Early History of India* (Oxford, 1904), deals briefly but thoroughly with the general aspects of its history. On the coins, consult Percy Gardner, *The Coins of the Greek and Scythic Kings of Bactria and India* (London, 1886), and E. Thomas, "Bactrian Coins," in *Journal of the Royal Asiatic Society* (London, 1873). For Indo-Greek art and Greek influence on India, consult Tarn, "Notes on Hellenism in Bactria and India," in the *Journal of Hellenic Studies* (1902), and Havell, *Indian Sculpture and Painting* (London, 1908).

BAC'TRIAN CAM'EL. See CAMEL.

BACTRIAN SAGE, THE. A title of Zoroaster, the Persian religious teacher, who was a native of the hills of the upper Oxus. See ZOROASTER.

BAC'TRIS (Gk. *βάκτρον, baktron*, staff). A genus of palms, of which 90 species are known, all of which are tropical American. The leaves of some are pinnate, those of others entire. They are generally small palms, some of them very small and with slender stems, those of *Bactris tenuis* being no thicker than a goose quill. Some are spiny and form thickets not easily traversed. *Bactris acanthocarpa* yields a thread that is exceedingly tough and is used for making nets. The maraja (*Bactris maraja*) palm produces large clusters of fruit, resembling small grapes, with a thin pulp of an agreeable subacid flavor. The stems of this species are used for walking sticks.

BACTRITES, băk-trī'tēz (Gk. *βάκτρον, baktron*, staff, stick, in allusion to its straight form similar to that of Baculites). A genus of fossil cephalopods of the order Ammonoidea, and the only member of the family Bactritidæ. The shells are straight, very slender, and gently tapering, with a round or elliptical section. The siphuncle is situated near the ventral wall and is very delicate. The suture is a simple curve with a small ventral angular lobe over the siphuncle, and, in some species of elliptical section, an incipient lateral lobe. The protoconch or embryonic shell is egg-shaped and erect, and has no scar such as is found on the initial chamber of the nautilus. Bactrites is of more than ordinary interest, because it seems to furnish one of those rare examples of a connecting link between two well-differentiated orders of animals, viz., the Nautiloidea and the Ammonoidea. The general form of the shell is that of *Orthoceras*, and the straight cone of *Bactrites* is a primitive character, as it is in *Orthoceras*, and not to be compared with the degraded uncoiled shells (*Baculites*) that are evolved in the senile (phylogerontic) stages of several Jurassic and Cretaceous races of Ammonoidea. The shape and position of the protoconch are very similar to that of *Mimoceras* (*Goniatites*) *compressum*, which shell is uncoiled in its early embryonic stages, but becomes closely wound in its adolescent stages. Moreover, one of the Nautiloidea, the genus *Protobactrites*, seems to afford an indication of the stock from which *Bactrites* itself was derived.

The genus *Bactrites* contains about 15 species that range through all the formations from the Ordovician to the Trias, inclusive, with the exception of the Silurian, in which latter no members of the group have yet been found. See CEPHALOPODA.

BACULARD D'ARNAUD, bă'kụ'lär' dăr'nō', FRANÇOIS. See ARNAUD, FRANÇOIS THOMAS DE BACULARD D'.

BACULITES, băk'ụ-lī'tēz (Lat. *baculum*, staff, stick, in reference to its straight form). A genus of fossil cephalopods of the order Ammonoidea, family Macroscaphitidæ. The shells are

usually found as segments of an elongated cone that tapers gently and has an elliptical or ovate cross-section. The suture line is quite complex and indicates that these shells belong to an advanced race of ammonoids. In perfect specimens preserving the protoconch, the embryonic shell is seen to be closely coiled for several turns and then to branch off on a tangent to the coil and maintain a straight condition throughout the remainder of its life. Several other genera included in the same family show similar aberrant phylogerontic forms that have all been derived from the normally coiled shells of earlier types. The genus *Baculites* contains about 30 species, all of which are found in rocks of the Cretaceous Age in both Europe and America. At one locality in France these shells are so abundant as to cause the name of "Baculite limestone" to be given to the rock containing them. Very fine specimens, often of great size —4 feet in length—have been found in the Black Hills of Dakota and Wyoming, and here have also been obtained specimens on which the mother-of-pearl presents more beautiful coloring than is to be found on any shells now living in the ocean. For illustration, see CEPHALOPODA, Plate II, Fig. 7. See CEPHALOPODA; CRETACEOUS SYSTEM.

BACUP, bāk'ŭp. A manufacturing town of Lancashire, England, on the Lancashire and Yorkshire Railway, 22 miles north of Manchester (Map: England, D 3). The town was incorporated in 1882, and since that time great improvements have been made in its condition and appearance. Bacup owns its water works, maintains public markets, parks, baths, and cemeteries, and has fine playgrounds. It also has a sewage farm for the utilization of the town refuse. There is a mechanics' institute and library. Bacup has extensive cotton and woolen factories, brass and iron foundries; and there are numerous coal mines in the neighborhood. Coöperative stores on a large scale are maintained. Pop., 1891, 23,498; 1901, 22,505; 1911, 22,318.

BADAGAS, bā-dā'gȧz. One of the Dravidian tribes of the Nilgiri Hills in southern India (numbering, in 1891, 29,613), somewhat shorter, darker-skinned, and longer-headed than the Todas, and probably less mixed with Aryan blood. They are not a disappearing people, but, aided by the policy of the Indian government, hold their own, though burdened by the caste system. Their name is said to signify 'northerners,' which indicates comparatively recent migration. They are monogamous and have some curious marriage customs. (See DRAVIDIANS.) Of recent literature since Shortt's "Tribes of the Neilgherries," in the *Transactions of the Ethnological Society of London* for 1869, may be mentioned: Breeks, *An Account of the Primitive Tribes and Monuments of the Nilagiris* (London, 1873); Reclus, *Primitive Folk* (Eng. trans., New York, 1891); and Oppert, *On the Original Inhabitants of Bharatavarsa, India* (Eng. trans., London, 1894).

BADAGRY, bā'dā-grē'. A seaport of Southern Nigeria, British West Africa, situated west of Lagos, with which it is connected by lagoons. It was formerly the capital of a negro kingdom, and during the Portuguese occupation was an important slave-trading centre, with a population of 10,000. Since then it has diminished in importance and in population.

BADAJOZ, bä'dȧ-hōs', *Sp. pron.* bä'dȧ-hōth' (anciently, Lat. *Pax Augusta,* 'Peace of Augustus' or *Batallium,* which the Moors turned into *Bax Augos, Bathaljus, Badaljoz,* whence *Badajoz*). Seat of a bishopric, capital of the Spanish province of the same name (Map: Spain, B 3), and official residence of the captain-general of Estremadura. It is situated about 5 miles from the borders of Portugal, in a fertile district, on the left bank of the Guadiana, which is here crossed by a granite bridge of 32 arches. It is strongly fortified and has a military hospital, an arsenal, and the old cathedral of San Juan, built about the middle of the thirteenth century, with a splendid organ, and paintings by Mateo, Cerezo, and Morales. The last named was born at Badajoz. Considerable trade is carried on with Portugal, and there are manufactures of soap, coarse woolens, leather, hats, and pottery. Pop., 1900, 30,899; 1910, 35,039. As one of the keys of Portugal, Badajoz has often been a place of importance in war. It was besieged in vain by the Portuguese in 1660, and again by the Allies in the War of the Spanish Succession in 1705. During the Peninsular War Badajoz was besieged by the French in 1808 and in 1809, and again in 1811, when it surrendered, March 11, to Soult. Several attempts to regain it were made by the British under Marshal Beresford and Lord Wellington, the latter of whom finally took it by storm, April 6, 1812.

BADAKHSHAN, bä'dȧĸ-shän' (Pers., Hind. *bad,* region, district + *Oxus,* river) (Map: Afghanistan, M 3). A district of northeastern Afghanistan, lying directly north of Cabul, on the edge of the Tamir Plateau. The Amu Darya or Oxus River flows along its northwestern border. The capital is Faizabad. It is a region of great fertility and is rich in metals—iron, copper, and silver principally, as well as lapis lazuli and rubies. The inhabitants are in great part Tajiks, a Persian-speaking Aryan race. They are Mohammedans—Shiites in the mountains and Sunnites in the plains. The population is estimated at from 100,000 to 150,000. They are largely a pastoral people, raising goats, camels, and a breed of small fiery horses. After the trade in metals and precious stones, however, the slave trade is of next importance. The people of Badakhshan seem to have been always under the immediate rule of their own chiefs, at the head of whom was the Ameer. They have generally, however, formed part of some great empire. In the eighteenth century Badakhshan constituted a part of the empire of Nadir Shah, after whose death it became subject to the Afghans. After many revolts and changes it was confirmed to Afghanistan by the Anglo-Russian agreement of 1873. Consult Yule, *Marco Polo* (London, 1871), and Vambéry, *Central Asia* (London, 1874).

BADALONA, bä'dȧ-lō'nȧ (*Baetulo, Betulo* of the Romans). A seaport town of Spain, in the province of Barcelona, 5 miles by rail northeast of the city of Barcelona, of which it is a suburb (Map: Spain, G 2). It is situated in a fertile region which produces grain, oranges, and a great variety of vegetables. The town has experienced rapid industrial growth and manufactures wine. There are, besides, shipyards, sugar and petroleum refineries, and glass works, the latter the largest in Spain. A considerable coastwise trade is carried on. Pop., 1887, 15,974; 1900, 19,240; 1910, 20,957.

BADDECK' (from the Fr. *Bedeque* for Ind-

Ebĕděk). A seaport and favorite summer resort on Cape Breton Island and Lake Bras d'Or. It is the capital of Victoria Co., Nova Scotia, Canada (Map: Nova Scotia, J 2). It is celebrated by Charles Dudley Warner in *Baddeck, and That Sort of Thing* (Boston, 1874). Pop., 1901, 1235; 1911, 1650.

BADEAU, bȧ-dō′, ADAM (1831–95). An American soldier and author. He was born in New York City, was educated in Tarrytown, N. Y., and in 1862 entered the Federal army as an aid to Gen. T. W. Sherman. In May, 1863, he was severely wounded while leading an assault on Port Hudson, and in March, 1864, became military secretary to General Grant, on whose staff he served until 1869, when he retired from the service with the regular rank of colonel and the brevet rank of brigadier general. He was afterward Secretary of Legation in London (1869), Consul General there from 1870 to 1881, and Consul General at Havana from 1882 to 1884. In 1877 and 1878 he accompanied General Grant on a portion of his tour around the world. In 1882–84 he was Consul General at Havana, but in the latter year he resigned because of differences with the administration. He published a collection of essays entitled *The Vagabond* (1859); *A Military History of Ulysses S. Grant* (3 vols.; new ed., 1885); *Conspiracy: A Cuban Romance* (1885); *Aristocracy in England* (1886); *Grant in Peace* (1886).

BADEBEC, bȧd′bĕk′. In Rabelais's *Pantagruel*, the wife of Gargantua and mother of Pantagruel. She died at his birth, after bringing forth at the same time 900 dromedaries, 7 camels, and a number of wagons, all laden with provisions.

BAD EMS. See EMS.

BADEN, bä′den. A grand duchy of the German Empire, the fourth state in size and the fifth in population, situated at the southwestern end of the empire (Map: Germany, C 4). It covers an area of 5823 square miles, exclusive of its share of Lake Constance (65 square miles). Its boundaries are formed by the Rhine on the west and the south, which separates it from the Rhine-Palatinate, Alsace, and Switzerland; Württemberg and Hohenzollern on the east; and Bavaria and Hesse on the north.

Surface and Hydrography. About 84 per cent of the total area is a part of the south German mountain and hill lands. The remainder belongs to the plain of the upper Rhine. The chief mountain system is the Schwarzwald (see BLACK FOREST), a narrow range of wooded mountains extending from Basel in a northeasterly direction for about 100 miles along the Rhine valley. It terminates at Pforzheim, descending gradually into the plateau of the Neckar in Württemberg. The highest peaks, as the Feldberg (4900 feet) and Belchen (4600 feet), are found in the upper or southern part of the Schwarzwald, which has a mean altitude of 3170 feet. The Odenwald Range, situated at the northern end of the grand duchy, has a mean altitude of about 1500 feet. One of the most remarkable mountain groups is the Kaiserstuhl, or 'Emperor's seat,' situated between Breisach and Endingen. Its base is about 23 miles in circumference, and its highest summit reaches an altitude of over 1800 feet.

Baden is drained by the Rhine, which receives the Neckar and smaller streams, and by the Danube, which takes its rise in the Schwarzwald. There are several mountain lakes in Baden, some of them situated at a great altitude; and a part of Lake Constance is also included in it.

The climate of Baden is, on the whole, very warm, but its temperature varies considerably on account of its uneven surface. The average yearly temperature is about 51° F. in the plains and 44° in the highlands.

Agriculture and Forestry. In spite of its mountainous surface Baden is one of the most productive parts of Germany. Abundantly watered and well cultivated, its soil has been brought to a high state of productivity, not only in the valleys, but also in the hilly regions. Of the total area, in 1900, 568,600 hectares (37.7 per cent) were in cultivated field and garden; 209,600 hectares (13.9 per cent), meadow; 54,700 hectares (3.6 per cent), pasture; 20,000 hectares (1.3 per cent), vineyard; 567,800 hectares (37.7 per cent), forest; 87,400 hectares (5.8 per cent), roads, yards, water, etc. The harvest of 1912 included 77,476 metric tons of rye, 80,723 wheat, 89,029 spelt, 98,409 summer barley, 111,070 oats, 1,030,364 potatoes, and 1,193,440 hay. Tobacco is an important product; in 1911, from a total of 7211 hectares there was a yield of 13,221,829 kilos of leaves, valued at 8,089,616 marks. Though the area in vineyards shows a decreasing tendency, wine continues a staple product; the Baden brands are among the best in Germany. The centre of viticulture is the circle of Freiburg. From a total productive area of 15,084 hectares in 1912, there was a yield of 123,274 hectoliters of must, valued at 6,200,000 marks. This output showed a great decline as compared with that of 1911, when from 15,604 hectares there were produced 364,914 hectoliters of must, valued at 21,700,000 marks. The extensive forests of Baden are exploited on a large scale. The Schwarzwald region yields the best timber for shipbuilding, which finds its way chiefly to Holland. The annual output of timber is valued at 20,000,000 marks, of which fully one-third is exported. Cattle raising is also an important and progressive industry. Live stock (December, 1912): horses, 74,000; cattle, 649,000; sheep, 40,000; swine, 476,000; goats, 135,000; fowls, 2,556,000.

The mineral production is comparatively unimportant; the chief products are salt and building stone.

Manufacturing and Commerce. Since its incorporation with the customs union of Germany in 1835 Baden's industrial conditions have undergone a rapid extension. During the period 1882–95 the number of people engaged in manufacturing increased from 204,542 to 287,450. The manufacturing industries are centred chiefly in the two circles of Karlsruhe and Mannheim. Foremost among them are the cotton and silk mills and to a lesser extent the woolen and linen mills. There are also extensive manufactures of jewelry, mirrors, machinery, leather, paper, cigars, and woodenware. Baden also contains one of the largest sugar mills in Germany and several large chemical factories. Watch making is an important industry in the Schwarzwald region, employing over 11,000 people. Baden is well fitted for commerce by its extensive waterways and by its railways. The latter in 1911 had a length of 2351 kilometers (1461 miles); broad-gauge railways aggregated 2048 kilometers (235 private); narrow-gauge, 303 kilometers (276 private). Mannheim is the chief commercial centre of Baden and one of the busiest ports on the upper Rhine.

Government. The constitution of Baden dates from Aug. 22, 1818, and was modified Aug. 24, 1904. Baden entered the North German Confederation for the founding of the German Empire by treaty of Nov. 15, 1870. The executive power is vested in the grand duke, who inherits as the eldest son of the male line (or, if that fails, of the female line). The legislative power rests with the grand duke and a parliament (Landtag); the parliament consists of two chambers, which convene every two years. The Upper Chamber is composed of the princes (of full age) of the grand-ducal house, the heads of the seigniorial families, 8 members elected for eight years by the landed nobility, the Archbishop of Freiburg and the Protestant prelate, 2 representatives of the state universities and one representative of the technical high school, 8 members appointed by the grand duke regardless of rank or birth; and some others. The Lower Chamber is composed of 73 members, 24 from 13 towns and 49 from rural districts. The members of the Lower Chamber are elected by direct popular vote for a period of 4 years, half of the members retiring every 2 years. Every male citizen 25 years old or over has the right to vote, and every male citizen after reaching the age of 30 is eligible to office. Baden is represented by 3 members in the Bundesrat and 14 deputies in the Reichstag of the Empire. For purposes of administration it is divided into 11 circles. The Council of State is divided into the four ministries of the interior (including commerce, industry, and agriculture); foreign affairs and justice; finance; and worship and instruction. The capital is Karlsruhe, with a population in 1910 of 134,313.

Every citizen has the guarantee of religious freedom, and the several religious denominations receive state aid. In military affairs Baden is under the control of the Imperial government, and its military contingent constitutes almost the entire Fourteenth Army Corps.

The revenue is derived mainly from direct and indirect taxes, domains, railways, and customs. The budget for 1911 balanced at 105,179,459 marks: for 1912, 105,146,683 marks. The railway debt of Baden (the only indebtedness of the grand duchy) amounted at the beginning of 1912 to 542,864,491 marks.

Public Instruction. The institutions for higher education, viz., the two universities of Heidelberg and Freiburg, as well as the technical and the art school of Karlsruhe, are under the supervision of the minister of worship and instruction. In 1912 the universities had 6227 students, and the technical school 1375. The secondary and elementary schools are under the control of the board of education and the different local boards and commissioners. The public elementary schools (there are very few private ones) in 1911 numbered 1659, with 5625 teachers and 335,264 pupils. The schools for secondary education number about 100, excluding the numerous trade schools, seminaries, teachers' institutes, etc.

Population. The population of Baden at the census of Dec. 31, 1910, was 2,142,833. In 1816 the grand duchy had 1,006,000 inhabitants; in 1864, 1,432,000; in 1871, 1,461,562; in 1880, 1,570,254; in 1890, 1,657,867; in 1900, 1,867,944. The average annual increase from 1816 to 1864 was 0.74 per cent; from 1864 to 1910, 0.88 per cent; from 1900 to 1910, 1.37 per cent. Of the total population at the 1910 census, Roman Catholics numbered 1,271,015 (59.32 per cent); evangelical Christians, 826,364 (38.56 per cent); other Christians, 13,229 (0.62 per cent); Jews, 25,896 (1.21 per cent). The population is very homogeneous, nearly 99 per cent being German (including 91 per cent natives of Baden) and only 1 per cent foreign. A comparison of the two industrial censuses of 1895 and 1882 reveals clearly the tendency in the economic development of the country. The proportion of the population engaged in agriculture shows a decrease for 1882–95 of 7 per cent; while the proportion engaged in manufacturing and other industries shows an increase of 3 per cent for the same period, with a corresponding increase in the number engaged in commerce and transportation and in persons without occupation.

History. The original inhabitants of Baden were the Alemanni. They were conquered by the Franks under Clovis in 496 and were Christianized. They made repeated attempts to regain their independence, but in vain; and the dukedom of the Alemanni was abolished in 748 by Pepin the Short. In the eleventh century Duke Berthold, a supposed descendant of the Alemannian Gottfried, built the castle of Zähringen in Breisgau, and with him begins the unbroken line of the princes of the house of Zähringen. Berthold's second son, Hermann, took the title of Margrave of Baden and became the founder of the still flourishing house of Baden. He died in 1074. The history of this house presents for several generations little else but a succession of partitions of the territories among brothers, to be again and again reunited upon one or other of the collateral branches becoming extinct. The prosperity of the country was thus greatly retarded. From the time of the Reformation there existed two lines, those of Baden-Baden and Baden-Durlach, which were united in 1771. The present capital, Karlsruhe, was built in 1715 by the Margrave of Baden-Durlach, Charles William. His grandson, Charles Frederick, favored the policy of Napoleon and joined the Confederation of the Rhine. By this move he doubled his possessions in extent and population and acquired successively the titles of Elector and Grand Duke. In 1811 he was succeeded by his grandson, Charles Louis Frederick, who, five years before, had married Stephanie, an adopted daughter of Napoleon. After the battle of Leipzig this prince seceded from the Confederation of the Rhine and (1815) joined the German Confederation.

In 1818 the Grand Duke Charles granted the charter which forms the basis of the present constitution. He was succeeded in the same year by his uncle, Louis, who was inclined to absolutism and had to contend at first with a powerful opposition. He succeeded, in 1825, in carrying through an alteration of the constitution, extending the duration of the diets, after which the government and the chambers acted more harmoniously. Louis died childless (1830) and was succeeded by his half-brother, Leopold. The known liberal tendencies of this prince promised at first a new life to constitutional government; but the tide of reaction, which became strong after the failure of the Polish insurrection and the fall of Warsaw in 1831, soon seized upon the government, and the act establishing the freedom of the press, which had been passed in 1831, was in 1832 declared abrogated. A fluctuating contest between a reactionary government and a growing opposition was carried on till 1846,

when the Constitutionalist Bekk was made Minister of the Interior, and liberalism thus placed at the helm. The first effect was to calm the public mind and to cause a split between the Liberals and the Radicals. The ninth Parliament met (December, 1847) under the most friendly and promising auspices, but the French Revolution of February, 1848, suddenly aroused the Radical party to the most violent activity. Not satisfied with a multitude of liberal measures passed by the Legislature, the revolutionary leaders, Hecker and Struve, aimed at establishing a republic, and stirred up an insurrection. The army sided with the insurgents, the Grand Duke fled, and a constituent assembly was called. The Grand Duke had recourse to Prussian aid, and after several battles was reinstated on his throne. Upon the whole, the reactionary tendency was less marked in Baden than in most other German states. In 1859 a conflict between the authorities of the state and the Roman Catholic hierarchy ended in favor of the latter; in 1861 the complete independence of the Catholic church was recognized by a definite settlement, and a like privilege was extended to the Protestant church of Baden. In the war between Prussia and Austria, in 1866, Baden lent aid to the latter, and on the declaration of peace was obliged to pay a heavy indemnity and to reorganize her army on the Prussian model. In 1867 Baden entered the North-German Confederation. In 1870–71 the troops of Baden fought with distinction in the Franco-German War, and the grand duchy became a part of the new-born German Empire. The present Grand Duke is Frederic II, who succeeded to the throne Sept. 28, 1907. See GERMANY.

Consult: *Das Grossherzogthum Baden in geographischer, naturwissenschaftlicher, etc., Hinsicht dargestellt* (Karlsruhe, 1885); Weech, *Badische Geschichte* (Karlsruhe, 1890); *Regesten der Markgrafen von Baden und Hochberg* (Innsbrück, 1892); Meyer, *Badisches Volksleben im 19 Jahrhundert* (Strassburg, 1900).

BADEN (Ger. baths). A watering place in the canton of Aargau, Switzerland, on the Limmat, 1260 feet above the sea, 13 miles northwest of Zürich (Map: Switzerland, C 1). It was known to the Romans as *Thermæ Helveticæ* and under the Hapsburgs was a stronghold of importance. Its waters are considered beneficial for gout, rheumatism, and diseases of the throat and lungs. Pop., 1900, 6100; 1910, 8318.

BADEN, or BADEN BEI WIEN (Ger. baths near Vienna). A watering place of Lower Austria, beautifully situated on the Schwechat, about 17 miles by rail southwest of Vienna (Map: Austria, E 2). Its warm sulphur springs, 13 in number, vary in temperature from 72° to 97° F. The town has the usual accessories of a fashionable watering resort—large bathing establishments, cursaal, trinkhalle, summer theatre, etc. In the neighborhood are numerous villas belonging to the Austrian nobility, and some interesting ruins. Baden was known in the time of Marcus Aurelius as *Thermæ Pannonicæ* (*Pannonian Springs*). It was made a city in 1840. About 4 miles from Baden is Meierling, a royal hunting lodge (now a convent), where Crown Prince Rudolph of Austria met his tragic death in 1889. Visitors number from 18,000 to 25,000 annually. Pop., 1890, 15,800; 1900, 17,700; 1910, 19,073.

BADEN, or **BADEN-BADEN.** A town and fashionable health resort of the grand duchy of Baden, about 20 miles southwest of Karlsruhe, situated in the pleasant valley of the Oos River, at the edge of the Black Forest (Map: Germany, C 4). It is chiefly celebrated for its hot saline springs, which were famous in the time of the Romans. They range in temperature from 115° to 153° F., and are recommended for the treatment of rheumatism, gout, and diseases of the kidneys and skin. Among the chief buildings and objects of interest in Baden and its vicinity are the ruins of the old castle, once the residence of the margraves of Baden; and the new castle, the summer residence of the Grand Duke since 1842; the Pfarrkirche; the Anglican and Greek churches; the trinkhalle, museum, luxurious bathing establishments, and the nunnery of Lichtenthal, founded in 1245. The principal industry is wood carving. The town Baden was known to the Romans as Civitas Aurelia Aquensis ('watering place of Aurelius'). It was burned by the French in 1689. Pop., 1895, 14,862; 1900, 15,700; 1910, 22,066. At the height of the season the influx of visitors quintuples the number of the resident population.

BADENI, bä-dĕn'yê, CASIMIR FELIX, COUNT (1846–1909). An Austrian statesman, born at Surochów, Galicia. After the completion of his academic education he studied law at Cracow and early entered political life. He rose rapidly into prominence, becoming in 1888 Governor of Galicia and seven years later Premier of the Austro-Hungarian Empire. The most notable event of his administration was the promulgation of the Ordinance of Languages for Bohemia and Moravia, a measure by which Badeni endeavored to place the Czech language on an equal footing with the German in the two provinces named. Disorderly scenes of obstruction occurred in the Austro-Hungarian Parliament, as the Germanic element bitterly opposed the bill, and finally, in 1897, the premier was forced to resign. From that time until his death he took no active part in politics.

BADEN-POWELL, bā'den-pō'el, SIR GEORGE SMYTH (1847–98). An English politician and author, born at Oxford. He graduated at Balliol College, Oxford, in 1875; in 1877 was appointed private secretary to the Governor of Victoria, and in 1885 was returned to Parliament as a Conservative for the Kirkdale Division of Liverpool. In 1886 he established a new steamship line running from Vancouver to Yokohama; in 1886–87 and 1891 investigated the dispute between Canada and the United States concerning the Bering Sea fisheries, and in 1893 was expert agent for the government in the conduct of the British case before the tribunal at Paris. He published *Protection and Bad Times* (1879); *State Aid and State Interference* (1882), also in protest against protection; and an anti-Home Rule work, *The Saving of Ireland, Industrial, Financial, Political* (1898).

BADEN-POWELL, SIR ROBERT STEPHENSON SMYTH (1857–). A British general. He entered the army in 1876, and served in India, Afghanistan, and South Africa, where he became assistant military secretary (1887–89) and occupied the same position at Malta (1890–93). He afterward served with distinction in Ashanti, as commander of the native levies (1895), and in the Matabele campaign. In 1897 he became colonel of the Fifth Dragoon Guards. During the Boer War Colonel Baden-Powell, with a force of 1200 men, was besieged for 215 days by a large Boer army in the town of Mafeking, and

notwithstanding famine and sickness and a number of desperate assaults by the Boers, he held out until he was relieved (May 18, 1900). In recognition of his great ability and imperturbable coolness in conducting the defense, he was advanced to the rank of major-general. He became chief of the South African Constabulary in 1900, and inspector-general of cavalry in 1903. In 1908 he became a lieutenant-general, commanding the Northumbrian territorials, and in the same year he inaugurated the boy-scout movement (q.v.). His principal publications are: *Pig-Sticking or Hog-Hunting* (1889); *Reconnoissance and Scouting* (1890); *Vedette* (1890); *Cavalry Instruction* (1895); *The Downfall of Prempeh* (1896); *The Matabele Campaign* (1896); *Aids to Scouting* (1899); *Sketches in Mafeking and East Africa* (1907); *Scouting for Boys* (1908); *Boy Scouts beyond the Seas; My World Tour* (1913).

BADENWEILER, bä'den-vī'lẽr. A town of Baden, Germany, situated among the spurs of the Black Forest, 700 feet above the Rhine and 1450 feet above sea level. It is well sheltered, has an equable temperature, fine air, and is visited annually by from 6000 to 7000 tourists. There are beautiful promenades and numerous villas in the vicinity, and the town contains a grand-ducal palace dating from the sixteenth century, a Kur-haus, Kur-park, etc.

BADGE, or COGNISANCE (LL. *bagea, bagia,* OF. *bage,* sign; cf. AS. *beág, beáh,* ring, ornament, LL. *baga,* Fr. *bague,* ring). A figure either selected by the owner from some part of the family coat or chosen as alluding to his name, office, or estate, or granted by the sovereign as a token of his favor. Badges were much used in England from Edward I to Elizabeth. The principal noble houses, in imitation of the royal family, had a distinctive mark for their retainers, the whole coat of arms being often too complicated to reproduce. Some of these badges are well known in history, and many have been perpetuated in the signs of old inns, with the memory of their origin entirely lost. Such are the white hart of Richard II, the bear and ragged staff of Warwick, the three feathers of the Prince of Wales (though King Stephen used this badge before the Black Prince's time), and the roses of York and Lancaster. Queen Anne was the last English sovereign to use a personal badge; she had the rose of England and the thistle of Scotland growing from one stem and imperially crowned. The term is loosely applied at the present time to various society emblems. See the illustration accompanying the article FRATERNITIES, COLLEGE.

BADGER, bäj'ẽr (probably from *badge,* alluding to the white mark on its head). Any of several small, burrowing carnivores of various genera, scattered throughout the warm and temperate parts of America, Asia, and Europe, and constituting, with the skunks, to which they are closely allied, the subfamily Melinæ in the family Mustelidæ. The group is characterized mainly by short, strong legs, elongated and more or less plantigrade feet, and straight, strong, fossorial toes. All are heavily furred, distinctly marked, and possessed of great strength, acuteness, and courage. They inhabit dens and are abroad mostly at night. They are provided with perineal glands, which contain substances emitting a fetid odor, the service of which, probably, is to attract the sexes. The pelts have considerable value as furs, and the hairs are largely used in making artists' brushes. The flesh is edible, but not often eaten in civilized communities.

The AMERICAN BADGER (*Taxidea americana* or *taxus*) is about 2 feet long, and has an appearance of remarkable breadth and flatness. The legs are short and firm, and the large feet are furnished with long and very strong claws, making them powerful digging tools. The tail is short and thick. The head is broad, massive, and dog-like, with round, furry ears, a hairy muzzle, and jaws filled with formidable teeth, scarcely less serviceable than those of the wolverine. The whole squat, compact, large-boned, massively skulled form indicates great muscular power, and it is controlled by a well-developed brain and great courage. The loose fur is a blend of blackish with white, gray, or tawny, except as to the feet, which are blackish brown. The head is strikingly marked, the general color, from the back of the neck forward, dark brown, broken by a distinct white stripe from the bridge of the nose back to the nape of the neck, and a somewhat irregular white stripe on each cheek, reaching from the corners of the mouth to near the top of the ears. Below this on each side is a crescent-shaped, dark-colored patch, separating the stripe from the white of the ears and throat. These conspicuous markings give to the countenance an expression of native ability and shrewdness in the disguise of a painted clown. This animal formerly ranged from Ohio westward, but now is not known east of the dry plains, except in Minnesota. It is found northward almost to Hudson Bay and southward into Mexico, where the local form (*T. berlandieri*) is called *tejon.* The badger's stronghold is in the arid regions that abound in gophers and similar burrowing rodents, which he digs out with ease or sometimes catches by a leaping chase. These form his principal food, and he is likely to seize and enlarge their burrows for himself; but birds, frogs, lizards, snakes, insects—in short, any animal food not carrion—are welcome to him. On the whole he fares well by digging out the snugly ensconced striped squirrels, prairie dogs, and other small animals from their underground retreats; and in this practice he serves the agriculturist a friendly turn. In New Mexico the badger is active all the year round, but in Canada it goes into its burrow as soon as the ground freezes and sleeps through the winter with no store of food other than its own fat. When surprised away from its hole, a badger will usually strive to avoid being seen by flattening itself upon the ground. If cornered, it will fight with the greatest courage. Young badgers occasionally are captured, and make interesting though hardly affectionate pets. They exhibit amazing strength in moving barriers and breaking bonds. The pelt is prime about October 1. It is strong and a beautiful silvery gray and brings from 75 cents to $1.50. During the 64 years from 1842 to 1905 over 80,000 badger skins were collected by the Hudson's Bay Company. For details of its life consult E. T. Seton, *Life Histories of Northern Animals,* vol. ii (New York, 1909). See Plate of MINOR AMERICAN CARNIVORES with CARNIVORA.

The EUROPEAN BADGER (*Meles taxus*) is similar to the American in size and colors, but different in dentition and other details. In the absence of open plains it haunts deeply wooded places and digs a deep chamber, where it spends

the winter, and where in spring four or five naked and blind young are produced. It is omnivorous in a wild state as well as in confinement; fruits, roots, beech mast, eggs, young birds, small quadrupeds, frogs, snails, worms, and insects equally constitute its natural food. It has been known to visit a garden for strawberries. It is also fond of honey and of the larvæ of wasps and wild bees, for which it digs up their nests, its shaggy hair protecting it from their stings. Its strength and courage are conspicuous. A barbarous sport was formerly practiced, called badger baiting or "drawing the badger." A badger kept in a burrow or a barrel was assailed by dogs, until at last, yielding to superior numbers, it was dragged out, upon which it was released and permitted to go back to its den, to recover itself and be baited again. This often happened several times daily when the badger was kept as an attraction to a public house of the low sort. The verb *to badger*, expressive of persevering annoyance by numerous assailants, arose from this practice. An old English name for the animal was "grey," and in Scotland and northern England the badger is still called a "brock" (see *Twelfth Night*, Act ii, Scene 5), and is frequently kept in captivity. (Consult Johnston, *British Mammals*, London, 1903). Several closely related species belong to the Asiatic fauna, where also are other relatives of different genera.

The SAND BADGER, or BALISAUR (*Arctonyx collaris*), of northeastern India and Assam, is a yellowish animal, taller and larger than the common badger and looking like a small bear. It is nocturnal and omnivorous in habits and is considered very fierce. The STINKING BADGER, or TELEDU (*Mydaus meliceps*), is an odd little burrower and insect eater of Java, with a skunk-like power of emitting a powerful stench. H. O. Forbes says of this animal: "Another slow prowler, the *Mydaus meliceps*, very often made my evening hours quite unbearable by the intensely offensive odor with which, even in its most inoffensive frame of mind, it hedged its crepuscular walks for at least a mile around . . . with a malignant scent that clung to one's garments, furniture, and food for weeks. . . . The natives have a superstition that if a man has fortitude enough to eat its flesh he will have become proof against sickness of all kinds."

The common HONEY BADGER of India, and the RATEL, or CAPE BADGER, of South Africa, are somewhat more distant relatives, closely allied to each other and forming the genus *Mellivora* of the subfamily Mustelinæ. Their coloration is peculiar, all the upper surface of the body, head, and tail being ashy gray, while the lower parts, separated by a distinct longitudinal boundary line, are black. Both are vigorous diggers and are even accused of robbing graves. Their generic name alludes to their observed fondness for honey (the ratel really hunts for bees with great sagacity), but they subsist upon living animals. Certain small raccoon-like animals of India and eastward, constituting the genus *Helictis*, and the Cape polecat (*Ictonyx zorilla*) of South and West Africa, which is remarkably like an American skunk in appearance and habits, complete the group of the nearest relatives of the badger.

BADGER, CHARLES JOHNSTON (1853–). A rear admiral in the United States navy, born at Rockville, Md. Appointed at-large to the United States Naval Academy by President Grant in 1869, he graduated four years later. He was promoted through successive grades to a captaincy in 1907 and became also in that year superintendent at Annapolis. During the world cruise of the Atlantic fleet in 1909–11 he was in command of the battleship *Kansas*. Soon afterward (in 1911) he was made a rear admiral and was given the command of the second division of the Atlantic fleet, with the rank of rear admiral. Of the entire Atlantic fleet he assumed command on Jan. 5, 1913.

BADGER, GEORGE EDMUND (1795–1866). An American statesman, born at Newbern, N. C. He graduated at Yale in 1813, studied law, and practiced in Raleigh. In 1816 he entered the State Legislature and later served as judge of the Superior Court of North Carolina. In 1841 he was appointed Secretary of the Navy by President Harrison, but after Harrison's death resigned because he disapproved of President Tyler's veto of the Bank Bill. He was elected to the Senate in 1846 to fill a vacancy and in 1848 to a full term. In 1853 President Fillmore nominated him as a judge of the United States Supreme Court, but the Senate would not confirm the nomination. He was an opponent of secession.

BADGER, OSCAR C. (1823–99). An American naval officer, born at Windham, Conn. He entered the navy as midshipman and served during the Mexican War. In 1861–62 he was in command of the *Anacostia*, of the Potomac flotilla, and for the precision of his fire was frequently mentioned in the reports of Lieutenant Wyman, commanding the flotilla. He was promoted to be lieutenant commander in 1862, and in 1863 commanded the ironclads *Montauk* and *Patapsco* in many engagements with the batteries and forts of Charleston Harbor. In 1863, while acting fleet captain on board the flagship *Weehawken*, he was severely wounded. In 1866 he was appointed commander, in 1881 commodore, and in 1885 was retired.

BADGER DOG. A dog formerly used in hunting or in baiting badgers. In England the basset, an almost extinct breed of medium-sized, long-bodied, short-legged hounds, was so used; and the German dachshund (q.v.) of the present originated in a breed adapted to pursuing badgers into their holes, the word meaning 'badger-dog.' It is said that the greyhound had a similar origin; but although a coarse sort of greyhound may probably have been used often in the sport of baiting badgers (called "greys"), this breed originated otherwise in the Orient.

BADGER STATE. See STATES, POPULAR NAMES OF.

BADGHIS, băd-gēz′, or **BADGHIZ** (Pers. the place where the wind rises). A region in the northwestern part of Afghanistan, bounded by the Heri-Rud and the Persian and Russian frontiers. It is mountainous in the centre, taking in a portion of the Paropamisus Range. The southeastern portion is less elevated and fertile. It is inhabited by Jamshidis and Hazaras.

BADHAM, băd′am, CHARLES (1813–84). A distinguished English classical scholar, professor of classics and logic at the University of Sydney, New South Wales, from 1867 until his death. He was born at Glasgow, Scotland, as the son of Charles Badham, Regius professor of physics at Glasgow and the translator of Juvenal, and of a cousin of the poet Thomas Campbell. He received his early education under Pestalozzi, in

Switzerland. He graduated at Oxford (1837), after which he spent some time in Italy, studying ancient manuscripts, and in Germany. He was a warm friend of Cobet. His chief publications are: *Criticism Applied to Shakspere* (1846), and annotated editions of the Greek classics, including the *Iphigenia* and *Helena of Euripides* (1851); and the *Philebus* (1855), *Euthydemus* (1865), and *Laches* (1865) of Plato. In his criticism of texts he followed the methods of Porson. Consult Sandys, *A History of Classical Scholarship*, vol. iii (Cambridge, 1908).

BADIA Y LEBLICH, bä-dē'ä ē lä-blēch', Domingo (1766–1818), known also by the name Ali-Bei-el-Abbassi. A Spanish traveler. He was born at Barcelona, and studied the Arabic language, physical science, and mathematics at Valencia. Partly out of personal curiosity and partly as an emissary of the Spanish government, he determined to visit the Barbary States in the disguise of a Mussulman. He went for a short time to London to study commerce and politics and spared no labor to make himself familiar with the manners and customs of the people he was about to visit. In 1803 he sailed for Africa, where he represented himself, under the name of Ali-Bei, as a descendant of the Abbassides. His talents gained for him such esteem that he was invited to the court of the Emperor of Fez and Morocco. After a two years' residence in Morocco he set out on a pilgrimage to Mecca in 1805, and after sojourning some time in Tripoli, Cyprus, and Egypt, arrived at the "holy place" in 1807, being the first Christian to visit it since the institution of Islam. Subsequently he visited Jerusalem and the chief places in Palestine and Syria, and in the autumn of 1807 arrived at Constantinople, whence he had soon to flee, the genuineness of his Mohammedanism being suspected. His long journey had been a bold masquerade, carried out with exquisite art. He deceived Moslem emperors and scholars; and in Cairo Châteaubriand spoke of him as the most cultured and polished Mussulman he had ever met. After his return to Spain he was made Intendant of Segovia and Prefect of Cordova by Joseph Bonaparte. On the expulsion of the French, Ali was compelled to leave the country. He went to Paris, where in 1814 he published an account of his travels, under the title *Voyages d'Ali-Bei en Afrique et en Asie pendant les années 1803–07*. The work was translated into the principal European languages. Four years after the publication Badia y Leblich set off on another journey to the East, but died suddenly at Aleppo.

BADINGUET, bä'dăn'gā'. Napoleon III, often so called because the garments in which, in 1846, he escaped from the castle of Ham, belonged to a mason of that name. His party came to be known thereafter as the "Badingueux."

BADIUS, bā'dē-ŭs, Jodocus, or **BADE,** bād, Josse (1462–1535). A French printer and author. He was born at Asche, near Brussels, and for this reason is sometimes called Ascensianus. He studied at Brussels and Ferrara and for several years taught Greek at Lyons. About 1500 he settled in Paris, where he founded a printing establishment and published, with his own notes, a large collection of the classics; also produced a *Life of Thomas à Kempis*, and a satire on the follies of women, called *Navicula Stultarum Mulierum*. His printer's stamp is the oldest-known reproduction of a printing press.

BAD LANDS. An American term applied to regions of unconsolidated rocks that have been extensively eroded. Bad Lands occur on arid plateaus formed by horizontal strata of loosely cemented sands and gravels. In these regions rain falls only during short periods, but then the storm waters erode the incoherent rock that is unprotected by vegetation, resulting in the formation of a labyrinthine series of valleys of all sizes, most of which are dry "arroyos" during the greater part of the year. When the erosion is carried to its extreme limit, the greater part of the region is reduced to base level, and isolated fragments of the old plateau rise above this to form table mountains, or "mesas." The best examples of Bad Lands are found in the upper portion of the Missouri drainage basin, in the vicinity of the Black Hills. They occur also to lesser extent in Colorado, Arizona, New Mexico, and Texas. The name "Bad Lands" is a literal translation of "Mauvaises Terres," a term used by the French-Canadian trappers, who first visited the regions.

BAD'MAN, The Life and Death of Mr. An allegorical tale by John Bunyan in 1680. As a realistic picture of the masses during Charles II's reign, it is quite as vivid as anything of Defoe's or Pepys's.

BAD'MINTON (from Badminton, England, the seat of the Duke of Beaufort). A game which much resembles lawn tennis. It can be played by two or four players, either in or out of doors, on a marked-out space 44 feet long by 20 feet wide for the four-handed and 17 for the two-handed game, divided into 4 courts, 2 at each end, with a centre space, across which a net is fixed, 5 feet from the ground at the centre, and 5½ feet at the posts. It is played with shuttlecocks, having 16 feathers, from 2½ to 2¾ inches long and weighing from 73 to 85 grains, which are driven by rackets or battledors over the net, backward and forward, until one of the players fails, under certain technical regulations applicable to the game, to return it. The racket is strung with fine gut and weighs usually about 6 ounces.

BADMINTON, The. A large London club of sporting men, so named in honor of the Duke of Beaufort's estate. It was formed in 1876.

BADOC, bä-dōk'. A town of Luzon, Philippines, in the province of Ilocos Norte (Map: Philippine Islands, C 2). It is situated near the coast, about 22 miles south of Laoag, and in 1903 had a population of 12,564.

BADOURA, bä-dōō'rä. In the story of Prince Camaralzaman in the *Arabian Nights*, the daughter of the King of China, who falls in love with the sleeping prince.

BADRULBUDUR, bä-drōōl'bōō-dōōr'. Aladdin's wife in *The Arabian Nights' Entertainments*. She is a beautiful Chinese princess. Despite her love for her husband, she twice nearly causes his undoing by giving away the "wonderful lamp."

BAEDA. See Bede.

BAEDEKER, bĕd'e-kēr, Karl (1801–59). A German publisher, born at Essen. In 1827 he set up a bookshop at Coblenz and in 1839 published travelers' handbooks for Belgium and Holland. These were succeeded by the *Handbuch für Reisende durch Deutschland und den österreichischen Kaiserstaat* (1842), and by guides to Switzerland (1844) and Paris and environs (1855). Thus was inaugurated this series of world-famous publications. Since 1861 English editions have appeared. The collection

now includes almost all European countries, and portions of North America and the Orient, as well as monographs on London, Paris, and Berlin. The volumes are supplied with excellent maps. In 1872 the firm removed to Leipzig, where complete revisions are frequently prepared.

BAEHRENS, bĕr'ens, Emil (1848–88). A German Latinist, born at Bayenthal. He studied classical philology at Bonn and Leipzig, was appointed instructor at Jena in 1873, and was professor at Groningen from 1877 until his death. His editions of the classics, though often marred by careless haste or bitter attacks on his opponents, are considered valuable because of the use they make of new manuscripts. His publications, which were extremely numerous, include *C. Valerii Flacci Argonauticon* (1875); *Catulli Veronensis Liber* (2 vols., 1876–85); the *Silvæ* of Statius (1876); and *Poetæ Latini Minores* (5 vols., 1879–83, with the additional volume of *Fragmenta Poetarum Romanorum,* published in 1886). In the preparation of the last-named work he examined over 1000 manuscripts.

BAEKELAND, bā'ke-länd *or* bā', Leo Hendrik (1863–). A Belgian-American chemist. He was born at Ghent and was educated at the university there, receiving the Doctorate of Science in 1884. He later studied electro-chemistry in the school of technology at Charlottenburg, Germany. After teaching chemistry and physics for several years at the university in his native city and in the normal school of science at Bruges, he came to America in 1889 and engaged in the manufacture of photographic papers of his own invention, including the widely used Velox paper. In 1899 he entered industrial practice as consulting research chemist. His best-known invention is Bakelite, a condensation product of carbolic acid and formaldehyde, which possesses a variety of valuable properties and is used as an electric insulator and as a substitute for amber, celluloid, and similar materials. In recognition of the value of this invention the American Chemical Society conferred upon him the Nichols medal and the J. Willard Gibbs medal. He contributed to scientific journals a number of original papers on photo-chemical and electro-chemical subjects and was president of the American Electro-chemical Society in 1909 and of the American Institute of Chemical Engineers in 1912.

BAENA, bä-ā'nâ (*Baniana, Biniana* of the Romans). A town of Spain, in the province of Córdova, situated about 32 miles southeast of the city of Córdova (Map: Spain, C 4). There are interesting remains of ancient and mediæval times here; of the old Roman town there are a number of relics. The town has stock-raising interests, and manufactures silk, spirits, soap, and flour. It also carries on a trade in grain, esparto, fruit, and wine. Pop., 1887, 12,036; 1900, 14,539; 1910, 14,730.

BA'ER, George Frederick (1842–1914). An American lawyer and capitalist, born in Somerset Co., Pa. He was educated at Franklin and Marshall College. After serving in the Civil War, he was admitted to the bar in 1864 and became confidential legal adviser to J. Pierpont Morgan. In 1870 he was counsel to the Philadelphia and Reading Railway Co., for some time was one of its directors, and in 1893 helped to reorganize the corporation. He became its president in 1901 and president also of the Philadelphia and Reading Coal and Iron Co., and of the Central Railroad of New Jersey. He is best known as the leader of the operators in the great anthracite coal strike of 1902. Because of his attitude during this time he aroused the animosity of American labor leaders and of many social reformers. In certain quarters he came to be referred to as "Divine Right" Baer because of a letter that he wrote in 1902 to the Rev. W. F. Clark at Wilkes-Barre, Pa. In this he said: "The rights and interests of the laboring man will be protected and cared for—not by the labor agitators, but by the Christian men to whom God in His infinite wisdom has given the control of the property interests of the country, and upon the successful management of which so much depends."

BAER, bâr, Karl Ernst von (1792–1876). A Russian naturalist, born in the province of Esthonia, Russia. From 1810 to 1814 he studied medicine at the University of Dorpat, and subsequently comparative anatomy with Döllinger at Würzburg, and in 1817 became prosector in the University of Königsberg. He was there appointed professor of zoölogy in 1819 and director of the Anatomical Institute in 1826. In 1829 he became professor of zoölogy and member of the Academy of Sciences at St. Petersburg, but returned the following year to Königsberg. After 1834 he was prominently identified with the Academy of St. Petersburg. He was one of the founders of the modern science of embryology, and was among the most influential scientists of his day. Of his numerous works, the most important are *Epistola de Ovi Mammalium et Hominis Genesi* (1827), in which the mammalian egg is described for the first time; *Ueber Entwickelungsgeschichte der Thiere* (1828–37); and *Untersuchungen über die Entwickelung der Fische* (1835). Consult the study by Stieda (Brunswick, 1878).

BA'ER, William Jacob (1860–). An American miniature painter. He was born in Cincinnati and studied at the Royal Academy in Munich under Loefftz, 1880–84. On his return to America he at first practiced genre and portrait painting in New York. In 1892 he took up miniature painting, to which his admirable draughtsmanship was exceptionally adapted, and became the pioneer of the modern miniature in America. When the American Society of Miniature Painters was founded in 1899, he was its secretary and later became its president. To a strong capacity for characterization he unites a broad and pictorial technical treatment, excelling especially in his delicate color. Works like "Primavera" and the "Hours" rank with the very best that has been produced in this art. Among his other well-known works are "Madonna of the Auburn Hair," "Daphne," "The Golden Hour," "Aurora," "In Arcadia," and "The Apple."

BAERLE, bär'le, Cornelius van. A cultivator of tulips in the story of the elder Dumas, *La tulipe noire.*

BAERLE. See Barlaeus, Kaspar.

BAETHGEN, bēt'gen, Friedrich (1849–1905). A German evangelical theologian and Orientalist, born at Lachem. He studied at Göttingen, Kiel, and Berlin, and held professorships at Kiel, Halle, and Greifswald. In 1895 he was appointed professor of Old Testament exegesis and Semitic languages at the University of Berlin. His works include *Untersuchungen über die Psalmen der Peschita* (1878), *Evangelienfragmente* (1885), and *Die Psalmen übersetzt und erklärt* (1892).

BAEYER, bā'yĕr, Adolf von (1835–1917). A

distinguished German chemist. He was born at Berlin. He studied chemistry under Bunsen and Kekulé, and received the degree of Ph.D. at Berlin in 1858, where he remained as privat docent, becoming assistant professor in 1866. In 1872 he became professor of chemistry at Strassburg. After 1875 he taught at the University of Munich. In 1881 the Royal Society, London, awarded him the Davy medal for his researches on indigo. In 1905 he was awarded the Nobel prize for chemistry. Professor Baeyer was one of the greatest organic chemists. He succeeded in synthesizing a remarkably large number of carbon compounds, including new classes of substances, some of which are not only important from a theoretical point of view, but have also found extensive application in the arts. His works in two volumes were published at Brunswick, Germany, in 1905. For his process in making artificial indigo, see INDIGO.

BAEYER, JOHANN JAKOB (1794–1885). A German soldier and geologist. He was born at Müggelsheim, Prussia, and educated at Berlin. He served with distinction in the War of Liberation, and in 1821 entered the topographical bureau of the general staff. He was intrusted with the task of preparing a triangulation of East Prussia. He became chief surveyor of the general staff in 1843 and in 1852 was promoted to the rank of major-general. His plan for a general survey of central Europe was accepted by the Prussian government, and in 1867 the survey was extended to embrace all of Europe. When the Central Bureau of European Surveys was established in 1865 at Berlin, Baeyer was appointed president, and four years afterward he was elected president of the Geodetic Institute. His numerous important works include: *Die Verbindungen der preussischen und russischen Dreiecksketten* (1857); *Ueber die Strahlenbrechung in der Atmosphäre* (1860); *Ueber Die Grösze und Figur der Erde* (1861); *Das Messen auf der sphäroidischen Erdoberfläche* (1862).

BAEZ, bä'ās, BUENAVENTURA (1820–84). A president, for four terms, of the republic of Santo Domingo. He was the son of a mulatto, inherited a large fortune, and was prominent in securing Dominican independence. He was president of the republic from 1849 to 1853, when he was driven from the country by Santa Ana. He returned in 1856, was again made president, and in January, 1858, was again driven out, but in 1865 returned once more, and was elected for the third time. The next year an insurrection drove him into exile, and in the following year he was again restored. He strove to have the United States annex the country, but the United States Senate refused to ratify the treaty which he and President Grant had drawn up in 1869 for the purpose.

BAEZA, bä-ā'thȧ. An old town of Spain, in the province of Jaén, about 22 miles northeast of the capital city (Map: Spain, D 3). It is in a fertile region, the leading products of which are barley, wheat, vegetables, and oil, and has manufactures of spirits, soap, and leather. Many cattle are raised in this district. Pop., 1900, 14,379; 1910, 15,843. Baeza, anciently known as Vivatia, was prosperous under Gothic kings, and flourished under the Moors, several of whose caliphs and kings resided here. It was taken from them by Alfonso VII in 1147, only to change hands several times. In the thirteenth century it was sacked by St. Ferdinand. It was formerly the seat of a university, founded in 1533, and contains evidences of former splendor. The cathedral, several fine churches, the oratory of St. Philip Neri, and the university, are among its interesting buildings.

BAF'FIN, WILLIAM (1584–1622). An English navigator. He accompanied James Hall in his search for a northwestern passage in 1612, and in 1613 commanded the English whaling fleet in the Arctic seas. In 1615 he went north in the *Discovery* under Bylot and explored the inlet now known as Baffin Bay. He was killed in 1622 while trying, in conjunction with a Persian force, to expel the Portuguese from Ormuz. Baffin was the earliest recorded navigator to attempt to determine longitude at sea by astronomical observation. Consult C. R. Markham's edition of the *Voyages of William Baffin* (London, 1881) for the Hakluyt Society.

BAFFIN BAY. A part of the northern Polar Sea between Greenland in the east and Baffin Land and North Devon in the west (Map: North America, F 2). It is about 800 miles long, with an average breadth of 280. Its greatest depth is 6890 feet. The tides do not rise more than 10 feet. The currents are generally toward the south, though on the east side of Davis Strait and Baffin Bay a current from Spitzbergen flows northward round Cape Farewell. The bay is scarcely ever free from ice, though during the summer months it is usually open, but sometimes ice-choked in Melville Bay and farther north. The shores are for the most part lofty and precipitous, backed by ranges of snow-clad mountains. The prevailing rocks are granite and gneiss. There are Danish settlements on Disco and Whale islands, and Eskimos inhabit the east coast from Cape York to Smith Sound. The principal animals are, on land, bears, black foxes, and hares; in the sea, the black whale, walrus, and seal, gulls, ducks, and other sea fowl. Baffin Bay was first explored in 1615 by William Baffin, and the accuracy of his observations and descriptions has been confirmed by subsequent navigators.

BAFFIN LAND. A large island west of Greenland, constituting a part of the Canadian District of Franklin. Its area is not accurately known, the west coast not having been as yet entirely outlined, but it is about 238,000 square miles, making Baffin Land the fourth largest island in the world. The east coast is mountainous and glaciated and is deeply indented by large bays. A few Eskimos are found along the east coast. The island is named in honor of William Baffin (q.v.). (Consult Franz Boas, *Baffin Land*, 1885, and *The Eskimo of Baffin Land and Hudson Bay*, 1901.) After nearly a year spent in exploring Baffin Land, Bernhard Hantzsch died there in June, 1911, leaving an account of his work and maps that was published in *Mitt d. Verein f. Erdkunde zu Dresden*, Band ii, pp. 669–716 (1913).

BAFFO, bäf'fô. See PAPHO.

BA-FYOT, bä'fê-ōt', or **BA-FIOT.** A Bantu tribe (also called Cabinda), living between the lower Kuilu and the Congo estuary. They are industrious and skillful, good boat builders, and reputed the best craftsmen on the West African coast. They have profited by contact with Europeans more than other tribes in this region, but still burn witches and combine paganism and Christianity in their religion.

BAGAMOND'S ROLL. See BAGIMONT'S ROLL.

BAGAMOYO, bä'gȧ-mō'yō. A seaport town and caravansary of German East Africa, situated a short distance northwest of Dar-es-Salaam (Map: Belgian Congo, G 4). It has few stone houses, as the natives, who constitute the bulk of its population, live mostly in huts. There are a custom house, a post office, and a park, with a monument to the troops who fell during an uprising of the natives in 1889. The town is connected by cable with Dar-es-Salaam and Zanzibar. Its roadstead is accessible for small boats. The region is fertile, and the town is a trading centre. Grain, bananas, and vegetables are among the important products. There is considerable caravan trade in ivory, cotton, and manufactured goods. The population is about 25,000 and includes only a few Europeans. Consult Dietert, "Bagamoyo und Handel und Wandel in Deutsch-Ostafrika," in Jahrg. ii *Beiträge zur Kolonialpolitik und Kolonialwirtschaft* (Berlin, 1901).

BAGANDA. See Uganda Protectorate.

BAGARA, bȧ-gä'rȧ. A tribe of pastoral Arabs in the Egyptian Sudan, on the White Nile, above Khartum.

BAGARIA. See Baghieria.

BAGASSE, bȧ-găs' (Fr. dialectic by-form of *bagage,* baggage, lumber), Cane Straw, or Cane Trash. The refuse matter left after the extraction or expression of the saccharine juice from sugar cane and sorghum. It was formerly used mainly for fuel in the sugar house, but is now fed to live stock and employed in paper making, etc. See Sugar.

BAGATELLE, băg'ȧ-tĕl' (Fr., It. *bagattella,* dim. of *bagata,* trifle, from Low Lat. *baga,* bundle; cf. bag, baggage). A game some forms of which are akin to pool, inasmuch as they are played with cues and balls upon a cushion-rimmed table. The table is usually about 7 feet long and 38 inches wide. At the head (which is semicircular) a group of 9 cups, set into the bed of the table, are arranged and numbered as follows:

5
3 2
8 9 7
4 6
1

It is played with 9 balls, one black, four red, and four white, or eight white and one red or black. The red or black ("King") ball is placed on a spot in front of hole 1, and the player strikes a ball at it from the balk line at the end of the table, and endeavors to put it, his own, or both balls into a hole or holes. Whatever hole the king ball falls into counts double. The remainder of the balls are driven, one by one up the table in like manner, and the sum total of the holes they drop into is the player's score.

In "Mississippi" a bridge with nine or more arches is placed in front of the first hole, and through these arches the ball must pass (but not until it has struck a cushion) before it can reach the holes beyond.

In the "Cannon" game three balls (and sometimes a table without cups) are used, a white, a spot-white, and a black, the object being to place the balls in the pockets by means of "cannon" (i.e., *carom*) play. See Billiards.

In *Sans Egal,* a French form of the game, the players use red and white balls respectively, and play at first on the black ball, each player trying to pocket that ball and then his own without pocketing his opponents. Another form of the game, "Bell Bagatelle," is played on an inclined board fitted with cups, arches with bells, and stalls, each of which is marked with a number.

BAGAU'DÆ. Peasants of Gaul who resisted Roman oppression about 270 A.D., capturing and destroying Augustudunum (now Autun). Claudius II temporarily repressed them, but Aurelian made concessions to them and proclaimed general amnesty. They rose again in 294, and Maximian was sent against them. Their first leader was Victoria; subsequently there were two, Ælianus and Amandus, the latter calling himself Emperor. The two last named fell in battle, and Maximian utterly defeated their forces; but they were troublesome to Rome until the end of the Western Empire.

BAG'BY, George William (1828–83). An American humorist. He was educated at Delaware College and afterward had a medical course at the University of Pennsylvania. He then took up editorial work, especially on the *Southern Literary Messenger,* from 1859 till near the close of the war. Subsequently he was made State Librarian and became widely known as a lecturer and humorist, writing over the name "Mozis Addums." He deserves to be remembered as having kept up the old school of Southern humor, founded by Longstreet and Hooper. His works were collected in 3 vols. (Richmond, 1884–86). Consult Trent, *Southern Writers* (1905).

BAGDAD, băg-dăd' *or* (as Anglicized) băg'dăd. A vilayet of Asiatic Turkey, situated near the southeastern end of the country, and covering an area of 42,962 square miles (Map: Turkey in Asia, L 6). It is watered by the Tigris and Euphrates, but the soil, with the exception of a small portion, is barren and unproductive. The population is estimated at 614,000, consisting of Turks, Arabs, Armenians, Jews, and Kurds.

BAGDAD, or **BAGHDAD.** The capital of the Turkish vilayet of the same name, and formerly one of the most magnificent cities of the Mohammedan world, situated in the centre of the vilayet on both sides of the Tigris (Map: Turkey in Asia, L 6). It is probable that the name is of Iranian origin coming from *Bag,* 'god,' and *dad,* 'given,' 'the gift of god'; for even if Bagdada is the correct reading of the name of a city occurring in Babylonian inscriptions as "Delitzsch maintains," it is by no means impossible that an Iranian tribe established itself in this region as early as in the Kassite period. (See Babylonia.) The modern and larger portion of the city lies on the eastern bank and is connected with the old town on the opposite side by two pontoon bridges, 650 and 715 feet long respectively. Bagdad is surrounded by the ruins of a brick wall, and a dry moat, and has an attractive appearance from the river. Upon closer examination, however, it proves to be ill built and neglected, with but few remnants of its former splendor. The streets are crooked, narrow, and filthy, houses are low, and the absence of windows in the front renders them exceedingly sombre and uninviting. The interior, however, is here and there richly decorated, and the courts are sometimes ornamented with artistic fountains. Bagdad contains a large number of mosques (most of them ruined), which alone testify to its former splendor. Among public buildings the most noteworthy are the Governor-General's palace, the citadel, and the numerous *khans.* Bagdad also contains a number of brick-covered bazaars, which have long

been famous. In the vicinity are situated tombs held in high reverence by the natives and visited annually by thousands of pilgrims. In olden times Bagdad was famous as a seat of learning and culture, but at present its high schools or *medresses* are few in number, and its importance is due chiefly to its commerce. Before the opening of the Suez Canal Bagdad was an important centre on the trade route from India to Europe. The traffic from India has declined somewhat, but, owing to development of railway facilities, it is still a place of commercial importance, being the mart through which pass the imports and exports of Mesopotamia, and the outlet for products of Arabia and Persia intended for Eastern markets. Transportation is effected from Basra to Bagdad by the Tigris, and from there to Constantinople, Aleppo, and Damascus by caravans. The chief articles of export are wool, grain, fruits (especially dates), horses, various Oriental fabrics, skins, gum tragacanth, feathers, and leather articles. Imports include iron and copper, sugar, and coffee. There are numerous manufactures of copper utensils, cloth, and felts. Bagdad is the seat of a United States consulate. The population has been repeatedly decimated by pestilence and inundations. It is variously estimated, the returns ranging from 125,000 to 200,000, consisting of Arabs, Turks, Jews, Persians, Kurds, Armenians, Syrians, and some Hindus. The Mohammedan population numbers about 125,000 and is practically equally divided between Sunnis and Shias. There are over 50,000 Jews, 15,000 Chaldæan Christians, besides Jacobites, and Greek Orthodox Christians.

Bagdad was built by the Abbassid Caliph Mansur (Almansur), 762 A.D., on the site of an old Babylonian city of a similar name. It was greatly enlarged by Harun-al-Rashid, under whom and his successor Mamun it attained the prosperity which is described in the pages of the *Arabian Nights*. Then, and for long afterward, it was one of the richest and most splendid cities of the world, except for a brief period when it was deserted by the caliphs. The rise to power of the commander of the caliph's Turkish bodyguard gradually reduced the caliphs to political insignificance, but they retained their headship in religion. In 1258 the grandson of Genghis Khan, Hulaku, put an end to the Abbassid Caliphate; but the descendants of the Tatar conqueror were expelled by Timur, who took the city 1393. In the beginning of the sixteenth century Shah Ismail, the founder of the Sofi Dynasty in Persia, made himself master of it. Turks and Persians strove for its possession until Amurath IV, in 1638, annexed it to the Ottoman Empire. Since then it has been nominally a part of the Ottoman Empire, but for long periods it was practically independent. Consult Le Strange, *Bagdad during the Abbasid Caliphate* (Oxford, 1900); C. Huart, *Histoire de Bagdad dans les temps modernes* (Paris, 1901); Streck in *Enzyklopädie des Islam* (1911).

BAGDAD. The port of Matamoros (q.v.), Mexico (Map: Mexico, K 5). It is situated in the State of Tamaulipas at the mouth of the Rio Grande del Norte, on the Gulf of Mexico, but its harbor is not accessible to large vessels. During the Civil War in the United States it was an important trading place for the Confederates, who had to run the blockade of the Federal ships.

BAGDAD RAILWAY. See TURKEY.

BAGE, ROBERT (1728–1801). An English novelist born at Darley, Derbyshire, Feb. 29, 1728. At the age of 23 he settled at Elford, near Tamworth, where he engaged in the manufacture of paper until his death, Sept. 1, 1801. The prevailing French social theories he embodied in several novels of considerable interest, as *Mount Henneth* (1781), *Barham Downs* (1784), and *Hermsprong* (1796). Consult Ballantyne, *Novelists' Library*, edited by W. Scott (London, 1821–24).

BAGEHOT, băj'ot, WALTER (1826–77). An English economist and publicist. He was born at Langport, Somersetshire, and was educated at University College, London, where he won distinction by his work in mathematics and in mental and moral philosophy and political economy. He began to read law, but never practiced the profession. After a stay of some months in Paris in 1851, where he lived through the coup d'état of December, he returned to England to take part in his father's shipowning and banking business. In 1858 he married the eldest daughter of the Rt. Hon. James Wilson, founder of the *Economist*, which had been established during the Corn-Law agitation to advocate free trade principles. In 1860, on the departure of his father-in-law for India, Bagehot became editor of the *Economist* and retained that position until his death in 1877.

Bagehot's principal works, which were widely translated and passed through several editions, were *The English Constitution* (1867), *Physics and Politics* (1872), and *Lombard Street* (1873). The first work, which has been widely used in England and the United States as a text-book, is a keen analysis of the English system of government. It is striking in its distinction between the "ornamental or theatrical" part and the practical parts, the crown and the House of Lords constituting the first, and House of Commons and the cabinet the second. The vigor of his language would imply that the theatrical parts were useless; but, on the contrary, Bagehot holds them in high honor, despite proposals for reforming the House of Lords. They seem to assure confidence in the stability of government and inculcate a respect for superiority and tradition which is the saving grace of English democracy. In his discussion of the practical parts he brings out strongly the essence of parliamentary government in the blending of executive and legislative authority in the cabinet. He was among the first to point out the excellences of the cabinet system. His work, *Physics and Politics*, expands the thesis that rule and tradition, awakening the spirit of coöperation, is the keynote of political progress. Without this habit of pulling together intellectual nations have failed to maintain themselves.

His *Lombard Street*, which is a description of the rôle that the Bank of England plays in the English financial system, lies in quite another field of thought, for which his training as vice-chairman of the Langport Bank and his position as editor of England's financial organ gave him special facilities of knowledge. The work is a masterly analysis of the English credit system, and its lucidity of statement has gained for it a wide reading and a permanent place in the literature of political economy.

Bagehot was a man of great versatility, whose reputation as one of the best conversationalists of his day will be understood by those who read

his *Literary Studies* and *Biographical Studies*, republished after his death in his collected writings, in which his vivacity and humor find greater scope than in his larger works. Consult the prefatory notice to *Literary Studies*, edited by R. H. Hutton (London, 1879), and M. E. Grant-Duff, "Walter Bagehot: His Life and Works," in his *Out of the Past* (London, 1903).

BAG'GAGE (Fr. *bagage*, from OF. *bague*, bundle, pack). In the law of common carriers all such articles of a traveler as are incidental to the journey or required by him during the journey. Thus, personal jewelry and a reasonable amount of money for expenses, as well as wearing apparel, etc., are baggage; but jewelry and goods intended for sale, articles of furniture, etc., are not. The significance of the distinction lies in the fact that the extraordinary liability of the common carrier extends to the baggage of a passenger, and yet, as a carrier of passengers, he is exempt from that liability for goods not coming under the description of baggage. The carrier, however, is liable for damage resulting from his gross negligence, even if the articles shipped or carried by the passenger are not baggage; and his acceptance of them, knowing their character, may put upon him the full liability of a common carrier. See CARRIER, COMMON.

BAGGAGE, MILITARY. The impedimenta of an army, including all articles of stores necessary, or pertaining to, a body of men moving from one point to another. Ammunition and food supplies, while coming under this general heading, take precedence of all other baggage, on account of their imperative necessity to the existence of troops in the field. In all armies strict rules are enforced, regulating the amount and description of baggage that may be carried for officers and soldiers at home and abroad, both in time of peace and during war. In the field, though a soldier in the ranks carries his whole kit, yet a certain proportion of wagons are allotted to his command for the heavier baggage —tents, cooking utensils, ammunition, etc. The question of baggage is one of the most difficult problems a commander in the field has to deal with. In the United States the transportation of baggage is covered by sec. 1151, *United States Army Regulations*, which provides that the baggage to be transported at public expense, including mess chests and personal baggage, upon change of station, shall not exceed the following weights:

RANK	IN THE FIELD, POUNDS	CHANGING STATION, POUNDS
Lieut.-General	1,500	15,000
Major-General	1,000	10,500
Brigadier-General	700	8,400
Field Officer	400	7,200
Captain	200	6,200
First Lieutenant, Contract Surgeon	150	5,100
Second Lieut. and Veterinarian	150	4,500
Post and Regimental non-commissioned Staff Officer, 1st Class Sergeants of the Hospital Corps, Chief Musician, Sergeant of the Signal Corps, Squadron and Battalion Sergeant Majors, First Sergeants, each, and Civil Service employees transferred	....	3,000

Adequate allowances are made for the expense of packing and crating baggage preparatory to shipment. Official books and papers of officers are transported at government expense and are not charged against the baggage allowances of officers. When officers or soldiers entitled to baggage allowances are retired, their baggage within their allowances is transported to their homes.

BAGGESEN, bäg'ge-sen, JENS (1764–1826). A Danish poet, born at Korsör, who in his early works represented eighteenth-century culture and afterward became a representative of a restrained romanticism. His first poems were *Comiske Fortaellinger*, 'Comic Tales' (1785), followed by satires, epistles (*Skiemtsomme Riimbreve*, 1807), and elegies, produced with restless haste, in which, however, he showed himself a conservative champion of form against the innovation of the romanticists, and won the title "poet of the graces." Under the patronage of the Duke of Augustenburg he traveled widely, was for a time director of the National Theatre in Copenhagen, and in 1800 went to Paris. In 1811 he became professor at Kiel and later returned to Copenhagen to find his fame eclipsed by that of the romantic Oehlenschläger (q.v.), who at first commanded his sincere admiration, but later evoked his bitter criticism. He left the field, defeated, for a voluntary exile at Hamburg in 1820. The *Labyrinth* (2 vols., 1792–93), his most important work, is a graceful impressionist's description of his journeys. He wrote also in German and left a vast and entertaining *Correspondence*. Though now little read and never genuinely popular, his work exercised in its time a great influence upon the literary public. His *Danish Works* were first published in 1827–32; his *Poetische Werke in deutscher Sprache* in 1836. Consult: Arentzen, *Baggesen og Oehlenschläger* (Copenhagen, 1870–78); A. Baggesen, *Jens Baggesens Biografi* (ib., 1843–56); Clausen, *Jens Baggesen* (ib., 1895).

BAGHELKHAND, bä-gāl'kŭnd' (Ar., Turk. *bagh*, garden + *el*, the + *khand*, hill). A British agency of Central India, situated between lat. 22° 40′ and 25° 10′ N. and long. 80° 25′ and 82° 45′ E. It comprises the native states of Rewah, Nagode, Maihar, Sohawal, and eight of lesser importance. Area, 14,706 square miles. Pop., 1891, 1,737,606; 1901, 1,554,577; 1911, 1,772,574.

BAGHERIA, bä'gâ-rē'â, or **BAGARIA,** bä'gâ-rē'â. A city in the province of Palermo, Sicily, 8 miles southeast of the city of Palermo (Map: Italy, H 9). The surrounding plains are splendidly fertile, and the town contains many deserted villas, formerly occupied by Palermo grandees. Among them are the Villa Palagonia, celebrated by Goethe, and the Villa Valguarnera, which has one of the most beautiful prospects in Sicily. Pop., 1881 (commune), 14,000; 1901, 18,218; 1911, 21,212.

BAGIMOND'S (bāj'ĭ-mŏnds), or **BAGIMUND'S** (bāj'ĭ-mŭndz) **ROLL.** The name given, from the end of the thirteenth century till the Reformation, to a valuation, according to which the ecclesiastical benefices of Scotland were taxed. It took its name from an Italian churchman, Boiamund de Vitia, who was sent from Rome in 1275 to collect the tithes from all the church livings in Scotland for an expedition to the Holy Land, as decreed by the Second Council of Lyons (1274). Hitherto the Scotch clergy had been taxed according to a conventional valuation, called the *antiqua taxatio;* but Boiamund set this aside, and, in spite of their opposition, assessed the benefices at their actual yearly

worth, or *versus valor*. Consult *Publications of the Surtees Society*, vol. xii (London, 1846).

BAGINSKY, bâ-gēn'skī, Adolf (1843–). A German physician. He was born at Ratibor, and studied at Berlin and Vienna. In 1890 he was appointed director of the hospital known as the Kaiser- und Kaiserin-Friedrich Krankenhaus, in Berlin, an institution devoted chiefly to the cure of the infectious diseases of children. He was private lecturer on children's diseases at the University of Berlin from 1881 to 1892, and in 1892 was appointed extraordinary professor at that institution. He founded and became co-editor of the *Archiv für Kinderheilkunde*, established in 1880. His principal works include: *Handbuch der Schulhygiene* (3d ed., 1898–1900); *Lehrbuch der Kinderkrankheiten* (8th ed., 1905); *Pflege des gesunden und kranken Kindes* (3d ed., 1885); *Das Leben des Weibes* (3d ed., 1885); *Die Antipyrese im Kindesalter* (1901); *Säuglingskrankenpflege und Säuglingskrankheiten* (1906); *Die Kinderaussage vor Gericht* (1910).

BAGIRMI, bâ-gēr'mê, or **BAGHIRMI.** A sultanate in the military territory of the Chad, French Equatorial Africa, bounded by Bornu, Wadai, and Lake Chad (Map: Africa, F 3). Its area is estimated at about 70,000 square miles. The population is made of different races, including Fulahs and Arabs, and before the wars with Wadai and Bornu numbered from 1,000,000 to 1,500,000, but has thereby been reduced to three-quarters of that number. The principal occupation is agriculture, but there are also some manufactures of textiles and leather. The form of government is absolute, and an armed force, estimated at over 10,000, is maintained. The prevailing religion is Islam, which was introduced in the sixteenth century. Since the agreement of 1896 between France and Germany Bagirmi has been recognized as belonging to the French sphere of influence. In 1897 a separate treaty was signed between France and the Sultan of Bagirmi, and a French resident appointed at Chekna, the capital. The former capital Massenya was destroyed in 1898. At the end of 1899 Rabah, a usurper of Bornu, invaded the state, but was speedily defeated by the French troops. His sons continued the contest, but by May, 1901, the country was completely pacified.

BAGLIONI, bâ-lyō'nê. A family of Florentine Renaissance architects, sculptors, and wood inlayers of the fifteenth and sixteenth centuries. The founder was Baccio d'Agnolo Baglioni (1462–1543), of whose four sons, all artists, two became prominent, Domenico (born 1511) and Giuliano (1491–1555), who followed their father's style. Baccio d'Agnolo, while not a genius, showed real talent in the treatment of palace architecture of moderate size in Florence. He continued the manner of Cronaca (q.v.), whom he had assisted in building the great hall of the Palazzo Vecchio. While not modifying Cronaca's style of exterior, he gave greater elegance and simplicity to the palace courts. Such were the Taddei and Ginori palaces. He showed considerable originality in the Bartolini Palace (1520), and in a couple of villas (Bartolini and Borgherini). The best work of Domenico is the Buturlin Palace.

BAGLIONI, Cavaliere Giovanni, called Il Sordo del Barozzo (1571–1644). An Italian painter and art historian. He was born in Rome, where most of his life was spent. His celebrated paintings in the St. John Lateran, St. Peter's, and elsewhere, are examples of the tasteless mannerism of his day and no longer interest us; but it is otherwise with his most important literary work, *Le vite de' pittori, scultori, architetti, ed intagliatori dal pontificato di Gregorio XIII del 1572, fino a' tempi di Urbano VIII nel 1642* (Rome, 1642; Naples, 1733), which is still a valuable source of information.

BAGLIVI, bâ-lyē'vê, Giorgio (1669–1707). A celebrated Italian physician of the Iatro-Physical school (see Borelli); descended from a poor Armenian family. In 1692 he went to Rome, where he attended the lectures on anatomy given by Malpighi. Soon afterward he was appointed professor of anatomy at the Sapienza College, Rome. He was the first to propound the doctrine of "solidism" in medicine, according to which the primary seat of disease is in the solid parts of the organism and not in the fluids, as had been universally maintained previous to his time. His complete works were published under the title *Opera Omnia Medica Practica et Anatomica* (Lyons, 1704). Under the title *De l'accroissement de la médecine pratique* a French translation by Boucher was published (Paris, 1851) of Baglivi's *De Praxi Medica ad Priscam Observandi Rationem Revocanda.*

BAGNACAVALLO, bä'nyâ-kâ-väl'lô (1484–1542). An Italian painter of the High Renaissance. His real name was Bartolommeo Ramenghi, and Bagnacavallo was his birthplace. He was a pupil of Francesco Francia at Bologna and afterward assisted Raphael in the decorations of the Vatican. His later work, however, shows the influence of Dosso Dossi. On his return to Bologna he became the head of the local school. The museum and churches of Bologna are rich in his works, among the best of which are "Christ Crucified" in St. Peter's and a "Madonna with Saints" in the Museum. Good examples of his work are also in the galleries of Berlin, Dresden, Milan, and Paris.

BAGNÈRES-DE-BIGORRE, bâ'nyâr' de bē'gôr' (Fr. baths of the Bigerrones; see below). A town and watering place situated on the left bank of the Adour, amid lovely scenery, in the department of the Hautes-Pyrénées, France (Map: France, S., E 5). At Bagnères there are 30 mineral springs of varied temperature and chemical composition, each of which is described as a specific for different diseases. There are 10 bathing establishments, and the place is visited annually by 25,000 to 30,000 invalids and tourists. It is a centre for winter sports, fêtes being organized each year. There are marble quarries in the vicinity of the town, which is noted for its manufacture of table tops, chimney-pieces, and woolen knitted goods. Pop., 1901, 8437; 1906, 8591; 1911, 8455. The place was well known to the ancient Romans, who called it Vicus Aquensis, or Aquæ Bigerrionum, and erected there many baths and a temple of Diana.

BAGNÈRES-DE-LUCHON, lu'shōn'. A watering place in the department of Haute-Garonne, France (Map: France, S., E 6). It is divided into an old and a new town; the latter, with its villas and gardens, fine streets and promenades, being five times as large as the cluster of mean and narrow streets which forms the old town. Bagnères-de-Luchon has 48 springs, which vary in their composition and their temperature. About 50,000 strangers annually resort to these springs. Pop., 1901, 3260; 1906, 3465; 1911, 3415. The Romans gave it the name Thermæ Lixonienses, but for many centuries, even

throughout the Middle Ages, the place was deserted. Mégret d'Etigny, whose statue stands in the town, caused the waters to be analyzed in 1751 and drew attention to their medicinal properties, but the popularity of the place dates only from the beginning of the nineteenth century.

BAGNES, bȧn'y', or **BAZNE,** Val de. A picturesque valley in the canton of Valais, Switzerland, watered by the Dranse, a tributary of the Rhône. It is encircled by mountains, of which the highest are Grand Combin, 14,164 feet, and Mont Gelé, 11,000 feet. Glaciers are found in the valley, the largest being the Corbassière and the Grétroz. Waterfalls and gorges abound along the course of the river, and its current is very swift. It has frequently overflowed and inundated the valley, notably in 1818, when, dammed by the Grétroz Glacier, it broke through and swept away 500 dwellings, drowning a number of people. The chief town of the valley, Chable, is sometimes called Bagnes.

BAGNES. The convict prisons of France. Serious crimes in France were, till 1748, punished by terms of service in the galleys. In that year these were abolished, and the convicts were employed in hard labor in arsenals and other public works, and the prisons in which they were lodged were called *bagnes,* from the Italian *bagno,* literally 'a bath'—a name supposed to have originated in the fact that the slave prisons at Constantinople contained baths, or because they stood near the baths of the seraglio. The Legislative Assembly of 1791 and 1792 mitigated the sufferings of the convicts, and substituted, for the detested name *galères,* that of *travaux publics,* to which succeeded the *travaux forcés* of the Code Napoléon. The practice of branding criminals with a hot iron was not abolished until 1832. The latest existing institutions of this class were at Toulon, Brest, and Rochefort. The discipline of the bagnes was cruel. Men were always chained in couples and released only after the most exemplary behavior. Their food was miserable, and they were herded together at night like cattle. The labor of the convicts was turned to profitable account, and the various handicrafts were taught in the prison under the direction of overseers. The industrious and clever were enabled to earn small wages. Formerly the punishment of the galleys was inflicted for comparatively slight offenses, such as removing landmarks, begging, poaching; but hard labor in the bagnes was reserved exclusively for such as committed crimes which seriously menaced the public peace and personal safety. These prisons were abolished in 1854, and the convicts were gradually drafted off to French Guiana and New Caledonia. Toulon Prison was not emptied till 1870. To readers of Victor Hugo's *Les misérables* the bagnes are familiar as the home, during many years, of the hero, Jean Valjean. Consult Zaccone, *Histoire des bagnes* (Paris, 1875).

BAG'NET, Mr. and Mrs. Joe. A gallant exartilleryman and his wife in Dickens's *Bleak House.* They have three children, all named after the towns at which they were born, Malta, Quebec, and Woolwich.

BAGNI-DI-LUCCA, bȧ'nyē dē lu̇k'kȧ (It. Baths of Lucca). A spa much frequented in the summer, in north Italy, 15 miles northeast of Lucca (Map: Italy, E 3). There are hot springs of various temperatures from 96° to 133° F. scattered over a limited neighborhood. It consists of several villages in the cool and shady valley of the Lima. The springs number 100, and were known in the Middle Ages as the Baths of Corsena. Pop., 1881, 9205; 1901, 12,150; 1911, 12,939.

BAG'NIGGE WELLS. A London picnic ground in the reign of George II situated on Gray's Inn Road, across from the present Mecklenburg Square. It was elaborately laid out with promenades, flower beds, and shrubbery, and contained a large single-roomed hall for entertainments of various kinds. It contained medicinal springs and originally consisted of certain baths, founded in 1708 as a rival of Baine's cold-bath establishment. It was highly popular until about 1850.

BAGOBO, bȧ-gō'bō. A Malay people living in the Davao District, Mindanao. They build good houses, are fair agriculturists, and are the best clad of any wild tribe on the Philippines, yet despite this they practice many savage customs, including human sacrifice. Consult *Philippine Journal of Science,* vol. vi, No. 3 (June, 1911); also F. C. Cole, "Wild Tribes of Davao District," *Field Museum Publication* (1913).

BAG'OT, Sir Charles (1781–1843). An English diplomatist. He became Under-Secretary of State in 1807; special envoy to France in 1814; Minister Plenipotentiary to the United States in 1815; Ambassador to Russia in 1820 and to Holland in 1824, and special Ambassador to Austria in 1835. He became Governor-General of Canada in 1842 and died in office.

BAGOT, Richard (1860–1921). An English novelist. He was educated in private schools. In 1882 he became the private secretary of the Governor of Western Australia, Sir Frederick Napier Broome. His publications comprise the following: *A Roman Mystery* (1899); *Casting of Nets* (1901); *The Just and the Unjust* (1902); *Donna Diana* (1903); *Love's Proxy* (1904); *The Passport* (1905); *Temptation* (1907); *The Lakes of Northern Italy* (1907); *Anthony Cuthbert* (1908); *The House of Serravalla* (1910); *My Italian Year* (1911); *The Italians of To-Day* (1912; Am. ed., 1913); *Darneley Place* (1912; Am. ed., 1913).

BAG'PIPE. A wind instrument, which up to the eighteenth century was common in almost every country in Europe and still continues in use among the country people in Poland, Italy, Sicily, the south of France, Scotland, etc. It consists of a leather bag, which the player inflates by blowing with his mouth through a tube, as among the Scotch Highlanders, or by means of a small bellows. The music proceeds from three or four pipes, whose mouthpieces are inserted into the bag; the wind being forced out by pressing the bag under the arm. One of the pipes, the *chanter,* is a primitive oboe with eight holes; the others, called *drones,* sound each only one continuous low note. It is certain that the bagpipe was in use among the Hebrews and Greeks, and there is enough evidence that in Germany and elsewhere in Europe it was among the most favorite instruments in the fifteenth century.

Though fallen generally into disuse, with the growth of musical refinement, the bagpipe is still a popular instrument in the Highlands of Scotland, and at gatherings of Highlanders, and even of Lowland Scotch, in America and other countries. Pipers in proper costume are also attached to the Highland regiments in England, and in some instances pipers are retained by Scottish noblemen to play on festive occasions.

Skill in playing the bagpipe is promoted by various Highland societies, which at periodical competitions give prizes to the best players of pibrochs, reels, and other airs. Consult E. de Bicqueville, *Les Musettes* (Paris, 1894), and W. H. Grattan-Flood, *The Bagpipe* (London, 1911).

BAG'RADAS. An eastern Algerian river, now called Medjerda. Its length is about 200 miles, and it opens into the Gulf of Tunis.

BAGRATIDES, băg'rȧ-tīdz, or **PAGRATIDES,** păg'rȧ-tīdz. A noble family of Armenia, descended from the ancient Jews, and converted to Christianity about the close of the third century. In 743 they were made hereditary governors of Armenia by the caliphs, and in 885 the first king of the line was crowned. The dynasty was extinguished in 1079 by the Byzantines. A line of Bagratides ruled in Georgia until 1802, when the last king ceded his territory to Alexander I and became a prince of the Russian Empire.

BAGRATION, bȧ-grä'tô-ôn', Peter Ivanovitch, Prince (1765–1812). A distinguished Russian general, descended from the noble family of the Bagratides of Georgia. He entered the Russian service in 1782 and was trained under Suvaroff. In 1788 he was engaged at the storming of Oczakov, fought in 1792 and 1794 against the Poles, in 1799 in Italy and Switzerland, and distinguished himself in the Austro-Russian War of 1805 against the French, especially in the sanguinary engagement of November 16 of that year at Hollabrun, when, with a small body of troops, he bravely stood during six hours opposed to the superior forces under Murat, and thus enabled the Russian general, Kutusoff, to reach Znaim with the main army. Subsequently Prince Bagration was engaged in the battles of Austerlitz, Eylau, Heilsberg, and Friedland, and took part in the Russian campaign against the Turks, being defeated in the battle of Tartaritza, 1809. In the campaign of 1812 he commanded the Second Russian Army of the West, and had the misfortune to fail in his attack on Davout, near Mohilev, but succeeded in forming a junction with the First Army of Smolensk. He was mortally wounded in the battle of Borodino and died on October 7.

BAG'SHOT BEDS (found in Bagshot Heath in Surrey). A series of sands belonging to the Middle and Upper Eocene of Great Britain. They rest on the true London clay, but their best development is on the Isle of Wight, where a thickness of at least 660 feet is recorded. Certain beds of the series are rich in reptilian and fish remains, as well as in those of mollusks.

BAGSHOT HEATH. A level stretch of country near the English counties of Surrey and Berkshire, once the place of many a highway robbery.

BAG'STOCK, Major Joe. A character in Dickens's *Dombey and Son.* He is fat, purple-cheeked, martial of speech, and apoplectic. He dines with amazing frequency and heartiness at Mr. Dombey's during that worthy's palmy days; but after the failure of Dombey and Son he severs the acquaintance in words of injured dignity. He lives opposite Miss Tox and is not without an interest in her matrimonial prospects.

BAGUIÓ, bä-gē-ō'. A town of Luzon, Philippines, capital of the province of Benguet, 4 miles north of Dagupan, the former capital, with which it is connected by rail. It is a health resort for the American troops, has a large sanitarium, and is the seat of government during the summer months. Pop., 1903, 489.

BAG'WORM, or **BAS'KET WORM.** The caterpillar of a moth (*Thyridopteryx ephemeræformis*) common throughout the northern United States, which spins a silken bag as a protection and moves about with it, head downward. It is enlarged as the larva grows, and at last is fastened to a tree branch at one end; within this the caterpillar transforms to pupa, and there the wingless female lays her eggs. The male is a fully winged moth, with dark body and light-colored wings. Bagworms often swarm in city parks and similar situations, and defoliate shade trees, unless the cocoons are collected and destroyed. Compare Faggot Worm.

BAHADUR, bȧ-hȧ'dụr, Shah (c.1767–1862). The last Great Mogul of the House of Tamerlane, who was nominal ruler from 1837 to 1857. For 70 years preceding his accession, however, the East India Company had been firmly established as the controlling force in the Mogul's realm. When he was 90 years old, the Mohammedans of Hindustan made him leader of the movement to reëstablish the Mogul Empire. He took refuge in the tomb of his ancestors when Delhi was captured by the British, but was taken prisoner, tried for rebellion and complicity in the murder of Europeans, and banished to Rangoon, under a sentence of imprisonment for life. He wrote a large number of songs, which were published under the title of *Safar* ('Victory'), and was regarded as the most gifted of the modern poets of Delhi.

BAHALUL, bä'hȧ-lōōl'. A character in *The Arabian Nights.* He is nicknamed "The Crazy" and is a fool of Harun al-Rashid's court.

BAHA'MAS. A group (the most northerly) of the British West Indian islands, situated in the Atlantic Ocean, between lat. 21° and 27° 31′ N., southeast of Florida and north of Cuba and Haiti (Map: West Indies, D 1). Including the reefs, they number over 3000, of which only about 20 are inhabited. The principal islands are New Providence, Abaco, Harbor Island, Great Bahama, Andros Island, etc. Total area of the group, 4403½ square miles. The islands are long and narrow, with a generally low surface, the highest point attaining an altitude of a little above 410 feet; they are comparatively fertile. Some of the larger islands have a valuable growth of timber. Cotton, which in former times was a staple product, is now little grown (export, 1911, £361), but efforts are being made to revive the industry. Sisal cultivation is important, the estimated area under this plant in 1911 being 20,000 acres, and the output for the year 6,672,780 pounds, valued at £44,855. Other products are maize, pineapples, oranges, grapes, etc. Fishing for sponges and other marine products is one of the important occupations. The climate, although moist, is not unhealthful for whites, though among the negroes there is a high rate of mortality from pulmonary complaints. The mild winter temperature has made the islands, particularly New Providence (the most important, with an area of 85 square miles), a popular health resort.

The imports into the Bahamas in 1911, principally textiles and flour, amounted to £311,095 (£306,098 in 1902), while the exports were valued at £209,251 (£207,601 in 1902). The principal articles of export are sponges, fibre, turtle shell, etc.

The islands are administered by a governor,

assisted by executive and legislative councils of nine members each, and a representative assembly of 29 members. The revenue and expenditures of the colony for 1911–12 amounted to £85,592 (£72,442 in 1902–03) and £82,676 (£74,613) respectively. The capital, Nassau (q.v.), is on New Providence; a United States consul is stationed there. Total population of the Bahamas in 1881, 43,521; 1901, 53,735; 1911, 55,944.

The Bahamas were discovered by Columbus in 1492, though the exact locality of his first landing has been the subject of considerable dispute. (See WATLING'S ISLAND; SAN SALVADOR; GUANAHANI; COLUMBUS, CHRISTOPHER.) The English in 1629 established a settlement on New Providence, from which they were driven by the Spaniards in 1641, in 1680, and again in 1703. In 1703 the settlement was abandoned, and the islands became notorious as the rendezvous of pirates and the scene of wild disorders, until recovered by the British in 1718. Again driven out by the Spaniards (1781), the British were finally confirmed (1783) in their possession. During the Revolution the Bahamas gave refuge to a number of American Tories, whose wealth and slave labor aided materially in the development of the islands. The blockade of the Southern ports during the Civil War made Nassau the chief station in the blockade-running trade and increased the commerce of the islands to an enormous extent. The Bahamas have suffered severely from hurricanes, notably in 1866, 1883, and 1908; and disastrous droughts have occurred. In 1848 the Turks and Caicos islands were separated from the other Bahamas and joined to Jamaica for administrative purposes. Consult *British Empire Series* (London, 1900), and G. B. Shattuck, *The Bahama Islands* (New York, 1905). For further references, see WEST INDIES.

BAHAR, bȧ-hȧr′. See BEHAR.

BAHAWALPUR, bȧ-hä′wȧl-po͝or′, or **BHAWALPUR**, b′hä′wȧl-po͝or′. One of the native states of the Punjab, India, in lat. 27° 41′ to 30° 25′ N., and long. 69° 30′ to 73° 58′ E., with an area of 17,285 square miles (Map: India, B 3). Pop., 1891, 650,000; 1901, 720,700; 1911, 780,641. The country is remarkably level, and, in spite of various irrigation projects, approximately only one-sixth is capable of cultivation, the fertile portion skirting the Ghara and the Indus. Beasts of chase, such as tigers and boars, abound; domestic animals, camels, kine, buffaloes, goats, and broad-tailed sheep, are raised. The principal exports are cotton, sugar, indigo, hides, drugs, dyestuffs, and wool. The principal imports are the wares of Britain. Bahawalpur is traversed by the Punjab Railway. It is one of the most important Mohammedan states in the district.

BAHAWALPUR, or **BHAWALPUR** (*Bhawal* Khan, name of a ruler + Skt. *pur*, city). The capital of the native state of the same name, India, situated 65 miles by rail from Multan, on a tributary of the Ghara, in lat. 29° 24′ N. (Map: India, B 3). It has a circuit of 4 miles—part, however, of the inclosed space being occupied by groves of trees. Bahawalpur has manufactures of silk scarfs and turbans, chintzes, and other cottons, and the immediate neighborhood is remarkably fertile, producing grain, sugar, indigo, tobacco, and butter, with an abundance of mangoes, oranges, apples, and other fruits in perfection. For external commerce Bahawalpur is favorably placed. It stands at the junction of three routes from the east, southeast, and south; while, toward the north, the Hindu merchants have dealings with Bokhara and even with Astrakhan. Pop., 1901, 18,716.

BAHÍA, bä-ē′ȧ. An eastern state of Brazil, bounded by Pernambuco and Piauhy on the north, Goyaz on the west, Minas Geraes on the south, and the Atlantic Ocean on the east. It has an area of 164,649 square miles. The slightly indented coast is well wooded and is the most fertile part of the state. In the interior the land rises in terraces and forms numerous elevated plateaus, mostly unfit for agricultural purposes. The northern part is taken up by the desert tracts called *sertaos*. The chief river is the São Francisco, which crosses the state from south to north. There are also a number of smaller streams flowing toward the Atlantic, such as the Paraguassu, Itapicuru, and the Rio de Contas, the first two navigable by steamers. The climate is hot and moist on the coast and dry in the interior. In the eastern part tobacco, sugar, cotton, tropical fruits, coffee, and cocoa are raised, and the cultivation of rubber trees has been introduced; but in the west grazing is the most important industry. Gold and diamonds are mined chiefly in the Sierra da Assurua, about the Paraguassu River, while salt and saltpetre are found in many other parts of the state. The commerce is to a large extent with Great Britain and France, and the exports consist of tobacco (used chiefly in the manufacture of cigars, about 70,000,000 being produced yearly), sugar, rubber, coffee, diamonds, and skins. The chief railway line is the Bahía-São Francisco, mostly owned by the state. There is another line from São Amaro to Bom Jardim. Pop., 1890, 1,919,802; 1910 (est.), 2,335,000. Capital, Bahía. Consult *Almanak administrativo do estado do Bahia* (Bahía, 1898); Branner, "The Geography of Northeastern Bahía," *Geographical Journal*, vol. xxxviii (London, 1911).

BAHÍA (Sp. and Portug. bay), or São Salvador de la Bahía de Todos os Santos. Capital of the state of Bahía, Brazil, the second city of the country, and the seat of an archbishop, who is primate of Brazil (Map: Brazil, K 6). It is situated on the east shore of the Bahía de Todos os Santos, or Bay of All Saints, from which it takes its name. It is 440 miles southwest of Pernambuco and 800 miles northeast of Rio Janeiro, with both of which cities it has communication by steamship and telegraphic cables. The city is divided into the *cicade baixa*, or lower city, and the *cicade alta*, or upper city. The former is the business quarter, with narrow, close, and dirty streets, while the upper city is clean and cool and commands a magnificent view. Hydraulic elevators connect the two parts of the city, and passenger traffic is also effected between them by means of *cadeiras*, or sedan chairs, the streets being so steep that carriages in many places cannot pass along them. The upper section is pleasantly surrounded by gardens of orange and banana trees and contains some fine buildings, notably the cathedral and the palace of the archbishop. The former edifice, the finest basilica in Brazil, constructed from marble brought from Europe, was the church of the Jesuits. The principal educational institutions are the university, normal school, medical college, museum, and a public library. Electric street railways traverse the city and suburbs, and Bahía is the starting

point and terminus of a railway to the interior. The harbor, protected by the natural breakwater formed by the island of Itaparica, is excellent. It has a circumference of more than 112 miles and is everywhere deep enough for the largest vessels. Extensive improvements were begun in 1909, with the result that the modern facilities instituted permit the mooring along the new docks of the largest ships. Heretofore only small boats could unload at the quays because of the heavy ground swell from the open sea. The ocean liners of the chief maritime powers of the world are represented in the shipping trade of Bahía. The bay and city are defended by an extensive system of fortifications, making it the most strongly protected town in Brazil. Of these defenses the best is the Fort do Mar, or Sea Fort, perched on an artificially enlarged rocky islet in the middle of the harbor.

The city has numerous industries. For upward of half a century Bahía has been the largest producer of cotton cloth, and also the supply base of northern Brazil for shoes, boots, and hats. It has considerable coast trade, the leading exports being sugar, cotton, coffee, hides, dyewoods, jute wares, and tobacco—its snuff having a widespread reputation. In spite of customs restrictions which prevent the full expansion of its trade, imports in 1912 amounted to nearly $17,000,000. Bahía is the seat of a United States consul. It is the oldest city in Brazil; Amerigo Vespucci first entered its bay in 1503; from its foundation, in 1510, by the Portuguese navigator Correa, till 1763, it was the capital of the country. It fell into the hands of Holland in 1624, but not long after was regained by Portugal, remaining in her possession till 1824, more than a year after the proclamation of independence in the rest of Brazil. Pop., 1890, 174,412; 1911 (est.), 290,000.

BAHÍA BLANCA, blän′kȧ (Sp. White Bay). A port of Argentina in the southern part of the province of Buenos Aires, about 450 miles by rail southwest of the capital of the country (Map: Argentina, E 11). The site was occupied as a trading post about 1829, but its development industrially did not begin until 1885. Situated on the Neposta River 3 miles from its entrance into the bay of Bahía Blanca, which offers one of the best harbors along this section of the coast, it is the natural outlet for trade of an extensive fertile region adjacent. The city is in direct steamship connection with European ports. It is well built, well paved, and possesses fine buildings, plazas, parks, hospitals, and all modern conveniences. It is an important railroad centre, and this fact, together with its well-sheltered harbor, has greatly enhanced trade, which has been very active since the beginning of the twentieth century. In 1912 the value of imports amounted to nearly 12,000,000 pesos, while the value of its export trade totaled 69,000,000 pesos. The leading articles of the latter are wool and grain. The Argentine government has established this port as its principal naval base. The United States is represented by a consular agent. Pop., 1901, 14,238; 1912, 72,706.

BAHÍA HONDA, ōn′dȧ (Sp. Deep Bay). A harbor on the north coast of Cuba, in the province of Pinar del Rio, about 55 miles west of Havana (Map: Cuba, B 4). The harbor is one of the best on the island, 5 miles long by 3 miles wide, with a depth of 18 to 36 feet. The town of Bahía Honda is distant about 2 miles. Sugar and tobacco are cultivated to a considerable extent in the vicinity, and there are copper and coal mines. At Aguacate are sulphur springs. Pop., Bahía Honda and Aguacate, in 1899, 1278.

BAHMAN, bä′mȧn, PRINCE. A character in "The Two Envious Sisters," a tale of the *Arabian Nights.* Leaving home in quest of adventure, he committed to his sister Parisadê a knife whose magic would reveal to her how he fared.

BAHNASA, bȧ-nä′sȧ, or **BEHNESA,** bē-nä′sȧ. A town of central Egypt, situated on the Bahr Yusuf (Joseph Canal) (Map: Egypt, C 2). It occupies the site of the ancient Oxyrhyncus, or Pempte, the capital of a nome in which the fish Oxyrhyncus ('sharp-snouted') was held sacred. Plutarch relates that a feud arose between this city and its neighbor, Cynopolis (Gk. *κύων,* dog + *πόλις,* city), where the dog was revered, on account of mutual insults and injuries to their respective sacred animals. Under the Ptolemaic Dynasty Oxyrhyncus was the seat of a Greek colony, and after the establishment of Christianity it became a city of convents, containing at one time more than 20,000 monks and nuns. Excavations conducted by Grenfell in the neighborhood in 1897 resulted in the discovery of a large number of valuable Greek papyri, including portions of the New Testament and of the works of classical authors (Homer, Herodotus, Thucydides, Sophocles, etc.), some letters, and many legal and commercial documents, illustrating life in Egypt during the Greek and Roman periods. The most important of these papyri have been edited, with translation and notes, by Grenfell and Hunt, under the title *The Oxyrhyncus Papyri* (2 parts, London, 1898–99). The name "Bahnasa" is sometimes applied to the oasis of Bahriyer, near the town.

BAHR, bär (Ar. a body of water). The Arabic word for sea, also applied to lakes and rivers. BAHR-EL-ABIAD, ä-bē-yäd′ (the White River), and BAHR-EL-AZRAK, el-äz′rĕk (the Blue River), are the chief branches of the Nile. BAHR-EL-YEMEN, el-yā′mĕn, is the Red Sea, and BAHR LUT, lōōt, the Dead Sea.

BÄHR, bär, GEORG (1666–1738). A German architect. He was born at Fürstenwalde, Prussia. As master builder for the municipality of Dresden he constructed the celebrated Frauenkirche, or Church of Our Lady (1726–40), in that city, which is considered one of the most perfect examples of the baroque style in Germany. He was famous as a builder of Protestant churches, and also erected a number of hotels in Dresden, such as the Hôtel de Saxe (1713–17) and the British Hotel (1720).

BAHR, bär, HERMANN (1863–). A prominent Austrian author and journalist, born at Linz. He studied philosophy, law, and political economy in the universities of Vienna, Gratz, Czernowitz, and Berlin, traveled extensively, and finally made his home in Vienna. In 1890 he became associate editor of the *Berliner Freie Bühne* (*Free Stage*), and in 1892 and 1893 was associate editor and critic of the *Deutscher Zeitung.* In 1894 he began to publish *Die Zeit,* and at other times edited the *Neue Wiene Tageblatt* and the *Oesterreichische Volkszeitung.* In 1906 he became manager of the Deutsches Theater in Berlin. Bahr appeared as an acute critic of the theories of life exploited in modern German and French literature. Although he began his literary career as a naturalist, he later attacked

this school, and tried to introduce into German and Austrian literature some of the features of the French symbolists and "decadents." This effort is especially pronounced in his *Zur Kritik der Moderne* (1890), *Die Ueberwindung des Naturalismus* (1891), and *Neue Studien* (1891). His later critique is contained in *Bildung* (1900), *Secession* (1900), *Premièren* (1902), and *Dialog vom Tragischen* (1903). His novels include *Die gute Schule* (1890); *Dora* (1893); *Neben der Liebe* (1893); *Stimmen des Bluts* (1909). Among his romances are *O Mensch!* (1910) and *Druf* (4th ed., 1910). Among his plays are *Die neuen Menschen* (1887); *Die Mutter* (1891); *Die häusliche Frau* (1893); *Der Apostel* (1901); *Der Krampus* (1902); *Der Meister* (1904); *Sanna* (1905); *Die Andere* (1905); *Das Konzert* (5th ed., 1909); *Die Kinder* (1911); *Das Prinzip* (1912). He also published the politico-controversial work, *Die Einsichtslosigkeit des Herrn Schäffle* (1886) and a volume of *Essays* (1912).

BÄHR, bâr, JOHANN CHRISTIAN FELIX (1798–1872). A German classical scholar, born at Darmstadt. He studied at Heidelberg, where he gained the favor and friendship of Creuzer, whose symbolic system of interpretation in mythological matters he himself pursued at a later period. He was elected a professor at Heidelberg in 1821. Previous to this he had occupied himself chiefly with the elucidation and criticism of Plutarch, the result of which was an annotated edition of *Alcibiades* (Heidelberg, 1822), and of his *Philopœmen, Flaminius, Pyrrhus* (Leipzig, 1826). At the same time he collected and published the fragments of Ctesias (1824). But a greater interest was excited by his *Geschichte der römischen Litteratur* (1828; 4th ed., 1868–70), which is noted for its clearness and comprehensiveness. Three supplements to this work also appeared: *Die christlichen Dichter und Geschichtschreiber Roms* (1836; 2d ed., 1872), *Die christliche-römische Theologie* (1837), and *Geschichte der römischen Litteratur im karolingischen Zeitalter* (1840). One of his most important works is his elaborate and learned edition of Herodotus (1832–35). In 1835 he published his *De Universitate Constantinopoli Quinto Sæculo Conditâ.* He likewise contributed numerous articles to Jahn's *Jahrbücher für Philologie* and kindred publications.

BÄHR, OTTO (1817–95). A German jurist, born at Fulda. He studied law and political science at Marburg, Göttingen, and Heidelberg, and in 1849 became justice of the Supreme Court of Cassel. For his defense of the constitution during the struggle of 1850 he was made justice of the Supreme Court at Fulda in 1851, but in 1856 he was recalled to Cassel and in 1863 was made a member of the Court of Appeals. In 1867 he became a member of the new Court of Appeals established at Berlin for Alsace-Lorraine and was elected to the Reichstag from the city of Cassel and to the Prussian House of Deputies. He became a justice in the Imperial Court at Leipzig in 1879, but retired in 1881 on account of ill health. His most important writings are a highly esteemed monograph entitled *Die Anerkennung als Verpflichtungsgrund* (1855) and a treatise on political philosophy, *Der Rechtsstaat* (1864). He was also author of the *Gesammelte Aufsätze* (2 vols., Leipzig, 1895).

BAHRAICH, bâ-rīch′. The name of a district in the division of Faizabad, united provinces of Agra and Oudh, British India, and of a town, capital of the district, situated at the foot of the Himalayas, 65 miles northeast of Lucknow (Map: India, D 3). Area of district, 2650 square miles; pop., 1891, 1,000,400; 1901, 1,051,850. The town, on the junction line from Gonda to Basti, began to flourish when the railroad was built and has a considerable trade. It manufactures fireworks and native cloth. Many thousands of pilgrims are attracted every year to the shrine of Masaud, a Mohammedan saint. Pop., 1901, 27,304; 1911, 26,907.

BAHRAL, bä′ral. See BURHEL.

BAHRDT, bärt, KARL FRIEDRICH (1741–92). A German theologian of the extreme skeptical school. He was born Aug. 25, 1741, at Bischofswerda, in Saxony, and studied at Leipzig, where he soon displayed extraordinary talents, together with some defects of character. His early theological writings betrayed the skeptical tendencies which were afterward more fully developed. On account of his immoral conduct he was, in 1768, compelled to leave Leipzig, where he had been a popular preacher and professor. In Erfurt, his next residence, he was appointed professor of philosophy and Hebrew antiquities, but gave offense by his rationalistic teaching as well as by his mode of life. He wrote *Briefe über die systematische Theologie* (2 parts, 1770–71), and *Wünsche eines stummen Patrioten* (1770), two works whose heterodoxy involved him in controversies and made his position untenable. In 1771 he went to Giessen, where he delivered theological lectures and preached with approbation. His translation of the New Testament (1773) was regarded as so heretical that the author was deprived of the privilege of teaching (1775). His creed, in fact, was simple deism, and one of the chief points in his theology was his rejection of miracles. Even the immortality of the soul was not positively maintained in his work. From 1775 to 1779 he was most of the time in great straits and compelled to earn his support as best he might; but in 1779 he became professor of philosophy at Halle and won enormous popularity. But he overworked himself and so resigned his professorship. When the Wöllner edict of 1788 against rationalism appeared, he ridiculed it anonymously, but was condemned to a year's imprisonment at Magdeburg. He employed his leisure in writing his autobiography, which is not noted for veracity (1790). Released, in 1790, he opened an inn at Halle, where he lived with a mistress. He then wrote the best book of the many he produced, *System der moralischen Religion* (1719). He died at Halle, April 23, 1792. For his biography consult J. Leyser, *F. Bahrdt, sein Verhältniss zum Philanthropismus und zur neuern Pädagogik* (2d ed., Neustadt, 1870).

BAHREIN (bâ-rān′) **ISLANDS** (Ar. *Bahrein,* two seas). A group of islands under British protection, situated in lat. 26° N. and long. 50° 40′ E., on the west side of the Persian Gulf, lying mostly within the bay northwest of the Katar Peninsula (Map: Asia, E 6). Total area, 230 square miles. The chief island, called Bahrein, or Aval, has a north and south extent of 25 miles and a greatest breadth east and west of 9 miles; and while having flat, sandy coasts, yet is hilly in the interior. The soil is generally fertile, and the frequency of springs permits the somewhat extensive growing of eastern tropical fruit, such as figs and dates, and

of grains, particularly wheat and barley. The pearl fisheries, on banks submerged from 50 to 200 feet below the sea level, and extending for a distance of nearly 125 miles along the shore, form an important industry. In the interior are found many curious mound tombs of considerable size. An excellent breed of donkeys is raised, and the only manufactures are mats and cloth made from fibre. There are about 100 villages in the islands, but only two cities of considerable size: Manama, the chief trading centre; and Moharek, the capital, each with a population of about 25,000 in 1912. These islands have long been important trading points. Pop., 1890, 68,000; 1912 (est.), 90,000.

BAHR-EL-ASWAD. See ATBARA.

BAHR-EL-GHAZAL, bär'el-gȧ-zäl' (Ar. the river of gazelles). A western tributary of the upper White Nile, which it joins in about 90° N. lat. Through its affluents (the Bahr-el-Arab and others) it collects all the waters flowing southeastward from the highland of Darfur; also those flowing north through the Bahr-el-Ghazal Province (Jur, Jalo, etc.) east of the water parting between the Nile and Congo basins. The slope of the river is so exceedingly gentle that the current is slow, swamps spread far and wide, and immense barriers of vegetation are formed that make navigation very difficult.

BAIÆ, bī'ē, now BAJA. A famous watering place of the ancient Romans, situated on a beautiful bay in Campania, west of Puteoli (now Pozzuoli) and north of Cape Miseno. It was renowned for its lovely climate and scenery, its warm sulphur springs, and its excellent sea food, especially the oysters of the neighboring Lucrine Lake. Many wealthy Romans had villas here, and the shore is dotted to-day with the remains of ancient houses, baths, and temples. Even under the republic Baiæ was notorious for its loose morals, and under the emperors life there was marked by extreme luxury and sensuality. With the decline of the Roman power Baiæ rapidly lost its importance, and was finally abandoned because of its malarious atmosphere. Recently it has attained some importance as a naval station.

BAIER, bī'ĕr, JOHANN WILHELM (1647–95). A Lutheran divine. His *Compendium Theologiæ Positivæ* (Jena, 1686; many ed., rep., St. Louis, Mo., 1882) was long the principal manual used by Lutheran divinity students.

BAÏF, bȧ'ĕf', JEAN ANTOINE DE (1532–89). A French poet, born at Venice. He was a member of the Pléiade (q.v.) and is perhaps best known for his unsuccessful attempt to introduce into French poetry the rhymeless verse (*vers mesurés*) of the ancients. For the promotion of this, and of a further design for the simplification of French orthography, he founded an "Académie de poésie et de musique" (1567–84). His *Poésies choisies* have been edited by Becq de Fouquières (1874), and his *Mimes, enseignements, et proverbs* by Blanchemain (1880). Consult Nagel, *Die metrischen Verse J. A. de Baïf* (Leipzig, 1878), and Mathieu Augé-Chiquet, *La vie, les idées et l'œuvre de Jean Antoine de Baïf* (Paris, 1909).

BAIKAL, bī'käl' (Turk., Tatar *bai*, rich + *kal, kul*, lake, sea; Mongol, *Dalai-Nor*, holy sea). The third lake in point of size in Asia, and the largest fresh-water lake of the Continent; situated in the south of Siberia, in the government of Irkutsk, on the line of the Siberian Railway, in lat. 51° 28′ to 55° 50′ N., long. 103° 45′ to 110° 20′ E. (Map: Asia, K 3). It covers an area of 13,330 square miles and has a shore line of 1220 miles. Its length is 386 miles, and its breadth from 9 to 50 miles; height above the sea, 1587 feet; greatest depth, 5400 feet, making Baikal the deepest fresh-water lake of the world. The average depth is 820 feet, and the lake is divided by two areas of shallow water into three deep basins. Its waters are clear and transparent. The Baikal, Barguzin, and other mountains inclose the lake, which is fed by over 300 streams, the chief of which are the Selenga and Barguzin. Its outlet is by the lower Angara, a chief tributary of the Yenisei. Baikal has several islands, the largest of which is Olkhon. Petroleum wells, mineral and hot springs are found in the vicinity of the lake. Earthquakes occasionally occur. Baikal forms an important link in the chain of communication between Russia and China and has several commercial ports, the most important being Lisvinichnoe, whence the Angara carries its waters to the Yenisei. The Trans-Siberian Railway passes around its southern end. Of recent years steamboats have given a considerable impetus to its trade. Its sturgeon, salmon, and fresh-water seal fisheries are valuable, and large quantities of other fish are also taken. A peculiar fish, called the golomynka (*Comephorus baicalensis*), which is almost one mass of fat, yielding train oil, was at one time caught in immense numbers, but is now rather scarce. The surface of the lake is frozen from November to April, but traffic is carried on over the ice. Besides the Russians settled on the banks of the Selenga and Angara, the shores of Lake Baikal are also inhabited by tribes of the Buryats and Tunguses. Consult Drizhenko, "Exploration of Lake Baikal," in *Geographical Journal*, vol. ii (London, 1898); Woeikow, "Der Baikalsee," *Pet. Mitt.*, 56, Band, Heft. vi (1910).

BAIKIE, bā'kĭ, WILLIAM BALFOUR (1825–64). An English naturalist, traveler, and philologist. He was born at Kirkwall, Orkney, joined the British navy, and was made surgeon and naturalist to the Niger Expedition in 1854. The senior officer died before reaching Africa, and Baikie took command and explored the Niger for 250 miles. In 1857 he was sent on a second expedition, but his vessel was wrecked, and all his companions returned to England. He settled for a time, with none but native assistants, at the confluence of the Binue and the Niger. Within five years he opened the Niger to navigation, made roads, and established a market for the native trade. He studied and made vocabularies of nearly 50 native dialects, and translated into Haussa portions of the Bible and Prayer Book. He published *List of Books and Manuscripts Relating to Orkney* (with Kirkwall, 1847), *Historia Naturalis Orcadensis Zoölogy* (with R. Heddle, 1848), and *Observations on the Haussa and Fulfulde Languages* (1861).

BAIKTASHI, bīk-tä'shē, or **BEKTASCHI.** A mendicant order of dervishes (q.v.), which had its origin in the fourteenth century. It takes its name from Hadji Bektasch, a Mohammedan saint. It was he who christened the newly constituted troops of Murad I the Janizaries. Shortly after this the Bektaschi sprang up and from their common patron were associated with the troop until its destruction. The order was abolished in 1826.

BAIL (OF. *bailler*, to carry, give, deliver,

from Lat. *baiulare*, to carry a burden, from *baiulus*, porter, carrier). The delivering up of a person under arrest, or against whom personal proceedings have been instituted, to accepted sureties who give security for his appearance at the proper time before the court, or for his carrying out the judgment of the court. The form of this security is usually a bond executed by the sureties, or a recognizance (q.v.) acknowledged by them. The term "bail" is also commonly applied as well to the security given and to the persons who give the security.

Bail may be required either in a criminal or a civil case, but in the latter only when the *person* of a defaulting debtor is proceeded against. With the modern changes of the laws with respect to the arrest and confinement of a debtor, the applicability of bail in civil cases has very greatly decreased. A person who has been bailed is placed in the custody of the surety who gives bail for him. He may therefore be arrested by the surety at any time and surrendered to the court, and when this is done the responsibility of the surety at once ceases. The surety is bound to produce his principal at the specified time unless prevented by the sickness, death, or legal imprisonment of the principal. In obtaining possession of the person of the principal, the surety has the right to call upon the sheriff or other law officers to assist him. An accused person entitled to bail has a right to demand the privilege at any time between the arrest and the final judgment of the court. The responsibility of the surety ceases upon the appearance in court of the principal at the proper time. If he does not so appear, the bond given as security may at once be declared forfeited by the court; whereupon execution may issue as for any judgment, and collection may be made forthwith. Under the common law bail could not be demanded in cases of felony. By statute law in Great Britain, and now universally in the United States, however, bail can be demanded in all cases except those of capital offenses. Considerable discretion is left to the magistrate as to whether an offense may or may not be such as properly to admit of bail. Thus, where an assault has been committed under such circumstances as to make it murder if the injured person should die, and where there is reasonable probability that death may ensue, a magistrate in any of our States would refuse to accept bail.

Generally speaking, in the United States the common law is closely followed in the regulation of bail. The English Bill of Rights (1 Will. and M. 2, chap. 2), the Constitution of the United States (Amdts., Art. VIII) and those of the several States prescribe that excessive bail shall not be demanded. What excessive bail may be is generally left to the determination of the court, though the criminal codes of many States specify a minimum sum for each class of offenses against the law, a lower amount than which shall not be accepted as security in such cases. A *bail piece* was originally a certificate issued to the surety attesting his act of offering bail; at present it generally signifies a warrant issued to the surety upon which he may arrest the person for whom bail has been taken. The term *straw bail* is a familiar designation of bail offered by persons not possessing the requisite financial responsibility, but willing to swear that they do possess it. The term is said to have originated in the fact that in the English bankruptcy courts such rascals were always in waiting in the outer halls, and that it was their custom to carry straw fastened on the shoe to signify the kind of service they were willing to render. At the present day, in civil cases, bail cannot be required unless there is some allegation of fraud involved, such as that the defendant is suspected of the design of putting property out of the reach of the court, or where he is arrested in a debt proceeding, and affidavit is made that he is about to leave the State, or where a tort or personal injury of a malicious kind is alleged. The old distinction in civil cases between common bail (or bail below) and special bail (bail above or bail to the action) is, therefore, not now of such consequence as formerly. Common bail, or bail below, was in effect an undertaking that the defendant would appear before the court at the day and place named in the process; special bail was a more general undertaking, entered into after such appearance had been made, that the defendant should satisfy the judgment of the court in damages, debt, or costs, or, failing to do so, should surrender his person to the court. The statutes of the States and the practice of the courts usually require persons giving bail to be possessed of real estate or property not easily removable from the jurisdiction of the court. In admiralty bail is often required, in actions *in rem*, to procure the discharge of the property proceeded against. The bail is in the form of a stipulation, by which the owner of the seized property and his sureties undertake to pay and perform the final decree in the case. Consult the authorities referred to under PRACTICE.

BAILÉN, bī-lān'. A town in the province of Jaen, Spain, 20 miles north of Jaen (Map: Spain, D 3). It is celebrated as the place where, in July, 1808, the French general, Dupont, capitulated, surrendering 18,000 men to the Spaniards under Castaños—the first great disaster to the French arms in the Peninsular War. Galena and zinc blende are mined in the vicinity. Pop., 1900, 7420; 1910, 8334. Consult Galdós, "Bailén," in *Episodios nacionales*, vol. ii (Madrid, 1882).

BAILEY, bā'lī (OF. *baile*, ML. *ballium* = Lat. *vallum*, wall = a court). Originally the bailey was any outer line of defense; then, more specifically, the wall of the outer court of a feudal castle, or any of its inner walls of defense. Hence it came to mean the whole space inclosed within these walls, except that covered by the keep. (See CASTLE.) With the development of feudal architecture there were several distinct courts, with their buildings and embattled walls, and each was called a bailey. Thus, there were the outer, the middle, and the inner baileys. The entrance to the outer bailey was by a drawbridge over the moat and through a strong gate; it was often defended by a barbican (q.v.), and precautions were also taken to defend the inner baileys. Each bailey had its special function. (See CASTLE; GOTHIC ARCHITECTURE.) In towns the bailey meant the entire space inclosed within the walls, or *vallum*, and was used in connection with civil and criminal jurisdiction; hence the Old Bailey in London and the Bailey in Oxford. In France the governor of a town was long called a *bailli*, and his subordinates were bailiffs.

BAILEY, FLORENCE MERRIAM (1863–). An American writer on ornithology. She was born at Locust Grove, N. Y., studied at Smith

College, Northampton, Mass., and began writing of bird life in the intimate fashion made so popular by the essays of John Burroughs. Her *Birds Through an Opera Glass* (1889) directed attention to that method of observation. She also published *A-Birding on a Bronco* (1896), *Birds of Village and Field* (1898), and *Handbook of Birds of the Western United States* (1902).

BAILEY, Gamaliel (1807–59). An American journalist, prominent in the antislavery conflict. He was born at Mount Holly, N. J., the son of a Methodist preacher; graduated at the Jefferson Medical College, Philadelphia, in 1827; and for several months, after 1829, was the editor, at Baltimore, of *The Methodist Protestant*, the short-lived official organ of a radical offshoot of the Methodist Episcopal church. He went to Cincinnati in 1831, and was physician in the cholera hospital during the great cholera epidemic of that year. Converted to Abolitionism through the famous Lane Seminary debates of 1834, he thereafter took an active part in the anti-slavery conflict, and in 1836 assisted James G. Birney (q.v.) in establishing a weekly antislavery paper, *The Cincinnati Philanthropist*, of which he became proprietor and editor-in-chief in September, 1837. His press was repeatedly destroyed by mobs, and his life was often threatened, but he nevertheless continued his work until 1847 and after 1843 was editor also of a daily paper, *The Herald*, likewise established by himself. In 1847 he removed to Washington and became the editor of a newly established antislavery paper, *The National Era*, which under his management attained a wide circulation, exerted a powerful influence, and came to be regarded in many quarters as the central organ of Abolitionism. To this paper Mrs. Stowe, Whittier, Amos A. Phelps, and Mrs. Southworth were regular contributors, and it was in it that, in 1852, Mrs. Stowe's *Uncle Tom's Cabin* first appeared. In 1848 the *Era* office was besieged for three days by a proslavery mob, which finally dispersed under the influence of an eloquent address by Dr. Bailey. Consult an article, "A Pioneer Editor," in *The Atlantic Monthly*, vol. xvii (Boston, 1866).

BAILEY, Jacob Whitman (1811–57). An American naturalist, known as the pioneer in microscopic research in America. He was born at Auburn, Mass., and in 1832 graduated at West Point, where, after 1834, he was successively assistant professor, acting professor, and professor of chemistry, mineralogy, and geology. He devised various improvements in the construction of the microscope and made an extensive collection of microscopic objects and of algæ, which he left to the Boston Society of Natural History. In 1857 he was president of the American Association for the Advancement of Science. He wrote many articles on scientific subjects for the *American Journal of Science* and for scientific societies, a report on the infusorial fossils of California, and a valuable volume of *Microscopical Sketches*, containing more than 3000 original figures. A sketch of his life is given in the *American Journal of Science and Arts*, vol. xxv (New Haven, 1847).

BAILEY, James Montgomery (1841–94). An American journalist who won an ephemeral popularity as the "*Danbury News* Man." He was born at Albany, N. Y., and, after receiving a common-school education, learned the trade of a carpenter. He removed to Danbury, Conn., in 1860, and worked at his trade for the two following years, but found time to write occasionally for the newspapers. During the Civil War he served in the Seventeenth Connecticut Volunteers. In 1870 he established the *Danbury News*, for which he wrote the humorous sketches, sometimes original, often simply descriptive of commonplace happenings, which won for him a national reputation and made his paper known throughout the country. His first book, *Life in Danbury*, was published in 1873; it consisted of selections from his newspaper articles. His other publications were *The Danbury News Man's Almanac* (1873), *They All Do It* (1877), *England from a Back Window* (1878), *Mr. Phillips's Goneness* (1879), and *The Danbury Boom; with a Full Account of Mrs. Cobleigh's Action Therein* (1880).

BAILEY, Joseph (1827–67). An American soldier, born in Salem, Ohio. He entered the Federal army as captain in 1861, in 1862 was appointed acting engineer of the New Orleans defenses, and in 1863 was promoted to be lieutenant-colonel. When, in 1864, the Red River was found too shallow for the passage of Admiral Porter's gunboats, Bailey, in face of opposition from the engineers, superintended the construction of dams which deepened the water in mid-channel and thus permitted the vessels to descend. He was promoted to be brigadier-general in 1864, resigned from the army in 1865, and, having removed to Missouri, was killed there while performing his duties as sheriff.

BAILEY, Joseph Weldon (1863–). An American legislator, born in Copiah Co., Miss. He was admitted to the bar in 1883 and within a few years was brought into prominence by his interest in politics. Here his unusual ability as a speaker appeared at once. In 1888 Bailey, having removed in the meantime to Gainesville, Tex., was a presidential elector-at-large. Elected to the House of Representatives in 1891, he was continued there for 10 years, at the end of which time he was chosen to the United States Senate. He was reëlected Senator in 1907 for the term ending 1913, and in the latter year was not again a candidate. Senator Bailey gained a reputation during his period of service as one of the most conspicuous and picturesque figures in the Senate and as one of the most eloquently persuasive orators ever a member of that body. Identified with the conservative wing of the Democratic party, and a deep student of constitutional law, he was particularly opposed to "free" interpretations of the Constitution. While in the House and during his earlier years in the Senate he was noted for aggressiveness in debate, but later on he was less frequently heard from the floor. In 1911, on account of the action of Democratic Senators in voting to accept the radical constitution passed by the voters of Arizona, Senator Bailey handed in his resignation to the Governor of Texas. This he later withdrew, announcing, however, in 1912, that he would not be a candidate for reëlection, but would retire to the practice of law. His last speech in the Senate was a remarkable attack on the initiative, referendum, and recall, and all similar devices for bringing about so-called reforms in the State and national governments.

BAILEY, Liberty Hyde (1858–). An American horticulturist and botanist, rural sociologist, and agricultural educator. He was born at South Haven, Mich., graduated at Michi-

gan Agricultural College in 1882, and became professor of horticulture and landscape gardening in that institution, 1883. He was appointed to the chair of general and experimental horticulture at Cornell University in 1888–1903, when he became dean of the College of Agriculture and director of the experiment station there until his retirement in 1913. He made numerous important investigations in the science and practice of horticulture, rural economics and sociology, agricultural education, and general rural questions. He served as chairman of the Roosevelt Commission on Country Life in 1908–09. He has published a large number of scientific and popular works, contributed largely to technical journals and popular magazines, and written numerous poems on country life. He edited *The Cyclopedia of American Agriculture* (1907–09), the *Cyclopedia of American Horticulture* (1900–02), and the *Rural Science, Rural Textbook, Gardencraft,* and *Young Folks' Library* series of manuals. He was also author of much of this material and of many other works, notably *The Principles of Fruit-Growing* (1897); *The Nursery Book* (1897); *Plant-Breeding* (1897); *Sketch of the Evolution of our Native Fruits* (1898); *Principles of Agriculture* (1898); *The State and the Farmer* (1908); *The Nature Study Idea* (1909); *The Training of Farmers* (1909); *Manual of Gardening* (1910); *The Outlook to Nature* (1911); *The Country Life Movement* (1911); *The Practical Garden Book* (1913).

BAILEY, Nathan or Nathaniel (?–1742). An English lexicographer. He published *An Universal Etymological English Dictionary* in 1721, adding a supplementary volume in 1727. This work was so popular that by 1802 it had reached its thirtieth edition, and Johnson made a liberal use of it in preparing his own dictionary. Among Bailey's other works is *The Antiquities of London and Westminster* (1726). In 1883 the English Dialect Society reprinted the eighteenth-century dialect words preserved in Bailey's dictionary. This work was one of the sources from which Chatterton drew his pseudo Old English words.

BAILEY, Philip James (1816–1902). An English poet, born at Basford, Nottingham. He studied at the University of Glasgow and was called to the English bar in 1840, but never practiced. His first poem, *Festus,* begun before he was 20 years old, was published in 1839. It was received with great enthusiasm, its author being classed by many critics of the day with Shakespeare and Milton. This extravagant estimate was naturally succeeded by a reaction, and for many years *Festus* was practically forgotten. In 1900, however, a renewed interest was manifested in it, and something like a fair critical estimate of the poem was made. *Festus* does, in fact, contain many passages of great power, and its language is often striking and majestic. On the other hand, it is excessively rhetorical; and this defect gives, upon a second reading, the impression of artifice and insincerity, while some of its best lines are really variants of Shakespearean originals. It was followed by *The Angel World* (1850), *The Mystic* (1855), and *The Universal Hymn* (1867), all of which have since been made a part of *Festus.* Bailey also published *The Age,* a satire (1858). Consult the eleventh or Jubilee edition of *Festus* (London, 1889). See English Poetry, Spasmodic School of.

BAILEY, Samuel (1791–1870). An English writer on politics, political economy, philosophy, and criticism. He became a banker and at his death left £90,000 to his native town, Sheffield. His writings generally are distinguished by independent thinking, logical precision, and warm aspirations for the improvement of mankind. His treatises on the mind, while abounding in original suggestions, expand and enforce the views of the school of Locke in metaphysics and what is termed the doctrine of utility in morals. Among his works the following may be mentioned: *A Critical Dissertation on the Nature, Measures, and Causes of Value* (1825); *The Right of Primogeniture Examined* (1837); *Letters on the Philosophy of the Human Mind* (3 series, 1855, 1858, 1863); and *The Received Text of Shakespeare's Dramatic Writings and its Improvement* (1861–62).

BAILEY, Solon Irving (1854–). An American astronomer, born at Lisbon, N. H. He graduated in 1881 at Boston University and was subsequently appointed associate professor of astronomy at Harvard. In 1889 he established at Arequipa, Peru, a southern station of the Harvard Observatory, and in 1893, on the summit of Mount Misti at an elevation of 19,000 feet, the most loftily situated scientific station in the world. During 1908–09 he made astronomical observations and an investigation of climatic conditions in South Africa. Papers by him are to be found in the *Annals* of the Harvard Observatory. In addition, he published: *A Discussion of Variable Stars in the Cluster ω Centauri* (1902); an extensive work, *Peruvian Meteorology* (1902); *Recent Total Eclipses of the Sun* (1902).

BAILEY, Theodorus (1805–77). An American naval officer, born in Chateaugay, N. Y. He entered the navy in 1818, became lieutenant in 1827, was commissioned commander in 1849 and captain in 1855, and in 1861 was assigned to the command of the *Colorado* in the blockade of Pensacola. In 1862 he was second in command of the fleet sent under Farragut against New Orleans. He led the attack upon the forts and was dispatched by Farragut to demand the surrender of the city. He was promoted in the same year to be commodore, and was appointed commander of the Eastern Gulf blockading squadron, in which post it is said that in 18 months he captured more than 150 blockade runners. After the war he was commandant at the Portsmouth (N. H.) Navy Yard and in 1866 was retired with rank of rear-admiral.

BAILEY PEONAGE CASE. See Alabama, *History.*

BAIL'IE (Scotch for *bailiff*). A superior officer or magistrate of a municipal corporation in Scotland, with judicial authority within the city or burgh. In royal burghs the office is in some respects analogous to that of alderman in England. The chief magistrate of a Scotch corporation, called the provost (q.v.), and often one or more of the bailies, are, by virtue of their office, in the commission of the peace. There are also *bailies of regality* and *barony,* who are appointed by the superior or overlord of the manor (q.v.), with limited powers. There is a bailie for the sanctuary or abbey of Holyrood, appointed by the Duke of Hamilton as hereditary keeper and having jurisdiction within the precincts. See Bailiff.

BAIL'IFF (OF. *bailiff,* Fr. *bailli,* administrator, Low Lat. *bailivus,* from *baiulus,* carrier,

one who carries burdens, takes charge of). An officer exercising superintendence on behalf of some superior authority. Through all the changes of application the word has undergone in the course of history, it has denoted an overseer of some kind. At the Greek Imperial court in Constantinople, the chief tutor of the Imperial children was called *baiulus*. The same title seems also to have been given in Constantinople to the superintendent of the foreign merchants, who was appointed by the Venetians, and it may possibly be for this reason that the title *balio* came at length to be applied also to the Venetian ambassadors themselves. In France, the royal *baillis* were at one time commanders of the troops, administrators of the royal domains, and judges, each one in his district. Under the feudal system in England lords of manors or of the larger territorial units known as liberties or hundreds, enjoyed usually the right of administering justice in their domains and, as an incident of their jurisdiction, appointed bailiffs to superintend their courts of justice. As very little knowledge was required for these situations, and as they might be purchased, they were held in little estimation; and in later times, the bailiffs became standing characters on the stage, held up to ridicule on account of their ignorance and absurd pretensions. In some instances, however, the office of bailiff has been preserved in England as an office of dignity and authority, corresponding to that of sheriff, as in the case of the Bailiff of Dover Castle.

In modern English law the term "bailiff" means: (*a*) a superior servant or agent, in which sense the term is synonymous with *steward* or *factor;* and (*b*) an officer of the court, a tipstaff, a sheriff's officer or deputy. Its first application is to a person employed in the administration and charge of lands, goods, or chattels. The bailiff is liable in an action of account for the profits which he has made, or which he might, by proper industry and care, have made.

In the second sense in the English law bailiffs may be either officers appointed by the judges of certain courts, or, in more modern times, officers appointed over their respective districts by the sheriff to perform certain duties, including the service of process of arrest, collection of fines, and summoning of juries. The sheriff being answerable for their misdemeanors, bailiffs are usually bound in an obligation with sureties for the due execution of their office, and are then called *bound bailiffs*. *Special bailiffs* are officers appointed by the sheriff on the application of a party in a civil suit for some particular purpose, and the sheriff is not held responsible for their acts in this regard. In the United States the term "bailiff" is seldom used, the corresponding officer being the deputy or undersheriff. Deputies are of two classes: (1) general deputies, or those who by virtue of their appointment have authority to execute all the ordinary duties pertaining to the sheriff's office; and (2) special deputies, or officers *pro hac vice*, to execute particular processes for a special purpose. See SHERIFF.

BAILIFF'S DAUGH'TER OF ISLINGTON, ĭz'lĭng-tŭn, THE. An old ballad in Bishop Percy's *Reliques of Ancient English Poetry*. The heroine, after dismissing her lover, finds him seven years later in London.

BAIL'IWICK (*bailiff, bailie* + *wick*, AS. *wīc*, village, from Lat. *vicus*, village). In English law, the district within which a sheriff may exercise jurisdiction. Thus bailiwick is generally synonymous with county, and as such includes the limits within which a sheriff's deputies may execute process. The term is said by Blackstone to have been introduced into England by the Normans "in imitation of the French, whose territory is divided into bailiwicks, as that of England into counties." The term is not in use in the United States. See BAILIFF; SHERIFF.

BAILLARGER, bå'yär'zhå', JULES GABRIEL FRANÇOIS (1809–91). A French physician; born at Montbazon (Indre-et-Loire). He devoted himself principally to mental disorders, and in 1842 obtained a prize from the Academy of Medicine for his admirable essay entitled *Des hallucinations, des causes qui les produisent et des maladies qu'elles caractérisent*, published in vol. xiii of the *Mémoires* of the society. In association with Longet and Cerise, he founded in 1843 a review especially devoted to the study of nervous affections and mental diseases, under the title *Annales médico-psychologiques du système nerveux*. In recognition of his splendid services during the second outbreak of the cholera in 1849, Baillarger was decorated with the medal of the Legion of Honor.

BAILLET, bå'yå', ADRIEN (1649–1706). A French scholar and critic, born at Neuville-au-Hez, Beauvois, and educated there. In 1676 he was ordained to the priesthood, and in 1680 he became librarian to the advocate-general. His principal work is *Jugements des savants sur les principaux ouvrages des auteurs* (9 vols., 1685–86). He also wrote *Des satires personelles* (2 vols., 1689); *Vie de Descartes* (2 vols., 1691); *Les vies des saints* (3 vols., 1701).

BAILLEUL, bå'yĕl'. The chief town of a canton, arrondissement of Hazebrouck, in the department of Nord, France, 46½ miles southeast of Calais by rail (Map: France, N., H 2). It is picturesquely situated on rising ground north of the river Lys, near the Belgian frontier. It is a quaint town of Flemish origin; the church of Saint-Vaast dates from the fourteenth century, and the Hôtel-de-Ville from the fifteenth; there is a museum of antiquities and paintings. Handmade lace is the chief industry, but the town has also manufactures of woolens, leather, brandy, and pottery. Pop., 1896, 13,450; 1901, 11,899; 1906, 13,573; 1911, 13,251.

BAIL'LIE, LADY GRIZEL (1665–1746). A Scottish poet, born in Berwickshire. She was the daughter of the Scottish patriot, Sir Patrick Hume, afterward first Earl of Marchmont, and in 1684 supplied him with food during his concealment in the vault beneath Polwarth Church. She shared her father's exile in Utrecht (1686–88). In 1692 she married the son of Robert Baillie, of Jerviswood. Some ballads written by her are preserved in Allan Ramsay's *Tea-Table Miscellany* (1724–27). The best known of them is "And Were na my Heart Licht, I wad Dee."

BAILLIE, HARRY. The shrewd proprietor of the Tabard Inn, in Chaucer's *Canterbury Tales*. It is in his hostelry that the pilgrims pass the first night of their journey, and in the morning he decides to continue on the road with them. He acts as the toastmaster of this literary feast, linking the different tales together by his little prefatory speeches.

BAILLIE, JOANNA (1762–1851). A Scottish

dramatist and poet born Sept. 11, 1762, at Bothwell, in Lanarkshire. In 1784 she went to reside in London, where her brother was a physician. Here and in Hampstead she remained till her death, Feb. 23, 1851. Through her long life she enjoyed a large share of the esteem and affection of her literary contemporaries. Her greatest achievement is undoubtedly the *Plays on the Passions*, which, though erroneous in conception, are full of noble and impressive poetry, and often display intense dramatic power. The principle upon which Miss Baillie proceeded in the construction of these plays was to take as the subject of each some passion, like hate, love, fear, or remorse, and to exhibit its influence on a character supposed to be actuated by nothing else. The leading personages of Miss Baillie's plays are, therefore, rather personifications of certain elements of human nature than genuine human beings. Still, there are scenes, in her tragedies especially, where the interest of the reader is intensely excited by the great art shown in her minute delineation of a particular passion, and where he is forced to forget the artificial theory underlying it. The first volume of the *Plays on the Passions* appeared in 1798 and met with remarkable success. Four years afterward she published a second volume; in 1804, *Miscellaneous Plays;* in 1812, the third volume of her *Plays on the Passions;* and in 1836, three volumes of dramatic poetry. The most popular, as well as the most powerful of her works, is the tragedy of *De Montfort*. It was performed in London, when Charles Kemble acted for 11 nights the character of the hero. Many of Miss Baillie's minor pieces are very sweet, simple, and beautiful; some of them are humorous ballads and poems in the Scottish dialect. Consult Baillie, *Dramatic and Poetical Works* (London, 1851), and Thackeray-Ritchie, *Book of Sibyls* (London, 1883).

BAILLIE, Matthew (1761–1823). A Scottish anatomist, born in Lanarkshire. He received his education at the universities of Glasgow and Oxford and subsequently continued his anatomical studies in London. In 1795 he published a small work entitled *The Morbid Anatomy of Some of the Most Important Parts of the Human Body*, which had a remarkable influence on the study of medicine and excited a spirit of careful induction among professional men. In 1799 Baillie relinquished his anatomical lectureship, in 1800 his position at St. George's Hospital, and after 1810 he acted as physician to the King.

BAILLIE, Robert (1599–1662). A Scottish Presbyterian clergyman. He was born at Glasgow and was educated in its university. In 1622 he was episcopally ordained, and (1631) was settled in Kilwinning. In 1640 he was one of the commissioners to go to London to prepare charges against Archbishop Laud. In 1642 he was appointed first professor of divinity at Glasgow; in the next year he sat as a commissioner in the Westminster Assembly of Divines and there asserted the divine right of presbytery as intolerantly as the churchmen had asserted the divine right of episcopacy. In 1649 he was one of the delegation sent to Holland to ask Charles II to accept the covenant and crown of Scotland. In 1661 he was made principal of Glasgow University. He died there in July, 1662. He was one of the most learned and accomplished of the Scottish clergy. His *Letters and Journals* (1637–62, best ed. by David Laing, 3 vols., Edinburgh, 1841–42) is a valuable contribution to knowledge of the times.

BAILLIE-GROH'MAN, William Arthur (1851–). An English sportsman and author. He was educated in England and on the Continent, had wide experience in the pursuit of big game, and as a rifle shot won about 70 prizes in America and Europe. His collection of prints and books pertaining to the chase is considered valuable. He was appointed a justice of the peace in British Columbia and published *Tyrol and the Tyrolese* (1876), *Sport in the Alps* (1896), *Sport and Life in North America* (1900), and other similar works.

BAILLIE OF JER'VISWOOD, Robert (?–1684). A Scottish patriot and martyr to the cause of civic liberty. He was a native of Lanarkshire and came into prominence in 1676 by opposing the tyranny of the Duke of Lauderdale, the favorite of Charles II, in the illegal arrest of a relative. By means of an antedated warrant Baillie himself was thrown into prison and, indignantly refusing to pay the fine inflicted, was kept there four months, but was finally released on paying one-half of the amount demanded. After this he was a marked man and on the discovery of the Rye House Plot was arrested on no stronger evidence than certain letters, really of a non-compromising character, to the leaders of the Puritan party in London. He was kept in prison 20 months and became seriously ill. At last, in a dying condition, he was brought before the High Court in Edinburgh on a charge of treason, and although no valid evidence was presented to show his complicity in the plot, was adjudged guilty on the morning of Dec. 24, 1684, and barbarously hanged the same afternoon. His bearing throughout was dignified and heroic, and he has been called the "Scottish Algernon Sidney." His son married the poet Lady Grizel Baillie (q.v.). Consult *The Tryal and Process of High Treson and Doom of Forfaulture Against Mr. Robert Baillie of Jerviswood, Traitor* (London, 1685).

BAILLOT, bä'yō', Pierre Marie François de Sales (1771–1842). A French violinist and composer. He was born at Passy and died at Paris. After receiving his musical education in Paris and Rome, he appeared in public in 1791, and in 1795 became professor of the violin in the Paris Conservatoire, which post he held until his death. He studied harmony and counterpoint under Catel and Cherubini, became a member of Napoleon's private orchestra in 1802, traveled in Russia in 1805–08, and in 1814 organized chamber-music concerts in Paris, which gained him reputation as a quartette player. In 1815–16 he made a tour in Holland, Belgium, and England, and became a member of the London Philharmonic Society. He was director of the orchestra at the Paris Opera in 1821–31, of the Concerts Spirituels in 1822–24, and of the Royal Orchestra in 1825. Baillot was the last great representative of the classical school of violin playing in Paris; he was famous as a teacher, and his *Méthode du violon*, adopted by the Conservatoire, was considered by Fétis one of the best works of its kind. His compositions are difficult and are almost forgotten. Consult Wasielewski, *Die Violine und ihre Meister* (Leipzig, 1893).

BAILLY, bä'yē', Antoine Nicolas (1810–92). A French architect, born in Paris. He executed various works as diocesan architect at Bourges, Valence, and Digne, and after 1860

erected in Paris the Lycée St. Louis and his most famous work, the Tribunal de Commerce. He was the first president of the Société des Artistes Françaises and an officer of the Legion of Honor.

BAILLY, JEAN SYLVAIN (1736–93). A French savant. He was born in Paris. Originally intended by his father to be an artist, he first turned aside into literature, until, becoming acquainted with Lacaille, he was induced to study astronomy, which proved to be the true sphere of his genius. In 1763 he presented to the Académie des Sciences his *Lunar Observations;* in 1766 appeared his *Essai sur la théorie des satellites de Jupiter,* and in 1771 a treatise on the light of these satellites. His historico-scientific works, *Histoire de l'astronomie ancienne* (1775), *Histoire de l'astronomie moderne* (3 vols., 1779–82), *Traité de l'astronomie indienne et orientale* (1787), are full of learning and ingenious disquisition and written with great elegance. In 1777 he published his *Lettres au l'origine des sciences,* and in 1779 his *Lettres sur l'Atlantide de Platon.* In 1784 he was elected a member of the Académie Française and in the following year of the Académie des Inscriptions. The *éloges* which he wrote about this period for the Académie des Sciences, viz., those on Charles V, Molière, Corneille, Lacaille, Leibnitz, Cook, and Gresset, were very highly praised. The Revolution interrupted his peaceful studies. During the earlier part of it he occupied a very prominent position. Elected president of the National Assembly, June 17, 1789, and mayor of Paris on the 15th of July, he conducted himself in these capacities with great integrity and purity of purpose; but at last lost his popularity by allowing the National Guard to fire on the masses who were assembled in the Champs de Mars, on the 17th of July, 1791, to demand the dethronement of the King. He now threw up his mayoralty, considering it impossible to satisfy either party, withdrew altogether from public affairs, and went to live first at Nantes, and afterward with his friend Laplace at Melun. Here he was seized by the Jacobin soldiery and brought to Paris, where he was accused of being a conspirator and was executed Nov. 12, 1793. Among his papers were found, and afterward published, an *Essai sur l'origine des fables et des religions anciennes* (1799), and *Mémoires d'un témoin oculaire de la Révolution* (1804). Consult Arago, *Biographie de Jean Sylvain Bailly* (1853) and Nourrisson, *Trois Révolutionaires: Turgot, Necker, Bailly* (1885).

BAIL'MENT (for derivation, see BAIL). A delivery of personal property by one party to another, to be held for the purpose and according to the terms of the delivery, and returned or delivered over when that purpose is accomplished. The party delivering the chattel is termed the *bailor;* the recipient, the *bailee.* A bailment is distinguished from a sale in that the identical thing delivered is to be restored in the same or an altered form and not its value in money or in a substituted article, and from a mortgage by the fact that in bailment there is no transfer of title. But so important is possession at the common law that the ownership is deemed to be divided between the bailor and bailee, the latter being said to have the "special property" in the bailed article, while the interest of the owner, sometimes described, by analogy to the law of real property, as a reversionary interest, is known as the "general property" therein. Bailments are generally divided into three classes, formerly designated by terms derived from the civil law: (1) that for the sole benefit of the bailor or the party whom he represents; (2) that for the sole benefit of the bailee or the party whom he represents; (3) that for the benefit of both parties. Familiar instances of bailment are the lending or hiring out of chattels, lien or the right to detain a chattel to enforce the payment of charges thereon, pledge or pawn and the custody of goods by an innkeeper or common carrier. As the common law is mainly concerned to protect possession, it is the bailee and not the owner of a chattel who is entitled to maintain the ordinary actions, such as trespass, trover, and replevin, for an interference with the bailed article while in the bailee's possession, although for a permanent injury done to the chattel, the bailor may prosecute a special action for the inquiry to his reversionary interest. The wilful destruction of the bailed article by the bailee or any unauthorized use thereof by him amounts to a conversion (q.v.) and ipso facto puts an end to the bailment. The important question, however, of the law of bailments is the determination of the obligations and liabilities of the respective parties in their several relationships. Thus, when the bailment is for the bailor's sole benefit, the bailee is required to exercise but slight care and is responsible only for gross negligence; but when wholly for the bailee's benefit, as a gratuitous loan, he must exercise the greatest care and is answerable for slight negligence; when the transaction is reciprocally beneficial to both parties, the bailee is required to exercise only ordinary care and is answerable only for ordinary neglect. It follows from this that a bailee, in the absence of special agreement, is not an insurer of the chattel placed in his hands and is not responsible for losses or damages necessarily incident to the purpose of the bailment; but he is liable for the violation of the obligation imposed by the terms of the contract, or for the misappropriation of the chattel or the misdirection of its use. By the common law an exception is made in the case of innkeepers and common carriers who are absolutely liable for the safe return of the goods intrusted to them, except from losses occurring by the act of God, the public enemy, or through the fault of the bailor. But this rule has been modified by statute in conformity with modern conditions, both in England and the United States; and the innkeeper may now, by providing a safe deposit and giving proper notice, require the guest to deposit his valuables, in default of which the innkeeper's liability does not exceed that of an ordinary bailee. It is also generally recognized that a common carrier's liability as an insurer against everything except the act of God or the public enemy may, by proper notice and fair and reasonable special contract, be reduced to exclude all losses and injuries except those resulting from his own or his servants' negligence. In the State of New York this doctrine is carried to the extent of permitting exception even from those damages resulting from his own negligence, but not from willful wrongdoing. The contract of a carrier of passengers is not a contract of bailment. Consult: Schouler, *Treatise on the Law of Bailments* (3d ed., Boston, 1897); Story, *Commentaries on the Law of Bailments* (9th ed., Bos-

ton, 1878); Beal, *Law of Bailments*, with notes to Canadian cases (London, 1900). See CARRIER, COMMON; INNKEEPER; LIEN; PLEDGE; MORTGAGE.

BAILY, EDWARD HODGES (1788–1867). An eminent English sculptor, particularly known for his portrait statues and busts, born at Bristol. In 1807 he entered the studio of Flaxman in London. He was made an associate of the Royal Academy in 1817 and a full member in 1821. The statue of Nelson in Trafalgar Square, London, is one of his finest works. His other sculptures include "Eve at the Fountain," "Hercules Casting Hylas into the Sea," "Psyche," "Eve Listening to the Voice."

BAILY, FRANCIS (1774–1844). An eminent English astronomer, born at Newbury. In the midst of active business as a London stockbroker, he laid the foundation of his scientific fame, and during the years of life usually devoted to repose, underwent labors and rendered services to astronomy which entitle him to be regarded as one of the most remarkable men of his time. Among the chief of these services were his share in the foundation of the Royal Astronomical Society and in the improvement of the *Nautical Almanac*, his laborious repetition of Cavendish's pendulum experiments and the production of the Royal Astronomical Society's star catalogue, based on a revision of the catalogues of Tobias Mayer, Halley, and the earlier astronomers. In 1842 he completed the reduction of Lalande's great catalogue for the British Association. He was elected a Fellow of the Royal Society in 1821 and was twice awarded the gold medal of the Royal Astronomical Society (1827 and 1843). He was also the first to describe fully the phenomenon known as Baily's beads, which is observed in connection with total eclipses of the sun. Just before the beginning and after the end of the obscuration of the sun by the moon's disk, the thin crescent-shaped unobscured portion of the sun seems to become suddenly discontinuous and looks like a belt of bright spots varying in size and separated by dark spaces. The resulting appearance may be compared to a string of beads. The phenomenon is the effect of irradiation and the inequalities of the moon's edge. In addition to an immense mass of contributions to the *Memoirs of the Royal Astronomical Society*, Baily wrote a valuable *Account of the Rev. John Flamsteed, the first Astronomer Royal* (1835), which gave rise to much discussion on the subject of that eminent man's connection with Newton. To the literature of life annuities, etc., he contributed several standard works, the chief of which are *The Doctrine of Interest and Annuities* (1808) and *The Doctrine of Life Annuities and Assurances* (1810). Consult Herschel, *Memoir of F. Baily, Esq.* (London, 1847).

BAILY'S BEADS. See BAILY, FRANCIS.

BAIN, bān, ALEXANDER (1818–1903). A Scottish psychologist. He was born at Aberdeen, Scotland, and studied at Marischal College from 1836 to 1840, obtaining the degree of M.A. He taught moral and natural philosophy at this institution from 1841 and 1845, and afterward became successively professor of natural philosophy at Anderson's University, Glasgow, assistant secretary to the Metropolitan Sanitary Commission from 1847 to 1855, secretary of the General Board of Health from 1848 to 1850, examiner in logic and moral philosophy at the University of London from 1857 to 1862, examiner in moral science for the India Civil Service from 1858 to 1860 and in 1863, professor of logic and English literature in the University of Aberdeen from 1860 to 1880, and lord rector of the University of Aberdeen in 1881. He received the degree of LL.D. from Edinburgh University in 1859. From the year 1840 Bain was a frequent contributor to the *Westminster Review* and Chambers's *Papers for the People* and *Information for the People*. In these publications he became well known both for his exceptionally apt popularizations and for his own researches in fields of applied science. But his enduring fame will be associated with his treatises on psychology. His best-known works are: *The Senses and the Intellect* (1855; 4th ed., 1894); *The Emotions and the Will* (1859; 4th ed., 1899); *The Study of Character* (1861); *Mental and Moral Science: A Compendium of Psychology and Ethics* (1868; 3d ed., 1872); *Logic, Deductive and Inductive* (1870, 1879); *The Relation of Mind and Body* (1873, 1897); *Education as a Science* (1879; 7th ed., 1889). Bain also edited Paley's *Moral Philosophy* (1852), published a biography of James Mill (1882), a criticism of J. S. Mill (1882), assisted in editing Grote's *Aristotle*, edited Grote's *Minor Works*, and wrote several authoritative works on composition and rhetoric.

Bain was a stanch empiricist, emphatically opposed to all transcendental and a priori methods of procedure. Following Hartley's lead, he sought to supply a physiological basis for all psychical facts. Perhaps the best characterization of his place in psychology is given by J. S. Mill in *Dissertations and Discussions* (1874): "Bain has stepped beyond all his predecessors and has produced an exposition of the mind of the school of Locke and Hartley . . . which deserves to take rank as the foremost of its class, and as marking the most advanced point which the *a posteriori* psychology has reached." "Those who have the highest appreciation and the warmest admiration of his predecessors are likely to be the most struck with the great advance which this treatise [*The Senses and Intellect*] constitutes over what those predecessors had done, and the improved position in which it places their theory." "With analytic powers comparable to those of his most distinguished predecessors, he combines a range of appropriate knowledge still wider than theirs; having made a more accurate study than perhaps any previous psychologist of the whole round of physical sciences." The most important modification made by Bain in the doctrine of association was the introduction of a new element in mental development—the tendency to spontaneous movement. "He holds that the brain does not act solely in obedience to impulses, but is also a self-acting instrument; that the nervous influence which . . . excites the muscles into action is generated automatically in the brain itself; not, of course, lawlessly and without a cause, but under the organic stimulus of nutrition." His work is marked by a spirit of precise analysis and zealous accuracy. It represents the high-water mark of English associationism. Consult: Mill, *Dissertations and Discussions* (New York, 1874); Ribot, *Contemporary English Psychology* (New York, 1873); articles in *Mind* (1904).

BAIN, ALEXANDER (1810–77). A Scottish electrician. He was born in Scotland, but in 1837 removed to London as a journeyman. Among his inventions were electrical clocks, an

earth-battery (1843), an apparatus for registering the progress made by ships (1844), the electro-chemical telegraph (1843), and an electrical apparatus for playing musical instruments at a distance.

BAIN'BRIDGE. A city, and the county-seat of Decatur Co., Ga., 235 miles west by south of Savannah, on the Atlantic Coast Line and the Georgia, Florida, and Alabama railroads, and on the Flint River (Map: Georgia, B 5). It is in a region producing cotton and tobacco and has brickyards, turpentine distilleries, ironworks, cotton oil mills, syrup refinery, etc. The city contains a Carnegie library and historic Fort Hughes, and owns its water works and electric light plant. Pop., 1900, 2641; 1910, 4217.

BAIN'BRIDGE, William (1774–1833). An American naval officer. He was born at Princeton, N. J., entered the merchant marine at the age of 15, became captain of a merchantman four years later, and in 1796, while in command of the *Hope*, was attacked by and defeated an English schooner, whose captain had attempted to impress some of the *Hope's* crew. On the organization of the navy in 1798 he became a lieutenant, and was placed in command of the schooner *Retaliation*. Later in the year he was captured off Guadaloupe by the French frigates *Volontier* and *Insurgente*. Being released after several weeks, he returned to the United States and made a report which caused the passage of the "Retaliation Act" of 1798 against French subjects captured on the high seas. In March, 1800, he was raised to the rank of captain and later in the year was sent with tribute to the Dey of Algiers, who compelled him to convey an embassy, under Algerian colors, to Constantinople. He next served as commander of the *Philadelphia* in the war against Tripoli (1801–05), capturing the Moorish frigate *Meshboha* (Aug. 26, 1803), but, running aground, he was himself captured in November, off Tripoli, where he and over 300 of his men were kept prisoners until the close of the war. Early in 1812 he was put in command, as commodore, of the *Constitution*, *Hornet*, and *Essex*, he himself being on the first; but soon afterward the three vessels parted company, and on December 29 the *Constitution* met and captured the British frigate *Java*. (See Constitution, The.) In 1815 he was made commander of the squadron fitted out against Algiers, but the war was averted. In the same year he established in Boston the training school for naval officers and afterward for two years (1819–21) cruised in the Mediterranean. He subsequently served at the Philadelphia and Charlestown navy yards, and from 1832 to 1833 acted as chief of the board of naval commissioners. He was a tall and powerful man and was noted at once for his strong will and his remarkable tact. Consult Harris, *Life of Bainbridge* (Philadelphia, 1837), and Cooper, *Lives of Distinguished American Naval Officers* (2 vols., Auburn, 1846).

BAINES, bānz, Edward (1774–1848). An English publicist, born at Walton-le-Dale. He was apprenticed to a printer at Preston and afterward at Leeds and in 1801 bought the Leeds *Mercury*, which subsequently became one of the most important of the provincial newspapers. He was consulted on important questions by many parliamentary leaders and was elected, in 1834, to succeed Macaulay as a member for Leeds. Until 1841 he continued in Parliament as an independent Liberal. He advocated the separation of church and state and the reform of factory laws, and opposed governmental interference in educational matters. He *of Lancaster*, and a *History of the Reign of the County of York* (1823), later enlarged as the *History of the County Palatine and Duchy of Lancaster*, and a *History of the Reign of George III* (4 vols., 1823). Consult his *Life* by his son (1861).

BAINES, Sir Edward (1800–90). An English politician, son of the preceding. He was elected in 1859 to Parliament, where he became the champion of many reforms. He opposed church tests in the universities, sought the disestablishment of the Irish church, and in 1861 and 1864 presented bills for extending the electoral franchise. He wrote a *History of the Cotton Manufacture in Great Britain* (1835) and other works.

BAINI, bä-ē'nē, Giuseppe (1775–1844). A celebrated Italian composer, one of the most distinguished and scientific of modern times. He was born and died in Rome. A pupil of the Seminario Romano and later of Jannaconi, he entered the papal choir in 1795 and in 1814 succeeded Jannaconi as chapelmaster. His numerous church compositions are distinguished by religious austerity and severe classical profundity. His *Miserere* for 10 voices was the only work of the nineteenth century deemed worthy to be performed at the Sistine Chapel, alternately with those of Allegri and Bai, during Holy Week. His best title to fame, however, rests upon his life of Palestrina, *Memorie storico-critiche della vita e delle opere di Giovanni Pierluigi da Palestrina* (2 vols., Rome, 1828; German trans. by Kandler, with notes by Kiesewetter, 1834). It is the standard work on Palestrina, though strongly biased with regard to non-Italian composers.

BAIOCCO. See Bajocco.

BAIRAKTAR, bī'rāk-tär', or **BAIRAKDAR** ('standard-bearer'). The title of the energetic Grand Vizier, Mustapha (1755–1808). He was born of poor parents, but early distinguished himself by his bravery. He fought against the Russians as Pasha of Rustchuk in 1806. When Selim III was deposed by the Janizaries in 1807, Bairaktar took the part of the dethroned Sultan, and after the murder of Selim in 1808 he deposed his successor, Mustapha IV, and elevated Mustapha's brother, Mahmoud II, to the throne. Bairaktar was now appointed Grand Vizier. In the exercise of this office he deposed the Grand Mufti, the leader of the Janizaries, and all the ulemas who had taken any part in the late revolution; while at the same time he was careful to secure the tranquillity of the capital and strengthened the regular army. His chief object was the annihilation of the Janizaries, but, like the unfortunate Selim, he fell a victim to that fierce band of soldiery. Favored by the more fanatical among the people, the Janizaries rebelled and, with the support of the fleet, attacked the Seraglio on Nov. 15, 1808, and demanded the restoration of Mustapha. Bairaktar defended himself bravely, but when he saw that the flames threatened to destroy the palace and that he was in danger of falling alive into the hands of his enemies, he strangled Mustapha, threw his head to the besiegers, and then killed himself.

BAIRAM, bī-räm' *or* bī'räm. See Beiram.

BAIRD, Absalom (1824–1905). An American

soldier. He was born at Washington, Pa., graduated at West Point in 1849, served in 1850–51 as second lieutenant of artillery in the Seminole War, was assistant professor of mathematics at the Military Academy in 1853–59, and from 1859 to 1861 was on garrison and frontier duty. During the Civil War he served in the Peninsular campaign, in Tennessee, and in the Atlanta campaign, and in 1865 was brevetted major-general U.S.A. In 1866–68 he was inspector-general of the Department of the Lakes; in 1868–70 of the Department of Dakota; in 1870–72 of the Division of the South; and in 1872–81 and in 1885, of the Division of the Missouri. From 1885 until he was retired in 1888, he was staff inspector-general, with the rank of brigadier-general.

BAIRD, CHARLES WASHINGTON (1828–87). A Presbyterian scholar. He was born at Princeton, N. J., a son of Robert; graduated at the University of the City of New York (now New York University) in 1848 and at Union Theological Seminary in 1852; American chaplain in Rome, 1852–54; pastor of a Reformed Dutch church in Brooklyn, 1859–61; after that time pastor of the Presbyterian Church at Rye, N. Y. He is the author of *Eutaxia, or the Presbyterian Liturgies* (New York, 1855); *A Book of Public Prayer* (1857); *A History of Rye* (New York, 1871); *Bedford Church* (1882); and especially *A History of the Huguenot Emigration to America* (2 vols., New York, 1885). Unhappily he did not live to carry out his plans for this extensive and valuable work.

BAIRD, SIR DAVID (1757–1829). A British general. He was born, Dec. 6, 1757, at Newbyth, Scotland, and was left fatherless at an early age. His mother procured his entry to the army in 1772, as ensign in the Second Foot, and he joined his regiment at Gibraltar in 1773; in 1778 he received his lieutenancy and in the same year, on account of his distinguished bearing and great height, was appointed by Lord Macleod, a family friend, to be captain of the Seventy-third Grenadier Regiment, afterward famous as the Seventy-first Highland Light Infantry. He served in British India, 1780–89. In September, 1780, at Perambucum, heroically fighting against overwhelming odds, he was severely wounded, taken prisoner, and held captive by Hyder Ali. Released in March, 1784, he became, in 1787, major in his regiment and in 1789 returned to England. In 1790 he purchased the lieutenant-colonelcy of his regiment, but, owing to the delay of his agent in this transaction, on two subsequent occasions lost the succession as commander-in-chief of the army. In 1791 he returned to India and, after some minor service, in 1799 led the storming party at Seringapatam, having obtained that perilous honor at his own urgent request, Colonel Wellesley (afterward Duke of Wellington) commanding the reserve. His merit was acknowledged by the home government. In the following year he was appointed to the command of an expedition against Batavia, which was, however, afterward sent to Egypt, where he assisted in the final expulsion of the French. On his return to India he found that the star of Wellesley was in the ascendant; and Baird, who had already complained of the preference given to that officer and who was, besides, of opinion that his own merits were constantly overlooked, applied for leave of absence and sailed for Europe in 1803. He was received at court with great distinction, knighted in June, 1804, and made a K.C.B. in the following August. In 1805 he commanded an expedition against the Dutch Settlements at the Cape of Good Hope, which was successful; in 1807 he commanded a division at the siege of Copenhagen; and in 1808 was sent to Spain with an army of 10,000 men to assist Sir John Moore. He distinguished himself in the battle of Corunna, Jan. 16, 1809, when his left arm was shattered by grapeshot and had to be amputated. Moore was killed in the action, and Sir David succeeded to the chief command, and had the honor of communicating the intelligence of the victory to government. On this occasion he received, for the fourth time in his life, the thanks of Parliament and was created a baronet. He retired from active service in 1810 and was made commander of the forces in Ireland in 1820. He died Aug. 18, 1829. Consult Hook, *Life of General Sir David Baird* (London, 1832), and Gore, *Character of Sir David Baird* (London, 1883).

BAIRD, GEORGE WASHINGTON (1843–). A rear-admiral, retired, of the United States navy, born in Washington, D. C. Following a public school and academic education, he studied engineering, was appointed third assistant engineer in the United States navy in 1862, and saw service during the Civil War. Promoted through successive grades up to 1905, he was then retired with the rank of rear-admiral. He became president of the Board of Education of Washington and was made a member of many engineering societies.

BAIRD, HENRY CAREY (1825–). An American publisher and writer, born at Bridesburg, Pa. From 1845 to 1849 he was a member of the publishing house of Carey & Baird, of Philadelphia, and in the latter year reorganized the firm as Henry Carey Baird & Co. In politics he was first a Whig and then a Republican. In 1875 he became a leader of the Greenback party, which nominated him for State treasurer of Pennsylvania and for mayor of Philadelphia. The former nomination he declined. He supported the free-silver cause and the protective system. His publications include pamphlets and contributions to works of reference and to periodicals on banking, money, and other economic subjects.

BAIRD, HENRY MARTYN (1832–1906). An American historian and educator. He was born in Philadelphia, graduated at New York University in 1850 and at Princeton Theological Seminary in 1856; traveled in Greece and Italy, and from 1855 to 1859 was tutor at Princeton. From 1859 until the year of his death he was professor of the Greek language and literature in New York University. He became widely known for his researches in the history of the Huguenots. Among his works are: *History of the Rise of the Huguenots in France* (1879, 1907); *The Huguenots and Henry of Navarre* (1886); *The Huguenots and the Revocation of the Edict of Nantes* (1895). These three works comprise, in six volumes, a succinct history of French Protestantism from 1512 to 1802, which has been admired by American and continental scholars. In 1906 he became a pensioner under the Carnegie fund.

BAIRD, ROBERT (1798–1863). An American clergyman and author. He was born in Fayette Co., Pa., graduated at Jefferson College in 1818 and at Princeton Theological Seminary in 1822. He passed several years in Europe, where he

labored especially for temperance and the revival and consolidation of evangelical Protestantism. He was agent and secretary of the American and Foreign Christian Union. His works include: *A History of Temperance Societies in the United States* (1836); *A View of Religion in America* (1842); *Protestantism in Italy* (1845); *History of the Albigenses, Waldenses, and Vaudois.* Consult a *Life* by Henry M. Baird.

BAIRD, SPENCER FULLERTON (1823–87). An American naturalist. He was born at Reading, Pa., Feb. 3, 1823, of English and German parentage, and died at Woods Hole, Mass., Aug. 19, 1887. He graduated from Dickinson College, Carlisle, Pa., in 1840, and in 1842 studied at the College of Physicians and Surgeons in New York City. During these earlier years he had formed valuable and influential acquaintanceships with Audubon and Agassiz and other leaders of American zoölogy, in much of whose work he was a collaborator. In 1845 he was elected professor of the natural sciences in Dickinson College, but continued his original work. He became assistant secretary of the Smithsonian Institution in 1850 and entered upon his life work. This was the period of an extensive exploration of the western half of the United States, and Baird had charge of the energetic efforts made under the direction of the Smithsonian Institution to carry on a scientific investigation coincident with the geographical exploration of that region and of the formulation and publication of the results in the reports of the Pacific Railway surveys and elsewhere. He also stimulated private research and the deposit of objects in the care of the Smithsonian, thus laying the foundation of the National Museum, which was organized (1857) and developed by him. Upon the death of Joseph Henry in 1878, he became secretary of the Smithsonian, and still further advanced its work and collections in the direction of zoölogy and American archæology. Meanwhile he had been urging the need of the investigation and conservation of the fishes and fisheries of the United States, and through his action Congress created in 1874 the Commission of Fish and Fisheries, appointing Professor Baird its first commissioner—an office which he retained until his death, and wherein he organized the entire science and practice of fish culture (q.v.) in the United States and made it a model that has been widely copied in other countries.

In the dual relation which he sustained to two great branches of public scientific work, increased by his constant editing and writing for the press, Baird exerted an influence more extensive and stimulative than was exercised by any other man of his time. He trained a large number of men who have reached great usefulness and fame in various departments of scientific and economic natural history and is affectionately remembered by a great circle of students for his helpful kindness and encouragement. A complete bibliography of the titles of his works and papers to 1882 was compiled by G. Brown Goode and published as *Bulletin No. 20 of the United States National Museum* (Washington, 1883). It contains 1063 titles, to which the product of five more years is to be added. He edited the Smithsonian Reports from 1878 and several Reports of the United States Commission of Fish and Fisheries, to which he also contributed many special papers. Among the more important of his publications are: *Catalogue of North American Reptiles* (1853); *Birds of America* (with Cassin, 1860); *Mammals of North America* (1859); *History of American Birds* (with Brewer and Ridgway, 1874–84).

BAIREUTH, bī'roit. See BAYREUTH.

BAISCH, bīsh, HERMANN (1846–94). A German landscape painter and etcher. He was born at Dresden. He studied at the Stuttgart Academy, and in 1868 went to Paris, where he was much influenced by the works of Dupré and Rousseau. In 1869 he became a pupil of Lier at Munich, and soon became known for his landscapes, which are distinguished by careful observation and subtlety of atmospheric effects. He ranked as one of the first "plein air" painters of Germany. He received numerous medals, was honorary member of the principal German academies, and exercised a wide influence as professor of landscape painting (after 1881) in the Academy of Karlsruhe. His most prominent works include: "Mill by Moonlight" (1878, Stuttgart Gallery); "Dutch Canal Landscape" (1882, Dresden Gallery); "At the Watering-Trough" (Hanover Museum); and "Ebb-Tide near Dordrecht" (1884, Berlin National Gallery). He is also known as an illustrator, chiefly of the poems and proverbs of his brother, Otto Baisch.

BAIT, bīt. See BEIT.

BAITER, bī'tẽr, JOHANN GEORG (1801–77). A Swiss classical scholar born at Zürich. He studied at Munich, Göttingen, and Königsberg, was for some time professor in the University of Zürich, and in 1837–39, 1843–45, and 1849–65 was rector of the Zürich Gymnasium. With Orelli and Winckelmann, he prepared a collective edition of the works of Plato (1839–42); with Sauppe, one of the speeches of Lycurgus (1834), and *Oratores Attici* (1838–50); and he contributed the *Annales* (1858) to the second edition of Orelli's recension of Tacitus. He also published an edition of the *Fabellæ Iambicæ* of Babrius, then recently discovered (with Orelli, 1845). In conjunction with Orelli, and afterward with Halm, he bought out the second edition of Orelli's great edition of Cicero, and, with Kayser, edited the philosophical writings of Cicero for the Tauchnitz edition of the complete works of that author (1860–69). He owes his fame chiefly to his skill in textual criticism.

BAIT FISHING. The second great subdivision of angling, which is again divisible into fresh-water fishing and salt-water fishing. For fresh-water bait fishing a shorter and stiffer rod is required than is used for angling with a fly for the same fish. The bait generally is sunk by attaching a split shot, or other lead sinker, about a foot above the hook, and in still water sometimes a cork or quill float is attached to the line at a point which will allow it to float upon the surface of the water when the bait is at the desired depth. The bait varies almost as much as does the fly in casting; for trout those commonly employed are worms, grasshoppers, and minnows; for bass, minnows, the helgramite or dobson, crawfish, small frogs, grasshoppers, and crickets. For sea fishing of the ordinary nature, where the fish are not expected to weigh more than two pounds, a stout rod 8 or 10 feet long, with 100 yards of No. 12 Cuttyhunk and a strong single gut-leader 3 feet long, a small float and 2-0 hooks, with shrimp or shedder crab bait, will be found effective. From the

2-pound blue fish up to the giant tarpon, which is occasionally yet caught by "still-fishing," bait fishing passes through a wide variety.

Bait casting is a variety of bait fishing in which the sinker and float are discarded: as in angling for black bass the rod should be from 6 to 8 feet long, weigh not more than 8 ounces, and have a first-class quadruple multiplying reel holding from 80 to 100 yards of line attached. The minnow is hooked and reeled up to within a foot or two of the tip of the rod. With the thumb pressing firmly on the spool of the reel, to prevent the back lashing of the line the rod is swung at arm's length to the rear below the waist line and pointing downward, and then brought forward with a steady sweep until it points in the desired direction, when the pressure on the reel should be released sufficiently to permit the line to pay out. For an overhead cast the rod is swung back directly over the shoulder and then quickly forward, the line being released, when the rod is about perpendicular. When the line is running out, the reel should be held with the side plates parallel to the water and with the handle uppermost. Reeling in should begin instantly the bait strikes the water. See ANGLING; FLY CASTING; TROLLING.

BAJA, bŏ'yŏ. A market town of Hungary, in the country of Bács-Bodrog, near the Danube, about 90 miles south of Budapest (Map: Hungary, F 3). It has manufactures of alcohol and shoes and carries on a large trade in grain, fruit, wine, and hogs. It is the chief river port of the grain-producing district known as the Bácska. Pop., 1890, 19,500; 1900, 20,361.

BAJADA DEL PARANÁ, bä-hä'dä děl pä'rä-nä'. See PARANÁ.

BAJAN. See BEJAN.

BAJAZET, bä'zhä-zā'. One of Racine's tragedies, having for its hero Bajazet, brother of Amurath I, Sultan of the Turks, 1359–89. The plot hinges on the hero's choice between the throne and his mistress. The play was performed at Paris, on Jan. 4, 1672. The character also occurs, with a change of episode, in Marlowe's *Tamburlaine* (1587), and in Rowe's *Tamerlane,* a tragedy performed in 1702.

BAJAZET I, bä'ye-zēd', or **BAYAZID I,** bä'yä-zēd' (1347–1403). Sultan of the Turks from 1389 to 1402. He succeeded his father, Amurath I, who was killed on the battlefield of Kosovo. Immediately on ascending the throne he inaugurated his rule by strangling his younger brother, Yakub, lest he should dispute the succession. He overran Bulgaria and a part of Servia, Macedonia, and Thessaly and subdued most of the states of Asia Minor. He received the name of Yilderim, "Thunderbolt," either because of these victories or because of his murder of his brother. At Nicopolis he gained a decisive victory over the Allied Hungarians, Poles, and French on Sept. 28, 1396. The greater part of the French, through whose impetuosity the battle was lost, were taken prisoners and slain. In 1402 Bajazet led his army against Timur (q.v.), who had invaded Asia Minor, and was completely defeated by the Mongol ruler near Angora. Bajazet himself fell into the hands of the conqueror, who treated him with great generosity. The story that he was carried about imprisoned in a cage is without any historical foundation. Bajazet died in 1403 in the camp of Tamerlane. He was succeeded in the government by his sons, Solyman I, Musa, and Mohammed I, the last of whom became sole ruler in 1413. The reign of Bajazet was a period of great corruption, in which the people generally imitated the actions of the Sultan and his chief ministers. Consult Gibbon, *Decline and Fall of the Roman Empire,* vol. vii (London, 1900), and Lane-Poole, *Turkey* (New York, 1889).

BAJAZET, or **BAYEZID II** (1447–1513). Sultan of the Ottoman Empire from 1481 to 1512. He was the son of the Sultan Mohammed II, the conqueror of Constantinople. He engaged in continual wars with Poland, Venice, Egypt, and Persia, and strengthened the Ottoman power in Europe, though not without meeting frequent checks and reverses. His later years were disturbed by disputes among his sons about the succession to the throne. He died near Adrianople in 1513, shortly after abdicating in favor of his son Selim. He was a patron of learning, a lover of luxury and splendor, and built several magnificent mosques in Adrianople and Constantinople. See OTTOMAN EMPIRE.

BAJAZET, MOSQUE OF. One of the many beautiful mosques erected by Bajazet II (q.v.). It was built in 1505, at Constantinople, and still stands. Its court is surrounded by marble arcades, the capitals of which are of jasper, and contains an octagonal fountain in the centre. Four Persian doorways lead into the richly carved and decorated interior.

BAJOCCO, bä-yōk'kō, or BAIOCCO, pl. BAJOCCHI (from *baio,* brown; so called from its brown-bay color). A copper coin in the Papal States equivalent to nearly a half-penny. It was 1-100 of the scudo, which was equal to $1.00. In the island of Sicily the Neapolitan *grano,* the 1-100 part of the ducato (= $.83) was also called a bajocco.

BAJ'REE. See GUINEA CORN.

BAJURA, bä-jōō'rä. The name of the banner of Mohammed.

BA'JUS, or **BAIUS,** MICHAEL—properly, DE BAY (1513–89). One of the most distinguished theologians of the Roman Catholic church in the sixteenth century. He was born in 1513 at Melin, Hainaut. He studied at Louvain and became doctor and professor of theology there in 1550. He was present at the Council of Trent in 1563 and also in 1564. He was the founder of the system of theology based directly on the Bible and the writings of the Fathers and setting aside the scholastic method. He assumed to base his theory on the writings of St. Augustine, whose doctrine of grace and free-will he sought to interpret into the entire inability of the human will to do good and into the absence of merit in all good works. His position was vigorously assailed by the Jesuits as unorthodox. The assertions that the human will, so long as it is left to its own freedom, can do nothing but sin, and that even the mother of our Lord was not free from original and actual sin, together with other such doctrines, drew on him the accusation of heresy. Seventy-nine of his propositions were condemned by Pope Pius V, in 1567, in the bull *Ex Omnibus Afflictionibus,* but he was not named as the author of them. Bajus submitted in 1569, but nevertheless did not give up his doctrines. He retained his position and was made chancellor of his university in 1575, but this did not shield him from the criticisms of his theological opponents. Gregory XIII confirmed the condemnation in the bull *Provisionis Nostræ,* Jan. 28, 1579, and Bajus was obliged

a second time to make explanation. He died at Louvain, Sept. 15, 1589, having earned the reputation of great learning, pure manners, and singular modesty. He may be regarded as the predecessor of the Jansenists, who inherited his Augustinian view, which was at that time termed Bajanism. His writings, mostly of a polemical nature, were published by Gerberon (2 vols., Cologne, 1696). Consult F. X. Linsenmann, *Michael Bajus und die Grundlegung des Jansenismus* (Tübingen, 1867).

BAJZA, boi'zŏ, JÓZSEF (1804–58). A Hungarian poet and critic, born at Szücsi, county of Heves, Jan. 31, 1804. When barely 20, he began contributing to Kisfaludy's *Aurora*, which has been called the cradle of modern Hungarian poetry and which Bajza afterward edited from 1830 to 1837. He was also editor of *Kritikai Lapok* ('Critical Leaves'), during 1830–36, and of the *Athenæum*, 1837–43; and these, together with Toldy's *Figyelmezö* ('Observer'), were the principal vehicles of his thoughtful essays and unsparing criticism, which exerted a strong and beneficent influence upon the rising Hungarian literature. His poems (Pesth, 1835) earned him a place among the best of his country's lyric poets. Through the publication of a series of foreign plays, and as director of the National Theatre at Pesth, he also gave valuable aid to the cultivation of a national drama. Later, his interests turned largely to history and bore fruit in 'Historical Library' (*Történeti Könyvtár*, 6 vols., Pesth, 1843–45), containing translations from many excellent foreign works; and a compilation from the German, 'The New Plutarch' (*Uj Plutarch*, Pesth, 1845–47). After March, 1848, Kossuth appointed him editor of his semi-official organ, the *Kossuth Hirlapja* (May to December). He died March 3, 1858, from a brain disease, which had been slowly developing for eight years. Bajza stands unsurpassed in the Hungarian literature for his perfection of poetic form. Because of his cold classicism Bajza did not attain the popularity of his fiery and patriotic contemporary Vörösmarty. His *Collected Works* have been edited by Toldy (6 vols., Pesth, 1861).

BAKACS, bŏ'kŏch, TAMÁS (?–1521). A Hungarian statesman and prelate, who was born about the middle of the fifteenth century. Though by birth a peasant, he became secretary to King Matthias Corvinus. He held various bishoprics, became Archbishop of Gran, and on the accession of Ladislaus II was made chancellor of the kingdom, and later Cardinal-Primate of Hungary and papal legate. He afterward preached a crusade against the Turks; but his army of peasants and vagabonds turned their arms against the nobility and clergy and a civil war ensued, accompanied by great cruelty on both sides, till it was ended by the rout of the insurgents by John Zápolya. Bakacs died in 1521, leaving an immense fortune.

BAKAIRI, bä-kī-ī-rē'. A detached Cariban tribe of primitive type, living about the headwaters of the Xingú River, central Brazil. They were visited in 1884 by Von den Steinen, who made the first scientific study of them and their language, which he regarded as the oldest representative of the Cariban linguistic stock, and thus of some ethnological importance. Consult Von den Steinen, *Durch Central-Brasilien* (Leipzig, 1888), and *Die Bakairí-Sprache* (Leipzig, 1893).

BAKALAI, bä-kä'lī. A Bantu tribe on the Ogowe, French Equatorial Africa. They have been pushed to the west by the warlike Fans, losing their former skill as workers in iron and copper and becoming traders. They number more than 100,000. Their religion is Mohammedan; learning is at a standstill. Consult Keane, *Ethnology* (Cambridge, 1896), and Deniker, *Races of Man* (London, 1900).

BAKAR. See BUCCARI.

BAKAU, bä-kou'. The capital of a district of the same name in Moldavia, Rumania, on the Bistritz, 188 miles north of Bucharest, by rail (Map: Balkan Peninsula, F 1). It has a gymnasium and some trade in agricultural products. Pop., 1899, 16,187; 1913 (provisional census), 18,985.

BAKE, bä'ke, JAN (1787–1864). A distinguished Dutch philologist, born at Leyden, Sept. 1, 1787. He held the professorship of Greek and Roman literature in the University of Leyden for the long period of 42 years (1815–57). His first important publication was a valuable contribution to the literature on Posidonius (1810), and this was followed by a learned edition of Cleomedes (1820). In collaboration with Geel, Hamaker, and Peerlkamp he published the *Bibliotheca Critica Nova* (1825–31) and independently contributed various classical articles to the *Scholica Hypomnemata* (1837–62). He brought out critical editions of Cicero's *De Legibus* (1842), the rhetorical work of Apsines and of Longinus (1849), and Cicero's *De Oratore* (1863). He died March 26, 1864. He was the brother of the philologist and jurisconsult ALEXANDER BAKE (1791–1844).

BAKEL, bä'kĕl'. A strongly fortified town, capital of the arrondissement of the same name, in the French colony of Senegal, northwest Africa, on the left bank of the Senegal River, northwest of Kayes (Map: Africa, C 3). Bakel has belonged to France since 1820 and was of great strategic importance in the wars with the natives. It is an important trade centre and the meeting place of caravans from the upper Senegal basin and the Niger. The trade is chiefly in dates, rice, beeves, ivory, and gold dust. During the rainy season it has direct navigation with St. Louis on the coast. Pop., 1900, 1760.

BA'KELITE. An artificial coal-tar product, used as a substitute for hard rubber, celluloid, or amber, and valuable for its properties of electrical insulation and resistance to heat. This substance was invented by the chemist, Dr. Leo Baekeland, from whom it derives its name. For its invention Dr. Baekeland received the Nichols medal of the American Chemical Society in 1909. Chemically bakelite is oxybenzylmethylenglycol anhydride. It is produced by warming together equal weights of phenol and formaldehyde and a small amount of an alkaline agent. The mixture separates into two layers, the upper of which is an aqueous solution, while to the lower, an intermediate condensing product, is given the name of "A." If the latter is heated above 100° C., a final condensing product called "C" is obtained, which may be avoided by working under a pressure of 50 to 100 pounds per square inch. The product so resulting is a hard solid mass, which is known as bakelite. It has a specific gravity of 1.25, is very hard and inelastic, and is an excellent insulator for both heat and electricity. As it is cheaper than hard rubber, it has found extensive application in electrical apparatus,

and for the same reason it is supplanting casein and celluloid in other fields. Wood soaked in the "A" product, and then heated under pressure, becomes coated with it so that it will appear as with a firm and waxy varnish. Cardboard, also, can be made into hard-polished sheets, and metal surfaces can be given a like coating. It also serves as a powerful cement, as, for example, in forming grindstones and like purposes.

BA'KER. A city, and the county-seat of Baker Co., Ore., 357 miles east by south of Portland, on the Powder River, and on the line of the Oregon Railroad and Navigation Company (Map: Oregon, H 3). It is in the centre of the eastern Oregon mining region and has a considerable trade as a distributing point for this district as well as an export trade in lumber, wool, live stock, and products of the mines. Gold mining, lumbering, stock raising, flour milling, clay and stone quarrying, and agriculture are the leading industries, and manufacturing interests are represented by saw and planing mills, iron works, brewery, brickyards, etc. Among points of interest in or near the city are the opera house, hospital, Masonic temple, natatorium, and several mines. Settled in 1860, as Baker City it was incorporated in 1872 and has since adopted the commission form of government. There are municipal water works, and electric light plant. Pop., 1900, 6663; 1910, 6742.

BAKER, Sir Benjamin (1840–1907). An eminent British civil engineer, born in England. He designed the cylindrical ship that transported one Cleopatra's Needle to America and the other to England, planned with Sir John Fowler the great Forth Bridge, and assisted in the construction of the great Assouan dam in Egypt. He also had an important part in designing the Blackwall tunnel, the great Tower Bridge in London, and the Metropolitan Railway system in that city. He published *Long Span Railroad Bridges* (1870).

BAKER, Charles Fuller (1872–). An American zoölogist, born in Lansing, Mich. He graduated in 1892 from the Michigan Agricultural College, where during his course he acted as assistant in zoölogy. After filling several positions in secondary schools and colleges as a teacher of biological subjects, he became an assistant professor at Pomona College, Cal., in 1903. Subsequently he was for several years chief of the department of botany at the Cuban agronomical station, then curator of the botanical garden and herbarium at the Museu Goeldi in Pará, Brazil. After serving in other similar positions in South America, he returned in 1908 to the United States and to Pomona College as professor of biology. He was in charge of the Colorado zoölogical and forestry exhibit at the Chicago World's Fair in 1893, and four years later became zoölogist and associate botanist to the Alabama botanical survey. Besides serving as botanist to the H. H. Smith exploring expedition in the Santa Marta Mountains in Colombia (1898–99), he himself conducted field explorations in several Western States and in Nicaragua, Cuba, and Brazil. He became editor of the *Pomona Journal of Entomology* and published *Invertebrata Pacifica* and (coöperatively) *Economic Plants of the World.*

BAKER, Edward Dickinson (1811–61). An American soldier and lawyer. He was born in England, but came to this country in 1816. He practiced law at Springfield, Ill., became prominent in politics, and was a member of the Illinois Legislature from 1837 to 1844, when he was elected to Congress. He resigned in 1846 to serve in the Mexican War and commanded a brigade at the battle of Cerro Gordo. After the war he was again elected to Congress. He declined a renomination in 1850, and in 1851 settled in San Francisco, where he soon became the leader of the California bar. Thence he went to Oregon and was United States Senator from that State. When the Civil War began, he raised a regiment in New York and Philadelphia. He declined a commission as brigadier-general and was killed at Ball's Bluff while leading a desperate charge. Consult J. D. Baltz, *Lancaster, Pa.* (1888), and Willard Glazier in *Heroes of Three Wars* (1880).

BAKER, Frank (1841–). An American zoölogist and anthropologist, born at Pulaski, N. Y. He graduated at the Columbian (now George Washington) University in 1880 (M.D.), took his master's degree at Georgetown University in 1883, and Ph.D. at the same institution in 1890. He became assistant superintendent of the Life-saving Service in 1889 and superintendent of the National Zoölogical Park at Washington in 1890. In 1883 he was appointed professor of anatomy in the Medical School of Georgetown University and was elected vice president of the American Association for the Advancement of Science in 1890. For the seven years following 1890 he was editor of the *American Anthropologist* and in 1897 was made president of the Association of American Anatomists.

BAKER, Frank Collins (1867–). An American zoölogist, born at Warren, R. I. He studied at Brown University and at the Philadelphia Academy of Natural Sciences. The latter institution sent him on a Mexican exploring expedition in 1890. After serving as zoölogist of invertebrates at Ward's Natural Science Establishment, Rochester, N. Y., he became curator of zoölogy of the Field Columbian Museum of Chicago in 1894, and curator of the Chicago Academy of Sciences in the same year. His publications include: *A Naturalist in Mexico* (1895); *Mollusca of the Chicago Area* (1898–1902); *Shells of Land and Water* (1903); *The Lymnæidæ of North and Middle America* (1911).

BAKER, George Pierce (1866–). An American scholar, writer, and educator, born in Providence, R. I. Graduating from Harvard in 1887, he became in the year following instructor in English at that university and thereafter successively instructor in forensics (1889), assistant professor of English (1895), and professor of English (1905). He established and carried on a department of dramatic writing and criticism at Harvard. His writings include: *The Principles of Argumentation* (with H. B. Huntington, 1895, 1905) and *The Development of Shakespeare as a Dramatist* (1907). Also he edited *The Forms of Public Address* (1904), *Some Unpublished Correspondence of David Garrick* (1907), *The Correspondence of Charles Dickens and Maria Beadnell, Hamlet* (1913), and various Elizabethan plays.

BAKER, Henry (1698–1774). An English naturalist. He was brought up to the bookselling business, but afterward devoted himself to scientific studies, especially to botany and microscopy. In 1744 he received the Copley medal from the Royal Society for his microscopic study of saline particles. Among his

works may be mentioned *The Microscope Made Easy* (1743), *Employment for the Microscope* (1753), and some poetical works.

BAKER, H. Brereton. An English chemist, born at Blackburn, Lancashire. He was educated at Balliol College, Oxford, where he was a scholar in natural science in 1879 and a demonstrator in chemistry in 1883–85. From 1885 to 1902 he was head of the science department in Dulwich College and in the following year served as head master of Alleyn's School, Dulwich. He became professor of chemistry in the Imperial College of Science and Technology, London, in 1912. His publications include "Combustion in Dried Gases" in the *Philosophy Transactions* (1888), and in the *Journal of the Chemical Society* the following: "Action of Light on Silver Chloride" (1892); "Drying of Ammonia and Hydrogen Chloride" (1898); "Union of Hydrogen and Oxygen" (1902); "Gaseous Nitrogen Trioxide" (with Mrs. Baker, 1907).

BAKER, Ira Osborn (1853–). An American civil engineer, born at Linton, Ind. He graduated from the University of Illinois in 1874 and in the same year became assistant in civil engineering and physics at that institution. He was appointed instructor in civil engineering in 1878, assistant professor in 1880, and professor in 1882. Besides contributions to technology journals, his writings on engineering subjects include *Leveling* (1886), *Treatise on Masonry Construction* (1889, 1909), *Engineers' Surveying Instruments* (1882, 1909), and *Treatise on Roads and Pavements* (1903).

BAKER, James Heaton (1829–1913). An American soldier and politician, born at Monroe, Ohio. He was educated at Ohio Wesleyan University. After having served as Secretary of State of Ohio (1854–56) and of Minnesota (1857–61) he entered the army as colonel of the Tenth Minnesota Volunteer Infantry and was brevetted brigadier-general and was mustered out of service in 1865. Subsequently he served as United States commissioner of pensions under President Grant, as surveyor-general of Minnesota (1875–79), and as state railroad commissioner (1881–86). In 1879 he purchased two Republican newspapers which he combined under the name of the *Mankato Free Press*. He published "Lake Superior" in *Minnesota Historical Society Collections* (1879); "The Sources of the Mississippi," *do.* (1887); *The Lives of the Governors of Minnesota* (1908).

BAKER, John Gilbert (1834–1920). An English botanist. Born at Guisborough, England, he was educated at the schools of the Society of Friends at Ackworth and York. Later he became lecturer on botany at the London Hospital and in 1866 was appointed assistant curator at the Kew Herbarium. From 1890 to 1899 he was keeper of Kew Gardens. Baker was associate editor of the *Journal of Botany* and published several works of importance on systematic botany, among the more important of which are the following: *Synopsis Filicum* (London, 1883), which is a later edition of the work begun by J. D. Hooker under the same title in 1868 and which is a descriptive catalogue of all species of ferns known at that time; *Monograph of the British Roses* (1869); *Monograph of the Ferns of Brazil* (1870); *Flora of Mauritius and the Seychelles* (1877); *Flora of the English Lake District* (1885); *Handbook of the Fern Allies* (1887); *Handbook of the Amaryllidaceæ* (1888); *Handbook of the Bromeliaceæ* (1889). A large number of shorter papers on botanical subjects have appeared in scientific journals. Baker was elected to the membership of the Royal and Linnæan societies and received honors from several scientific associations.

BAKER, Moses Nelson (1864–). An American editor and writer, born at Enosburgh, Vt. He graduated from the University of Vermont (collegiate department) in 1886 and from the engineering school, with the degree of C.E., a year later. In 1887 he became associate editor, and in 1908 editor, of the *Engineering News*. Montclair, N. J., chose him as the president of its board of health in 1904. As the result of special study of matters connected with sewage disposal and with municipal government, he wrote: *Sewage Purification in America* (1893); *Sewage Disposal in the United States* (joint author, 1894); *Potable Water* (1899); *Municipal Engineering and Sanitation* (1901); *British Sewage Works* (1904). He was editor of the *Manual of American Water Works* (1888–91, 1897) and of the *Municipal Year Book* (1902). He also edited the departments of municipal engineering and municipal government in The New International Year Book and revised articles in these departments for The New International Encyclopædia.

BAKER, Ray Stannard (1870–). An American journalist and author. He was born in Lansing, Mich., and graduated from the Michigan Agricultural College in 1889. A partial law course, and studies in literature, he took at the University of Michigan. He was reporter and sub-editor on the Chicago *Record* (1892–97), managing editor of McClure's Syndicate (1897–98), and associate editor of *McClure's Magazine* (1899–1905). In 1906 he became one of the owners and editors of *The American Magazine*. One of the most widely read journalists of his day, he contributed to *McClure's* and other magazines several notable series of articles on social and economic conditions in the United States. Among his writings are: *Boys' Book of Inventions* (1899); *Our New Prosperity* (1900); *Seen in Germany* (1901); *Boys' Second Book of Inventions* (1903); *Following the Color Line* (1908); *New Ideals in Healing* (1909); *The Spiritual Unrest* (1910).

BAKER, Sir Richard (1586–1645). The author of the *Chronicle of the Kings of England from the Time of the Romans' Government unto the Death of King James*, a book long esteemed and quoted on all matters of English history by the country gentry. Addison makes his model squire, Sir Roger de Coverley, refer to it frequently. Baker was born in Kent, was educated at Oxford, and in 1603 was made a knight. About 1620 he married and settled in Oxfordshire, of which county he was made high sheriff; but he was soon after thrown into the Fleet Prison for the debts of his wife's family which he had assumed, and here he wrote his *Chronicle*, first published in 1641, besides several pious works of less note. He died in prison in great poverty.

BAKER, Sir Samuel White (1821–93). An English traveler, explorer, and sportsman, born in London. He studied in England and Germany and in 1848 established an agricultural colony at Newara Eliya, Ceylon, where he remained until 1855 and achieved much reputation as a hunter of big game. In 1859–60 he superintended the construction of a railway connecting the Danube with the Black Sea. In

1861 he set out from Cairo for the discovery of the source of the Nile. He first explored the Atbara, Setit, and other Nile tributaries of northern Abyssinia, added somewhat to geographical knowledge of the region, and demonstrated that to these tributaries the Nile sediment is due. Thence he (in 1862) proceeded up the Nile to Gondokoro, where he awaited the arrival of Speke and Grant, who had left Bagowayo in 1860, and the former of whom had discovered the Victoria Nyanza to be the true Nile source. Informed by Speke of another lake, said to be crossed by the Nile on the river's course to Gondokoro, he continued his journey amid the defiance of the slave traders and the mutiny of his troops, and on March 14, 1864, discovered the Albert Nyanza. Thus, notwithstanding the inaccuracy of some of his observations, subsequently rectified by Stanley, he had finally cleared away the mystery from the Nile problem which, since Herodotus, had perplexed the world. In 1869–73, with the rank of pasha and major-general, he commanded an expedition sent out by the Khedive of Egypt for the suppression of the slave traffic, the establishment of regular trade, and the opening to commerce of the great equatorial lakes. Subsequently he explored and hunted in Cyprus, Syria, India, Japan, and the United States. He wrote: *The Rifle and the Hound in Ceylon* (1853); *Eight Years' Wanderings in Ceylon* (1855); *The Albert Nyanza* (1866); *The Nile Tributaries of Abyssinia* (1867); *Cast up by the Sea* (1868); *Ismailia* (2 vols., 1874); *True Tales for my Grandsons* (1883); *Wild Beasts and their Ways* (1890). Consult the T. D. Murray and A. S. White *Memoir* (London, 1895).

BAKER, THOMAS (1656–1740). An English antiquary and author. He was born at Lanchester, Durham, and was educated at St. John's College, Cambridge, where he soon became a fellow. As a non-juror he lost in 1690 the rectory of Long Newton, and in 1717 his fellowship, but spent the last 50 years of his life at Cambridge. He is known chiefly from his valuable manuscript collections, comprising 42 folio volumes, on the history and antiquities of the University of Cambridge. His history of St. John's College was edited by Professor Mayor in 1867.

BAKER, VALENTINE (1827–87). An English soldier, known as Baker Pasha, brother of Sir Samuel White Baker. He served in the Kaffir War (1852–53), received two medals for bravery in the Crimean War, and was promoted to colonel of the Tenth Hussars in 1860. He left England in 1873 to explore the northeastern frontier of Persia and described his journey in *Clouds in the East* (1876). In 1875 he was imprisoned and cashiered for insulting a young woman in a railway carriage. He entered the service of the Sultan in 1877, took part in the Turko-Russian War as major-general unattached in Mehemet Ali's army, and wrote a history of that campaign, entitled *The War in Bulgaria* (2 vols., 1879). He was summoned to Cairo by the Khedive in 1882 to be commander in chief of the Egyptian army, but on arriving there he was offered the command of the Egyptian police instead. Ordered to Suakim after the defeat of Hicks Pasha (November, 1883), he was defeated near Tokar by a body of Osman Digna's troops in 1884. He then returned to England and in 1885 was appointed to General Wolseley's staff; but Queen Victoria refused to ratify any appointment restoring him to the British army. In 1887 he went again to Egypt, and died at Tel-el-Kebir.

BAKER, WILLIAM MUMFORD (1825–83). An American author, born in Washington. He graduated at Princeton and was a Presbyterian pastor successively at Galveston and Austin, Tex., and at Newburyport and South Boston, Mass. Besides *Inside: A Chronicle of Secession* (1866), considered his most important work, he wrote a number of tales, including *The Virginians in Texas* (1878), *The New Timothy* (1870), *His Majesty, Myself* (1879), and *Blessed Saint Certainty* (1881).

BAKER, AND THE BAKER'S WIFE, THE. Popular names for Louis XVI and Marie Antoinette, because of their giving bread to the starving rioters who collected before the Palace of Versailles, Oct. 6, 1789.

BA'KERIES, MILITARY. See FIELD KITCHEN.

BAKER'S AN'TELOPE. A large antelope (*Hippotragus bakeri*) of the Sudan, with horns of a massive type. It is pale liver-red, with penciled ears and some black stripes on the shoulders. It was named after its discoverer, Sir Samuel Baker.

BAKER'S DOZ'EN. The number 13, instead of the usual 12. The custom of using 13 for a dozen is supposed to have originated when heavy fines were imposed for short weights, and the bakers in particular added an extra unit to guard against a possible short weight. The number 13 has also been called the Devil's Dozen, referring in that case to the number of witches supposed to assemble at each of their great festivals, and also to the superstition that 13 is an unlucky number. See WITCHCRAFT.

BA'KERSFIELD. A city and the county-seat of Kern Co., Cal., 168 miles northwest of Los Angeles, on the Southern Pacific and the Atchison, Topeka, and Santa Fe railroads, and on Kern River (Map: California, G 7). It has a public library and fine county buildings. The city controls important commercial interests as the centre of an oil, natural-gas, live-stock, and fruit-growing region, and contains foundries and machine shops, refineries, extensive gold mines, planing and flouring mills, packing houses, etc. There are also large deposits of fuller's earth, gypsum, borax, marble, salt, copper, tungsten, iron, and sulphur. A considerable water power is developed from the Kern River. Bakersfield was settled in 1872. Pop., 1890, 2626; 1900, 4836; 1910, 12,727; 1920, 18,638.

BAKER UNIVERSITY. A coëducational institution at Baldwin, Kan., founded in 1858 by the Kansas Conference of the Methodist Episcopal church. The departments include the College of Liberal Arts, academy, musical conservatory, public speaking, fine arts, household arts, preparatory professional courses, and summer school. In 1913 there were 32 instructors and 515 students. President, Wilbur N. Mason, D.D.

BAKE'WELL (anciently, *Badecan-willan*, protected wells, from AS. *þeccan*, Ger. *decken*, to cover = *wella*, *wylla*, spring, Eng. well). A small but ancient town in Derbyshire, England, on the Wye, 25 miles northwest of Derby (Map: England, E 3). It lies in the midst of beautiful scenery; in the vicinity are black-marble and limestone quarries and coal and zinc mines. Arkwright first established cotton mills here. The town has chalybeate springs and warm baths, a museum, and a spacious old Gothic church. In the seventeenth century the plague

ravaged and almost depopulated this town. Pop., 1901, 2850; 1911, 3078.

BAKHMUT, bäk-mōōt′. The chief town of the district of the same name, in the government of Ekaterinoslav, south Russia (Map: Russia, E 5). It lies in a hollow on the banks of the Bakhmut, a shallow affluent of the north Donetz River. In its immediate vicinity are deposits of salt of great purity and thickness of vein. A number of foreign companies exploit the mineral from which they also manufacture soda. The region, within a radius of 60 to 80 miles, abounds in coal, both of the cheaper and the anthracite varieties, and quicksilver is also mined. In the city salt is manufactured by the evaporating process from water drawn from wells. The product is accounted among the best in the world and is exported widely. Among the industrial establishments are glass, fireproof-brick, lime, and cement factories, iron and flour mills and breweries. The town was settled in the seventeenth century and was surrounded by a wooden wall in 1703; 80 years later it was promoted to the rank of chief town of the district. Pop., 1897, 19,400.

BAKHTCHISARAI, bäk′chê-sâ-rī′ (Pers. palace of gardens, from *bakhtcha,* garden, orchard + *sarāi,* palace, inn). The residence of the ancient princes or khans of the Crimea, situated in a narrow limestone valley about 20 miles from Simferopol, the capital of the government of Taurida, Russia (Map: Russia, D 6). It is a typical Tatar town and has 36 mosques, one Christian church, and two synagogues. In the centre of the city is the famous palace or Khan-sarai. Built in 1519 by the Khan Abdul-Sakhal-Gerai, the magnificent palace, after years of decay, was restored to its former grandeur in 1787 by orders of Prince Potemkin. Of the other noteworthy buildings, the mosque of the Khan is probably the most magnificent; it was erected in 1737 by the Khan Selamit-Gerai. In one of the old Jewish synagogues a parchment roll of the Bible—the most ancient, according to some Hebrew scholars—was discovered. It is now in the Imperial Library. The principal articles of manufacture are the well-known red and yellow morocco leather, fur coats, boots and shoes, and cutlery. The town is a mart for the products of the neighboring country, such as tobacco, flax, grain, and especially fruits. Its population, principally Mohammedans, numbered (1897) 13,000, including 3000 Christians, 1000 Jews (mainly Karaites), and some Greeks.

BAKHTEGAN, bäk′te-gän′ (Map: Persia, E 6). A salt lake in southwest Persia, to the east of Shiraz, 74 miles long, and from 4 to 13 miles broad. It is formed by the Kur River. Its altitude is 5100 feet above the sea. Large deposits of fine salt are gathered from its basin when the lake dries up in summer.

BAKHUIZEN VAN DEN BRINK, bäk′hoi-zen vän dän brĭnk, Reinier Cornelis (1810–65). A Dutch historian. He was born at Amsterdam, Feb. 28, 1810. Among his noteworthy achievements must be mentioned *Vondel met Roskam en Rommelpot* (new ed., 1891), *Variæ Lectiones ex Historia Philosophiæ Antiquæ* (1842), *La retraite de Charles Quint* (1842), and *Het huwelijk van Prins Willem met Anna van Saksen* (1853). He was in 1854 made keeper of the state archives and published *Het Rijksarchief* (1857) and *Cartons voor de geschiedenis van den nederlandsche Vrijheidsoorlog* (1860–77). He died at The Hague, July 15, 1865. Not the least of his services to Holland was his connection with *Gids,* a monthly publication of very high aim.

BAKHUYSEN, bäk′hoi-zen, Ludolf (1631–1708). One of the foremost Dutch marine painters. He was born at Emden and began as a clerk and writing teacher in Amsterdam. His masters in painting were Aldert van Everdingen and Heinrich Dubbels, and he soon rose to the first rank in marine painting. The rival of Wilhelm van der Velde, who painted "The Calm," Bakhuysen depicted stormy seas and many times risked his life and those of seamen in the pursuit of studies for his pictures. His coloring does not compare favorably with that of his rival; nevertheless he portrays the spirit of the sea, particularly in its wild and boisterous aspects. He has left numerous examples of his work, and many of them are of considerable size. One, representing a coast scene of great beauty, dated 1675, is in the Amsterdam Museum. In the Louvre is his "Rough Sea at the Mouth of the Maas." Two of his pictures are in the Museum at The Hague. Many are in England, seven being in the National Gallery, London. Peter the Great was his pupil, and the painter made for the Czar numerous drawings for the construction of vessels. The King of Prussia and other European princes are said to have visited his studio. After he was 71 years old he began etching on copper. He also painted portraits of considerable ability. Consult Van der Willigen, *Les artistes de Haarlem.*

BA′KING. The mode of cooking food in a heated chamber or oven. The term is also applied in the manufacture of bricks, pottery, etc. The oven of a kitchen range is simply an iron chamber, with flues for conveying the heated gases of the fire round it and usually provision for ventilation. Ovens are now often heated by water or by steam and also by gas and electricity. The chemical as well as the mechanical effect of cooking upon food is explained in the article on Cookery. The chemistry of bread baking is discussed under Bread.

BAKING POW′DER. A chemically prepared material used as a substitute for yeast in making bread, biscuits, etc. Bicarbonate of soda, tartaric acid or bitartrate of potash, and acid calcium phosphate mixed with starch or flour are the materials from which the baking powders are very commonly made. When water is added to these substances in making bread, they combine and give off carbonic-acid gas or carbon dioxide, exactly as does yeast by fermenting, which causes the bread to rise. Sometimes in place of tartaric acid alum is substituted to cheapen the cost of production. The possible harmfulness of alum for the purpose is a disputed point. Bicarbonate of ammonia is sometimes used to leaven foods. A domestic method uses bicarbonate of soda and sour milk or cream of tartar (potassium bitartrate). See Bread.

BAKONY WALD, bŏ′kôn-y′ vält, or **BAKONY FOR′EST.** A chain of mountains in Hungary, extending northeastward from the neighborhood of Lake Balaton towards the bend of the Danube (Map: Hungary, F 3). It is about 60 miles long, over 20 miles in width, and densely covered with forests. Numerous herds of swine are reared within its limits. Its average height is not over 2000 feet; the highest peaks are found on the western side. The lower parts of the chain are under cultivation; a considerable export trade is carried on in the excellent

marble of several quarries, and there are numerous villages in the valleys. The railway line from Stuhlweissenburg to Komorn winds through the chain, reaching its highest point near Gombas (1220 feet).

BAKSHEESH, bāk'shēsh', or **BAKSHISH** (Pers. *bakhshish,* a present). In the East, in modern times, in special significance of gratuity (Ger. *Trinkgeld*), which, however, the Orientals do not quietly wait to receive, but loudly and even insolently demand. Every traveler, whether in Turkey or in Egypt, in Asia Minor or in Syria, if he receives the smallest service from any native, is immediately reminded, by the cry of "Baksheesh, Baksheesh," to pay for the courtesy by a monetary gift.

BAKST, bākst, Leon Nikolajewitsch (1886–). A Russian decorative designer. He was born in St. Petersburg, of Jewish parentage, and studied there in the Academy of Arts. Under the patronage of a Russian Grand Duchess, he continued his studies in Paris. Returning to Russia, he was active at Moscow, painting interesting genre scenes of Russian life and portraits in the conventional manner, several examples of which are in the Tretiakoff Gallery, Moscow. His reference to political conditions in his paintings displeased the Russian authorities, and he removed to Paris in 1906. He soon became known as a designer of stage settings and achieved universal recognition, when the Imperial Russian ballet visited the French capital in 1909, with the productions of *Cleopatra* and *Scheherazade.* These were followed by the remarkable designs for *Salome,* with Egyptian settings, *Narcissis, Daphnis and Chloe,* and *A Faun's Afternoon* in Greek settings, *The Blue God,* Anamese and Javanese, *Thamar,* Transcaucasian and Chinese. *The Butterflies,* and *The Carnival.* He also designed settings for Wolf-Ferrari's opera, *The Secret of Suzanne,* in rococo, Boris Godounow in Byzantine settings, and for D'Annunzio's *La Pisanelle* (Renaissance) and *Saint Sebastien* (mediæval). The ballet for his most recent production, *The Orientale,* was given in New York in 1914 with the celebrated Russian dancer Pavlowa in the leading rôle. His designs are characterized by extraordinary richness and brilliancy of color, caused by pure tones interplaying with remarkable chromatic effect. His drawing is conventionalized, but highly characteristic. His teeming imagination is only equaled by his remarkable fertility of invention. An interesting exhibition of his principal designs and drawings was held in New York and other American cities in the winter of 1913–14.

BAKU, bä-kōō' (a corruption of the Pers. *badkubu,* given to it on account of the destructive winds of that region). The seat of administration of the Russian government of Baku in the Caucasus; an important seaport and naval station on the west coast of the Caspian Sea, on the peninsula of Apsheron (Map: Russia, J 6). It is an important commercial and manufacturing centre, has several shipbuilding yards, and is known especially for the rich petroleum wells in its neighborhood. On the new quay, which is about a mile in length, along the shore south of the city, there are modern stores and bazaars, many fine buildings, and the ancient garden of the khans. The older town, laid out in terraces on the slope of a hill, has irregular, narrow streets and alleys lined with low, wooden, flat-roofed houses. Here are the ruins of the palace of the khans—once a magnificent edifice built in the Mussulman style of the fifteenth century, and the mosques of the shah, erected in 1078. North of the harbor, also on the shore, is the so-called "black town," whither the crude oil is conducted through pipe lines from the oil wells 8 or 9 miles north of the town, and where it is refined for the market.

The climate of Baku is mild, its harbor having frozen but once in 80 years; the mean temperature for the year is 58° F., for January 38°, and for July about 78°. The city owes its prosperity to the petroleum industry. In addition to oil refineries there are a number of mills, tobacco factories, shipbuilding yards, and chemical works. The advantageous position of Baku near the Persian frontier and at the eastern terminus of the Transcaucasian Railway has made it the *entrepôt* for the Russo-Persian trade. Cotton, rice, silk, wine, dried fruits, and walnut wood pass through Baku from Persia on their way to Russia and western Europe, in exchange for various goods of Russian manufacture. The growth of Baku's population has kept pace with that of its industry. In 1860 it numbered only 13,800; in 1897, 112,253; in 1904, 177,777; in 1910, 217,900. The predominating element is Tatar. This race constitutes the bulk of the laborers and small traders; Russians are next in number and fill the official positions as well as some of the commercial and financial posts; Armenians are numerous, and among them are the leading merchants. The petroleum industry is largely in the hands of foreign capitalists.

The date of the founding of Baku is not known; the town is mentioned by an Arab geographer of the tenth century. The easily igniting gases, arising from the soil saturated with petroleum, seem to have been known to the ancient Parsis, or fire worshipers, and attracted great numbers of pilgrims. Baku was in possession of the Persians from 1509 to 1723, when it was captured by the Russians; the latter restored it to the Persians in 1735, but in 1806 it passed finally to Russia. A vast conflagration took place in 1901. In September, 1905, Baku was the scene of sanguinary conflicts between the Armenian and Tatar populations. During the rioting the oil industry suffered immense damage. The total loss, direct and indirect, to the different concerns amounted to tens of millions of rubles. The commercial and industrial section of the town was almost entirely destroyed. Consult: Marvin, *The Region of Eternal Fire* (new ed., London, 1891); Louis, "The Baku Petroleum District," in the *Engineering Magazine,* no. xv (New York, 1898); Henry, *Baku: An Eventful History* (1906).

BAKU. A government of the Russian viceroyalty of the Caucasus. Area, 15,061 square miles; pop., as estimated Jan. 1, 1911, 1,033,700 (274,100 urban, 759,600 rural). Capital, Baku (q.v.). It is classed as a Transcaucasian government, though its northern part extends beyond the Caucasus Range. It is of importance largely on account of its oil wells. These are principally located in the vicinity of the city of Baku, into which the oil is piped and where it is prepared for export. This district is the most prolific single district in the world and the principal source of Russia's supply. The output in 1901 was 671,000,000 poods, the entire Russian output 706,000,000; in 1908, 467,000,000 poods (525,000,000 for all Russia); in 1909, 490,000,000 (557,000,000); in 1910, about

479,000,000 (about 573,000,000). The average output per well in 1910 was 188,000 poods, 186,000 in 1909, 187,000 in 1908, 351,000 in 1901. The decline is due to the gradual decrease in the quantity derived from spouters (15,000,000 poods in 1910, and 98,000,000 poods in 1901); to the decrease in the average output per well; and to the increased depth of the bore holes together with a decrease in the number of holes bored per annum. The output from the island of Tcheleken (about 20,000,000 poods) is shipped to Baku, but is not included with the Baku production.

BAKUBA, bä-kōō'bä. A Bantu-speaking people living in the Kasai District of the Congo, who have recently been described under the name of "Bushongo"; they are related to the Baluba. The Bakuba are distinguished among all the Congolese tribes by the high development of their æsthetic sense. They are admirable wood carvers, decorating goblets, toilet boxes, drums, and in fact all kinds of wooden objects with characteristic plait patterns. The most remarkable product of their industry, however, is the plush-like pile cloth woven of raffia-palm fibres by the men and decorated with designs sewed on and trimmed down by the women. Visited and briefly described by the early travelers in the Kasai region, the Bakuba have been more recently studied by Frobenius and Torday. The latter and Joyce have collaborated in the most authoritative account hitherto published, *Les Bushongo* (Publications of the Tervueren Museum, Belgium, 1911). Some valuable data are to be found in Sir Harry Johnston's *George Grenfell and the Congo*.

BAKUNIN, bä-kōōn'yĕn, Mikhail (1814–76). A Russian agitator and writer, the founder of militant anarchism. He was a member of an aristocratic family, and after serving in the army from 1832 to 1838, traveled in Germany, where he devoted himself to the study of philosophy. His liberal tendencies had become marked even before he left Russia. In 1841 he was in close association with the leaders of the Young-German movement at Berlin, and in 1843 he appears as fraternizing with the Polish exiles in Paris. He passed a number of years in Switzerland, where he became prominent in communistic circles. In 1847 the Russian government demanded his return to Russia and upon his refusal confiscated his property. In the same year he was expelled from Paris upon the demand of the Russian authorities as the result of a violent speech in which he called upon the Poles and Russians to unite for the overthrow of the absolute monarchy. During the two years following he was plunged into the vortex of the revolutionary movement which was then convulsing all Europe. We find him at Berlin shortly after the outbreak of the March Revolution in 1848; in June of the same year he took part in the Pan-Slavic Congress at Prague and in the disturbances which followed, and in May, 1849, he was one of the leaders of the insurrection at Dresden and became a member of the Revolutionary government there. He was taken prisoner at Chemnitz and was condemned to death in May, 1850, but the Saxon government surrendered him into the hands of the Austrian authorities, by whom he was tried and again sentenced to death. At the request of the Russian government he was returned to Russia, where he was tried and for a third time sentenced to death. The sentence was commuted to life imprisonment by order of the Czar, and after several years in various fortresses Bakunin was sent to Siberia in 1855. In 1859 he was sent to the Amur region, whence he succeeded in making his escape on an American ship to Japan. Proceeding to London by way of the United States, he threw himself into the Socialistic movement, which was then making rapid progress under the leadership of Marx and Engels. In 1869 he founded the Social Democratic Alliance, which soon joined the International Workingmen's Association. By this time, however, he had become a believer in militant anarchism, and he attempted to impose his doctrines upon the association, whose policy was one of peaceful agitation. This led to his expulsion in 1872. In 1873 Bakunin retired from active life and spent the remainder of his days in Switzerland. He died at Bern June 13, 1876. A list of his writings, comprising mainly articles in newspapers and periodicals, covers 10 printed pages in Nettlau's *Bibliographie de l'anarchie* (Paris, 1897).

BAKWIRI, bä-kwē'rē. A Bantu tribe of Kamerun, of medium height, well proportioned, and with regular features. Cannibalism was formerly practiced. Drum signaling is much used. The code admits of carrying on sustained conversations, and news is rapidly conveyed to long distances. Witchcraft, ordeals, and sacrifices prevail.

BALAAM, bā'lăm. A seer, and the hero of a remarkable story told in connection with the conquest of Palestine by the Hebrews. The main narrative is found in Num. xxii.–xxiv. At the instance of Balak, King of Moab, Balaam is said to have left his home at Pethor to pronounce a curse upon Israel. He at first declined (xxii. 13), but on the second call was allowed by God to go, though with the instruction to speak only what God should tell him. In reality, however, God was angry with Balaam because he went, and manifested his displeasure by sending an angel with drawn sword to block up Balaam's path. While Balaam himself did not notice the angel, his ass saw him and tried to turn aside. Driven back into the road, the ass pressed so closely against the mountain wall that Balaam's foot was crushed. The angry seer continued to beat his ass until God opened the mouth of the ass, and she spoke to Balaam, rebuking him. Then his eyes were opened, and he saw the angel, who permitted him to go on, with the understanding that he was to speak only such words as were put upon his lips. He was received by Balak at Kiriath-huzoth and taken to the shrines of Baal. At Balaam's order seven altars were prepared and seven oxen and seven rams sacrificed. Then Balaam prophesied, but God put a word of blessing in Balaam's mouth instead of a curse. A second and a third time Balak prepared altars and offered sacrifices, but each time Balaam blessed Israel. When rebuked for this by Balak, he answered that he must obey the commands of God. The seven oracles prophesy (1) Israel's greatness (xxiii. 7–10); (2) Israel's conquering power (xxiii. 18–24); (3) Israel's prosperity, with a king greater than Agag; (xxiv. 3–9); (4) Israel's king, the star coming forth from Jacob, who will smite Moab and Edom (xxiv. 15–19); (5) the destruction of Amalek (xxiv. 20); (6) the capture of the Kenites by the Ashurites (xxiv. 21 f.); and (7) the end of another people, probably the Amorites, who afflicted Asher and

Eber (xxiv. 23 f.). According to Num. xxxi. 16, Balaam counseled the women of Midian to cause the Israelites to commit trespass against Yahwe; as a punishment he was slain with the Midianites (Num. xxxi. 8; Josh. xiii. 22).

As to the home of Balaam, Num. xxii. 5 declares that he came from the land of the sons of Ammon (so Heb. MSS., Jerome and Syriac), but this may be a gloss occasioned by the absence of an oracle against Ammon. "Pethor on the river" has been understood as referring to Pitru on the Euphrates, and Aram to Mesopotamia; but the river is not necessarily the Euphrates; the similarity between the Hebrew letters *r* and *d* has often caused a confusion of Aram and Edom, and Balaam is not likely to have been represented as coming a distance of 20 days' journey, or through the country occupied by Israel to the southern end of Moab. Balaam ben Beor is believed by many scholars to be identical with Bala ben Beor, the first King of Edom according to Gen. xxxvi. 32. Attempts have been made by critics to assign different parts of the narrative to two sources, but they have not been very convincing. Balaam is nowhere represented as friendly to Israel, and, in the present condition of the text, it is not possible to use the alternation of the divine names as a criterion, or to put stress upon the apparent inconsistencies between xxii. 20 and xxii. 22. The episode of the talking ass adds to the charm of the story and, like so many an animal fable, teaches a very wholesome lesson. That animals may be conscious of the presence of a spirit when men fail to recognize it is a widespread idea (cf. Wellhausen, *Reste arabischen Heidentums*, pp. 151, 201, 2d ed., 1897). From the statement in Deut. xxiii. 5 f., that "Yahwe was not willing to hearken unto Balaam, but changed the curse into a blessing," Bertholet infers that Balaam was supposed actually to have cursed Israel, but without effect. It is possible that this passage alludes only to Yahwe's unwillingness to hear from the lips of Balaam a curse of his people Israel and a consequent change by the divine afflatus of an intended curse into a blessing. A conception of the inherent efficacy of the prophetic curse or blessing clearly underlies the whole story. Nevertheless the earliest tradition may have known only that the *hija*, or "curse," which formed so important a preparation for, and accompaniment to, the actual fighting was pronounced by the King of Edom and Midian. The later success of Israel showed the futility of any such curse and paved the way for the conviction that no curse could have been uttered, but only words of praise. A gifted poet in Israel answered the natural question as to what these words must have been. He probably lived in the Davidic age, as his allusions to the great King, his victories over Edom and Moab, and the discomfiture of nations like the Kenites and the Amelekites that still existed at his time seem to indicate. In later times Balaam became the type of the prophet uttering his oracles for hire and the heretical teacher. Consult A. v. Gall, *Zusammensetzung und Herkunft der Bileamperikope* (1900); Holzinger, *Numeri*, pp. 104 ff. (1903); Bertholet, *Die Religion in Geschichte und Gegenwart*, vol. i, pp. 1248 ff. (1909); N. Schmidt, *The Messages of the Poets*, pp. 327 ff. (1911).

BALAAM. The name under which the Earl of Huntingdon is satirized in Dryden's *Absalom and Achitophel.*

BAL'ACHONG (Malay *bālachān*). The name given by the Chinese to a condiment eaten with rice, made of putrid shrimps or small fish pounded with salt and spices and then dried.

BALAFRE, bȧ'lȧ'frȧ', Le (Fr. the scarred). 1. A name applied to Ludovic Lesly, uncle of Quentin, in Scott's *Quentin Durward*, because of his scarred cheek. 2. A characterization of two dukes of Guise for a similar reason.

BALAGUER Y CIRERA, bä'lä-gär' ē thē-rā'rȧ, Víctor (1824–1901). A Spanish poet, historian, and statesman; born and educated at Barcelona. He was archivist and afterward professor of history in the university there. For the 25 years following 1843 Balaguer was head of the Liberal party in his native city. His political views were advanced through the medium of *El Conseller*, a paper which he owned and edited. Although intensely regional in his sympathies, he was not a separatist. He was made Minister of Public Works in 1872, Vice-President of the Cortes in 1880, and successively Minister of the Colonies and Minister of Finance, and later a life Senator. A special study of the history and legends of Catalonia was made by him. A writer of plays which were produced in Barcelona while their author was still in his teens, and of verse more popular than original, he frequently used the pseudonym "el Trovador de Montserrat." His influence upon the literary renaissance in Catalonia was very great, and no one did more than he in the establishment of the Floral Games (*Juegos Florales*) that so powerfully aided this movement. In 1891 he published his great epic trilogy, *Los Pirineos*, which has been translated into Italian, and into German verse for the stage. This work inspired the Spanish composer Felipe Pedrell to create a lyric drama for which Balaguer made the special libretto. During the last 15 years of his life he devoted much of his time and most of his wealth to establishing and equipping a library and museum at Villanueva y Geltrú, which he left heavily endowed in his will. He was a member of the Royal Academy of History (1875) and of the Spanish Royal Academy of the Language (1883) and possessed the Grand Cross of the Order of Carlos III. Among his more important works are: *Estudios históricos y políticos* (1876), *Historia de Cataluña y de la Corona de Aragon* (1860–63), *Historia política y literaria de los trovadores* (1878–80), *Tragedias* (1879), and *Poesías completas* (1884).

BALAHISSAR, bä'lȧ-his-sär' (Turk. and Ar. *bala*, high + *hissar*, castle). A village of Asiatic Turkey, situated about 8 miles southwest of Sivrihissar, in the vilayet of Angora (Map: Turkey in Asia, D 3). Near by are ruins of the ancient Pessinus, a flourishing town of Galatia, famous for the worship of Cybele, to whom a fine temple was built by the kings of Pergamum. The people of Sivrihissar use this region as a quarry, and the ancient ruins are fast disappearing.

BA'LAK. A caricature of Dr. Burnet, Bishop of Salisbury, in *Absalom and Achitophel*, by Dryden and Tate. He appears in part ii.

BALAKIREFF, bȧ-lä'kē-ryĕf, Mili Alexeyevich (1837–1910). A Russian composer and founder of the Young Russian school of music. Ulybysheff (Oulibicheff) was his first teacher in music at his native city, Nizhni-Novgorod. Of exceptional memory, he knew at the age of 18 nearly all the classics of music by heart.

In 1855 he graduated from the mathematical department of the University of Kazan and went to St. Petersburg, where Glinka befriended him. He made a brilliant début as a pianist, but gave up that career; nor could Ulybysheff's Mozart worship make a classicist of him. Russia was reawakening, after the Crimean War, from her enforced torpor during the reign of Nicholas I, and Balakireff gathered around him several youthful enthusiasts, Cui, Mussorgski, and later Rimsky-Korsakoff and Borodin, all striving for nationalism in music, with Glinka and Dargomyzhski as their models. The foundation of the Modern Russian school was now laid. Under the energetic guidance of Balakireff they studied all the masters of music from the earliest times. He possessed a striking power of analysis as well as of imparting knowledge, and he taught them whatever he learned himself. "Truth and nationalism" was their battle cry. At first in literary articles, then in musical compositions, they embodied their theories. Balakireff's own contributions to this movement were *Songs* (1858–60); three overtures (on Russian themes, 1858; on Czech themes, 1867; and the Millennial, 1862); incidental music (overture, march and four entr'actes) to *Lear* (1858–61); a collection of 40 *National Songs* (1866); and a piano fantasy, *Islamey* (1869). The songs have remained a classic in their national treatment of the added accompaniments, and the fantasy has been pronounced the most difficult piano composition. It was a favorite of Liszt's, and one which all his pupils had to learn. Jointly with Lomakin, Balakireff founded, in 1861, the *Free Music School*. In its classes the "new truths" were inculcated, at its concerts the works of the Young Russian school were performed, under Balakireff's passionate baton. In 1867 he gained a European reputation by his production and conducting of Glinka's *Ruslan and Lyudmila* in Prague. On his return he was elected conductor of the Russian Musical Society, but resigned in 1869 on account of intrigues, and in 1872 withdrew from public life owing to ill health. From 1883 till 1894 he was director of the Imperial Capella, which he has placed on a solid musical foundation by organizing classes in various branches of musical instruction. His fantasy for orchestra, *Tamara* (1867–82), and his symphony in C major (1898) are his greatest works. They are growing, passionate, and full of rich orchestration. All his larger works are programme music of the Berlioz-Liszt school. Though not prolific, he occupies, in the history of Russian music, one of the most distinguished places. Consult Cui, *La musique en Russie* (Paris, 1880), and Pougin, *Essai historique sur la musique en Russie* (Turin, 1897).

BALAKLAVA, bä'lȧ-klä'vȧ. A small port in the southwest of the Crimea. It is separated by a rocky peninsula from the harbor of Sebastopol, from which it is about 6 miles distant. The harbor, which affords secure anchorage for the largest ships, is perfectly landlocked, the entrance being so narrow as scarcely to admit more than one vessel at a time. Balaklava is the Portus Symbolorum of the ancients, and the present name is supposed to be a corruption of the Italian *Bella-chiava* ('fair haven'). It was long the seat of a Greek colony. In the fourteenth century it fell into the hands of the Genoese, who have left behind them the interesting ruins of a fortress on a rock overlooking the bay. They were expelled in the fifteenth century by the Turks. On the acquisition of the Crimea by Catherine II of Russia it was made a military station. In 1854 the town was occupied by the British, under Lord Raglan. Here an inefficient commissariat allowed great numbers of the troops to starve to death in the midst of bountiful supplies rendered inaccessible by official red tape. The name "Balaklava" is probably best known to English peoples in connection with the charges of the Heavy and the Light Brigades (Oct. 25, 1854), the latter made famous by Tennyson's poem. To-day, in spite of its splendid harbor, the town has a population of only about 1500, mostly Greek fishermen. The surrounding country is devoted to grape growing.

BALALAIKA, bäl'ȧ-lī'kȧ. A popular Russian stringed instrument. It consists of a triangular (rarely, oval) body and a rather long neck with frets. Formerly it had only two strings; now the usual number is three, although there are also instruments with four strings, which are plucked with the finger. The Russian peasants use it in the accompaniment of their folk songs. In recent years W. W. Andreeff has improved the quality of the tone and organized at St. Petersburg a regular balalaika orchestra of 30 instruments, which he has taken on tours through Europe, rendering only Russian folk music. The organization visited America in 1910 and in succeeding years with great success.

BALAMBAN. A pueblo on the west coast of Cebu, Philippines, about 23 miles northwest of the town of Cebu, on the Strait of Tanon. It has a well-sheltered harbor, an active coast trade, and a population of about 13,000.

BALA MURGHAB, bä'lȧ mōōr-gäb'. See MURGHAB.

BALAN, bȧ'lăN'. An early poem, a later rendering of which was *Fierabras*, one of the most popular tales of the Charlemagne cycle. An English version of *Balan* was *The Sowdan of Babylon*. In the latter romance Balan is the name of the father of Fierabras. He was overcome by Charlemagne. The Arthurian character, Balan, was the brother of Balin.

BAL'ANCE (Lat. *bilanx*, having two scales, from *bis*, twice + *lanx*, plate). An instrument used for the comparison of two masses or, speaking less technically, for ascertaining the weight of a body. The balance in its essence is simply a lever (q.v.) or beam poised or suspended so as to move freely about an axis transverse to its length. The force acting on one arm of the lever is produced by the action of gravity on the body whose weight is to be determined, and is equal to its mass m multiplied by g, the acceleration due to gravity. (See MECHANICS.) If the lever is in equilibrium, or the beam at a horizontal position, there must be a force equal, but opposite in direction, acting on the other arm at an equal distance, and as the acceleration due to gravity is a constant for any one point on the earth's surface, and as the arms of the lever are equal by construction, the mass of known magnitude upon which gravity acts must be equal to the mass of the unknown body. If the arms of the balance are unequal in length, it follows, from the law of the lever, that the masses are inversely as the length of the arms. The balance, accordingly, enables us to learn the actual mass of a body by direct comparison with a standard of mass. The spring balance (q.v.), on the other hand, measures the weight or attraction exerted by the earth on a body, and as the

force of gravity varies from point to point, the force acting on the spring must vary with the place. The mass of the body which is being weighed is constant, so that the amount that the spring is stretched depends upon the acceleration due to gravity.

From the foregoing considerations it will readily be seen that there are two methods which

FIG. 1.

may be followed in the construction of a balance: Either to make the arms equal in length, and then find the number of weights of known value which will produce equilibrium, as in the case of the ordinary balance; or by having a known constant weight whose position, and consequently the effective length of the arm on which it is suspended, can be varied at will, as in the case of the steelyard. These facts were early known, and the balance is one of the first instruments to be used for measurements, having been employed by the ancient Egyptians, as the accompanying illustration testifies, and by other nations of antiquity. The steelyard played an important part in the ordinary commercial transactions of the Romans, and interesting specimens of these balances and their weights have survived which show few if any important variations from the ordinary steelyard of the present.

FIG. 2.—ROMAN STEELYARD.

Considering the simple balance, it is found that its first essential is that the arms should be equal, so that when once there is equilibrium the known and unknown weights may be interchanged without disturbing this condition. Otherwise the balance is false, and the weight obtained is not correct, being too great if the standard or known weights are placed in the short pan, and vice versa. Then, as it is necessary that the beam should move freely, there must be a proper mounting or suspension where friction is reduced to a minimum, and as the force of gravity acts vertically, both known and unknown weights must be carried in suitably suspended pans.

The balance is an instrument whose use is susceptible of great accuracy, and this is attained in the balances used by physicists and chemists in their measurements of precision. While the theoretical considerations involved are of course applicable to all forms of balances, they become of greater significance in discussing these finer instruments where extreme accuracy is desired. In such a balance the beam is of metal and carries at its middle point, transverse to its length, a steel or agate knife-edge which rests on surfaces of similar material. The line of contact between the knife-edge and the plane is the axis around which the beam revolves; and when the beam is at rest a vertical line through the centre of gravity would include this knife-edge. Connected with the beam, as shown in the illustration, Fig. 3, is a fine pointer, which passes over a graduated scale at the base of the supporting pillar, while at or near its extremities are placed, at equal distances from the central knife-edge, knife-edges upon whose sharp edges, turned upward, are placed the bearing surfaces of the

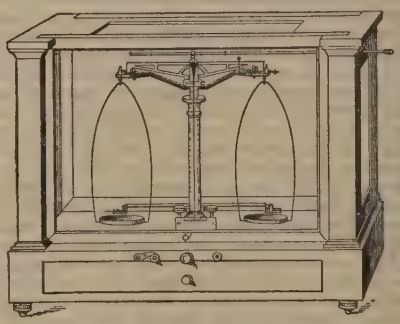


FIG. 3.—ANALYTICAL BALANCE.

metallic pieces from which the pans are suspended. In order that a minimum of wear should come upon these sharp edges, mechanism is provided to support the beam and pans whenever there is no actual weighing, and the devices to accomplish this vary in different forms of balances. The beam is graduated into 10 equal divisions, which in turn are similarly subdivided, and a hook on a movable rod is provided, by means of which a fine loop or rider of wire can be placed and removed at any desired point on the beam. Such is a general description of a balance, though there are, of course, numerous mechanical modifications and refinements to insure facility of operation and accuracy of measurement. The underlying principles will perhaps better be understood by referring to the diagram, Fig. 4. Let *ACB* represent the beam of a balance, and let the points where the knife-edges intersect a vertical plane through the beam be located on the line *ACB*, though this condition in practice is not always realized, and the knife-edges at the end of the beam may be either higher or lower than the centre knife-edge. The point of support is at *C*, consequently the centre of gravity is situated at *C* on a vertical line passing through this knife-edge. The location of the centre of gravity of the beam is an important consideration. If it were above the point of support, the beam would be in unstable equi-

librium and would seek a more stable position and in so doing would overturn. If the centre of gravity coincided with the axis of revolution, the beam would rest in any position indifferently, while the stability increases with the distance of the centre of gravity below the point of support. With an increase in the stability of the beam, the less the sensitiveness of the balance and the quicker the time in which it will cease from oscillating and take up a position of rest. The sensitiveness also depends on the length of the arms, increasing with the length, and the ease, or lack of friction resulting from skillful construction, with which the beam oscillates. The more sensitive the balance the larger the period of oscillation of the beam, though it is necessary to consider the time necessary in making a weighing, and not adjust an ordinary balance to too high a degree of sensitiveness. An ordinary fine balance, as used by the physicist or chemist, is constructed and adjusted to have a period of vibration of between 10 and 15 seconds.

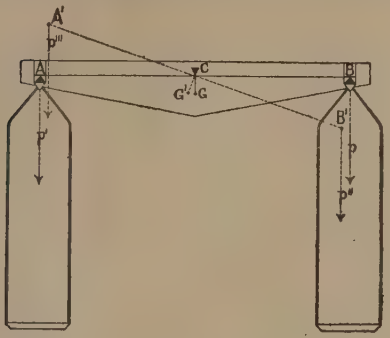


FIG. 4.

Assuming that the arms are equal in length and that equal loads are carried in each pan, or, in other words, that the beam is in equilibrium, the forces denoted by the dotted lines p and p', acting vertically, are of course equal. If now a small excess of weight be added to the right-hand pan, there will be an increased force on the right-hand arm, which may be represented by p'', and the beam will be deflected by an amount which for small additions of weight is proportional to the excess and is of course indicated by the pointer and scale.

In using a fine balance, precautions must be observed in its care and manipulation. The balance, which is inclosed in a glass case and kept free from dust, is first leveled in order that the supporting pillar should be vertical. If the pointer of the balance is not at the middle point, or zero (many physicists prefer to renumber the scale so that the numbers run consecutively from the left to the right, instead of the usual arrangement where the divisions are numbered to right and left from the centre mark) i.e., the zero or point of rest of the balance does not coincide with the zero of the scale, the true zero must be determined by taking the mean of an even number of swings on one side, and an odd number on the other, and then their mean. The body is placed in one of the pans while both pans and beam are supported. In the other are placed the weights, the usual practice being to begin with the larger weights and work toward the smaller. The weights are of brass, platinum, or aluminium, the smaller weights being in the form of pieces of sheet metal and "riders" of fine wire. The pans and beams should always be supported while the weights are changed. After the approximate weight of the body is ascertained, so that the addition of a centigram will cause the pointer to come to rest on the opposite side of the scale, the "rider" is brought into play and adjusted at such a position that the pointer comes to a rest at zero. A more rapid and usual method is that known as "weighing by swings," where points of rest when the weights differ by a certain small unit are obtained as described above. The amount to be added to the smaller amount of the weights will be such a fraction of the small units as will be obtained by taking as the denominator the number of scale divisions between the two rest points, and as the numerator the distance of the true zero from the first point. It is often convenient with such a balance to have a table of sensitiveness, from which one can tell at a glance the number of milligrams corresponding to a scale division for any given load. The experimenter can also find the ratio of the two arms of the balance and use it as a correction factor, as well as determine the errors of the set of weights in order to refine his measurement. He should, in addition, take into consideration the amount of air displaced by weights and the body being weighed, particularly if their densities differ considerably. An analytical or assay balance will have a sensitiveness of 1-50 or even 1-400 of a milligram, and is used in chemical analyses for the exact determination of the mass of various substances, though a sensitiveness of one-half milligram suffices for many ordinary analytical purposes. In the use of the balance there are many methods, complex and exact, which are used by the physicist, and which will be found described in the more advanced treatises on experimental physics.

Probably the most accurate use of the balance is at the International Bureau of Weights and Measures at Sèvres, near Paris, where the standard kilograms constructed by the bureau are preserved and compared. Here the balances are of great sensitiveness, and are operated by an observer in an adjoining room, who uses a telescope to observe the deflections. There is automatic apparatus to change the weights from one pan to another, and the temperature is maintained constant.

Balances are constructed in many forms for various purposes where it is not at all necessary to employ such refinements as have been described. Those of the apothecary or grocer are familiar examples, while the balance for weighing bullion combines large capacity with considerable sensitiveness. In small balances use is sometimes made of the bent lever, especially in balances for weighing letters, chemicals, and other small objects. Here a constant weight is placed on the short or bent arm, and the body of unknown mass on the long arm. A pointer on a graduated scale indicates the weight of the body. The graduations are not even, as the angular displacement from a position of equilibrium does not increase proportionately with the increase of weight.

Bibliography. For a description of ancient balances, consult Gerland and Traumüller, *Geschichte der physikalischen Experimentirkunst;* and Sokeland, "Ancient Desemers or Steelyards,"

in the *Smithsonian Annual Report for 1900* (Washington, 1901), translated from the *Verhandlungen der Berliner Gesellschaft für Ethnologie* (Berlin, 1900). For a description of the manipulation of a balance in fine measurements, the reader should consult Kohlrausch, *Lehrbuch der pratischen Physik* (Leipzig, 1905), or his more elementary *Kleiner Leitfaden der praktischen Physik* (Leipzig, 1900). An excellent systematic treatise is Felgentraeger, *Theorie, Konstruktion und Gebrauch der feineren Hebelwage* (Leipzig and Berlin, 1907), as is also Braver, *Die Construction der Waage*, 3d ed. by Lawaczek (Leipzig, 1906); Stewart and Gee, *Lessons on Elementary Practical Physics*, vol. i (London, 1889), and Glazebrook and Shaw, *Practical Physics* (London and New York, 1893), give excellent descriptions of the theory and manipulation of balances, which also will be found discussed at considerable length in the larger treatises on practical physics. The publications of the International Bureau of Weights and Measures describe the method of testing standard kilograms and the balances used by the bureau.

BALANCE, and **BALANCE SPRING**. The balance of a watch is a wheel finely poised on its axis; the pivot holes in which it turns being frequently—in chronometers and clocks, as well as in watches—jeweled, or made of small rubies, diamonds, etc., for the sake of durability. The natural effect of an impulse given to such a wheel would be a complete rotation on its axis. This, however, is convertible, by the escapement (q.v.) and by the balance spring, into a vibratory motion. The balance spring is held to be a crowning invention in the mechanism of the watch; and the honor of its first suggestion has been claimed for no less than three very eminent men—Hooke, an Englishman; Abbé Hautefeuille, a Frenchman; and Huygens, the Dutch astronomer. The honor, however, is thought to belong to Hooke, who applied for a patent for the invention in 1658 or 1660.

The balance spring consists of a coil of fine steel wire which determines the time of vibration of the balance. One of its extremities is fastened to a point independent of the balance, while the other is attached near its axis. When the balance is at rest, the spring is not under tension, its position being called the point of rest; but when an impulse is given to the balance by the crown wheel of the escapement, the balance moves around just so far as the impulse given is able to overcome the elastic resistance of the spring. When that resistance becomes equal to the impulse given, the balance stops for a moment, and then is driven back by the elastic recoil of the spring, and continues thus to vibrate so long as the impulse is repeated or the watch is in motion. The subject of balances and balance springs and their adjustment is treated at considerable length in Britten, *Watch and Clockmakers' Handbook* (London, 1896). For a general description of watchmaking and for illustration of the balance wheel, see CLOCK and WATCH.

BALANCE OF POW'ER. An expression used in diplomacy, with reference especially to the European Powers, to denote a condition of affairs in which no one state is permitted to have such a preponderance as to endanger the independence of the others. This idea is not confined to modern times. The Greek states acted upon it by a kind of instinct of self-preservation, though it was not directly formulated. It has, however, been more distinctly avowed as a motive of political conduct, and more systematically acted upon since the time of Charles V, whose ambitious designs awakened the European Powers to the danger of such overwhelming preponderance in one dynasty. The motive of preserving the balance of power came first distinctly into the foreground in those alliances which England, Holland, and Austria repeatedly formed against the schemes of Louis XIV. It was the same cause that broke up the most powerful of these coalitions; for in the War of the Spanish Succession, when the Hapsburg candidate for the Spanish throne became, by the death of Joseph I, sovereign of Austria and Holy Roman Emperor, and the power which, in the hands of Charles V, had menaced the equilibrium of Europe, seemed likely again to be wielded by one man, England withdrew from the coalition and saved Louis from a decided overthrow. The kaleidoscopic changes in political alliances that characterized European history from the Treaty of Utrecht to the end of the Seven Years' War were the result of a frantic attempt on the part of continental statesmen to preserve the balance of power. The aggressions of Napoleon called all the powers of Europe to arms against him in the name of the balance of power; and in readjusting the map of Europe the balance of power was often invoked to cover the jealousy which resisted claims to restitution of territory. For some time the balance of power in Europe has been embodied, as it were, in a hexarchy or permanent congress of the six Great Powers—Great Britain, France, Germany, Austria, Russia, and Italy. Mutual jealousy among the leading Powers, on the score of extension of boundaries, is looked to as the great safeguard of the smaller states. After this manner the Crimean War arose out of Russia's renewed attempt to extend her dominion over Turkey. It was in the name of the balance of power that the nations, in 1878, at the Congress of Berlin, deprived Russia of many of the advantages she had gained by the Treaty of San Stefano. Within the last 30 years, however, the balance of power has encountered an opposing principle in the rising spirit of nationalism. It is now generally recognized that countries may no longer be carved arbitrarily into morsels for the sake of preserving a political equilibrium, but that physical and social conditions must be taken into consideration as forces playing a part in the formation of states. United Italy, United Germany, and the Pan-Slavic spirit in Russia exemplify the growth of this political idea. On the other hand, a new phase of the old problem has been presented by the spread of European colonization and commerce in Asia and Africa. The balance of power has been in a measure extended over the whole world, and France, Germany, and Italy are everywhere seeking colonies and "spheres of influence" to balance the colonial empires of England and of Russia.

As a result of the Balkan War in 1912–13, the sudden rise to power of the Slav races at one time seriously threatened the political equilibrium of Europe and startled the courts of the Great Powers, but owing to rival ambitions and racial jealousies all fears of a Slavic preponderance were quickly dissipated and vanished when the Balkan states turned their arms against those of their own race.

BALANCE OF TRADE. A term applied to the difference between the value of the exports and imports of a country. This difference was formerly measured roughly, by the outflow or inflow of the precious metals in the settlement of accounts. When the exports exceeded the imports, causing an inflow of the precious metals, the balance was deemed favorable; in the contrary case, unfavorable. All of these expressions, which are still familiar, had their origin in the conception of political economy dominant in the so-called mercantile period. (See POLITICAL ECONOMY.) It was one of the fundamental errors of that system to confound the wealth of nations with their stocks of precious metals, and the economic policy of the period zealously favored anything which seemed to increase the stock of the precious metals, and as sweepingly condemned whatever had an opposite tendency. It will be readily understood how upon such principles the attainment of a favorable balance of trade became the chief end of commercial policy. Various measures were adopted to secure this end and led to the manifold restrictions upon commerce which characterize peculiarly the eighteenth century.

With the spread of the notions of economic freedom and the gradual adoption of a more liberal if not an absolutely free-trade policy in commercial affairs, the "balance of trade" lost its commanding place in economic doctrine. But it remained for a long time, and is to-day, a frequent popular criterion of national prosperity. Apart from the importance thus ascribed to the balance of trade, there is doubtless the feeling that a nation which imports more than it exports must pay the excess from its accumulations and thus gradually become impoverished. But if it be true that a people living upon its accumulations is on the road to impoverishment, it is by no means true that an excess of imports over exports is evidence of such a fact.

Whatever its bearing upon the national welfare, there could be no doubt that under the simpler conditions of a century ago an excess of merchandise exports over imports was an adequate explanation of an inflow of the precious metals. This would still be true if current sales and purchases were the only economic relations that bound peoples together. But this is far from being the case. In addition to movements of goods we have movements of debts (bonds, stocks, etc.), and movements of services (freights for transportation), between the nations. Any inequality in the movement of goods may be compensated, not only by payments of gold and silver, but by transfers of indebtedness or the performance of services. Indeed, the last two factors may be of such importance as to determine a movement of gold exactly contrary to what the merchandise movement might lead us to expect. Thus the United States, in the fiscal year 1912, with an excess of merchandise exports over imports of $551,057,475, had exports of gold exceeding imports by $8,391,848. In the United States an excess of merchandise exports, and in Great Britain an excess of imports, may be said to be normal conditions of trade. Since it thus appears that the balance of merchandise exported and imported no longer explains the phenomena of international payments, the scope of the phrase "balance of trade" has sometimes been extended to include the balance of international settlements. But in so doing the phrase once clear and distinct becomes involved and uncertain. It seems better to confine it to its original meaning to indicate one factor of modern commercial relations, and not the substance of them all.

It should be added that the practical determination of the balance of trade is beset with difficulties. Methods of determining the value of both exports and imports are necessarily crude, and it is not to be doubted that many of the false conclusions that have arisen in the discussion of trade balances have had their origin in the defects of commercial statistics. No analysis of trade returns can truthfully do more than indicate broad general tendencies without an examination into the methods by which such returns are prepared.

BALANGA, bä-läŋ'gä. The capital of the province of Bataan (436 square miles; pop., 45,166), on the island of Luzon, Philippines (Map: Luzon, D 5). It is on the west coast of Manila Bay, 34 miles northwest of Manila. It is a telegraph station, and its location on a shore road makes it an important point. It is well built and has a government house, a city hall, and a prison. Irrigation from the river Talisay is carried on to a considerable extent. Pop., 1903, 7347.

BAL'ANOGLOS'SUS (Gk. *βάλανος, balanos,* acorn, gland + *γλῶσσα, glōssa,* tongue). A remarkable worm-like invertebrate animal, now generally regarded as in some way related to the probable ancestral form of the vertebrates. Two or three genera form the sole family of the order Enteropneusta and the class Hemichorda (or Adelochorda). The body is long and slender and, some distance in front of the middle, is banded by an elevated ring, called the collar, from the front of which springs the somewhat tongue-shaped proboscis. (See illustration on Plate of ASCIDIANS, ETC.) Back of the collar, on each side of the body, are series of vertical slits opening through both the body wall and the wall of the alimentary canal. Water taken into the mouth passes out through these openings and aërates the blood. The slits therefore function as gill slits; and they are supported by "chitinous" rods, like the gill arches of *Amphioxus.* Projecting forward from the anterior upper side of the œsophagus is a short cartilaginous rod, which helps support the proboscis. This apparently corresponds to the notochord of the embryo of the higher vertebrates, and, because of its incomplete condition in *Balanoglossus,* the name "Hemichorda" is given to the class.

The species of *Balanoglossus* (and allied genera) are found buried in the sand of the seashore in shallow water in various parts of the world. They have been taken on both coasts of America, on the Pacific coast, north to Alaska, on the European side of the Mediterranean, in the East Indies, in the Bahamas, and on the south shore of Jamaica. Most of the known species are small and dull-colored, but some of the West Indian species are over a foot in length and half an inch in diameter, and are brightly colored with red and yellow. There are generally little heaps of excrement about the entrance to the holes in which *Balanoglossus* lives. All the species have a musky odor, which is strong enough to indicate their presence to any one familiar with the smell. Sometimes it is so strong as to be highly disagreeable. Many of the species have a complicated metamorphosis in their development, the pelagic bell-shaped

larva being known as a tornaria. It resembles superficially the larval form of some of the echinoderms, and for that reason some zoölogists have sought for evidence of relationship between that group and the Hemichorda. It is generally believed now, however, that the nearest living relatives of the Hemichorda are to be looked for among the Ascidians. Compare AMPHIOXUS; CHORDATA. For illustrations, see ASCIDIANS.

BALAO, bä-lä'ō (Sp. to leap or dance). The name in the West Indies for the fishes of the family Hemiramphidæ, allied to the gars. See HALF-BEAK.

BALAOAN, bä'lou-än'. A town of Luzon, Philippines, in the province of La Unión, situated 26 miles north of San Fernando. Pop., 1903, 10,008.

BALARD, bà'lär', ANTOINE JÉRÔME (1802–76). A French chemist. He was born at Montpellier and died in Paris. He began his career as a pharmacist, but was subsequently appointed professor of chemistry at the Sorbonne and at the Collège de France, Paris. In 1868 he was made inspector-general of superior instruction. Balard carried out a number of interesting investigations both in pure and applied chemistry, but is best known as the discoverer of the element bromine, which he found in the mother liquors remaining after the extraction of common salt from sea water.

BAL'AS (Ar. *balakhsh,* a ruby from *Badakhshan, Balashan,* near Samarkand). The rose-red variety of ruby spinel (q.v.), called also rubicelle.

BALASHOV, bäl'ä-shôf'. The chief town of a district, in the government of Saratov, Russia, on the left bank of the Khoper, a tributary of the Don, about 125 miles west of the city of Saratov (Map: Russia, H 4). Balashov has a considerable export trade in grain. Pop., 1885, 10,100; 1897, 12,200.

BALASORE, bäl'ä-sōr' (Turk. and Ar. *bala,* high + *sore,* dwelling). The capital of the district of the same name in the Orissa division, Bengal, British India, near the Burabalang, which enters the sea to the west of the Hugli or Calcutta River, 118 miles southwest of Calcutta (Map: India, E 4). It has dry docks and, in spite of an obstructed harbor, maintains a coasting trade, which consists principally of exports of rice and salt, and imports of oil, metal, and cloth. Before the deepening of the Hugli it was a transhipping place for Calcutta sea trade. The town has been the seat, successively, of Portuguese, Dutch, and Danish factories. In 1846 the Danes sold their interest in the place to the English. Pop., 1901, 20,880; 1911, 21,362.

BALATE, bä-lä'tä. The name in the Philippines for a local holothurian (*Holothuria atra*), which is a favorite sort of trepang. Consult Jordana y Morera, *Bosquejo geográfico e historico-natural del archipelago Filipino* (Madrid, 1885). See TREPANG.

BALATON, bŏ'lŏ-tôn, LAKE (Hung. for Ger. Plattensee). The largest lake in Hungary, about 55 miles southwest of Budapest (Map: Hungary, E 3). Its extreme length is 48 miles, with a breadth of from 3 to 10 miles, and an estimated area, including its frequently submerged marshes, of 420 square miles. Its depth is stated to exceed 100 feet near Tihany, although the average rarely goes beyond 25 feet. It is fed by numerous streams and springs and discharges its superfluous waters through the Sió, the Kapos River, and the Kapos Canal into the Danube. The southern bank is low, while the northern is bounded by vine-clad hills. The lake abounds in fish, notably in "fogas," a variety of perch which is considered a great delicacy in Germany and Austria-Hungary.

BALAUS'TION'S ADVEN'TURE. A dramatic monologue by Robert Browning. The author's own fondness for Euripides is reflected in Balaustion's enthusiastic devotion to the humanest of the Greek tragedians. The Rhodian girl is one of the loveliest creations in English poetry. The poem was published in 1871 and was afterward continued in *Aristophanes' Apology.* See BROWNING, ROBERT.

BALAWAT, bä'lä-wät'. A ruined city of Turkey in Asia, 10 miles northwest of Nimrud. Its Arabic designation is Jaqut Balâbâdh. It is the site of the ancient Imgur Bel, a fortified place built by Asurnazirpal II (885–860 B.C.) and his son, Shalmaneser III (860–825 B.C.). Asurnazirpal II began the construction of a fine palace which was completed by his successor. Among the most interesting relics recovered from the ruins are splendid bronze gates that opened into the vestibule. They are now in the British Museum. Consult Birch, *The Bronze Ornaments of the Palace Gates of Balawat* (London, 1880–81).

BALAYAN, bä'lä-yän'. A seaport town of Luzon, Philippines, in the province of Batangas (Map: Luzon, D 11). It is situated at the northwest end of the Gulf of Balayan, 30 miles northwest of Batangas, has a good harbor, and vessels have made the town a base of supplies. The inhabitants are engaged in fishing, cattle-raising, agriculture, and coast trade. Pop. (1903) of town, 8493; of municipality, about 25,000.

BALBEC. See BAALBEK.

BALBI, bäl'bē, ADRIANO (1782–1848). An Italian geographer, born at Venice, who became successively professor of geography at Murano, professor of physics at Fermo, and a customs official in his native city. He published numerous works on geography and on statistics, most of which have been translated into the principal European languages. Among his works are: *Prospetto politico-geografico dello stato attuale del globo* (1808), *Atlas ethnographique du globe on classification des peuples anciens et modernes d'après leurs langues* (1826), *and Abrégé de géographie* (1838).

BALBI, GASPARO. A Venetian merchant of the sixteenth century, the first traveler who left an account of India beyond the Ganges. He made a 10-years visit to India. After his return he published, in 1590, the results of his travels in a volume entitled *Viaggio all' Indie orientali.* A Latin translation was printed in De Bry's *Collection of Voyages and Travels to the East Indies,* published at Frankfort in 1590–94. Balbi appears to have set down without exaggeration all that he himself saw and is particularly minute and exact concerning commercial matters, but there is scarcely any limit to his credulity with regard to what he heard from others. Having visited Goa and Cochin and other Portuguese settlements, he sailed for Pegu, then an independent empire, where he remained two years. His account of this last country is the most interesting of his narratives.

BALBI'NUS, DECIMUS CÆLIUS. One of the two emperors of Rome whom the Senate elected, on hearing of the death in Africa of the elder Gordianus and his son, in opposition to Maxi-

minus, who had the support of the legions in Germany. He was celebrated as an orator and a poet and was a man of mild disposition. His coadjutor, Marcus Clodius Pupienus Maximus (see PUPIENUS), was a bold and resolute soldier, who had risen from the people. They had reigned only a few months, during which time Maximinus had been killed by his own soldiers, who afterward submitted to Maximus, when they were both killed in 238 A.D. by the Pretorians, who at that time were animated by bitter hostility toward civilians and extended it to the rulers who had been elected by them.

BALBO, bäl'bō, CESARE, COUNT (1789–1853). An Italian statesman and historian, born at Turin. At the age of 18 he was appointed by Napoleon auditor of the Council of State at Paris; in the following year he became secretary to the commission sent to organize the province of Tuscany and continued for several years in similar service until the downfall of Napoleon. Thereafter he cast in his fortunes with the house of Savoy and entered upon a military career; but this also was soon interrupted by his being unjustly implicated in the Revolution of 1821. After three years of exile in France he returned home and gave himself up to historical studies. In 1843 appeared his *Delle speranze d'Italia*, whose chief contention was that national independence must precede the enjoyment of constitutional liberty. After freedom of the press was secured in 1847, he founded the *Risorgimento* in conjunction with Cavour. In 1848 he became president of the first constitutional ministry of Piedmont and from that time until his death, in 1853, retained a seat in the Chamber as one of the representatives of Turin. A conservative by temperament and training, his ideal was Italian unity and independence, so far as was consistent with the maintenance of the papal power, and this idea dominates all his writings. The more important of these include: *Storia d'Italia sotto ai Barbari* (1830); *Vita di Dante* (1839); *Meditazioni Storiche* (1842); and the posthumous works, *Della monarchia rappresentativa in Italia* (1857); *Sommario della Storia d'Italia* (1862). His historical novels (new ed., Leipzig, 1864) were popular in their day. The best *Life* of Balbo is by Ricotti (Florence, 1856). Consult also A. Vismara, *Bibliografia di C. B.* (Como, 1882), and G. Mazzoni, *L'Ottocento* (Milano). Selected works, edited by F. Nicolini, are now appearing at Bari (1913–). *The Life of Dante* was translated by Bunbury (London, 1852).

BALBOA, bál-bō'ȧ, VASCO NUÑEZ DE (1475–1517). A Spanish explorer, the first European to see the Pacific Ocean from American shores. He was born of a noble but reduced family at Jerez de los Caballeros. After leading a rather dissolute life in his youth he took part in the great mercantile expedition of Rodrigo de Bastidas to the New World. He established himself in Santo Domingo and began to cultivate the soil; but fortune proved adverse, and in order to escape from his creditors he had himself smuggled in a cask on board a ship and joined the expedition to Darien in 1510, commanded by Martín Fernandez de Encisco. An insurrection which took place obtained for Balboa the supreme command in the new colony. Confused accounts which reached him of a great western ocean impelled him, in 1513, to set out in quest of it. On September 25 of that year he obtained the first sight of the Pacific Ocean from a mountain top in the Isthmus of Panama. On the 29th he reached the water at the point which is still known by the name he gave to it, the Gulf of San Miguel, and took formal possession for Spain, naming the ocean the *Mar del Sur*, or South Sea, the coast at this point trending nearly east and west. His natural enthusiasm at this great discovery was shared by all the educated men of his time, and the descriptions of it by contemporary authors may still be read with much interest.

The governorship of the territories conquered by Balboa, and known as Darien, was obtained in 1514 by Pedro Arias (Pedrarias) Dávila, by means of his intrigues at the Spanish Court. Balboa resigned the command into the hands of the Governor, a narrow-minded and cruel man, and in a subordinate situation undertook many successful expeditions; but these, and all his other merits, only served to increase the hatred of Pedrarias Dávila toward him. The King recompensed Vasco Nuñez for his discoveries by appointing him *Adelantado del Mar del Sur* (the Pacific), and Governor of Panama, Coyba, and the lands he had discovered in the Pacific. The government of the mother country sought in vain to mediate between them, and Balboa even arranged to marry the daughter of Pedrarias. But on the first occasion of dispute which arose, Balboa, having been induced by Pedrarias to deliver himself up, was accused of a design to rebel, and upon evidence furnished by Garabito, the supposed friend to whom Balboa had intrusted his affairs, he was convicted and beheaded at Acla in 1517.

BALBRIG'GAN (Gael. Brecon's town, from *baile, bally*, place, town, fort). A seaport town of county Dublin, Ireland, 22 miles north of Dublin (Map: Ireland, E 3). Its principal manufactures are embroidered muslins, cotton, calico, and hosiery. The name "Balbriggan" has been used to describe varieties of cotton-knit goods prepared elsewhere. There is a little coast trade in grain and fish. Balbriggan is a favorite watering place. After the battle of the Boyne William III encamped here. Pop., 1901, 2236; 1911, 2273.

BAL'BUS, LUCIUS CORNELIUS. 1. MAIOR. A native of Gades (Cadiz), in Spain. After serving in the war against Sertorius he came to Rome and received the citizenship from Pompey. He was on terms of intimate friendship with both Pompey and Cæsar, especially with Cæsar. He helped to form the First Triumvirate, and, as a skillful financier, was chosen to look after Cæsar's property and interests during the latter's Gallic campaigns. In 56 B.C. his enemies and those of the triumvirs prosecuted him on a charge of illegally exercising the rights of Roman citizenship. He was defended by Cicero, in a speech still extant, and acquitted. Under Octavianus he was made Consul (40 B.C.)—the first time this honor had ever been conferred on one not born a Roman citizen. 2. MINOR. A nephew of the above. He, too, won Roman citizenship through Pompey. He served under Cæsar in Spain and in Africa, and was rewarded with the position of Pontifex. As Questor in Spain in 43 B.C., under Asinius Pollio, he used his office for fraud and oppression. Years later (21 B.C.) we find him as Governor in Africa, where he defeated the Garamantes (19 B.C.) and obtained a Roman triumph—a new honor for one not born a Roman citizen.

BALCH, bȧlch, EMILY GREENE (1867–). An American economist and writer. She was born in Jamaica Plain, Mass., and received her col-

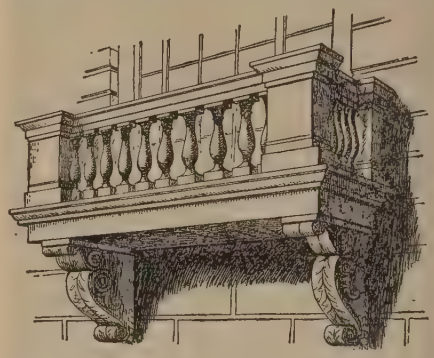
legiate education at Bryn Mawr. The year following her graduation in 1888 she spent in Paris in the study of political economy, and later she took special work at the University of Chicago (1895) and in Berlin (1895–96). In the latter city she was engaged in seminary work with professors Schmoller and Wagner. For a time she was connected with Denison House, a college settlement in Boston, and there also she was prominent in child welfare work. After being connected with the department of economics at Wellesley College for several years she was in 1903 made associate professor of economics and sociology. In 1908–09 she was a member of the Massachusetts State Commission of Industrial Education. Her writings include *Public Assistance of the Poor in France* (1893) and *Our Slavic Fellow-Citizens* (1910).

BALCH, George Beall (1821–1908). An American naval officer, born in Tennessee. He entered the navy in 1837, studied at the naval school in Philadelphia in 1841–43, and participated in most of the naval operations of the Mexican War. In 1862 he was promoted to be commander, and subsequently, in command successively of the *Pocahontas* and the *Pawnee*, of the South Atlantic blockading squadron, distinguished himself by his operations on the Black and Stone rivers (Tenn.) and Togoda Creek (S. C.). He was commissioned captain in 1866, commodore in 1872, and rear admiral in 1878; was superintendent of the United States Naval Academy from 1879 to 1881 and was retired in 1883.

BALCH, Thomas Willing. An American lawyer and author, who graduated from Harvard College in 1890 and from the law school of the University of Pennsylvania in 1895. He took up the practice of law in Philadelphia. The following works on international law are by him: *Some Facts about Alsace and Lorraine* (1895); *The Alabama Arbitration* (1900); *The Alaska Frontier* (1903); *L'évolution de l'arbitrage internationale* (1908); *La question de pêcheries de l'Atlantique* (1909); *The Arctic and Antarctic Regions and the Law of Nations* (1910); *La baie d'Hudson, est-elle une mer libre ou une mer fermée?* (1911; Eng. ed., under the title *Is Hudson Bay a Closed or Open Sea?* (1912).

BALCONY, băl'kō-nĭ (It. *balcone*, from *balco*, scaffold; Ger. *Balken*, beam). 1. A projecting platform in front of a window or of several windows on the outside of a private or public building, inclosed by a balustrade or parapet, and supported either by consoles and brackets or by supports rising from the ground. The balcony was occasionally used in Græco-Roman architecture, as is shown by several houses in Pompeii, by a temple at Baiæ, by ancient frescoes and reliefs, and by literary descriptions of the *mœniana* of Roman houses, but it did not become popular until the Middle Ages in the Orient and southern Europe.

Early wooden examples have perished; the finest remaining ones are the stone balconies in Italy, both in the communal palaces, where they served for public speeches and announcements (often called *ringhiera*), and in private palaces, such as those of Venice and Rome. In Italy they were usually uncovered, but sometimes, especially in France, they were surmounted by canopies, supported either on brackets or on columns rising from the balcony. Renaissance architects made an important feature of the balcony. In northern Europe, especially Switzerland and Germany, the structure was usually of wood and became a most picturesque part of houses and chalets. 2. The term is also ap-



A VENETIAN BALCONY.

plied to the gallery or stern walk outside of the stern of a large ship, and in theatres to the part between the dress circle and the gallery.

BALDACHIN, băl'dà-kĭn (It. *baldacchino*, a canopy, from *baldacco*, the Italian name of *Bagdad*, where the fabrics were manufactured). A term borrowed from the East and originally used of rich silks or brocades in the form of a canopy or tent-like or umbrella-like covering, such as were used in the East, either to place or carry over the heads of dignitaries or to pitch as tents. They formed an indispensable part of the court and traveling equipment of Byzantine and Mohammedan rulers and magnates, and were among the most sumptuous presents interchanged (e.g., that sent by Harun-el-Raschid to Charlemagne). Baldachins became well known in Europe, through the Italian trade with Constantinople and the Mohammedan East, and also through the Crusades. Supported on four poles, they were carried over the heads of civil and religious dignitaries in all processions, coronations, marriages, religious rites, etc., and this custom is still continued in the processions of the Catholic and Greek churches. Fixed baldachins were used in royal and feudal throne rooms, in papal and episcopal halls, and over state tribunals: the term is also used for the canopies over state bedsteads. During the Renaissance, when the more purely architectural forms of the canopies over high altars, side altars, tombs, etc., were superseded by others of more pictorial type, the term "baldachin" was applied to these permanent structures of marble or metal, such as Bernini's famous bronze baldachin over the high altar of St. Peter's in Rome. In this sense the baldachin becomes practically identical with the *ciborium* (q.v.) over the tomb altar in early mediæval churches; but the word should probably be restricted to such examples as imitate the draped canopies above described.

BALD COOT, BALD EAGLE, etc. See Coot; Eagle; etc.

BALD CY'PRESS. See Cypress.

BALDE, bäl'dĕ, Jakob (1604–68). A Latinist and poet, native of Alsace, who wrote in Latin. He was a Jesuit and for a time professor of rhetoric at Innsbruck (1628), and then at Ingolstadt (1635), and court preacher at Munich (1638–50) and at Neuberg (1650–68). He excelled as a lyric poet and was especially success-

ful as an imitator of Horace. Of his poems the following deserve mention: *Lyricorum Libri IV*, *Epodon Liber I* (1643); *Sylvæ Lyricæ* (1643); *Urania Victrix* (1663)—an allegory. Consult G. Eitner, *Jacob Balde's Leben und Charakter* (Breslau, 1863), and J. Bach, *Jakob Balde* (Freiburg, 1904).

BALDER, bąl'dĕr. A narrative poem by Sydney Dobell, written at Amberley Hill in 1853 and published in 1854. Its plot is singularly painful, and it abounds in monotonous descriptions. It evinces, however, a lofty imagination and a fine appreciation of nature.

BALDER, bąl'dĕr (Old Norse *baldr*, AS. *bealdor*, OHG. *balder*, prince, lord; cf. OHG. *bald*, bold, Old Norse *ballr*, bold, impudent). In Scandinavian mythology, the son of Odin and Frigg, symbol of summer, light, beauty, amiability, persuasive eloquence, and gracious wisdom. According to the *Gylfeginning* (see EDDA) he lived at Brejdablik. The *Voluspa* tells a story of his death suggesting the myths of Adonis and Persephone. Here Balder is killed by the evil god, Loki, aiming for the blind god, Hödur, an arrow of mistletoe (symbol of midwinter). He was the first of the *Æsir* to die. Hel, the goddess of the underworld, promised to release Balder, if heaven and earth unanimously asked it. Loki, as Thökt, refused, and escaped vengeance. But Balder will return after Ragnarök, the Twilight of the Gods, and usher in a golden age. Use has been made of this myth by Richard Wagner in his Nibelungen tetralogy. See AESIR; SCANDINAVIAN AND TEUTONIC MYTHOLOGY.

BALDER DEAD. 1. A dramatic poem by the Danish writer, Johannes Ewald, published in 1773. 2. A stately and pathetic narrative poem by Matthew Arnold, founded on the death and funeral of the Norse god and his journey to the underworld, where he was held in honor. See BALDER.

BALDERSTONE, bąl'dĕr-stōn', CALEB. A faithful old butler in the family of the Master of Ravenswood, in Scott's *Bride of Lammermoor*.

BALDI, bäl'dē, BERNARDINO (1553–1617). An Italian savant and poet. He is said to have been master of a dozen languages and to have written upward of 100 different works. He became tutor to Ferdinando Gonzaga, through whom he was made Abbot of Guastalla, an office which he held for 25 years. He was famous as a theologian, mathematician, geographer, antiquarian, historian, and didactic poet. He devoted 12 years to the work of which the *Cronica dei matematici* is an abridgment and also wrote *La Nautica* (a finely toned poem on navigation), an Arabic grammar and dictionary, and a translation of the *Targum* of Onkelos. Consult G. Zaccagnini, *La vita e le opere di B. Baldi* (Modena, 1903).

BALD'NESS, ALOPECIA; CALVITES. Absence or deficiency of hair upon the scalp. Alopecia is the scientific term. Pincus is authority for the statement that the life of a hair is from two to six years, at the end of which time it falls and is replaced by new growth. According to this calculation, from 50 to 60 hairs are shed each day. During vigorous health and until the prime of life has been passed, enough new hairs grow to replace the dead ones, and baldness does not occur. Congenital baldness occurs in some individuals and is sometimes called *hypotrichosis congenita*. Senile alopecia is observed in the aged as a part of the general atrophy incident to this condition; there is a gradual thinning of the hair upon the top, front, and sides of the head, steadily advancing as age increases. Premature alopecia occurs in individuals from 20 to 35, either with or without manifestations of disease. A frequent cause of baldness in the young is seborrhœic eczema of the scalp, which is characterized by increased formation of dandruff and is of bacterial origin. It occurs as early as the eighteenth year. Other local causes are ringworm of the scalp, psoriasis, eczema, erysipelas, and lupus. Syphilis and favus (q.v.) are common causes. Anæmia, wasting diseases, such as fevers, childbearing, and debility due to dissipation, are all ascribed as causes of baldness. It is also hereditary in certain families and in such cases appears to be due to failure in the nutrition of the scalp. Women are less liable to baldness than men—a fact probably due to the circumstance that they take better care of the hair, and less frequently exhaust the natural oil of the sebaceous glands of the scalp by the use of strong alkaline shampoos. Shaving the head, when the hair falls in great quantity, as after long-continued fevers, is generally practiced; but the wearing of a wig impedes the growth of hair upon a shaven scalp. Chloral, ointment of mercury, cantharides, sulphur, tar, and resorcin are used with success in checking baldness in some cases.

ALOPECIA AREATA is a disease of the hair follicles of neurotic origin, which produces, quite suddenly, circumscribed patches of baldness of the scalp, sometimes of the eyebrows or beard, and in rare instances of the whole body. The disease often follows mental shocks, psychic disturbances, or injuries to the nerves. Consult Jackson and McMurty, *A Treatise on Diseases of the Hair* (Philadelphia, 1912); and Joseph, *Lehrbuch der haarkrankheiten* (Leipzig, 1910).

BALDO, bäl'dō, MONTE (It. bold mountain). A mountain group, 26 miles long and 7½ miles wide, on the boundary between south Tirol and the province of Verona, Italy, and bordering Lake Garda on the east. Its highest peaks are Cima di Val Dritta or Monte Maggiore (7277 feet) and Altissimo (6821 feet). Fine views are obtained from these summits, and the quarries yield choice marble.

BALDOVINETTI, bäl'dō-vē-nĕt'tē, ALESSIO (1425–99). A Florentine painter and decorative designer of the early Renaissance. His master in painting is unknown, but we do know from documents that he was associated with Andrea del Castagna and with Domenico Veneziano, of whom, according to Berenson, he was a pupil. He belonged to that group of realists whose chief mission lay in solving the technical problems of painting. According to Vasari, Baldovinetti used oils before their introduction into Italy by Antonello do Messina; he made especial progress in rendering landscape. Nearly all his paintings are in Florence. The earliest ascribed to him are three small panels belonging to the cycle painted by Fra Angelico (q.v.) for the sacristy doors of Sant' Annunciata and now in the Uffizi. His earliest attested painting is a fresco of the "Nativity" in the same church. Of his decorations for the Portuguese chapel in San Miniato (1466) only an "Annunciation" and several figures of the ceiling survive. His greatest and most ambitious achievement was a series of frescoes for Santa Trinità (completed in 1497), upon which he labored 16 years, receiving a compensation of 1000 gold florins. Of the many portraits they

contained, but a single head, a likeness of the painter himself, survives in the Galleria Morelli Bergamo; there also he is represented by a group of prophets on the ceiling. In the lunettes of the chapel at Bergamo are several subjects by him, but his fine altar-piece, "The Trinity," surrounded by saints and angels (1472), is now in the Academy of Florence. Among other noteworthy works are a charming "Annunciation" and a "Madonna with Saints" in the Uffizi; and Madonnas in the Louvre and the collection of Madame André, Paris.

Baldovinetti was perhaps more important as a decorative artist than as a painter. He designed some of the intarsias, executed by Giuliano da Majano, in the sacristy of the cathedral of Florence and painted many objects of applied art, such as the fronts of cassoni (chests), caskets, shields, coats of arms, etc. Of his stained glasses a good window survives in the Pazzi Chapel. Contemporaries considered him the foremost designer of mosaics in his day, and he wrote a practical manual upon the subject. He restored the mosaics of the façade and of the choir chapel of San Miniato, and both the interior and exterior of the baptistery. Consult: Pierotti, *Ricordi di Alessio Baldovinetti* (Lucca, 1868); Londi, *Alessio Baldovinetti* (Florence, 1907); Berenson, *The Study and Criticism of Italian Art* (2d series, London, 1902).

BALD'PATE', or **BALDHEAD.** 1. An American white-headed duck. (See WIDGEON.) 2. A kind of domestic pigeon. 3. In the West Indies, a dove (*Columba leucocephala*). 4. A fruit crow (q.v.).

BALDRIC, bal'drik, or **BAUDRICK** (Fr. *baudrier*, from MGH. *balderich*, girdle). A band or sash worn partly as a military and partly as a heraldic symbol. It passes round the waist as a girdle, or passes over the left shoulder and is brought down obliquely under the right arm, or is suspended from the right shoulder in such a way as to sustain a sword. Many of the effigies of knights contain representations of the baldric, worn more frequently as a belt than as a shoulder sash.

BALDUNG, bäl'dung, **HANS**, usually called **GRIEN** (GRÜN), from his favorite color (c.1480–1545). A German painter and engraver, one of the principal artists of the High Renaissance. He was born at Weiersheim, near Strassburg, of a patrician family originally from Gmund in Swabia, the son of a jurist in the service of the Bishop of Strassburg. He probably studied in Nuremberg with Albrecht Dürer, whose influence is very perceptible in his early works, both paintings and engravings. In 1509 he became a citizen of Strassburg; in c.1512–16 he was employed upon the great altar and other decorative works in the minster at Freiburg, and from 1517 until his death he resided at Strassburg as court painter to the bishop and as a member of the city council. A good example of the painting of his earliest period is the "Adoration of the Kings" in the Berlin Museum. His masterpiece is the great altar of Freiburg Minster, the central panel of which represents the Coronation of the Virgin; the wings, four scenes from her life. The masterly treatment of light and shade in this painting shows his indebtedness to Grünewald (q.v.). To the same period belong two "Crucifixions" at Berlin and Basel and two other paintings in the cathedral of Freiburg. The most notable of his remaining pictures are the "Bewailing of the Body of Christ" in the National Gallery, London; two representations of "Death Seizing a Young Woman" (1517) in the Museum of Basel, and the "Birth of Christ" (1520) in the Museum of Aschafenburg. Other examples of his work are in the collections of Sigmaringen and Strassburg. His style was not especially adapted to portraiture, but of all his work of this kind the masterpiece is the votive picture in which the Margrave Cristoph of Baden, his wife, 10 sons, and 5 daughters are represented as kneeling before the Madonna and St. Elizabeth. Baldung's chief strength lay in his draughtsmanship; no other painter of the German Renaissance, except Dürer and Holbein, has left as many drawings as he. He excelled especially in his designs for woodcuts, which allowed a freer scope to the imagination than painting (for a list of his woodcuts, see the article "Baldung" in Meyer's *Kunstler Lexicon*). No less famous as a designer of stained glasses, he produced pieces which may now be seen in the Freiburg Minster and the museums of Berlin, Nuremberg, Karlruhe, Basel, and Freiberg. As a painter he was one of the very best of his day, in color excelling Dürer and most of his other contemporaries. Consult the monograph by Von Téreys (Strassburg, 1896), and Baumgarten, *Der Freiburger Hochaltar*, vol. xlix (Strassburg).

BALDWIN, **BALDOUIN**, or **BALDUIN.** The name of several members of the house of Flanders, who reigned as Kings of Jerusalem during the period of the Crusades.—**BALDWIN I** (1058–1118) was King of Jerusalem after 1100. He was the youngest brother of Godfrey de Bouillon (q.v.), Duke of Lower Lorraine, or Brabant. He took part in the First Crusade, quarreled with Tancred, retired to Edessa at the request of the Christian inhabitants of the place, and was soon after created Count of Edessa. After the death of his brother Godfrey, in 1100, he became Protector of the Holy Sepulchre and Baron of Jerusalem, and immediately assumed the regal title, which his brother had refused. He was defeated by an invading force from Egypt in 1102. He made some conquests, including Cæsarea, Acre, and Sidon. He died in Egypt. Unlike his brother, Godfrey, Baldwin was worldly and ambitious.—**BALDWIN II** (Baldwin du Bourg), cousin of Baldwin I, succeeded the latter as Count of Edessa, and in 1118 as King of Jerusalem, reigning until 1131. During his reign Tyre was taken, in 1124, with the assistance of a Venetian fleet, and the Order of the Templars was instituted. He was held in captivity by the Turks for six months. He died Aug. 21, 1131, leaving four daughters. Shortly before his death he resigned the crown in favor of his son-in-law, Fulk of Anjou, who reigned till 1142.—**BALDWIN III** (1129–62), the son and successor of Fulk of Anjou, was King of Jerusalem after 1143. He has come down to us in tradition as a model of crusading chivalry. The Christians lost Edessa during his reign. He several times defeated Nureddin, Sultan of Aleppo. He endeavored to improve the external and internal defenses of his kingdom. Saracens are said to have served under him, so much was he respected. He married Theodora, the daughter of the Greek Emperor Manuel, and died, it is believed, of poison, at Tripolis, in Syria, Feb. 10, 1162. His reign marked the height of power of the Latin Kingdom of Jerusalem. He was succeeded in the government by his brother Amalric, or Amaury, who died in 1173.—**BALD-**

WIN IV, the son and successor of Amalric, surnamed the Leper, reigned till 1183.—BALDWIN V, a child of five, the son of Sibylla, sister of Baldwin IV, was then called to the throne. He died in 1186, a year before Jerusalem was retaken by Saladin. Consult Gibbon, *Decline and Fall of the Roman Empire*, and Cox, *History of the Crusades* (New York, 1889); also references under CRUSADES.

BALDWIN I (1171–c.1206). The first Latin Emperor of Constantinople. He was born at Valenciennes, the son of Baldwin VIII, Count of Flanders and Hainaut. In 1195 he succeeded his father as Count of Flanders. In 1200 he appointed his brother Philip to the regency of Hainaut and Flanders and joined the Fourth Crusade. Part of the Crusaders—Baldwin I among others—were induced to assist the Venetians in reconquering Zara, in Dalmatia, from the King of Hungary. While at Zara the young Alexius, son of Isaac II, Emperor of Constantinople, asked the assistance of the Crusaders against his uncle, Alexius Angelus, who had deposed and blinded Isaac II and had usurped the throne. In return for their aid he promised to pay the Crusaders a liberal sum of money, to help them recover Palestine, and to effect the union of the Greek church with the Roman. The Crusaders agreed, defeated the usurper's forces, and restored the rightful emperor; but when Alexius was unable or unwilling to carry out his promises, they turned their arms against him. A revolution broke out in the city at the same time. Alexius the Younger was murdered, and his father died soon after. Alexius Ducas Murzuflos then usurped the throne, but was defeated by the Crusaders, and Constantinople was sacked, the Latins and the Venetians sharing the booty. Baldwin was chosen Emperor, and crowned on May 9, 1204; but he received only about a fourth part of the Empire—Constantinople and Thrace—the Venetians obtaining "a quarter and a half of a quarter of the Empire." A part also fell to the French adventurers who accompanied the expedition, and several provinces remained in the hands of Greek princes. The capacities of Baldwin I were not able to cope with the evils necessarily attending so anomalous a position. The Greeks were discontented and, backed by Calo-John, King of Bulgaria, took advantage of the absence of Baldwin I's brother with the flower of his troops in Asia and rose and massacred the Latins scattered throughout the towns of Thrace and made themselves masters of Adrianople. Baldwin laid siege to the town with the forces he had at his disposal, but was defeated and taken prisoner, April 14, 1205, by the Bulgarian King, and probably died about a year after (1206) in captivity. The facts about his death were never known. In 1225 a usurper attempted to pass himself off for Baldwin and thus obtain Flanders. Baldwin I was succeeded by his brother Henry. Consult Pears, *Fall of Constantinople* (London, 1885), and Gerland, *Geschichte des lateinischen Kaiserreiches*, Teil i (Hamburg, 1905).

BALDWIN II (1217–73). The last Latin Emperor of Constantinople, from 1239 to 1261. He was the son of Peter II (de Courtenay) and the nephew of Baldwin I. When his brother Robert died, in 1228, Baldwin was too young to rule, and an agreement was made with John of Brienne, who had been King of Jerusalem, by which Baldwin was to marry John's second daughter, and John was to be Emperor until his death. John died, March 23, 1237, but as Baldwin was in western Europe he was not crowned Emperor until December, 1239. His reign was disastrous. He spent much of the time in the West, seeking aid in the defense of his capital. In order to obtain money he sold to St. Louis of France some of the most sacred relics at Constantinople, to hold which Louis built the Sainte Chapelle at Paris. On the night of July 25 or 26, 1261, his capital was taken by one of the generals of Michael Palæologus, ruler of Nicæa, and Baldwin fled to Italy. With him terminated the Latin Empire in the East. Consult Gibbon, *Decline and Fall of the Roman Empire*, vol. vi (new ed., London, 1898).

BALDWIN, ABRAHAM (1754–1807). An American statesman. He was born at Guilford, Conn., and graduated at Yale in 1772. In 1777 he entered the army as chaplain, and served until the close of the Revolutionary War, when he removed to Savannah, Ga. In 1784 he was sent to the State Legislature, and from 1786 to 1788 was a delegate to the Continental Congress. He was a prominent member of the Constitutional Convention of 1787, and as such cast an important vote, leading to a compromise, the result of which was the creation of the United States Senate. He was a member of Congress from 1789 to 1799, and was United States Senator from 1799 until his death, serving in 1801 and 1802 as President pro tem. In 1802 he was one of the three Georgia commissioners who negotiated the cession to the Federal government of a large part of the State's western lands. He conceived the plan of the University of Georgia, obtained a charter for it, and from 1786 to 1801 served as its first president.

BALDWIN, CHARLES H. (1822–88). An American naval officer, born in New York City. He entered the navy in 1839, served as midshipman during the Mexican War, and became a lieutenant in 1853. He resigned in the following year, but reëntered the service in 1861 and in 1862 commanded the *Clifton*, of the mortar flotilla under Farragut, at Forts Jackson and St. Philip. In 1869 he was appointed captain, and in 1883 was promoted to be rear admiral, commanding the Mediterranean Squadron. He was retired in 1884.

BALDWIN, CHARLES SEARS (1867–). An American college professor and author, born in New York City, and educated at Columbia University, where he received the degrees of A.B., A.M., and Ph.D. In 1891 he was appointed instructor in English in that university and, in 1895, instructor in rhetoric. He then became a member of the faculty of Yale University, but returned to Columbia in 1911 as professor of rhetoric and English composition. His writings include: *The Inflections and Syntax of the "Morte d'Arthur" of Sir Thomas Malory* (1894); *Specimens of Prose Description* (1895); *De Quincey's Revolt of the Tartars* (1896); *The Expository Paragraph and Sentence* (1897); *A College Manual of Rhetoric* (1902); *American Short Stories* (1904; Ger. ed., 1911); *How to Write: A Handbook Based on the English Bible* (1905); *Bunyan's Pilgrim's Progress* (1906); *De Quincey's Joan of Arc and English Mail Coach* (1906); *Essays out of Hours* (1907); *Writing and Speaking* (1909); *Composition, Oral and Written* (1909).

BALDWIN, EVELYN BRIGGS (1862–). An American Arctic explorer, born at Springfield, Mo. He studied at Northwestern College (Naper-

ville, Ill.), and taught in the public schools of Kansas in 1887–91. In 1892 he was appointed observer in the United States Weather Bureau. Subsequently he became an inspector-at-large in the United States Signal Corps. In 1893–94 he was meteorologist of the Peary Expedition to North Greenland, and in a similar capacity accompanied in 1898–99 the Walter Wellman Expedition to Franz-Josef Land. He discovered and explored Graham Bell Land in May, 1899. In 1901 he organized the Baldwin-Ziegler Expedition, sailing under his command for the discovery of the North Pole by way of Franz-Josef Land. The expedition returned in 1902, having deposited several caches of provisions in Franz-Josef Land. Baldwin wrote for periodicals several articles dealing with Arctic life.

BALDWIN, James (1841–). An American author and compiler, born in Hamilton Co., Ind. In 1887–90 he was connected with the educational department of Harper and Bros., New York, and from 1890 to 1893 was assistant editor of *Harper's Magazine.* He then became a schoolbook editor for the American Book Company. His publications include: *Six Centuries of English Poetry* (1892); *The Famous Allegories* (1893); *Old Greek Stories* (1895); *The Horse Fair* (1895); *Four Great Americans* (1896); *Hero Tales Told in School* (1904); *Abraham Lincoln, a True Life* (1904); *Thirty More Famous Stories* (1905); *The Golden Fleece* (1906); *Stories of the King* (1909); *Fifty Famous People, a Book of Short Stories* (1912).

BALDWIN, James Mark (1861–). An American psychologist, born at Columbia, S. C. He graduated from Princeton in 1884 and received A.M. and Ph.D. degrees from that university in 1887 and 1889, respectively. He studied at Leipzig, Berlin, and Tübingen in 1884–85. In 1886–87 he was instructor in German and French at Princeton; from 1887 to 1889 he held the chair of philosophy at Lake Forest University (Ill.); and thereafter, up to 1909, he was successively professor of logic and metaphysics at the University of Toronto (Canada), Stuart professor of psychology at Princeton, and professor of philosophy and psychology at Johns Hopkins University. In 1909 he became honorary professor at the National University of Mexico. He was given the first honorary D.Sc. conferred by the University of Oxford and also received LL.D. degrees from the universities of Glasgow and of South Carolina. Perhaps best known in the fields of child and social psychology and of genetic logic, he also gained recognition in experimental psychology as an advocate of the fundamental importance of "motor" elements in consciousness, as the founder at Toronto of the first psychological laboratory to be established in the British Empire, and as the founder also of the psychological laboratory at Princeton. With J. McK. Cattell in 1894 he founded the *Psychological Review.* Besides various articles in philosophical, psychological, and popular journals, he is the author of the following works: *German Psychology of To-Day* (trans., 1886); *A Handbook of Psychology* (2 vols.: i, 1889; ii, 1891; i, 2d ed., 1890); *Elements of Psychology* (1893); *Mental Development in the Child and Race* (1895, 3d ed., 1906); *Social and Ethical Interpretations in Mental Development* (1897; 4th ed., 1906); *The Story of the Mind* (1898); *Fragments in Philosophy and Science* (1902); *Development and Evolution* (1902); *Thought and Things, or Genetic Logic* (3 vols., 1906–11); *Darwin and the Humanities* (1909); *The Individual and Society* (1910); *History of Psychology* (1912). Editor: *Dictionary of Philosophy and Psychology* (3 vols., 1901–05); *The Psychological Review* (1894–1909); "Philosophy," in *Johnson's Universal Encyclopedia; Library of Historical Psychology* (1903–); *Princeton Contributions to Psychology* (1897–1903).

BALDWIN, John Denison (1809–83).– An American journalist, born at North Stonington, Conn. He was self-educated, studied law and theology, and for several years after 1833 was pastor of a church at North Bradford, Conn. He was editor successively of the *Charter Oak,* a Hartford newspaper, the *Boston Commonwealth,* and the *Worcester Spy;* was three times chosen member of Congress, and wrote extensively for the magazines on archæological and kindred subjects. He published *Raymond Hill,* a volume of poems (1847), *Prehistoric Nations* (1869), and *Ancient America* (1874).

BALDWIN, Joseph G. (1815–64). An American humorist. He was born in Alabama, where he was successful in law, politics, and literature. In 1854 he went to California and was a justice of the Supreme Court of that State (1858–62) and chief justice (1863–64). His best-known early publications are his racy *Flush Times in Alabama and Mississippi* (1853) and *Party Leaders* (1855). The latter contains judicial estimates of Southern statesmen. He died in San Francisco. Consult Mallers, in *The Sewanee Review* (April, 1901).

BALDWIN, Robert (1804–58). A Canadian statesman. He was born at York (now Toronto), received a grammar-school education, and was called to the bar in 1825. He soon became interested in politics. At that time the administration of affairs in Upper and Lower Canada (now respectively the provinces of Ontario and Quebec) was controlled by an oligarchy which monopolized the public offices. In both provinces there was much popular discontent and a demand for an executive council accountable to the legislature. (See Political Parties, *Canada;* also Canada, *History.*) This demand affirmed the principle of responsible government, which early engaged the support of Baldwin and dominated the remainder of his public life. In 1829 he was elected to the Assembly of Upper Canada, but in 1830 lost his seat on a technicality and for six years thereafter untiringly labored in behalf of the popular cause. In 1836 he was made a member of the executive council by the reactionary Lieutenant Governor, Sir Francis Bond Head, but, hampered by political opponents in the council, found that he could not be useful and resigned. The radical reformers, led by William Lyon MacKenzie, broke out in rebellion in 1837–38, but Baldwin condemned their course, maintaining that a responsible executive was amply sufficient to restore public confidence. The Radicals of Lower Canada had also revolted (1837–38); and until the arrival of the Earl of Durham as Governor General and High Commissioner in 1838 there were few signs of English interference to allay the increasing discontent. The famous report of that nobleman in 1839 influenced the British Parliament to favor responsible government and brought about the passage in 1841 of an act which united the two provinces. Baldwin became a member of the executive council under the new régime; but, dissatisfied with the attitude of the Governor General, Lord Sydenham, he soon resigned. In the meantime friendly

coöperation between the leaders in Upper and Lower Canada, which had been promoted by the union, led to a successful popular party under dual leadership. In harmony with this movement Baldwin and Louis Hippolyte LaFontaine became in 1842 the leading members of the first Canadian administration to accept responsible government. That principle was, however, not yet firmly established; and Sir Charles (afterward Baron) Metcalfe, who opposed it, adopted a course which compelled Baldwin to resign in 1843. Five years of heated controversy followed, and in 1848 Baldwin and LaFontaine were again returned to power. Their administration (1848–51) marked the final and complete establishment of responsible government. Among the important reforms passed under Baldwin's leadership were the revision of the judicial system of Upper Canada, the foundation of Toronto University on a nonsectarian basis, and the organization of municipal government in that province. Under this administration also the railway system of Canada began to be vigorously developed. The disaffected in Lower Canada were appeased by amnesty and by a bill reimbursing those who had suffered from destruction of property in the rebellion of 1837–38. Baldwin resigned in 1851, mainly from lack of sympathy with the advanced wing of his party, of whose radical tendencies he strongly disapproved. His purity of personal character and his political integrity were never questioned. Consult Dent, *Canadian Portrait Gallery* (Toronto, 1880); Leacock, "Baldwin, Lafontaine, Hincks" (Toronto, 1907), in *The Makers of Canada Series*.

BALDWIN, Simeon Eben (1840–). An American jurist and educator, born at New Haven, Conn. He graduated in 1861 at Yale, was admitted to the bar in 1863, and in 1869 was appointed an instructor in the Yale Law School. He became professor of constitutional and private international law in 1872 and in 1893 associate judge of the State Supreme Court of Errors. From 1907 to 1910 he was chief justice of that court, then becoming Governor of Connecticut. At various times he was president of the American Bar Association, the American Social Science Association, the International Law Association, the American Historical Association, and the American Political Science Association. He was a member of the commission appointed in 1872 by the State to revise laws on education and of that appointed in 1873 to revise the General Statutes. His publications include: *Digest of the Decisions in the Connecticut Law Reports* (2 vols., 1872, 1882); *Modern Political Institutions* (1898); *American Railroad Law* (1904); *The American Judiciary* (1905); *The Relation of Education to Citizenship* (1912).

BALDWIN, William Henry, Jr. (1863–1905). An American railway official, born in Boston, Mass. He graduated at Harvard College in 1885, and four years later was made president of the Montana Union Railroad. He soon became associated with the development of the Union Pacific Railway, of which system he became assistant vice president in 1890–91. He was general manager of the Flint and Pere Marquette Railroad (1891), third vice president (1894–95) and second vice president (1895–96) of the Southern Railway. In 1896 he became president of the Long Island Railroad, which position he held at the time of his death. In 1903 he was also made president of the Pennsylvania and Long Island Railroad Company, organized to extend tunnels under the North River, Manhattan Island, and the East River, to connect with the Long Island Company's system. Mr. Baldwin took an active and effective interest in various reform movements in New York and also in educational work in the South. He was at one time chairman of the General Board of Education. Consult J. G. Brooks, *An American Citizen* (Boston and New York, 1910), and *Memorial* by People's Institute (New York, 1905).

BALDWIN CITY. A town in Douglas Co., Kan., 15 miles south of Lawrence, on the Atchison, Topeka, and Santa Fe Railroad (Map: Kansas, G 5). It is the seat of Baker University (M. E.), founded in 1858. Near the town is the battlefield of Black Jack, the scene of the first bloodshed in the slavery strife preliminary to the Civil War. Baldwin City was settled in 1853 and was incorporated about 1858. It has a mayor, elected annually, and a city council. The water works and electric light plant are owned by the municipality. Pop., 1900, 1017; 1910, 1386; 1913 (est. exclusive of 800 students), 1450.

BALDWINSVILLE. A village in Onondaga Co., N. Y., 12 miles northwest of Syracuse, on the Delaware, Lackawanna, and Western Railroad, and on the Barge Canal and Seneca River and Syracuse Lakeshore and Northern Electric Road. Supplied with natural gas and excellent electric power plant for both power and lighting (Map: New York, D 4). The industries of the village include machine, spring, and knife works, and paper mills. Baldwinsville is in a highly productive agricultural region, producing grain, corn, hay, tobacco, and dairy products. The village has a splendid high school and owns its water works. Pop., 1890, 3040; 1900, 2992; 1910, 3099.

BÂLE, bål. See Basel.

BALE, John (1495–1563). Bishop of Ossory, in Ireland, born in the village of Cove, Suffolk, England, Nov. 21, 1495. He was educated as a Carmelite monk at Cambridge, but afterward turned Protestant, became rector at Thornden, in Suffolk, and, being persecuted by the Roman Catholics, fled to Flanders (1540), where he remained eight years, during which he wrote numerous works. He was recalled by Edward VI and successively presented to the living of Bishopstoke, in Hampshire, and the bishopric of Ossory (1552). In this latter sphere he made himself so obnoxious to the Roman Catholics by his zeal in the Protestant cause that on news of the death of Edward (1553) his house was attacked and five of his servants killed. He himself escaped out of the country, after great difficulty and heavy loss, and came finally to Basel. On the accession of Elizabeth (1559) he returned to England and was made a prebendary in the cathedral of Canterbury, where he died in November, 1563. His chief work was first published in 1548 under the title of *Illustrium Majoris Britanniæ Scriptorum Catalogus hoc est Angliæ, Cambriæ et Scotiæ Summarium*, a history of English literature. His *Select Works* were published by the Parker Society, with a biography (Cambridge, 1849). He wrote many treatises and several scriptural plays.

BALEARIC (bāl'ē-ăr'ĭk) **CRANE.** See Crane.

BALEARIC ISLANDS. A group of four large islands—Mallorca (Majorca), Menorca (Minorca), Ibiza (Iviza), and Formentera—and 11 islets (Cabrera the largest), which constitute a province of Spain. They lie off the coast of

Valencia, in the Mediterranean, in lat. 38° 4′ to 40° 5′ N., and long. 1° to 5° E. (Map: Spain, G 3). They have a total area of 1936 square miles and a population (Dec. 31, 1910) of 326,023. The climate is healthful and temperate. The soil generally is good. Vines, olives, and other fruit trees are cultivated abundantly. The coasts are precipitous, with some excellent harbors—that of Mahōn, in Minorca, being one of the finest in Europe. The Balearic Islands were taken possession of by the Carthaginians at an early date, and after the destruction of Carthage they fell into the hands of the Romans. They were taken by the Saracens in 798 and became a separate Moorish kingdom in 1009. In 1232 the Moors were expelled from the islands by King James I of Aragon, and from 1276 the islands formed the independent kingdom of Mallorca until they were annexed to Aragon in 1349. The capital is Palma, on Mallorca. Consult Vuillier, *The Forgotten Isles* (New York, 1896), and Harrasowsky, "Les Baléares," in the *Revue de Géographie*, vol. xliv (Paris, 1899).

BALEEN' (Fr. *baleine*, Lat. *balena*, whale). Whalebone in its original state in the mouth of a baleen whale. See WHALE.

BALEN, bä'lĕn, HENDRIK VAN (1575–1632). A Flemish painter. He was born at Antwerp and was the pupil of Adam van Noort, the teacher of Rubens. He finished his studies in Italy and became instructor of Van Dyck and Snyders. Later he was influenced by Rubens and even by Van Dyck, as may be seen in the excellent paintings, including portraits of the painter and his wife, over their tomb in St. Jacob's, Antwerp. He excelled in small figures, especially mythological subjects. Good examples of his work are in the cathedral and museum of Antwerp and other important galleries of Belgium, and in Holland, Germany, and the Louvre.

BALER, bä-lär'. The capital of the sub-province of Principe, in the island of Luzon, Philippines, on the Baler River, about 90 miles from Manila, with which it carries on trade by land and water. United States troops took possession of this town in April, 1900. Pop., about 2500.

BALESTIER, băl'ĕs-tēr', WOLCOTT (1861–91). An American journalist, publisher, and author, born at Rochester, N. Y. He studied at Cornell University and the University of Virginia, and in New York City was editor of *Tid-Bits*, a humorous weekly, whose name was afterward changed to *Time*. In 1889 he became junior member of the publishing house of Heinemann & Balestier, of London and Leipzig. His publications include: *A Patent Philtre* (1884); *A Fair Device* (1884); a campaign life of James G. Blaine (1884); *A Victorious Defeat* (1886); *A Common Story* (1891); with Rudyard Kipling (his brother-in-law), *The Naulahka*, of which Balestier wrote the early (American) chapters (1892, 1900); and "Benefits Forgot," in the *Century Magazine* (1892).

BALFE, bălf, MICHAEL WILLIAM (1808–70). A popular English composer of operas. He was born, May 15, 1808, in Dublin. When only seven years old, he played in public one of Viotti's concertos for the violin. At 16 he made his début in London as a violinist, in the Drury Lane orchestra. In 1825 he went to Italy, where he studied counterpoint under Federici at Rome, and singing under Filippo Galli at Milan, and began his successful career as a composer, with music for the ballet *La Pérouse*, performed at La Scala, in Milan. In 1827 he sang in the Italian Opera at Paris with Malibran and Sontag. He, however, returned to Italy and devoted himself to composition, producing in rapid succession some 30 operas, of which the most popular are *The Bohemian Girl* (1843), *The Rose of Castile* (1857), *Satanella* (1858), and the posthumous *Il Talismano* (1874), his most serious effort. Balfe lacks depth and individuality; but his gift of simple melody, his strong comic vein, and his facility of writing have won for him a prominent place among English composers. Consult C. L. Kenney, *Memoir* (London, 1875), and W. A. Barrett, *Balfe: His Life and Work* (London, 1882).

BALFOUR, băl'fo͝or or băl'fēr, ARTHUR JAMES (1848–). An English statesman. He was born July 25, 1848, and studied at Eton and Cambridge. From 1878 to 1880 he acted as private secretary to his uncle, the Marquis of Salisbury, Secretary of State for Foreign Affairs. He represented Hertford in the House of Commons in 1874–85 and Manchester from 1886 to 1905, acting, during his early parliamentary career, with the famous "Fourth Party" led by Lord Randolph Churchill. He was President of the Local Government Board in 1885, became Secretary of State for Scotland in 1886, and Chief Secretary for Ireland in 1887. This last appointment was severely criticised, since Balfour's reputation had been that of an easy-going philosopher; but in office Balfour seemed a different man. He administered his office with a combination of strictness and good sense such as had been shown by few of his predecessors. As a result, in 1891 he was made First Lord of the Treasury and government leader in the House of Commons, offices which he resumed in 1895 after acting as leader of the Opposition during the intervening period of Liberal ascendency (1892–95). On the retirement of Lord Salisbury in July, 1902, he succeeded to the premiership. His tenure of office was chiefly remarkable as witnessing the decline and partial disintegration of the powerful Unionist party. The chief cause contributing to its downfall was the attitude of the government on the question of tariff reform, which was brought to the forefront by Joseph Chamberlain (q.v.) in 1903. Without embracing Mr. Chamberlain's protectionist views, the premier made himself the advocate of a professedly half-way policy which the supporters of free trade characterized as identical with Mr. Chamberlain's proposals. In 1903 the Cabinet was reconstructed as a result of the resignation of several members who were opposed to protection. In the Commons a number of Unionists seceded to the Liberal party, while another section was active in combating protectionist principles within the party. The sessions of 1904 and 1905 were given over largely to debates on the fiscal question, in which the opposition sought to elicit from the premier a definite statement as to the relation of his views to those of Mr. Chamberlain, and failed before his remarkable adroitness. On July 20, 1905, the government was defeated in the House of Commons in the course of an Irish debate, but the premier declined to resign on the ground that the vote was in the nature of a trick. Dissensions within the party, however, finally led to the resignation of the ministry in December. In the general election of January, 1906, the Unionists suffered a crushing defeat, Mr. Balfour himself failing of reëlection in Manchester.

He entered Parliament, however, as representative for the City of London and continued, as leader of the Conservative Opposition, to play a leading rôle in the proceedings of the House of Commons. In the struggle between the Lords and Commons that immediately preceded the enactment of the Parliament Act, Balfour counseled submission, at the same time making public to the Conservative leaders a letter from the Prime Minister which told of the King's promise to create new peers if necessary. For this Balfour was criticized and he resigned, Nov. 8, 1912. During the European war he was First Lord of the Admiralty, 1915–16, Foreign Secretary, 1916–19, and head of the mission to the United States in 1917. After the war he represented his country in the League of Nations, at the Washington Disarmament Conference, and other important councils. In Mr. Balfour's philosophic writings the naturally skeptical bent of his mind is clearly displayed; he is one to whom disbelief, or a contemptuous suspension of judgment, comes more easily than faith. As a writer, his highest merits are subtlety and originality, though Spencer and others whose conclusions he impugns have accused his dialectic of sophistry. His works are: *A Defense of Philosophic Doubt* (1879); *Essays and Addresses* (1893); *The Foundations of Belief* (1895; new ed., 1900); *The Fiscal Reform* (1906); *Arthur James Balfour as a Philosopher and Thinker* (1912); *Theism and Humanism* (1915); *Essays, Speculative and Political* (1920).

BALFOUR, Andrew (1873–). A Scottish bacteriologist and author, born in Edinburgh. His earlier education was obtained in his native city—at George Watson's College and at the university. Later he took advanced studies at Cambridge, but it was from the University of Edinburgh that he received the degree of M.D. in 1898. In 1900–01 he served as civil surgeon in the South African War, and from 1902 to 1910 was director of the Wellcome Research Laboratories at Khartoum. He was also appointed sanitary adviser to the Sudan medical department, and medical officer of health for Khartoum. He wrote several novels: *By Stroke of Sword* (new ed., 1901); *To Arms!* (new ed., 1902); *Cashiered, and Other War Tales* (1902); *Vengeance is Mine* (new ed., 1905); and the following medical works: *Public Health and Preventive Medicine*, with C. J. Lewis (1902); the first, second, third (1909), and fourth (1912) *Reports of the Wellcome Research Laboratories; Review of the More Recent Advances in Tropical Medicine*, with R. G. Archibald (1909); *Second Review* (of the same) (1911).

BALFOUR, Francis Maitland (1851–82). A Scottish embryologist, born at Edinburgh; brother of the Rt. Hon. A. J. Balfour. He graduated in 1873 at Trinity College, Cambridge. In 1876 he was appointed lecturer on, and (1882) professor of, animal morphology. His publications are: *The Development of Elasmobranch Fishes* (1878), made up largely of the results of original research conducted at Cambridge and at the Stazione Zoölogica of Naples; and *A Text-book of Comparative Embryology* (2 vols., 1880–81), in great part an original work, distinguished alike for profound learning and clear statement. He was killed, with his guide, on July 19, 1882, during either the ascent or descent of the Aiguille Blanche de Penteret, Switzerland.

BALFOUR, Gerald William (1853–). An English politician born at Edinburgh. He studied at Eton and received the degree of M.A. from Trinity College, Cambridge. In 1855–86 he served as member of the Commission on Labor, and was private secretary to his brother, the Rt. Hon. A. J. Balfour, then President of the Local Government Board. He became a member of Parliament in 1885: from 1895 to 1900 was Chief Secretary for Ireland and introduced the Local Government Bill; in 1900 was appointed President of the Board of Trade, and in 1905 President of the Local Government Board. He failed of reëlection to Parliament in the general election of 1906.

BALFOUR, Isaac Bayley, M.D., LL.D. (1853–1922). A Scottish botanist, born in Edinburgh. He graduated at the University of Edinburgh, studied at Strassburg and Würzburg, and from 1879 to 1884 was professor of botany in the University of Glasgow. In 1884–88 he was professor of botany at Oxford and in the latter year accepted a similar chair at the University of Edinburgh. He also became King's botanist in Scotland, and keeper of the Royal Botanic Garden at Edinburgh. In 1880 he explored the island of Socotra, Indian Ocean, on behalf of the British Association and of the Royal Society, Edinburgh, in whose *Transactions*, vol. xxxi (1888), appeared the results of the journey. He became, in 1887, an editor of the *Annals of Botany*. A *Botany of Rodriguez* he published in 1878, and a *Botany of Socotra* 10 years later.

BALFOUR, Sir James (?–1584). A Scottish judge and politician. He was educated for the priesthood, but devoted himself to ecclesiastical law. He was implicated in the plot for the assassination of Cardinal Beaton, and after the surrender of the castle of St. Andrews (June, 1547) was imprisoned in the French galleys. He regained his freedom by changing his creed and returned to Scotland. He conspired with Bothwell for the murder of Darnley and received the governorship of Edinburgh Castle, which he later surrendered to Murray, in return for a pardon for his share in Darnley's death and other favors. He was Lord President of the Court of Session during Murray's regency, but, suspected of intriguing with the adherents of the Queen, he was deprived of his office in 1568. After Murray's death Balfour contrived to gain the favor of the new regent, Morton, and received a commission to make a general digest of the law. This is the earliest text-book on Scottish law and is called *Balfour's Practicks*. In 1573 he again fell into disfavor and fled to France, but returned about 1580 and was instrumental in bringing about the fall of Morton. He died before Jan. 24, 1584. Balfour is one of the most contemptible figures of the period—"the most corrupt man of his age," as Robertson rightly describes him, though the scorn of Knox for "Blasphemous Balfour" may perhaps be partially explained by his abandonment of Protestantism in the galleys.

BALFOUR, John. A Covenanter who appears in Scott's *Old Mortality* as "Balfour of Burley." The real John Balfour, the Covenanter, was historically of Kinlock and not of Burley or Burleigh. John Balfour of Burleigh participated in the assassination of Archbishop Sharp in 1679 and was outlawed.

BALFRUSH, bal-frōōsh′, or **BARFRUSH** (Pers. landing place, market). An important

commercial town in the Persian province of Mazanderan, situated on the river Bahbul, about 12 miles from its mouth in the Caspian Sea (Map: Persia, E 3). It is a clean and well-built town with fine bazaars and the ruins of an old pleasure palace of Shah Abbas. It is connected by a well-shaded road with Meshed-i-Ser, its port, through which it carries on a considerable trade in cotton, dried fruit, sugar cane, flax, hemp, and metals, chiefly with Russia. The town is also connected by road with Teheran and carries on extensive commerce with the interior. The population was once estimated at 200,000, but it has since been greatly reduced by epidemics, so that at present it is less than 50,000.

BALG, bälg, GERHARD HUBERT (1852–). An American philologist, born at Efferen, near Cologne, Germany, and educated partly in that country and partly at the University of Wisconsin, where he graduated in 1881. He received the degree of Ph.D. at Heidelburg, in 1883, and taught at the University of Wisconsin and at private and public schools in the United States. He published several valuable philological works, notably *A Comparative Glossary of the Gothic Language, with Especial Reference to English and German* (1887–89); *The First Germanic Bible, and the Other Remains of the Gothic Language* (1891), and an English edition of Wilhelm Braune's *Gothic Grammar* (1883–95). He also supplied Germanic etymologies for the *Standard Dictionary*.

BALGOWNIE, bâl-gou'nē, BRIG OF. A bridge of a single arch, over the Don at Aberdeen, Scotland, built in 1320.

BALI, bä'lē. One of the Dutch East India islands, situated east of Java, from which it is separated by the narrow Bali Strait (Map: East Indies, E 6). It forms, with the island of Lombok, the Dutch outpost residency of Bali and Lombok, having an area of 4063 square miles and a population of 524,000. The island covers an area of over 2168 square miles. Its surface in general closely resembles that of Java. It is mountainous and volcanic and reaches in its highest summit (the volcano Gunung-Agung) an altitude of 10,497 feet. In the lower portions of the island the common products of the East Indies, such as rice, cotton, sugar, coffee, tobacco, and indigo, are raised in large quantities. Politically the island is divided into the two districts of Buleleng and Jembrana (Dutch) and the autonomous states of Klung Lung, Bangli, Mengui, Badung, and Tabanan. The capital is Buleleng.

The natives, anthropologically, are one of the most interesting peoples of Malaysia. Physically and linguistically they are close to the Malayan or proto-Malayan Javanese and share the capacities of these for culture. In metal work and sculpture they are markedly successful. The Balinese and the natives of the adjacent island of Lombok, alone in Malaysia, retain as their religion Brahmanism in a form older than that now found in Hindustan, and other traces of Hindu influence also occur. The participation of the women in trade and industry indicates a power to resist the doctrines of Islam. Of more recent literature since Laut's *Het eiland Bali en de Balienzen* (Amsterdam, 1848) may be mentioned Van Vlijmen's *Bali* (Amsterdam, 1875). See INDONESIANS; MALAYS.

BALIKESRI, bâ-lē'kĕs-rī, or BALIKISRI. A town of Asiatic Turkey, in the vilayet of Brusa, about 75 miles southwest of the city of Brusa (Map: Turkey in Asia, B 3). It contains a number of mosques and is the seat of an annual fair, visited by over 30,000 people. There is commerce in grain, opium, silk, and the region abounds in minerals. Its population is nearly 25,000, of which about three-fourths are Mohammedans.

BALINESE, bä'lē-nēz'. See BALI.

BALINGHEM, bâ'lăn'găm'. The historic site of the "Field of the Cloth of Gold," a small town near Calais, in the department of Pas-de-Calais, France. See FIELD OF THE CLOTH OF GOLD.

BALIOL, bā'lī-ol *or* bāl'yol, EDWARD DE (?–1367). The son of John Baliol. He was received as the vassal King of Scotland at the English court and made himself conspicuous, in 1332, by his daring and successful invasion of Scotland, then under the regency of Randolph, Earl of Moray. Accompanied by some English noblemen, bent on recovering their forfeited estates in Scotland, he landed with a few hundred followers at Kinghorn, in Fifeshire; defeated the Earl of Fife; pushed boldly into the country and, on Dupplin Moor, in Perthshire, routed with immense slaughter an army more numerous than his own. On September 24 he was crowned King of Scotland at Scone. He acknowledged English suzerainty and promised to give up Berwick. He had enjoyed the kingly dignity for about three months, when he was surprised in his camp at Annan by a party of Scottish nobles and nearly lost his life as well as the crown. After the capture of Berwick, in 1333, he regained the throne. He was used as a tool by Edward III until 1356, when he surrendered to the latter the whole kingdom of Scotland. He died at Wheatley near Doncaster in 1367, and with him ended the house of Baliol. Consult Longman, *History of the Life and Times of Edward III* (London, 1869).

BALIOL, JOHN DE (1249–1315). Lord of Galloway, and King of Scotland from 1292 to 1296. On the death of Princess Margaret, in 1290, he became a competitor for the crown of Scotland. As the grandson of the eldest daughter of David, Earl of Huntington, brother of William the Lion, and grandson of David I, his claim was pronounced superior to that of his principal competitor, Robert Bruce, Lord of Annandale, son of a second daughter. The arbiter on the occasion was Edward I, of England, who found this a fit opportunity for asserting his claim as Lord-paramount of Scotland. This claim was acknowledged by the Scottish Estates in submitting the contest to his decision; and, consistently with this submission, Baliol, before and after receiving the crown (Nov. 30, 1292), swore fealty to Edward as his feudal superior. He was soon made to feel that his sovereignty was merely nominal, and the indignities which he experienced roused him to an assertion of his rights as king. With the advice of his nobles, he concluded an alliance in 1295, with France, then at war with England—an act of revolt followed by speedy chastisement. Edward invaded Scotland with a large force, defeated the Scottish troops, took Baliol prisoner, and compelled him formally to surrender his crown, July 10, 1296. Baliol was held as a prisoner for three years, enjoying, however, a limited freedom and something of royal state. At the end of that time he was permitted to retire to his patrimonial estates in France, where he died

in 1315. The estimate by his subjects of this prince was significantly indicated by the surname of Toom Tabard or 'Empty Jacket.' Consult Burton, *History of Scotland*, vol. ii (Edinburgh, 1905), and Lang, *History of Scotland*, vol. i (Edinburgh, 1904).

BALIOL, Mrs. Martha Bethune. The imaginary narrator of some of Scott's *Chronicles of the Canongate.*

BALIOL COLLEGE. See Balliol College.

BALISARDA, bä'lē-sär'dȧ. A magic and all-penetrating sword, mentioned in Ariosto's *Orlando Furioso.* It was made by a witch, Falerina, to kill Orlando.

BALISAUR, bäl'ī-sä'ụr. An East Indian badger. See Badger.

BAL'ISTRA'RIA (LL. *balistra*, Lat. *ballista*, crossbow). One of the names given to those narrow apertures so common in the walls of old castles through which the crossbowmen discharged their bolts. Their lower terminations are generally circular, but sometimes in the form of a shovel. They do not seem to have come into use till the thirteenth century. See Artillery; Loopholes.

BALIUAG, bä-lē'wäg. A town of Luzon, Philippines, in the province of Bulacan (Map: Luzon, E 7) 13 miles north of Bulacan. It is the market for a rich agricultural region and is noted for a fine grade of bamboo hats which are manufactured in the town. In 1899 was established here the first municipal government in the Philippines under American occupation. The people of Baliuag are thrifty, progressive, and industrious. Pop., 1903, 15,936.

BALIZE, bȧ-lēz'. See British Honduras; Belize.

BALKAN (bȧl-kän' *or* bąl'kȧn) **MOUN'TAINS** (Turk. high ridge; the ancient *Hæmus*). A mountain range in southeastern Europe, in the Balkan Peninsula, forming a continuation of the Carpathian system. As such they may be considered to begin at the western extremity of the Transylvanian Alps, at the gorge known as the Iron Gates of the Danube, where the boundaries of Hungary, Rumania, and Servia meet. Thence they extend due south through Servia and along the borders of Servia and Bulgaria, then bend abruptly to the east, and continue in that direction as far as Cape Emineh, on the Black Sea (Map: Balkan Peninsula, E 3). Their western boundary attains the Morava-Vardar basins. The first section of the Balkans—that extending north and south—is formed by rounded hills and ridges, which attain an extreme elevation of about 7000 feet. The main range consists of several sections arranged successively along an east and west axis. They constitute the divide between the Danube and the Maritza watersheds and the boundary between Bulgaria and eastern Rumelia. In this main division, comprising the central Balkans, are the highest summits of the range, several of which exceed 7000 feet (Yümrücktchal, 7789; Kadimlia, 7410; Ambarica, 7052). The eastern Balkans, from the vicinity of Sliven to the Black Sea, consist of numerous ridges, usually less than 3000 feet high, and of more broken character than the mountains in the western and central sections. From the Balkans various ranges extend southward toward the Ægean, the principal being the Rhodope (Despoto-Dagh), whose summits overtop those of the Balkans. The islands of the Ægean form its southern prolongation. Among the passes of the Balkans may be mentioned the Troyan, Rosalita, and Shipka passes, which are at elevations of 4000 to 5000 feet. The Rilo Dagh is the most elevated peak in the Rhodope range. Its highest point is about 9900 feet. The Balkan range is composed largely of folded sedimentary strata; but in the west crystalline schists, containing deposits of copper, lead, and iron ore, are prominent.

BALKAN PENIN'SULA. A name commonly applied to the easternmost of the three great southern peninsulas of Europe, bounded by the Adriatic Sea on the west and the Black and Ægean seas on the east. Its northern boundary is generally considered to be the Danube, the Save and its tributary, the Kulpa. Thus defined, the peninsula comprises, within an area of about 175,000 square miles, the following countries: European Turkey, Bulgaria, Servia, Bosnia, and Herzegovina, part of Croatia, Dalmatia, Montenegro, Albania, and Greece.

The eastern coast of the peninsula, overlooking the Black Sea, is generally low and marshy and almost unbroken, except for the Gulf of Burgas. Through the Bosporus, a narrow channel about 20 miles long, the Black Sea communicates with the Sea of Marmora, which adjoins the peninsula on the southeast. The shores of the latter sea differ but little from those of the Black Sea in their general appearance. The Sea of Marmora communicates with the Ægean Sea through the Dardanelles channel. The coasts of the Ægean Sea form numerous gulfs and safe harbors of great commercial importance. The coasts of the Greek Peninsula are greatly indented and surrounded by numerous islands. The western coast of the Balkan Peninsula, above the Gulf of Arta, is generally mountainous. The greater part of the peninsula is covered with numerous mountain chains, the chief of which is the Balkan (q.v.), to which the peninsula owes its name.

Owing to the mountainous character of the country, the rivers which traverse the peninsula are mostly short, and very few of them navigable. The most important of them are the Maritza, Vardar, Morava, and Drin. There are also several lakes, the most important of which is that of Scutari. The climate is colder than in the other Mediterranean regions in the same latitude, and the snowfall during the winter is considerable.

The leading races of the peninsula are the Serbo-Croatians (Servians, Bosnians, Croatians, and Montenegrins) and Bulgarians, forming the southern branch of the Slav family, the Albanians, descendants of the ancient Illyrians, the Greeks, and the Turks. Since 1913 Turkish suzerainty has ceased in the peninsula, Bosnia and Herzegovina having been annexed by Austria-Hungary in 1908 and the remaining tributary territory having become independent as a result of the Balkan War of 1912–13. The Turks first obtained a foothold in the Balkan Peninsula in the middle of the fourteenth century, conquered Constantinople in 1453, putting an end to the Byzantine or Greek Empire, and soon after were masters of the whole peninsula. The Turkish Empire in Europe fell to pieces in the course of the nineteenth century, and at the present time Turkish rule extends over only about one-eighteenth of the region. The strife of nationalities is intense in the Balkan Peninsula and threatens at any moment to disturb the existing order. Consult: T. Fischer, "Die südosteuropäische Halbinsel" in *Länderkunde von*

Europe, vol. ii, part 2, 1890); Miller, *Travels and Politics in the Near East* (London, 1898); D. G. Hogarth, *The Nearer East* (New York, 1902); and Tuma, *Die östliche Balkan-Halbinsel* (Vienna, 1886).

BALKAN WAR. The causes of the armed conflicts which occurred in the Balkans during the years 1912–13 were traceable to long-continued disorders in Macedonia and Albania, to a temporary union of all the Christian states of the Balkans, except Rumania, and to the weakening of the Ottoman Empire consequent upon the internal dissensions following the Turkish Revolution of 1908 and the military reverses suffered in the Turco-Italian War (q.v.).

Macedonia had been ceded by Turkey to Bulgaria in 1878 pursuant to the Treaty of San Stefano, but the Congress of Berlin in the same year revised this treaty and through the insistence of Great Britain and Austria-Hungary restored the district to Turkey. By Article XXIII of the Treaty of Berlin, however, the signatory powers bound themselves to establish an organic law providing for good government in Macedonia and to see that it was applied. For 34 years this promise was unfulfilled, despite the repeated protests of the Christian inhabitants—Bulgars, Greeks, and Serbs. Gradually as the small Christian states of the Balkans grew stronger they interested themselves increasingly in the welfare of their respective nationalities in Macedonia. A serious revolt of Macedonian Bulgars almost precipitated war between Bulgaria and Turkey in 1903; only the intense rivalry among the various Balkan states and their inability to agree upon any common division of European Turkey postponed an appeal to arms. Nevertheless the misgovernment and atrocities in Macedonia at once attracted general attention, and from 1903 to 1908 the European Powers, led at first by Austria-Hungary and Russia, endeavored to secure reforms in the Turkish administration. Austro-Hungarian and Russian civil agents obtained some supervision in the three vilayets of Saloniki, Monastir, and Kossovo; Italian officers undertook to reorganize the *gendarmerie;* and the Concert of Europe assumed direction of financial matters. Unfortunately the system was far from complete, and there was slight harmony among the Powers. Germany wished to meddle as little as possible with the administration of a Turkish province. Great Britain, on the other hand, supported by Russia, wished to go much farther. Accordingly in 1907 the British ministry proposed a new plan, including the reorganization of justice under the direction of European agents, and King Edward VII and the Czar met at Reval with their respective foreign ministers and agreed on a thorough programme of reforms.

At this juncture came the Turkish revolution of 1908 (see TURKEY), by which the progressive and radical Young Turk party overthrew the autocracy of the Sultan, set up a constitutional government, and loudly heralded the principles of equality and liberty. The European Powers believed in the good faith of the Young Turks and in their ability to remove the Macedonian abuses, and this confidence was shared by the subject races of Macedonia themselves. The foreign advisers were therefore speedily recalled from Macedonia, and the international programmes of reform fell into abeyance. It soon became evident, however, that the Turkish Revolution was directed not only against the Sultan's tyranny but against his feeble foreign policy which permitted the Powers to interfere in the internal affairs of the Empire. The revolution aimed at nationalization and centralization quite as much as at liberalism. In their desire to build up a strong, unified nation, the Young Turks introduced compulsory military service for Christians as well as for Moslems, but the realization of reforms promised by the Treaty of Berlin seemed more remote than ever. The special privileges long accorded to the subject races were curtailed; public meetings were prohibited; constitutional and national clubs were suppressed. This policy of Ottomanizing Macedonia had the effect of driving the people into more or less open rebellion. Lawless bands infested the country. Political assassinations were common. The repressive measures of the Turks served only to bring new recruits to the outlaws.

A very significant effect of the mistaken policy of the Young Turks was to draw the Christian nationalities together in common hatred of the Turks. From 1903 to 1908 the Serb, Greek, and Bulgar bands were as likely to massacre one another as to massacre Turks. Now they laid aside their rivalries. By the close of 1910 the Bulgars and Greeks in Macedonia who had long been the bitterest and most active in their hostility became fully reconciled, and this was followed by close and friendly relations between the governments of Greece and Bulgaria.

Another important result of the Ottomanizing policy of the new Turkish régime was disorder and insurrection in Albania. The turbulent chieftains and tribesmen of that province had been singularly loyal to the Ottoman Empire so long as their local customs and practices were respected, but as soon as the Young Turks undertook to abridge their privileges and to deprive them of arms, they rose in revolt. Every year from 1909 to 1912 was marked by desperate fighting in the mountains of Albania, each Turkish campaign becoming more expensive and less successful than the preceding one. In August, 1912, the Albanians submitted to the Turkish government a number of demands which included provision for a distinct judicial system—the restriction of Albanian military service in time of peace to the European vilayets, the use of the national language in civil administration, the establishment of schools, the undertaking of public works, the restitution of arms, and a general amnesty. The government was delaying its reply to these demands when the Balkan War broke out. With the Albanian situation both Montenegro and Servia were directly concerned, and Serb irregulars were to be found fighting shoulder to shoulder with Albanians in the insurrections of 1911 and 1912.

The same determined policy of the Young Turks which led to disorders in Macedonia and Albania brought on the Turco-Italian War of 1911–12, and the Italian occupation of Tripoli and Cyrenaica and seizure of twelve islands in the Sporades humiliated the Turkish government and fed the ambition of the Christian states of the Balkans. A definite understanding was reached in March, 1912, by the governments of Bulgaria, Servia, Greece, and Montenegro. Owing largely to the statesmanship of M. Venezelos, the Greek premier, jealousies and conflicting interests were not permitted to divide the states or keep them from their

BALKAN STATES
CONSTANTINOPLE, ROUMANIA, BULGARIA, YUGO-SLAVIA, ALBANIA AND GREECE
SCALE OF STATUTE MILES
0 10 20 40 60 80 100 120 140 160
SCALE OF KILOMETERS
0 20 40 80 120 160 200 240
Important towns are shown in heavy face type
Railways shown thus
ROUMANIA
BULGARIA
YUGO-SLAVIA
BOSNIA
HERZEGOVINA
SERVIA
TRANSYLVANIA
MOLDAVIA
WALLACHIA
BUKOWINA
BESSARABIA
SLAVONIA
BANAT
BUKHAREST
BELGRADE
SOFIA
Jassy
Galatz
Braila
Ploesti
Krajova
Ruschuk
Shumla
Varna
Silistria
Kustendje
Kilia Mouth
Mouths of the Danube
St. George Mouth
C. Kaliakra
C. Emineh
Sea of Azof

ADRIATIC SEA
IONIAN SEA
AEGEAN SEA
SEA OF MARMORA
THE STRAITS
TURKEY
ASIA MINOR
GREECIAN ARCHIPELAGO
SEA OF CANDIA
ALBANIA
EPIRUS
THESSALY
MACEDONIA
ROUMELIA
ACARNANIA & ÆTOLIA
ACHAIA & ELIS
ARGOLIS & CORINTHIA
ATTICA & BŒOTIA
EUBŒA
CYCLADES
CRETE OR CANDIA
(To Greece)
Same scale as main map
Black Sea
Sea of Marmora
Constantinople
Adrianople
Smyrna
Salonika
Gallipoli
Brusa
Durazzo
Corfu
Cephalonia
Zante
Scutari
Monastir
Berat
Janina
Prevesa
Patras
Athens
Missolonghi
Lepanto
Navarino
Tripolitza
Argos
Nauplia
Corinth
Thebes
Lamia
Volo
Larissa
Mount Athos
Thasos
Lemnos
Mitylene
Chios
Samos
Scala Nova
Rhodes
Cyprus
Candia
Canea
Retimo
Sitia
Cerigo
Milos
Santorin
Naxos
Paros
Andros
Tenos
Hermopolis
Patmos
Nikaria
Lemnos
Imbros
Tenedos
Baba Kalessi
Dardanelles
Constantinople
Scutari
Kalolimni
Samothraki
Longitude E East 26° from F Greenwich
24°
22°
18°
20°

central purpose. The alliance was formed to free the men of their religion and race from Turkish rule and to overthrow and dismember the Ottoman Empire in Europe.

Greece, Servia, and Bulgaria naturally sympathized with the people of their own nationality in Macedonia. Montenegro likewise sympathized with the Albanian rebels, and the Turks complained of frequent attacks by Montenegrins on the border. In Bulgaria public opinion was greatly agitated by a massacre at Kotchana in August, 1912. As to Servia, one of the many incidents that angered the people was a massacre of Serb Christians at Senitza in Novibazar in July. The emotions of the Greeks were stirred by reports of Turkish atrocities in Thessaly and by the clamorous appeals of the Cretans for annexation to the Greek kingdom, which had been increasing ever since the Græco-Turkish War of 1897 (q.v.).

These threatening conditions led the Porte in July, 1912, to announce its intention of introducing judicial, economic, educational, and administrative reforms in Albania. The rather vague assurance was extended to Macedonia in September, and in October the Turkish government revived the vilayets law of 1880, which constituted local autonomous councils, half of whose members, however, were to be appointed by the governor. Such tardy concessions could not stay the crisis, for the Balkan allies were by this time unitedly insisting upon a far more radical programme — national autonomy for Macedonia, Christian governors of the European vilayets, local militia, and the withdrawal of Turkish troops. Announcement that Turkey would hold army manœuvres near Adrianople was followed by orders for the mobilization of Bulgarian, Servian, Greek, and Montenegrin forces. By Oct. 8, 1912, nearly half a million men threatened the Ottoman Empire from the north, while over 100,000 Greeks were massed on the Thessalian frontier. The Turks retaliated by confiscating munitions of war intended for the allies and by holding up about 100 Greek merchant vessels.

Meanwhile the Great Powers had been attempting to prevent war. A conference on September 8 of the German Chancellor with Count Berchtold, Foreign Minister of Austria-Hungary, resulted in an expressed determination of the two governments to maintain the territorial *status quo* in the Balkans and to avert hostilities by encouraging the Porte in its "policy of decentralization"; and Austria-Hungary speedily mobilized an army with the avowed intention of protecting her interests in the sanjak of Novibazar. A proposal of the French foreign minister, M. Poincaré, for concerted diplomatic action, tardily assented to by Great Britain, led to representations by the ministers of Russia and Austria-Hungary, acting as mandatories of the Powers, at the Balkan capitals, on October 8, to the effect that (1) the Powers would reprove any belligerent action; (2) they would assist in securing, under Article XXIII of the Treaty of Berlin, reforms in the administration of European Turkey that would not infringe upon the sovereignty of the Sultan or the territorial integrity of the Ottoman Empire; (3) in case of war, they "would not permit at the end of the conflict any modification of the territorial *status quo* in European Turkey." On the very same day Montenegro severed relations with the Porte and declared war.

On October 13 Bulgaria, Servia, and Greece dispatched an identical note to Turkey requiring the establishment of complete Macedonian autonomy under Christian governors within six months. Upon receipt of the note Turkey immediately recalled her representatives from their respective capitals. Formal declarations of war against Turkey were issued on Oct. 17, 1912, by Greece, Servia, and Bulgaria.

The military plans of the four Balkan powers were well coördinated and directed to a common purpose. The chief objective of the Montenegrin campaign was Scutari. The Servians aimed at defeating the Turkish forces in Macedonia in coöperation with the Montenegrins in the west and the Greeks in the south and then to dispatch troops to seize the port of Durazzo on the Adriatic. The Greek attack was directed to the capture of Saloniki. The Bulgarians, whose forces were the strongest, were to perform the chief task of overwhelming the Turks in Thrace and pushing them back to Constantinople. Thus the Turks were attacked at the same time in four separate regions and were unable to concentrate and act on the offensive. Their commander-in-chief was Nazim Pasha, who was appointed on October 3. It was soon perceived that in the face of the vigorous and rapid assault of the Balkan armies the Turkish military organization had fallen into a deplorable state of inefficiency and unreadiness.

On the northeast Bulgarian forces, aggregating over 300,000 men, commanded by General Savoff (q.v.), occupied Mustapha Pasha on October 19 and Kirk-Kilisseh on the 24th. By the 27th Adrianople was invested, the garrison of 60,000 men henceforth making vigorous but unsuccessful sorties. On the 27th the Bulgarians captured Eski-Baba; and two days later began the sanguinary battle of Lule Burgas, the chief battle of the war, extending along a front of about 22 miles. Three attacks on the Turkish centre were repulsed, and the position was finally carried only after a hand-to-hand encounter. The Bulgarian generals did not restrain the ardor of their troops, and movements, especially infantry charges, involving heavy sacrifices of life, were carried out with remarkable heroism. The losses on each side were very heavy. The Turks were ill-supplied with food and ammunition and suffered also from defective leadership. The well-directed Bulgarian artillery fire wrought havoc among them. At last they began to retreat, but without panic, and fighting did not actually cease until November 2. The strength of the Turkish army engaged at Lule Burgas was placed at 150,000. Their loss in killed and wounded was about 35,000 and in prisoners about 3000. The Bulgarian loss was estimated at 15,000.

The Turks now fell back on Tchorlu and a little later withdrew behind the strong Tchatalja forts, the last line in defense of Constantinople. On November 12 the Bulgarians began their attack, but the Turks successfully stood their ground. To carry the defenses involved heavy loss, and it was hoped that the cholera, which had broken out among the Turks, would lead them to surrender. The Turks opened negotiations for an armistice on November 13, and operations were suspended, but when the allies presented their terms on November 20, they were at once rejected. On November 25, however, a meeting was arranged between General Savoff of the Bulgarians and Nazim Pasha, the Turkish

commander-in-chief and Minister of War, and three days later the negotiations were definitely resumed at Tchatalja. Finally, on December 3, a protocol was signed for an armistice which was to last until the end of the peace negotiations.

Meanwhile, in the western field of war, Servian forces took Prishtina on October 22, Novibazar on the 23d, and Senitza on the 26th. On the same day Uskub was occupied. Many of the Turks scattered in panic, but the main body withdrew toward Monastir. On October 27 the Servians, after driving the Turks back with heavy losses from Kotchana and Ishtib, captured Kuprulu. The Turks came to a stand in a narrow defile of the mountains between Kuprulu and Perlepe, whence the Servians tried to dislodge them on November 3. This was accomplished, but only after a long battle, in which the Servians suffered heavily. Meanwhile one portion of their army had been dispatched in the direction of Scutari to coöperate with the Montenegrins, another toward the coast at Durazzo, and a third to join the Greeks in the neighborhood of Saloniki. But the main body advanced to Monastir, which, after two days of desperate fighting, was captured on November 18. The last important success of the Servians was the occupation of Durazzo on November 28. The victorious advent of Servia on the Adriatic coast gave rise to international complications noted below.

The Greeks, under Crown Prince Constantine, invading Macedonia from the Thessalian frontier, had already occupied Elassona, won successes near Mount Olympus, in the Melina Pass, and at Damsei, gained an important victory at Saranporo Pass on October 23, and on the following day captured the town of Servia. By the 31st they had occupied Verria on the Saloniki-Monastir Railway and had routed a Turkish detachment at Kailar. On November 3 their main column occupied the "holy town" of Yenidje and advanced thence on Saloniki, in conjunction with a detachment which had been landed at Stavros and with a Bulgarian force from Kuruk. The condition of the Turks in the defense of Saloniki was deplorable, and they were unable to offer effective resistance. After a two days' investment the town was surrendered on November 8. The number of the Greeks was placed at about 60,000 and of the Turks at about 25,000. A Bulgarian division and a Servian regiment entered Saloniki on November 9, and there were henceforth many evidences of jealousy among the allies. A Greek expedition against Janina had not attained its object when the armistice of Tchatalja was signed on December 3; Greece therefore declined to agree to the armistice and continued operations on land and sea. During the autumn and winter Greek warships managed to capture all the Ægean islands not already occupied by Italy.

The Montenegrins began their advance on Scutari on October 8. On the 12th they invested Tarabosch and on the 14th captured Tuzi. Essad Pasha, the Turkish commander, contested their advance at each mountain stronghold, but was at length obliged to take refuge within the fortress of Scutari. In the west Berane was taken on October 16, and toward the east Prizrend and Ipek on the 31st. South of Scutari another army of Montenegrins and Servians occupied Alessio and San Giovanni di Medua on November 5.

Ever since the outbreak of war the European Powers had continued their efforts in behalf of peace. M. Poincaré, the French premier, proposed early in November that the Powers should pledge themselves to "territorial disinterestedness," but this did not meet with favor among the members of the Triple Alliance, of whom Austria-Hungary occasioned the chief apprehension. She was known to be hostile to any movement that would bring Servia to the Adriatic or, by imposing a barrier of Slav states, cut Austria-Hungary off from the road to Saloniki. Toward the end of November Sir Edward Grey, the British Foreign Secretary, proposed that representatives of the Powers should be especially authorized to confer on the Balkan question at one of the European capitals. This was accepted, and London was designated as the place for the conference. Soon after the appearance of the Bulgarians before the Tchatalja lines, Turkey asked the Powers to mediate and received the reply that no terms unacceptable to all the belligerents would be forced upon them.

By the armistice signed at Tchatalja on Dec. 3, 1912, Bulgaria, Servia, Montenegro, and Turkey agreed to send delegates to a peace conference at London. During the armistice the armies were to retain their positions, and the besieged fortresses of Adrianople and Scutari were not to be reprovisioned. Greece, as has been seen, refused to accede to this agreement, while Janina remained in Turkish hands and continued her attacks on that city. Nevertheless, at the first session of the peace conference in London on December 16, the Greeks insisted on a share in the deliberations. The Turks, after some delay and efforts to obtain a counter-concession, yielded on this point. The territorial demands which the allies submitted December 23, comprising the cession of all territory west of a line from Rodosto to Cape Malatra, of the Ægean islands and of Crete, were refused by the Turkish diplomats, and the conference was suspended by the allies on Jan. 6, 1913. On the 16th the Porte was advised by the Powers to yield on the question of the surrender and cession of Adrianople. After receiving the assent of a Council of Notables on January 22, the Turkish government proposed to compromise on the division of Adrianople and the autonomy of the Ægean Islands.

These concessions were insufficient to satisfy the allies, and on Feb. 3, 1913, there was a general resumption of hostilities. The Bulgarians with Servian help pressed the attack on Adrianople; two forts were taken on March 9; and on the 26th the whole eastern line of defenses was carried and the Turkish commander, Shukri Pasha, was compelled to surrender with some 30,000 men. A vigorous attack was then made on the Tchatalja line; the town of Tchatalja was taken, and Bulgarian detachments occupied Delepes, Injes, Subachu, and Serbele. Meanwhile the Greeks had captured Janina, March 6; the siege of Scutari had been urgently prosecuted by Montenegrin and Servian troops; and Greek ships in the Adriatic were coöperating with the allied forces in northern Albania.

Further mediation of the Powers was impeded by their clashing interests. The moral support which Russian sentiment gave to the Greek-Christian Slavic Balkan states brought Russia into sharp conflict with the Austro-Hungarian "expansion to Saloniki" policy. After the resumption of hostilities between the

Turks and the allies, the attention of the Powers was directed to the settlement of conflicting claims to Albania. In deference to the strenuous representations of Austria-Hungary, they agreed to incorporate Scutari in an autonomous Albanian state and to forbid the acquisition by Servia of an Adriatic port, although Servia was to be given commercial access to the Adriatic over a neutral railway. In return, the Triple Entente secured for Servia and Montenegro the debatable territories of Ipek, Prizrend, Dibra, and Djakova. The northern and eastern frontiers of the new principality of Albania were accordingly agreed upon by the Powers on March 26, 1913. The immediate result of this agreement was the relaxation of Austro-Russian tension and the simultaneous withdrawal of Russian and Austro-Hungarian troops from the Galician frontier. With the consent of the Porte, the Powers renewed on March 1 their offer of general mediation in the struggle. Two weeks later the allies were willing to accept the good offices of the Powers on condition that the western boundary of Turkey should be the Rodosto-Malatra line, that Crete and the Ægean islands should be ceded, and that an indemnity should be paid by Turkey. The Powers, unwilling to give Bulgaria a foothold on the Dardanelles, insisted on a line from Enos to Midia by way of the Maritza and Ergene rivers; and as both Italian and German interests opposed the union of the Ægean islands with Greece, the Powers offered to determine later the status of those islands. On April 1 the Porte was ready to accept a direct line from Enos to Midia, and the allies were finally induced to agree to mediation, reserving the right to discuss with the Powers the claim for $300,000,000 indemnity, the disposition of the Turkish national debt, the status of the Ægean islands, and the delimitation of the boundaries in Thrace and in Albania.

On April 19, 1913, a second armistice was signed at Bulair by all the belligerents except Montenegro. The announced decision of the Powers to incorporate Scutari in Albania only incited King Nicholas to redouble his efforts to capture that city. An international fleet under the command of the British Admiral Burney attempted to punish this defiance by blockading the coast from Antivari to San Giovanni di Medna on April 10. Unintimidated, the Montenegrins continued the siege, captured Scutari on April 23, and then at once acceded to the armistice of Bulair. For a while it was feared that negotiations looking toward a definite peace would be complicated by serious differences among the Powers concerning the fate of Scutari. Although the European Concert had already declared that Scutari should be incorporated in an autonomous Albania, the unexpected triumph of the Montenegrins aroused a storm of pan-Slavist sentiment in Russia. It was only the determined attitude of Austria-Hungary and the loyal support of her allies that forced King Nicholas to evacuate Scutari. On May 14, 1913, the city was occupied by an international military force in the name of the new principality of Albania.

As soon as Montenegro had grudgingly submitted to the Powers, delegates of the Balkan allies and of Turkey opened the second London Conference for the discussion of the terms of a general peace. Warned by Sir Edward Grey that the Powers would not tolerate protracted deliberation, such as had wrecked the first London Conference, the Balkan diplomats came to an agreement late in May. By this Treaty of London, signed on May 30, 1913, it was stipulated that Turkey should surrender to the allies Crete and all territory on the European mainland west of the Enos-Midia line; that the delimitation of the Albanian frontiers and the disposition of the Ægean islands should be left to the adjudication of the Powers; and that financial questions incident to the readjustments should be submitted for decision to an International Commission at Paris.

Thus, within eight months, the Ottoman Empire had been shorn of all her European possessions except Constantinople and a small tract of adjacent land east of the Maritza River. But the surprising rapidity and ease with which this result had been achieved only whetted the ambition of each of the Balkan states to secure the bulk of the spoils. On one hand, Bulgaria claimed the greater part of Macedonia, including Saloniki and Monastir. On the other hand, Servia demanded a greater share of Macedonia than had been allotted to her in the Serbo-Bulgarian treaty of March, 1912, and Greece was insistent upon retaining both Saloniki and Kavala, which her troops had occupied. Rumania, too, had long been clamoring for a "strategic frontier" and for compensation from Bulgaria in return for her own neutrality during the Balkan War. In this emergency the Czar offered his services as mediator, but was petulantly refused. Inspired with a false confidence in the prowess of their army and possibly encouraged by Austro-Hungarian machinations, the Bulgarian government drifted rapidly into a second war, this time with their former allies and with Rumania and Turkey as well. Bulgarian troops took the offensive against the Greeks in the Panghaion district and engaged the Servians in a three days' battle at Slatovo. The new war, thus begun on June 30, was not formally recognized until July 5–6, when Bulgaria completed the diplomatic rupture with Greece and Servia, and Montenegro declared war against Bulgaria. On the 10th Rumania proclaimed hostilities, and almost simultaneously the Turks took advantage of the discord among their enemies and the withdrawal of the Bulgarian army from Tchatalja to advance in force toward Adrianople. Against such overwhelming odds the Bulgarian armies contended in vain. On the north the Rumanians quickly occupied Turtukai and Baltchik and dispatched a column to threaten Sofia. On the south Adrianople was retaken with ease by the Turks on July 22. The advance of the Greeks from the southwest was more stubbornly resisted, but by the end of the month the armies of King Constantine had possessed themselves of all the important towns along the railway between Doiran and Dedeagatch and were advancing up the Struma River toward the Bulgarian boundary and the city of Sofia. Meanwhile on the west the Servians with Montenegrin aid had repulsed Bulgarian attacks and closed in upon Kotchana and were preparing to descend through the Osogovska Pass upon the Bulgarian town of Kustendil and thence converge with their other allies upon Sofia. Anxious to avoid further calamities, King Ferdinand sued for peace.

After a week's conference at the Rumanian capital of the representatives of all the Balkan

states, except Turkey, the Treaty of Bucharest was signed on August 6. Rumania of course secured an extension of her southeastern frontier as far as the Turtukai-Baltchik line. Bulgaria was obliged to abandon Kotchana and Radovisht to Servia, and Saloniki, Doiran, Demir-Hissar, Seres, Drama, and Kavala to Greece. In making this cession Bulgaria retained the town of Strumnitza in Macedonia and some 60 miles of seacoast on the Ægean between the mouths of the Mesta and Maritza. The Serbo-Greek boundary was so determined by the Treaty of Bucharest that Monastir became Servian and Vodena and Florina fell to Greece. Subsequently Montenegro received from Servia, as compensation for assistance in the two wars, approximately a half of the sanjak of Novibazar, including Plevlye, Byelopolye, Ipek, and Djakova. For a brief period it was believed that the Treaty of Bucharest, concluded without much regard to the nationalities of the peoples in the distributed territories, would be revised by Russia or by Austria-Hungary. The new arrangement, however, was upheld by France and Germany, and the Dual Monarchy could hardly demand a change after the German Emperor had congratulated Rumania and Greece upon the settlement.

It still remained for Bulgaria once more to settle with the Turks the status of Adrianople. Bulgaria had counted upon the Powers to enforce the provisions of the Treaty of London, but now, unfriended and isolated, she was obliged to send General Savoff to negotiate a new treaty with the Porte. The Turks were not content even with the Maritza River as the boundary, but, making the most of their enemy's weakness, they compelled the Bulgarian envoy to renounce his claim to Kirk-Kilisseh and Demotika. By the Treaty of Constantinople, signed Sept. 29, 1913, the Turco-Bulgarian line would follow the Maritza from its mouth to a point near Mandra and thence, passing west of Demotika, would leave both that town and Adrianople to Turkey; near Adrianople the line would bend eastward and, passing north of Kirk-Kilisseh and south of Malko Tirnovo, would terminate on the Black Sea at Sveti Stefan. Bulgaria emerged from the conflict discredited and deprived not only of Adrianople but also of the control of railway connections with Dedeagatch, her single new port on the Ægean.

While the Second Balkan War was in progress, the Ambassadors' Conference of the Powers at London was fixing the southern frontier of Albania. On August 11 announcement was made that it would run from a point south of Cape Stylos to Lake Ochrida, incorporating the district of Koritza in Albania, much to the vexation of the Greeks. With the government of Albania as well as with the boundaries of the new state, the Powers were concerned. About October 1 they set up at Valona an International Commission of Control, consisting of six members, representing Austria-Hungary, Italy, Russia, Germany, France, and Great Britain. Late in October it was announced that the Powers had agreed to nominate as first prince of autonomous Albania Prince William Frederick of Wied, a German subject and a relation of Queen Elizabeth (Carmen Sylva) of Rumania. Consult: Lane, *Peace Theories and the Balkan War* (London, 1912); H. Callan, "Lands and Peoples of the Balkans," in *Scottish Geographical Magazine* (Edinburgh, 1898); Lyde, *A Military Geography of the Balkan Peninsula* (London, 1905); E. Ashmead-Bartlett, *With the Turks in Thrace* (London, 1913); H. Wagner, *With the Victorious Bulgarians* (London, 1913); *The Balkan War Drama*, by a special correspondent (London, 1913); Pierre Loti, *Turquie agoniste* (Paris, 1913).

BALKES, bäl'kĕs (more correctly BILKIS). The name "Arabian legend" gives to the Queen of Sheba, who married Solomon and bore him a son. She is alluded to in the 27th surah of the Koran and in Beckford's *Vathek* (q.v.).

BALKH, bälk. A district of Afghan Turkestan, corresponding to ancient Bactria. It is bounded on the north by the river Amu, on the east by Badakhshan, and on the west by the desert. Offsets of the Hindu-Kush traverse it in a northwestern direction, and slope down to the low steppes of Bokhara. Its area is approximately 5000 square miles. The soil has the general characteristics of a desert land; only a few parts are made fertile by artificial irrigation. The climate shows great variation. The commercial importance of the district greatly diminished with the discovery of the sea route around the Cape of Good Hope. The inhabitants, whose number cannot be ascertained, are Usbeg Tatars and range in character and occupation from plunderers of caravans to tillers of the soil and artisans.

BALKH, bälk (Turk. high town; anciently, *Bactra*). The chief city of a district of the same name, in Afghan Turkestan, situated where the Balkh River separates in numerous canals, about 23 miles south of the Amu-Darya, or Oxus River (Map: Asia, Central, K 3). It is surrounded by a mud wall; but though bearing the imposing title of Amul-Balad ('mother of cities'), little survives of the grandeur of ancient Bactra, on the site of which it is built, and Mazar-i-Sherif has usurped most of its importance since an outbreak of cholera in 1872. It contains a mosque, a citadel, and several half-ruined schools. It was twice destroyed by Genghis Khan and Timur, and in 1825 it was plundered by the powerful ruler of Kunduz, Mir-Murad-Bei. Balkh is reputed to have been at one time the centre of the Zoroastrian religion. There is a new town of the same name a short distance to the north of Balkh. The population is estimated at from 8000 to 15,000.

BALKHASH, bäl-käsh' (probably the *Vouru-Kasha* of the Avesta; *vouru*, great + *kasha*, lake). The fourth lake in size on the Eurasiatic continent, near the eastern borders of Russian Central Asia, in lat. 45° and 48° N., and long. 75° and 79° E. (Map: Asia, G 4). It was formerly connected with the smaller lakes lying beyond its eastern end, but it is now dwindling gradually in size. It has an area of 8600 square miles, and stretches from southwest to northeast over a distance of 330 miles; its breadth varies from 6 miles in the eastern part to 54 miles in the western. With the exception of its northern coast, the shores of Balkhash are so low that it is often difficult to locate their outline. The lake is shallow, navigation irregular, and the fisheries unimportant. It is frozen from November to April. Its waters are usually extremely saline except at the mouth of the rivers which empty in it. It has several feeders from the southeast, the principal of which is the navigable river Ili. The largest of several islands is Utch-Aral, near its western shore.

BALL (OHG. *balla*, Ger. *Ball*, Fr. *balle;* cf. Eng. *bale*, a round pack). The ball was to the primitive man not an implement of sport, but an absolute necessity of existence. The first were stones rounded by the action of tide or current, and man used them with a sling to crush in the forehead of the beasts upon whom he fed. Specimens of the *Bos primigenius* so slain have been exhumed from ancient bogs. The slaying of Goliath by David will immediately come to mind as an instance in which the stone ball from the brook was used as a weapon of offense. Hannibal's Balearic slingers, in the second Punic War, demoralized the Roman infantry by the terrible execution they did while yet at a distance and out of sight. The sling remained a part of the equipment of the English army until the fifteenth century. The South Americans had a modification of the sling in their *bolas*. They attached a ball to each end of a thong, with another in the centre to hold by and get the necessary impetus. These were thrown and twirled round the legs of a distant and fleeing animal, bringing it to earth.

As an aid to outdoor activities and sports the ball claims a venerable antiquity. Thus, one of the most beautiful episodes in the *Odyssey* is the description of Nausicaa and her maidens, in which, as rendered by Pope,—

> "O'er the green mead the sportive virgins play,
> Their shining veils unbound—along the skies,
> Tos't and retos't the ball alternate flies."

The ball games of the Greeks came to be much valued as a means of giving grace and elasticity to the figure, and in the special rooms provided for them in the gymnasiums they were played almost daily by persons of all ages and ranks. A teacher (*pilicrepus*) was in attendance, and certain rules and gradations of the exercise were observed, according to the physical condition of the player. The Romans also practiced ball playing in connection with their baths, but it never assumed the importance attached to it by the Greeks. Of the various kinds of balls used by them, the commonest were the *pila*, a handball stuffed with hair, and the *follis*, a large inflated skin, like a football. There were several recognized games, vaguely resembling handball and football; and in the Byzantine period a game distinctly similar to the modern polo was played on horseback by the nobles.

Ball playing seems to have been of great antiquity in the west of Europe also. In the sixteenth century it was in great favor in the courts of princes, especially in Italy and France. Houses were built for playing in all weathers, and in gardens long alleys were laid out for the purpose, the names of which still adhere to many localities. Thus, one of the most famous streets in London takes its name from the Italian *palla*, 'a ball,' and *maglia*, 'a mallet'—the game thus denoted being described in Blount's *Glossographia* (1656): "Pale Maille: a game wherein a round bowle is with a mallet struck through a high arch of iron (standing at either end of an alley), which he that can do at the fewest blows, or at the number agreed on, wins. This game was heretofore used in the long alley, near St. James's, and vulgarly called Pell-Mell."

From the *jeu-de-paume* of the Middle Ages came the modern tennis, racquets, and lawn tennis. The origin of football is equally remote. It has been discovered in regions as far apart as the Faroe Islands in the north, New Zealand in the south, and the Philippines in the tropics. A peculiar kind of game with an inflated ball was played by the Indians of the Amazon; they threw it in the air, and shot at it from opposite directions with blunt arrows. The game of lacrosse originated with the North American Indians, and evidently could have had no connection with the Oriental games, though it is not unlike them in several respects. But in all these questions of origins the historical data are so meagre and the modifying influences of various games upon one another have been so general that the true history of few games can be completely told. Besides the many famous games of universal acceptance in which the ball is the prime factor, there are many less-known sports, popular in certain localities, which are in the same way dependent upon it. The Frenchmen play the game of the hammer, hitting a ball along the highways; the Italians play *pallone* by striking the ball with a rubber casing worn over the hand. The Spaniards are devoted to their *fronton*, which is akin to handball. Even the Eskimos have their ball game to while away the tedium of the long winter; and marbles are too universal to be restricted to any locality or period. See BASEBALL; FOOTBALL; TENNIS; BASKET BALL.

BALL. Ammunition for firearms or ordnance. Before the era of hollow or elongated shells and bullets, all projectiles were solid and spherical. The term "ball ammunition" or "ball cartridge," however, is still used as a distinction from "blank ammunition." In military pyrotechny, "balls" in many varieties are used, either to give light, produce dense smoke, or diffuse suffocating odors. In these latter respects, however, they are, under modern conditions, rarely if ever used. See AMMUNITION; ORDNANCE; PROJECTILES.

BALL, ELMER DARWIN (1870–). An American entomologist, born at Athens, Vt. He was educated at Iowa State College and Ohio State University. From 1902 to 1907 he was professor of zoölogy and entomology in the Utah Agricultural College, at the end of this period becoming director of the Utah Experiment Station. In 1909 he was appointed director of the School of Agriculture in the Utah Agricultural College, and a year later held the presidency of the Utah Academy of Science. His writings include systematic studies of the life histories of the Cercopidæ Jassidæ and the Fulgoridæ, and also contributions on the economic effects of grasshoppers, codling moths (1907), and sugar-beet leaf hoppers (1907 and 1909).

BALL, JOHN (?–1381). An English preacher, well known for his connection with the Wat Tyler Insurrection in 1381. It was Ball who preached from the famous text:

> "When Adam dalf, and Eve span,
> Who was thanne a gentilman?"

He was executed at St. Albans on July 15, 1381. See TYLER'S REBELLION.

BALL, SIR ROBERT STAWELL, LL.D. (1840–1913). An English astronomer, born at Dublin, Ireland. He was educated at Trinity College, Dublin, and became, successively, professor of applied mathematics and mechanism at the Royal College of Science for Ireland; professor of astronomy in the University of Dublin; professor of geometry and astronomy at the University of Cambridge. He wrote *Elements of*

Astronomy (1880; 1900); *The Story of the Heavens* (1885; 1905); *The Story of the Sun* (1894); *Great Astronomers* (1895; new ed., 1906); *The Earth's Beginning* (1901; new ed., 1909); *Popular Guide to the Heavens* (1905; 3d ed., 1913); *Natural Sources of Power* (1908); *A Treatise on Spherical Astronomy* (1908); *A Primer of Astronomy* was reissued in 1911; besides many magazine articles, essays, lectures, and reviews. He was elected a Fellow of the Royal Society in 1873, was astronomer-royal of Ireland (1874–92), and in 1892 was made director of the Cambridge Observatory. At various times he was president of the Royal Astronomical Society, of the Mathematical Association, and of the Royal Zoölogical Society of Ireland. He was knighted in 1886. In 1902 he visited the United States and addressed several public or semi-public meetings.

BALL, THOMAS (1819–1911). An American sculptor, the most important of the early middle period. He was born at Charlestown, Mass., March 6, 1819, the son of a house and sign painter, and on the early death of his father undertook the support of the family. His employment as a boy-of-all-work in the old New England Museum, Boston, turned his attention to art and led him to the study and practice of portrait painting. His first attempt in sculpture was a small bust of Jenny Lind, and this was followed by other cabinet busts of musicians of his acquaintance—for Ball was an amateur musician of great ability, being the first in America to sing the basso of Elijah. A life-size bust of Daniel Webster brought great success and assisted his departure for Florence in 1854. After two years' study he returned to Boston and was in 1860–64 engaged in modeling his celebrated "Washington" (unveiled 1869), the first equestrian statue in New England and by far the best of any type so far produced. In 1865 he returned to Florence, where he spent most of his later life. Among the more important of his later works are: Edwin Forrest as "Coriolanus" (1867), now in the Actors' Home, Philadelphia; "Eve stepping into Life," considered by the sculptor as his most important work; "La Petite Pensée," a well-known ideal head; "St. John the Evangelist" in Forest Hills Cemetery, Boston. In 1875 his celebrated "Emancipation Group" in Washington (replica in Boston) was unveiled—a bronze representation of Lincoln freeing a kneeling slave and a work of real inspiration; in 1876 was completed the colossal bronze figure of Daniel Webster in Central Park, New York; and in 1878, the statue of Josiah Quincy before the City Hall, Boston. At 70 years of age Ball began his most ambitious and probably his greatest achievement, the Washington monument at Methuen, Mass. It consists of a great block of Carrara marble, surmounted by a collossal bronze figure of Washington; at the base are four seated figures representing Oppression, Revolution, Victory, and Cincinnatus, and above these the busts of Washington's four principal generals. The sculptor's last years were spent in Montclair, N. J.

Ball is one of the most important figures in the development of American sculpture, for which he set a new standard both in craftsmanship and in ideals. To an observer accustomed to the subtleties of present-day modeling, the surfaces and textures of his statues seem oddly smooth; but the figures are always truly sculpturesque and are serious and dignified in conception. He published an autobiography entitled *My Threescore Years and Ten* (1891) and a number of lyrics and other poems. Consult Taft, *History of American Sculpture* (New York, 1903).

BALL, WALTER WILLIAM ROUSE (1850–). An English mathematician. He was educated at University College, London, and at Trinity College, Cambridge. In 1878 he was appointed lecturer at the latter college, in 1891 director of mathematical studies, and in 1898 senior tutor and chairman of the college educational committee. He became auditor of the Cambridge University accounts (1907) and in addition to his other duties served frequently as examiner and as member of boards and syndicates. His writings, besides many papers contributed to mathematical journals, include: *The Genesis and History of Newton's Principia* (1893); *The Student's Guide to the Bar* (7th ed., 1904); *History of Trinity College, Cambridge* (1906); *A History of the First Trinity Boat Club* (1908); *Short Account of the History of Mathematics* (5th ed., 1912); *Mathematical Recreations and Essays* (5th ed., 1912).

BAL'LAD (OE. and OF. *balade*, Fr. *ballade*, dancing song, from Late Lat. and It. *ballare*, to dance, from Gk. *βαλλίζειν*, *ballizein*, to dance; cf. *ball*, *ballet*). A versified narrative, in a simple, popular, and often rude style, of some valorous exploit or some tragic or touching incident. Indeed, so far as subject is concerned, the ballad is a species of minor epic yet with a strong lyric element. It is comparatively short, the story being circumscribed, and not embracing a combination of events, as does the plan of the grand epic. There can be little doubt that the ballad has been the earliest form of poetry among all nations, and that the earlier epics or heroic poems of the higher kind, such as the *Cid* or the *Nibelungenlied*, and, for that matter, the *Iliad* and *Odyssey* of Homer grew out of such simple beginnings. The old ballads were handed down orally and thus underwent constant changes. Accordingly, unlike modern poems, the popular ballad has no individual author, and the treatment of the theme, whether war, crime, love, or enchantment, was thus always objective, there being no poet to thrust forward his own emotions. These ballads make their appeal directly to the common feelings of love, hate, fear, shame, and grief, by means of a great variety of incident. Some of them are humorous, being merely *fabliaux* in ballad measure; some are versions of current romances, but the best of them spring from native tradition. It was long ago observed that the ballads of various nations are frequently based upon the same or similar incidents; and the tracing of the development of these primitive *Märchen*, whether they were carried from people to people by wandering minstrels or are the common inheritance of the Indo-European races, is of more interest and value to the student of folklore than is the study of their form to the historian of poetry. See Gummere, *The Beginnings of Poetry* (New York, 1901).

All the British ballads, in the present form, are of comparatively recent date; the oldest manuscript now existing is assigned to the first quarter of the fifteenth century. But there are allusions to Robin Hood, by Langland, 50 or more years earlier; and, according to Child, this story undoubtedly began to assume a ballad form as early as the thirteenth century. There is no reason, in any case, to doubt that the Anglo-

Saxons had their narrative songs; indeed, Tacitus speaks of certain *carmina* among the Germanic peoples, though none of these have survived independently, being fused in such connected works as *Beowulf* and the *Nibelungenlied*. Of British ballads, those in the Scotch dialect are the best, being much more spirited than those composed in England. This may be accounted for partly by the fact that in the north their traditional form was long preserved, while in the south they got into print early and were thus subjected to a kind of revision which amounted to mutilation. It is difficult to make a selection, owing to the abundance of material, but among the best known are the "Geste of Robin Hood," a series of ballads forming a miniature epic; "The Hunting of the Cheviot," "Sir Patrick Spens," "Mary Hamilton," "The Wife of Usher's Well," "The Twa Corbies," "Clerk Saunders," and "Fair Helen of Kirkconnel Lea." All these old ballads were intended for a musical setting. If short, they were sung; if of considerable length, they were chanted, often by professional minstrels, to the accompaniment of some instrument, as the harp or fiddle. The typical stanza (though subject to variations) consists of two rhyming verses, each having seven accents, divided into lines of four and three accents. Ballads were always popular in England, although after the invention of printing they were not so commonly sung. In the eighteenth century a great revival of interest in the older ballad literature took place, stimulated largely by the publication, in 1765, of Percy's *Reliques of Ancient English Poetry*, derived mainly from a seventeenth century manuscript. Other famous collections followed: Scott's *Border Minstrelsy* (1802–03) and Motherwell's *Minstrelsy, Ancient and Modern* (1827). The influence of Percy's book was very great in both England and Germany. It led to a whole class of imitative ballad literature, of which may be mentioned Bürger's "Lenore," Tennyson's "Revenge," and Rossetti's "King's Tragedy." Such imitators, however, have taken suggestions from rather than held close to the older ballad form and have especially departed from their models in the intrusion of the subjective note of characteristic modern poetry. In fact, the paramount interest of the revival of balladry lies in the fact that it broke up the exclusive domination of the heroic couplet and led to freer versification. American ballads are not wanting; some of them may be found in the collection *Cowboy Songs* (New York, 1911), made by John A. Lomax; important as genuine ballads in the proper sense, and illustrative of the literary laws at work in the production of the ballads of the past the world over. Crude and artless as they are, they justify strict classification as ballads by the impersonality of their authorship, their primitive and robust humanity, and the blend of lyrical and narrative elements.

The oldest extant German ballad of the kind described under this title is the famous *Hildebrandslied* (q.v.), which can be traced to the eighth century and is the only survivor of its period and class. By the middle of the twelfth century the development of German poetry, despite all Romance influences, had definitely won its greatest triumphs in the field of native ballad literature. By 1300 the courtly minnesinger had begun to give place to the *bourgeois* meistersinger; and the latter for two centuries summed up the poetical life of the nation in their ballads. The sixteenth century was a period of rapid decline, as in England; and it was not, as already indicated, until Percy's influence on Herder and Bürger had caused a revival of interest that the ballad again came to the front, and was during the nineteenth century a subject of wide literary interest.

Among the Latin nations the Spaniards possess the richest ballad literature. Here the fact that the ballad preceded the romance is easy of demonstration. The simple emotions of the people are vividly depicted in the *coplas, seguidillas*, and *muñeiras* which sprang up in great numbers. The octosyllabic line was the commonest metre, and assonance (q.v.) was used instead of rhyme.

The ballads (*pjesme*) and hero songs (*yunak*) of Servia, while comparatively little known, deserve an important place in any general treatment of the subject. Their history is at least as long as that of the western ballads; and the researches of recent scholars, especially Vuk Stephanovich (1787–1864), and Ljudovik Gaj (1809–72), have succeeded in accumulating in permanent form a vast mass of them which possess the same general characteristics in subject as the other ballads, while as to form the older ones are generally composed in 15 and 16 syllable lines, the modern in decasyllabic metre. As a nation comparatively untouched by modern unifying civilization, the Servians are still producing, or maintaining in popular use, ballads which look upon life from a primitive point of view, which has long been lost in the west.

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For the Servian, Bowring, *Servian Popular Poetry* (London, 1827); Kapper, *Volkslieder der Serben* (Leipzig, 1853), and Krauss, *Sagen und Märchen der Südslaven* (Leipzig, 1884). See also SERVIAN LITERATURE.

For the ballad in general, see Gummere, *The Popular Ballad* (New York, 1907); and id., *Democracy and Poetry* (1911).

BALLAD. In music the term designated at different periods widely divergent musical forms. The oldest ballads were chiefly literary productions which were recited by minstrels with impro-

vised accompaniment on the harp. This is particularly true of the oldest ballads of England, Scotland, Scandinavia, and Spain, while in Italy the ballad (*ballata*) was a real dance song before the development of instrumental music. Riemann considers it highly probable that in Germany and France during the twelfth and thirteenth centuries these simple dance songs were gradually transformed into more artistic forms. At any rate, during the fifteenth century we find the ballad together with the rondeau (q.v.) the most popular form of artistic song with instrumental accompaniment, especially in Spain. By far the greater number of the 459 compositions contained in the *Cancionero musical de los siglos XV y XVI* are such ballads. In England ballads not only enjoyed the greatest popularity during the sixteenth century, but ballad writing became even a fashionable amusement. After the sixteenth century the form of the ballad became more and more simple, gradually returning to the plain strophic folk song. Its decline was particularly rapid in England, where about 1800 the term denoted a cheap, trivial song whistled in the streets.

The modern ballad is not a revival of the older form. Zumsteeg (q.v.) was the first to furnish a musical setting for the splendid literary ballads of Goethe, Schiller, and Bürger, and naturally the musical form (scarcely more than the same strophic melody for all stanzas) was very primitive and inadequate. Löwe (q.v.), whose fame rests entirely upon his ballads, strove for characteristic expression of each stanza and secured artistic unity by means of a few pregnant motives, which appear constantly in thematic development. Schubert, Schumann, and Brahms, adopting Löwe's principle, have furnished unsurpassed examples of the modern vocal ballad. Schumann also set several of Uhland's ballads for soli, chorus, and orchestra. Senta's ballad from *The Flying Dutchman* is perhaps the most widely known example of this form. In modern music, especially since Chopin wrote his superb *Ballades*, the term appears frequently as a title of purely instrumental works for piano or orchestra. Such works have the same thematic structure as the vocal ballad, but their fundamental mood is usually that of the more sinister emotions. For the older ballads consult H. Riemann, *Handbuch der Musikgeschichte*, vol. ii, part i (Leipzig, 1906).

BALLADE, bȧ'lȧd' (Fr.; see BALLAD). A poem which consists of three stanzas of eight lines, followed by one of four lines (known as the "envoy"), or three of 10 lines with envoy of five, each of the stanzas and the envoy closing with the same refrain. In the ballade of eight lines there are but three rhymes, in this order: *A, B, A, B, B, C, B, C;* the envoy repeats the last four. The envoy is a special feature of the ballade and chant royal; it was usually a form of dedication to a noble patron, so that even in modern ballades it generally begins with a vocative, as "Prince!" "Princess!" or the like. The chant royal is merely an enlarged ballade, with five stanzas of 11 lines and envoy of five. While poems of undecided structure, called rondeaux, and ballades began to make their appearance at the end of the twelfth century, the ballade, as a strict metrical form, is really due to François Villon (q.v.) and Charles of Orléans. Théodore de Banville (q.v.) revived this and other early French forms about 1860, and they have since been successfully imitated in English by Swinburne, Andrew Lang, Austin Dobson, Edmund Gosse, W. E. Henley, Frank Dempster Sherman, and others.

BALLADINO, bäl'lȧ-dē'nō, ANTONIO. A versifier in Ben Jonson's *The Case is Altered*, whose motto is: "Tut, give me the penny; I care not for the gentlemen, I." Munday, a contemporary dramatist, is satirized.

BALLAD-OPERA. A kind of operetta which was the rage in England during the eighteenth century. Instead of writing music to the words, the process was reversed. A number of well-known popular airs were strung together and new words were written to the music. These airs were interspersed in spoken dialogue. The first and most popular of these ballad operas was John Gay's (q.v.) *Beggar's Opera*, produced in London in 1727. It was followed in the next year by six similar works by different authors. In 1750 the *Beggar's Opera* made its appearance in New York, and for three-quarters of a century works of this kind were the only operatic fare offered to the American public. Consult G. Sarrazin, *John Gay's Singspiele* (Weimar, 1898).

BALLAGI, bŏl'lō-gē, MÓR (MORITZ), originally **BLOCH,** blŏK (1815–91). A Hungarian philologist and theological author, born at Inócz, of Jewish parentage. After completing his studies at Budapest and Paris he undertook a translation of the Bible into Hungarian, for the purpose of Magyarizing the Jews. Of this work, only the Pentateuch and the Book of Joshua were published (Budapest, 1840–43). In 1840 he was made a member of the Hungarian Academy. He became a Protestant in 1843 and thereafter studied theology at Tübingen. From 1855 to 1878 he was professor of theology at Budapest. His philological works include: *Ausführliche theoretischpraktische Grammatik der ungarischen Sprache* (1843; 8th ed., 1881); *Vollständiges Wörterbuch der ungarischen und deutschen Sprache* (2 vols., 1854–57; 6th ed., 1890); *Magyar példabeszedek Közmondások* ('Collection of Hungarian Proverbs') (2 vols., 1850; 2d ed., 1855).

BALLANCHE, bȧ'länsh', PIERRE SIMON (1776–1847). A French writer on social theories. Among his works may be mentioned: *Antigone* (1814); *Essai sur les institutions sociales dans leurs rapports avec les idées nouvelles* (1818); *Le vieillard et le jeune homme* (1819); *L'homme sans nom*—a novel (1820); *Palingénésie sociale* (never completed), and *La vision d'Hèbal* (1832). The *Palingénésie*, which he did not finish, was to be an exposition of the workings of God in history and is considered his greatest work. His system, termed "Ballanchism," attracted much attention. Ballanche was a member of the circle gathered around Châteaubriand and Madame Récamier, his platonic affection for the latter forming part of the literary history of his period.

BAL'LANTYNE, JAMES (1772–1833). A Scottish printer, born at Kelso. He studied at Edinburgh University and in 1796 became proprietor and editor of the *Kelso Mail*. He published Sir Walter Scott's *Minstrelsy of the Scottish Border*, and in 1802, at Scott's advice, set up a printing establishment at Edinburgh. In 1808 he also became a member of the firm of John Ballantyne & Co., booksellers, and from 1817 he edited the *Weekly Journal*. Not only did he read the proofs of Scott's works for technical details, but oftentimes he proffered criticisms which, as Lockhart testifies, led Sir Walter to introduce important changes into the

treatment of a subject. Although not himself responsible for the financial difficulties of Scott, he was involved in the failure of Constable & Co. and subsequently was retained by the trustees of the creditors to conduct the literary affairs of the printing establishment and to edit the *Weekly Journal*.

BALLANTYNE, James Robert (1813–64). A British Orientalist, born at Kelso, Scotland, and educated at Haileybury College, Herts, England. He was at first instructor at the Scottish Naval and Military Academy, but was sent to India in 1845 to take charge of the Government Sanskrit College at Benares, with which institution, after 1856, he was also connected as professor of moral philosophy. Upon his return to Europe he was appointed librarian of the East India Office. His primary aim, as embodied in his works, was the elucidation of Oriental ideas in such a way as to show their relation to European science. His works include: *The Practical Oriental Interpreter* (1843); *Catechism of Sanskrit Grammar* (2d ed., 1845); *A Synopsis of Science in Sanskrit and English Reconciled with the Truths to be Found in the Nyaya Philosophy* (1856)— a work of genuine scientific merit; *Christianity Contrasted with Hindu Philosophy* (1859).

BALLANTYNE, Robert Michael (1825–94). A Scottish author, born at Edinburgh, a nephew of James Ballantyne. In 1841–47 he was in the service of the Hudson's Bay Fur Company in Rupert Land and in 1848 published an account of his experiences as, *Hudson's Bay; or, Life in the Wilds of North America*. From 1856, in his own words, he "lived by making story-books for young folks." Of these he wrote with much success more than 80, including *Young Fur Traders* (1856), *Coral Island* (1857), *The Gorilla Hunters* (1862), *Black Ivory* (1873).

BAL'ARAT'. The most important commercial centre, next to Melbourne, in Victoria, Australia (Map: Victoria, C 5). It consists of the two municipalities of Ballarat West and Ballarat East, situated in one of the richest of Australian gold fields, on the west and east banks of the Yarrow River. It is 74 miles northwest of Melbourne and is the centre for six branch railroads. Its chief industries are those of the gold mines, iron foundries, woolen and flour mills, breweries, and distilleries. It is the see of Anglican and Catholic bishops, has many handsome buildings, churches, hospitals, monuments, Botanical Gardens, an excellent School of Mines, etc. Its establishment and rise date from the discovery of gold in 1851. The largest gold nuggets ever unearthed were discovered here. Ballarat East and Ballarat West have been distinct municipalities since 1855, and in 1870 the latter was proclaimed a city. Pop., 1911, 42,403.

BAL'LARD. Formerly a city in King Co., Wash. It has a good harbor and is one of the most important lumber manufacturing centres in the United States. Other leading industries are the manufacture of foundry and machine-shop products and shipbuilding. Ballard was settled in 1882 and was incorporated in 1890. In 1907 the towns of Ballard, Columbia, and portions of other precincts were joined to Seattle and now form a part of that city.

BALLARI. See Bellary.

BAL'LAST (first part of uncertain origin; perhaps Eng. *bare*, mere + *last*, burden, weight). Weight carried by a ship or boat to secure proper stability, both to avoid risk of capsizing and to secure the greatest effectiveness of the propelling power. Modern steamers have tanks fitted for water ballast and rarely carry any other kind. The tanks are located forward, aft, and amidships, in order that the vessel may not only be immersed to a safe extent, to avoid danger of capsizing, but also so that the trim, or inclination of the keel to the surface of the water, may be adjusted. When light (i.e., with little or no cargo), steamers require *trimming* by the stern (i.e., to have the stern more deeply immersed than usual), in order to submerge the screw or screws. Sailing vessels require greater stiffness (i.e., power to resist capsizing) than steamers, in order to stand up under the force of wind against their sails as well as to resist the motion imparted by the waves. The amount of ballast needed depends not only upon the depth of immersion, but upon the shape of the hull, some forms of which require more ballast than others. In ballasting or stowing cargo, the ballast and cargo are considered together, the quantity and distribution of the former being dependent on the latter. The combined effect of both should not place the centre of gravity too low or too high. If too low, the ship will be unduly *stiff* and will roll violently and jerkily, though perhaps not deeply; and she will sail sluggishly, except in a comparatively smooth sea. If the centre of gravity is too high, the vessel will be *crank*, and will be dangerous from lack of power to right herself when heeled over by the wind pressing on her sails or by the action of the waves; she may roll deeply, but her rolls will be slow; crankness interferes with speed under sail, because it reduces the amount of sail which can be safely carried; furthermore, the lack of righting power, or stability, which causes crankness, prevents the vessel from responding quickly to the action of the waves. A vessel is said to be *in ballast* when she has ballast only on board.

The term is applied to bags of sand used to steady or lighten a balloon. Civil engineers use the term "ballast" to signify the sand or gravelly material which is laid as a foundation for roads, concrete floors, etc., or as packing between railway sleepers, in order to give them solidity. No modern railway is considered to be complete or safe for transit until it is dressed and finished by ballasting. The possibility of procuring ballast at a cheap rate considerably affects the course of railway undertakings.

BALLAST PLANTS. Plants growing on or distributed from the ballast of ships, from seeds which were contained in the ballast when loaded on the vessel, or which have fallen on it in transit. Various kinds of plants have thus been transported from one region to another. Botanists have made a special study of ballast plants in relation to the general subject of the transportation of plants by different agencies.

BALLASTER. See Baluster.

BAL'LATER (Gael. *baile*, town + *leiter*, slope of a hill). A village and police burgh of Aberdeenshire, Scotland, on the Dee, 43 miles by rail west-southwest of Aberdeen (Map: Scotland, E 2). It is frequented on account of the medicinal springs in the neighborhood. Pop., 1911, 1240.

BALL BEARING. See Bearing.

BALL CLAY. See Clay.

BALLENDEN, John. See Bellenden.

BALLENSTEDT, bäl'len-stĕt. A town in the German duchy of Anhalt, situated in the Harz

Mountains, about 7 miles by rail from Quedlinburg. It is celebrated chiefly for its castle, the summer residence of the dukes of Anhalt-Bernburg. From the tenth to the sixteenth century this castle was a Benedictine monastery. It is the seat of a district court, has a fine park, an extensive library, and a number of valuable collections. Pop., 1900, 5423; 1910, 6100.

BALLENTYNE, JOHN. See BELLENDEN.

BALLENY (bäl-lā'nē) **ISLANDS.** A group of islands in the Antarctic Ocean in lat. 67° S., and long. 163° E., 280 miles north of Victoria Land (Map: Antarctic Region, F 6). It consists of three large and two small islands, of volcanic origin, and covered with glaciers. Freeman's Peak, on Young Island, is about 12,000 feet high. The group was discovered by John Balleny in 1839, and at the time two of the volcanoes were in eruption.

BALLESTEROS, bä'lyä-stā'rôs, DON FRANCISCO (1770–1832). A Spanish general and statesman, born at Saragossa. He entered the army and served with distinction against the French. When the Duke of Wellington was appointed to the chief command of the allied armies, Ballesteros resigned, refusing to serve under a foreigner, in consequence of which he was banished to Ceuta. Upon the restoration of Ferdinand VII Ballesteros received the command of an army corps and became Minister of War in 1815. Appointed Vice President of the Provisional Government by Ferdinand VII, he opened the prisons of the Inquisition, returned to the municipality of Madrid the rights granted by the Cortes in 1812, and at the head of the national militia dispersed the enemies of the constitution. In the war against France (1823) he was compelled to retreat and to agree to terms of peace so humiliating, and in the eyes of the Spaniards so disgraceful and unwarranted, that he has always been considered a traitor. Excluded from the general amnesty, he was forced, upon the downfall of the constitutional government, to flee to Paris (1824), where he lived in retirement until his death.

BALLESTREM, bäl'les-străm, FRANZ XAVER, COUNT VON (1834–1910). A German statesman. He was born on the family estate of Plawniowitz in upper Silesia, entered the Prussian army, served in the campaigns of 1866 and 1870–71 and at the close of the latter retired with the rank of captain. He was elected to the Reichstag in 1872 and took a prominent position in the Centre Party, being appointed a papal chamberlain by Pius IX for his vigorous services in the Culturkampf. He was First Vice President of the Reichstag in 1890–93 and President from 1898 to 1906. In 1903 he became a member of the Prussian House of Lords.

BALLET, bäl'lā' *or* bäl'lĕt (Fr. dimin. of *bal*, dance, It. *ballo*, ball, dance, from Late Lat. and It. *ballare*, to dance; cognate with "ballad.") A species of dance in which a company of trained performers, either singly or in groups, interpret music by means of the choregraphic art. Owing to its resemblance to the chorus of the classic Greek tragedy, attempts have been made to trace its history back to the pantomimic, sacrificial dances of antiquity. The earliest ballet performance of which we have record was in Milan, at the wedding of the Duke of Milan to Isabel of Aragon in 1489. The home of our modern ballet was undoubtedly Italy, where it was first employed as a court spectacle. In its infancy song and recitation were introduced with the music and dancing which we know at present.

From Italy the ballet was carried to the French court in the time of Catherine d' Medici. In 1581 Baltasarini (called Beau Joyeux), Catherine's director of music, presented the famous *Ballet Comique de la Reine*, and the new entertainment soon proved so popular that royalty itself took part in the performances. With the growth of court luxury under Louis XIII and Louis XIV, the *ballets-de-cour* were more elaborately staged and became a favorite diversion. Both monarchs are said to have taken part in them when young. One of the most famous court ballets at this time was the *Triomphe d'Amour*, produced by Quinault, Benserade, and Lulli in 1681. It was in this same year that women first took parts, the entire cast having previously been of men. During the reign of Louis XIV the ballet was first placed on the popular stage.

In 1758 appeared the publication of Jean Noverre's *Lettres sur le danse et les ballets*, which revolutionized its form. Noverre contended that the ballet was a blending of the arts and was to be used primarily for the interpretation of a story and not for the display of virtuosity. He attempted to abolish words from the ballet and substitute pantomime; from his time dates the *ballet d'action* and the abolishment of pure formalism in the dance. He was appointed dancing master of the ballet at the Paris Opera by Marie Antoinette and continued his activity until the French Revolution.

During the period of the upheaval in France there is no record of the ballet, but in the first half of the nineteenth century we have the heyday of the French and Italian schools. Gaetan Vestris and his son Auguste appeared about 1810; the former was reputed to be the most graceful male dancer that ever trod the stage. In 1822 Marie Taglioni set Paris aflame by her *La Sylphide;* shortly afterward her rival, Fanny Ellsler, eclipsed her fame in *Le Diable Boiteux;* Carlotta Grisi, the ethereal, gained her reputation in *Giselle*, a ballet composed specially for her by the author, Théophile Gautier; Fanny Cerito, and Lucile Grahn also belong to this period. The high-water mark of this type of ballet came in 1845, when four of the greatest danseuses—Taglioni, Grisi, Cerito, and Grahn—appeared in London in the famous ballet *Pas de Quatre*. This was regarded as an international event of first importance. Within six years of that date this entire school had disappeared, and but one name stands out in the third quarter of the century, Rosati, who was decidedly second-rate compared to her predecessors.

The ballet as a separate performance then disappeared in favor of skirt dancing and high kicking, save when given as an interlude to the opera (cf. FAUST). In the last quarter of the century, however, the school of the Russian ballet began to appear as the successor of the French and Italian.

The first movement in Russia toward the formation of a ballet was when Czar Alexius in 1672 ordered Johan Gregory to collect performers of the dance. In the reign of Czarina Anne (1730–1740) C. Friedrich Wellman was ordered to secure recruits for the public entertainments, and twelve ballet masters were appointed. This was the beginning of the school

of St. Petersburg. Following sovereigns encouraged its growth until the beginning of the nineteenth century, when Didelot, the great ballet master, appeared to do the same thing for the Russian ballet that Noverre had done in France. He formulated principles and exact methods of instruction and induced all the great dancers, such as Taglioni and Ellsler, to appear in St. Petersburg. When in 1850 French and Italian dancers no longer shone on the stages of western Europe, the Russians continued quietly and inconspicuously to preserve the traditions in their own country, and gradually, under Petipas and Fokine, the present Russian school evolved. It is unlike any previous school, uniting with the formal romanticism of the old-time ballet fairy lore an intensely modern realism. For the first time in the history of the ballet, under M. Bakst, the Russian painter, is emphasised the importance of proper blending of color and mass in the entire *mise-en-scène*. This school produced Anna Pavlowa, pronounced the equal of Taglioni and Ellsler.

Consult: Menestrier, *Des ballets anciens et modernes* (Paris, 1682); Noverre, *Lettres sur la danse et les ballets* (Lyons, 1760; new ed., Paris, 1807); Castil-Blaze, *La danse et les ballets* (Paris, 1832); Voss, *Der Tanz und seine Geschichte* (Berlin, 1868); A. Pougin, *Dictionnaire historique du théâtre* (Paris, 1885); Flitch, *Modern Dancers and Dancing* (London, 1912).

BALL'-FLOW'ER. A detail of ornament in English Gothic architecture, so named from its resemblance to a ball within a flower, usually with three, sometimes with four, petals. The ball-flower is supposed by some to be an imitation of a pomegranate.

BALLIN, Hugo (1879–). An American figure and decorative painter. He was born in New York City; studied at the Art Students' League, where he won a scholarship, and later (1900–03) in Italy. During this time he had the advantage of studying mural decorations in Lombardy and Umbria with Robert Blum. He returned to this country to reside and practice in New York. Among his chief paintings are "Susanna's Bath"; the "Lute Player"; "Three Women Dancing about Cupid," which won the Shaw Prize in 1905 (the year in which he became an Associate of the National Academy); "Mother and Child" (Clarke Prize, 1906); "The Portative Organ," an excellent example of his style. Because of his notable ability in the field of decorative painting, Ballin became known as one of the most promising of the younger American artists. He excels especially in color, which is always soft and in a low key, and his work is elusive in line and excellent in composition. His art, more than that of any other contemporary American painter, recalls the harmonies of the masters of the Italian Renaissance.

BALLINA, băl'ĭ-nä' (shortened from Gael. *Bel-an-atha-an-feadha,* the ford south of the wood, from *bel,* estuary + *ath,* ford). A seaport in the counties of Mayo and Sligo, Ireland, on the Moy, 7 miles south of its entrance into Killala Bay (Map: Ireland, B 2). The Moy runs through the town, is crossed by two bridges, and separates the two counties. Ballina proper is on the Mayo side, the Sligo portion being called Ardnaree. The river is navigable from the sea to a mile and a half below the town. Ballina has a brisk trade in agricultural produce, in salmon, and in cured provisions. Flour, beer, coarse linens, and snuff are manufactured. The river Moy and Lough Conn are favorite angling resorts. Killala Bay was the rendezvous of the French invaders in 1798. They landed and took Ballina, but three weeks afterward were defeated at Killala. Pop., 1901, 4505; 1911, 4662.

BALLINGER, băl'ĭn-jĕr. A city and the county-seat of Runnels Co., Tex., 225 miles west of Fort Worth, on the Colorado River, and on the Abilene and Southern and the Gulf, Colorado, and Santa Fe railroads (Map: Texas, C 4). The city contains a Carnegie library, two theatres, three parks, and a lake, and owns its water works. It is situated in a rich agricultural region, producing corn, cotton, wheat, peanuts, fruit, etc., and has a flour and a cotton-seed-oil mill. An enormous irrigating plant on the Colorado River is in the course of construction. Pop., 1900, 1128; 1910, 3536.

BALLINGER, Richard Achilles (1858–1922). An American lawyer and public official. He was born in Boonesboro, Iowa, graduated from Williams College in 1884 and was admitted to the bar two years later. Until 1897 he practiced, successively, in Kankakee, Ill., New Decatur, Ala., and Port Townsend, Wash. In 1890–92 he was a United States court commissioner and in 1894–97 a judge of the Superior Court of Jefferson Co., Wash. Immediately after this he took up the practice of law in Seattle, of which city he was mayor from 1904 to 1906. Following two years as commissioner of the General Land Office, he was chosen by President Taft Secretary of the Interior (1909). His opposition to a radical programme for the conservation of public resources brought him into bitter conflict with Gifford Pinchot, the chief forester. Finally a congressional inquiry was made into the methods employed by Mr. Ballinger in administering certain Alaska coal lands belonging to the government. (See Alaska, *Public Lands;* and United States, *History.*) Upheld throughout by the President, the Secretary was not permitted to resign until he had been exonerated by the investigating committee. Early in 1911 he returned to the private practice of law in Seattle. His published writings include *Ballinger on Community Property* (1895) and *Ballinger's Annotated Codes and Statutes of Washington* (1897).

BALLIOL (bāl'yol) **COLLEGE.** One of the largest and most important colleges in the University of Oxford. Its original foundation is attributed to Sir John de Baliol of Barnard Castle, Durham (father of the Baliol who contested the crown of Scotland with Bruce), as an act of penance for injuries done to the churches of his neighborhood. Its first scholars were in residence between 1260 and 1266 in a hired house; but while Balliol may claim, on the ground of the longest occupation of the same site and of priority in the benefaction to which it owes its inception, to be the oldest of the Oxford colleges, it was not, until 20 years later, a college in the modern sense of the word; it was originally, like the colleges of Paris at the same time, simply an association of students presided over by a principal of their own election, and did not become an endowed corporation with a permanent home until, in 1282, Devorguilla, wife of John de Baliol, completed the scheme and gave the college its first statutes. It was long comparatively unimportant. Although Wiclif became its master about 1360,

it was for a while the home of the champions of the scholastic philosophy. In the fifteenth century it became "the nursing mother of the early English humanists," such men as Humphrey, Duke of Gloucester, and John Tiptoft, Earl of Worcester, being numbered among its scholars. After this period of brilliance Balliol was little heard of until the nineteenth century, when it came once more to the front. It was blessed with a succession of able masters, of whom the most famous was Benjamin Jowett; it received many notable benefactions, particularly the Snell Exhibitions, which have attracted many brilliant Scotchmen, among them Adam Smith, Sir William Hamilton, and J. G. Lockhart; and, at the same time that it set the example (with Oriel) of opening its scholarships to general competition, it established a rigid standard of ability for its members, by requiring from them an additional entrance examination and obliging them to read for honors in the schools. The college consists of a master, 26 fellows and honorary fellows, about 50 scholars and exhibitioners, and in 1912 had 262 undergraduates. Its buildings date from the library, part of which is as old as 1430, to the present hall, completed in 1877. It has a long list of distinguished graduates, particularly in the nineteenth century. Among poets and men of letters it can boast of Southey, Matthew Arnold, Swinburne, Clough, Andrew Lang, and Calverley, besides having associated to itself Robert Browning as an honorary fellow. To the Oxford Movement it contributed Cardinal Manning and William George Ward; and to the English Church two of its primates, Tait and Temple. And more than one of the intellectual and social movements specially characteristic of the end of the nineteenth century owe their inspiration to T. H. Green, fellow of Balliol from 1860 and afterward professor of moral philosophy, while many of the leading politicians of the present time are graduates of Balliol. Consult H. W. C. Davis, *Balliol College* (London, 1899).

BALLIS'TA. See ARTILLERY.

BALLIS'TIC PEN'DULUM. See BALLISTICS.

BALLIS'TICS (*Ballista*, an engine for hurling missiles—Lat. from Gk. *βάλλειν*, *ballein*, to throw). The science which treats of the motion of heavy bodies projected into space. Its usual meaning is, however, restricted to the motion of projectiles of regular form, fired from cannon or small arms.

The motion of a projectile, from the instant it starts from its seat at the bottom of the bore of a gun until it strikes the object aimed at and comes to rest, passes through three distinct and discontinuous phases which necessarily give rise to as many different branches of the science of ballistics. These are called, respectively, *interior ballistics*, which treats of the motion and cause of motion of a projectile while in the gun; *exterior ballistics*, which considers the motion of the projectile from the time it emerges from the gun with a known velocity of translation and of rotation until it strikes the object aimed at; and *ballistics of penetration*, which has reference to the effect of the projectile upon the target. This is not the order in which the three phases of the subject are usually presented to the artillerist, but the reverse. He desires to penetrate or destroy a certain object, say the side of an armored ship. Ballistics of penetration enables him to determine the velocity his projectile must have on impact and the proper striking angle to accomplish the desired result. Exterior ballistics would then carry the data thus obtained to the gun and determine the necessary muzzle velocity and angle of projection. Lastly, interior ballistics would ascertain the proper charge, kind of powder, size, shape and density of the grains to give the projectile the muzzle velocity demanded without unduly straining the gun.

These three divisions will be considered separately in the order first named.

INTÉRIOR BALLISTICS

Interior ballistics treats of the temperature, volume, and pressure of the gases into which the powder charge in the chamber of a gun is converted by combustion, and the work performed by the expansion of these gases upon the gun, carriage, and projectile. It determines among other things the proper relation of weight of charge to weight of projectile and length of bore, the best size, shape, and density of the powder grains for different guns and their effect upon the maximum and muzzle pressures. It deduces formulas for determining the pressures upon the surface of the bore for different charges, sizes, and shapes of grains, and thus shows how to build up the gun so as best to resist these pressures.

Early History. It is only within the last 50 years that the complicated phenomena which take place in the bore of a gun when the charge is fired have been clearly apprehended. The celebrated Benjamin Robins (1740) made many experiments relating to interior ballistics. His deductions from his experiments, in spite of the extremely erroneous and sometimes absurd opinions on the subject that were entertained in those days, justly entitle Robins to be called the "father of modern gunnery." Dr. Hutton's experiments verify most of Robins's deductions, differing principally in the estimate of maximum temperature and pressure. Count Rumford (1792) made the first attempt to measure directly the pressure of fired gunpowder. The account of his experiments was the most important contribution to interior ballistics which had been made up to that time.

Recent History. In the study of interior ballistics the gun may be regarded as a thermodynamic machine or heat engine, which does its work in one stroke, in contradistinction to the steam engine, which works through a series of strokes. And, just as with the steam engine, an indicator diagram may be drawn for the gun representing graphically by a curve the relation between the pressure of the powder gas and the distance traveled by the projectile, which distance measures the volume occupied by the gas. Thus in Fig. 1, if OB represents the axis of the bore, the pressures may be shown under different conditions by the indicator curves Pab, $OP'P''ab$, and $OP'P'''b$. If the exact form of either of these pressure curves were known, it would be easy to determine the velocity of the shot (very nearly) at any travel OB down the bore. For, as with all indicator diagrams, the area $OP'P'''bB$, bounded by the curve of pressures, the axis of x (axis of the bore of the gun), the ordinate OP' through the origin of motion, and any other ordinate $O''P'''$

or Bb drawn through the base of the projectile at any travel OO'' or OB measures the work done by the expansion of the gas, which, if we omit

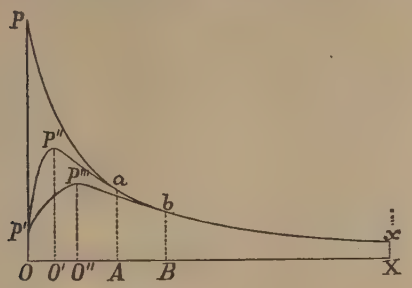


FIG. 1. — PRESSURE CURVE.

$O\,P$, axis of pressures; $O\,X$, axis of bore of cannon; OP', pressure if the charge burned instantaneously; $OP'P''\,a\,b\,x$, curve of quick-burning powder; $OP'P'''\,b\,x$, curve of slow-burning or cocoa powder.

a certain percentage for friction, recoil of the gun, loss of heat by conduction, etc., may be equated to the kinetic energy of the projectile. This gives the fundamental equation of work:

$$\text{Work of expansion} = \frac{wv^2}{2g}\left(1 + \frac{1}{2}\left(\frac{r}{n}\right)^2\right)$$

in which w is the weight of the projectile, g the acceleration of gravity, v its velocity, and n, which measures the twist of rifling, is the number of calibres the projectile advances while making one revolution about its axis. In our army guns, which have an increasing twist, n varies continuously from 50 at the beginning of rifling to 25 near the muzzle. The numerical value of the term containing n, which represents the projectile's energy of rotation at the muzzle where it is greatest, is 0.008; and as this is small in comparison with unity, which represents the projectile's energy of translation, it is usual also to omit this in establishing the equations of interior ballistics and to regard the entire work of expansion as measured by the energy of translation of the shot. We therefore have approximately,

$$\text{Work of expansion} = \frac{wv^2}{2g}. \qquad (1)$$

This of course is not a true equation, since the first term is greater than the second on account of the energies omitted; but it can be made true by suitably increasing the weight of the projectile in the second member, or better still, by diminishing the value of a factor, called the "force of the powder," which enters into the first member. And this last is what is actually done in deducing equations for velocity and pressure from the above fundamental equation of work.

Formerly, before the laws of thermodynamics were known, the law of pressures was sought by measuring the velocity of the shot at various travels in the bore and drawing a space-velocity curve to suitable scales, taking the measured velocities for ordinates and the corresponding travels of the projectile for abscissas. By means of this curve a pressure, or indicator curve, may be drawn, and from this an empirical law of pressures deduced. If the velocities could be measured with great accuracy and at numerous points in the bore, especially in the neighborhood of greatest pressure or acceleration, pressure curves could be laid down with great precision, as will be shown later. But the pressure curve thus determined cannot be relied upon beyond the experimental limits upon which it was based.

The first experimenter who made use of this method was the Chevalier D'Arcy, in 1760, who measured the velocity of a bullet at the muzzle of a musket with a ballistic pendulum, after the barrel had been successively shortened by cutting off a portion. This method has been repeated in modern times and the muzzle velocities measured much more accurately than was possible in D'Arcy's time. In 1891 Laurence V. Benét, director of the Hotchkiss Ordnance Company, Paris, experimented with a Hotchkiss 57 mm. rapid-firing gun by "cutting off successive lengths from the chase and observing the velocities of a series of rounds fired, with each resulting travel of projectile." In 1903 similar experiments were made at the Springfield Armory with a rifle the barrel of which was successively shortened 20 times by cutting off one inch at a time. About the same time experiments were made in France with a 16 cm. rifle specially prepared so that the chase "could be *increased* in length by the addition of either one or two tubes at pleasure so as to give three measured muzzle velocities corresponding to three different travels of projectile." (Consult *Mémorial de l'Artillerie de la Marine*, vols. xxi, xxii, and *Journal of the United States Artillery*, vols. xx, xxvi.) In 1845 General Cavalli experimented with a 16 cm. gun by drilling small holes perpendicular to the axis at different distances from the base, into which were screwed wrought-iron barrels from which bullets were propelled by the charge of the gun, while at the same time giving motion to the projectile. The velocities of these bullets were measured, from which the corresponding pressures were inferred. These pressures were much too great on account of the energy with which the products of combustion impinged against the bullets. In 1854 a Prussian Artillery Committee, whose president was General Neumann, experimented with a gun of small calibre by drilling a hole into the powder chamber in which was fitted a small barrel. If cylindrical projectiles of the same length and made of the same material were placed in the gun and in the small barrel, then, on the supposition that the pressure in the powder chamber was uniform, the two cylinders would describe equal spaces in equal times, since the pressures on the bases divided by the respective weights of the projectiles give the same quotient. Therefore, if the velocity of the *cylinder* were measured when it emerged from the small barrel, the velocity of the *projectile* when it had moved the same distance down the bore would be known. These experiments were much more satisfactory than those of General Cavalli, and the conclusions of the committee were subsequently confirmed by the Russian General Mayenski in 1867, who measured the velocity of a projectile at different positions in the bore by a method of his own invention. "He used a projectile to the base of which was attached a rod passing through the breech of the gun and arranged so as to rupture electric currents

placed at varying distances along the path of this rod."

Between the years 1857 and 1859 Maj. T. J. Rodman of the United States Ordnance Department carried out an extensive series of experiments with smoothbore guns of 7-inch, 9-inch, and 11-inch calibres for the purpose of measuring directly the pressure of the powder gas at various points along the bore. His method was to bore at these points channels to the interior of the gun, into which he inserted a very ingenious apparatus for measuring the pressure of the gas invented by himself, and which he called the "indenting" or "cutter gauge." A modification of this apparatus designed to remove certain difficulties inherent in the cutter gauge is now used by all nations and is known as the "crusher" or "pressure" gauge. This gauge consists of a housing *H* (Fig. 2), in which are assembled a steel piston *P* and a copper cylinder *C*, which is centred and kept in place between the piston and the closing plug *J* by the spring *S*. A small copper cup *c*, called an "obturating cup," prevents the entrance of gas past the piston. When the gun is fired, the gas pressure against the piston is transmitted to the copper cylinder, which is thereby permanently shortened or compressed by an amount varying with the pressure. The amount of compression is measured by an instrument called the "micrometer caliper," which is capable of measuring the ten-thousandth part of an inch; and from this measured compression the pressure per square inch that produced it is taken from an experimental table of compressions called a "*tarage* table." Major Rodman's estimates of the pressure of the powder gas are too great on account of the necessity of placing the gauge on the exterior of the gun. Major Rodman was the first to demonstrate by actual experiment that the maximum pressure can be greatly diminished by increasing the size of the powder grain. He also invented a perforated grain which burns with an increasing surface of combustion and thereby tends to equalize the pressure in the bore. The principle involved in this invention is of very great importance in gunnery and has been extensively utilized.

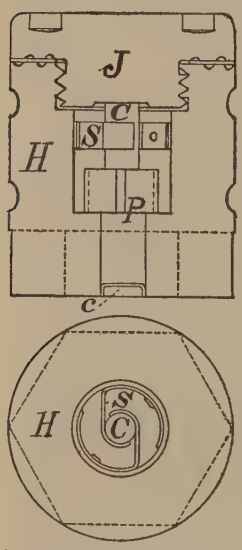


FIG. 2.— NOBLE PRESSURE GAUGE. *P*, piston; *H*, housing; *S*, spring; *C*, cylinder; *J*, closing plug.

About 1862 Capt. Andrew Noble, formerly of the Royal Artillery, but then connected with the Elswick works at Newcastle-on-Tyne, invented a chronoscope for measuring exceedingly small intervals of time, which he soon after applied to the "measurement of the times at which a projectile passed certain points in the bore of a gun." From these measured times he deduced the velocity of the shot from its seat to the muzzle, and then determined in the usual way by calculation the corresponding pressures. (Consult *Phil. Trans.*, 1875, part i, pp. 107–108.) "The mechanical part of the instrument consists of as many thin disks, 36 inches in circumference, as there are points where velocities are to be measured, all keyed on to a single shaft and made to rotate at a very high and uniform velocity through a train of wheels by means of a very heavy descending weight. A stop-clock connected with an intermediate shaft gives the precise speed of the circumference of the disks which is usually arranged at about 1250 inches per second.

"The recording arrangement is as follows: Each disk is furnished with an induction coil, the primary wire from which is conveyed to a plug inserted in the gun at a point where we may wish to record the instant at which the shot passes. There is at each point a special contrivance by which the shot in passing severs the primary wire, thereby causing a discharge from the secondary, which is connected with a discharger near the edge of the disk. The spark records itself on the disk by means of paper specially prepared to receive it. The instrument is capable of recording the millionth part of a second, and when in good working order the probable error of a single observation should not exceed 4 or 5 one-millionths of a second." This latter statement may be a little oversanguine; but it is admitted by a competent judge to be "practically correct to a hundred-thousandth of a second."

The data employed by Noble and Abel in their discussion of the phenomena attending the combustion of gunpowder in cannon were derived chiefly from the experiments carried on by the Committee of Explosives whose president was Colonel Younghusband, F.R.S., using the Noble chronoscope above described (*Phil. Trans.* for 1875). Experiments were made by the committee with the 10-inch, muzzle-loading, 18-ton rifle, loaded with 70 pounds of pebble powder (gunpowder) and a 300-pound projectile. See under *Exterior Ballistics*.

Theoretical Determination of Velocity.—The work done by the adiabatic expansion of y pounds of powder gas at the initial temperature of combustion, in the bore of a gun, is given by the equation

$$\text{Work of expansion} = fny\left\{1 - \frac{1}{(1+x)^{\frac{1}{n}}}\right\} \qquad (2)$$

in which n is a simple function of the specific heats of the gas, f is the pressure of unit weight of the gas at temperature of combustion, per unit of surface, and x is a number which varies directly with the travel of the projectile and represents, approximately, the number of volumes of expansion of the gas. If we assume that the work of expansion is measured by the energy of translation of the projectile, we get from equations (1) and (2) the following expression for the square of the velocity:

$$v^2 = \frac{2gfny}{w} X_2, \qquad (3)$$

in which X_2 stands for the quantity within the braces of (2). If the charge of powder in the chamber of a gun were converted into gas be-

fore the projectile had time to move, (3) would give the velocity of the shot at any travel with great accuracy. This was practically the case with the old-time fine-grained powder, which was consumed almost instantaneously. But for the modern large-grained powders, which require an appreciable time for burning, the equation does not apply, at least not while the grains are burning. The dimensions of modern powder grains vary with the calibres of the guns for which they are designed. For example, the grains for our 8-inch rifle (called multi-perforated grains) are cylinders about half an inch in diameter and an inch long, with seven small longitudinal perforations, one of which coincides with the axis of the cylinder, while the others are symmetrically disposed about the axis. These perforations in the grain under consideration are about one-twentieth of an inch in diameter. For the 14-inch rifle these dimensions are increased about 70 per cent. It will readily be seen that it requires a large part of the entire time the projectile remains in the gun after firing for these grains to burn up. Indeed it frequently happens that they are not all consumed until after the projectile leaves the bore.

It is impossible, in an article like this, to furnish all the details of the deduction of a formula for giving the velocity of a projectile in the bore of a gun while the powder is burning. The problem is a very complicated one and has not yet been rigidly solved. Many assumptions have to be made which are not strictly true, and formulas require to be tested at every point by comparing computed with measured results. It has been established by experiments due chiefly to M. Vieille that grains of modern powder burn in parallel layers, and that the velocity of combustion under the constant pressure of the atmosphere is uniform. It is also known that the velocity of combustion, and therefore the disengagement of gas, increases with the pressure, so that in attempting to deduce a formula for the velocity of a projectile in a gun where the pressure is constantly changing, and greatly exceeds the atmospheric pressure, the law which governs the velocity of combustion becomes of the first importance. It is believed that the law of the square root of the pressure, propounded by Sarran, is very near the truth. At any rate the formula for velocity based upon this law gives results agreeing very well with observation, as will be shown later.

The first important step in deducing a formula for velocity while the powder is burning was made by Ensign (later Captain) J. H. Glennon, United States navy, who in 1888 published a paper in *Proceedings of the United States Naval Institute* entitled *Velocities and Pressures in Guns*, in which he gave an original expression for the weight of powder burned in a gun at any time as a function of the distance traveled by the projectile. Colonel Ingalls following up Glennon's idea deduced the following general equations for velocity and pressure while the powder is burning and which apply to all forms of grain:

$$v^2 = MX_1\{1 + NX_0 + N'X_0^2\}$$
$$p = M'X_3\{1 + NX_4 + N'X_5\}$$

In these equations M, M', N, and N' are functions of the gun and powder constants, while X_0, X_1, X_3, X_4, and X_5 are functions of w and n, that is, of the number of volumes of expansion, approximately, and the ratio of the specific heats of the powder gas.

Noble and Abel determined the ratio of specific heats of the gases of fired *gunpowder* at temperature of explosion to be $1\frac{1}{3}$ and therefore $n = 3$. With this value of n Ingalls has computed and published an extensive table of the X functions by means of which their values, or rather their logarithms, can be taken out for any value of w, or—what is the same thing—for any travel of the projectile, by simple interpolation.

For certain forms of grain N and N' may be regarded as zero and the expressions for v^2 and p are reduced to the first term of the second member. This simplification occurs with very thin flat grains of large surface; and with long cylindrical grains with an axial perforation. With other forms of grain,—long slender strips or cylinders,—the third term may be omitted but not the second. While with spherical, cubical, and multi-perforated grains all the terms must be retained theoretically; though in many cases the third term is so small that it may safely be neglected.

The constants M, M', N, and N' may be determined in various ways. The following data must be known: *Gun Constants.* Calibre; travel of projectile in bore from seat to muzzle; volume of powder chamber. *Powder Constants.* Size, form, and density of grains; force of the powder and velocity of burning under atmospheric pressure. *Elements of Loading.* Weight of powder charge and of projectile. With these data the constants can all be readily computed by suitable formulas. If the force of the powder and velocity of burning in open air are not known, the constants can then be found by means of a measured muzzle velocity and the maximum pressure, which last is assumed to be the pressure given by a crusher gauge placed, usually, in the cartridge bag or in some part of the powder chamber. Or, the constants may be determined more accurately by means of two measured velocities in the bore when these are available.

Comparison of Theory with Observation.—"The solution of the problems of interior ballistics requires the adoption of several hypotheses and simplifications that are only approximately true, and the practical value of the formulas deduced can be established only by a comparison of predicted results with experiment, which is the final test of all physical formulas." For a first comparison take the velocities measured in the 10-inch rifle with the Noble chronoscope, already mentioned. In this case the constants M, M', and N were determined by the two measured velocities 1027 f.s. and 1464 f.s. corresponding, respectively, to travels of the projectile of 2.26 and 8.26 feet. From these data the following equations for velocity and pressure were deduced:

$$v^2 = 889860\, X_1\{1 - 0.05364\, X_0\}$$
$$p = 57834\, X_3\{1 - 0.05364\, X_4\}.$$

(For the details of the calculations, consult Ingalls's *Interior Ballistics*, 2d ed., Fort Monroe, 1894.) The formula for pressure has the same degree of accuracy as the velocity formula since the former was derived from the latter by differentiation, according to the principles of mechanics.

Table I, which is sufficiently explained by its caption, gives the measured and computed velocities for the distances traveled by the projectile found in the first column. The differences in the fourth column show a wonderful agreement between theory and observation. They are all, except the first, less than 1 per cent of the measured velocity and are practically nil. If the agreement of the computed velocities with those measured with the Noble chronograph is a proof of the correctness of the velocity formula, so, conversely, is this agreement an illustration of the precision and accuracy with which this chronograph measures extremely small intervals of time.

TABLE I

TABLE OF MEASURED AND COMPUTED VELOCITIES OF A 300-POUND PROJECTILE IN THE BORE OF A 10-INCH RIFLE, FIRED WITH A CHARGE OF 70 POUNDS OF PEBBLE GUNPOWDER. ALSO COMPUTED PRESSURES

Travel of projectile in feet, from start	Measured velocity in feet per second	Computed velocity	Measured minus computed	Pressure on bore of projectile in pounds per square inch	Remarks
0.41	436.0	450.8	−14.8	34,752	Maximum pressure
0.50	501.7	505.0	−3.3	34,557	
0.82	657.0	661.0	−4.0	32,005	
1.06	750.0	748.2	1.8	29,648	
1.65	911.0	908.0	3.0	24,400	
2.06	992.8	992.5	0.3	21,403	
2.26	1027.0	1027.0	0.0	19,302	
2.74	1097.0	1098.0	−1.0	17,580	
3.06	1137.0	1139.0	−2.0	16,121	
7.06	1412.0	1420.0	−8.0	7,022	
8.26	1464.0	1464.0	0.0	5,476	
10.15	1527.0	1516.0	11.0	4,269	Muzzle

Other and even more striking examples of the agreement between the measured and computed velocities of a projectile in a gun may be found in the *Journal of the United States Artillery*, vols. 25, 26, and 39, and in Ingalls, *Interior Ballistics*, pp. 107, 129, 130, 133, 161, and 165.

Multiperforated Grains. These grains, which have already been described and which are exclusively used in the larger guns of both the army and the navy, are the only grains which burn with an increasing surface of combustion; but they do not retain their original form until completely consumed—as do all other forms of grain in use—but break up when the least dimension, called the web thickness, is burned through, into 12 slender rods, or "slivers," as they are technically called, which burn according to a law different from that by which the entire grain burned. Thus two independent sets of formulas for velocity and pressure become necessary to represent what actually takes place in the gun. This may be illustrated by an example pertaining to the 14-inch seacoast rifle. This piece was fired Jan. 23, 1911, with a charge of 328 pounds of nitro-cellulose powder plus an "igniter" of 9 pounds of rifle, or saluting, powder, and a projectile weighing 1664 pounds. The muzzle velocity, measured in the usual way with a Boulengé chronograph (see section on *Exterior Ballistics*), was 2252 f.s. and the maximum pressure, shown by a crusher gauge, was 43,640 pounds per square inch, or a pressure on the entire base of the shot, of 3359 tons of 2000 pounds. From these data were obtained the following equations for the velocity and pressure on the base of the projectile.

From the origin to a travel of 210.75 inches:

$$v^2 = 1197100\, X_1 \{1 + 0.03542\, X_0 - 0.00061\, X_0^2\}$$
$$p = 53102\, X_3 \{1 + 0.03542\, X_4 - 0.00061\, X_5\}.$$

From a travel of 210.75 inches to the muzzle:

$$x^2 = 2051700\, X_1 \{1 - 0.05180\, X_0\}$$
$$p = 91013\, X_3 \{1 - 0.05180\, X_4\}.$$

(For the details of this example, consult Ingalls, *Interior Ballistics*, pp. 162 et seq.)

To use these formulas for any travel of projectile the first operation would be to divide the travel expressed in inches by 45.465, which is the reduced length of the initial air space in the powder chamber, in inches. That is, it is the length of a cylinder of the diameter of the bore whose volume is the same as the air space (space not occupied by the powder charge) in the chamber. With this quotient, which is designated by x, and is the argument of the table of the X functions, take out from the proper columns the values of such of the functions as are required. As an example, what would the pressure be when the projectile has traveled 36.372 inches? By division, as above indicated, we find $x = 0.8$, and then from the table, $X_3 = 0.7249$, $X_4 = 4.03$, and $X_5 = 14.91$. Substituting these values of X_3, X_4, and X_5 in the first of the above expressions for the pressure, it comes out 43,640 pounds per square inch. In a similar manner the velocity at this travel would be found to be 991.4 feet per second. At the muzzle, where the travel of projectile is 413.85 inches, the second set of formulas gives $v = 2252$ f.s. and $p = 9485$ pounds per square inch. This large muzzle pressure is of course wasted, and could only be utilized by increasing the length of the gun. It may be shown that the velocity in this case could never exceed 3150 f.s. whatever may be the length of the gun.

Muzzle Energy.—The muzzle energy of a projectile, designated by Em, is given by the equation:

$$Em = \frac{wv^2}{4000g} \text{ foot-tons},$$

which becomes for the 14-inch gun we have been considering

$$Em = \frac{1664\,(2252)^2}{4000 \times 32.16} = 65600 \text{ foot-tons};$$

and this enormous energy is produced in about $\frac{1}{15}$ of a second. A horse power is defined "as the rate at which work is done when 33,000 pounds (16.5 tons) are raised one foot in one minute." According to this definition the muzzle energy of this shot represents nearly three million horse power.

Theoretical Value of the Force of the Powder. —The theoretical value of this factor (designated by f) is

$$f = \frac{p_0 v_0 T}{273},$$

where p_0 is the normal atmospheric pressure; v_0 the volume of unit weight of the powder gas at temperature of combustion and under normal atmospheric pressure; and T the absolute temperature of combustion. By means of this formula and the best procurable values of v_0 and T for nitro-cellulose powder the value of f comes out 2076.7. The value of this factor computed on the supposition that (1) is a true equation, with the data already used for the 14-inch gun, is 1759.7. According to these calculations about 15 per cent of the total work done by the expansion of the gases of combustion was expended in doing other work than that of giving energy of translation to the projectile. See EXPLOSIVES.

EXTERIOR BALLISTICS

In exterior ballistics we determine the path of a projectile from the instant it leaves the gun until it strikes the target, or, in the case of shrapnel, bursts in the air at any desired point, knowing its shape, calibre, weight, its initial velocity of translation and rotation, the resistance it meets from the air, and the action of gravity.

History. The theories relative to the motion of projectiles were originally of the crudest kind. Up to the middle of the sixteenth century bullets were supposed to move in right lines from the gun to the target, and shells fired from mortars were thought to describe a path made up of two right lines joined by an arc of a circle. The trajectory was divided into three parts: First, *violent*, which was thought to be a right line; second, *middle* or *mixed*, which was an arc of a circle; and third, the *natural*, which was a right line. In a work on gunnery, published by Niccolò Tartaglia, a Venetian, in 1537, he proved that no part of the path of a projectile could be a right line, and that the greater the velocity of the projectile the flatter is its path. Tartaglia also invented the gunner's quadrant (q.v.) for giving elevation. Galileo demonstrated the parabolic form of the trajectory in vacuo in his *Dialogues on Motion*. Newton's discovery of the law of gravitation made plain the cause of the curvilinear motion of projectiles. By the use of the calculus, his own invention, he determined the momentum transferred from the projectile to the particles of air at rest, which is the method followed at the present day, and which leads to the law of the square of velocity. So far as a rigorous solution of the trajectory in air is concerned, the problem remains to-day about where Newton and Jean Bernouilli left it.

Ballistic Machines. There are two ways in which the velocity of a projectile after leaving the gun may be determined experimentally —by measuring the projectile's momentum, and by measuring the time required for the projectile to pass over a given space. The first method is the older; and many years ago, when guns and projectiles were small, velocities low, and ranges short, the results were sufficiently accurate for most practical purposes. Modern gunnery is much indebted to the now discarded *ballistic pendulum* and *gun pendulum*, which have long since been supplanted by the cheaper and more accurate machines using the second method.

The *Ballistic Pendulum* was invented about 1743 by Benjamin Robins, who was the first to make a systematic and intelligent series of experiments to determine the velocity of projectiles. The principle of the ballistic pendulum, as well as of Count Rumford's gun pendulum, is the transformation of the elements of the projectile's momentum from a small mass and high velocity to a large mass and low velocity, more easily measured by the methods then known. The ballistic pendulum consisted of a plate of iron to which was bolted a block of wood to receive the impact of the ball, the whole suspended from a horizontal axis about which it was free to revolve. The block when struck by the ball recoiled through a certain arc which was measured by the length of tape wound from a reel. The arc of oscillation being measured, the velocity of the ball can be found by calculation. This light pendulum could stand the impact of musket balls only, but with it Robins began the science of gunnery by determining the relations which should exist between the calibre, length of barrel, and charge of powder. Dr. Hutton (1775–91), Dr. Gregory (1814), and Major (later Colonel) Mordecai, of the United States Ordnance Department (1842–45), made many experiments with improved ballistic pendulums.

By the second method a projectile's velocity is determined by measuring the time required to pass over a known space in its path. We will not take time to describe any of the numerous machines invented for this purpose prior to 1840, when Wheatstone, the celebrated English electrician, suggested the use of electricity for measuring small intervals of time. Some of them were very ingenious, but they were all lacking in precision even for the low velocities then obtainable. A simple calculation will illustrate this. Suppose the known space to be 150 feet and the observed time of describing it $\frac{1}{10}$ of a second. Then the velocity, which is equal to the space divided by the time, would be 1500 feet per second; and to make this true within one foot, the time must not be in error more than $\frac{1}{15000}$ of a second. It is only by the use of electricity that such precision is possible. The general method of using electro-ballistic machines is as follows: Two vertical target frames or screens are placed perpendicular to the plane of fire; the first as near the gun as possible without being sensibly affected by the blast, and the second a measured distance further from the gun, say 150 feet (s). A copper wire passes several times across each screen forming a grating through which the projectile cannot pass without breaking the wire. From the screens the wires go to the chronograph which may be in any convenient place. The passing of the projectile through each screen is instantly recorded by the chronograph so as to give the interval of time (t) between these occurrences. We then have

$$v = \frac{s}{t},$$

where v is the mean velocity at the middle point between the screens, which can be reduced to muzzle velocity by a suitable formula.

The electro-ballistic machines most in use at the present day are the Boulengé chronograph and the Bashforth chronograph—the former used

principally on the continent of Europe and in this country and the latter in England.

The Boulengé chronograph, invented by Captain Le Boulengé of the Belgian Artillery, was greatly improved by Captain Bréger of the French Marine Artillery. The following is a description of the modified instrument, taken substantially from *Ordnance Notes*, No. 193. It

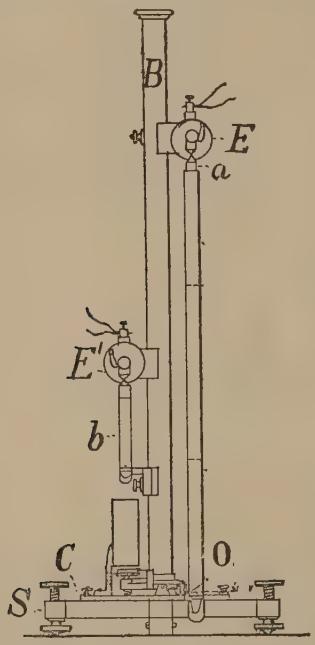


FIG. 3.—THE BOULENGÉ CHRONOGRAPH.

a and *b*, suspended rods; *E* and *E'*, electro-magnets; *B* and *S*, stand with leveling screws; *O*, marking knife.

consists of a vertical column, *B* (Fig. 3) to which are affixed two electro-magnets; the right-hand one, *E*, is actuated by the current of the first screen, and supports an armature called the *chronometer rod*, *a*. The left-hand magnet, *E'*, is actuated by the current of the second screen and supports an armature called the *registrar*, *b*. The chronometer, *a*, is a long cylindrical brass tube terminating at its upper extremity in a piece of soft iron and bearing at its lower end a heavy steel bob which causes it to fall vertically when released. It is covered by a closely fitting zinc cylinder called the recorder. The registrar is of the same weight as the chronometer. When the projectile passes through the first screen the chronometer is liberated and falls vertically, continuing close to the marking knife, *O*. The second screen being pierced, the registrar falls upon a horizontal plate, *b* (Fig. 4), which turns upon an axis and releases the spring, *s*. The spring is furnished with a square knife, *m*, which, when released, strikes the zinc recorder and leaves an indentation upon it. The position of this indentation, which is a sharp, well-defined cut, on the recorder shows the distance the chronometer had fallen while the projectile was passing over the distance between the screens plus the time required for the machine to operate. A simple application of the law of falling bodies gives the time.

The Boulengé chronograph, from its simplicity of construction and the ease with which it can be manipulated, is well adapted for measuring muzzle velocities and will probably continue to be used for that purpose. But in studying the laws which govern the resistance of the air to the motion of projectiles, it is necessary to know the velocity of the same projectile at several equidistant points of its path and thus to determine its loss of velocity, or what is technically known as the retardation. This might be done by employing several Boulengé chronographs—one for each pair of screens; and theoretically there can be no objection to their use. But the practical objections to the multiplication of instruments and observers are obvious. In 1864 the Rev. F. Bashforth, B.D., then professor of mathematics at the Artillery College, Woolwich, invented a chronograph which is capable of measuring with great accuracy the time occupied by a projectile passing over any number of successive spaces between equidistant screens connected electrically with the chronograph. Bashforth made a great many experiments with his chronograph, principally at Shoeburyness, between the years 1865 and 1879, and laid the foundation of our knowledge of the resistance of the air, as affecting the motion of a projectile.

It has been demonstrated by experiment that the resistance of the air to the motion of similar projectiles moving with the same velocity, is proportional to the surface exposed, that is, to the square of the projectile's diameter (d^2), and to some function of the velocity. If r is the retardation, and C a factor depending upon the weight, diameter, length, and form

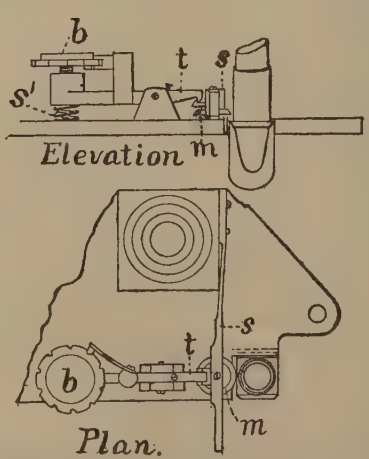


FIG. 4.—MARKER OF THE BOULENGÉ CHRONOGRAPH.

t, trigger; *s*, spring; *m*, marking knife; *b*, pan for catching short rod; *s'*, spring.

of head of the projectile, its steadiness of flight and the density of the air it encounters, we may write the following equation:

$$Cr = kf(v),$$

where k is a coefficient to be determined by experimental firing.

It is impossible with our present knowledge to determine the exact form of $f(v)$ for all velocities, from first principles. As has been already stated, Newton found

$$f(v) = kv^2;$$

but experiments have abundantly shown that this form of $f(v)$ is true for only a limited range of velocities. It is certain that its form changes several times between the extreme limits of velocities employed in gunnery. Colonel Siacci of the Italian Artillery deduced a complicated empirical expression for Cr in terms of the velocity, which gives retardations agreeing very closely with experiment from $v = 100$ to $v = 3000$ f.s. It possesses, however, no practical advantages over the customary method of expressing the retardation by suitable powers of the velocity so chosen as to represent the mean retardations over certain ranges of velocity ascertained by experiment. We therefore have on this hypothesis

$$Cr = kv^n$$

The values of k and n for oblong projectiles deduced by General Mayevski were based upon a discussion of the Krupp firings made at Meppen in 1881, for velocities up to 700 m.s.; and were subsequently extended by Colonel Zaboudski to include velocities up to 1100 m.s. The numbers as published were in kilogrammeter units, and were reduced by Colonel Ingalls to foot-pound units and made the basis of his extensive ballistic tables published by the United States government in 1900. They are continued in Table II.

TABLE II

Range of velocities	Value of exponent n	log. k
3600 f.s.		
2624.2	1.55	7.6090480−10
1804.9	1.70	7.0961978−10
1375.2	2	6.1192596−10
1228.9	3	2.9809023−10
967.80	5	6.8018712−20
787.86	3	2.7734430−10
0	2	5.6698914−10

As an illustration of the meaning of these numbers we have, for example, for velocities between 2624.2 f.s. and 1804.9 f.s., the expression

$$Cr = 0.0012479\ v^{1.7};$$

and for velocities between 1804.9 f.s. and 1375.2 f.s.,

$$Cr = 0.00013160\ v^2,$$

and so for the other velocities. The coefficients, k, are so determined that the value of Cr computed by both these equations is the same for $v = 1804.9$ f.s. So that, although there is a sudden change in the law of retardation at this point, there is no apparent break in the ballistic table, which depends upon these laws. See Table III.

Horizontal Trajectory. The horizontal trajectory is that part of a complete trajectory lying above the level of the gun—that is, when the point of fall is at the height of the gun. In vacuo a projectile would describe an arc of a parabola whose axis is vertical; and as a parabola is symmetrical with respect to its axis the descending branch of the trajectory would be the same as the ascending. The angle of fall would be the same as the angle of elevation and the striking velocity the same as the muzzle velocity. But in the actual trajectory, owing to the resistance of the air, this symmetry disappears. The descending branch is steeper than the ascending branch, the angle of fall is greater than the angle of departure, and the range and striking velocity are less than in vacuo. For very flat trajectories, that is to say, when the angular elevation given to the piece is not more than 4 or 5 degrees of arc, the curvature of the horizontal trajectory may be omitted and the motion considered rectilinear. In this case, by means of the expressions for Cr given in Table II, equations may easily be found giving the horizontal range (X) and time of flight (T) in terms of certain functions of the muzzle and striking velocities (V and v). These equations are the following:

$$X = C\{S(v) - S(V)\}$$

and

$$T = C\{T(v) - T(V)\}.$$

The factor C, called the ballistic coefficient, is made up of several factors when complete. But for type projectiles and for normal conditions of the atmosphere its value for flat trajectories is

$$C = \frac{w}{d^2},$$

in which w is the weight of the projectile and d its diameter in inches. It will be seen that C measures the ability of a projectile to overcome the resistance of the air; or, as we may say, it is the measure of the ballistic efficiency of a projectile. The S and T functions, called, respectively, the space and time functions, are tabulated with other functions given later with the velocity (v or V) for the argument. They were computed by means of formulas derived from the tabulated values of Cr given above.

As an example of the use of the above equations for range and time of flight, take the following data pertaining to the 14-inch rifle: $d = 14$ in.; $w = 1664$ lbs.; $V = 2252$ f.s. With these data compute the striking, or remaining, velocity (v), for a horizontal range of 3 miles, or 15,840 feet, and the time of flight.

The expression for the range gives, by transposition,

$$S(v) = \frac{X}{C} + S(V);$$

or, giving to X, C, and V their values,

$$S(v) = \frac{196 \times 15840}{1664} + S(2252)$$
$$= 1865.8 + 4159.4 = 6025.2.$$

The space function of the muzzle velocity is interpolated from the ballistic table (see Table III); as is also the remaining velocity (v) from its computed space function. From the table we find $v = 1774.98$ f.s. For the time of flight we have

$$T = \frac{1664}{196}(2.398 - 1.463) = 7.938 \text{ seconds.}$$

It may be interesting to consider for a moment the enormous effect exerted by the air upon a swiftly moving body, as shown by this example. The loss of energy of the projectile in its pas-

sage of three miles through the air is given by the equation

$$\text{Loss of energy} = \frac{w(V^2-v^2)}{2g} = \frac{w(V+v)(V-v)}{2g}.$$

Applying the numbers given above, taking $g = 32.16$ f.s., and dividing by 2000 to reduce the result to foot-tons, we find the loss of energy to be 24,848 foot-tons—and this in about 8 seconds.

At the firing ground of the Krupp works, Essen, remaining velocities have been repeatedly measured for even greater ranges than three miles, and the computed velocities completely verified, and also the computed times of flight.

When the angle of elevation exceeds 5° or 6°, the error resulting from disregarding the curvature of the trajectory begins to be felt. But Siacci has shown that this error is practically compensated by substituting for the striking velocity (v) what he called the *pseudo velocity* and designated by the letter u. The relation between the real and pseudo velocities is expressed by the equation

$$u = v\frac{\cos\theta}{\cos\phi},$$

in which ϕ is the angle of departure, or initial inclination of the trajectory to the horizontal plane, and θ the inclination of any other point of the trajectory. At the far end of the horizontal range the inclination (θ) is called the angle of fall and is designated by ω. At the summit of the trajectory θ is zero. The pseudo velocity is employed in all ballistic formulas in place of the real velocity (v); but at the muzzle, where $\theta = \phi$, u becomes the muzzle velocity (V), as is shown by the above equation. The value of u at the point of fall will be distinguished by u'.

Fundamental Formulas. The following equations, due to Colonel Siacci (consult *Giornale d' Artiglieria e Genio*, Rome, April, 1880), have been adopted by artillerists the world over for the solution of the principal problems of exterior ballistics:

$$x = C\{S(u) - S(V)\}$$

$$\frac{y}{x} = \tan\phi - \frac{C}{2\cos^2\phi}\left\{\frac{A(u)-A(V)}{S(u)-S(V)} - I(V)\right\}$$

$$\tan\theta = \tan\phi - \frac{C}{2\cos^2\phi}\{I(u) - I(V)\}$$

$$t = \frac{C}{\cos\phi}\{T(u) - T(V)\}.$$

In these equations x and y are the rectangular coördinates of any point of the trajectory, the origin being at the muzzle of the gun, and the axis of x horizontal; and t the time of flight to the point x, y. $A(u)$ and $A(V)$ are certain functions of the velocity—muzzle or pseudo—and are called altitude functions. $I(u)$ and $I(V)$ relate to the inclination of the trajectory and are called inclination functions. The other symbols have already been defined.

At the summit of the trajectory $\tan\theta$ becomes zero and the third of the above equations reduces to

$$\sin 2\phi = C(I(u_0) - I(V)),$$

in which u_0 is the pseudo velocity at the summit. By means of this formula and the ballistic table, u_0 can be calculated when C, V, and ϕ are known.

For the horizontal trajectory the above equations reduce to

$$x = C(S(u') - S(V))$$

$$\tan\omega = \frac{C}{2\cos^2\phi}(I(u') - I(u_0))$$

$$T = \frac{C}{\cos\phi}(T(u') - T(V))$$

$$I(u_0) = \frac{A(u') - A(V)}{S(u') - S(V)}.$$

We will now complete the calculations pertaining to the 14-inch gun by computing the angle of elevation (ϕ) and angle of fall (ω). The striking velocity, which for this particular trajectory is sensibly the same as the pseudo velocity, has been found to be 1774.98 f.s. By interpolation from the abridged ballistic table the following additional numbers are obtained:

$$A(V) = 189.79$$
$$A(u') = 337.18$$
$$I(V) = 0.06510$$
$$I(u') = 0.09532$$

By means of these numbers and the value of $S(u') - S(V)$ already computed, we find

$$I(u_0) = 0.07900 \quad \therefore u_0 = 1994.375$$
$$\phi = 3° 23'$$
$$\omega = 3° 59'.$$

When the angle of elevation is considerable, the projectile passes through air in the middle of its course less dense than at either end of its trajectory, and the less resistance offered to the projectile increases the range and must be accounted for in the ballistic formulas. A mean resistance is usually assumed due to a height of two-thirds the greatest altitude of the projectile, and a correction applied to the ballistic coefficient in the shape of a factor greater than unity taken from a table of factors having the height of projectile for argument. By a combination of the fundamental formulas given above we get the following general expression for y:

$$y = \frac{C^2}{2\cos^2\phi}(zI(u_0) + A(V) - A(u)),$$

in which $$z = \frac{x}{C}.$$

By means of this formula the height of a projectile at any distance (x) from the gun can be computed. For the summit or maximum ordinate this equation becomes

$$y_0 = \frac{C^2}{2\cos^2\phi}(z_0 I(u_0) + A(V) - A(u_0)),$$

in which $$z_0 = S(u_0) - S(V).$$

For the trajectory already considered, we have found $u_0 = 1994.375$, and from the ballistic table we find

$$S(u_0) = 5128.15$$

and $$A(u_0) = 259.31,$$

and then $$z_0 = 968.75$$

and $$y_0 = 253.6 \text{ ft.}$$

This value of the maximum ordinate affords a good idea of the flatness of the trajectory of a high-power gun for a range of three miles, and

suggests that a considerable portion of the trajectory at either end would be danger space for a war ship.

One of the principal objects in view in the deduction of ballistic formulas and the preparation of tables for their use is the computation of range tables for the different guns in service. "A range table should be so constructed as to afford all the data necessary to enable the gun for which it was prepared to be properly and promptly laid in such a manner that its projectiles may hit an object whose distance from the gun is known, and also to predict the effects of the shot upon the object. The constants upon which a range table is based are the calibre or inclined to the horizon, within certain limits." But these limits are ample for nearly all practical purposes. According to this principle if ϕ' is the range-table angle of elevation for a certain horizontal range, then the angle of elevation required to hit an object at the same distance but at an angular elevation (ϵ) above the gun will be $\phi + \epsilon$; and this addition to ϕ is made by simply pointing the gun at the object. It has been shown by calculation that a ship in the offing firing at the Signal Station battery at Gibraltar, which is 1270 feet high, with a high-power gun could safely employ the range-table angle of elevation. And this is probably an extreme case.

TABLE III

ABRIDGED BALLISTIC TABLE

From Table I, *Ingalls's Ballistic Tables*, "Artillery Circular M"

v or u	$S(u)$	D	$A(u)$	D	$I(u)$	D	$T(u)$	D
2300	3987.6	35.6	178.78	2.25	0.06297	0.00043	1.388	0.015
2290	4023.2	35.7	181.03	2.27	0.06340	0.00044	1.403	0.016
2280	4058.9	35.8	183.30	2.30	0.06384	0.00044	1.419	0.016
2270	4094.7	35.9	185.60	2.32	0.06428	0.00045	1.435	0.015
2260	4130.6	36.0	187.92	2.34	0.06473	0.00046	1.450	0.016
2250	4166.6	36.2	190.26	2.36	0.06519	0.00046	1.466	0.016
2240	4202.8	36.2	192.62	2.39	0.06565	0.00047	1.482	0.017
2230	4239.0	36.4	195.01	2.41	0.06612	0.00047	1.499	0.016
2220	4275.4	36.4	197.42	2.44	0.06659	0.00048	1.515	0.016
2210	4311.8	36.6	199.86	2.46	0.06707	0.00048	1.531	0.017
2200	4348.4	36.7	202.32	2.50	0.06755	0.00049	1.548	0.017
1810	5876.7	42.1	323.28	3.90	0.09235	0.00083	2.315	0.023
1800	5918.8	42.3	327.18	3.96	0.09318	0.00084	2.338	0.024
1790	5961.1	42.6	331.14	4.02	0.09402	0.00086	2.362	0.024
1780	6003.7	42.8	335.16	4.08	0.09488	0.00088	2.386	0.024
1770	6046.5	43.1	339.24	4.14	0.09576	0.00089	2.410	0.024
1760	6089.6	43.3	343.38	4.21	0.09665	0.00090	2.434	0.024
1750	6132.9	43.5	347.59	4.27	0.09755	0.00092	2.458	0.025
510	25114.0	42.0	16021.0	93.6	2.22455	0.01040	26.472	0.082
509	25156.0	42.0	16114.6	94.2	2.23495	0.01046	26.554	0.083
508	25198.0	42.2	16208.8	94.8	2.24541	0.01052	26.637	0.083
507	25240.2	42.2	16303.6	95.5	2.25593	0.01059	26.720	0.083
506	25282.4	42.3	16399.1	96.1	2.26652	0.01065	26.803	0.084
505	25324.7	42.4	16495.2	96.8	2.27717	0.01071	26.887	0.084

and weight of the projectile and the shape of its head, from which data is deduced the ballistic coefficient for a standard density of the air; also the muzzle velocity and the jump of the gun—that is, the elevation or depression of the muzzle due to the shock of the discharge. These should be determined with all the precision possible before beginning the construction of the table. With these data are computed for a series of horizontal ranges, forming the argument of the table, and which occupy the first column, the angle of departure, angle of fall, striking velocity, and time of flight. These are the fundamental elements required in a range table; but it should also give the variations of the angle of departure due to variations of the muzzle velocity and of the density of the air; the drift of the projectile due to rifling; slope of fall; danger space; penetration of different kinds of armor; probable rectangle of hits, etc., all of which must be taken into account for effective work."

Rigidity of the Trajectory.—A range table gives the angle of elevation necessary to hit an object on the same level as the gun. But it happens in practice that the object fired at is almost always above or below this level; and here comes in the principle of the *rigidity of the trajectory* which asserts that "the relations existing between the elements of a trajectory and the chord representing the range, are sensibly the same whether the latter be horizontal

If we imagine a projectile whose diameter and weight are so adjusted as to make the ballistic coefficient unity—like the projectile used with the obsolete 3-inch wrought-iron field gun—for such a projectile the differences of the space functions in the upper part of this table show the distances the projectile would travel, moving with the velocity in the first column, while its velocity was reduced by the resistance of the air, 10 f.s. For example, the projectile starting with a velocity of 1810 f.s. would travel 42.1 feet while its velocity was reduced to 1800 f.s. The lower part of the abridged table shows that the projectile would travel the same distance while the velocity was reduced from 510 f.s. to 509 f.s.

A projectile whose ballistic coefficient is 7, which is nearly that of a 12-inch shot, would range seven times as far, or 294.7 feet, before losing 10 foot-seconds of its velocity.

The most important of the problems of exterior ballistics can be solved by means of the formulas here given in connection with the general ballistic table. But the solution of many of them is greatly facilitated by the use of certain auxiliary formulas and tables, for a description of which the reader is referred to the works mentioned at the close of this article.

The formulas and tables of exterior ballistics like those of interior ballistics are more or less empirical and must be tested by actual experiment before they can be fully accepted. A few ex-

amples of the agreement between computation and observation in high-angle firing, where the errors of theory should be the greatest, are here given:

1. "A shot was fired April 28, 1892, on Krupp's practice ground at Meppen, in presence of the Emperor, from a 24 cm. coast gun, with an angle of elevation of 44°. The weight of the projectile was 215 kilos=474 lbs., and the muzzle velocity 640 m.s.=2100 f.s. The range was measured and found to be 20.226 m.=22,120 yds." The data of this example were taken from the *Exhibition Catalogue of the Cast-Steel Works of Fried. Krupp*, p. 31 (Chicago, 1893). It is worked out in full in the introduction to Ingalls's *Ballistic Tables* (page v), and the results only will be given here. The computed range was 22,138 yards. The computed time of flight was 71.2 sec. Observed time, 70.2 sec. The projectile reached a height—computed as explained above—of 21,431 feet, and the correction for tenuity was made for two-thirds this altitude, or 14,287 feet.

2. The "jubilee shots," so called, were fired at Shoeburyness, England, in the spring of 1888 with a 9.2-inch wire-wound gun. Weight of projectile, 380 lbs.; muzzle velocity, 2360 f.s. There were three series of shots fired at 30°, 35°, and 40° elevation, respectively. The ranges were all measured and the times of flight observed. Table IV gives the mean measured ranges and times of flight, and those computed:

TABLE IV

Angle of elevation	Mean measured range (yards)	Computed range (yards)	Difference	Mean observed time of flight, seconds	Computed time of flight, seconds	Difference
30°	17922	17881	41	50.25	50.53	−0.28
35°	19175	19435	−260	57.11	58.02	−0.91
40°	20876	20922	−46	63.45	64.30	−0.85

Many other striking examples of the agreement between computed and observed ranges and times of flight, with guns of all calibres, and with angles of observation from zero to 45°, are given in Ingalls's *Handbook of Problems in Exterior Ballistics*.

BALLISTICS OF PENETRATION

The laws which govern the penetration of projectiles into different kinds of armor are very obscure, and little has been done up to the present time save the determination of empirical formulas, which satisfy with more or less exactness the measured penetrations upon which they were based. From among the numerous formulas which have been published the following three are selected as typical and are probably as correct as any:

1. Wrought-iron plates (Tresidder).

$$\tau = [5.5795 - 10]\frac{w^{\frac{1}{2}}v^{\frac{3}{2}}}{d^{\frac{1}{2}}}.$$

2. Krupp cemented plates, by capped armor-piercing shot.

$$\tau = [5.2685 - 10]\frac{w^{\frac{1}{2}}v^{\frac{3}{2}}}{d^{\frac{1}{2}}}.$$

3. For hard-faced plates, by uncapped projectiles.

$$\tau = [6.8234 - 10]\frac{w^{\frac{1}{2}}v}{d^{\frac{1}{2}}}.$$

τ is the penetration in inches.

As an example, take the 14-inch shot already considered. Its striking velocity at a range of three miles was found to be 1775 f.s., and this substituted in the above formulas gives 30.96, 15.48, and 12.88 inches penetration, respectively. This supposes the shot to strike normally. When the shot strikes at an angle with the normal it is customary to multiply the normal penetration by the cosine of this angle to get the true penetration. But this is only a rough approximation.

Consult: Didion, *Traité de balistique;* Bailly, *Traité de balistique rationnelle* (1883); Vallier, *Balistique experimentale* (1894); Siacci, *Balistica* (Italian); Mayevski, Zaboudski, *Ballistics* (Russian); La Llave, Ollero, Mata, *Exterior and Interior Ballistics* (Spanish); Bashforth, *The Motion of Projectiles* (1872), *Tables of Remaining Velocity*, etc. (1871), *The Bashforth Chronograph* (1890); Sarrun, Sébert, Hugoniot, Lionville, Vieille, Gossot, French officers and savants whose contributions to *Mémorial d'Artillerie de la Marine* and *Mémorial des Poudres* are of the greatest importance in the study of ballistics; Glennon, *Velocities and Pressures in Guns* (1889); Noble and Abel, *Researches on Explosives* (1874); Noble, *Researches on Explosives* (1894); Lissak, *Ordnance and Gunnery* (1907); and many papers in the *Journal of the Royal Artillery;* Hadcock, *Explanation of the Ballistic Tables*, etc.; Charbonnier, *Balistique* (1905). See PROJECTILES, MOTION OF.

BAL'LISTITE. A form of gunpowder of which the chief constituent is nitroglycerine. See GUNPOWDER; EXPLOSIVES.

BALLOON. See AËRONAUTICS.

BAL'LOT (Fr. *ballotte*, It. *ballotta*, dim. of *balla*, a ball). Primarily, a little ball, used in the practice of secret voting. Secret voting is thence called "voting by ballot," whether it be a ball, a ticket, or a mechanical device that is used for the purpose. Wherever the practice of deciding questions by vote has obtained, some form of secret voting has always been found necessary. The dicasts in Greece voted secretly by means of balls, stones, or shells with marks. From this use of marked shells (Gk. *ostrakon*, a shell) in popular voting came the so-called *ostracism*, or secret vote of the people, by which they drove into exile those who became obnoxious to them. *Tabellæ*, or tickets, were chiefly used by the Romans. If the vote concerned a change in the law, the tickets were marked V. R., the initial letters of the words "Uti Rogas," expressing assent to the proposer's proposition; and A for "Antiquo," expressing adherence to the old law. If the vote concerned the election of candidates to a public office, then the tickets bore the names of the candidates. The system of secret voting in Rome was fixed by various laws, of which the Lex Gabinia, 139 B.C., was the first; but the popular assemblies voted by ballot as well as by acclamation long before the passing of these laws. These ancient forms of secret voting continued into the Middle Ages, and especially the method of voting by colored balls, from which the usage takes its name. Balls may be used in voting in various ways: e.g., the voter may deposit a ball in either

of two boxes, so conjoined that no one shall be able to say into which he drops it; or he may be presented with two balls—a white and a black—and so drop one of them into a box that it shall be unknown which he used. This original form of balloting is still commonly employed in voting on the question of the admission or rejection of members of private clubs and in other cases of a similar nature.

In modern times, however, the most common form of ballot has been the written or printed ticket. In the New England Colonies the practice of voting "by papers" was in vogue from the very first, and there is some reason to suppose that some of the Puritans had become familiar with that usage in Holland or elsewhere on the Continent. The ballot has been occasionally employed in legislative assemblies. It was used in the Venetian Senate; and in Great Britain it was first called for, not for the purpose of elections, but of protecting the independence of members of Parliament in their votes on proposed legislation. After the Restoration, in 1660, it was used for purposes of ostracism in the Scottish Parliament. In 1710 a proposal for secret voting was carried in the English House of Commons, but rejected by the Lords. From 1840 to 1845 the ballot was in use in the French Chamber of Deputies. But the idea of secret voting in deliberative and legislative assemblies responsible to the people is now universally abandoned as inconsistent with the fundamental principles of popular government, of which publicity and the free criticism rendered possible by publicity are the great safeguards.

Toward the end of the eighteenth century vote by ballot for elections to the British Parliament was advocated by some of the Whigs; and it was one of the first things demanded by English Reformers at the beginning of the nineteenth century, the followers of Bentham being specially earnest in advocating it. It stood in the original draft of the Reform Bill of 1832. It was first proposed in the British Parliament in 1833 by the historian Grote, who renewed the motion every year till 1839. It was one of the six points in the reform demanded by the Chartists. In 1851 the proposal of vote by ballot was carried in the Commons against the opposition of Lord John Russell and the Liberal Government of that time by a majority of 51. The report of a select committee of the House of Commons in 1869 greatly contributed to decide public opinion in favor of the ballot as a necessary safeguard against corruption, intimidation, disorder, and all sorts of undue influence at elections. The result was Mr. Forster's Ballot Act of 1872, which introduced secret voting at all parliamentary and municipal elections except parliamentary elections for universities. It had already been adopted for school board elections in 1870. With the introduction of the ballot at parliamentary elections, the public election at the hustings, which had been so often associated with rioting and violence, disappeared.

Voting by printed ballot is now the method generally employed in elections in countries where constitutional government exists. The ballots may be furnished by the candidate for office, the political party engaged in promoting his election, or by the government. The first or the second of these plans has usually been adopted in local and general elections in the United States. But the fact that several officers —whose names may conveniently appear on a single ballot—are usually to be voted for at the same election, the great cost of printing and distributing the ballots to multitudes of voters, and the organization of party "workers" requisite for this work of distribution, have combined to render it impracticable, usually, for the individual candidate to supply the voters with ballots bearing his name, and to throw that burden upon the political party. Hence the "party ballot," which has done so much to build up the great party organizations in this country, and which has been a prolific source of corruption, fraud, and intimidation of the individual voter.

These defects of the "party ballot" in the last few years of the nineteenth century produced a widespread public sentiment in favor of a ballot reform, which in many of the United States resulted in the adoption of the third plan above referred to—namely, the printing and distribution of the ballots by the State. With some modifications, due to local conditions or to the efforts of party managers to derive a partisan advantage from the system, the form commonly employed is the "official" or "Australian ballot," so called from the fact that it was the first employed with success in some of the Australian states. Its most distinguishing feature is the arrangement of the names of all the candidates for a given office, whether nominated by party organizations or by independent effort, in order on the ballot, the voter indicating his choice by some mark written by him opposite the name of his chosen candidate. The usual and preferable form of the official ballot is the "blanket ballot," in which the names of all the candidates for an office are arranged in alphabetical order, irrespective of party affiliations. In a few of the States, however, the practice of arranging the candidates in party columns, each column headed by an emblem—as an eagle or a star—has been adopted. This device is justified as a concession to the necessities of the illiterate voter, who may, by placing his mark at the head of a party column, cast a vote for all the candidates of that party, instead of choosing, out of an alphabetical list, the names of the individual candidates favored by him. This form of ballot is greatly favored by the political organizations for the reason—which constitutes the chief indictment of the method—that it tends to promote "straight" party voting and to discourage the practice of independent voting. Certain novel mechanical devices for insuring secret voting and for obviating the more serious objections to the use of the printed ballot will be described under the head of Voting Machine.

The length and complexity of the official ballot, containing the names of all candidates for all the offices to be filled at a given election, has introduced a new element of confusion. To obviate this, and thus to promote more intelligent voting, a movement aiming to reduce the number of offices to be filled by election at a given time has recently gained great headway in this country. Two methods for accomplishing this purpose have found favor —the separation of national from state and of local from state and national elections by holding them at different times, and the use of the "short ballot." The latter, which involves the election of only the principal officers of the state or city, leaving the others to be appointed, involves important changes in the fundamental

law of the several states as well as the reform of the system of voting by ballot.

For a description of the process by which the state has assumed the regulation of elections, and for an exposition of the laws which have been enacted for securing the purity of the ballot, see ELECTION; ELECTORAL REFORM; CORRUPT PRACTICES; PRIMARY ELECTIONS; VOTE; VOTER; SUFFRAGE.

BALLOT, SHORT. See ELECTORAL REFORM.

BALLOU, bȧ-lo͞o′, HOSEA (1771–1852). An American clergyman and one of the founders of the Universalist denomination in this country. He was born at Richmond, N. H.; after scant schooling he began to preach in 1793, and became a pastor at Dana, Mass., in 1794, and at Barnard, Vt., in 1803. From 1807 to 1815 he was minister of the Universalist congregation at Portsmouth, N. H., and from 1817 until his death was in charge of the Second Universalist Society of Boston, Mass. In 1819 he established the *Universalist Magazine* (later called *The Trumpet*), and in 1831 the *Universalist Expositor* (later called the *Universalist Quarterly Review*). He took a most active part in formally organizing the denomination, in extending its work, and in adding to its literature. He was also known as an eloquent pulpit orator and was much in demand for special celebrations. From John Murray, the first preacher of Universalism in the United States, he differed in the entire rejection of the so-called Calvinistic theology. Chief among his publications are *Notes on the Parables* (1805), *Treatise on the Atonement* (1807), and *The Doctrine of Future Retribution* (1834). For an account of his life and doctrines consult biographies by T. Whittemore (4 vols., Boston, 1854–55), and O. F. Safford (ib., 1889). Consult also J. C. Adams, *Hosea Ballou and the Gospel Renaissance of the Nineteenth Century* (Boston and Chicago, 1903).

BALLOU, HOSEA (1796–1861). An American clergyman, the grand-nephew of Hosea Ballou, of Boston. He was born in Vermont; was pastor in Connecticut and Massachusetts, and in 1853 became first president of Tufts College. He was one of the editors of the *Universalist Magazine*, later published under the name of *The Trumpet*. He was the author of *Ancient History of Universalism*, and edited a translation of Sismondi's *History of the Crusades* (Boston, 1833). A *Biography of the Rev. Hosea Ballou* was written by M. M. Ballou, his son.

BALLOU, MATURIN MURRAY (1820–95). An American journalist, born in Boston, Mass. He founded *Gleason's Pictorial*, the first American illustrated weekly; and was successively editor of *Ballou's Pictorial*, *The Flag of Our Union*, *Ballou's Magazine*, and the Boston *Globe*, of which he was one of the founders. He published *Due West; Due South; History of Cuba* (Boston, 1854); and a *Biography of the Rev. Hosea Ballou*, his father.

BALLOU, WILLIAM HOSEA (1857–). An American author, born in Hannibal, N. Y. He studied at Northwestern University and at the University of Pennsylvania, and was subsequently a member of several United States scientific surveys (1875–78). After some time spent in reform work and journalism he devoted himself to scientific and public interests and to business pursuits. Fort Worth University conferred on him the degree of Sc.D. in 1911. Besides having written many scientific articles for American magazines and foreign weeklies, he is the author of some 300 poems and also of the following novels: *A Ride on a Cyclone* (1889); *The Upper Ten* (1890); *An Automatic Wife* (1891); *Spectacular Romances* (1892); *Love on a Log and Other Stories* (1895).

BALL'S BLUFF. A locality on the Potomac, 33 miles northwest of Washington. Here, on Oct. 21, 1861, during the Civil War, 1900 Federal soldiers of McClellan's army, under Col. E. D. Baker, were overwhelmingly defeated by about 3000 Confederates under General Evans, the latter fighting from the shelter of a thickly wooded grove. The Federals lost about 1000 in killed, wounded, and prisoners, Colonel Baker falling during the engagement; while the Confederates lost only 150. The disaster was due to the blundering generalship of McClellan and his division commander, Stone. The latter was arrested by order of the Secretary of War and imprisoned for six months in Fort Lafayette. This arrest seems to have been unwarranted, as no charges were ever preferred against him and he was later reinstated in command. Consult Johnson and Buel (ed.), *The Battles and Leaders of the Civil War*, vol. ii (New York, 1884).

BALLSTON SPA, bąl'ston spä. A village, the county-seat of Saratoga Co., N. Y., 7 miles southwest of Saratoga Springs, on the Delaware and Hudson Railroad and on the Kayaderosseras River (Map: New York, G 4). It has some reputation as a summer and health resort and is widely known through its mineral springs. The water flows from a depth of 650 feet through a tube bored into the solid rock, and is highly effervescent. The village has a county courthouse, fair grounds and track, the Saratoga county almshouse and hospital, and the Spa sanitarium. The industries include a large tannery, foundries and machine shops, a shirt waist and textile factory, and pulp and paper mills. Settled in 1787, Ballston Spa was incorporated in 1807. Town meetings are held every two years and charter elections annually. The board of education, the village president, and the board of trustees are chosen by popular vote. The water works are owned and operated by the village. Pop., 1900, 3923; 1910, 4138.

BAL'LYME'NA (Gael. middle town). A town and important railway centre of county Antrim, Ireland, on the Braid, 33 miles northwest of Belfast (Map: Ireland, E 2). It lies in a densely populated and well-cultivated district, has agricultural and iron-mining industries, and manufactures linen, especially brown linen. Pop., 1901, 10,886; 1911, 11,381.

BAL'LY TREE. See BLACK BULLY.

BALM, bäm (for derivation, see BALSAM), *Melisa officinalis*. An erect, branching, perennial, herbaceous plant, 1 to 2 feet high, of the family Labiatæ, a native of the south of Europe, naturalized in England, and escaped from gardens in the United States. It has ovate, crenate leaves and axillary one-sided whorls of white or pale yellow flowers. The whole plant has an agreeable, lemon-like smell, on account of which it is frequently cultivated in gardens. It is a valuable honey-producing plant and is sometimes grown for bee forage. Balm is employed for making an agreeable and somewhat exhilarating beverage called balm wine. The leaves and tops are used in medicine under the name of Melissa, or balm. For medicinal use the herb should be cut before the appearance of the flowers, which begin to expand in July. It is nearly inodorous when dry. The taste is some-

what austere and slightly aromatic. Balm has scarcely any therapeutic value. The quantity of oil contained in it is not more than sufficient to communicate a pleasant flavor to the infusion, which forms an excellent drink in febrile complaints, and when taken warm tends to promote the operation of diaphoretic medicines. A variety of the common catmint (*Nepeta cataria*), with a smell like that of balm, is often mistaken for it. Moldavian balm (*Dracocephalum moldavicum*) is a native of the country from which it derives its name, and of Siberia, etc.; an annual plant, having, when fresh, a smell like that of balm, but less pleasant. It is much used in Germany for flavoring. Bastard balm (*Melittis melissophyllum*), a native of the south of England and of many parts of Europe, is a very beautiful plant, which, when dried, has a delightful fragrance and retains it long. In the United States *Collinsonia canadensis* is called horse balm, and *Monarda didyma*, bee balm. All these are of the family Labiatæ.

BALMACEDA, bäl'mä-sā'dä, JOSÉ MANUEL (1838–91). A Chilean statesman. He was born at Santiago, studied there at the Seminario Conciliat, became a leader in the Liberal Club de la Reforma, and in Congress rose to be parliamentary chief of the Progressive party. In 1882 he was appointed Minister of the Interior, and in 1885 Minister of Foreign Affairs. He was elected President in 1886, and forthwith inaugurated an era of public improvement, during which laws were liberalized, railroads were built, and the system of public education was widely extended. Nevertheless this policy eventually alienated from him all save those directly interested in office. In 1890 he was suspected of scheming to effect the election as his successor of Señor San Fuentes, a politician generally distasteful to all parties, and occasion was thus afforded for open dissatisfaction. When he had thereupon proceeded to appoint an unpopular ministry and dissolve Congress, a revolutionary junta was formed and civil war began (Jan. 7, 1891). After the utter defeat of the government troops near Valparaiso (August 7), Balmaceda sought refuge in the Argentine Legation, Santiago, where, on September 18, he committed suicide. Consult Pedro Montt, *Exposition of the Illegal Acts of ex-President Balmaceda, which Caused the Civil War in Chile* (Washington, 1891). See CHILE, *History*.

BALMAIN'. A suburb of Sydney, Australia. See SYDNEY.

BALME (bälm), COL DE (OF. neck or gorge of balsam). A mountain pass in the Alps between Mont Blanc and the group of the Dent du Midi, 7221 feet high. Through it passes the bridle path from Chamonix to Martigny. It is noted for its fine views.

BALMES, bäl'mĕs, sometimes written **BALMEZ,** JAIME LUCIANO (1810–48). A Spanish ecclesiastic, philosopher, and publicist, born at Vich, Catalonia. After studying at the University of Cervera he became a priest (1833), and passed his life in teaching, travel, and study. His fame rests upon his *El Protestantismo comparado con el Catolicismo en sus relaciones con la civilizacion europea* (6th ed., Madrid, 1875; orig. Barcelona, 2d ed., 1844–45; Eng. trans. from the French, Paris, 1842–44, London, 1849; 10th ed., Baltimore, 1868), which is a very able defense of the Roman church in reply to Guizot's *Civilization in Europe*. Other writings of his (in English translation) are *The Foundations of Religion Explained* (London, 1858) and *Letters to a Skeptic on Religious Matters* (Dublin, 1875). For his biography, consult Blanche-Raffin, *J. Balmez, sa vie et ses ouvrages* (Paris, 1849).

BALM OF GILEAD. See BALSAM.

BALMORAL (bäl-mŏr'al) **CASTLE** (Gael. *baile*, dwelling, town + *morail*, majestic). A royal residence situated on the river Dee, about a mile west of Crathie in West Aberdeenshire, Scotland (Map: Scotland, E 2). The estate, purchased in 1848 by the Prince Consort and subsequently extended, now comprises 40,000 acres. In 1853–55 the old building was replaced by a handsome granite castle built in the Scottish baronial style and furnished and decorated in accordance with Highland tastes. The castle consists of two separate blocks of buildings united by wings and a massive tower; it has a straggling rather than an imposing appearance, but commands a magnificent prospect. It was the autumnal residence of Queen Victoria. The castle can be visited by special order when the royal family is not in residence.

BALMUNG, bäl'mung. The name of Siegfried's sword in the *Nibelungenlied*. Originally the ancestral blade of the Nibelungs, it was presented to him by the generous Shilbung and Nibelung, whom straightway he thanklessly slew.

BALNAVES, bäl-nāv'ĕs, HENRY (1512–79), of Halhill, a Scottish reformer. He was born at Kirkcaldy in Fifeshire, and educated at St. Andrews and at Cologne, where he was imbued with the teachings of Lutheranism. On his return to Scotland he studied law. James V made him a senator of the College of Justice in 1538, and when Arran took up the regency he was made Deputy Keeper of the Privy Seal (1542). In the following year he was imprisoned for a time on account of his Protestantism, which became all the more active by these attempts at repression. Suspected of complicity in Cardinal Beaton's murder, he was declared a traitor and excommunicated. He fled to the castle of St. Andrews, and when it was captured by the French was sent to France with Knox and others as a prisoner of war. Here he wrote a treatise on justification, which was published after his death by Knox, with a laudatory preface, under the title of *The Confession of Faith* (Edinburgh, 1584; reprinted, London, 1831). When Mary of Guise assumed the regency in 1556, Balnaves' forfeiture was rescinded. He returned to Scotland and took an active part in public affairs, as a commissioner to settle the Treaty of Berwick (1559–60) and to revise the Book of Discipline (1563), and as an assessor with the regent Murray to inquire into the charges against Mary in connection with Darnley's murder (1568). He died in 1579. For his biography, consult Rogers, *Three Scottish Reformers* (London, 1874).

BAL'NIBAR'BI. One of the countries mentioned by Swift in his *Gulliver's Travels*.

BALNEOLOGY. See HYDROTHERAPY.

BALSA, bäl'sä (Sp. Port. from Peruv. *balza*, a light wood, of which rafts are made). A raft or float, used originally for carrying passengers across a river or for landing in the surf. It consists of two floats—commonly made of logs from the balsa tree, the wood of which is almost as light as cork—separated a short distance from each other and held in that position by a framework. It has been used in South America for centuries; it sometimes consists, as

on the coast of Brazil, of several sharpened logs held together by slats, and, used by fishermen, is often met far out at sea. On the western coast of South America balsas are made of bullock hides sewn together over a framework to form a body of nearly circular section, pointed and turned up at the ends; two of them are joined together by a framework to which they are lashed. The balsa must be regarded as a development of the raft principle, and is analogous to the pirogue, proa, banca, catamaran, and other outrigger boats of Asia and the Pacific islands. The balsas used in the navy are composed of two floats joined by a framework, over which are laid slats about an inch apart. Each float is about 10 feet long, of oval section, but somewhat flattened on top and tapering slightly from the centre towards the ends, built up of staves and banded like a barrel. The width of naval balsas is about two-thirds the length. Larger sizes have been issued, but they are not now supplied. The "india-rubber balsa" has been used on shipboard more or less since 1837, but since the advent of collapsible boats its use has decreased. It is composed of two or more cylindrical, air-tight bags, with apparatus for inflating them, and a framework and raft body to hold them together and afford a platform for passengers or freight. It is comparatively light and portable, but takes up much deck room, and the rubber deteriorates rapidly.

BALSAM, bȧl'sam (Lat. *balsamum*, Gk. *βάλσαμον*, *balsamon*, resin of the balsam tree, the tree itself). A name formerly comprehending many resinous substances and oils, to which important medicinal virtues were ascribed, as well as of medicines compounded of resins and oils. When the term "balsam" is now used without addition, the balsams of Peru and Tolu are generally intended. These two balsams are very similar in all their more important properties, and are both produced by trees of the genus *Myroxylon* or *Toluifera*, of the family Leguminosæ, natives of the tropical parts of America. *Myroxylon balsamum pereiræ*, which is called the quinquino, a beautiful tree, common from Peru to Mexico, is generally regarded as the species which produces the balsam of Peru; and *Myroxylon balsamum genuinum*, a very similar species, found in the forests of Tolu, the banks of the Magdalena, etc., as that which produces the balsam of Tolu; but it is doubtful if the difference is not at least as much owing to the modes of procuring and preserving the balsam; and other species of the same genus are supposed also to yield it. Both balsams have a very fragrant odor. They are used in confectionery to impart a flavor like that of vanilla; also in perfumery, and for pastilles, etc. In medicine they are administered as gentle stimulants and tonics and particularly in chronic bronchial affections. Tolu lozenges are a popular and pleasant remedy for troublesome coughs. These balsams are also used for cleansing ulcers. They contain cinnamic acid, a peculiar oily substance which has been called *cinnamein*, also known as oil of balsam of Peru, resins, benzoic acid, toluene, etc. The name "white balsam of Peru" is sometimes given to a balsamic substance which flows from the *Liquidambar styraciflua*. See LIQUIDAMBAR.

The name "balm of Gilead" is generally applied to a liquid resinous substance which has long enjoyed a very high reputation in the East, being prized not only for its fragrance, but also for the medicinal virtues which it is supposed to possess. It is the subject of several allusions in the Old Testament, which strongly indicate the prevalent opinion of its preciousness; and is celebrated by Strabo, Pliny, Diodorus Siculus, and other ancient writers as a cure for almost every disease. It is generally believed to be produced by a species of *Commiphora*—a small tree growing in Arabia and Abyssinia, and known as *Commiphora opobalsamum* or *Balsamea meccanensis*. The finest balsam, called opobalsam, or balm of Mecca, is obtained by incisions; at first turbid and white, it finally becomes of a golden-yellow color and of a consistence like honey. Inferior kinds are obtained by boiling the fruit and the wood. Balm of Gilead is irritating when applied to the skin and is believed to resemble balsam of Copaiva in its effects upon the human system.

Other substances, sometimes designated balsams and possessing a somewhat similar fragrance, are produced by different species of Burseraceæ. Among them is one called South American balm of Gilead, the product of a tree called *Protium carana*. Balsamic substances are furnished also by a number of species of Clusiaceæ—balsam of Umiri, a fragrant yellow fluid, by *Humiria floribunda*, a South American tree. Canada balsam is a kind of turpentine obtained from the balm-of-Gilead fir (*Abies balsamea*); Hungarian balsam, from the mugho or mountain pine (*Pinus pumilio* or *mughus*); and Carpathian balsam, from the stone pine (*Pinus pinea*). (See FIR and PINE.) Balsam of Copaiva is the produce of different species of *Copaifera*. (See COPAIBA.) A variety of *Populus balsamifera* is known in the United States as the balm-of-Gilead tree. Balsam apple is a name applied to the fruits of two species of *Momordica*, natives of the East Indies, but rather common in the West Indies.

BALSAM (*Impatiens balsamina*). An erect, semi-succulent annual, native of India, and cultivated in flower gardens for more than 300 years. It is sometimes called "touch-me-not," because of the bursting tendency of the ripened seed pods, and also "lady's slipper," referring to the shape of the flower. Many varieties have arisen through cultivation and selection. The double sorts are known as camellia-flowered varieties. The plant grows from 1 to 2½ feet high and branches freely. The flowers are axillary and vary in color from white and yellow to dark-red. The plant is of easy culture. Seed may be sown in the open, or plants started in pots and planted out after danger of frost is past.

BALSAM APPLE. See MOMORDICA.

BALSAMO, bäl'sȧ-mō, JOSEPH. See CAGLIOSTRO.

BAL'SAMODEN'DRON. See MYRRH.

BALTA, bäl'tȧ. A town in the government of Podolia, Russia, situated on an affluent of the Bug, about 210 miles southeast of Kamenetz-Podolski, the capital of the government (Map: Russia, C 5). It is poorly built and very filthy. It is connected by rail with Odessa. The chief articles of its commerce are grain, cattle, and the manufacture of beer, tiles, and soap are among the principal industries. It holds two annual fairs. Pop., 1897, 24,400, 75 per cent of which are Jews. Formerly a Turkish possession, it was ceded to Russia by the Treaty of Jassy in 1791.

BALTA, JOSÉ (1816–72). A Peruvian soldier and statesman, President of Peru in 1868–72,

BALSAM, ETC.

1. BAMBOO (Bambusa vulgaris); *a*, Tip of a female flowering stalk.
2. BARBERRY (Berberis vulgaris).
3. BEECH (Fagus sylvatica).
4. BALSAM (Impatiens balsamina).
5. SMART WEED or KNOT WEED (Polygonum aviculare).
6. BANYAN (Ficus benghalensis).

born at Lima. In sundry revolutions he won military distinction, and in 1855 he withdrew from the army with the rank of colonel. In 1867 he was one of the leaders of the insurrection which drove into exile (January, 1868) the dictator Prado. In 1872 he was shot by order of the Minister of War, General Gutierrez, who had instituted a military mutiny. The populace were swift in their revenge upon both Gutierrez and his brother, who had played the assassin.

BALTARD, bål'tär', Louis Pierre (1764–1846). A prominent French architect and engraver. He studied in Rome (1788–91). He was professor of architecture at the Ecole Polytechnique in 1796, was architect of the Panthéon under the Empire, and supervisor of prisons and markets, 1815–18. He held, after 1818, a professorship at the Ecole des Beaux-Arts and was, after 1837, general inspector of Paris monuments. Among the buildings designed by him were the prison and arsenal at Lyons. He published several works, and was engraver for the great work on Egypt issued by order of Napoleon.

BALTARD, Victor (1805–74). Son of the above, pupil of his father in painting and architecture at the Ecole des Beaux-Arts; won Grand Prix de Rome in 1833. He is noted especially as the architect of the Halles Centrales (general market) of Paris, built between 1852 and 1859. This immense edifice of iron and glass, covering several acres and intersected by a main avenue and two cross streets, was the pioneer of all modern iron-and-glass buildings, and after 60 years of use still serves admirably its original function. Baltard was made architect of the Hôtel de Ville in Paris in 1853. In the reorganization of the corps of architects of the city of Paris in 1860 by Baron Haussmann, he was appointed director, with special charge of the Halles Centrales. He published several monumental books.

BALTCHIK, bäl-chēk' (probably ancient *Melissa*). A seaport of Rumania, situated on the Black Sea, about 24 miles northeast of Varna (Map: Balkan Peninsula, G 3). It has a well-protected harbor and is the seat of a considerable trade in agricultural products. Pop., 1900, 5869; 1905, 6588; consisting chiefly of Turks, and for the rest, Bulgarians, Tatars, and Greeks. This town was bombarded by the Turks in October, 1912, and ceded by Bulgaria to Rumania in accordance with the Treaty of Bucharest of Aug. 10, 1913.

BALTHAZAR, bål-thā'zēr. 1. A character in Eichberg's opera of *The Doctor of Alcantara.* 2. Belshazzar, "which that highte Balthasar," in Chaucer's *Monk's Tale.* 3. One of the Wise Men of the East. 4. The name of several minor characters in plays of Shakespeare.

BALTIC (bąl'tik), Battle of the. See Copenhagen.

BALTIC PROVINCES. A term comprehending three Russian governments bordering on the Baltic, viz., Courland, Livonia, and Esthonia (Map: Russia, D 3). Area, 35,614 square miles. Pop., 1911, 2,687,400. The great bulk of the population consists of Letts and Esths—the former akin to the Lithuanians, the latter a Finnish race. The higher classes, nobility and burghers, are Germans, who constitute about 7½ per cent of the total population of the three governments. The number of Russians is still insignificant. The Teutonic Knights and Sword bearers subjugated the Letts in the thirteenth century, introducing German civilization and Christianity by fire and sword. The inhabitants are nearly all Protestants. Although the soil is not very fertile, agriculture is in a flourishing condition, owing to the improved methods of cultivation and a generally higher intelligence of the people. Commerce and manufactures are also highly developed, favored by the proximity of the Baltic. For further details, see articles on the separate governments.

The Baltic provinces once belonged to Sweden, except Courland, which was a dependency of Poland. The Swedish provinces came into the possession of Russia in the beginning of the eighteenth century through the conquests of Peter the Great, and Courland was acquired in 1795. Peter the Great conceded to the provinces their own administration and guaranteed the inhabitants freedom of conscience. These rights were confirmed anew in 1856, but in spite of this a systematic attempt was made by the Russian government, especially since 1880, to assimilate the provinces with the rest of the Empire. The Greek church endeavored to proselytize the people, the Russian language was substituted for the German in the schools and courts, and the press was subjected to censorship. These measures aroused great discontent in the Baltic provinces, especially among the German nobility, who, constituting but a small fraction of the population, exercise great power over the peasantry. The fall of 1905 witnessed the outbreak of a formidable revolutionary movement among the Lettish and Esthonian peasantry, directed against both the German landowners and the Russian government and partaking largely of the nature of a Jacquerie. See Russia.

BALTIC SEA. The inclosed sea in northern Europe, bounded by Germany, Denmark, Sweden, and Russia, and communicating with the North Sea through a series of winding channels known as The Sound, Great Belt, Little Belt, Kattegat, and Skagerrak. From the peninsula of Denmark, which may be regarded as its western limit, the Baltic extends eastward to the frontier between Germany and Russia and thence northward to about lat. 66°. The greatest length of the Baltic from Lübeck in Germany to Haparanda in Sweden is about 930 miles, while its breadth varies from an extreme of 425 miles (Stockholm to St. Petersburg) to less than 50 miles at the southern extremity. It covers an area of about 160,000 square miles. The northern extension includes three large bays or gulfs, the gulfs of Riga and Finland, indenting the coast of Russia, and the Gulf of Bothnia between Russia and Sweden. On the coast of Germany are smaller indentations, including the bays of Pomerania, Lübeck, and Kiel, and the Gulf of Danzig. The principal islands are Rügen, Bornholm, Oland, Gottland, Osel, Dagö, and the Åland and Danish groups. The depression occupied by the Baltic is generally shallow; on the Stolpe Bank, off Stolpmünde in Germany, the depth is less than 40 feet, and over considerable areas it does not exceed 120 feet. Like the North Sea, the greatest depths are found in the northern part, the extreme being 1542 feet (south of Stockholm). The Baltic receives the drainage of a large part of northern Europe, including western Russia, northeastern Germany, and nearly the whole of Sweden. Owing to this drainage and to the restricted channel to the North Sea, the surface water of the Baltic contains only a third as great a percentage of salt as the Atlantic, and the saltness shows a ten-

dency to decrease towards the west and north. Tidal action is apparent only on the southern coasts, but there are surface currents of a low degree of salinity which flow constantly from the Baltic to the North Sea, while deeper currents, whose waters contain a larger content of salt, flow in the opposite direction. Storms are frequent and often cause severe losses to shipping. Easterly winds are particularly dangerous, as they drive the water before them in the form of huge tidal waves. Navigation in the northern part is suspended by ice during the winter season and early spring. The Baltic is of great commercial importance to northern Europe; the most important ports are Copenhagen, in Denmark; Kiel, Lübeck, Stettin, Danzig, and Königsberg, in Germany; Riga, Reval, St. Petersburg, Cronstadt, Helsingfors, and Åbô, in Russia; and Stockholm, Karlskrona, and Malmö, in Sweden. The Baltic is connected with the North Sea by an artificial waterway, the Kaiser Wilhelm Canal, 61.3 miles in length, which was completed in 1895. The canal contains no locks and is of sufficient depth to permit the passage of deep-sea ships. More than 40,000 vessels with a tonnage of 7,000,000 pass over its waters annually.

BALTIMORE, bą̀l'tĭ-mōr. The metropolis of Maryland, and the seventh city in point of population in the United States. It is situated on the Patapsco River, at the head of tide water and navigation, about 14 miles from Chesapeake Bay (Map: Maryland, L 3). The city extends about 6¼ miles from east to west, and between 4½ to 5½ miles from north to south, covering an area of 31½ square miles, or 20,254 acres.

Physical Characteristics. Baltimore is situated, in common with other great centres of the Atlantic border, at the junction of the plateau of old crystalline rocks and the overlying beds of younger and still unconsolidated formations, which stretch out towards the east. The hills within the city are composed of younger sands and gravels, which are cut through by such streams as Herring's Run, Jones's and Gwynn's Falls, and the Patapsco River. The climate of the city is temperate and bracing, removed alike from the bitter cold and enervating heat of more extreme localities.

Baltimore is roughly divided into two nearly equal parts by a small stream—Jones's Falls—which rises 20 miles to the north and flows through the city. The area of this stream is being converted into a highway, to be known as the Fallsway, of a minimum width of 75 feet, running diagonally across the city from the docks to the railroad terminals. The stream flows through the sewer pipes, above which there has been constructed a system of concrete arches, which are in turn covered by a pavement of stone blocks. The portion of the city northeast of the stream, of which Fells's Point and Canton, with wharves, factories, and canneries lining the water's edge, are respectively the south and southeast ends, is still denominated "Old Town." The southeastern section is occupied largely by immigrants and presents the ordinary characteristics of a seaboard city. To the north, east, and northeast stretches the residential quarter of the city's breadwinners. Of the section southwest of the Falls, Locust Point is an irregular strip extending to the southeast, with numerous wharves, railroad terminals, and grain elevators, and tipped at the very extremity by Fort McHenry. The southwestern corner is Spring Garden. The wholesale business section extends north from Pratt Street, the extreme northern limit of the harbor, and is bounded by Paca, Baltimore, and Light streets. A little beyond is Baltimore Street, the chief latitudinal thoroughfare. Farther on, widening out to the west, lies the retail shopping district, while beyond, extending halfway to the northern limits, is the fashionable residential quarter. The northern and northwestern sections are substantial-dwelling districts, fringing out to modest but comfortable artisans' homes. Houses are numbered in the decimal plan, running north and south from Baltimore Street, and east and west from Charles Street.

Monuments and Buildings. Baltimore is called the Monumental City, a title derived less from the number of its stone memorials than from the early date at which Washington Monument, in Mount Vernon Place—a noble marble shaft rising 164 feet, surmounted by a heroic figure of Washington—and Battle Monument, in Monument Square, were erected. Mount Vernon Place contains several bronzes by Barye and one by Dubois, the Rhinehart monument of Chief Justice Taney, and the Story replica of the George Peabody monument. Other monuments of interest are the Wells and McComas, the Armistead, the William Wallace, the Wildey, the Howard, the Confederate, the Ridgely, the Francis Scott Key, and the Soldiers' and Sailors' monuments.

The characteristic of Baltimore architecture is solidity and convenience. The public buildings of special interest are the city hall, the post office, the custom house, the city jail, the Peabody Institute, the Johns Hopkins Hospital, the Enoch Pratt Free Library, the Masonic Temple, and, most beautiful of all, the courthouse, of white marble, in classic Renaissance style, with interesting mural paintings by Blashfield and Turner, and a bust of Severn Teackle Wallis, the distinguished Maryland jurist and man of letters. The city boasts many large and beautiful apartment houses, such as the Marlborough, Washington, Esplanade, Homewood, and Algonquin. The Continental, Equitable, American, Baltimore and Ohio, and Fidelity buildings are imposing office structures. The important clubs of the city are the Maryland, occupying a beautiful Romanesque edifice of white marble; Baltimore, Athenæum, University, Phœnix, and Country (Roland Park). The Stafford, Rennert, Howard, Caswell, Eutaw, Emerson, Kernan, and Belvedere are the principal hotels. A United States Subtreasury is located here.

Parks and Squares. The public parks and squares of Baltimore are beautiful and well distributed. The more important are Druid Hill (674 acres), Gwynn's Falls (375 acres), Clifton (267 acres), Wyman (198 acres), Carroll (177 acres), Patterson (128 acres), Herring Run (154 acres), Riverside (17 acres), Latrobe (14 acres), Swann (11 acres), and Federal Hill (8 acres). Druid Hill may be reasonably described as one of the finest parks in the United States. It abounds in natural beauties which have been carefully preserved and emphasized. Druid Lake, an artificial basin, is part of the municipal water-works system. Carroll Park contains the historic Carroll mansion. Clifton Park was purchased from the Johns Hopkins University. Wyman Park, and a tract which will probably be called University Park, situated adjacent to

Homewood (the suburban site of the Johns Hopkins University), on Charles Street, bid fair to rank among the most attractive parks of the city. Under an adopted plan prepared by Frederick Law Olmsted, the city has undertaken a definite extension of its systems of parks and squares.

Suburbs. Baltimore's suburban growth has been very rapid. Suburbs extend north and northwest of the city proper for about 10 miles and are made accessible by electric car lines. It is estimated that these suburbs have (in 1913) a population of 100,000. Among the more important are Arlington, Mount Washington, Roland Park, Walbrook, Forest Park, and Catonsville.

Cemeteries. Greenmount Cemetery (containing the graves of many illustrious men, including those of John McDonogh, Johns Hopkins, and Sidney Lanier), Loudon Park, and the National Cemetery are the most important burial places. Westminster, one of the oldest and smallest churchyards in the city, contains the grave of Edgar Allan Poe.

Educational Institutions. Baltimore ranks as one of the foremost educational influences of the country. A graded system of public schools provides free instruction in kindergarten, primary, secondary, collegiate, and normal studies, and in manual training. The system comprises 161 schools, employing 1850 teachers, with a total enrollment of 79,000 pupils and an average attendance of 62,000; including both elementary and secondary schools. Baltimore is the seat of the Johns Hopkins University (q.v.), opened for instruction in 1876. Other institutions of learning are St. Mary's Seminary of St. Sulpice, Loyola College, Goucher College, Morgan College (colored), and St. Joseph's Seminary (colored). Among the professional schools are the law and medical departments of the University of Maryland, College of Physicians and Surgeons, Maryland College of Pharmacy, and Baltimore College of Dental Surgery. The last named, founded in 1839, is the oldest dental college in the world. Other schools and academies are McDonogh School, Bryn Mawr School, Calvert Institute, Academy of the Visitation, Notre Dame of Maryland, and Mount de Sales Academy.

The Peabody Institute, endowed by George Peabody, who laid the foundation of his great fortune in Baltimore and entertained a strong friendship for its people, contains a valuable library of 180,000 books, 28,000 pamphlets, and 1400 maps, an interesting art gallery, and a well-organized conservatory of music. The art galleries of Mr. Henry Walters contain one of the choicest private collections in the United States, and are opened to the public at certain seasons for the benefit of a local charity. The Maryland Historical Society has a valuable collection of books, pamphlets, and manuscripts, and an art gallery. The Maryland Academy of Sciences possesses interesting natural-history collections. The Maryland Institute includes a school of art and design and a library.

The libraries of the city, in addition to those connected with the several institutions enumerated above, are the Enoch Pratt Free Library, containing more than 306,000 volumes, with branch libraries in various parts of the city; the Baltimore Bar Library, the Maryland Diocesan Library, the Medical and Chirurgical Faculty Library, and the New Mercantile Library.

Charitable Institutions. Among the important charitable institutions of the city, supported by endowment, private contribution, or public aid, are the Johns Hopkins Hospital, in construction and equipment one of the finest in the world; Sheppard-Pratt Insane Asylum, Maryland University Hospital, Union Protestant Infirmary, City Hospital, Maryland General Hospital, St. Joseph's Hospital, Church Home and Infirmary, Hospital for the Women of Maryland, Jewish Home for Consumptives, Eudowood Tuberculosis Sanitarium, Hebrew Hospital and Asylum, Baltimore Orphan Asylum, Thomas Wilson Sanitarium, St. Vincent's Infant Asylum, Nursery and Child's Hospital, Hebrew Orphan Asylum, Bay View Asylum (the city almshouse), House of Refuge, Maryland Hospital for Insane, Mount Hope Retreat. Numerous other sectarian and non-sectarian institutions provide for the relief of the sick, needy, and the infirm. A Pasteur Institute (city) is in successful operation.

Churches. The first Methodist Episcopal church in the United States was founded in Baltimore. The city is also the seat of a Protestant Episcopal bishop and of a Roman Catholic archbishop (Cardinal Gibbons), whose diocese is the first in the United States. Important Roman Catholic church assemblages have been held here from time to time, one of the most interesting being the Third Plenary Council in 1885.

The city abounds in noteworthy ecclesiastical structures. The Roman Catholic Cathedral, built in the early part of the nineteenth century, is remarkable for the chaste simplicity of its design and proportion of its parts. Of more recent construction are Grace Episcopal Church, First Methodist Episcopal Church, First Independent Christ's Church, First Presbyterian Church, First Baptist Church, Associate Reformed Church, Vernon Place Methodist Episcopal Church, and the Eutaw Place, Madison Avenue, and Bolton Street synagogues.

Trade and Industry. Natural geographical situation, favorable trade connections, and unusual harbor facilities constitute Baltimore's chief commercial advantages. At the entrance to the harbor the Patapsco River divides into the northwest, southwest, and middle branches. The northwest pierces 2½ miles into the very heart of the business portion of the city. The southwest and middle branches envelop the southern and southwestern sections, giving a long expanse of water front in close proximity to the lines of the Baltimore and Ohio and the Wabash railroads. The main harbor, or that on the northwestern branch, has a water front, measured on the pier head line, of 6½ miles, an area of 630 acres, and while leaving ample fairways for the movement of vessels, furnishes 96 acres of anchorage grounds, on which the least depth of water is 19 feet. The whole of the lower portion of the harbor, covering the elevators and steamship piers, has a depth of 27 feet at mean low water. The harbor along the southwest and middle branches has, within the city limits, and measured on the pier-head line, a water front of 5½ miles, and nearly as much more on the opposite banks in the county. It covers an area of 1300 acres, and has channels of 24 feet depth at mean low water. The municipal pier system has been adopted. This favorable geographical situation has been emphasized and developed by the establishment of direct lines of communication. The Baltimore and Ohio Railroad reaches in one direction to Philadelphia, thence by direct connection to New

York, and on the other hand penetrates to the west, southwest, and northwest to the waters of the Mississippi. The Northern Central Railroad serves to connect Baltimore with the great Pennsylvania system, and affords a direct outlet to the north. Two associated branches of the Pennsylvania system are the Baltimore and Potomac to Washington, and the Philadelphia, Wilmington and Baltimore to Philadelphia and the north and east. The Western Maryland Railroad, constructed largely through municipal aid, and extending in one direction through the fertile valley of the Shenandoah and in another into the rich Cumberland Valley, has been acquired by the extensive Wabash system; and in July, 1912, a new trunk line connecting Baltimore and the Atlantic seaboard with Pittsburgh and the West was inaugurated by way of the new Western Maryland extension.

Regular communication between Baltimore and foreign ports is afforded by the North German Lloyd to Bremen, the Neptune line to Rotterdam, the Atlantic Transport line to London, and a number of other lines offering frequent service. The city is the largest corn-exporting port in the United States. Other important articles of local export are wheat, flour, cotton, tobacco, copper, and coal. Importing activity centres about iron ore, bananas, pineapples, coconuts, sugar, and general merchandise. In 1910 Baltimore ranked fourth among all the seaports of the United States in the value of exports and sixth in the value of imports.

The manufacturing enterprises of Baltimore are most varied, scarcely a single important industry being unrepresented. It is the largest manufacturing centre in the United States for fertilizers, straw goods, cotton duck, fruit canning, and oyster packing. It has the largest copper-refining plant in America. In the total value of its manufactured products Baltimore stood in 1909 thirteenth among the cities of the United States. The shipbuilding industry has recently undergone marked development. Sparrow's Point, with its great steel plant, Curtis Bay, Locust Point, and Woodberry are busy industrial centres.

The closer proximity of Baltimore, by several hundred miles, to the great cotton belt of the South, to the grain-growing sections of the West, and to the wood, coal, and iron wealth of the interior, affords cheap and easy access to the raw materials of industry. It is believed that Baltimore's location in the middle of the Atlantic coast and its facilities for collecting and distributing from and to the inland will throw to the port a large proportion of the trade that will pass through the Panama Canal. The proximity of a rich and productive country, the low cost of water transportation, and the economy of domestic distribution through municipal markets render the cost of living in Baltimore much less than in many smaller cities.

Municipal Government. The original municipal charter, granted in 1796 and repeatedly amended and modified, was replaced in 1898 by a modern reform instrument of government. Under its provisions the government of the city is vested in a mayor, who holds office for four years, a bicameral city council, and various administrative departments, boards, and commissions. The municipal officials, with the exception of the city register and printer (elected by the city council), and the comptroller, surveyor, and president of the second branch of the city council (elected by popular vote), are appointed by the mayor, with the consent of the higher branch of the city council. The mayor, comptroller, city engineer, city solicitor, and president of the higher branch of the city council constitute a board of estimates, exercising essential control of municipal finances. The board of awards is of similar composition, with the register substituted for the city engineer. The mayor, comptroller, register, and two other persons appointed by the mayor serve as commissioners of finance in the administration of the municipal debt.

Baltimore spends annually, in maintenance and operation, about $22,000,000, the principal items of expense being: police department, $1,270,000; charity and corrections, $530,000; street lighting, $391,000; fire department, $1,100,000; parks and squares, $522,000; schools, $2,500,000; sewers and sewerage disposal, $2,500,000; interest on debt, $2,450,000. The water works, representing a total construction expenditure of nearly $20,000,000, are owned and operated by the city. The entire system now includes some 732 miles of mains, two standpipes, eight storage reservoirs and two impounding reservoirs. The city has a gross bonded debt of about $75,000,000, and the assessed valuation of property, real, personal, and corporate, is $782,000,000. The city parks are maintained by a franchise tax upon the receipts of the street railways.

Population. The thirteenth census (1910) of the United States gave the total population of Baltimore as 558,485, divided into 118,851 families, occupying 101,905 dwellings. Of this number 268,195 were males and 290,290 were females; 481,442 were native born and 77,043 were foreign born. The total number of whites was 473,387 and of colored 85,098. Of the native whites 261,474 had native parents and 134,870 had foreign parents. The total illiterate population 10 years old and over was 20,325, of whom 10,887 were white and 9438 were colored; 1920, 733,826.

History. The foundation of Baltimore is associated with the emergence of the proprietary government of Maryland from an era of troublous times towards the close of the first quarter of the eighteenth century. With the expansion of commerce and the increase of population, it was not long before the need of a port near the head of Chesapeake Bay began to be felt. Attention was directed to a remarkable site on the north side of the Patapsco River, 14 miles from the waters of the bay, offering easy access and safe harbor to vessels of large size. On July 14, 1729, a petition was presented to the Provincial Assembly praying for the erection of a town at this point, and three weeks later a bill to this effect was passed.

Baltimore slowly but surely forged ahead of older towns in trade. The history of the city immediately before and during the Revolutionary War forms a familiar chapter in our national history. From Baltimore largely came the zeal and energy with which Maryland entered into the War of Independence. The events of the war interrupted foreign commerce and cut off all continental supplies; but it stimulated local manufactures and shipping thereafter. Local merchants engaged extensively in the world's carrying trade, and "Baltimore clippers" became famous. During the War of 1812 the city was attacked by land and water, but successfully defended in each case. During the bombardment

of Fort McHenry, Francis Scott Key, while detained on board a British vessel, composed the national anthem, "The Star-Spangled Banner." The introduction of new industrial methods succeeded the reactionary depression following the War of 1812. The Chesapeake and Ohio Canal and the Baltimore and Ohio Railroad were projected and carried forward by local enterprise. The first telegraph line in the United States was constructed between Washington and Baltimore. Industry, trade, and commerce suffered heavily from the events of the Civil War. Communication with the South was completely cut off, and western trade diverted to other channels. A mob attack upon a Massachusetts regiment in its passage through the city, on April 19, 1861, inflamed the country and led to the Federal occupation of the city. But the causes of prosperity were suspended, not destroyed, and as the prostrate industrial life of the tributary territory revived, the city emerged into new importance as an industrial centre. In 1888 a large area or "belt" of suburban territory was annexed to the corporate limits. On Feb. 7, 1904, a conflagration wiped out the business centre of the city. The fire burned 30 hours and spread over the territory bounded by Fayette, Charles, Baltimore, Liberty, and Lombard streets, the water front, and Jones' Falls. The loss was estimated at $125,000,000. Within three years the burnt area was completely rehabilitated. The fire has since been considered a blessing in disguise because of the spirit of progress which it awakened. The diversification of manufactures, the growth of commerce, extension of trade, increase of population, the influx of foreign elements, the rise of economic standards, the development of civic consciousness have been the essential elements in the later history of Baltimore.

Consult: Scharf, *The Chronicles of Baltimore* (Baltimore, 1874); Thomas, *The City Government of Baltimore* (ib., 1889); Hollander, *Guide to the City of Baltimore* (ib., 1893); Love, *Baltimore: The Old Town and the Modern City* (ib., 1895); Hollander, *The Financial History of Baltimore* (ib., 1899); and Coyle, *The Baltimore Book* (ib., 1912).

BALTIMORE, BARONS OF, or LORDS BALTIMORE. The title of the Calvert family in the Irish peerage. SIR GEORGE CALVERT, first Lord (c.1580–1632). A British statesman. He was born at Kipling, Yorkshire, and graduated at Oxford in 1597. He then became secretary to Sir Robert Cecil and won the esteem of James I, who knighted him in 1617 and made him Secretary of State in 1619. In 1621 and again in 1624 he sat in the House of Commons; but becoming a Catholic shortly afterward, he resigned, only to be raised to the Irish peerage by the favor of the King as Baron of Baltimore. He early became interested in the colonization of the New World and in 1621 dispatched a ship to Newfoundland to establish a settlement. In 1623 he obtained a charter to found a colony there under the name of the Province of Avalon. He crossed the ocean himself in 1627 and again in 1629, taking his family with him, but encountered many difficulties from the hostility of the French and the severity of the climate and soon applied for a grant of land in a more genial region. Although the King had tried to dissuade him from his project, he finally obtained (in 1632) a grant of the territory which was called "Maryland" by Charles I in honor of the Queen. Before the charter was issued, Sir George died, and the grant devolved upon his son Cecil, who thus became the real founder of Maryland, although he never visited the Colony. He sent settlers, however, under his younger brother, Leonard (see CALVERT, LEONARD), who was the first Governor of Maryland (1634–47). The successive Barons of Baltimore, or Lords Baltimore, were: GEORGE (first), CECIL (second), CHARLES (third), BENEDICT (fourth), CHARLES (fifth), and FREDERICK (sixth). The house became extinct with the last, who died without leaving legitimate issue. All of them were prominently identified with the history of Maryland.

Consult: W. H. Browne, *George Calvert and Cecilius Calvert, Barons of Baltimore* (New York, 1890); L. W. Wilhelm, *Life of George Calvert* (1884), one of the Maryland Historical Society's monographs; J. P. Kennedy, *Discourse on the Life and Character of George Calvert, Lord Baltimore* (Baltimore, 1845); C. H. Firth, article in *Dict. of Nat. Biog.*, and references there cited; C. C. Hall, *The Lords Baltimore and the Maryland Palatinate* (Baltimore, 1905).

BALTIMORE ORIOLE. See ORIOLE.

BALTINGS, bäl'tingz. The royal family from which the Visigoths chose their kings.

BALTISTAN, bäl'tē-stän' (Pers. *stan*, district, region; of the Baltis), or LITTLE TIBET. A province of Kashmir, a native state, India, on the south of the Mustagh and north of the Kashmir province (Map: India, C 1). It is situated in the midst of enormous mountain ranges with peaks of 25,000 and 26,000 feet, and one over 28,000 feet, and glaciers which are the largest known out of polar regions. The area is estimated at about 13,000 square miles, and the population at about 60,000. The people are essentially Mongolian and in large part profess Mohammedanism. Their language is a Tibetan dialect. Cultivation of the soil is dependent on irrigation, and life presents many hardships. The cold is often intense, and the country is almost without forests. Independent rule in Baltistan, by the rajas or gialpos, came to an end in 1840. Years of oppression followed, but the country, now under the administration of the Wazit Wazarat of Ladakh and the protection of the government of India, may look for better days.

BALTZER, bälts'ĕr, JOHANN BAPTISTA (1803–71). A German theologian. He was born at Andernach, studied at Bonn, and after his ordination to the priesthood in 1829, was made professor of theology at Breslau in the following year. He was at first an enthusiastic follower of Georg Hermes in his attempt to reconcile the newer German philosophy with the Roman Catholic teaching, but definitely broke with his school in 1839 and associated himself with the speculations of Anton Günther. After the papal condemnation of the latter's teachings Baltzer submitted indeed, but his independent spirit led him into further difficulties, and he was suspended in 1862. As in natural sequence he was a strenuous opponent of the definition of papal infallibility and was a promoter of the Old-Catholic movement in Silesia. He published *Die biblische Schöpfungsgeschichte* (2 vols., 1867–73), and *Ueber die Anfänge der Organismen* (4th ed., 1869). For his life, consult: Friedberg (Leipzig, 1873), and Melzer (Bonn, 1877), both favoring Baltzer's attitude, and Franz (Berlin, 1873), representing the other side.

BALTZER, WILHELM EDUARD (1814–87). A German theologian and leader of the movement known as the *Freie Gemeinden*, or free religious communities which have sprung up since the middle of the nineteenth century in opposition to dogmatic and traditional theology. He was born at Hohenleine, studied at Leipzig and Halle, and entered the Lutheran ministry, but on account of the liberal views which, following Delitzsch, he had adopted, was not looked upon with favor. Consequently, in 1847, he founded a "free church" of his own and presided over a convention of similar organization at Nordhausen in the same year. Until 1881 he continued to be a representative leader among them, but lived in retirement at Grotzingen for the last few years of his life, partly occupied in the promotion of vegetarianism, for which he founded an association and an annual publication. His writings were mainly devoted to the propagation of his views; among them are *Alte und neue Weltanschauung* (4 vols., 1850–59); *Gott, Welt und Mensch* (1869); *Vegetarisches Kochbuch* (14th ed., 1900).

BALU, bä'lōō (native name). A variegated wild cat of Sumatra, probably a variety of *Felis aurata*.

BA-LUBA, bȧ-lōō'bȧ. A Negroid people of the middle Kasai Basin, Belgian Congo. They are intelligent, adaptive, industrious, and skilled in the arts; travelers praise the good qualities of this powerful people.

BALUCHI, bȧ-lōō'chē, or **BELOOCHE.** A modern Iranian dialect, with many foreign loanwords from the Persian, Arabic, Turkish, and Sindhi. The Baluchi is divided into two main dialects, one of which, the southern or Makrani, has preserved many of the older features of the language with less change than is the case with the northern Baluchi, which, however, possesses the better-known literature. The Baluchi is far inferior to the Afghan (q.v.) in literary development. On the other hand, it represents in its consonantal system by far the oldest stage of any of the modern Iranian dialects, being in this regard on the same level as the Middle Persian or Pahlavi (q.v.). Thus the Persian changes *rd, rz* to *l*, while Baluchi preserves the original sounds: Persian *dil* (heart), Baluchi *zirdē* (cf. Russian *serdtse*, Lat. *cordis*); original *dj* is preserved, whereas it becomes *z* in Persian: Bal. *djan* (wife) = Pers. *zan*. Baluchi is seen to be equally conservative in that it does not change, as does the Persian, medial and final surds to sonants: Bal. *šap* (night) = Pers. *šab*, etc. The ruling race of Baluchistan, the Brahui (q.v.) speak a language which is entirely different from the Baluchi, being of Dravidian origin. Consult: Geiger, "Sprache der Balutschen," in Geiger and Kuhn, *Grundriss der iranischen Philologie* (Strassburg, 1898), and the literature there cited. Longworth-Dames, *Popular Poetry of the Baloches* (Folklore Soc. publications, London, 1907).

BALUCHISTAN, bȧ-lōō'chē-stän', or **BELUCHISTAN,** be-lōō'- (Pers. *stan*, district, region, of the Baluchis). A British dependency in Asia, bounded by Afghanistan, on the north, Sindh (British India) on the east, the Arabian Sea on the south, and Persia on the west (Map: Asia, Central, K 6). It extends from lat. 25° to 32° N., and from long. 61° to about 70° 30′ E., and covers an estimated area of 134,650 square miles, including the territory directly or indirectly held by Great Britain.

Description. The general appearance of the surface is rugged and uninviting. The chief mountain ranges enter from Afghanistan, through the northeastern end, and branch out towards the south and the west. Parallel to the eastern frontier runs the Kirthar Range, terminating at Cape Monzen, on the Arabian Sea. The level country found mainly in the northwest consists of stony plains. The highest peaks have an altitude ranging from 10,000 to 12,000 feet. The coast line, having a total length of about 600 miles, is mostly elevated and very little indented. It is without any harbors, but has a few roadsteads, the most important of which are Ormarah and Gwadur. The rivers of Baluchistan are generally short and flow in a direction from north to south. Very few of them, however, reach the coast, as their scanty waters are either diverted for irrigation purposes or are absorbed by the sandy soil. The chief of them are the Bolan and the Mula in the north, the Purali and the Hingol in the south, the latter entering the sea, and the Dasht at the southwestern end, also discharging into the Arabian Sea. The climate varies greatly with the formation of the surface. The winters are generally severe, and snow is found even in the valleys. The summers are excessively hot, especially on the coast.

Industries. The cultivable area in comparison with the total area is small; for, excepting the plains of Kachhi, Las Bela, and the Dasht in Makran, cultivation is confined to limited areas in the middle of the valleys between the mountains. Grains, cotton, indigo, and all kinds of southern fruit are cultivated in several parts of the country, and the date palm grows in abundance in Makran. Land available for grazing purposes is found in some localities, and camels, sheep, and horses are reared. The mineral deposits are numerous and include gold, silver, copper, iron, zinc, saltpetre, and different kinds of salts. Manufacturing industries are practically non-existent; the principal products are rough blankets. The chief exports are wool, hides, dried fruit, madder, and tobacco. Transportation is effected chiefly by camels and the Sindh-Pishin Railway. There are about 550 miles of railway, and more are under construction. The town of Quetta in northwest Baluchistan is one of its important centres and is fast acquiring prominence as the western terminus of the Indian railway system.

Government, etc. Baluchistan consists of British Baluchistan (districts and administered territories), administered by a chief commissioner under the Governor-General of India; the native state of Khelat, governed by a khan under the control of a British political agent; the native state of Las Bela, governed by a jam, who is also controlled by the political agent; and tribal areas. British territory consists of the districts of Quetta Pishin, Loralai, Zhob, Bolan, Chagai, and Sibi; capital, Quetta; area, 46,960 square miles; pop. (1911), 414,412. The area of Khelat is stated at 73,278 square miles; capital, Khelat. Las Bela has 7132 square miles, and the tribal areas 7268 square miles. The total area of the native states is therefore 87,678 square miles; pop. (1911), 396,432; total Baluchistan, 134,638 square miles; pop., 810,844 (of whom 758,761 are Mohammedan). The two principal tribes are the Baluchis and the Brahuis.

Ethnography. The Baluchis, or Biloch, after

whom Baluchistan is named, are, like the Afghans, an Aryan people, with Indic and Iranic linguistic affinities, perhaps more of the latter. Some Arab, Turk, and Negro blood also exists in some of the Baluchis. They are physically above the average, largely nomadic, and present some of the best and some of the worst characteristics of partly civilized races. In physical constitution, dress, and mental disposition they are distinguished from the Brahuis, who seem to have come earlier into the country. Both peoples are followers of Islam, professing the Sunnite creed, and the various tribes still lead a semi-independent life. Less important peoples in Baluchistan are the Persian Dehwars, or "villagers," the Gypsy-like Luris, and the Mekranis of the coast, who are considerably mixed in race. For more recent information consult Oliver, *Across the Border, Pathan and Biloch* (London, 1890), Dames, *Popular Poetry of the Baloches* (London, 1907), and other works.

History. Baluchistan, which is first mentioned by the historians of Alexander the Great under the name of Gedrosia, was ruled from early times to the end of the seventeenth century by a line of Hindu princes. Hard pressed by the mountain tribes of the interior, the Hindu rulers summoned to their aid the Brahuis, under their leader Kumbar, who subdued the predatory tribes and then made themselves masters of the country. The descendants of Kumbar established themselves firmly in power and were confirmed in their authority by the celebrated Nadir Shah, ruler of Persia, who overran the region on his expedition into India in 1739. Under the energetic Nasir Khan (1739–95), the supremacy of the Khan of Khelat was successfully asserted over the numerous tribal chiefs. British influence in Baluchistan dates from 1839, when, in reprisal for the khan's hostile conduct, Khelat was stormed by General Willshire. By a treaty of alliance concluded between Nasir Khan II and Great Britain in 1854, that ruler, in return for an annual subsidy of 50,000 rupees, later increased to 100,000, conceded to the British the right of armed intervention in any part of his territory—an exercise of power which the British government carried to the extent of forcing the resignation of the ruler of Khelat, Mir Mahmud Khan, in 1893. Since that date Baluchistan has come more and more under British influence, a large section of the country being now under the direct control of a British agency. Consult: Macgregor, *Wanderings in Balochistan* (London, 1882); Möckler, "Origin of the Balloch," in *Asiatic Journal* (Calcutta, 1896); Noetling, "Ueber prähistorische Niederlassungen in Baluchistan," in *Zeitschrift für Anthropologie und Ethnologie* (Berlin, 1899); Bellew, *Races of Afghanistan* (London, 1880). Consult also the *Proceedings* of the Royal Geographical and the Royal Asiatic societies.

BALUCKI, bȧ-lōōts′kē, Michal (1837–1901). A popular Polish novelist and playwright. Born at Cracow, he studied at its gymnasium and university, being graduated from the latter in 1861. While still at the university he attracted considerable attention by his verse and prose, and a year after graduation his literary career may be said to have begun. It continued uninterrupted for nearly 40 years, save for a twelvemonth spent in prison for participation in the Polish Revolution of 1863. On his release he published, under the pseudonym of Elpidon, his first novel, *The Awakening* (1863). This, like most of his novels and comedies, satirized the manners and customs of the time in Poland. It was followed by three frank comedies in similar vein: *The Young and the Old* (1866), *The Counselor's Advisers* (1887), and *Hunting a Husband* (1869). Then came a number of novels, among which were *Dazzling Poverty* (1870), *The Jewess* (1871), *Sabina* (1871), *From Camp to Camp* (1872), *The Parson's Niece* (1872), and *The White Negro* (1875). *A Romance without Love* (1870) is one of his most popular novels. Among his other comedies the best known are *The Emancipated* (1873), *Gilded Youth* (1876), *The Amateur Theatre* (1879), *The Town Council* (1880), *The Open House* (1883), *Miss Valerie* (1891), *The Flirt* (1893), and *The Burgomaster of Pipidowka* (1894). Besides these and other of his longer works, Balucki wrote numerous short stories and essays on literary, historical, and dramatic subjects. The distinguishing characteristics of his creative writing are a strong democrative tendency and a persistent scorn of the prejudices and other shortcomings of society. Yet the author's brilliant style and unforced humor have not only saved him from offending his readers, but have actually aided in conveying the much-needed lessons. In this way his influence on Polish readers has been very great, as great perhaps as Gogol's in Russia and Dickens's in England. Owing to his distinctly national appeal, his works have not yet been translated into either French or English, although two or more have been rendered in German.

BALUGA, bȧ-lōō′-gȧ. Name applied to the Negrito mixed-bloods of Central Luzon, Philippine Islands.

BAL′USTER, popularly **BAN′ISTER** or **BAL′LASTER** (Fr. *balustre*, It. *balaustro*, through Lat. *balaustium*, from Gk. βαλαύστιον, *balaustion*, flower of wild pomegranate tree; so named from its shape). The name given to small shafts or pillars set in a line at short equal distances, and supporting a capstone or handrail. Though balusters were represented in Assyrian bas-reliefs, they seem to have been entirely unknown in classic architecture. Their artistic development came with the Renaissance. The earliest type resembled miniature pillars; then came a type consisting of two short candelabrum-shafts or slender vase-like forms, connected by a scotia and moldings, the lower "vase" being inverted; and finally (c.1540) the baluster with a single vase or pear-shaped swelling with well-defined base and cap. Modern balusters of wood for interior use are often slender spindles, sometimes (since 1750) spirally twisted. Metal balusters of very varied forms are often used. See Balustrade; Renaissance Art, *Architecture*.

BALUSTRADE′, (from *baluster*). A range of balusters, together with the hand rail or capstone which they support; also any decorative railing or parapet, whether designed with balusters or not. It may serve as a parapet for a stairway, balcony, terrace, bridge, or roof, or as a railing for an altar or chancel, or a partition between the public and private parts of any room, as a court room or office. Unimportant as a feature in classic architecture, it was treated with considerable elegance of openwork tracery by the later mediæval architects. It was the Renaissance artists who invented the forms of vase-like balusters commonly used in neo-classic architecture. Among notable examples of Renaissance balustrades may be mentioned those of the Gondi

Palace court at Florence, of the cathedral pulpit at Siena, of the *tribuna* in the Sistine Chapel, of the two *cantorie* or music balconies formerly in the Duomo at Florence (now in the "Opera del Duomo"), sculptured respectively by Luca della Robbia and Donatello, and of the staircase tower of Francis I at Blois, France.

BALUZE, bȧ'lụz', ETIENNE (1630–1718). A French historian, born at Tulle. Almost his entire life was spent in Paris, and there he published his famous histories, *Histoire généalogique de la Maison d'Auvergne* (2 vols., 1708), and *Vitæ Paparum Avenionensium* (2 vols., 1693). The latter is on the *Index* because of its Gallicanism, and the former led to his temporary banishment because too favorable to Cardinal de Bouillon. He edited the works of Charlemagne and Servatus Lupus.

BALZAC, bȧl'zȧk', HONORÉ DE (1799–1850). The greatest novelist of France, and, according to some critics, of the world, if we regard at once the quantity of his work, the multitude and variety of his creations of character, his coördination of them into a microcosmic picture of the society of his time, and the scope and depth of his insight into the sordid ambitions and ideal impulses that actuate human life. His own career had given him a varied and acute experience. He was born at Tours, May 16, 1799, the first of four children of well-to-do *bourgeois*, self-indulgent, a little Rabelaisian, and not at all literary. His infancy was passed with a foster mother in the country. He showed no cleverness in his studies and found no appreciation at home, but he was a diligent pupil of the "truant school." His wanderings along the vineyards of the Loire and in the noisy cooper shops of the suburbs of Tours have left picturesque traces throughout his work, especially in the *Contes drôlatiques*, and he has borne an eloquent witness to the pathos of his school life in *Louis Lambert*.

Balzac had very early what his sympathetic sister Laure calls "the intuition of renown." A family misfortune was to him a kind providence, for it brought him at 19 to Paris and stimulated his literary activity by contact with Guizot, Villemain, and Cousin. His novels, especially *César Birotteau*, attest his three years' study of law; but he refused to practice, and in spite of discouragements, domestic and public, he devoted himself to literature, doubting sometimes his power, but never his vocation. It took him 10 years (1819–29) to learn his trade, the management of his novelistic tools. His work in this period ranks with that of Pigault-Lebrun. Only in the light of the future can it be said to show even promise of the kind of excellence which he was to realize. Harassed by poverty, oppressed by debts due to caprice and bad judgment, he worked indefatigably, and at last produced in *Les Chouans* (1829) a story of Brittany in 1799, one of the first and best of the historical novels of France, though its attempted imitation of Scott is more obvious than successful. What follows *Les Chouans*, good and bad, was admitted by Balzac to a place in his works; what went before, he ignored. The next six years were years of marvelous fertility, sustained excellence, and progressing power, fostered by intercourse with Hugo, Vigny, Lamartine, and George Sand. He made useful aristocratic acquaintances also, the Duchesse d'Abrantès and Madame de Castries, his Duchesse de Langeais. Then he fell under the spell of a Polish lady, Madame Evelina Hanska, whom he had met some years before, and till the death of M. Hanska, in 1842, his production and development suffer some check, to revive again for the complete flowering of his genius for five years (1842–47). After that he became more and more absorbed in plans for marriage with Madame Hanska, and hindered from work by illness and by visits to the Russian estates of his betrothed, whom he married there a few months before his death. Balzac's correspondence with his sister and his recently published letters to Madame Hanska are a sufficient revelation of his character. To an intense imagination that made him at times a visionary, he joined an intense application that made him at other times a recluse. In thought the child was a man; in action the man was a child, capricious and prodigal, full of schemes that made others rich and kept him poor; restless, passionate, morbid sometimes, especially in the hope deferred of his unfortunate relation to Madame Hanska, but never forfeiting sympathy, because always frank and almost childlike in his broad humanity. There was something awesome in the intensity with which he lived out his 50 years. Hugo expressed this when he said at his grave in Père Lachaise that "such coffins proclaim immortality. We feel the divine destiny of that intellect which has traversed earth to suffer and be purified. So great a genius in his life can but be a great spirit hereafter."

In any survey of Balzac's work it is well to consider first what he tried to do. He explains this in the preface to his novels collected under the title *La comédie humaine*. He says his thought was to do for human nature what had recently been done for zoölogy—to show that all society was bound together by a unity of composition, diversified by evolution in varied environments, so that there were species of men as of animals. The soldier, the lawyer, the workman, the scholar, the statesman, would show as distinct and abiding characteristics as the wolf, the shark, the ass, the raven, and the sheep. But this, he continues, would require several thousand characters; and how should he give unity to his creations? He would let society tell its own story. He would be its secretary, draw up an inventory of its virtues and vices, gather the facts of its passions, compose types for it by uniting homogeneous natures, and so produce a history of manners from the point of view of a conservative, a Christian, and a monarchist, who knew through friends the Old Régime and the Republic, and had lived under the Empire, the Bourbons, and the democratic monarchy of July. His novels were to be as a secretary's minutes, ideal in conception, but real in detail, shrinking from neither vice nor passion, because these are the motive forces that melt and recast human nature, but giving to religion its due place, and making virtue not only lovable but interesting. That is what he undertook to do, and though his work is incomplete, he left no part unessayed. His achievement stimulated Zola to write his pseudo-realistic novels of the Second Empire; while with scarcely less genius, English society has been drawn in the numerous books of Anthony Trollope, as many phases of nineteenth-century America are presented by William Dean Howells. Balzac has a right to ask that his work be judged as a whole, by the good as well as by the evil. Like that other *Comedy* of Dante, his *Human Comedy* has its Hell, but it has also its Purga-

tory and its Paradise. Balzac is by some considered immoral; others pronounce his work, as a whole, serious in purpose, high and edifying in tone.

The *Comédie humaine*, as it stands, vast yet unfinished, has been compared by Zola to a cyclopean palace, with splendid halls and wretched corners, with broad corridors and narrow passages, and superpiled stories in varied architecture. Two thousand characters cross its stage; and in their mimic life, which to Balzac for the time became reality, they formulate the chief types and events of social existence in such a variety of setting that his comedy has not only its genealogy but its geography. It is a work of criticism, analysis, and investigation, to be enjoyed in its parts, but to be understood only as a whole. Balzac divided his *Human Comedy* into *Scenes of Private Life*, of *Provincial Life*, of *Parisian Life*, of *Country Life*, of *Politics and War*, and to these he added *Studies*, philosophical and analytic. There are those who admire the analytic acumen displayed in this division; but as Balzac frequently transferred tales and novels from one to another group to suit his fancy or a publisher's convenience, it seems time wasted to stress the classification. It is more philosophical to study his work as it grew in his mind—i.e., chronologically—and then to treat it briefly in its entirety. *Les Chouans* was followed by six *Scènes de la vie privée* (1803), of which *El Verdugo* is a masterly tale of terror, and *Gobseck* one of the world's great studies of morbid avarice. *La maison du chat-qui-pêlote* (1830), written before these, though published a little later, in its plea for conventional marriage shows Balzac to be a master in social psychology. And, as though he would excel at once in every genre, the same year witnesses the Dresden-shepherdess introduction and the luridly romantic close of *Une double famille;* the curious Machiavellianism of *Les deux rêves; Adieu*, a masterpiece of tragic pathos; the fantastic *L'elixir de longue vie;* two stories of abnormal love, *Sarrasine* and *Une passion dans le désert;* and, finally, an acute study of the purification of religious feeling through persecution in *Une episode sous la terreur*. And with all this came contributions to journals whose titles for this year alone fill two octavo pages of Louvenjoul's *Histoire des œuvres de Honoré de Balzac*.

A marvelous fertility characterized the next three years, till his first meeting with Madame Hanska (1833). Much of this time he passed away from Paris, to avoid interruptions. The more important works of 1831 are *La femme de trente ans* (incomplete), *L'enfant maudit* (incomplete), *Le réquisitionnaire, Les exilés* (a wonderful evocation of Paris in 1308, setting ajar the gate that was to open on the spirit world in *Louis Lambert* and *Séraphita*); *Le chef d'œuvre inconnu;* the remarkable *L'Auberge rouge;* the curiously mystic *Peau de chagrin;* the mediæval legend, *Jésus-Christ en Flandre;* a remarkable study of avarice, *Maître Cornélius;* and, outside the frame of the *Human Comedy*, the *Contes drôlatiques* (the first of three *dizaines* published till 1837). The work of 1832 is even more remarkable. It touches the depths of horror in *La grande Bretêche*, deals gracefully with romantic honor in *Madame Firmiani*, and with romantic love in *La bourse;* becomes pitiful in *Colonel Chabert*, and tragic in *Le message;* gives an exquisite picture of child life in *La grenadière*, preaches a stern social morality in *La femme abandonnée*, epitomizes the French clergy of the Restoration in *le curé de Tours*, unveils the courtesan morals of the Renaissance in *Les Marana*, and crowns the year with the mystic *Louis Lambert*. And during 1833, also, he tells a correspondent that he lives in "an atmosphere of thoughts, ideas, plans, works, conceptions, that mingle, bubble, and sparkle in my brain." Of these, the *Contes drôlatiques* show the effervescing of a joyous animal nature; *Férragus* is a sort of detective story; *Le médecin-de-campagne* is photographic in its reproduction of peasant thought and country scenes, and *Eugénie Grandet* is Balzac's greatest study of avarice, and perhaps his greatest novel. No wonder that in January, 1834, Balzac complains that he is "dazed with ideas and hungry for rest." Yet this year produced *Père Goriot*, thought by many to be his best novel; *La duchesse de Langeais, Le recherche de l'absolu*, part of *Séraphita*, and many revisions of older work. Balzac now begins to suffer, naturally, from neuralgia, but in 1835 writes a fine study of remorse, *Une drame au bord de la mer;* an inferior one, *Melmoth réconcilié;* the weirdly sensuous *La fille aux yeux d'or;* and that subtly humorous "bride's breviary," *Le contrat de mariage*. His one long novel of the year, *Séraphita*, is regarded by many as an exquisitely mystic poem in prose, a hymn to the purification of human passion by a sublime aspiration for the divorce of sentiment from sense, first product of that love of his for Madame Hanska which almost immediately became a distraction and a hindrance to his genius. Students of Balzac are, however, not in accord as to the merits of *Séraphita*, which has been described as an obscure reflection of Swedenborgianism, and full of passages that are meaningless.

With 1836, we enter on a period of arrested development, although that year offers the charming *Messe d'Athée;* the ultra romantic *Lys dans la vallée;* the admirable last part of *L'enfant maudit;* a classic study of *La vieille fille*, the French *School for Scandal; L'interdiction*, a legal romance, and some less significant work. *Les employés* marks in 1837 the lowest ebb of the mature Balzac. *Gambara, César Birotteau*, and the *Contes drôlatiques* complete the work of that year; and 1838 is as relatively insignificant, with *Le cabinet des antiques, La maison Nucingen, Une fille d'Eve*, and the first part of what was to become a great novel, *Les splendeurs et misères des courtisanes*. In this year he bought a country house, "Les Jardies," where Gambetta was to meet his death, and where Balzac did most of his work until, in 1843, he bought and fitted up, in long-deferred hope of marriage, the city house in which he died. His country life lent a passing freshness to *Le curé de village* (1839) and to the early parts of *Béatrix*, a curious study of the instinct of social conformity common to all phases of feminine affection—the platonic, the cerebral, and the venal. To 1839 belongs also *Massimilla Doni*, and 1840 brought *Le secret de la Princesse de Cadignan*, the fine *Seconde étude de femme, Pierrette, La muse du département*, part of *Les illusions perdues*, with some very inferior work. Then something of his old exuberance returns, and 1841 sees *Une ténébreuse affaire*, the terrible *Bachelor Housekeeping* (*La rabouilleuse*), *Ursule Mirouet, Les mémoires de deux jeunes mariées, La fausse maîtresse*, and *Le martyr*

calviniste. The year 1842 is unimportant in production, but memorable for the first collected publication of the *Human Comedy* under that title, with its evolutionist preface, and for additions and revisions to which this gave occasion. In 1843, Balzac spins copy in *Honorine*, finishes *La muse du département* and *Les illusions perdues*, a satire on French journalism, his longest novel, and by the number of its characters and the ramifications of its plot, one of the chief radiating points in the study of the psychology of *La comédie humaine*. He visited Madame Hanska, now a widow, this year in Russia, and in 1845 and 1846 twice in Italy and once in Germany; but he now worked, as he says, "with a fury more than French—Balzacian." In 1844 he printed the playfully romantic *Modeste Mignon*, completed *Béatrix* and *Les petits bourgeois* (printed, 1854), and published all that appeared during his lifetime of *Les paysans*, the most sternly realistic of his novels. The years 1845 and 1846 produced only trivial work; but he was working on four great novels that were to crown his genius, *La cousine Bette*, *Cousin Pons*, *Les splendeurs et misères des courtisanes*, and *L'envers de l'histoire contemporaine*, that was to close the *Human Comedy* with its noblest conception of Christian womanhood. Sickness made his last years unfruitful; and his posthumous *Député d'Arcis* is largely by his literary executor, Charles Ribou. Balzac's attempts in drama, except possibly *Mercadet* (first acted in 1851), are not significant.

Balzac died in Paris, Aug. 18, 1850, at the height of his fame; but he was hardly appreciated at his true value until the epoch-making study by Taine (1865) showed him to be truly classic, one of the world's greatest creators in imaginative literature. The dominant trait in his style, imagination, and thought is exuberant virility. He has the animal and the intellectual intemperance of a romantic realist. He observes with minute accuracy, but with a poet's vision. He is of his world, yet he dominates it. No depths, no heights, of human nature seem foreign to him. His qualities become his defects. He is embarrassed at once by his wealth of ideas and of words. At his best his style is admirable, but it often staggers and occasionally falls under over-elaboration. In construction the stories lack proportion, but in character-drawing he stands next to Shakespeare. Here are the money-grubbers and the money-spenders, studied realistically and in symbolic types; cynics who mock the pleasures they pursue; parasites of social disease; fresh young girls; restless "women of thirty"; poor relatives; philanthropists; saints —a social microcosm. Here is a novelist who tried to see life steadily, to correlate all the material, moral, and social factors of modern society. With Shakespeare and Saint-Simon, says Taine, Balzac is "the greatest storehouse of documents that we have on human nature."

Balzac's works: 24 vols. fiction separately; *Human Comedy*, 47 vols.; *Droll Stories*, 3 vols.; *Drama*, 2 vols.; *Correspondence*, 2 vols.; *Letters to Madame Hanska*, 1 vol. The youthful *Works* are published in 10 vols. In 1913 there began to appear from the Imprimerie Nationale in Paris, the definitive edition of *The Comédie Humaine*, planned to consist of 43 volumes, with 1500 illustrations by Paul Huard. Three volumes contain bibliographical notes and other comments, a life of Balzac, and a critical estimate of his place in literature, while each volume is to contain a key to the identity of the persons whom Balzac had in mind in creating his characters that are famous in the particular volume. The researches of Count de Spoelberch de Lovenjoul are to be utilized, so as to make accessible all that is now known or probably will ever be known concerning this great master of fiction.

Bibliography. The more essential books for a study of Balzac are Lovenjoul, *Histoire des œuvres de Honoré de Balzac* (Paris, 1886); M. F. Sandars, *Honoré de Balzac: His Life and Writings* (New York, 1905); Corfbeer and Christophe (*Répertoire de la comédie humaine* (Paris, 1887), a dictionary of characters. For plots consult Barrière, *L'œuvre de Balzac* (Paris, 1890); for criticism, Lovenjoul, *La genèse d'un roman de Balzac; Les paysans* (Paris, 1901); the essays of Taine, Sainte-Beuve, Faguet, Zola, Paul Flat, Doumic, Duclaux (1909), Peck, and Wells, *A Century of French Fiction* (1898); for biography: Wormley, *Memoir of Balzac* (Boston, 1892; defective); Ferry, *Balzac et ses amis* (Paris, 1888); Lemer, *Balzac, sa vie et ses œuvres* (Paris, 1892); Hanotaux and Vicaire, *La jeunesse de Balzac* (Paris, 1903); A. Le Breton, *Balzac, l'homme et l'œuvre* (Paris, 1905); Ferdinand Brunetière, *Balzac* (Paris, 1906; trans. Philadelphia, 1906), with a bibliographical appendix; Frederick Lawton, *Balzac* (London and New York, 1910). Translations, fairly complete and satisfactory, of the *Human Comedy* are published in London, Boston, Philadelphia, and New York, the last-named containing valuable editorial and critical comment by W. P. Trent. The latest translation of the works of Balzac is the *Centenary Edition*, K. P. Wormley, translator (Boston, 1903–1912). Saltus, *Balzac* (Boston, 1888) has a good bibliography. The most indefatigable collector of Balzaciana has been Count de Spoelberch de Lovenjoul (q.v.), whose remarkable industry and lavish expenditure have lately given the world access to original documents that have thrown much new light on the life and thought of the great novelist.

BALZAC, Jean Louis Guez de (1597–1654). A noted French essayist and stylist. He was born at Angoulême of wealthy parents, and having received a good education was taken by Cardinal de la Valette to Rome, and wrote thence letters to persons prominent at court that made him recognized on his return as master of composition and style in a generation that regarded such abilities with excessive reverence. His letters, collected in 1624, are empty, bombastic, and affected, but they entitle Balzac to rank as a reformer of prose, as his contemporary, Malherbe (q.v.), is of verse. He underwent bitter accusations of plagiarism in 1625 and withdrew to Angoulême, where he produced his uninspired and laborious lucubration, *Le prince* (1631); *Discours* (1644); *Le barbon* (1648); *Aristippe*. He was elected to the Academy in 1634. Balzac's *Works* were collected in 2 vols. (Paris, 1665, 1854). The *Letters* are well edited by Larroque (Paris, 1874).

BALZANI, bâl-tsä'nê, Count Ugo (1847–). An Italian historian, born in Rome and educated at the university of his native city. He became known as a distinguished scholar in his chosen field, and honors were heaped upon him at home and abroad. He was made a member of the Reale Accademia dei Lincei and of the Istituto Storico Italiano, and was chosen presi-

dent of the Reale Società romana di storia patria. In England the University of Oxford conferred upon him the honorary degree of Litt.D., and the British Academy elected him a corresponding fellow. To the transactions of various continental institutions with which he became connected he contributed many articles and reports, and wrote also: *Il Regesto di farfa di Gregorio di Catino* (1879); *La Storia di Roma nella Cronica di Adamo da Usk* (1880); *Early Chroniclers of Italy* (1883); *Le Cronache Italiane nel Medio Evo* (1884; 1909); *The Popes and the Hohenstaufen* (1886).

BALZICO, bäl-tsē'kō, ALFONSO (1825–1901). An Italian sculptor. He was born at Cava di Tirreni, near Salerno, and studied his art principally at Rome. On his return to Naples he secured the patronage of the Bourbon monarch, but his patriotic tendencies resulted in his call to Turin by Victor Emmanuel I. Among his commissions for the latter the principal were the bronze equestrian statue of Duke Ferdinand of Genoa (1867, Turin, his masterpiece), and Massimo d'Azeglio (1873, Turin). He removed with the royal family to the new capital, Rome, where his later life was spent. His other works include the marble monument to the composer Vincenzo Bellini, and the bronze "Victor Emmanuel" (1897), both in Naples; and "Cleopatra," a nude which obtained the gold medal at Paris, 1900. Balzico's art forms a marked exception to the dreary mediocrity of the Italian sculpture of his day.

BAMAKO, bä'mȧ-kō'. A town of Africa and, since 1904, the capital of the French colony of Upper Senegal and Niger. It is situated about 135 miles southwest of Segu, in lat. 12° 15′ N., and long. 8° 5′ W. (Map: Africa, D 3.). The town is the terminus of the Niger-Senegal Railway and is an important trade centre. Pop., 1911, 6539.

BAMBA, bäm'bȧ. A Bantu tribe of the Ba-Fyot, or Ba-Kongo group, Angola. They are of medium stature, the figure well rounded and well proportioned, with woolly hair, dark-brown color, beardless, and little hair on the body. They have adopted some of the arts of Europeans, though they easily revert under tribal influences. They are polygamists and ancestor worshipers, and practice witchcraft, although images of Roman Catholic saints are employed as fetiches. Small terra-cotta images are placed on the graves of important men.

BAMBARA, bȧm-bä'rȧ. A region in west Africa, situated on both sides of the upper Niger. It derives its name from the inhabitants, who were formerly under kings; but upon the overthrow of King Ahmadu in 1891 the country was divided into several states under Bambar chiefs. It is mountainous in the southwest and flat and often swampy in its northern part. It has a soil of remarkable fertility, yielding annually two crops of corn, rice, yams, and many kinds of fruit. Forests of butter trees cover vast tracts. The climate is very hot, and the lower parts of the country are subject to inundation from time to time by the Niger. The principal industries are the weaving of cloth, a work performed exclusively by women, and the manufacture of metal and leather products. The commerce is quite extensive. The principal towns are Segu, Sansanding, and Bamako. The region is a part of the French West African colony of Upper Senegal and Niger. The inhabitants are heathens of mixed negro and Fulah blood and belong to the Mandingo family. They are a mild and industrious people; but, despite their fertile soil and their thrifty habits, they have been reduced to the direst poverty by their Mohammedan oppressors, the Toucouleurs. Their country was visited by Mungo Park.

BAMBERG, bäm'bĕrK. A city in the district of upper Franconia, Bavaria, beautifully situated on the banks of the Regnitz, not far from its confluence with the Main, about 30 miles north of Nuremberg (Map: Germany, D 4). Numerous bridges connect the various sections of the city, which is intersected by three branches of the river. The streets are wide and well built, and there are a number of attractive squares. The most noteworthy of its public buildings is the cathedral, a magnificent edifice in the Byzantine style, founded by Henry II early in the eleventh century and restored after a fire in 1110. It contains, among other monuments, the elaborately carved tomb of the founder and his consort, Cunigunda. Attached to the cathedral is a library of over 300,000 volumes, with valuable missals and manuscripts and what is represented to be the prayer book of Henry II. There are several other fine ecclesiastical structures of early date and the old palace of the former prince-bishops of Bamberg. The ruins of the castle of Altenburg, originally the seat of the Count of Babenberg and the scene of many important historical events, stand on an eminence about a mile and a half from the town. The educational institutions of Bamberg are numerous, as are also the charitable institutions, which include a municipal hospital, an orphan and an insane asylum. The industries consist chiefly of the manufacture of beer — which is famous throughout Germany—cotton, woolens, gloves, furniture, musical instruments, shoes and leather goods, tobacco, sugar, starch, etc. The United States is represented by a consular agent. The city's government is in the hands of a municipal council of 42 members and an executive board of 19, elected by the former. Bamberg received municipal privileges in 973. Pop., 1900, 41,820; 1910, 48,063. Consult Vöge, "Ueber die Bamberger Domsculpturen," in *Repertorium für Kunstwissenschaft,* vol. xxii (Berlin, 1899).

BAMBERGER, bäm'bĕrK-ẽr, LUDWIG (1823–99). A German parliamentarian and writer on political and economic subjects. He was born at Mainz, of Jewish parentage, and studied law at Giessen, Heidelberg, and Göttingen. Implicated in the Revolution of 1849 as editor of the *Mainzer Zeitung,* he was condemned to death, but was amnestied in 1866. As a member of the National Liberal Party in the Reichstag (1871–80) he defended the gold standard against the bimetallists, opposed the economic policy of Prince Bismarck (after 1879), and advocated free trade, becoming the founder and president of the Verein zur Förderung der Handelsfreiheit. Compelled by his antagonism to Prince Bismarck's theories to resign from the National Liberal Party, he formed the group known as the "Secessionists," which afterward became merged in the German Liberal Party, and as a member of which he opposed the colonial policy of the government. The following are some of his important publications: *Erlebnisse aus der pfälzischen Erhebung* (1849); *Monsieur de Bismarck* (1868; English translation, 1869); *Die fünf Milliarden* (1873); *Deutschland und der Sozialismus* (1878); *Deutschthum und Judenthum* (1880); *Die Stichworte der Silberleute besprochen* (4th ed., 1893); *Erinnerungen* (published by Nathan, 1899).

BAMBINO, bäm-bē'nō (It. a baby). In art, the representation of an infant, especially of the Christ Child. The term is used of certain images of the swaddled Child, the most famous being the *Santissimo Bambino* in the church of Ara Cœli at Rome, held in great veneration for its supposed miraculous power of curing the sick. It is carved in wood, painted, and richly decorated with jewels and precious stones. The term "bambino" is also applied to any infant in Italian painting and sculpture; e.g., to the famous medallions of foundlings on the Foundlings' Hospital, Florence. See illustration.

BAMBOCCIADE, bäm'bŏch-ĭ-ăd' (Fr. *bambochade*, It. *bambocciata*, caricature, from *bamboccio*, puppet, little child). A picture of common rustic life treated with grotesque humor; a kind of genre painting of low life. The term is said to be derived from the nickname of Van Laer, *Bamboccio*, "the cripple." Tavern scenes, rollicking and boisterous village games, with smoking, drinking, and festival making are favorite subjects in this style of painting. Dutch and Flemish painters of the seventeenth century were unrivaled in such subjects; such as Brauwer, the brothers Ostade, Teniers the Younger, Jan Steen, Peter van Laer, and many others. In the nineteenth century certain painters of the Munich school (Knaus, Defregger, Vautier) often painted in this vein, as did Wilkie and others in Great Britain.

BAMBOO' (Malay, *Cambu Mambu*). A name applied to about 200 species of *Bambusa, Arundinaria, Phyllostachys* and other genera of grasses, many of which attain a great size, some 70 to 100 feet in height, and have trunks a foot in diameter. The species are numerous and are found in tropical and subtropical regions, both of the eastern and western hemispheres. They are of great importance to the inhabitants of the countries in which they grow, being found from sea level to 12,000 feet in the Himalayas and 15,000 feet in the Andes. All of them have a jointed subterranean rootstock (rhizome) which throws up numerous stems. These are generally straight and erect; although one large species (*Bambusa agrestis*), common in dry mountainous situations in the southeast of Asia, has crooked and sometimes creeping stems. The stems grow to their full height unbranched, but afterward throw straight horizontal branches, especially in their upper parts, forming a dense thicket; and many of them, being strongly armed with spines, are planted for defense. Some of the smaller kinds are often planted as hedges. The stems are jointed like those of other grasses, very hard, but light and elastic, hollow, containing only a light spongy pith, except at the joints or nodes, where they are divided by strong partitions. They are therefore readily converted into water vessels of various sorts; and when the partitions are removed, they are used as pipes for conveying water. They are also much employed for housebuilding, for bridges, etc. Split bamboo is extensively used for weaving into nets, for hats, umbrellas, fishing rods, etc. The smaller stems are converted into walking sticks and are employed in light wickerwork. In China the leaf sheaths and other portions of the stem are used for making paper. Recent experiments in India show that some species of bamboo are well suited for the production of paper pulp. The stems of different species vary also very much in the thickness of the woody part and so in their adaptation to different purposes. The external covering of the stem is, in all the species, remarkably silicious; the stem of *Bambusa tabacaria* is so hard that it strikes fire when the hatchet is applied. This species is a native of Amboyna and Java; its slender stems are polished and used for the stems of tobacco pipes. The leaves of some kinds are used for thatch, and the Chinese plait hats of them. From the nodes of the bamboo there exudes a saccharine juice which dries upon exposure to the atmosphere, and which the Greeks called Indian honey. It is also sometimes named tabaris or tabasheer; but this name more properly belongs to the phosphorescent silicates found in some species of bamboo and of other large grasses growing in dry situations. (See TABASHEER.) The young shoots of some kinds of bamboo are eaten like asparagus or are pickled in vinegar. The seeds of some species are used as rice and for making a kind of beer. Bamboos are generally of very rapid growth, and they are often found in arid situations, which would otherwise be destitute of vegetation. The species common in the West Indies (*Bambusa vulgaris*) is supposed to have been introduced from the East Indies. Some species are hardy in England and in parts of the United States, where they are used in landscape gardening. A number of species were introduced into the United States from Japan in 1902, and they are reported as growing satisfactorily in Florida and Louisiana. *Arundinaria macrosperma* is native to the southern United States, where it forms extensive canebrakes. See Plate of BALSAM.

Fossil Forms. Fossil forms of bamboo are abundant in the Pleiocene deposits of France.

BAMBOO RAT. Any of various species of mole rats (q.v.) of India and eastward, belonging to the genus *Rhizomys*, and found in and near bamboo jungles.

BAMBOROUGH (bäm'bûr-ō) **CASTLE** (fortress of Bebba, Queen of Ida). An English castle situated in the village of the same name, 14 miles north of Alnwick, in Northumberland. It was erected by Ida of Northumberland and was repeatedly assailed in the wars of the Saxon and Danish kings. In 1095 it was held by Earl Mowbray against William II. During the Wars of the Roses the fortress was greatly damaged, but was restored in the eighteenth century.

BAMBUK, bäm-bōōk'. A hilly region in west Africa, situated between the river Senegal and its tributary, the Faleme, and forming a part of the French colony of Sénégal. Except for its unhealthful climate, Bambuk is a well-favored country, with a very rich vegetation and well adapted for cattle raising. Its special importance, however, lies in gold deposits, which are so extensive as to be found almost in every part of the country. But the output is insignificant, as exploitation is entirely in the hands of the natives. The population, estimated by some at 800,000, belong to the Mandingo family and ostensibly profess Islam; but practically they are pagans and of a very ferocious disposition. Bambuk was explored by Mungo Park, Tourret (1824), Raffenel (1847), Flize (1856), Pascal (1860), Marge and Quintin (1863), and has been under French protection since 1858. Consult Riorot, *A travers le Fouta Djallon et le Bambouc* (Paris, 1885).

BAMIAN, bä'mē-än'. Once a famous town and valley of Afghanistan, situated about 80 miles northwest of Kabul (Map: Asia, Central, L 3). The valley is at an elevation of 8496

BAMBINO

FROM THE SCULPTURE BY ANDREA DELLA ROBBIA IN THE FOUNDLINGS' HOSPITAL, FLORENCE

feet and is the only known pass over the Hindu-Kush, 40 miles north of the ruins of Bamian, for artillery and military transport. This is believed to have been the route followed by Alexander the Great in his conquests in western Asia. Considerable interest attaches to this region on account of the historical remains in the form of numerous cells hewn in the rock, and the gigantic statues which seem to indicate that the place was once one of the chief centres of Buddhist worship. The two largest statues are found in a deep niche and in spite of their dilapidated condition still show some traces of elaborate carving and painting. Each contains a winding stair, by which it is possible to ascend to the head. The whole valley is covered with the ruins of tombs, mosques, and other buildings, once belonging to the town of Ghulghuleh, which more recently occupied this site and was destroyed by Genghis Khan in 1221. Eight miles eastward of Bamian lies the ancient fortress of Zohak, attributed to the fabulous Persian serpent-king of that name. The fortress is preserved for the purpose of guarding the important pass. Both there and in the valley of Bamian a great number of coins, ornaments, and other antiquities have been found.

BAMP'TON LEC'TURES. These lectures are so called after the name of their founder, the Rev. John Bampton, Canon of Salisbury (died 1751), who left estates, originally worth £120 per annum, to the University of Oxford, for the endowment of eight divinity-lecture sermons, to be preached at Great St. Mary's every year and to be published at the expense of the estate within two months of their being preached. The preacher is to lecture on one of the following subjects: "The Confirmation of the Christian Faith and the Confutation of all Heretics and Schismatics," "The Divine Authority of the Scriptures," "The Authority of the Primitive Fathers in Matters of Christian Faith and Practice," "The Divinity of Christ," "The Divinity of the Holy Ghost," "The Apostles' and Nicene Creeds." No person is qualified to preach these lectures who has not taken the degree of M.A., either at Oxford or Cambridge, and the same person shall never preach them twice. The first course was delivered in 1780, and they are still continued (since 1895, biennially). The more noteworthy of these lectures are those by White, in 1784, *Christianity and Mohammedanism;* Nott, in 1802, *Religious Enthusiasm* (against Whitefield and Wesley); Mansel, in 1858, *The Limits of Religious Thought;* Liddon, in 1866, *Our Lord's Divinity;* Hatch, in 1880, *The Organization of the Christian Churches;* Farrar, in 1885, *History of Interpretation;* Cheyne, in 1889, *The Psalter;* Gore, in 1891, *The Incarnation;* Sanday, in 1893, *Inspiration;* Inge, in 1899, *Christian Mysticism.* The complete and official list of lectures will be found in the *Historical Register of the University of Oxford* (published yearly).

BAN (OHG. *ban, bann,* AS. *bann,* order under threat of punishment; hence Fr. *ban,* public proclamation). A word derived from a root signifying 'to signal,' 'to proclaim,' which meaning it retained in the phrase *bans* or *banns* (q.v.) of marriage. In feudal times it denoted a summons to arms and also the military force thus summoned. The latter meaning it retains in several countries of Europe—as in France, where the National Guard is classed as the *ban* and the *arrière-ban,* or reserve; and in Germany, where the two divisions of the *Landwehr* are distinguished as the first and second *bans,* respectively. In the Middle Ages the *Acht* or *bannum* was a sentence of outlawry pronounced against those who escaped from justice or refused to submit to trial. We often read of refractory princes, and even cities in Germany, being placed under the *ban of the Empire.* The following are the terms of banning used in an old formula: "We declare thy wife a widow and thy children orphans; we restore all thy feudal tenures to the lord of the manor; thy private property we give to thy children, and we devote thy body and flesh to the beasts of the forest and fowls of the air. In all ways and in every place where others find peace and safety, thou shalt find none; and we banish thee into the four roads of the world—in the devil's name." Besides these sentences of outlawry, many other announcements were accompanied with denunciations and imprecations. When a grant of land was made for a religious purpose, or when a charter of liberties was granted, the transaction was proclaimed in public with certain ceremonies, and curses were denounced against any one who should violate the deed. Thus *banning,* or publishing, came to be associated with cursing; and hence the origin of the popular use of the word. It occurs in this sense in Shakespeare, Milton, and other early writers. The phrase "ban of the Church" is the equivalent of the term "excommunication" (q.v.).

BAN, or **BA'NUS** (*ban,* in Southern Slavic and Hungarian, from Persian *bān,* lord; cf. Russ. and Pol. *pan,* master, lord). The title given to some of the military chiefs who guarded the southern boundaries of the Hungarian Kingdom. It is equivalent to the German *markgraf* and the English "Lord of the Marches." The ban was appointed by the King, and his appointment was ratified by the Diet. In political, judicial, and military affairs his powers were almost royal, especially within his own territory. In times of war he led the troops of his *banat* (q.v.). Among the *banats* were those of Dalmatia, Croatia, Slavonia, and Bosnia. Their boundaries were constantly changing with the encroachments of the Turks. In the sixteenth century there was formed the double *banat* of Dalmatia and Croatia. In the reign of Maria Theresa the ban was acknowledged to be the third dignitary of the Kingdom of Hungary; appointed a member of the Hungarian Council of Government, and President of the Council of the Banat; and was made the bearer of the Golden Apple (the symbol of sovereignty) at the coronation of the King. In 1849 Croatia, Slavonia, and Dalmatia became Austrian crownlands; but by the *Ausgleich* of 1867 Croatia and Slavonia were restored to Hungary and continued as a banat, with a special local administration for internal affairs.

BAN, bän, MATIJA (1818–1903). A prominent poet of the southern Slavs. He was born at Dubrovnik (Ragusa), where he received a good education, including a thorough knowledge of French and Italian. He traveled extensively over the Balkan Peninsula, made his literary début with Italian lyrics (*Il terremonto di Ragusa; Il Moscovito; Radimiro*), and settled in Belgrade (1844) as tutor to the daughters of Prince Alexander Karageorgevitch. It was for their benefit that he wrote *The Woman's Educator* (3 vols., Belgrade, 1847). From 1849 till 1853 he published the literary-scientific maga-

zine *Dubrovnik* at the city of the same name. Besides a drama, *Mejrima*, he published in his native tongue *Various Songs* (1853), mostly on erotic and political themes, and the following year was appointed instructor in French and Italian at the Belgrade Lyceum. The adverse criticism evoked by his ode addressed to the Sultan forced him to resign this post and devote the rest of his life to literary labors and travel. Among his tragedies the most noteworthy are *Dobrilo and Milenka; Tsar Lazar; The Death of Prince Dobroslav; Jan Hus* (1884); *Martha the Statholder; or, The Fall of Novgorod the Great* (1881).

BANA, bä'nâ. A thousand-armed deity in Hindu mythology. His arms were cut off by Krishna, but his life was spared by the interposition of Siva, who was his friend.

BANA (seventh century A.D.). A Sanskrit author. His greatest works were two novels, the *Harshacarita*, or *Adventures of Harsha*, a historical romance (Eng. trans. by Cowell and Thomas, London, 1897), and the *Kādambari* (Eng. trans. by C. M. Ridding, London, 1896). Both of Bana's stories are largely indebted to the *Vāsavadattā* of Subandhu. He also wrote the *Parvatīpariṇayanatakam*, or 'Parvati's Marriage,' based on the *Kumārasambhava* of Kalidasa and a farce, the *Sarvacarita*. A lost drama by him entitled *Mukuṭataditaka* is mentioned, and some have ascribed to him the Buddhist play *Nagānanda*, or 'Joy of Serpents,' usually attributed to Harsha or to Dhavaka. Bana's lyrics are contained in his *Caṇḍūśtaka*, or 'Century of Durga.'

BANAK, bän'ak, or **BANNOCK** (native name *pan-iti*). A warlike tribe of Shoshonean stock, formerly roving over southern Idaho and eastern Oregon, and now concentrated upon the Fort Hall reservation, Idaho. They are confederated with the Shoshone, the two tribes together numbering about 1400 persons, "so intermarried and related to each other that it is nearly impossible to distinguish one from the other." Consult R. H. Lowie, "The Northern Shoshone," *Anthropological Papers, American Museum of Natural History*, vol. ii (1909).

BANANA, bâ-nä'nâ. The only seaport of the Belgian Congo and situated on a small sandy peninsula on the west coast of Africa, at the mouth of the Congo (Map: Belgian Congo, B 4). The town is a trading station, contains a number of foreign factories, and has a white population of about 120. The port is connected by steamship lines with Hamburg, Liverpool, and Antwerp.

BANANA, bâ-nä'nâ (Sp. the fruit of the tree *banano*). A name applied alike to the well-known fruit and to the plant which bears it. Most of the varieties commonly eaten raw belong to the species *Musa sapientium*, which name signifies 'muse of the wise,' and is intended to convey an allusion to a statement by Theophrastus concerning a fruit which served as food for the wise men of India, and which, from his description, is supposed to have been the plantain or banana. The names "plantain" and "banana" are somewhat vaguely used in their application to different cultivated varieties, but the true plantains or cooking bananas belong to *Musa paradisiaca*. The banana is a tropical plant grown for its fruit, fibre, and the beauty of its foliage. It is evidently of Indian origin, but is now extensively cultivated in all tropical countries of the world. It is a large herbaceous plant with a perennial root or rhizome, from which the plant is perpetuated by sprouts or suckers. The young plants may be transplanted, after attaining a height of 3 feet, by cutting them loose with a spade; such plants should be set deeply in rows of 8 to 12 feet apart, so that the broad leaves will shade the ground. It can be increased by root cuttings planted shallow and covered with peat or peaty compost. Young plants of this sort must be transplanted to full light and be given ample room as soon as two or three leaves have formed. The banana begins to bloom in 1½ to 2 years after being established. The flower bud is a peculiar, large heart-shaped formation which, on developing, exposes a true flower under each of its scales. From 50 to 150 of these may be developed in a single bud, from which a bunch containing as many bananas will develop. The plant grows from 10 to 40 feet in height and carries a whorl of broad ornamental leaves at the top of the stalk. A stalk bears but once, dies down, and is replaced by sprouts, two or three of which are allowed to bear.

The species grown for their fibre, as well as those grown for ornament, usually produce seed, while the edible banana of commerce is seedless. Those which bear seeds are usually propagated by seeds, as it is more economical. Dwarf sorts are chiefly used for ornamental planting and landscape effect, but the Chinese Dwarf or Cavendish banana, *Musa cavendishii*, is an important shipping banana in Hawaii. Recently this variety has been somewhat extensively planted in Central America because it is more resistant to disease than the varieties commonly grown there.

There are many varieties of the banana, but the variety most commonly grown is the Martinique, a large yellow fruit growing in large dense clusters. The *baraçoa*, or Red Jamaica, is now but sparingly grown as compared with a few years ago and is seldom exported. The banana is a very important fruit, wholesome, palatable, reasonable in price, and in market the year round. It is eaten raw and cooked. For the latter purpose the under-ripe fruit in which starch has not yet been converted very largely into sugar, is preferable. Bananas have, on the average, the following composition: water 75, starch, sugar, etc. 21, and fat, crude fibre, protein, and ash each 1 per cent. This fruit has a little lower water content than other common fresh fruits and so a little higher food value, pound for pound. Its food value lies in the carbohydrates (sugar, starch, etc.) it supplies, the energy value being 460 calories per pound.

The imports of bananas in the United States alone have increased from a few hundred bunches in 1870, to $14,484,258 in 1913. The fruit comes chiefly from the West Indies and Central America, although some is produced in Florida, Louisiana, California, and Hawaii. Banana flour, made by grinding the dried unripe fruit, is used quite largely in banana-growing countries, and is becoming known elsewhere. Dried ripe bananas, used like figs or raisins, are also finding a market. See PLANTAIN. For illustration see BREADFRUIT TREE.

Banana Diseases. With the rapid extension of commercial plantings of bananas a number of serious diseases have appeared in Central America, South America, and the West Indies. There is divided opinion regarding the causes of these

1. GIGANTIC BAMBOO, from Ceylon.

2. PAPER BIRCH (Betula papyrifera).

3. GREAT BANYAN TREE, in Calcutta Botanical Gardens.

diseases. Some appear due to bacterial attack, while others are attributed to parasitic fungi. One disease, known as the Surinam Panama disease, has practically ruined the plantations in Surinam. According to Drost, it is due to the fungus *Leptospora musæ*. Another trouble, also known as Panama disease, is caused by species of Fusarium. There appear to be marked differences in the resistance of different varieties to these diseases. Other fungi reported as seriously attacking banana plants are *Marasmius semiustus*, *Sphærostilbe musarum*, *Thielaviopsis paradoxa*, and *Cercospora*.

BANANA-BIRD. The name of several birds which feed on bananas. In the American tropics any species of oriole (*Icterus*) or a hangnest may be so called, though this is a book name rather than one in common use. (See ORIOLE.) In Jamaica and the Antilles the small honey-creepers of the genus *Certhiola* or Cœreba are popularly called banana-quits (see Plate of CREEPERS), and the African plant-cutters—glossy black, cuckoo-like birds of the genus *Musophaga*—are styled banana-eaters.

BANANA FAM'ILY. See MUSACEÆ.

BANANA-FISH. See LADYFISH.

BANANAL, bä'nä-näl' (also called Santa Anna). An island lying in the Rio Araguaya, province of Goyaz, Brazil (Map: Brazil, G 6). It is over 200 miles long, with a width of 35 miles, has a fertile soil and forests of valuable woods. North of the centre is a lake of considerable size.

BANAS, bä-näs', or **BUNAS,** bŭ-näs'. A river of Rajputana, near the Aravalli Hills, and joining the Chambal after a northeasterly course of over 300 miles (Map: India, C 3).

BANAT, băn'at, *Ger. pron.* bä-nät' (for derivation, see BAN). A common name applied to any district or territory under the administration of a ban, but specially applied to a district of southern Hungary comprising the three counties, Temes, Torontál, and Krassó-Szörény (Map: Hungary, G 4), though it was never ruled by a ban. The total area is 11,013 square miles; the total population, which is very heterogeneous, in 1900 was 1,528,605, and at the census of Dec. 31, 1910, 1,582,133. Temes has an area of 2761 square miles, with (1900) 400,910 inhabitants (in addition Temesvár and Versecz, towns with municipal rights, with 33 square miles and 72,555 inhabitants and 76 square miles and 27,370 inhabitants respectively); Torontál, 3823 square miles and 594,343 inhabitants (in addition, Pancsova, town with municipal rights, 44 square miles and 20,808 inhabitants); Krassó-Szörény, 4276 square miles and 466,147 inhabitants. The principal town of the district is Temesvár. The Banat is one of the most fertile and best-cultivated districts of Hungary. Owing to its mild climate and rich soil, abundant crops of grain and fruits are raised, while the mountains contain rich mineral deposits, especially coal. Among its numerous mineral springs, the best known are those of Mehádia, in Krassó-Szörény county. The district, which from 1652 to 1716 was under the Turkish dominion, became uninhabited and covered with forest and marshes, but was reclaimed under Maria Theresa, who drained the land by means of canals and by free grants of land induced a considerable immigration from Germany, Turkey, and Servia, thereby laying the foundations of its present prosperity. In 1779 it was united with Hungary. It was formed into an Austrian crownland in 1849, but was restored to Hungary in 1860. See BAN.

BAN'BRIDGE. A town in county Down, Ireland, built on a steep slope on the left bank of the Bann, 76 miles north of Dublin (Map: Ireland, E 2). It is a thriving seat of linen manufacture in all its stages, from the preparation of the soil for the flaxseed to the finishing of the finest linen. Miles of bleaching-greens exist in the vicinity, while there are numerous factories along the Bann. Pop., 1901, 5006; 1911, 5101.

BANBURY, băn'bĕr-ĭ (anciently Berenburig, Bera's fort). A market town in Oxfordshire, England, on the Cherwell, and the Oxford Canal, 23 miles north of Oxford (Map: England, E 4). Banbury is the centre of the famous rich red land of Oxford County. This region is one of the most fertile in the kingdom. Banbury is noted for its manufacture of agricultural implements and for malt liquors, leather, cheese, and cakes. It was a stronghold of Puritanism in the seventeenth century, and the term "Banbury man" came to be applied, as a term of derision, to the typical Puritan. The old "Banbury Cross," famous in the nursery rhyme, is replaced by a modern one. There are a castle, several fine churches, and the town possesses excellent schools. It was incorporated as early as 1553. Pop., 1891, 12,767; 1901, 12,967; 1911, 13,458. Consult Beesley, *History of Banbury* (London, 1841). See CROSS.

BANC (OF. *banc*, Low Lat. *bancus*, MHG. *banc*, Ger. *Bank*, bench). In law, the bench or seat of judgment. Hence the sittings of a superior court of common law, composed of more than one judge, to determine questions of law; or the sittings of a full court or quorum, as distinguished from the sittings at *nisi prius* (q.v.), or by one judge, for the purpose of trying issues of fact, are called "sittings in banc" or "in banco." The term is in use in the United States as well as in England. See BENCH; COMMON BENCH; COURT.

BANCA, băn'kà, or **BANKA.** One of the Dutch East Indian islands northeast of Sumatra, from which it is separated by the Banca Strait. It is of an oblong shape and covers an area of about 4379 square miles (Map: East Indies, C 5). Its surface is generally flat, although it has some elevations on the northern and southern ends. The climate is moist and unhealthful for Europeans. The most important product of the island is tin, which has been mined by the government since 1832. The annual yield of that metal is between 15,000 and 20,000 tons. The surface is heavily wooded and the flora is remarkable. Spices grow widely, as do other tropical products. The principal articles of import are rice and salt. Administratively Banca, together with a few adjacent small islands, constitutes a separate residency. The population of the residency in 1905 was 115,189, of which 327 are European and over 43,723 Chinese.

BANCA, băn'kà. A small boat, used in the Philippine Islands. It is shaped from a single log and therefore belongs to the class called "dugouts." Practically all of them are fitted with outriggers like the proas. The crosspieces are usually of bamboo, and the float is often of the same material. A few of the boats are of rather large size, are built with frames and planking, and have a schooner rig.

BANCBANUS. See BANKBAN.

BANCO, băn'kō (It. bench, counter, bank). A commercial term meaning the standard money in which a bank keeps its accounts, as distinguished from the current money of the place. The distinction was more necessary when the currency consisted, as it often did, of clipped, worn, and foreign coins. These the early banks (at Venice or Amsterdam, for instance) received at their intrinsic worth, crediting the depositor in their books with this bank value. The term was chiefly applied to the money in which the Hamburg bank kept its accounts, before the adoption of the new universal coinage of the German Empire. It was not represented by any coinage.

BANCROFT, băn'krŏft *or* băn'krôft, Cecil Franklin Patch (1839–1901). An American educator, born at New Ipswich, N. H. He graduated in 1860 from Dartmouth College, studied in German universities, and in 1867 having finished his course at Andover Theological Seminary, was ordained to the Congregationalist ministry. From 1860 to 1864 he was principal of the Appleton Academy at Mount Vernon, N. H., and from 1867 to 1872 of the Lookout Mountain Educational Institutions, Tennessee. In 1873 he was appointed principal of Phillips Academy, Andover, Mass. It is said that he prepared more students for colleges and scientific schools than any other secondary school instructor in the United States. He published many contributions in periodicals and made numerous public addresses. He was at various times president of the Head-masters' Association, the Dartmouth Alumni Association, the New England Association of Colleges and Preparatory Schools. Consult *Andover Townsman,* Oct. 11, 1901.

BANCROFT, Edward (1744–1820). An American naturalist and chemist. He was born in Westfield, Mass., but at an early age he went to Guiana and there practiced medicine. Later he went to England, where, through the close friendship of Franklin, he obtained a place on the staff of the *Monthly Review.* While holding this position he wrote a series of strong articles in maintenance of American rights and in vindication of Franklin's relation to the *Hutchinson Papers* episode. Charged with arson in 1777, he fled to Paris and became a spy in the employ of the American Commissioners there. It has been commonly charged that he sold information gained from Silas Deane, a former teacher of his, to the British government. There does not seem to be much foundation for this. The reports of the American Commissioners show that he enjoyed their utmost confidence. (Consult Wharton, *Diplomatic Correspondence of the American Revolution,* Washington, 1889.) In 1769 Bancroft published a *Natural History of Guiana* and in 1794 the first volume of an extended work on colors and calico printing, *Experimental Researches concerning the Philosophy of Permanent Colors.* In the meantime (1785) Parliament had granted him special rights of importing and using a certain kind of oak bark in calico printing.

BANCROFT, Frederic (1860–). An American historian, born in Galesburg, Ill. He graduated from Amherst College in 1882, received the degree of Ph.D. from Columbia in 1885, and spent several years abroad in study at German and French universities. From 1882 to 1892 he acted as librarian to the Department of State at Washington. At various times he was lecturer at Amherst College and at Columbia, Johns Hopkins, and Chicago universities on the political and diplomatic history of the United States and Europe. In 1900 he was a delegate to the Congress of Historians at Paris, and in 1902–03 he lectured at the Lowell Institute in Boston on "Life in the South." A member of the literary staff of the *Nation* for many years, he contributed also to other reviews and to magazines articles on historical subjects, and published *The Negro in Politics* (1885); *Life of William H. Seward* (1900); *The Public Life of Carl Schurz,* with William A. Dunning (1908); *Speeches, Correspondence, and Political Papers of Carl Schurz* (1913).

BANCROFT, George (1800–91). An American historian. He was born at Worcester, Mass., Oct. 3, 1800, and as the son of the Rev. Aaron Bancroft, a Unitarian clergyman, the author of a *Life of Washington,* he inherited the blended qualities of the historian and the ecclesiastic. He was trained at Exeter, N. H.; entered Harvard College at 13, and on his graduation in 1817 went to Göttingen, where he took the degree of Ph.D. in history, being among the first of Americans to study there. His studies were in German, French, and Italian literature, in the classics, Arabic, Hebrew, history, and natural sciences. Leaving Göttingen in 1820, Bancroft went to Berlin, enjoying the society of Schleiermacher, Wilhelm von Humboldt, Varnhagen von Ense, and other distinguished scholars. He studied also at Heidelberg, and on a visit to Jena met the venerable Goethe at Weimar. Returning in 1822 to America, he became tutor in Greek at Harvard and essaying his father's profession, preached occasionally with moderate approval. But literature soon claimed him. In 1823 he published a volume of verse, and with Dr. Joseph G. Cogswell opened a school at Northampton. In the next year he published a translation of his former teacher, Heeren's *Politics of Ancient Greece,* and in 1826 an *Oration,* advocating universal suffrage as the foundation of true democracy. In 1830 he was elected without his knowledge to the Legislature, but he declined to serve and in the next year refused a nomination. Already he was absorbed in his great historical work, *The History of the United States,* of which the first volume appeared in 1834, and the tenth 40 years later. In this form the book was published in 6 volumes (1870–76), 2 concluding volumes (xi and xii) were published (1882) as a *History of the Foundation of the Constitution of the United States,* and the whole appeared in a final revision in 6 volumes (1884–85), as the *History of the United States, from the Discovery of America to the Inauguration of Washington.*

But though this bulky history occupied thus the central position in the labors of a lifetime, it did not engross Bancroft's scholarly activities. In 1830–35 he wrote a *Political Address* to the people of his State, at the request of the Young Men's Democratic Convention, and, giving up his school, moved to Springfield, where he gave himself wholly to historical studies, till, in 1838, he was made Collector of the Port of Boston by President Van Buren. The Democratic party nominated him for governor in 1844. He failed of election by a small margin, and was appointed Secretary of the Navy by President Polk. His management was marked

by the establishment of the Naval Academy at Annapolis, which was devised and organized on his sole initiative by an ingenious straining of executive authority. He also fostered the work of the Washington Observatory and raised the standard of professorial instruction. He showed diplomatic foresight and decision in constantly renewed orders to the American Pacific Squadron to seize California in case hostilities should break out with Mexico—orders executed with far-reaching results. Acting temporarily as Secretary of War, it fell to him to give the command to march troops into Texas. His services at Washington led to his appointment as Minister to Great Britain (1846–49), where he procured modification in the laws of navigation and allegiance. On his return in 1849 Bancroft lived in New York, devoting himself to historical studies, interrupted by diplomatic services as Minister to Prussia in 1867, to the North German Confederation (1868), and to the new German Empire in 1871. From this post he was recalled at his own request in 1874. While Minister at Berlin he assisted in the settlement of the Northwest Boundary dispute between the United States and Great Britain. Oxford made him a D.C.L. in 1849, and Bonn a J.U.D. in 1868. His miscellaneous publications are very numerous. Among the more important may be named an oration at Springfield (July 4, 1836); *History of the Colonization of the United States* (1841); and an oration in commemoration of Andrew Jackson (1844); *The Necessity, the Reality, and the Promise of the Progress of the Human Race* (1850–54); *Memorial Address on Abraham Lincoln* (1866); *A Plea for the Constitution of the United States* (1886); and *Martin Van Buren* (1889). His last address was at the opening of the third meeting of the American Historical Association, April, 1886. His old age was spent in Washington and at his summer home at Newport in charming domesticity. Bancroft was twice married. He died at Washington, D. C., Jan. 17, 1891.

As an historian Bancroft was a democratic idealist. His zeal for justice was deep, but occasionally misdirected; his patience in gathering materials indefatigable; his literary composition labored and frequently over-elaborated. There is a tendency to ponderous expression and to philosophic discursiveness; but though somewhat out of tune with the historic spirit and the literary taste of our own day, his work exercised a very great influence on the generation of the Civil War in stirring and maintaining in the American people the inspiring conception of a continent dedicated to liberty.

Consult: Davis, "George Bancroft," in *American Academy of Arts and Sciences*, vol. xxvi (Boston, 1846–1900); Green, *George Bancroft* (Worcester, 1891); Rives, *Memorial of George Bancroft* (New York, 1892); Schuyler, *Correspondence and Remarks upon Bancroft's History of the Northern Campaign of 1777* (New York, 1867); Wallis, *Mr. Bancroft as an Historian* (Baltimore, 1896); West, *George Bancroft* (New York, 1900). Also the monograph, "A Little More Light on Andrew Johnson," by Prof. William A. Dunning, setting forth the claim that Bancroft wrote the inaugural message and other papers of Andrew Johnson (q.v.). This monograph was published in the *Proceedings* of the Massachusetts Historical Society for November, 1905, and was separately printed at Cambridge in that year. *Life and Letters of George Bancroft* (ed. M. A. DeW. Howe, Boston, 1908) is biographically of the first importance.

BANCROFT, Hubert Howe (1832–1918). An American historian, born at Granville, Ohio. After entering the book business in Buffalo, N. Y., he was sent to California in 1852 to establish a branch there. He became interested in the history of the Pacific coast and collected documents of all sorts relating to it. His business prospering, he practically retired in 1868 and gave himself up to historical work on a large scale, employing numerous assistants to explore and index his vast collection. He preserved a great mass of material on all phases of the history of the Pacific region, and in 1900 he presented no fewer than 60,000 volumes to the University of California, with about 500 original manuscripts, relating to the pioneer history of the coast. With the aid of his collaborators, he published during the period 1875–87 a monumental "West American Historical Series," 39 volumes in all, covering not only the history of 12 Western States, but that of Central America, Mexico, British Columbia, and Alaska. In addition the complete work includes 5 volumes on *The Native Races of the Pacific States*, and 2 volumes on *The Northwest Coast*. Among other of Bancroft's writings are: *Popular Tribunals* (2 vols.); *Chronicles of the Builders of the Commonwealth* (7 vols., 1891–92); *Essays and Miscellany* (1890); *Some Cities and San Francisco* (1907), and *The Book of Wealth* (1910). An account of his labors is given in *Literary Industries* (1890), continued in *Retrospection, Personal and Political* (1912).

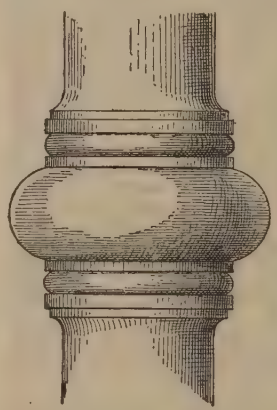
BANCROFT, Marie Effie Wilton, Lady (1840–1921). An English actress and manager. She was born at Doncaster, and as a child appeared on the stage with her parents, who were both actors. Among her early parts was that of Fleance in *Macbeth* (1846). After several years in the provincial towns she made her London début, Sept. 15, 1856, at the Lyceum, as the boy Henri, in *Belphegor*, playing the same night in *Perdita; or, the Royal Milkmaid*. She won great popularity in several boy characters, in burlesques at various theatres, as Cupid in two different plays, and notably as Pippo, in the *Maid and the Magpie*, by H. J. Byron, at the Strand Theatre (1858). For several years she remained at the Strand, taking numerous parts of the same general type. In April, 1865, she began, in partnership with Mr. Byron, the management of the Prince of Wales's Theatre, having secured as a leading actor Squire Bancroft (q.v.), whom she had met shortly before in Liverpool. The house soon became noted for its series of successful comedies by T. W. Robertson, realistically depicting certain features of the social life of the day and staged with unusual attention to naturalness of detail. In successive years they brought out *Society* (1865), *Ours* (1866), *Caste* (1867), *Play* (1868), *School* (1869), and *M. P.* (1870). Miss Wilton, who in 1867 became Mrs. Bancroft, regularly took the principal female parts in these pieces, her husband being leading man. Some of her best-known rôles were Mary Netley, in *Ours;* Polly Eccles, in *Caste;* and Naomi Tighe, in *School;* and also Lady Teazle in *The School for Scandal* (revived 1874); Zicka, in *Diplomacy* (1878); and Nan, in *Sweethearts* (1879).

Mr. and Mrs. Bancroft likewise presented at their theatre a number of prominent actors, among them Hare, Coghlan, the Kendals, and Miss Terry. In 1880 they moved to the Haymarket Theatre, a larger house, where they continued the successful presentation of modern comedy. July 20, 1885, they retired from the stage, and very rarely appeared afterward, though in 1893 Mrs. Bancroft took part with her husband (who was knighted in 1897) in the revival of *Diplomacy* at the Garrick Theatre. She collaborated with her husband in the production of two volumes of reminiscences called *Mr. and Mrs. Bancroft On and Off the Stage, Written by Themselves* (London, 1888), and *The Bancrofts: Recollections of Sixty Years* (London, 1909). She is also the author of the novel, *The Shadow of Neeme.*

BANCROFT, Richard (1544–1610). An English prelate and Archbishop of Canterbury (1604–10). He was born at Farnworth in Lancashire and was educated at Cambridge, where he graduated B.A. in 1567 and M.A. in 1570. In 1575 he became rector of Fenersham and from this time on became more and more recognized as the leader of the strictly Anglican party as against Puritans on the one hand and Roman Catholics on the other. His opportunity came in the series of attacks on the Anglican church known as the Marprelate Tracts. These he combated by two methods: reply through numerous tracts which he himself wrote or caused others to write; and through bringing offenders to trial before the Ecclesiastical Commission Court, of which he became a member about 1587. In addition to this he delighted the High Church party by a sermon on Feb. 9, 1589, in which he asserted the divine right of bishops and urged the theory of the apostolic succession. His progress was rapid, and he became Bishop of London in 1597 and in this capacity attended the deathbed of Elizabeth. At the accession of James I he did his best to prevent any alliance between the crown and Puritanism and at the Hampden Court Conference (1604) urged the cause of Anglicanism with intemperate zeal. The same year he succeeded in passing through Canterbury Convocation a series of canons aimed at Puritanism which forced many clergymen to give up their livings. Their cause, however, was taken up by Parliament, and for the rest of Bancroft's life a constant struggle was waged between the Puritan Parliament and the archbishops. Not content with this, he involved himself in a struggle with the courts of common law over the rights of the church courts. The balance of his time was spent in the more peaceful work of translating the Bible, of which work he was "Chief Overseer" and which resulted in the "Authorized Version" published the year after his death. He died Nov. 12, 1610. Bancroft was in no sense a lovable person, but the Anglican church undoubtedly owes, in a large measure, her present constitution to this able combative Bishop. Consult Usher, *The Reconstruction of the English Church* (New York, 1910).

BANCROFT, Sir Squire Bancroft (1841–). An English actor and manager, born in London. He began his dramatic career in Birmingham in 1861. After playing in Dublin and Liverpool he was invited to London by H. J. Byron and Miss Wilton, and made his first appearance at the Prince of Wales's Theatre, in April, 1865. His subsequent history is in constant connection with that of Miss Wilton, whom he married in December, 1867. (See Bancroft, Marie.) He continued with Mrs. Bancroft in the management of the Prince of Wales's Theatre and, after 1880, the Haymarket, till July, 1885, when they retired together. After that his chief appearances were at the Lyceum in *The Dead Heart*, with Irving (1889), and in February, 1893, at the Garrick, in *Diplomacy.* He was knighted in 1897. Consult *Mr. and Mrs. Bancroft On and Off the Stage, Written by Themselves* (London, 1888), and *The Bancrofts: Recollections of Sixty Years* (London, 1909).

BANCROFT, Wilder Dwight (1867–). An American chemist, born in Middletown, R. I. He graduated at Harvard in 1888 (A.B.), and did four years of special work in Strassburg, Leipzig, Berlin, and Amsterdam (1889–93). In 1892 he was given the degree of Ph.D. at Leipzig. He was assistant in chemistry at Harvard in 1888–90, instructor in chemistry there in 1894–95. He was assistant professor of physical chemistry at Cornell in 1895–1903, when he became full professor. In 1905 he was elected president of the American Electro-Chemical Society, and in 1910 of the American Chemical Society. He founded and became editor of the *Journal of Physical Chemistry* in 1895. His publications include *The Phase Rule* (1897).



BAND OF A COLUMN.

BAND (from *bind*). In architecture, the word is used in two senses: (1) to designate any ring or collar encircling a round feature, as a shaft or tower; (2) to designate any flat architectural member continued horizontally along a wall or other part of a structure, such as a flat stringcourse or a frieze. In Gothic, especially English-Gothic architecture, the long shafts of pier clusters are often interrupted by one or two molded bands or shaft rings, and these occur also in Byzantine and Moorish architecture. One of the finest of classic bands is the famous anthemion band of the Erechtheum at Athens.

BAND. Originally the term "band" had general reference to any combination of instruments organized for the performance of instrumental music, in which sense it is still largely employed in England. In modern technical usage it refers only to such combinations of instruments as are usually played on the march. Up to the twelfth century there had been no attempt at musical organization on the part of wandering or roving musicians—a condition due as much to the evil repute in which they were held as to the unsuitable character of their primitive instruments. About the thirteenth century conditions had so far improved that recognition and sanction were conceded them, and bands of pipers and trumpeters came into existence.

So seriously did they value their art after this that guilds were formed, the members of which elected a head or piper king, who, in common with the rank and file of the membership, was pledged to see "that no player, whether he be piper, drummer, fiddler, trumpeter, or performer on any instrument, be allowed to accept engagements of any kind, whether in towns, villages, or hamlets, unless he had previously enrolled himself in the guild." The original guild was probably that of the Brotherhood of St. Nicholas, organized at Vienna in 1228, which 100 years later was placed under the control of a regularly appointed board nominated by the Austrian government. From these guilds town bands were formed throughout Germany and Austria, consisting for the most part of fifes, flutes, schalmey, bombard, zinkers, or cornetti (six-holed horns, similar in shape to a cow's horn, and played with a special mouthpiece), bagpipes, viols, and drums. The development of the wind band (brass, wood wind, and reed instruments) was curiously influenced by the peculiar restrictions defining the social status of every calling during the Middle Ages. Thus, the trumpets and kettledrums were reserved exclusively for the nobility and forbidden to ordinary minstrels. In some towns stringent laws were passed forbidding bands of more than five or six pipers to play at an ordinary citizen's wedding, or other functions of similar importance; bands of greater strength, or the *full band*, being reserved for civic and religious occasions. The music played by such bands was learned by ear and rarely put into writing, in order to add effect to the supposedly secret nature of their order. Between the seventeenth and eighteenth centuries music began to be noted down, and the monotonous character of the band music (due to the impossibility of their horns and trumpets giving the third and seventh of the dominant chord) was largely done away with by adding a few trumpets tuned in other keys.

At the beginning of the eighteenth century instrumental music had separated very distinctly into the three or four great groups or divisions in which we find it to-day. The *full orchestra*, combining every element and vehicle of musical expression, addressed itself to the musical intellects; while the *brass band* retained its mission as church and community music, especially for rendering chorales in the open air, and the *military band* appealed to the masses at large. The bands of to-day may be grouped as follows: (*a*) drum and fife, or drum and bugle; (*b*) brass band; (*c*) military band. Drums, fifes, and bugles or trumpets have remained practically unchanged, and are now, as they always have been, inseparably connected with all that pertains to the life of the soldier. The brass band has ever been closely connected with the services of the Church, and in England has reached its highest development through the numerous workingmen's band organizations of Lancashire and Yorkshire. Such bands as *Besses-o'th'-Barn*, *Stalybridge Old Band* (under Alexander Owen, a celebrated leader), and similar bodies, in many instances composed entirely of coal miners or factory operatives, have been reckoned among the most potent influences in the modern development of music among the masses of England. Brass bands are met with in the United States, but only where military bands are not possible.

The military band as a musical organization (as a regimental or military feature, it will be found treated under BAND, MILITARY) is the modern representative of the original town band. The first French military bands, organized by Lully (q.v.) under the commission of Louis XIV, consisted of a quartet (soprano, alto, tenor, and bass) of oboes, with regimental drums, for all of which he wrote separate parts. The music of the town bands was performed by all the instruments in unison. Queen Elizabeth's band had consisted of 10 trumpets and 6 trombones, besides a few other instruments. The Lully of the Germans was a civilian musician named Wieprecht, who, because of severe opposition, succeeded in getting his scheme of instrumentation introduced into but a single Prussian regiment. Sax (q.v.) of France succeeded in the introduction of similar reforms in the army of Napoleon III. The invention and rapid improvement of the clarinet marked a new era, and it became as important and essential a feature of the military band as is the violin to the orchestra. Next followed the invention of the bassoon (or *fagotto*) and French horns. The saxophone family (B flat soprano, F flat alto, B flat tenor, E flat barytone, and B flat bass), although practically the invention of the French bandmaster Sax, have only within the last few years become common to military bands generally.

The modern *concert military band* may be described as a result of the following causes: (1) a development of the brass band; (2) a desire to give more complete artistic expression to the increasing repertoire of band music; (3) the prominence given to the wind band, in the composition of the great modern orchestral composers. To the latter cause, and to the easy transition from orchestra to band of most modern orchestral compositions, may be indirectly attributed the great increase of the woodwind section of the concert band—flutes, oboes, clarinets, and contrabassoons (*contra fagotti*). An instance of this may be found in Wagner's "Elizabeth's Prayer," where the wood winds are used alone. Similarly, in many of the most beautiful passages of the Nibelungen music, the strings are not used at all. The reflex influence of such music on the concert band has been to cause the invention and introduction of new instruments, in order to secure the desired tone color. The military concert band has received its greatest impetus in the United States, where it may be said to have been inaugurated in the Fourth of July concerts given by the Boston city government as a feature of the regular Independence Day celebration usually held on the historic Common. The series of promenade concerts which followed met with remarkable success, and brought Patrick Sarsfield Gilmore (q.v.) into prominence as a bandmaster. D. W. Reeves succeeded Gilmore at the latter's death, but soon resigned in favor of Victor Herbert, who is held to have rivaled John Philip Sousa (q.v.) in the advancement of the military band. The organization known as Sousa's Band, marked at the beginning of the twentieth century what was universally regarded to be the highest type of concert military band. Sousa, who had attained national eminence in connection with the United States Marine Band at Washington, resigned his position in order to devote himself to concert work entirely, with a band whose membership was as carefully recruited as that of the great orchestras. The

band of the French Garde Républicaine was his model, and he has succeeded in placing his organization at the head of the concert bands of the world.

Band Instrumentation for brass, military, and concert bands is as follows: *Brass* (if of 10 pieces), E flat tuba, barytone, 2d alto, B flat tenor, E flat cornet, 1st alto, 2d B flat cornet, 1st B flat cornet, bass drums and snare drum. For a band of 20 pieces the following instruments are added: 1 solo, A flat cornet, and 2 1st B flat cornets; 1 3d B flat cornet; 1st, 2d, and 3d trombones, and 1 B flat bass. The average military band is composed as follows: 2 1st B flat clarinets; 2 seconds, and 1 3d B flat clarinet, 1 piccolo, 1 E flat clarinet, 2 1st B flat cornets, 1 2d and 1 3d B flat cornets, 1st, 2d, and 3d altos, 1st, 2d, and 3d trombones, oboe, glockenspiel, saxophones (occasionally), barytone, B flat bass, E flat tuba, bass drum and snare drum. The concert military band includes such additions to the regular military band as are demanded by the programme undertaken. String bass, glockenspiel, saxophones, contrafagotti, and tympani are invariably added. Consult A. A. Clappé, *The Wind Band and its Instruments* (New York, 1911).

BAND, MILITARY. In the army service, an organized body of musicians, instrumentalists, under a bandmaster or chief musician, generally assigned to each regiment of cavalry and infantry, and to the headquarters of the branches of the service. Military bands of one form or another are coeval with military bodies themselves. Every ancient nation had its peculiar music, instruments, and national songs. If tradition assigns the reed, lute, and string to the shepherd and herdsman, it is no less the authority for imputing the jarring instruments of percussion and strident brass to men of war. Ancient songs referred invariably to great victories, memorable sieges, and valorous deeds, and were sung in camp and on the march. With the Spartans the song of Castor was the signal for combat; the Romans charged to the musical accompaniment of trumpets and horns; while the ancient Germans preferred the more complex aggregation of drums, flutes, cymbals, and clarions. At the beginning of the period of the Middle Ages the instruments handed down and preserved by most European nations were those used in the rallying of troops, calling them to battle, or enlivening a fatiguing march with the few crude melodies of which they were capable.

In France the minstrels and troubadours greatly aided instrumental progression. They would frequently accompany the troops on the march and to battle, having as instruments the rebec, a small, three-stringed violin; the bagpipe, and the flute, or fife, to which, in 1330, was added the clarion. The cornet, another war instrument of the ancients, made its appearance about the same time. Towards the end of the fifteenth century regularly organized military bands began to make their appearance, their collection of instruments comprising drums and trumpets principally, which, in the case of the Italian bands, was further augmented by the pandean pipes, together with the flute and fife. The drummer used a single stick. Bagpipes and violins were added about the beginning of the sixteenth century, the invention of the former instrument belonging to the Alps or Piedmontese inhabitants.

The Swiss mercenaries, in 1535, introduced into France the combination of fife and drum, which has ever since and in nearly every land been the popular musical vehicle for the expression of martial spirit.

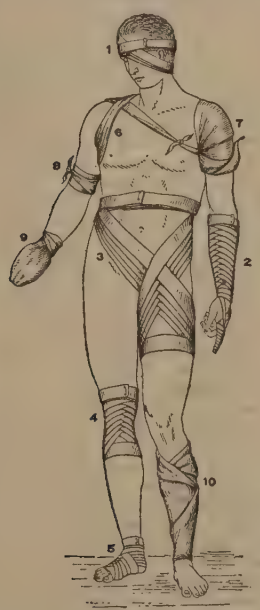
In the seventeenth century the Prussians introduced the hautboy, which was given to the dragoons and musketeers of the Guard. To the Eastern nations, through the Hungarians, we owe the kettledrums, bassoon, and true flute; to the Italians the tambourine; to the Hanoverians the modern horn; and to the Turks the cymbals and big drum. The entire musical scheme of military bands at the beginning of the eighteenth century was a combination of all these instruments, with the addition of the cavalry trumpet. The average infantry band consisted of drums, fife, horn, bassoon, big drum, and cymbals; the cavalry bands of hautboy, bagpipe, and kettledrums. The bassoon, hautboy, horn, and trumpet, however, were indifferently employed by both troops. A French ordinance dated April 19, 1766, appoints a band of music to each regiment. New instruments making their appearance are: the clarinet (q.v.), which, however, is not incorporated into the band until 1755; the serpent, triangle, and trombone, each entering successively and from different sources. Practically it was not until 1792 that military music and military bands began the development that has brought them to their present high state of efficiency. In England officers hired civilian musicians to act as the band of their respective regiments—a system which obtained until the foundation of Kneller Hall (q.v.) in 1857; but in France and Russia bands were part of the army organization. About this time the individual bandmaster becomes prominent as the great factor of progress, among the most important of whom must be placed the famous Neithardt, born Aug. 10, 1793, who, when still a young man, was for two years bandmaster of the Garde-Schützen Battalion, and afterward for 20 years the bandmaster of the Kaiser-Franz Grenadiers. This latter band he brought to a high state of perfection. Progress in England must be credited largely to Charles Godfrey, born 1790, who in 1813 joined the band of the Coldstream Guards as a bassoon player, became bandmaster, and remained such until his death in 1863. In the United States Patrick Sarsfield Gilmore (q.v.) was the moving spirit. His first band was organized in Boston, 1859, but shortly afterward he became a bandmaster in the Federal army, serving throughout the Civil War, and becoming world-famous for the novel effects he produced in military music. Bands in the United States army are recruited generally for that specific purpose, the members being enlisted men, and usually consist of 28 men, all ranks. (For their pay, see PAY AND ALLOWANCES.) Instruments are supplied by the Quartermaster's Department. There is a school for army bands at Governor's Island, N. Y., which is more or less experimental in character, but it is hoped that a permanent school for training young men and boys for bands of the United States army will be developed from it, the scheme employed in England being the prospective plan.

In England bandmasters are specially trained at Kneller Hall, and on appointment receive warrant rank, with pay at 5 shillings per day, and £70 per annum from the band fund. The men are generally recruited as boys, from 14 to 16 years of age, usually from military institu-

tions, schools, and training ships. The official establishment of British army bands is 31 all told for infantry, and 23 for cavalry; but without exception this number is greatly increased at the personal expense of the officers of the regiments, who pay for all extra men, music, and instruments. A thoroughly trained, fully equipped, numerically strong band is often a point of regimental rivalry, and while it has succeeded in endowing the British army with the best bands in Europe on an average, it has been done only at the expense of officers, already financially overtaxed. The following bands are considered among the leading military bands of Europe: the Royal Artillery, Royal Marine, and Guards Band, of England; the Kaiser-Franz Grenadier Band, of Germany; the Guides Band, of Belgium; the Garde Républicaine Band, of France; the Imperial Guards Band, of Austria; the Ottoman Palace Band, of Turkey; the Bersaglieri Band, of Italy; the Czar's Regiment of Guards Band, of Russia.

For fuller details the reader is referred to *United States Army Regulations* for composition and equipment of United States army bands; Grove, *Dictionary of Music* (London, 1894), for biographies of military music composers and bandmasters; and the article "Militärmusik," by Rode, in the *Musikalisches Conversations-Lexicon* (Berlin, 1877).

BAN'DAGE (Fr. from *bande*, a strip; cf. BAND). A strip of woven material used by surgeons to apply pressure on a part or to re-



BANDAGES APPLIED.

Roller Bandages: 1, eye; 2, finger, wrist, and forearm; 3, groin; 4, knee-cap; 5, foot and ankle. Triangular Bandages: 6 and 7, shoulder; 8, upper-arm; 9, hand; 10, leg.

tain dressings upon wounds. The most common bandage is a strip of linen, flannel, muslin, or cheese cloth, from 1 to 5 or more inches in breadth and 10 yards long, rolled longitudinally: the roller bandage. It is applied to a limb in a spiral, each turn overlapping the preceding about one-third of its width and adjusted to tapering or enlarging parts of the limb by reversing the bandage, or turning it back upon itself. It must be applied smoothly, so as to exert even pressure. A "figure-of-eight" bandage is often used in the neighborhood of joints, the turns crossing each other in a way to resemble that numeral. The "spica" bandage, so called from its supposed resemblance to the arrangement of the husks of an ear of corn, is applied at the junction of a limb with the body; 3, in the figure, illustrates a spica of the groin. There are also bandages to suit special purposes, as the four-tailed for the head or knee, which consists of a piece of cloth split up on each side towards and nearly to the centre. When applied, the tails are crossed and tied so as to make an extemporaneous nightcap. In the packets supplied to soldiers of the German army and to members of an ambulance corps, as well as to members of "first aid to the injured" societies, are large handkerchiefs, to be used as triangular (Esmarch) bandages, slings, or, when folded, short roller bandages. Roller bandages of crinoline, rubbed full of fresh plaster of Paris, are used in making plaster splints in case of fracture, etc. They are thoroughly wet first and then applied rapidly. Starch, silica, and dextrin bandages are used in much the same manner to secure stiff and immobile dressings. India-rubber bandages are employed, on the other hand, where a flexible support is required, as in varicose veins of the legs.

BANDAI-SAN, bän-dä'ē-sän' (Jap. Bandai mountain). A volcano of Japan, situated near the centre of the island of Nippon (Map: Japan, F 5). It consists of a number of peaks, none of which exceed a height of 6000 feet, situated around an elevated plain, on the northern side of Lake Iwanashiro. The last eruption of the volcano occurred on July 15, 1888, when a tremendous mass of earth and rock was thrown out by the explosion of one of the craters, Ko-Bandai-san, and rolled down the mountain slopes into the Nagase valley, devastating an area of over 27 square miles and killing 461 people.

BANDA (bän'dȧ) **ISLANDS.** A group of several small islands of the Dutch East Indies, in the Moluccas (q.v.) south of Ceram and attached to the residency of Amboina (Map: Australasia, E 3). The two largest islands are Banda Neira and Lontor. Gunong Api, the highest island, is an active volcano 2200 feet above the sea, constantly emitting vapor and sometimes doing great damage. Only a few of the islands are inhabited. Their total area is about 17 square miles, and the main products are nutmegs and mace. The capital is Banda, on Banda Neira. It is well fortified and has a good harbor. The population of the islands is about 9500, of whom about 500 are Europeans. The Banda Islands were discovered in 1512 by the Portuguese, who were dispossessed by the Dutch in the seventeenth century. Since then they have shared the fortune of the other Moluccas. Consult Warburg, *Ein Beitrag zur Kulturgeschichte der Banda-Inseln* (Leipzig, 1897).

BANDAN'A (Hind. *bāndhnū*, from the dyeing of wares with those parts tied [*bāndh*, cord, tie, band] that are to remain undyed). A printed handkerchief, originally of Indian origin and manufacture and usually made of cotton, though real Indian bandana silks and handkerchiefs are

occasionally seen. The cloth is first dyed turkey-red, and then the pattern is made by discharging the color with bleaching liquor in a hydraulic press. The pattern to be discharged is cut out on two plates of some metal, such as lead, which is not acted on by the liquor, the plates being the full size of the handkerchief. A dozen or more handkerchiefs are put in at once between the plates, and so many of these courses are entered together as will fill the press. Then the pressure is applied, and the liquor is run in on the uppermost plate, which is grooved on the upper side to receive it, and holed to pass it from plate to plate through all the cloth folds in the press. The pressure on the cloth to make clean work by preventing the spreading of the liquor is enormous. The patterns in the real bandana style of printing are spots and diamond prints, the best suited for discharging, and even for these a pressure of 500 tons is required to work them clean.

BANDA ORIENTAL, bän'dȧ ō'rē-ĕn-täl' (Sp. eastern bank). A name once locally used to designate the republic of Uruguay, which is on the east side of the Uruguay River.

BANDEL, bän'dĕl, Ernst von (1800–76). A German sculptor. He was born at Ansbach and studied at the Munich Academy. After some years in Nuremberg and Rome he returned to Munich, where he carved portrait busts. In 1834 he went to Hanover and undertook, among other larger works, the colossal statue of the German hero Hermann or Arminius at Detmold, to which he devoted the best years of his life and a large part of his own resources. In 1871 the Imperial government contributed 10,000 thalers to the work, and the statue was unveiled in 1875, the sculptor receiving a pension of 12,000 marks in recognition of his devoted services. Although Bandel was educated in the classic school, he nevertheless endeavored to free himself from its influence, as well as to hold himself aloof from the Romantic tendencies of his day. His aim was to found a national school of sculpture based upon naturalism, but his individuality was not sufficiently powerful to break the bonds of classicism. Consult his own monograph, *Die Arminsäule* (Hanover, 1861), and his biography by Schmidt (Hanover, 1892).

BANDELIER, bän'dē-lēr', Adolph Francis Alphonse (1840–1914). An American archæologist, born at Bern, Switzerland. He traveled under the direction of the Archæological Institute of America in New Mexico, Arizona, Mexico, and Central America, 1880–85, and went in 1892 to Peru, Bolivia, and Ecuador, under commission of Henry Villard. For several years he continued researches in the last-named countries in behalf of the American Museum of Natural History in New York City, whose important collection of Bolivian and Peruvian antiquities he made. In 1904 he was appointed lecturer in American Archæology at Columbia University and served until 1911. Among numerous other works of investigation he published *The Art of War and Mode of Warfare* (1877); *Archæological Reconnaissance in Mexico* (1881); *Final Reports of Investigations among the Indians of the Southwestern United States, 1880–85* (1890–92); *The Gilded Man (El Dorado) and Other Pictures of the Spanish Occupancy of America* (1893); *On the Relative Antiquity of Ancient Peruvian Burials* (1904); *The Indians and Aboriginal Ruins of Chachapoyas, Peru* (1907); *The Islands of Titicaca and Koati* (1910).

BANDELLO, bän-dĕl'ō, Matteo (c.1485–c.1560). Next to Boccaccio, the most widely known of all the Italian writers of *novelle*, or tales. He was born at Castelnuovo in Piedmont, educated at a convent in Milan, and in early life became a Dominican monk. After several years of wandering through the courts of the south, he settled at Mantua (1515), where under the patronage of the Gonzaga family he made many powerful friendships. In 1521 he returned to Milan, where he remained till 1526, when his connection with the Morone conspiracy forced him to flee. At first secretary to Luigi Gonzaga, he served from c.1528 to 1541 as adviser of Cesare Fregoso. After the murder of the latter he accompanied Fregoso's wife to France. Her influence in 1550 procured him the bishopric of Agen, which he held till 1554. He continued for the rest of his life in France. Not to consider his *Rime* (1537), dedicated to his idealistic love for Lucrezia Gonzaga, and his 11 cantos of *Lodi* (1545) in her honor, Bandello's most important work is his *Novelle* (vols. i–iii, 1554; vol. iv, 1573). These tales belong to the type made familiar by the still more famous collections of the *Decameron* and the *Heptameron*, and have their origin in the conversations which Bandello attended in the long course of his social life. They deal with the tales made familiar in the French *fabliaux*, with popular traditions and anecdotes, historical episodes, the events of current life; and are narrated in a simple conversational style, much as they were actually told in intimate social intercourse. Bandello has little psychological penetration and no power over the comic, but he has a marked sense for the picturesque and a naïve interest in the strange and fantastic. Together with the introductory notes, which describe the occasions on which Bandello heard the tales, his stories give valuable insight into the social life and manners of his time. He narrates, among others, the story of Romeo and Juliet, though Shakespeare probably derived his plot from another source. His work has been used extensively by Lope de Vega, Massinger, and Byron. Consult E. Masi, *M. Bandello o vita italiana in un novelliere del' 500* (Bologna, 1900). The tales were translated by J. Payne (London, 1890); the best edition of the *Novelle* is that of Brognoligo in 6 vols. (Bari, 1910–12).

BANDE NOIRE, bänd nwär (Fr. black band). The name given in France after 1815 to those speculators who had bought up, at ridiculously low prices and in depreciated currency, the lands and houses confiscated from the Church and the émigrés during the Revolution. The opprobrious name was fixed on them on account of their vandalism in the destruction of magnificent works of art, churches, convents, and chateaus for the sake of the building material. It has, however, been affirmed that these men did considerable service to the community in removing old and useless edifices, and that their minute subdivisions into lots of the old territorial domains has favored agriculture and ameliorated the condition of the people. Consult Lavergne, *Economie rurale de la France* (Paris, 1877).

BAN'DEROLE (Fr., It. *banderuola*, a little banner, dimin. of *bandiera*, banner). A small streamer fixed immediately under the crook, on the top of a staff of a crozier and folding over

the staff. Also an architectural term for the flat inscribed band used in the Renaissance buildings, similar to those now used for mottoes on coats of arms.

BANDETTINI, bän'dĕt-tē'nē, TERESA (1763–1837), called also in the academies AMARILLA ETRUSCA. An Italian *improvvisatrice,* born at Lucca, whose beauty, wit, and skill at extempore versifying made her famous in the academies of Italy and won her the laurel crown of poetry in Rome (1794). She was a friend of Monti and Alfieri and of the leading people of the day.

BAND FISH. One of the several greatly compressed and much elongated marine fishes, principally of the family Cepolidæ. The red band fish (*Cepola rubescens*), about 15 inches long, dwells in the Mediterranean, where, on account of its brilliancy, it is sometimes known as the "fire-flame" and "red-ribbon." Species also occur in Asiatic waters, inhabiting quiet depths, where they are free from the action of the waves, feeding on seaweed and small shellfish. The name is also sometimes applied to the oarfish (q.v.).

BANDHOLTZ, HARRY HILL (1864–). An American soldier, born at Constantine, Mich. After graduating from the United States Military Academy in 1890 he rose steadily through the various grades, serving as major of volunteers with the Seventh Infantry in the Santiago campaign of the Spanish-American War, and as captain with the Second Infantry in the Philippine insurrection campaigns. In 1901–02 he was governor of Tayabas Province, and afterward he became assistant chief of the Philippine constabulary, in command of the district of southern Luzon. In 1907 he was promoted to be brigadier-general and chief of the Philippine constabulary. In the discharge of his duties he captured or destroyed various outlaw bands and their chiefs, the last of whom he successfully subdued in 1911.

BAN'DICOOT (a corruption of the Telugu word *pandi-kopper,* meaning 'pig-rat'). A member of the marsupial genus *Perameles,* included in the family Peramelidæ. The species are not numerous, about 12 in all, and are scattered through Australasia. The muzzle is long and pointed and the head shrew-like. Much of the day is passed in burrows in which they make nests of grass and leaves. They feed both on insect food and vegetables. Their powerful claws enable them to dig up roots with ease, and they frequently do great damage to the gardens of the outlying settlements. The pouch opens backward and has accommodation for six or eight young. The long-nosed bandicoot (*Perameles nasuta*) is about 20 inches long, including a 5-inch tail. "It has ears like a rabbit, a long, sharp nose like a shrew, hind quarters like a kangaroo, and tail like a rat."

The closely related rabbit bandicoots consist of two Australian marsupials of the genus *Peragale.* The best-known form (*Peragale lagotis*) is known in its western Australian home as "native rabbit," from its enormous ears. The form, gait, and even the flavor of the flesh are rabbit-like. It burrows in the soil for grubs and also feeds on grass and vegetables. The pig-footed bandicoot (*Chœropus costanotis*) is the only member of its genus. It differs from other bandicoots and resembles a pig in having but two functional toes on each foot. It is small in size and omnivorous.

BAN'DICOOT RAT. The largest-known species of rat (*Nesokia bandicota*), a native of India and Ceylon, where it is also known as Malabar rat and pig rat, the latter being the significance of the Telugu word of which *bandicoot* is a corruption. Its body often exceeds a foot in length, the tail being of equal length. It is black above and grayish beneath, and the long tail is very thick at the base. It frequents arid, hilly districts, where its flesh is a favorite article of food with the coolies and is said to be delicate in flavor and to resemble young pork. It feeds chiefly on grain and roots and is very destructive to gardens and to poultry, burrowing under walls to reach what it wants. "Its nests, when rifled, are frequently found to contain considerable quantities of rice, stored up against the dry season." It is not known north of the Ganges and Indus. Other species of the genus extend from Palestine to Formosa.

BANDIERA, bän-dyā'ra, ATTILIO and EMILIO (1817 and 1819–44). Italian patriots. The two brothers came of a noble Venetian family; their father was an admiral in the Austrian service, and they themselves were officers of rank in the navy. Out of zeal for the cause of Italian independence, they entered into conspiracies against the Austrian government and carried on a correspondence with Mazzini, their idol, who was then in exile in England. In 1844 they were forced to flee to Corfu, whence they returned in the hope of stirring up an insurrection in Calabria. They were betrayed to the police authorities and, with seven of their companions, captured as soon as they had landed. On July 25, 1844, they were shot in the market place of Cosenza, while singing patriotic hymns and exclaiming "Viva l'Italia!" The death of the two noble youths aroused the hatred of Liberal Europe against the Austrian tyranny in Italy and prepared the way for the first movement of liberation in 1848. Consult Ricciardi, *Storia dei fratelli Bandiera e consorti* (Florence, 1863).

BANDINELLI, bän'dē-nĕl'lē, BARTOLOMMEO, or BACCIO (1488–1560). An Italian sculptor. He was born at Florence and was a pupil of his father, Michelangelo di Viviano, an able goldsmith, and of Rustici. He imitated the works of Michelangelo, whose "David," symbolic of Florentine freedom, he, the protégé of the Medici, attempted to surpass with a "Hercules and Cacus" (1534), placed like it in front of the Palazzo Pubblico. Ugly and exaggerated in form and sentiment, this group succeeded only in making its author the object of satire and ridicule. But Vasari's generally accepted charge that Bandinelli destroyed Michelangelo's famous cartoon of the "Bathing Soldiers" is probably due to that author's dislike of him. Through his industry many Italian cities were adorned with his statues and river gods, but their treatment was so commonplace that they failed to elevate or inspire public taste. His best work is to be found in the marble choir screen of the cathedral at Florence, wherein he has personified, in relief, figures of the virtues and figures of prophets and apostles. There is grace in their conception, and they are intelligently arranged as to the space at command. In the choir of the Annunziata at Florence is a group representing "Nicodemus Supporting Christ"; the Nicodemus is a portrait of Bandinelli himself. His other works include "Adam and Eve" and "Bacchus" (National Museum, Florence).

BAND OF HOPE UNION. The most important of the children's temperance societies

of England, started with local unions in 1847. In 1855 the United Kingdom Band of Hope Union was formed, and later the Edinburgh, Scottish, and Hibernian unions. With the income derived from small weekly dues, they maintain lectures, agents, a publishing department, fêtes, and concerts. Illustrated lectures are given in elementary and common schools, institutions, reformatories, and workhouses. Children over seven years old may belong. The latest statistics indicate that there are over 15,000 Bands of Hope and juvenile temperance societies in Great Britain, with a membership of about 2,000,000. See TEMPERANCE.

BAN'DOLIER', or **BANDOLEER** (Fr. *bandoulière*, It. *bandoliera*, shoulder belt; cf. *band*). A cartridge belt, worn over the shoulder; strongly made of stout canvas cloth, with a separate pocket for each cartridge or round of ammunition. It was extensively used by the colonial troops of Great Britain and portions of the mounted infantry, and officers armed with the revolver, during the Boer War of 1899–1902. The first use of the bandolier as an article of military equipment dates back two centuries, when muskets were provided with matchlocks. The musketeers were furnished with gunpowder in small cylindrical boxes made of wood, tin, or leather, each containing sufficient for one charge. Twelve of these little boxes were fixed to a belt called a bandolier, worn over the left shoulder. Ammunition for the rifle is issued to troops of the United States army in bandoliers, each containing 60 rounds. Each bandolier is fitted with a sling suitable for carrying it over the shoulder. The bandoliers are packed in moisture-proof containers, each holding 20 bandoliers filled with cartridges.

BAN'DON, or **BAN'DONBRIDGE**. A town in county Cork, Ireland, on the Bandon, 20 miles by rail southwest of Cork (Map: Ireland, C 5). Bandon was at one time a prosperous manufacturing town, with extensive cotton-spinning and weaving industries, which now have almost entirely disappeared; a considerable grain and provision trade is carried on, and there are flour mills and breweries, but the population, which was 9049 in 1841, had diminished by 1911 to 3122. The country around Bandon is very beautiful, well wooded, undulating, and pastoral. The river described by Spenser as "the pleasantest Bandon, crowned by many a wood," has a course of 40 miles, 15 of which are navigable to Innishannon, 5 miles below Bandon.

BANDONG, bän'dông. The capital of the Preanger residency in Java, situated in the western part of the island, and connected by rail with Batavia (Map: East Indies, C 6). It contains a fine park and plain in front of the regent's residence, a school for native teachers, and a racecourse. The volcano of Guntur is near by. Pop., estimated at 21,200.

BANDTKE, bänt'ke, or **BANDTKIE**, bänt'kye, JERZY SAMUEL (1768–1835). A Polish historian, philologist, and bibliographer. He was born at Lublin and was educated at Halle and Jena. From 1811 until his death he was librarian and professor at Cracow. He wrote several valuable works, among which may be mentioned *Polnisch-Deutsches Wörterbuch* (1806), *Polnische Grammatik für Deutsche* (1808; frequently reprinted), and *Dzieje narodu polskiego*, 'History of the Polish Nation' (1810; 3d ed., 1835).

BANDY LEG. See LEG.

BANE'BER'RY. See ACTÆA.

BANÉR, bä-nâr', JOHAN (1596–1641). A Swedish general in the Thirty Years' War. He was born at Djursholm, near Stockholm, entered the army in 1615, and early distinguished himself in the wars against Russia and Poland. He accompanied Gustavus Adolphus to Germany in 1630 and was conspicuous in the battle of Breitenfeld (1631), in which he repulsed Pappenheim and largely contributed to the victory. He was left to oppose Aldringer in the west when the battle of Lutzen was fought (1632), and after the death of Gustavus Adolphus he assumed chief command of the Swedish army, invaded Germany with varying success, obtaining decisive victories at Wittstock (1636) and Chemnitz (1639). He failed in an attempt, in 1641, to capture the Emperor at Ratisbon and died soon afterward at Halberstadt. Consult C. F. Manderfeldt, *Eloge de Jean Banér, feldmarechal général pendant la guerre de trente ans* (Copenhagen, 1787), and Lundblad, *Johan Banér* (Stockholm, 1823).

BANES, bä'nâs. A town on the north coast of Cuba, in the province of Santiago de Cuba, about 35 miles north by east of Holguin (Map: Cuba, K 6). It has an excellent harbor and is noted for its shipments of fruit, especially bananas.

BANFF, bämf. A seaport and the county town of Banffshire, Scotland, at the mouth of the Deveron, 50 miles by rail north-northwest of Aberdeen (Map: Scotland, F 2). It forms a higher or inland town, and a lower or sea town, on the Moray Firth. The town is very well built, and the streets are clean and well paved. Among the noteworthy buildings are Banff Castle, a handsome town hall with a lofty spire, and the academy, a fine building of classical style. There are a number of educational institutions, including a museum and several libraries. To the south of Banff is Duff House, the seat of the late Duke of Fife, with a large park. A seven-arched bridge over the Deveron unites Banff with the seaport of Macduff, on the right bank of the river. Manufactures include beer, and leather, wool, and iron goods. The chief exports are grain, agricultural products, cattle, salmon, and herrings. Banff, with Macduff, Elgin, Cullen, Inverary, Kintore, and Peterhead, sends one member to Parliament. Population, royal and municipal burgh, 1901, 3730; 1911, 3821. Its earliest-known charter was granted by Malcolm IV about 1163. Robert II in 1372 made Banff a royal burgh. Archbishop James Sharp was born here in 1618. Consult Cramond, *The Annals of Banff* (Aberdeen, 1891–93).

BANFF, bämf. A popular health and pleasure resort in southwestern Alberta, Canada, on the Bow River and on the Canadian Pacific Railroad (Map: British Columbia, F 4). The village (pop., 937 in 1911) is situated amid grand scenery of the Rocky Mountains and has a boiling sulphur spring, open-air swimming baths, a fine hotel, and a sanitarium, all included in the Rocky Mountain National Park of Canada (area, over 5000 square miles), of which Banff is the railway depot. Consult *Banff in the Canadian Rockies* (Montreal, 1900).

BANFFSHIRE, bämf'shēr. A county in the northeast division of Scotland, bounded north by the Moray Firth; east, southeast, and south by Aberdeenshire; west, by Elgin and Inverness shires (Map: Scotland, E 2). Its greatest

length is about 59 miles, its greatest breadth about 31, its extent of seacoast about 30; area, 630 square miles. The surface is mountainous, interspersed with fertile valleys and fine pastures. The soil in many parts is very fertile and highly cultivated. Agriculture and herring and salmon fisheries are the leading occupations. The chief towns and villages are Banff, Macduff, Keith, and Buckie. Pop., 1801, 35,807; 1851, 54,170; 1891, 64,190; 1901, 61,500; 1911, 61,402.

BÁNFFY, bän'fē, DESIDERIUS, BARON (1843–1911). A Hungarian statesman. He was born at Klausenburg, Transylvania, and educated at the universities of Leipzig and Berlin. He entered the government service and became prefect (*Obergespan*) of various counties of Transylvania. He was elected deputy and became President of the House of Deputies in 1892. On the resignation of the Wekerle cabinet in 1895 he was intrusted with the formation of a new Liberal ministry. He resigned both the premiership and his mandate as deputy in 1899, but reentered politics in 1903 as head of a new party advocating radical nationalistic views. He was a member of the coalition which brought parliamentary government to a standstill in 1905–06, but seceded in the spring of 1906. See HUNGARY.

BANG, bäng, BERNHARD LAURITS FREDERIK (1848–). A Danish scientist, professor of pathology and therapy in the Royal Veterinary and Agricultural College at Copenhagen. He became widely known for his researches in veterinary science, and especially for his investigations into contagious abortion and tuberculosis. With Stribolt he discovered, in 1896, the cause of contagious abortion in cattle, and subsequently he studied its treatment and the possibility of immunization. In 1892 he originated the Bang method of eradicating tuberculosis from dairy herds by the isolation of the mildly affected animals and the artificial feeding of their calves with milk free from tubercle bacilli. This method has been extensively applied in Denmark, Sweden, and Norway, with favorable results. Bang is the author of a large number of articles in the veterinary and other scientific journals of the world.

BANG, HERMANN JOACHIM (1857–1912). A Danish author, a nephew of Olaf Lundt, born in the island of Seeland and educated at the Academy of Sorö and at Copenhagen. He wrote the following popular novels, tales, and romances: *Haablöse Slägter* (1880; Ger. trans., *Hoffnungslose Geschlechter*, 1900); *Fädra* (1883; dramatized as *Ellen Urne*, 1885); *Excentriske Noveller* (1885); *Stille Eksistenser* (1886); *Tine* (1889); *Under Aaget*, a collection of novels (1890); *Ti Aar* (Ger. trans., *Zehn Jahre*, 1891); *Teatret* (1892); *De fire Djaevle* (1895; Ger. trans., *Die Vier Teufel*, 1897); *Ludvigsbakke* (1896); *Det hvide Hus* (1898; Ger. trans., *Das weisse Haus*, 1902); *Vad Vejen*, considered his best novel (Ger. trans., *Am Wege*, 1898); *Udvalgte Fortaellinger* (1899); *Liv og Död* (1900; Ger. trans., *Leben und Tod*, 1901); *Englen Michael* (1902); *Joseph Kainz* (1910). Etta Federn published a collection of Bang's fiction in German in 1910.

BANG, PEDER GEORG (1797–1861). A distinguished Danish jurist and statesman. He was born at Copenhagen and in 1830 was appointed professor of law in the university there. He took an active interest in politics, rising from offices in his native city to be a national figure. Several times he was Minister of Agriculture and Minister of the Interior, and in 1854 he was made head of the cabinet. His highest post was that of Supreme Court justiciary. His two principal works are *Lärebog i de til den romerske privat Ret henhörende Discipliner* (2 vols., 1833–35) and *Systematisk Fremstilling af den danske Procesmaade* (with J. C. Larsen, 5 vols., 1841–43). His uncle, Frederick Luding Bang (1747–1820), was a distinguished professor of medicine at the University of Copenhagen and author of a number of works on medical subjects.

BANGALA, bäng'gä-lä. A tribe of cannibal negroes on the Middle Congo. They are of warlike character and have furnished excellent troops to the Belgian Congo. See AFRICA.

BANGALORE, bäng'gä-lōr' (Hind. city of beans). A fortified town in the native state of Mysore, India, 70 miles northeast of Seringapatam, in lat. 12° 58′ N. and long. 77° 38′ E. (Map: India, C 6). It is the chief military station of the British in the territory, and the seat of the British resident. It has manufactures of cotton cloth and woolens, especially the latter. The place is more than 3000 feet above sea level and is remarkable for its salubrity, for the temperature seldom rises above 90° or descends below 61°. The municipal water supply is excellent, and European vegetables grow in abundance. The town is well laid out, has handsome public buildings, and beautiful botanical gardens. The most prominent structure is the Maharaja's palace. There are a number of European educational institutions, and the chief, the High School or Central College of the province, is well attended. The military cantonment, housing a large British and native force, is to the northeast. Bangalore dates from the foundation of its fort in 1537. It was a favorite residence of Hyder Ali, and in 1791 it was stormed by the British under Lord Cornwallis. Pop., 1891, 180,300; 1901, 159,000; 1911, 189,485.

BANGE, bänzh, VALÉRAND DE (1833–1914). A French colonel of artillery, who organized the present artillery system of the French army. He was born at Balignicourt. In 1873, as director of the *atelier-de-précision* in the Dépôt Central in Paris, he reconstructed both the light and heavy fieldpieces then in use, and the models he proposed in 1876 were adopted for the army in 1879. From 1882 to 1889 he was director of the Cail corporation, whose plants at Grenelle, Denain, and Douai he transformed into ordnance factories. He competed successfully with Krupp in 1884 for the contract to supply the Servian government with fieldpieces. Bange's gun was also preferred by England, Italy, and Sweden. For the Antwerp Exposition of 1885 he made a gun of 34 centimeters (about 13¼ inches) calibre, 35 feet long, from which two projectiles weighing 600 kilograms (about 1320 pounds) were fired with charges of 200 kilograms (about 440 pounds) of powder, the range being 18,000 meters (about 12 miles); but the gun burst at the third discharge. Bange was the first to make effective use of the screw principle in the mechanism of the breech block, and his gas check, consisting of a pad to prevent the escape of gases in more or less modified form, finds application in most guns with screw breech block. See GUNS, NAVAL, and ORDNANCE. For a description of his inventions, consult Hennébert, *L'Artillerie Krupp et l'artillerie de Bange* (1886).

BANGKOK' (city of wild fruit trees).

The capital of Siam and the chief commercial city of the country, situated on both banks of the Menam, about 25 miles by river from the bar at its mouth or about 14 miles direct (Map: Siam, D 4). It lies in a very low region and covers an area of over 15 square miles, principally on the left bank of the river. It is divided into many islands by arms of the Menam, and a large portion of the population live in floating houses; many houses are built on piles as a precaution against inundations, which are of common occurrence, owing to the low surface of the region. In recent years well-planned streets and roads have been built, crossing the water courses and canals and lined with many solidly built houses of brick. The portion of the city on the left bank of the river is surrounded by a high wall, about 6 miles in circumference. The part which adjoins the royal palace is beautifully laid out, with a number of parks and fine residences. The palace grounds are surrounded by a wall, inclosing the royal palace, the royal library, temples, theatre, harem, and the residences of the vast retinue of servants and attendants. The temples of Bangkok are numerous and gorgeous. A typical temple is built in several stories, rising terrace-like one above another, the whole forming a pyramidal-shaped building, the several roofs being of glazed tiles of the most brilliant colorings, while resplendent pillars are richly decorated with gold. The interior is invariably decorated profusely with precious stones, porcelain vases, and numerous statues of Buddha. In one of the temples there is a gigantic image of the saint in a reclining position, about 140 feet long, and richly inlaid with mother-of-pearl and gems. Among the temples, or *wats*, the most magnificent are Wat Phra Keo, Wat Benchamabophit (built in commemoration of the late King Chulalongkorn), Wat Phra Chetupon, Wat Suthat, and Wat Saket (in whose grounds rises the Golden Mount).

As the chief port of Siam, Bangkok has an extensive commerce, which is chiefly in the hands of Chinese and Europeans. The former have succeeded in monopolizing the retail trade as well as many of the industries of the city. The chief exports are rice and teak. In the year 1910–11 the rice export amounted to 17,588,349 piculs, valued at 91,060,879 ticals; teak, 7,624,092 ticals; total exports, 108,907,821 ticals. The native industries are almost extinct, and the porcelain ware, for which Siam was once famous, has been replaced by the Chinese article. In the year 1910–11 the tonnage entered at the port was 965,607, of which 415,393 German, 217,265 Norwegian, and 133,408 British. There is regular steam communication with Singapore, Saigon, and Hong Kong.

The transportation in the city was formerly and is still in part effected by boats, but Bangkok is now provided with a system of electric railways. A large part of the city is lighted with electricity. Bangkok is the seat of foreign legations as well as of many consular representatives, including one from the United States. There are four railway stations, terminals of the lines which connect the provinces with the capital. According to a census of 1910, the population was 628,675, of whom about 200,000 were Chinese; the remainder was made up largely of Siamese, Burmese, natives of French Indo-China, and Malays. Bangkok was an insignificant village until 1766, when Ayuthia, the residence of the King, was destroyed by the Burmese, and Bangkok became the capital.

BAN'GLE (Hind. *bangri*, glass bracelet). A loose bracelet or armlet, generally of slender silver wire, and frequently strung with coins or ornamental pendants. Any number may be worn at one time. The bangle has a high antiquity, and many of the same form as those worn in modern times are represented on ancient works of art and have been found at Pompeii and in the tombs at Præneste.

BANGOR, bân'gôr (Gael. *Beannchar*, pointed hill). A seaport town, and favorite watering place in county Down, Ireland, on the south side of the entrance to Belfast Lough, 12 miles northeast of Belfast (Map: Ireland, F 2). It has manufactures of embroidered muslins and linen goods. Bangor Abbey, founded by St. Congall in 555, had 3000 inmates in the ninth century when it was destroyed by the Danes. The site is now occupied by the parish church. The Royal Ulster Yacht Club holds regattas at Bangor. Pop., 1901, 6046; 1911, 7776.

BANGOR (Celt. high choir). An episcopal city, municipal borough, and seaport town, in the northwest of Carnarvonshire, North Wales, Great Britain, on the southeast bank of Menai Strait, 9 miles northeast of Carnarvon, and 60 miles west of Chester (Map: Wales, B 3). The town stretches southwest through a fertile valley and is divided into upper and lower Bangor, the latter consisting chiefly of a narrow, crooked street, a mile long. The grandeur and beauty of the surrounding scenery have long made it a favorite resort. Bangor is the oldest bishopric in Wales, reputed to have been founded about 550 by St. Deiniol. The cathedral built by him was destroyed by the Saxons in 1071, rebuilt in 1102, and again destroyed by fire in 1402. The present edifice, built between 1496 and 1532, is a plain embattled cruciform structure, 214 by 60 feet, with a pinnacle tower 60 feet high. There are numerous educational institutions, including the University College of North Wales, Independent, Baptist, and Normal colleges. The town has undergone much modern improvement. It was incorporated in 1883; has municipal water works, gas and electric-lighting plants; maintains a free library, and has erected artisans' dwellings. Its chief trade is derived from the great Penrhyn slate quarries, 6 miles distant, which employ over 3500 men. The slates are taken to Port Penrhyn and exported to all parts of the world. Two miles west of the city the Menai suspension bridge, and Stephenson's famous Britannia tubular bridge, one mile to the south, span the Menai Strait. Pop., 1891, 10,000; 1901, 11,269; 1911, 11,236.

BANGOR. A city, port of entry, and the county-seat of Penobscot Co., Me., 135 miles by rail northeast of Portland, at the head of navigation on the Penobscot River, on the Maine Central and Bangor and Aroostook railroads, and on the Boston and Bangor division of the Eastern Steamship Line (Map: Maine, D 4). The Kenduskeag Stream, which here empties into the Penobscot, divides the city, the sections of which are united by several bridges; and a bridge 1300 feet long, over the Penobscot, connects Bangor with the opposite city of Brewer. The city is the seat of the Bangor Theological Seminary (Congregational), founded in 1816, the University of Maine Law School, the Bangor State Insane Hospital, and the Eastern Maine General Hospital. It also has a fine county

courthouse and a custom house, high school, and public library—the three last having been erected since the $4,000,000 conflagration in 1911. Bangor is an important commercial and manufacturing centre, with advantages of excellent water power, and a good harbor, having a deep-water frontage of three miles. Bangor is the jobbing and distributing centre for a wide area of Maine. The lumber interests are very extensive, and there are large foundries, machine shops, and factories, producing trunks, paper, stoves, canoes, and moccasins. In 1912 the value of the foreign commerce of the district of Bangor exceeded $4,000,000. The water works and street-lighting plants are owned by the municipality. The government, under a charter of 1834, is vested in a mayor, elected annually, and a bicameral city council, which controls the appointments of most of the administrative officers, though some are nominated by the mayor, subject to the consent of the board of aldermen. A movement for commission government was defeated in March, 1913. Pop., 1900, 21,850; 1910, 24,803; 1920, 25,978.

Bangor was visited by Champlain in 1604 and is one of the many places supposed to be the site of the mythical city, Norumbega (q.v.). The first permanent settlement was made in 1769 by Jacob Buswell, a "soldier and hunter, boat builder and cooper." The place was known as "Kenduskeag Plantation" until 1787, and as "Sunbury" from 1787 to 1791, when it was incorporated as a town under the name of Bangor. In 1834 it was chartered as a city. Consult: *History of Penobscot County* (Cleveland, 1882); various articles in the *Bangor Historical Magazine*, vol. i (Bangor, 1886); and an article, "Annals of Bangor," in *The Maine Historical Magazine*, vol. ix (Bangor, 1895).

BANGOR. A borough in Northampton Co., Pa., 45 miles (direct) southeast of Scranton, on the Lackawanna and Lehigh and New England railroads (Map: Pennsylvania, L 5). It is the centre of slate-quarrying interests and has silk mills and machine shops. Bangor was settled about 1760 and was first incorporated in 1875. The government is vested in a burgess, elected every three years, and a unicameral council. Pop., 1890, 2509; 1900, 4106; 1910, 5369.

BANGO'RIAN CON'TROVERSY. See HOADLY, BENJAMIN.

BANGOR THE'OLOG'ICAL SEM'INARY. A Congregational theological school. It was chartered by the Massachusetts Legislature in 1814, opened at Hampden, Me., in 1816, and removed to Bangor, Me., in 1819, where it graduated its first class in 1820. The course of study covers three years. The relation between the seminary and the Congregational churches of the State has always been close, and to these churches the seminary has furnished more than half of their pastors. In 1913 the library contained over 28,000 volumes, and the value of the seminary property, including buildings, was over $400,000.

BANGOT, bäng'ôt. See MANGUIAN.

BANGS, ISAAC SPARROW (1831–1903). An American soldier, born at Canaan, Me. He was mustered into the Federal service in 1862 as captain in the Twentieth Maine Volunteers, participated in the battles of Antietam and Fredericksburg, was appointed lieutenant-colonel of colored troops in 1863, and was placed in command of the Eighty-first United States colored infantry. Subsequently he became colonel of the Tenth United States colored heavy artillery, and commanded Forts Jackson, St. Philip, Pike, and Livingston, and the defenses of New Orleans. In 1865 he was brevetted brigadier-general of United States volunteers for gallant and meritorious service during the war.

BANGS, JOHN KENDRICK (1862–1922). A prolific American humorist and editor, born at Yonkers, N. Y. He graduated at Columbia College in 1883, where he edited the *Acta Columbiana* and first became known for his gift of humor. Later, he was associated with *Life*, *Harper's Magazine*, and *Literature*. In 1899–1902 he was editor of *Harper's Weekly*. In 1904–05 he was editor of *Puck*. He wrote *Coffee and Repartee* (1886) and *The Idiot* (1895), humorous productions which have been much enjoyed. His *House-Boat on the Styx* (1896) and *The Pursuit of the House-Boat* (1897) contain much amusing anachronism. His other works include *Mr. Bonaparte of Corsica* (1895); *The Enchanted Typewriter* (1899); *Uncle Sam, Trustee* (1902); *Proposal under Difficulties* (farce, 1905); *The Worsted Man* (play, 1905); *Lady Teazle*, a musical comedy version of *The School for Scandal* (1910); *The Idiot at Home* (1900); *The Inventions of the Idiot* (1907); *Echoes of Cheer* (1912), and *A Line o' Cheer for Each Day o' the Year* (1913), besides a large number of less known and less enduring books. Since 1910 Mr. Bangs has been very successful as a lecturer.

BANGS, LEMUEL BOLTON (1842–1914). An American physician, born in New York City. He graduated at the College of Physicians and Surgeons in 1872; was successively professor of genito-urinary diseases in the New York Post-Graduate Medical School and Hospital; genito-urinary surgeon in St. Mark's Hospital, New York; professor of genito-urinary surgery in the University and Bellevue Hospital Medical School. He was also consulting surgeon for various New York and Brooklyn hospitals and attending surgeon at the Bellevue Hospital. In 1895 he was President of the American Association of Genito-Urinary Surgeons. He has written an *American Text-Book of Genito-Urinary Diseases* (1898).

BANGS, NATHAN (1778–1862). An American clergyman. He was born in Connecticut. He began to preach as an itinerant in 1801, labored for some years in Canada, and removed to New York in 1810. He was chosen head of the Methodist Book Concern in 1820, and in 1828 became editor of the *Christian Advocate and Journal*. In 1829 he was elected Bishop of Canada, but declined the office. He became president of the Wesleyan University in 1841, but soon afterward returned to pastoral work in New York. Dr. Bangs was the author of numerous publications, the most important of which is the *History of the Methodist Episcopal Church* (4 vols., 1839–41). Consult a *Life* by Abel Stevens (New York, 1863).

BANGUED, bân-gād'. The capital of the province of Abra, Luzon, in the Philippines (Map: Philippine Islands, C 2). The province is situated in the northern part of the island, has an area of 1484 square miles, and a population of 49,702. The surface is rugged, and there are numerous volcanic spurs. The valleys are fertile, with cotton, tobacco, rice, vegetables, etc., as the principal products. The capital is situated on the left bank of the Abra River, 236 miles north of Manila. It was first

settled in 1598. It has a telegraph station. Pop., 1903, 12,956.

BANGWEOLO, băng'wê-ō'lō. A shallow lake of central Africa, situated in Northern Rhodesia, between lat. 11°–13° S., the meridian of 30° E. cutting it centrally (Map: Africa, G 6). Its area is about 1158 square miles, and it is 3675 feet above the sea. It lies in the midst of a flat plain, its shores are low, parts of the lake are merely swampy in the dry season, and its surface is considerably expanded in the months of rain so that the shore line cannot be definitely defined. Most of the open water is bordered by tall water reeds. In the lake are a number of small inhabited islets, the largest of which is named Kisi. The chief tributary of the lake is the Chambezi from the east, while its outlet is the Luapula, issuing from its southern end, the large eastern source stream of the Congo. The lake was discovered in 1868 by Livingstone, who died at Chitambo's, on May 1, 1873, on the south shore of the lake. He believed that Bangweolo was one of the sources of the Nile. Consult Singer, "Der Bangweolo-See," in vol. xliv, *Petermanns Mitteilungen* (Gotha, 1898), and Weatherley, "Circumnavigation of Lake Bangweolo," in *Geographical Journal*, vol. xii (London, 1898).

BANIALUKA. See BANJALUKA.

BANIAN, băn'yan (Skt. *vanij*, merchant, trader). In India, a merchant or trader generally. It is more particularly applied to the great merchants in the west of India, especially in the seaport towns of Bombay, Surat, Cambay, etc., who carry on a very extensive trade by means of caravans with the interior of Asia, even to the borders of Russia and China. These merchants travel much, and the establishments and countinghouses of Indian banians are to be found in almost every commercial town of any note in Asia. In Bengal a corrupted form *bunya* is often applied to the native grain dealer. Some of the Marathi banians are agriculturists as well as traders, while in the Punjab the banians are said to belong in part to the degraded Chamar, or leather-working caste. Broadly speaking, the banians are a subdivision of the Vaisya caste, although in Bengal they are ranked with Sudras. In religion they are predominantly Vishnuites, with a large number of Jains in the west of India. From its original association with the merchants and the market place, the banyan tree of India received its name.

BANIAN. See BANYAN.

BA'NIM, JOHN (1798–1842). An Irish novelist. He was born at Kilkenny, April 3, 1798. In 1822 John and his older brother Michael (1796–1874) planned a series of short novels, which should do for Ireland what Scott was doing for Scotland. Three years later appeared *The O'Hara Tales*, followed in 1826 by a second collection; in 1828, by a third series, this last by Michael alone, as also another series in 1839, to which Miss H. L. Martin contributed "Canvassing." These sketches at once attracted notice, and they have maintained a place in literature. They contain many vivid portrayals of character, with the emphasis laid on the dark side of Irish life. If they have not the humor of Maria Edgeworth's *Castle Rackrent*, there is a certain compensation in the poetic feeling of John and in the vigor of Michael. See, for example, *Father Connell* (1840), by the latter. John afterward published several longer novels, *The Boyne Water* (1826), *The Anglo-Irish* (1828), and *The Denounced* (1829), besides several dramas, the best known of which is *Damon and Pythias*. In 1836, general sympathy having been attracted towards his privations, occasioned by disease that prevented all literary exertion, a pension of £150 per annum from the Civil List was awarded him, which was afterward increased by £40 for the education of his daughter. He died at Windgap Cottage, near Kilkenny, Aug. 13, 1842. Michael lived on, and wrote *The Ghost Hunter* (1833), *Father Connell* (1840), *Clough Fion* (1852), and *Town of the Cascades* (1864). He died at Booterstown, near Dublin. Consult: Murray, *Life of John Banim* (London, 1857); H. S. Krans, *Irish Life in Irish Fiction* (New York, 1903); and see the section relating to Irish literature in Keating's *History of Ireland*, ed. by D. Comyn (1902–1908). See also IRISH LITERATURE.

BAN'ISHMENT (for derivation, see BAN). An extreme form of punishment for crime in primitive society, consisting in the exclusion of the criminal from the protection of the law and his abandonment to his enemies and to strangers. The ban or sentence of outlawry (q.v.) passed upon him not only absolved his family or tribe from all responsibility for him, but also involved the confiscation of his lands and goods. It was usually incurred for a refusal to submit to the jurisdiction of the tribunals or to the ordinary penalties imposed by them. In more advanced society banishment has sometimes been practiced as a punishment for crime—usually as a commutation for the death penalty—but in a mitigated form not involving outlawry, but enforced absence from the country. In this form, either with or without confiscation of goods, it was not an uncommon form of punishment in the Middle Ages, and in England during the Wars of the Roses; and it is to-day employed in some countries—as in Russia, Turkey, and the Central and South American republics—as a punishment for political offenses. In later English law the term has been employed to describe the penalty of transportation to the colonies, instituted by the act of Parliament, 39 Eliz. c. 4. Banishment has never been practiced as a means of punishment in the United States. It would probably fall within the constitutional provision forbidding the imposition of cruel and unusual forms of punishment. The practice of excluding or of deporting undesirable aliens, which obtains in America as well as in most other civilized countries, does not come under the description of banishment. See EXILE; PUNISHMENT; ALIEN; TRANSPORTATION, PENAL.

BANISTER. See BALUSTER.

BANJALUKA, băn'yȧ-lōō'kȧ, or **BANIALUKA.** A town of Bosnia, the capital of the district of the same name, situated on the navigable river Verbas and connected by railway with Agram (Map: Austria, E 4). It contains a number of mosques and several monasteries, and in its vicinity are situated some hot springs and coal and iron mines. It has cloth, powder, and grain mills, manufactures tobacco and beer, and carries on a trade in grain, animals, and tobacco. Pop., 1910, 14,793, including about 7000 Mohammedans, 2000 Catholics, and over 300 Jews. Banjaluka was, in 1878, the scene of an engagement between the Austro-Hungarians and the Bosniaks.

BANJERMASIN, băn'jēr-mäs'sĭn. A city and district in Southeastern Borneo, held by the

Dutch since 1787 and incorporated in their possessions since 1860. The region is watered by the Banjar River, is inhabited chiefly by Dyaks, and produces gold, diamonds, coal, spices, gum, iron, wax, rattan, etc., in which articles there is considerable trade. Forest and jungle in the hilly interior, and rice fields in the flat valleys and along the seacoast are the features of the landscape. The town of Banjarmassin is built mostly on piles because of frequent inundation. Pop., 1895, 45,082; 1900, 52,685.

BAN'JO (a corruption, in negro-slave pronunciation, of *banjore, banjer;* cf. *bandore,* Portug. *bandurra,* Russ. *bandura,* all from Gk. *πανδοῦρα, pandoura,* a musical instrument with three strings). An instrument of the guitar kind, with or without frets, played with the fingers. It has a long neck, with a body resembling a tambourine or drumhead, formed of parchment stretched tightly upon a hoop. Banjos have from five to nine strings, usually of catgut, the lowest in pitch, however, being often covered with wire. The melody string, or thumb string, is placed outside the lowest bass string, and is played by the thumb of the right hand; the turning peg for it is inserted halfway up the neck. The thumb string from nut to bridge measures 16 inches, the other strings 24. The five-stringed banjo is tuned either a, e′, g♯′, b′, e², the last note being the thumb-string, or in G, a note lower. The pitch of the banjo is an octave lower than the notation. The banjo is a favorite instrument with the negro. Thomas Jefferson (*Notes on Virginia,* page 47) speaks of it as an instrument "proper to the blacks, which they brought hither from Africa, and which is the original of the guitar, the chords being precisely the four lower chords of the guitar." In Africa the instrument is known under the name *bania.*

BANJOEMAS. See BANYUMAS.

BANJUWANGY, bän′yo͞o-wäŋ′gês (fragrant water). A seaport on the east coast of Java, the chief town of the district of that name (Map: East Indies, D 6). It is a military station, has extensive trade, and has an estimated population of 9000.

BANK (same as *banc,* bench, elevation). A portion of the oceanic basin within which the water is relatively shallow. A bank covers a larger area than a bar, the banks of Newfoundland and of the British Isles extending over several thousands of square miles; the depth of water also may be such as to offer no obstacles to navigation, although considerably less than the average for the oceanic trough. Banks occur off the shores of continents and islands where they have been built up by the deposition of sediment swept along by currents whose velocity (and hence transporting power) has been checked by contact with an opposing current or with a body of still water. In the case of the Newfoundland banks much of the sediment is transported by the icebergs brought down by the Arctic current from Greenland; that current meets the warmer waters of the North Atlantic drift south of Newfoundland and the bergs are then rapidly dissipated. Submarine banks have an important economic interest in that they afford the best fishing grounds for cod, mackerel, herring, and most of our edible sea fishes.

BANKA. See BANCA.

BANKBAN, bäŋk′ bän′ (properly **BENEDICT BOR**), called also BANCBANUS. A Hungarian military governor of the thirteenth century. There is a story, almost certainly legendary, to the effect that, his wife having been wronged by the Queen's brother, he stormed the royal castle and cut the Queen to pieces. On this are founded two dramas—one in Hungarian by Katona (1827), and the other Grillparzer's *Ein treuer Diener seines Herrn* (1830)—as well as a national opera by Friedrich Erkel.

BANK, BANK'ING (Fr. *banque,* It. *banca,* from Ger. *Bank,* a bench, table for changing money. Hence, *bankrupt;* It. *banca, rotta,* broken bench, as in Florence a bankrupt had his bench broken).

Definition. The term bank is today generally applied to any one of a great variety of institutions which exercise the functions of lending or advancing funds, guaranteeing credit, gathering and safeguarding savings, dealing in securities, collecting bills and drafts, and issuing notes. The term banking still remains associated in the popular mind with the making of loans of actual money, although that function long ago became nearly obsolete. It is still customary to speak of banks of "discount, deposit, and issue" although the distinction between these terms is no longer drawn as formerly. A prevalent classification today recognizes (1) commercial banks, engaged in dealing in short term credit and (2) investment banks dealing in long term credit and the instruments which represent it.

Origin and Early History. The origin of banking is in remote antiquity, but in its nature and scope great changes have been made during the past four centuries and particularly since the opening of the nineteenth century. The modern banker is a dealer in credit while in ancient times the so-called banker was a mere custodian of the funds of ôthers and at times a buyer and seller of foreign moneys. The bill of exchange appears to have been recognized and used as a credit instrument by early bankers. Evidence of its use in Assyria several thousand years before Christ is available. In Athens and Rome several hundred years before the Christian Era there were merchants who dealt in foreign bills and received deposits. Instruments resembling the modern check were apparently in use. Livy mentions the argentarii as appearing as early as 350 B. C. By the time of Justinian the business of banking had become established and a body of jurisprudence relating to it had been evolved.

During the Middle Ages the insecurity of property and the risks attending commerce practically reduced banking once more to money changing, although there was still some traffic in bills of exchange. Modern banking is by some dated from the establishment of the early Venetian banks (1400–1600) in which the functions of deposit and note issue or the equivalent of them were exercised.

The Bank of Amsterdam and the Bank of Hamburg established during the seventeenth century performed duties approximately those of the modern bank. They did not issue bank notes and were not authorized to make loans but their credits based upon coin deposited became a popular medium of exchange in the settlement of all large transactions. These credits were known as "bank money" and are regarded by some as the first step in the evolution of the check and deposit system now in common use in Europe and the United States.

The Bank of Amsterdam was successfully managed from 1609, the date of its establishment, until the middle of the following century when secret advances to the Dutch East India Company resulted in the destruction of its credit. It was liquidated by a royal decree in 1819. The Bank of Hamburg was always conservatively managed and survived until 1873 when the adoption of an imperial coinage and bank currency by Germany rendered its services no longer necessary.

The banks of mediæval and early modern times thus had really but little similarity to the banking institutions of the later modern period. Centuries of experience were necessary to evolve current banking methods and to dispense with the conception of the bank as a money-lender organized on a large scale. From about the year 1700 onward, the beginnings of modern conceptions of banking may be traced. The first distinct institution to be developed was that of the credit note issue. Bank notes not covered by coin but representing or secured by the "notes of hand" or "bills of exchange" made by the customers of the bank, and protected by specie only to the extent of a percentage of their value, such protection being known as "reserve" or "cover" were gradually introduced into use and their employment became general during the second half of the eighteenth century. The balance sheets of most banks at about the close of that century show a great preponderance of outstanding notes among their liabilities, most loans being made through the bank's "extension" of its "credit," such credit having first taken the form of a "discount." At the same time but very much more slowly the idea of the "deposit" was being developed. Such deposits were at first what the name implies—a sum of cash left with the bank and transferable on its books at the order of the owner. By a natural process of evolution there developed the practice of crediting customers with such sums upon receiving from the customer a note of hand or bill which was admitted to discount. The basic operation of banking was thus discounting the obligations of its customers while the proceeds of the discount took the form either of a note or deposit subject to check. Wide use of the deposit was first developed in England and had attained a very substantial development by 1850. It was furthered by the growth of restrictive legislation which tended to hamper the action of banks in issuing their notes. Nevertheless by 1850 those operations were so general and well recognized not only in England, but throughout the world that the so-called classical economists designated the three basic functions of banking as being those of discount, deposit and issue. During the past fifty years of banking experience, a new conception of the banking function has become widespread, it being recognized that there is no essential difference between discount, deposit and issue but that the fundamental banking service is that of recognizing the title of a customer to credit and then substituting the bank's own credit for that of the individual up to a specified or agreed upon amount. This is what is called commercial banking. Of late years a distinction has been drawn between commercial and investment banking, the latter term being applied to the service rendered by institutions which collect savings or idle capital from individuals and turn them over to borrowers or producers who wish to use them in the conduct of industry. Such investment bankers find it expedient to issue or "float" securities which are offered for sale to investors and which represent a lien or claim upon the property of the borrowers. Investment banking is thus an operation of a totally different type from commercial banking, since its service consists of the gathering of funds which can be used in the creation of "capital goods" whose purpose it is to produce an income, while commercial banking is concerned with the turnover of consumable goods or goods approaching the consumable stage, and the advances made by the bank are liquidated through the absorption of the goods by consumers who purchase and pay for them out of their earnings or other incomes.

Classes of Banks. Banks are usually spoken of as divided into several classes, but the line of division or classification is not based upon any very uniform or recognized principle. In the United States there is a distinct legal grouping based upon the origin or source of their charter powers. This grouping recognizes so-called national banks which are vested with full banking powers of the commercial sort, including discount, deposit, or issue; State banks chartered by the several States or organized under general banking laws of the State and which are closely similar to the national banks except that they are in practice deprived of the power of note issue; savings banks which perform the function of receiving actual deposits of money or the equivalent thereof and investing such deposits in long term securities, largely mortgages on real estate; and trust companies which in most States exercise in addition to the fiduciary powers which their names imply (guardianship, trusteeship, executorship and others) many of the discount and deposit powers of commercial banks, but like the State banks are without the power of note issue. "Private banks" are usually partnerships existing under the general banking law of the several States. In foreign countries institutions of all these classes exist, the distinction between them being recognized substantially as in the United States, although in most countries the charters or certificates of incorporation are obtained from a single authority instead of as in this country, either from the central Federal or from the State government. Under recent legislation the sharp functional line which had once been drawn between these classes of banks is largely erased, although it still remains true that various institutions emphasize one side of their business and others devote attention chiefly to a different one. The classification of banks in principle is thus a matter of experience and depends upon the clientèle to which the institution appeals and the field which it has found most profitable.

Deposit Function. As already seen the function of receiving cash funds on deposit was one of the primitive functions of banking. Thus the Bank of Amsterdam, already described, simply received bullion and stored it issuing receipts for it which could be transferred from hand to hand and entitled the holder to get back the gold or silver originally deposited upon the payment of a small premium for withdrawal. Such a bank was merely a warehouse for bullion, but its service was valuable because it substituted the notes of the bank for the varied and uncertain metal circulation of the period, consisting of the coin of many nations often

worn or clipped. The bank received them at bullion value thus fixing their real value once for all. Early banks also by performing the service of safe keeping funds in times of hazard rendered a service which merited payment by the depositor. With commercial development the idea of safeguarding funds for depositors was displaced by the concept of receiving such funds and becoming liable to the depositor for them, they being reloaned in the meanwhile to borrowers. The final development was the granting of deposit credits to borrowers who were then classed as depositors. In modern banking no distinction either of accounting or in any other way is made between the depositor who leaves actual cash with the bank and the depositor who has given it his own obligation and received a credit in exchange.

Checks and Credit Instruments. For the depositor the bank acts as paymaster. The depositor pays his debts by orders upon the bank in the form of checks. This not only relieves the depositor of the necessity of keeping in his own possession sums of money larger than he has an immediate use for, whose safe-keeping would be a matter of anxiety and concern, but also furnishes him, through the endorsement of the check by the payee, a receipt for the money paid out. The banks also act as collectors for their depositors. Only a small part of the deposits in banks consists of actual cash; by far the larger proportion, often nine-tenths, being in checks and other credit instruments. When a check is deposited to the credit of a person, the bank charges itself with the duty of collecting it. If the bank is not able to collect at par, a fee may be asked for this service, but in general the cost is borne by the bank and not the depositor. If drawn upon the same bank, the collection consists merely of a transfer upon the books of the bank. If drawn upon another bank, collection may be made directly or through the clearing house. (See CLEARING HOUSE.) In either case there is likely to be a set-off, and the collection effected without the transfer of cash. But in addition to collecting checks, the bank collects other debts, such as coupons and negotiable paper.

Savings Deposits and Interest. In addition to these advantages which the depositor obtains from his bank account, he sometimes receives interest upon his deposits. Among the commercial banks of the United States the practice of paying interest upon deposits is now widespread. Persons who desire interest upon deposits must, as a rule, be content to surrender something of the absolute and immediate control over their funds, which is the characteristic of commercial banking. In such cases they patronize the savings banks or the loan and trust companies rather than the national bank. In these institutions various plans are adopted to restrain the depositor from making sudden calls for any considerable amount of his deposit. Sometimes it is a requirement of previous notice of the intention to withdraw, or again it may be a provision that a certain part of the deposit is to remain untouched, and that interest be paid upon this only.

Note Issues. The other form in which the modern bank issues its liabilities is that of notes. Note issues as already seen considerably antedated the modern form of credit deposit although deposit banking, in the sense of banking which occupied itself chiefly with actual cash funds, was the earlier form.

Where banking is not highly developed, the check is not a satisfactory means of making payment. In country districts sellers of produce often hesitate to accept checks, doubting the credit of the drawer. Under such conditions a bank, if not restrained by law from so doing, may employ its credit in the form of bank notes. Such notes are merely the promises of a bank, to pay a certain sum on demand; they are liabilities essentially of the same nature as deposits. Sound banking requires that a reserve shall be held for their redemption on demand, exactly as a reserve is held against deposits. There is no general rule as to the proportion of reserve to deposits in either case; but the proportion will generally be the same. It follows that there is no basis in fact for the popular view that banks which issue notes secure extraordinary profits thereby. The profit which a bank gains through making a loan of its credit in the form of bank notes is exactly the same as the profit it gains through lending its credit in the form of a deposit. It is of course a matter of great importance to the business man that he should be enabled to secure bank credit in a form which meets the needs of the community. In the city the most convenient form is the deposit upon which checks may be drawn; in rural districts the most convenient form is the bank note.

Where banks are freely permitted to issue notes, the process of redemption is analogous to the process by which checks are presented for cash. Every day, business men deposit with their banks notes received in payment for goods, etc. If such notes are deposited with the bank which issued them, the form of liability of the bank is simply changed, the value of the note being credited as a deposit. If deposited with other banks, they are assorted and presented promptly to the issuing bank, to be redeemed in cash. Accordingly no bank can issue an indefinite volume of notes, since this would endanger its solvency. There are the same restraints upon overissue of notes as upon overexpansion of deposits.

Although the bank note and the deposit are essentially liabilities of the same nature, the former is in most countries subjected to far more stringent regulation than the latter. The discrimination made by government in its treatment of the two forms of liabilities is explainable partly by the fact that whereas the depositor is presumably familiar with the financial standing of the bank in which he keeps his funds, no one can be expected to be a fair judge of the solvency of all banks whose notes he may receive in the course of business. In some measure the discrimination is due to the fact that the similarity in appearance between the bank note and lawful money creates a general belief that note issue is more properly a governmental function than any other use of the bank's credit, and should therefore be subjected to minute regulation, if not actually assumed by the government.

Where the regulation of note issue is very stringent, it often happens that banks are deterred from employing notes in making loans. If the check system is not commonly employed the result is a reduction in the lending power of the banks, since every loan implies the withdrawal of money. The principal sufferers, under these conditions, are the borrowers, who are

compelled to pay a higher rate of interest than would be necessary if the banks could employ their credit more fully.

Reserves. As already seen, both notes and deposits serve as a currency or circulating medium and they thus presuppose certainty on the part of recipients that they can be met promptly on demand. Success in thus meeting demand liabilities at sight when presented depends upon the holding of adequate cash funds, or upon being able to present other and offsetting claims upon those who ask for conversion. That part of the bank's funds which is held in cash or in credit available for use in liquidating demand obligations is called the bank's reserve.

When business is in its ordinary condition, a bank can, after some experience, approximate pretty nearly to the amount of the greatest demand for a return of deposits throughout the year, and provide accordingly. But sometimes the credit of a bank becomes doubted, either from causes peculiar to itself, or on occasions of a panic or general distrust, when all who own money wish to have it in their own possession. In these cases there is a *run* on the bank for repayment of its deposits, and the amount called for may be far beyond the maximum demanded in ordinary times. If the bank is unable to get a sufficient amount of cash to meet the demand, it is said to *suspend payment*, and, as a general rule, it must wind up its business, the confidence of the public that it will in future meet its liabilities on demand being now destroyed. There are two prime rules in safe banking: the one is, that the bank shall lend its funds only on undoubted and readily realizable securities, however low the profit; and the other that the bank shall retain a sufficient amount of its resources—and this is called the *reserve*—to meet the possible demands of the depositors even in case of a *run*, although there may be no reason to expect one; for when a run comes, it seldom casts its shadow before. But it is evident that the greater the reserve of a bank, the less the amount of funds which it can lend out and draw interest for; hence the temptation which banks lie under of imprudently lending out a too great proportion of their funds; and it is their yielding to this temptation that frequently precipitates the failures of banks.

In the practice of private banking the amount of the reserve is wholly in the discretion of the banker. Chartered or incorporated banks are frequently subject to legal provisions which determine not only a minimum reserve, but prescribe how it shall be held.

Bank Loans. It has been shown that the bank's liabilities are created only upon receipt from customers of their own obligations in equal amount, subject to an interest charge which constitutes the inducement to the bank to make the advance. The obligations of customers thus made directly in favor of the bank are usually termed "loans and discounts" the former designation ordinarily applying to advances bearing interest while the latter includes obligations of fixed amount due at a later date, from which the interest is deducted in advance in the form of "discount." Such loans and discounts are of several classes being grouped as time or demand paper, commercial or collateral advances or single and double name paper or bills of exchange. Bank loans are, in form, time loans for a definite period of days or months, and call loans, upon which instant payment may be demanded at will. Either form of loan may be made on the personal credit of the borrower, though this is not considered good banking, and can be safely done only in cases of persons of unquestionable standing. Loans are made, as a rule, upon mercantile paper and upon personal notes secured by the deposit of collateral. The time of the loan is definitely fixed by the face of the instrument, and the amount loaned is that stated in the note or draft, less the interest upon the same for the unexpired time. Loans upon collateral are either for a definite period of time or on call. As in the latter case the amount of interest cannot be fixed in advance, it is customary to loan a definite sum, and at the expiration of the loan collect also the interest at a rate agreed upon for the duration of the loan. The collateral or security consists of stocks or bonds greater in value than the amount of the loan and probable interest, which are for the time being deposited with the bank. In the event of failure to pay the loan the bank secures the satisfaction of its claim by the sale of the securities. In the case of discounts of mercantile paper the bank relies upon the good faith and general property of the several parties to the note or draft, without having a claim against any specific property. Ordinarily the borrower is content to receive the loan in the form of a credit account upon the books of a bank, upon which he may draw checks at will. Thus the discounted value of the mercantile paper or personal note is credited to the borrower as a deposit. In most modern banks of deposit the vast mass of the deposits are created in this way. In effect the borrower has merely exchanged his credit for that of the bank. He is ready to pay current interest to the bank because the latter's credit is generally acceptable and serves all the purposes of ready money.

Public Regulation of Banking. Public regulation of banking was originally regarded as unnecessary, banking institutions being allowed to conduct their business with but little restraint under charters that were often very broadly and loosely drawn. The harm done by unwise banking and the constant danger of loss to depositors resulting from bank failures and suspensions became more and more evident as experience showed the great service which could be rendered to individuals and corporations through the assistance of banks, as a larger and larger proportion of the population became customers, or holders of the obligations, of banks. Hence in many countries banking has been recognized as a semi-public service occupation and various methods of controlling it have been resorted to. Of these, the oldest is probably the issuance of bank charters only in an exceedingly restrictive and detailed form, practically constituting a code of law governing the operation of the institution. Growing directly out of this original plan, has been that of governmental control, or partial ownership, of a large central bank whose function it has been to keep the other banks of the community within bounds by requiring of them constant redemption of their obligations and by subjecting them to unofficial surveillance. In newer countries and particularly in the United States, where so-called "free banking" (i.e., the issuance of charters to practically any group of applicants who comply with relatively easy conditions) has taken root, the supervision of the govern-

ment has been exerted through regular and frequent bank examinations by functionaries appointed by the government, while the requirement of publicity of bank statements at frequent intervals has also tended to exert a useful influence upon the management of institutions.

Governmental regulation of one type may take the form of making the noteholder a preferred creditor in case of insolvency of the bank. This provision may be reinforced by giving the noteholder also a limited claim upon the general property of the stockholder. Thus, if the total assets of an insolvent bank are insufficient to redeem its notes, the stockholder may be called upon to make up the deficit, to the extent, say, of the par value of stock held by him. Further, note issue may be limited to a certain proportion of the capital of a bank. The various banks enjoying the privilege of note issue may be compelled to contribute to a fund for the redemption of notes of banks which have failed. Another method is to require the pledge of specified securities as a guaranty to the noteholder. This plan is best exemplified in the national banking system of the United States.

Central Banking. Apart from the mere question of public regulation central banking, either under governmental control or exclusively under private management, or directed by a combination of methods, has been developed as a means of overseeing, controlling, and directing banking, and of unifying banking practice and preventing undue expansion. Central banking is essentially banking for bankers; and central banks, in recent years, have tended to do less and less business for individual customers and more and more for other banks. In general the practice in central banking today recognizes the holding of reserves and the exclusive issue of notes as apropriate functions. The lending or discounting function, when performed by a central bank for its customer banks, is called rediscounting. In the practice of European central banks, the proceeds of rediscounts, when credited to the customer banks on the books of the reserve institution, constitute reserve credit, and notes may be used as the reserves of the customer banks. Rates charged for such rediscounting are ordinarily higher than the rates prevailing in the market, and are said to "lead" the market, the thought being that such higher interest charges prevent the applicant for rediscounts from obtaining them merely as a means of making current profits or earnings. The rate at reserve or central banks is thus used as a test or criterion of the volume of credit available in the community, and is supposed to show (when studied in conjunction with the reserve ratio or ratio of cash held to outstanding liabilities of the central bank) whether money conditions are "easy" or stringent in the community.

Theory of Banking. If every transaction in the community were effected by means of a bank check and if all traded equally and simultaneously with one another, operations would balance or clear, and there would be no occasion for redemption. Not only, however, are many transactions settled in money, but there is a difference in time of settlement due to the lapse of a certain period between the date when an obligation is incurred and the date when it can be settled out of the proceeds of goods sent to market meanwhile. Banks in extending credit provide a means by which individuals may use their titles to goods or property in the purchase of other goods or property. They thus provide a medium of exchange and, if their judgment as to the basis or security for the credit they thus extend is good, they simply enable commodities to exchange against one another, and so their action need not affect the current level of prices or relation between goods and money. It may happen, however, that borrowers at banks direct the purchasing power placed in their hands by means of bank deposits or bank notes in special channels, thus concentrating it upon certain classes of goods. It may also happen that banks grant credit upon the security of long term or future wealth or capital, thus in effect converting future resources into an immediate demand for existing consumption goods. Such action tends to bring about an advance of prices and is usually termed "inflation." It takes effect ordinarily in a general change of price index numbers. The opposite or converse movement is "deflation" and is effected through elimination from bank portfolios of the long term or doubtful paper existing there. This is usually accompanied by a decrease of prices. In inflation current obligations fail to cancel or clear one another so that reserve ratios decline as a rule and eventually in extreme cases banks may have to suspend specie payments.

Banking in the United States. The earliest use of the term "bank" in the American Colonies was to designate an issue of paper money, and it may be said that, in the history of banking in the United States, banks of issue play a more important part than elsewhere. The collapse of the continental paper currency in 1781 led to the chartering by Congress on the last day of the year of the Bank of North America. In addition to the usual business of a bank, this institution was designed to furnish through its notes a circulating medium for the country. The Bank of New York, and that of Massachusetts, at Boston, were chartered in the year 1784. But the erection of these institutions did not check the issue of paper money by the several States, which, however, ceased with the adoption of the Federal Constitution, which expressly forbade such issues.

Among the earliest acts of the new Congress was one chartering the first Bank of the United States, Feb. 25, 1791. The charter was for 20 years. The authorized capital was $10,000,000, of which the government took $2,000,000. The capital subscribed by the public was to be paid one-fourth in specie and three-fourths in government securities bearing 6 per cent interest. The government subscription was to be borrowed from the bank, payable in 10 annual instalments. The notes issued by the bank were receivable by the government for all debts due to it. The charter of this bank did not prevent the rise of a considerable number of banks in the States, which also issued notes. But by reason of its larger capital, and its several branches in different parts of the country, the Bank of the United States dominated the entire banking system and regulated the issues of the State banks. It could and did refuse to receive as deposits, or in payments, the notes of banks which were not sound, and by sending the notes received from one branch to another would insure the presentation of the notes of other banks for redemption. In the early part of the century the government sold its stock in the bank, and when, in 1811, the charter expired, the government had no direct

interest in its renewal. The renewal of the charter was opposed by the State banks, and the effort to secure it failed. The bank, thereupon, wound up its affairs. The absence of the restraining influence of the Bank of the United States soon made itself felt. State banks multiplied; from 90 in 1810, they grew to 150 in 1814, with note issues of $62,000,000. The war with England brought about a general suspension of specie payments, and a very disordered state of the bank-note circulation, the only currency of the country. The "old regulator" was seriously missed, and, on April 3, 1816, Congress chartered the second United States Bank at Philadelphia, with power to establish branches. Its capital was $35,000,000, of which the Federal government took $7,000,000; the bank, with its branches, was made the official depository of government money; its bills were receivable for all payments to the government and it was the agent for negotiating Federal and State loans. This compelled the State banks to resume specie payments, and business again moved forward steadily. State banks, however, grew in number rapidly. In 1816 there were 246, with $90,000,000 capital. In 1830, when the rechartering of the United States Bank was proposed, there were 330 State banks, with $145,000,000 capital. President Jackson, in his message, December, 1829, expressed his opposition to the United States Bank, and his expected veto of the bill to renew the charter came in July, 1832. The next step was to remove the deposits of public money from the bank. This took the form of an order to cease deposits in the United States Bank and to draw out the balance in payments. This could be done only by order of the Secretary of the Treasury, and as that officer refused to conform to the President's wishes, he was summarily removed, and a more tractable man was appointed in his place. The old bank, which had more than once saved the credit of the nation, was crippled and went down. In the wind-up it was found that its whole capital was lost, though it managed to pay its debts. It continued operations under a charter from the State of Pennsylvania until 1837, when it failed in the general crisis.

The refusal to continue the National Bank gave full scope to State institutions, and they grew with mushroom rapidity. In 1837 there were 788 of them, with a capital of $291,000,000. Their aggregate circulation was $159,000,000 and their deposits were $127,000,000. The loans and discounts amounted to $525,000,000. The inevitable crash was hastened by an enormous crop of cotton in 1836, a consequent decline in prices, and the depreciation of the credit of cotton dealers and their backers. The tumble began in 1837, and by the first of June there was an entire suspension of specie payments; values of all forms of property depreciated, business was deranged, and a period of wretchedness began which continued nearly five years. However, Congress passed a general bankruptcy law, the States assisted, by limitation and other laws, and by 1843–44 the country had nearly recovered. The banks had many trials; some resumed only to suspend again, and many went into liquidation. Congress passed the Independent Treasury Act, and thereafter the Federal government had no direct concern in banking until the Civil War broke out. The crisis of 1837 taught wisdom to the State banks, and a general retrenchment was the consequence. Between 1838 and 1842 the number of banks was reduced from 829 to 691; capital from $317,000,000 to $229,000,000; circulation from $116,000,000 to $59,000,000; and discounts from $486,000,000 to $254,000,000. Further security was demanded by the public, and among the new measures were the Suffolk Bank plan in Massachusetts, and the New York safety-fund system. The Suffolk Bank plan was merely an arrangement whereby that bank was made the channel through which all notes of New England banks that found their way to Boston, as most of them naturally did, were at once forwarded to the issuers for redemption. The result was that all solid bankers found it for their interest to deposit with the Suffolk a redemption fund, as that insured the acceptance of their notes.

The New York safety-fund system required each bank to deposit, with the banking department of the State, securities consisting of Federal or State stocks, or bonds and mortgages, which, in case of the failure of the bank, were sold, and the proceeds applied to the liquidation of its debts. In 1857 there was another crash, followed by a general suspension of specie payments; but the depression did not long continue.

One of the serious evils, avoided to a great extent by the issue of greenbacks and national bank currency, was counterfeited or altered bills. When almost every bank had its own plates for six or more denominations of notes, the country was flooded with counterfeits and alterations, and no business man ventured to accept a bank note not well known to him without previous comparison with counterfeit detectors, weekly volumes giving description of counterfeits and spurious notes.

The Civil War (1861–65) made large issues of credit necessary, and among the earliest financial proposals was one to enlist the interest of banks in the national credit by permitting them to organize under a national law and issue notes on the basis of bonds purchased by them and deposited with an officer of the government. It was, however, some time before these proposals took the form of law in February, 1863. The principle upon which this act was based was the issue of notes based upon government bonds deposited with the Treasury. The law proved defective, and was replaced by the Act of June 3, 1864. Under this act there was established a bureau in the Treasury Department, presided over by the Comptroller of the Currency, which should have supervision over the national banking system. No bank with less than $100,000 capital was to be organized in cities of above 6000 inhabitants; for places under 6000, the organization of banks with a capital of $50,000 was permitted. Fifty per cent of the capital of a bank was required to be paid in before the bank could commence business; the remainder of the capital was to be paid in in five equal monthly instalments. At least 30 per cent of the paid-in capital was to be invested in United States bonds, and transferred to the Treasurer, upon which he was authorized to issue to the banks notes equal to 90 per cent of the par value, but not to exceed the market value of bonds so deposited. The entire amount of currency to be issued was limited to $300,000,000, one-half to be apportioned among the States according to their respresentative population, and the other half with regard to the existing bank-

ing capital, resources, and business of the several States. The notes were to be redeemable in lawful money on demand, and were receivable in all payments to the United States, except for duties on imports. Country banks were required to maintain reserves equal to 15 per cent of their outstanding notes and deposits, of which three-fifths might be redeposited with other national banks in 17 specified large cities, denominated reserve cities. Reserve city banks were to maintain reserves equal to 25 per cent of their deposits and outstanding notes, but one-half of such reserves might be redeposited in national banks in New York City, which was made a central-reserve city. Later Chicago and St. Louis were placed on the same footing. Country banks were obliged to provide for redemption of their notes at par by some reserve city bank; reserve city banks were required to make similar provision for redemption in New York City. The system was slow in getting into operation, and the aid rendered the government by furnishing a market for its bonds was, after all, slight. In January, 1865, there were only 638 banks that had organized under the national law. To hasten the process a law of March 3, 1865, imposed a tax of 10 per cent on the notes of State banks, to go into effect July 1, 1866. Under the stimulus of this law the reorganization proceeded rapidly, and in October, 1866, the number of national banks had reached 1644.

National Banks. Of the national banking system, it may be said that the Civil War presented to Congress as its first duty the invention of some plan for restraining the heterogeneous banking system and providing a system of a homogeneous and absolutely safe character—one that would be truly national, operating alike in every part of the United States. The necessities of the government inspired the new order, but the old was rapidly failing to meet the wants of the people. The new, therefore, may be said to have grown out of the necessities of business as well as the straits of the nation. The new system preserved all the advantages of the old and added many new ones. It gave absolute protection to the holders of the national bank notes, as government bonds were deposited with the United States Treasurer in 10 per cent excess of their issue for the security of their redemption. It provided a high degree of security for the deposits, making the stockholder liable, in an equal amount of his stock interest, for their ultimate payment. It provided for a uniform bank note of equal value in every part of the country, so engraved and issued that security against counterfeits was far better attained than ever before. It provided for a system of redemption which made exchange merely nominal, and gave to national bank notes, wherever issued, a uniform value throughout the country. It provided a system of published reports over the sworn signatures of the executive officers of the banks, and a uniform system of examination under the direction of the Comptroller of the Currency.

The national banks were required to pay to the revenues of the general government as follows: (1) one-half of 1 per cent, semi-annually, on the circulation allowed by law; (2) one-quarter of 1 per cent semi-annually, on the average deposits for the half year; (3) one-quarter of 1 per cent semi-annually, on capital not in government bonds. The act permitted local taxation of individual holdings of national bank shares, but not at a higher rate than that applied to other moneyed capital.

Without any wide departure, until 1913, from the principles laid down in the original act, the laws governing national banks were, from time to time, considerably modified in details. Thus the restriction upon the aggregate amount of bank-note issues was removed in 1876. The charters of the banks were to lapse in 20 years, but in 1882 Congress authorized the recharter of the banks for terms of equal length. The currency law of March 14, 1900, made a number of important changes in the conditions of the issue of national bank notes. It permitted the issue of notes to the par value of the bonds deposited, instead of 90 per cent of the par value, subject only to the restriction that, in case the market value of the bonds should fall below the par value of the same, additional deposits of bonds or of lawful money might be required to maintain the security for the notes issued. The law provided for the conversion of several series of outstanding bonds into 2 per cent gold bonds, payable 30 years after date. To effect this change it offered to the banks a special inducement in reducing the tax upon the circulation, so far as issued upon the new bonds, from 1 per cent to one-half of 1 per cent. The act, moreover, favored the extension of the national banking system to small communities, inasmuch as it permitted the erection of banks with a capital of $25,000 in places where the population was less than 3000.

Apart from the change in circulation which was brought about by the Act of 1900, the development of the National Banking System during the two decades since that time has followed fairly conventional lines. One effect of the Act of 1900 was to increase very greatly the number of small banks with capitals of $25,000 or slightly more, and thus the number of new organizations has been maintained from year to year at a rapid rate of growth. The last report of the Comptroller of the Currency shows that the total number of national banks at the close of 1921 was about 8150. Of these a more than proportional number has naturally consisted of the banks of lower capitalization. The tendency of the note issue after the adoption of the Act of 1900 was naturally upward, reaching its peak about 1909, but the currency was always inelastic and unsatisfactory for reasons later set forth (p. 630). Nevertheless, no very great changes in the business or position of the banks took place until the adoption of the Federal Reserve Act on Dec. 23, 1913. In that Act, however, there were included several provisions of fundamental importance to the national banking institutions and through them to the State banking institutions. Probably the most important general requirements of the Act were that the banks become members of a Federal Reserve Bank, subscribe for its stock and deposit their reserve, at first in part, and later entirely with it. The Act, however, also granted to them authority under certain conditions to establish foreign branches and this permission was taken advantage of by a few large banks which have created net-works of branches abroad. The Act further granted to national banks the authority to accept bills thus enabling them to create outstanding time liabilities just as they had already possessed the authority to create demand liabilities. Advantage of this authority has been taken by some 375 banks,

that number of accepting institutions being known although there is nothing to prevent any national bank from accepting drafts up to a certain specified percentage of its capital without obtaining specific permission, so that the number may at any time be much greater than that just given. In addition to these important changes, the Federal Reserve Act also authorized national banks under certain conditions to lend 25 per cent of their capital and surplus upon real estate security thereby enabling them to assist directly the farming population of their communities through fairly long term advances. Added to these important changes was the fact that under the Federal Reserve Act, national banks were to be allowed to sell their government bonds at the rate of $25,000,000 per annum, to the newly organized Federal Reserve Banks at par, the latter banks taking over this currency and refunding it if they desired to do so, into 3 per cent bonds without the circulation privilege, thus theoretically providing for relieving the banks of the bonds and for retiring their outstanding bond currency within about 30 years. This provision was unfortunately only temporarily put into effect owing to the entry of the United States into the European War and the enormous issues of new bonds which followed thereafter. An important indirect influence upon the national banking system was also exerted by that provision of the Federal Reserve Act which constituted Federal Reserve Banks fiscal agencies of the government. This meant that eventually the Reserve Banks became the sole depositories of government funds while under the stress of war necessities they themselves later constituted their member banks, both national and State special depositories, but on conditions quite different from those which had previously existed when the national institutions were the sole and direct holders of government monies. Entitled to rank also with these great changes, was the provision of the Federal Reserve Act which granted to national banks the power to assume and exercise fiduciary functions upon the basis of substantial equality with those enjoyed by the local trust companies in the various parts of the country where such banks were situated. This privilege practically admitted the national banks into the trust company field and when the constitutionality of the action had been affirmed by the Supreme Court in 1916, the applications of national banks to the Federal Reserve Board for permission to exercise these fiduciary powers became numerous. Up to the close of 1921, 1387 banks had been granted by the Board the right to exercise such powers. Inasmuch as trust companies were also given competitive privileges which put them on a parity with national banks, through their admission to full rediscount opportunities by virtue of their permission to obtain membership in Federal Reserve Banks, the years since 1913 have helped to develop a parity and community of interest and method among State banks and trust companies and national banks which has on the whole tended to produce a more homogeneous banking system.

Banking Reform. The national banking system had been increasingly unsatisfactory ever since its adoption but the objections to such a system of banking grew more obvious at about the time of the panic of 1893. From that time forward the national banking currency became less and less satisfactory, and with each recurring stringency or "panic" less and less aid was rendered by the banks to business. The essential difficulties in the case were as follows:

(1) The national bank currency, being based upon United States bonds was obviously limited by the gross amount of such bonds in existence; while, since the price of such bonds was easily much above par, the banks being unable to obtain more notes than a sum equal to the par of the bonds, they found their profit greatly lessened as the value of the bonds rose.

(2) Owing to the practice of massing reserves in city banks (so-called "pyramiding" of reserves), our reserve position was very unstable. In times of stringency heavy drafts would be made upon the deposits carried by out of town banks with New York, Chicago and other metropolitan institutions, and as a result these banks would often be forced close to the danger line.

(3) The lack of any point of union, or community of policy, between national banks, save a loose general supervision at Washington, prevented the development of a discount market or of any uniformity in interest rates.

For these reasons a movement designed to attain so-called "banking reform" developed soon after 1893, and was continued with varying fortune during the two decades succeeding. An outstanding incident in it was the so-called "Indianapolis Currency Commission" an organization of bankers and business interests which was largely instrumental in securing the adoption of the gold standard act of 1900. This act as already observed in some measure alleviated the unfortunate note issue conditions then existing by providing for a consolidated issue of 2 per cent bonds possessing the circulation privilege at the same that it allowed the organization of national banks of $25,000 capital and so furnished banking facilities for the smaller towns. Such measures, however, although they provided the basis for a larger and somewhat more responsive note issue (rising to over $725,000,000) did not meet the essential difficulties in the case which were found in the pyramiding of reserves and the lack of coördination in the system. The banking reform movement had originally crystallized around the question of note issue, its advocates constantly insisting that an elastic note issue plan similar to that of the Canadian banks would solve the difficulty, but it came more and more, after the year 1900, to recognize that what was needed was a thorough reorganization of banking. The panic of 1907, however, broke upon the country before any relief measures had been taken. It tended to stimulate the demand for some legislative action and as a result Congress in 1908 enacted the so-called Aldrich-Vreeland Act providing for emergency circulation not to exceed $500,000,000 and taxed at the rate of 5 per cent (per annum) for the first month with 1 per cent for each additional month up to a maximum of ten. Such circulation might be issued either upon approved bonds deposited with the Treasury in Washington or upon approved securities or "two-name commercial paper" secured by the credit of so-called currency associations including not less than ten banks, the issues, however, not to exceed 30 per cent of the capital and surplus of the issuing bank. Only one or two such associations were at first organized and the act appeared to be a dead letter, remaining practically in that condition until the outbreak of the European war when Congress hastily amended

and liberalized it so that considerable issues of currency took place under its terms.

Federal Reserve System. Meantime, however, Congress had provided for a more thorough-going investigation of the whole question of banking and currency, and authorized (under the Aldrich-Vreeland Act) the appointment of a body known as the National Monetary Commission, composed of congressmen and senators, which should make a report of its findings. The commission thus appointed prepared a bill which was introduced into Congress early in 1912. The balance of power had, however, shifted to the Democratic Party and the bill of the National Monetary Commission was never given serious consideration. It would have provided for the formation of an institution analogous to a central bank with a total of fifteen branches established at various places throughout the country. This plan was similar in its character to measures which had previously been introduced by Charles N. Fowler, Chairman of the Banking and Currency Committee of the House of Representatives during the years 1904–08. It was, however, a more completely developed and perfected bill than any of its predecessors and embodied ideas which had been fairly generally accepted by the banking community.

The Democratic House of Representatives early in 1912 adopted a resolution providing for what was known as the "money trust inquiry" to be carried on by the Banking and Currency Committee. Under this authority the committee in question created two sub-committees, one of which was vested with the power to conduct inquiries into the so-called money trust, while the other was directed to prepare a banking revision measure. This second sub-committee, under the chairmanship of Honorable Carter Glass of Virginia, drafted a bill designed to reorganize the banking of the country, and after the election of Woodrow Wilson in November, 1912, submitted the measure to him and received a tentative approval for it. Mr. Glass was appointed Chairman of the Banking and Currency Committee in the new Congress which met immediately after the inauguration of President Wilson in 1913, and the bill which had previously been developed under the direction of the sub-committee in the preceding Congress was shortly introduced (June, 1913) and thereafter considered and adopted by the House of Representatives on September 17. This measure was considerably modified in the Senate but in conference committee it was amended back into nearly its original form, becoming a law on Dec. 23, 1913. As thus passed, the act provided for the establishment of a "Federal Reserve" System in which all national banks were obliged to take membership by subscribing 3 per cent of their capital and surplus to the stock of institutions to be organized in a number of districts throughout the country and known as Federal Reserve Banks. These banks were corporations chartered for twenty years under Federal authority, receiving deposits only from the government and from their member banks (though subsequently allowed to receive deposits from other banks under certain conditions), their chief duties being the issuing of notes and the holding of the reserves of their members. Their business consisted primarily of rediscounting paper for their members, although they were also authorized to buy paper (of the same kind that had been made rediscountable) in the open market, should they see fit. In issuing notes the Reserve Banks, as they were popularly called, were authorized to deposit eligible rediscounted paper with their chairman (the Federal Reserve Agent), acting as trustee for the government, who then issued an equal amount of notes to the Reserve Bank. The latter then placed them in circulation by paying them out or handing them to members who had requested such accommodation. By a later amendment gold might also be deposited with the chairman of the board in lieu of eligible paper. These notes were made obligations of the United States and receivable for all public dues. An organization committee, created under the act, eventually divided the country into districts and established twelve banks. Government control of the institutions was provided for by authorizing the Federal Reserve Board to name three out of nine directors for each of the reserve banks, the other six members being required to include three business men and three bankers, one business man and one banker being selected by banks voting individually, in each of three distinct groups (including the small, medium and larger banks of each district). It was further provided, in order to insure democratic government of the banks, that each bank should have but one vote regardless of capitalization. With reference to reserves, the act required that the 25 per cent reserve formerly required in central reserve cities be cut to 18 per cent of demand obligations; likewise also the 25 per cent formerly required in reserve cities was cut to 15 per cent, and the 15 per cent in other places was cut to 12 per cent. Of these reserves 7 per cent was to be placed by central reserve city banks with their reserve bank 6 per cent by reserve city banks and 5 per cent by all others. Time deposits were made subject to a 5 per cent rate throughout. Federal Reserve Banks were to be authorized to pay 6 per cent cumulative dividends after all expenses and allowances had been provided for to their stockholders, and their remaining earnings were then to be paid to the government.

An important feature of the act on its foreign banking side was found in the authorization granted the larger national institutions to establish branches abroad and in its grant of the power of accepting time bills (not over 90 days' maturity) to national institutions. In its ordinary rediscount operations the reserve banks were limited to ninety-day paper growing out of commercial, agricultural or industrial transactions, speculative paper being barred.

The act as thus adopted was subsequently modified by nine principal enactments. The important features in these amendments were (1) enlargement of the acceptance power to 100 per cent of capital and surplus; (2) permission to national banks to subscribe to the stock of foreign banking enterprises formed for the purpose of establishing branches abroad; (3) termination of the reserve requirements of the original law and substitution therefor of a provision requiring all reserves to be kept in Reserve Banks, such reserve to consist of 13 per cent of demand deposits for central reserve city banks, 10 per cent for reserve city banks, 7 per cent for all others, with time deposits at 3 per cent; (4) adoption of the so-called Edge Act authorizing the formation of corporations for the purpose of making long term investments abroad, national banks being permitted to sub-

scribe to their stocks; (5) enlargement of amount of loans permitted to be made on the strength of Liberty Bonds as collateral; (6) modification of voting arrangements governing the election of directors in Federal Reserve Banks; and a few others. Of these amendments the only one which fundamentally altered the structure and significance of the act was that transferring the entire reserves to the central institutions.

As provided for by the Act of 1913 the Federal Reserve System went into operation (preliminary details having been arranged by an organization committee) technically on the 10th of August, 1914, the banks themselves being actually opened for business on November 2, while reserves were paid over on November 14 of the same year. Prior to the actual opening of the banks Congress as already noted had revised and extended the provisions of the Aldrich-Vreeland law in order to relieve the severe financial stringency brought on by the opening of the European war and resulting from the sudden and unexpected calls made by English and other foreign creditors who demanded immediate payment in gold of amounts which in ordinary circumstances would have been carried during the summer and autumn season and paid off through exports of commodities. Under this revision of the Aldrich-Vreeland law emergency currency amounting to nearly $450,000,000 was issued and the use of it resulted in a considerably inflated condition in some parts of the country. The Federal Reserve System when fully established had the effect of immediately releasing a great deal of lending power previously "tied up" by reason of the fact that resources under the old law were so much higher than under the new. There was little general demand for the resources of the Federal Reserve System, therefore, save in those parts of the country where banks, in order to retire their emergency currency issued under the Aldrich-Vreeland law, applied for rediscount facilities in order to transfer their liability to the Federal Reserve Banks. The first work of the new System was thus to assist in the retirement of the emergency currency. In spite of the great increase of business throughout the United States during the first two years of the European war, there was no very serious need of Federal Reserve assistance, and during 1915 and 1916 many of the Reserve Banks were barely able to make expenses or to cover a part of their dividends in addition. The two years were occupied largely in developing methods of discounting and establishing new plans of note issue. A constructive piece of work carried through during these years was the establishment of the Gold Settlement Fund at Washington whereby the Federal Reserve Banks were enabled to clear on the central set of books conducted by the Board the bulk of their obligations against one another, thereby avoiding the shipment of specie. This clearance, at first carried on only once each week, was later made a daily clearance, and eventually came to supersede in large part the work of the local clearing houses.

With the entry of the United States into the European war early in 1917, a new epoch in the history of the Federal Reserve System and of the banking system of the United States in general opened. The fundamental problem at the opening of the war was that of finding means to supply the Treasury with necessary funds. This object was temporarily accomplished by direct borrowing from the Federal Reserve Banks on short term treasury certificates. The system of Liberty Loans was then developed and the Reserve Banks were made the active agents of the Treasury in placing them. The Federal Reserve Act had originally provided for making the banks the fiscal agents of the government and this was now interpreted to include not only sub-treasury functions but also all those relating to the sale and distribution of bonds. The importance of the sub-treasuries accordingly was reduced and they were eventually closed in 1920, but during the latter part of the war and the period just after it their activity was purely nominal. With the issuance of the First Liberty Loan in July, 1917, the activity of the Federal Reserve Banks was largely transferred to a war basis including the management of public finance and continued so throughout the remainder of the struggle.

War Banking and Finance. From the date of the entry of the United States into the European war the function of the Federal Reserve System became almost exclusively that of financing the process of borrowing from the people. During the years 1917, 1918, and 1919 the government increased the national debt from a little over $1,000,000,000 to a little over $25,000,000,000. These great loans were for the most part placed first through the banks and then with the rank and file of the investing public. It would probably have been impossible to dispose of the enormous quantities of bonds which the government was obliged to sell in order to provide itself with funds without some kind of special banking aid. Such aid was particularly necessary in view of the fact that it had been determined by the Treasury authorities to dispose of the bonds at a rate of interest quite materially below the prevailing rate in the market. The first issue of Liberty Bonds was sold at 3½ per cent and as subsequent issues were put out the rate was gradually raised until it reached 4¾ per cent on the fifth victory loan (1919); although it should be remembered that the first loan bearing 3½ per cent had been wholly exempt from taxation of all classes, while subsequent loans were only partially so exempt. That the public might be induced to purchase up to the full extent of its saving power, paying for the bonds it thus bought on the installment plan, Federal Reserve Banks were instructed by the government through the Federal Reserve Board to fix a rate for the rediscount of paper equal to the coupon rate on the Liberty Bonds. Commercial banks generally were induced to discount directly for their customers at the same figure. Thus a buyer of bonds who was unable to pay for them in full, borrowed from his bank the additional amount he needed, the bank carrying it without cost to him since the coupons provided for the borrower's own interest charge. The bank then rediscounted such paper at the same (coupon) rate with the Federal Reserve Bank of its district. This policy was very successful in "stabilizing" the rate of interest, but it also tended to transfer the principal burden for the time being at least to the banks. The system was perfected through the steady issue of Treasury certificates sometimes as often as twice a month, these certificates running for ninety days as a rule and being funded at the end of that period

into the successive issues of Liberty Bonds which were then subscribed for and carried as indicated. The burden resting upon Federal Reserve Banks thus became heavier and heavier as the war advanced and as successive issues were sold. Hence the reduction of the reserve ratio (ratio of gold to demand liabilities) of the system, which fell from about 90 per cent before the war to about 52 per cent at the end of 1918, shortly after the Armistice. The fifth Victory Loan which was floated early in 1919 was sold upon the same general principles that had been pursued in the earlier financing and resulted in increasing the burden resting upon the reserve system still further. The successful floating of this loan was followed by a speculative development of business and especially of foreign trade, which continued during the year 1919, and although checked early in 1920 did not reach its peak until about the close of the latter year.

Prices during the war had tended to rise rapidly as a result of a variety of causes. Of these the principal was the tremendous demand exerted by all governments for commodities, coupled with the natural shortage in production which resulted from the withdrawal of a large part of the productive labor of all of the Western nations for the purposes of war. A contributing cause of the rise in prices, however, was found in the suspension of specie payments and excessive issue of currency which produced the condition of "inflation" reflected in unduly high prices for commodities and services of all classes. This price and wage advance continued steadily up to a peak in May, 1920, at which time the index number of prices was approximately 270 measured from a base in 1913 taken as 100. The check to expansion and wholesale-price advance administered early in 1920 has been variously explained and has been popularly attributed in the United States to the fact that Federal Reserve Banks toward the end of 1919 resolved upon the so-called deflation policy. This deflation policy took form as an advance of interest rates above the low levels that had been established during the Liberty Bond period. It was aided by a more strict interpretation of the eligibility of paper for rediscount, coupled with an effort to induce borrowers who had obtained advances on Liberty Bonds as collateral to settle these loans and thus to take them out of the banks. The inadequacy of this explanation is indicated by the fact that the recession in business and prices which set in early in 1920 did not originate in the United States but was first indicated by the collapse of the silk market in Japan, while in most foreign countries no very definite deflation effort was undertaken until after the business recession had begun. Federal Reserve discounts as already stated did not reach their peak until the end of 1920 some eight months after the business decline had started. At that time total assets of the Reserve Banks were approximately $5,000,000,000 while bills discounted were about $2,700,000,000 and currency outstanding was about $3,336,000,000. As the decline of business became more pronounced during 1921 the price level gradually sank to approximately 140 or a little more than half its level at the peak while discounts at Federal Reserve Banks had been reduced by the end of 1921 to less than $1,150,000,000. Notes at the same time receded to about $2,400,000,000, thus contracting over one-fourth of their maximum amount. The inability of foreign countries to settle their enormous purchases in the United States had led during the war to very heavy advances made by the government to foreign governments and expended almost entirely in the United States. These advances were to be continued until about the middle of 1919 some eight months after the Armistice and amounted to about $9,500,000,000. When they came to a close there ensued a period of trade expansion already noted during which considerable advances were made by American banks and business houses for the purpose of carrying foreign buyers as long as possible. As it became more and more evident that foreigners would not be able to liquidate these debts in full banks and exporters began to withdraw these credits and the large movement of gold into the United States which had been very marked during 1916 and 1917 was resumed. From the opening of the war in 1914 to the close of 1921 the total net importations of gold into the United States amounted to about $1,542,000,000 and the total gold holdings of the Federal Reserve Banks rose to about $2,900,000,000. At the same time the ratio of reserve to liability advanced to approximately 70 per cent. One of the noteworthy services of the Reserve Banks during this whole period of unusual trial and strain was seen in the great reduction of bank failures, the total of failures at no time being large and in some years being practically negligible.

National System of Clearance. One of the most important features of the Federal Reserve Act was seen in its provision for a satisfactory clearance and collection system. The original act had authorized each Federal Reserve Bank to "exercise the functions of a clearing house" for its members. In carrying out this authorization the Board first established what has come to be known as a gold settlement fund. This was intended as a means of settling obligations between reserve banks. Each reserve bank contributed a certain amount of gold to the fund and then telegraphed weekly to the Board its claims against others in a single figure. The clearance was effected on a set of books kept for the purpose and each bank was then notified of the changes resulting therefrom in its participating share of the gold settlement fund. So successful was the system that it eventually came to include a total of over $500,000,000, while a second fund was established for the clearing of obligations between the Federal Reserve agents departments of the several banks. Altogether the gold settlement fund which had come into effective working about eight months before the United States entered the war proved a most effective agency in gathering the subscriptions to the Liberty Loans in different parts of the country without disturbance to the banking and commercial mechanism. The second phase of the clearance and collection system was found in the plan instituted in the several districts for the purpose of clearing and collecting local items on behalf of the member banks themselves. The Act had authorized the reserve banks to accept items from members on deposit at par without charge for exchange or collection, the intent being that such items should be automatically and instantaneously credited to the depositing banks, being simultaneously charged off against the reserve accounts of the banks upon which

they were drawn. Resistance on the part of the members who feared that as a result they would lose their profitable collection business resulted in an unsuccessful attempt to apply the system upon a voluntary basis. This proved totally ineffectual, and in July, 1916, it was resolved to introduce a system of credit and collection in which the deposits made by members were carried to their account only after the lapse of sufficient time to permit the actual transmission of the checks to the member banks on which they were drawn thereby giving such banks an opportunity to examine and pass upon the signatures. This system was gradually extended not only to members, but also to non-members and eventually came to include some 29,000 banks out of a total of 30,000 in the country, all these banks undertaking to remit at par. In the year 1920–21 resistance on the part of Southern banks which found themselves deprived of collection charges led to the enactment of hostile legislation in six Southern States while the validity of collection methods employed by Reserve Banks was brought to a trial in the courts. A verdict in the Federal District Court for Georgia rendered in March, 1922, has upheld the system employed by the Federal Reserve Bank. The effect of the system up to date has been greatly to reduce charges to the business public (although not to wipe them out altogether owing to the effort of organized clearing houses to maintain at least a moderate charge for collection service), and to eliminate enormous volumes of unpaid checks which had previously been routed from bank to bank for the purpose of building up so-called reserve deposits thereby swelling the amount of such deposits technically carried on the books of the various institutions. The elimination of this so-called "float" has greatly tended to increase the liquidity and solvency of the banking system and to diminish the danger of unexpected runs upon individual institutions.

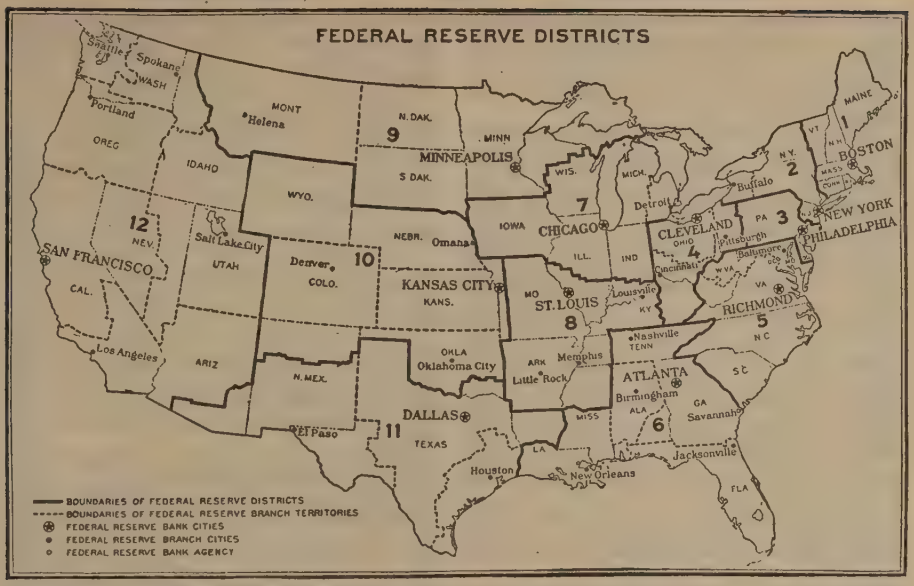
Standardization of Paper. Another important service rendered by the Reserve system has been the standardizing and definition of commercial paper. The eligibility rules laid down by the Federal Reserve Board in accordance with the powers bestowed by the Federal Reserve Act have been generally accepted throughout the country as indicating the highest type of commercial paper available and the result has been to eliminate much doubtful long term or non-liquid paper from the banks entirely or at all events to confine it locally. In the process of thus defining and developing commercial paper the Board has sought to secure the introduction of acceptance of two-name paper well known abroad but much less frequently employed in the United States. Acceptances under the Administration of the Reserve Board have taken two forms—trade and bankers acceptances. The trade acceptance although urged upon the attention of the public by the Board has been on the whole not well adapted to American commercial practice owing to the widespread prevalence of the so-called cash discount system. It has never attained very large development. The bankers acceptance on the other hand has been widely employed in the financing of foreign trade and at one time probably amounted in volume to a little less than $700,000,000 of acceptances made by member banks. During the business depression it fell off in amount a little more than $400,000,000 (end of 1921), and has been in some measure impaired by the amendment enacted by Congress providing for so-called dollar acceptances drawn on countries in which it was not possible to furnish documentary evidence of the basis for transactions. Owing to this and other abuses the bankers' acceptance was somewhat lessened in popularity as a strictly commercial instrument, although it has at all times retained an important position as a finance bill or clean bill.

Growth of Reserve System. The Reserve System has established in all 22 branches with the purpose of increasing the efficiency of its collection mechanism and of promoting the convenience of members in the discounting of paper and the drawing of bills. These branches have been located at strategic points throughout the financial districts and their existence has gone far toward eliminating bad effects of any errors that may have been committed in the original arrangement of districts. Although at the outset it was believed that considerable rearrangement of such districts would be necessary these turned out to be only minor changes and the geographic divisions of the system continued but slightly changed up to the present time. As thus constituted today the system with its branches may be represented in the accompanying map.

Banking in England. In the banking system of England the central figure is the great Bank of England. This bank, the most important in the world, was projected by William Paterson (q.v.), and was incorporated July 27, 1694. It was constituted as a joint-stock association, with a capital of £1,200,000. In return for the loan of its entire capital to the government, it received the right to issue notes and a monopoly of corporate banking in England. It was not until early in the nineteenth century that this monopoly was broken down. At its very outset the Bank of England was a servant of the government; and in a lesser or greater degree it has enjoyed this character through all the stages of its subsequent history. At first the charter of the bank was for 11 years only; but in consequence of the great services of the institution to the government, its charter has been at various times renewed. The last renewal was in 1844, and the charter of that year still subsists, its terms being subject to modification or revocation by the government at pleasure. By the Act or Charter of 1844 the bank was divided into two departments—the *issue* and the *banking*. What led to the division was this: it was supposed that, when a foreign drain of gold should set in, it would, if the currency or circulation in the country had been purely metallic, have produced a contraction of the circulation, and a consequent fall of prices, and, as an ultimate result, the cessation of the drain.

In the *issue* department of the Bank of England the sole business is to give out notes to the public. Before the separation of the departments the government was indebted to the bank £11,015,100. This sum was declared to be now a debt due to the issue department, and for the issues of notes to that amount no gold need be held by it. The amount of this so-called "fiduciary issue" has since increased to £18,450,000.

Viewed in its banking department, the bank differs from other banks in having the manage-



RESOURCES.*	
Gold and gold certificates	$316,937,000
Gold settlement fund—F. R. Board	532,351,000
Total gold held by bank	849,288,000
Gold with Federal Reserve agents	2,123,373,000
Gold redemption fund	48,207,000
Total gold reserves	3,020,868,000
Legal tender notes, silver, etc.	127,498,000
Total reserves	3,148,366,000
Bills discounted:	
Secured by U. S. Government obligations	189,909,000
For other Federal Reserve banks	.....
All other—For members	279,192,000
For other Federal Reserve banks	.....
Bills bought in open market	154,060,000
Total bills on hand	623,161,000
U. S. bonds and notes	224,638,000
U. S. certificates of indebtedness:	
One-year certificates (Pittman Act)	74,000,000
All other	257,969,000
Total earning assets	1,179,768,000
Bank premises	41,568,000
Five per cent redemption fund against F. R. Bank notes	7,587,000
Uncollected items	511,571,000
All other resources	15,988,000
Total resources	$4,904,848,000

LIABILITIES.*	
Capital paid in	$105,078,000
Surplus	215,398,000
Reserved for Government franchise tax	2,281,000
Deposits:	
Government	43,780,000
Member banks—reserve account	1,865,199,000
All other	30,297,000
Total	1,989,276,000
F. R. notes in actual circulation	2,124,422,000
F. R. Bank notes in circulation—net liability	67,259,000
Deferred availability items	430,314,000
All other liabilities	20,820,000
Total liabilities	$4,904,848,000
Ratio of total reserves to deposit and F. R. note liabilities combined	77.5%
Contingent liability on bills purchased for foreign correspondents	.....

* June 28, 1922. Twelve Reserve Banks combined.

STATISTICS OF MONEY AND CREDIT IN THE U. S.—1914–1921.

(000 omitted)

	General stock of money in United States.	All banks, national, State, and trust companies.							
		Loans and discounts.				Deposits.			
		Member banks.		Nonmember banks.	Total.	Member banks.		Nonmember banks.	Total.
		National banks.	State banks and trust companies.	State banks and trust companies.	All banks.	National banks.	State banks and trust companies.	State banks and trust companies.	All banks.
June, 1914[1]	$3,779,052	$6,430,069	.....	[2] $5,813,290	$12,243,359	$6,359,188	.....	[2] $7,166,600	$13,525,788
June, 1915[1]	3,923,077	6,659,971	.....	[2] 5,956,692	12,616,663	6,611,282	.....	[2] 7,482,368	14,093,650
June, 1916[1]	4,374,966	7,679,167	.....	7,113,349	14,792,516	8,143,048	.....	[2] 9,494,749	17,637,797
June, 1917[1]	5,425,417	8,957,678	.....	[2] 8,423,246	17,380,924	9,743,755	.....	[2] 11,188,113	20,931,868
June, 1918[1]	6,615,008	10,135,842	$3,153,726	[2] 6,143,295	19,432,863	11,219,526	$4,456,546	7,642,420	23,318,492
June, 1919[1]	7,592,079	11,010,206	4,494,656	6,445,167	21,950,029	12,457,925	6,211,276	8,497,149	27,166,350
June, 1920[1]	7,804,528	13,611,416	6,027,030	7,729,785	27,368,231	14,311,401	7,582,238	9,390,850	31,284,489
June, 1921[1]	8,073,737	12,004,515	.....	[4] 12,757,414	24,761,929	15,142,331	7,385,507	[4] 16,135,093	31,277,424

[1] Figures as of last week in month.
[2] Includes both member and nonmember State banks and trust companies.
[4] Includes both member and nonmember State banks and trust companies.

ment of the public debt and paying the dividends on it; in holding the deposits belonging to the government and making advances to it when necessary; in aiding in the collection of the public revenue and in being the bank of other banks.

During the European war great changes necessarily occurred in the currency and banking situation in Great Britain. The amount of currency in circulation rose to probably three times its prewar amount, while prices advanced more than 100 per cent. Shortly after the outbreak of the war the convertibility of Bank of England notes was suspended and provision was made for an issue of treasury which were put out by the government, these being of a lower denomination. At the date of the Armistice the treasury notes in circulation were about 320,000,000 pounds sterling. Scotch and Irish notes were made legal tender but this privilege was withdrawn after the close of hostilities. It is difficult to say how long the changes in British and Scotch banking will continue. The Currency and Bank Notes Act of 1914, although passed to meet an emergency, was not in form a temporary act, and while the restoration of actual convertibility of notes and credit into gold was promised by the Chancellor of the Exchequer early in 1922 it has not thus far been feasible to make it effective. The value of the pound sterling, however, has steadily risen toward par from the low point reached soon after the close of the war.

Other Banks in the United Kingdom. While the Bank of England long held a monopoly of banking in London, it could not prevent the rise of banks throughout the provinces. In the first instance these banks were merely private partnerships, and the number of partners could not exceed six. These country banks issued notes, and were without any government supervision or control. After the panic of 1825 a law was passed permitting the country banks outside of a radius of 65 miles from London to organize as joint-stock companies, with their right to issue notes unimpaired. The Bank of England strenuously but ineffectively opposed the extension of the joint-stock principle, which had been conceded in the provinces, to the London banks. In 1833 an Act of Parliament authorized the establishment of such banks in London, though it refused to give them the note-issuing privilege. When the Bank of England was rechartered in 1844, all joint-stock banks and private banks were restrained from issuing further notes, though they were authorized to maintain the circulation then outstanding, calculated on the average of the twelve weeks' prior to April 27, 1844. Under the terms of the act, the Bank of England has since absorbed the whole of the English banks notes issues, the last of which lapsed in 1921.

The earliest banking institution in North Britain was the Bank of Scotland, instituted by a charter of incorporation from the Scottish Parliament in 1695. The original capital was £1,200,000 Scots, or £100,000 sterling. In 1774 the amount of stock was extended to £200,000 sterling; now it is £2,000,000 sterling. In 1727 a new and similar establishment was constituted under the title of the Royal Bank of Scotland, whose advanced capital is now £2,000,000. In 1746 another association was formed, and incorporated by royal charter, with the title of the British Linen Company. From £100,000 its capital has increased to £1,250,000. Besides those three banks, there are in Scotland five other joint-stock banks with total deposits of £291,000,000, but no private banks.

In consequence of allowing interest on deposits, the banks in Scotland may be said to hold the whole currency of the country, minus only the money passing from hand to hand. This widespread system of depositing is greatly aided by the establishment of branches from the parent banks, and these branches are found in every small town in the kingdom. The entire number of branch banks in Scotland is about 1300. At these branch banks the agent (who is usually a responsible person in business) discounts bills within certain limits, issues letters of credit, and pays out notes, and also gives cash on demand for them; though, strictly, the notes of a bank are payable on demand at the head office only. By a strict system of supervision Scottish branch banks are usually well conducted and are of great service in every department of trade.

In Ireland there are nine joint-stock banks, having 947 branches and sub-branches. Aggregate circulation in 1921 was £19,000,000. The circulation of the Bank of Ireland was £9,000,000. This bank was established in 1783, with privileges resembling those of the Bank of England. Its capital is £2,769,230, and its reserve £1,140,000. The capitals of the other banks vary, the total being £27,000,000, while deposits are £213,000,000. Six are banks of issue. Interest is allowed on money deposited for a stated period, but not on money at call, or as a rule on current accounts.

Continental Banks. On the continent of Europe there are both private and state banks. The Bank of France stands second in repute only to the Bank of England. It was founded in 1800, and in 1806 was placed upon an enduring basis. Its original capital was 45,000,000 francs, which was increased in 1806 to 90,000,000 francs, and later reduced to 67,900,000 francs, with a reserve of 12,980,750 francs. It has the sole right to issue bank notes in France and enjoys a high degree of public confidence, which it is so anxious to retain that in 1888, when dangerous counterfeits of its 1000-franc notes were put into circulation, it preferred to redeem them rather than, by refusing payment, to impair the general readiness to receive its own genuine paper. The Bank of France has often rendered important services to the French government in furnishing large and promptly given loans. It has some 600 branches or *succursales* in the chief cities of France. The Banque Nationale of Belgium is conducted upon the model of the Bank of France. It issues notes for 20, 50, 100, 500, and 1000 francs. In Germany the Imperial Bank (Reichsbank) was established by an act passed in 1875, with the right to issue notes not covered by bullion in the vaults, to the amount of 250,000,000 marks ($62,500,000); while a number of subordinate banks are permitted to issue uncovered notes to the amount of 135,000,000 marks ($33,750,000). Notes are issued for 5, 50, 100, 500, and 1000 marks. The state itself (by an act passed in 1874) may issue 120,000,000 marks in small notes for the general convenience of the public. For a more detailed treatment of the banking systems of foreign countries, see articles on those countries.

Conditions on the Continent during the Euro-

pean war ran closely similar to those in Great Britain, always allowing, of course, for the variation in the phenomenon of inflation due to differences in banking and currency systems. In France a moratorium was declared shortly after the outbreak of the war and this affected deposits as well as notes. It, however, was soon ended, but at no time during or since the war have Bank of France notes been made convertible into coin. On the other hand, large support has had to be given by the Bank of France to the government. All this led to an enormous increase in the note circulation (consisting of the issues of the Bank of France), but no considerable change in the actual structure of banking took place. Provisions for the official control of exchange and forbidding the export of capital were early introduced and have continued in effect. In Germany the shock to the banking system caused by the war was quite as severe as anywhere else but technically produced no great change during the continuance of the struggle. Early in August, 1914, the government provided for a legal tender currency which however was later retired and its place was taken by notes of the Reichsbank. All notes and currency were declared inconvertible and a special type of loan banks was established. After the close of the war the loss of gold and the necessity of resorting constantly to the aid of the Reichsbank tended to drive the mark further and further downward until early in 1922 it reached a level in the New York market of 3/10 of a cent. In other European countries central banking systems had been established more or less upon the lines indicated by the experience of the Bank of England. All of these systems were more or less affected by the war and in practically all there was a suspension of specie payments which has continued to the present date. Practically all of these systems of banking are today subject to possible change as the problem of restoring a solvent condition in the different European countries is worked out. Both currency and banking conditions throughout Europe are so unsettled that the exact future course of events can hardly be predicted.

Colonial and Oriental Banking. The type of banking developed in Great Britain and the United States which may be described as deposit banking under central control has gradually made its way into most parts of the world in a more or less modified form. An off-shoot of the British banking system is seen in the banks of Canada where 17 institutions each vested with the note issuing power are allowed to establish branches practically as they choose throughout the entire country. The result has been to bring about at the same time a very substantial degree of central banking at the same time preserving many of its competitive features. The Canadian banks protect the public in so far as note issues are concerned by the establishment of joint guaranty of note issue, the entire outstanding note issue being the first lien upon the assets of all banks and being protected in addition by a guaranty fund placed with the Dominion Government. These notes are freely issued without limit up to the capital of the issuing banks and they supply what is today the best example of a typical "asset secured" bank currency in the world.

Another form of the British banking system is seen in Australia where about 25 banks, some with head offices in London and branch offices in Australia, others with head offices in Australia and branches in London, have developed an efficient system of deposit and note banking with thousands of connections scattered throughout the country. Centralization there is afforded through a government bank, the so-called Commonwealth Bank which holds the public funds, and which, while not ordinarily undertaking sharp competition with the other banks, does not hesitate to make its rate of discount more or less effective by doing a regular commercial banking business and by buying and selling paper and at times entering into banking relationships with the other banks of the commonwealth.

In other British colonies, there has been a local development of banking somewhat along the Australian lines, although in South Africa culminating in the Reserve Bank of South Africa; or in still others carried on by means of branches established by British capital and operating on an international basis. Good examples of the latter are seen in the banking systems of the China coast ports where the Honkong and Shanghai, the Chartered Bank of India, Australia and China and others have established a net-work of branches closely operating under the general direction of head offices. These banks, while transacting considerable deposit business, derive a large profit from the circulation of their note issue among the population and also devote themselves in a primary degree to foreign exchange operations, financing the import and export of commodities on a short time basis and speculating in silver.

In Japan, the Bank of Japan bears somewhat the same relation to other privately owned banking institutions as does the Bank of England, has sole power to issue notes on the mainland of Japan and generally exerts a control over the discount market which, however, is in a somewhat rudimentary condition.

South American Banking. In South America various banking systems largely patterned after those in Great Britain and Germany prevail. Working in combination with the branches of British, French, German and Italian (overseas) banks, these local or native institutions provide a more or less thorough and satisfactory system of local banking which is the more effective because of the fact that the trade and industry of the South American countries are largely based upon exportation and importation, the exports consist of the staple raw commodities of these countries, while imports consist of consumable commodities brought from abroad. The general problems of banking in South America are special because of the long term character of the credit which is frequently required there and because of the fact that so large a share of the business consists of export and import financing, but in structure and organization the banking systems of these countries follow closely the European models.

War Changes in Foreign Banking. The European war naturally affected the banking systems of all nations very profoundly resulting in most countries in an enormous expansion of credit both in the form of notes and of deposits, while practically everywhere the banks of the several countries became overloaded with government securities of various kinds either purchased for their own account or taken as collateral behind paper which had been left

with them by customers for the purpose of carrying these bonds pending gradual liquidation of subscriptions to them. Another financial feature of the war was the almost immediate imposition of a gold embargo and in most countries the expansion of bank paper into gold. These conditions naturally removed the ordinary and normal restraint upon the growth of bank credit and tended to aggravate the dangers of unsoundness which always present themselves in such circumstances even without the presence of urgent war demands. While, therefore, there was but little progress in banking organization or banking structure during the war, there was very great modification of the character of the business done by the several banks and very great change in their reserve and character of outstanding liabilities. As the war progressed, gold, which had been carefully conserved through the measures just indicated, had in many cases to be exported so that Germany, Austria-Hungary and most of the southeastern States of Europe lost their gold supplies as a result of payment of international obligations or shipments of gold made necessary by the urgent requirement of raw materials or foodstuffs. Russia, in the meanwhile, had under Bolshevik rule practically abandoned or destroyed the entire structure of banking and credit which had been developed during the prewar period, and the great stock of gold in Russia was largely exported during the latter part of the war and during the post war inflation period which succeeded. The situation in the principal countries of Europe may be best understood from a survey of the currency and deposit situation of some of the principal States at about the close of 1921 as contrasted with their reserve stocks, the whole being compared with prewar figures.

Consult: Bagehot, *Lombard Street* (New York, 1874); Conant, *A History of Modern Banks of Issue* (New York, 1897); and id., *Principles of Money and Banking* (New York, 1905); Dunbar, *Theory and History of Banking* (New York, 1891; enlarged edition edited by Sprague, New York, 1906); Francis, *History of the Bank of England* (London, 1848); White, *Money and Banking* (Boston, 1896); *Report of the Monetary Commission* (Chicago, 1898); Fiske, *The Modern Bank* (New York, 1904); Steele, *Present-Day Banking* (London, 1909); Morawetz, *The Banking and Currency Problem in the United States* (New York, 1909); Muhleman, *Government Supervision of Banking Throughout the World* (New York, 1911); *Reports of the National Monetary Commission* (Washington, 1910–11); *Reports of the Comptroller of the Currency;* Kirkbride, Sterritt and Willis, *Modern Trust Company* (New York, 1921); Willis and *Edwards, Banking and Business* (New York, 1922); *Reports of Federal Reserve Board,* 1914–21; *Currencies After the War* (London, 1920). See also CREDIT; CURRENCY; INTEREST; SAVINGS BANK.

BANK BILLS, or **NOTES.** The promissory notes of a bank or banker, issued under special legal authority, payable to bearer on demand. They differ from an ordinary promissory note in two important particulars: they may be reissued after payment, and they do not become stale, or overdue, by the expiration of a reasonable time after their issue. Bank of England notes are a legal tender in England for all sums exceeding £5, except by the bank. In the United States bank bills are not a legal tender. Whether a demand or payment must be made before an action can be brought on a bank bill is a question upon which the decisions in the United States are in conflict. Consult the authorities referred to under BANK, BANKING.

BANK DIS'COUNT. See BANK, BANKING.

BANK HOL'IDAYS. In law, days on which obligations, such as promissory notes or bills of exchange, may not be demanded so as to put the maker or payer thereof in default. In England every Sunday, Christmas Day, Good Friday, Easter Monday, the Monday in Whitsun Week, the first Monday in August, the 26th of December (called *Boxing Day*), or, if that day is Sunday, the 27th, or any day appointed by Order in Council in place of either of the last four days, and any day appointed by royal proclamation as a public fast or thanksgiving day, are bank holidays. Banks are to be kept closed on such days, and bills and notes payable on any of these days are declared payable on the next following business day. In the United States Sundays and public holidays (q.v.) are, as a rule, bank holidays; and negotiable paper payable on such day, without grace, is payable the next business day. If it is entitled to days of grace (see BILL OF EXCHANGE), and the last day of grace falls on a public holiday, it is payable on the last preceding day, in the absence of a statute varying this rule. Such statutes, making the bill or note payable on the day following instead of the day preceding the holiday, where the last day of grace falls on the holiday, have been enacted in several of the United States.

BANKIPUR. A civil station adjoining the city of Patna (q.v.), British India.

BANK NOTES, MANUFACTURE OF. The chief aim in the manufacture of bank notes is to render counterfeiting impossible, or, at least, easy of detection. This is usually accomplished by peculiarity of paper, design, ink, and printing, or by a combination of these means. English bank notes are printed with the blackest and most indelible ink on a peculiar kind of handmade paper bearing a distinctive watermark. (See PAPER.) As a further security against counterfeiting, a self-registering machine is used for impressing upon the note a mark known only to the Bank of England officials. Until 1837 copperplate printing was employed for English bank notes; and from 1837 to 1855 the method of Perkins Heath for the reproduction of designs by the mill and die process was employed. The great advantage of this method was that a large number of steel plates of the same pattern could be produced from an original with comparative ease. In 1855 electrotype printing was introduced by Smee and the mechanical officials of the Bank of England, and since that time all English bank notes have been printed from the electrotype plates.

The extensive use of Treasury notes or other forms of paper currency in the United States led the Bureau of Engraving and Printing of the Treasury Department at Washington to develop methods for producing notes which should not only be difficult to counterfeit, but which should be legible, durable, and artistic in design. In many instances celebrated artists have been engaged to furnish designs for notes; but more generally the designs have been prepared by the artists belonging to the Bureau. Whoever the designer may have been, the work of transferring the design to the plate, and the entire mechanical

production of the note, except the manufacture of the paper, is carried out by the Bureau.

The paper is made by a private concern only for the government, the process of manufacture being patented. It is made by machinery and is tougher than that of the Bank of England, which is made by hand. The principal ingredients of the paper are linen and cotton fibre, into which threads of silk are introduced lengthwise in the sheets in such a manner as to be visible in the printed note. The process of manufacture, as carried on at the Bureau of Engraving and Printing, is as follows:

The design of the note, including all the lettering and devices thereof, upon a sheet of the required form, being in the hands of the workmen, they first proceed to make the die. A plate of soft, highly polished steel is selected, and upon it is sketched the design, or such portions of it as are of the same color, if more than one tint is to be used in printing. A separate die is needed for every shade used. This is then carefully engraved. It will be understood that, unlike the method of wood engraving, the lines which take the ink are cut into the plate instead of being raised above its surface. The engraver is limited to such parts of the work as can be done by hand; other portions, such as the fine scrolls and elaborate tracery, are done entirely by machinery. The principal apparatus used is a complicated piece of mechanism, which actuates a plate to which the steel for the die is attached and caused to press against a diamond point. This is known as a cycloid ruling machine and is employed for the straight work. Perfectly true and delicate lines are thus cut into the metal, making figures technically termed "cycloid rosettes." The geometric lathe used for the elaborate work on the back of the different denominations of paper money requires the services of an expert mathematician to figure out the succession of curves, and once the combination is changed the original figure in its detail never can be reproduced.

The die, being complete, is ready for the transfer process. Postage stamps, for instance, are made in sheets of 200, so that the die must be transferred that number of times on a single plate. It is first casehardened and then put, face up, in a press which is made with a combination of levers actuated by the foot, so as to give the tremendous pressure of 21 tons on a single line. A cylinder or "roll" of soft steel is, by careful gauging, placed so as to rest directly over the face of the die and at the same time is so arranged as to revolve easily along its surface even when under the full weight. The pressure is then applied, with the result of forcing the soft steel of the roll into the lines of the engraving, so that, when complete, the periphery of the cylinder shows an exact reproduction of the face of the die, only the lines sunk on the die are now raised on the roll. Next, the cylinder is casehardened. Then the plate—soft steel again—to be used for the final printing is placed in the press, and the roll is arranged above it. Now the cylinder leaves its impression on the plate, the hard steel of the raised lines cutting deep into the surface, so that a precise duplicate of the original die is obtained. This is repeated as many times as there are to be repetitions of the stamp or note on the single plate, which is then ready for use.

The ink for printing is made on the spot. In a large room are ten or a dozen paint mills, which are busily grinding the colors and oil together. Two large ones are filled with green ink, another with vermilion, while others are making blue, red, and other tinted inks.

The next important department is the paper-room, where the paper is received and cut in sheets of the required size. The notes are made of a peculiar material containing colored fibres. The paper for postage stamps is made of the best linen. It is of short fibre, very fine, and extremely strong. The sheets on which currency is to be printed are counted as soon as received, and the results reported for verification. They are placed in heaps, marked off in sets of 100 and 1000.

The Bureau of Engraving and Printing employs both hand and power presses, steam presses being used exclusively for printing the backs of treasury and bank notes and for revenue and postage stamps. In the power presses the operations are practically the same as with the hand presses, but are performed automatically by the press itself. The more recent types of power presses print from plates bent in cylinder form.

As soon as a printer has completed the work assigned to him he hands it, made up in "books" of 100 impressions, each sheet inclosed between two others of brown paper, to a clerk. He is then credited with his delivery, spoiled sheets being counted the same as perfect ones, so that if his return is correct his debit account on his pass book, which is kept in a different apartment and by other employés, is thus balanced. The finished impressions are now carefully counted and inspected. A day's work for a hand printer consists of from 800 to 1000 impressions, each sheet containing four bills. The spoiled ones are removed and sent to the proper agents to be burned, while the others are hung in the drying room. This apartment is heated by steam pipes, and the paper is suspended by wires for a day or two, until perfectly dry. Then the brown paper is removed, and the sheets, packed between leaves of press-board, are subjected to the action of a powerful hydraulic press. They are then once more inspected and counted. The entire process of printing requires about one month, and each sheet is counted about 50 times before the packages of 1000 are transferred to the vaults of the Treasury Department.

BANKHEAD, JOHN HOLLIS (1842–1920) An American public official and legislator, born in Moscow, Ala., and educated in the public schools. After four years of service with the Confederate army in the Civil War he entered politics. In 1865–67, and again in 1880–81, he was a member of the Alabama House of Representatives, and in 1876–77 a State Senator. He held the position of warden of the Alabama penitentiary from 1881 to 1885. Soon afterward (1887) he was elected to the Fiftieth Congress, and from that time until 1907 he served continuously. In the latter year he was appointed a member of the Inland Waterways Commission. At the Democratic primaries in Alabama in 1906 he had been nominated an alternate Senator to succeed J. T. Morgan in event of the latter's death (see ALABAMA, *History*), and consequently in June, 1907, Senator Morgan having died, Bankhead was appointed United States Senator, and in July was elected by the Legislature. He was reëlected in 1911 for a full term of six years, beginning March 4, 1913.

BANK OF NORTH AMERICA. See BANK, BANKING.

BANK OF THE UNITED STATES. See BANK, BANKING.

BANK'RUPTCY (*bank* + Lat. *ruptus*, broken, from *rumpere*, to break, It. *banca rotta*, usually taken to refer to the former Italian custom of destroying the money counter when a bank failed). In popular usage, the inability of a person to pay his debts, or the financial condition of one who has failed in business; as a technical law term, the status of one who has been adjudged a bankrupt.

The legal position of a debtor in primitive communities is one of great hardship. He is at the mercy of his creditor, who, after exhausting the property of the debtor, may generally seize his body and force him to work out the debt or become a slave. With the development of society various devices are resorted to for the amelioration of the debtor's condition, terminating, as a rule, in a more or less satisfactory system of bankruptcy, the cardinal principle of which is that one who is unable to pay his debts in full may be discharged therefrom upon giving up all his property for ratable distribution among his creditors. The history of bankruptcy and insolvency legislation in England furnishes a good illustration of this statement. While it is true that there was no process of the common law by which a man could pledge his body or surrender his liberty for the payment of his debts, the courts permitted a legal fiction to grow up that a debtor who did not pay a judgment against him was guilty of a breach of the peace, subjecting his body to imprisonment by the writ of *capias ad respondendum*. The first bankruptcy act in England was passed about the middle of the sixteenth century. It reflects the harsh and unfeeling attitude which the propertied classes, which controlled the courts and the legislation of that period, entertained toward the insolvent debtor. This act (34 and 35 Hen. VIII, c. 4) was entitled "Against such as do make Bankrupt," and recites that "divers and sundry persons, craftily obtaining into their hands great substance of other men's goods, do suddenly flee to parts unknown, or keep their houses, not minding to pay or restore to any, their creditors, their debts and duties, but of their own wills and pleasures consume the substance obtained by credit of other men for their own pleasure and delicate living, against all reason, equity and good conscience." It then proceeded to confer upon various judicial officers power to take the offending debtors and their property; to sell the latter, and to divide the proceeds ratably among creditors. Under Elizabeth and James I additional bankruptcy statutes were passed, all keyed to the same note of suspicion and harsh judgment of the failing debtor. The Act of 21 James I (c. 19) was especially severe, providing that the debtor who could not render some just reason why he became bankrupt should stand upon the public pillory, have one of his ears nailed thereto, and then cut off. If his failure to pay his debts was due to fraudulent practices, he might be put to death.

With the growth of English trade the hazards of commercial enterprises were so multiplied, and the complexity of business relations so increased, that this Draconian legislation against failing debtors was found to be not only unjust but impolitic. Accordingly bankruptcy laws underwent a radical change, until, in Blackstone's time, they were considered "as laws calculated for the benefit of trade, and founded on principles of humanity as well as justice; and to that end," adds the great commentator, "they confer some privileges, not only on the creditors, but also on the bankrupt or debtor himself. On the creditors, by compelling the bankrupt to give up all his effects to their use without any fraudulent concealment; on the debtor, by freeing him from imprisonment and discharging him from his debts, if he had been honest."

These laws, however, applied only to traders, because it was thought that they were, "generally speaking, the only persons liable to accidental losses," and that it was "an unjustifiable practice for any person but a trader to incumber himself with debts of any considerable value." Those who were not traders could get relief from imprisonment for debt only to the extent provided by an entirely distinct set of statutes, those relating to insolvency (q.v.). Although Blackstone describes the bankruptcy laws of his age in the most optimistic vein, deeming them, as he did almost every other branch of English law, the perfection of human reason, they have been modified repeatedly during the last 100 years. Thirty-eight bankruptcy acts have been passed in England, beginning with that already mentioned under Henry VIII, and, for the present, closing with the Act of 1883, as amended in 1890. These statutes have been a series of experiments, and although the latest had for its motto, "The estate for the creditor, not for the debtor, nor for the trustee," it cannot be considered a finality, for it has not accomplished its avowed purpose of satisfying the creditor class. This is shown by the fact that nearly one-half of the business insolvencies in England are liquidated under deeds of settlement or voluntary compositions with creditors outside of the bankruptcy court.

Under the present bankruptcy acts in England and in the United States, proceedings in bankruptcy may be instituted by the debtor or by creditors. The former is called a voluntary, the latter an involuntary proceeding. Each is begun by filing a petition. The debtor's petition must state that he is unable to pay his debts and is willing to surrender all of his property to the use of his creditors. Whether a person is liable to be adjudged a bankrupt upon the petition of creditors depends upon his having committed an act of bankruptcy. The United States Bankruptcy Statute of 1898 as amended in 1903 enumerates five classes of acts of bankruptcy. First, conveying, or removing, or permitting to be removed, any of his property with the intent to defraud any of his creditors; second, transferring, while insolvent, any of his property with intent to prefer a creditor; third, suffering, while insolvent, any creditor to obtain a preference through legal proceedings, and not securing the discharge of such preference; fourth, making a general assignment for the benefit of creditors; or, being insolvent, applying for a receiver for his property, or because of insolvency having a receiver put in charge of his property; fifth, admitting in writing his inability to pay his debts, and his willingness to be adjudged a bankrupt on that ground.

After the debtor is adjudicated a bankrupt, a trustee is appointed by the creditors (subject to some supervision by the Board of Trade in England, by the bankruptcy court in this country), who becomes vested not only with all the prop-

erty in possession of the debtor at the time when he was adjudged a bankrupt, but with all that he had transferred in violation of the statute or in fraud of creditors. It is important that the trustee's title should relate back of the adjudication. By providing for the relation back of the trustee's title, every transfer of his property made or suffered by an insolvent debtor, with intent to prefer a creditor over others, within three months in England, four months in the United States, before the filing of the petition in bankruptcy, is rendered invalid, and the property may be brought back into the estate for division among creditors. Moreover, even when a creditor has obtained security from the debtor, which is not invalidated by the statute, he is not allowed to share in the bankrupt's estate unless he turns over the security to the trustee, or deducts from the amount of his claim the value of his security. It is the duty of the bankrupt to make a full disclosure and surrender of his property, save such as is exempted by statute, as well as to supply a full and honest list of his creditors. Upon establishing their claims, in the prescribed manner, the creditors are entitled to take part in the meetings provided for by statute, as well as to receive dividends. The debtor may be punished criminally for certain violations of the bankruptcy law; and a discharge from debts will be denied for various reasons. Under the present Federal statute it will be denied if he has committed an offense punishable by imprisonment, as provided therein, or if he has fraudulently destroyed, concealed, or failed to keep books of accounts, or records, showing his true financial condition, or obtained property on credit by a materially false statement in writing, or within four months prior to petition transferred, or removed, destroyed or permitted to be removed, destroyed, or concealed, property with intent to defraud, or in voluntary proceedings been granted a discharge in bankruptcy within six years, or in the course of the proceedings in bankruptcy refused to obey any lawful order of the court. Even when a discharge is obtained, it does not relieve the bankrupt, as a rule, either in England or here, from debts grounded in fraud or other moral misconduct. In this country no political disability follows an adjudication in bankruptcy. In England, however, an adjudged bankrupt is disqualified from sitting or voting in either house of Parliament or from holding various other specified offices. This disqualification ceases as soon as the bankrupt is discharged, if the court certifies that he was free from misconduct, and at the end of five years from a discharge in other cases.

Article I, Sec. 8, of the Federal Constitution, gives to Congress power "to establish . . . uniform laws on the subject of bankruptcies throughout the United States." This grant of power to Congress does not exclude the States from legislating on this subject, but a Federal bankruptcy statute suspends while in force, the operation of a State statute covering the same ground. Congress has exercised this power but sparingly. It passed the first bankruptcy law in 1800. This was copied quite closely from the English statute of that time. As it applied only to traders, it soon became unpopular with other classes and was repealed in 1803. The next venture in bankruptcy legislation by Congress was made in 1841, at the request of insolvent debtors, who, after the panic of 1837, had become a numerous and influential class. This bill proved no more satisfactory than its predecessor, and it was repealed after a short life of two years. After the repeal of this act no serious attempt was made to pass a Federal bankruptcy law until 1864, when Congressman Jencks, of Rhode Island, introduced a bill upon this subject. His very instructive speech, explanatory of its purpose and provisions, is contained in the *Congressional Globe* for 1863–64, at page 2636. The bill met with serious opposition and did not become a law until June, 1867. In 1874 it was amended in various respects. One of the changes required one-fourth in number and one-third in value of the creditors to unite in an involuntary petition. This made it very difficult for creditors to force a debtor into bankruptcy, and thereafter the proceedings were mainly voluntary. Moreover, the charges upon bankrupt estates under this law were heavy, often exorbitant, and the creditor class was disappointed in its workings. Their agitation for its repeal was crowned with success in 1878.

Twenty years elapsed before the fourth and present Act was passed by Congress in 1898 (amended by subsequent acts of Congress in 1903, 1906, and 1910). It was the outcome of a compromise between the friends of a bill fashioned largely after the present English statute, and those who were either opposed to any Federal legislation on the subject, or were anxious to limit such legislation within the narrowest possible bounds. Its definition of acts of bankruptcy is much narrower than that of the English statute. Even one who has committed an act of bankruptcy may defeat an adjudication by convincing a jury that the aggregate of his property is, at a fair valuation, sufficient in amount to pay his debts. It secures, however, a fairly expeditious, convenient, and economical administration of bankrupt estates. While the Federal district courts have original jurisdiction in bankruptcy, the statute provides for referees, who may perform many of the judicial duties in bankruptcy proceedings, and whose districts are not to extend, as a rule, beyond the limits of a single county, thus making it easy for suitors to attend upon the proceedings. Consult: Brandenburg, *Law of Bankruptcy* (3d ed., Chicago, 1903); Bump, *Law and Practice in Bankruptcy* (11th ed., Washington, 1898); Collier, *Law and Practice in Bankruptcy* (9th ed., Albany, 1912); Baldwin, *Concise Treatise upon the Law of Bankruptcy* (8th ed., London, 1900); Robson, *Treatise on the Law of Bankruptcy* (7th ed., London, 1894).

BANKS, Sir Joseph (1743–1820). An English naturalist. He was born in London, Feb. 13, 1743, the only son of William Banks and Sarah, daughter of William Bale, who left him a large fortune. He graduated at Oxford, imbued with a profound interest in natural history, and it was by his exertions that lectures in natural history were first introduced into that university. In 1766, after having been elected a fellow of the Royal Society, he began his travels by a journey to Newfoundland and Labrador to collect plants, whence he brought the first scientific collections from that region. In 1768–71 he accompanied Cook's expedition round the world in a vessel, the *Endeavour*, equipped by himself, in which he visited successively Rio de Janeiro, Cape Horn, Tahiti, New Zealand, Australia, the Malay Archipelago, Cape of Good Hope, and St. Helena. His friend, the botanist Solander, and two artists accompanied him on this expedition.

Botany Bay and the Endeavour River were named at this time, and Cook also gave the name of Banksland to an island south of New Zealand. During this visit to Tahiti Banks sowed seeds of various Brazilian plants. The death of Dr. Solander long delayed the publication of the manuscripts and plates of the botanical results of the expedition, which were preserved in the British Museum, and finally published in 1900. As one result of this expedition the marsupial fauna of Australia first became known to science. In 1772 Banks explored the Hebrides and Iceland and discovered the great geysers of the latter country. He was elected president of the Royal Society in 1778, which office he held for 42 years. While he published little himself, he did much to arouse an interest in natural science in Great Britain and was a patron and protector of scientists in general. His great collections and library, now preserved in the British Museum, were accessible to naturalists and were the basis of many important systematic works by Fabricius, Broussonnet, Gärtner, and Robert Brown. He married Dorothea, daughter of William Weston-Hugessen, in 1779, but left no children. He died in Isleworth, Jan. 19, 1820. Consult Duncan, *Short Account of the Life of Sir Joseph Banks* (Edinburgh, 1821), and *Sir Joseph Banks and the Royal Society* (London, 1846).

BANKS, Louis Albert (1855–). An American clergyman and author. He was born at Corvallis, Ore., and educated at Philomath College, Ore., and at Boston University. In 1893 he was the Prohibition candidate for governor of Massachusetts and afterward became an evangelist for the American Anti-Saloon League. A few of his very numerous writings are: *Religious Life of Famous Americans* (1904); *Spurgeon's Illustrative Anecdotes* (1906); *The Problems of Youth* (1909); *The World's Childhood* (1910); *The Great Themes of the Bible* (1911); *The Lincoln Legion* (1912).

BANKS, Nathaniel Prentiss (1816–94). An American soldier and politician, born at Waltham, Mass., where he received a common-school education and learned the trade of a machinist. He then edited a local paper; studied law and was admitted to the bar; served several terms in the Massachusetts Legislature, for part of the time as Speaker of the Assembly, and in 1853 was chairman of the Massachusetts Constitutional Convention. In 1853, also, he was elected to Congress by a coalition of the Democrats and Free-Soilers, but soon joined the "Know-Nothings" and afterward identified himself with the newly organized Republican party. During his second term in Congress he was Speaker of the House, having been chosen on the 133d ballot. He was Governor of Massachusetts from 1857 to 1859 and then became president of the Illinois Central Railroad, which position, however, he resigned on the outbreak of the Civil War, to enter the Federal service. He was commissioned major-general of volunteers on May 16, 1861; commanded the Fifth Army Corps along the upper Potomac and in the Shenandoah valley in 1861–62, and on March 23, 1862, a part of his army under Shields defeated Jackson at Winchester. In April, 1862, at the head of two divisions, he was assigned to the task of protecting the Shenandoah while McClellan proceeded against Richmond by way of the Peninsula; but, soon weakened by the withdrawal of one of his divisions, he was defeated by Jackson at Front Royal on May 26 and was forced back upon the Potomac. Soon afterward he joined Pope, then commanding the Army of Virginia, and on August 9 was defeated by a force of Confederates in the battle of Cedar Mountain. He then was in command for a time of the defenses of Washington, and in December, 1862, commanded the expedition to New Orleans and replaced Gen. B. F. Butler as commander of the Department of the Gulf. In the spring of 1863 he conducted the campaign against Port Hudson (q.v.), which, after resisting several assaults, was finally surrendered, July 9, 1863, on the receipt of the news that Vicksburg, farther up the river, had been taken by Grant. Early in 1864 General Banks was directed to lead an expedition up the Red River, with a view to regaining western Louisiana from the Confederates, but he was defeated by Gen. Richard Taylor at Sabine Cross Roads and was forced to withdraw to the Mississippi. In May, 1864, he was relieved of his command and, resigning his commission, was again elected to Congress, where he served, with the exception of one term, until 1877 and was for many years chairman of the Committee on Foreign Relations. He was again elected to Congress in 1888, but after 1890 suffered from a mental disorder and withdrew wholly from public life. In 1891 Congress voted him an annual pension of $1200. Because of his factory life when a young man, he was popularly known as "the Bobbin Boy."

BANKS, Thomas (1735–1805). An English sculptor. He was born at Lambeth and studied in the classes of the Academy, whose gold medal enabled him to prosecute further study at Rome. He remained in Italy from 1782 to 1789 and executed, among other works, the marble "Cupid Catching a Butterfly," which was acquired by the Empress Catharine of Russia during the artist's sojourn at St. Petersburg. She also gave him another commission for a group called "Armed Neutrality." On his return to London he was in 1785 elected to the Royal Academy. Several of his monuments are in Westminster Abbey and St. Paul's; in the latter is his statue of Lord Cornwallis. His most ambitious effort is his plaster model of "Achilles Mourning the Loss of Briseis." Among his other works is "Shakespeare between the Tragic and Comic Muses" in Stratford-on-Avon. Banks has been called the father of English ideal sculpture, but he may be best classed as a mediocre forerunner of the classic art of Thorwaldsen and Flaxman.

BANKS, Sir William Mitchell (1842–1904). A Scottish surgeon and anatomist, born in Edinburgh. He graduated in 1864 at Edinburgh University, was demonstrator of anatomy in the University of Glasgow, and subsequently at Liverpool, in 1868, became known as a consulting and operating surgeon. He reëstablished the Medical School of Liverpool and founded University College, one of the three colleges constituting Victoria University. For some time he was professor of anatomy in University College. In 1886 he was elected first president of the Liverpool Biological Society, and in 1897 delivered the address in surgery before the British Medical Association assembled at Montreal. He was one of the originators of the modern method of operating for cancer of the breast. His publications include various papers and addresses.

BANK'SIA. A genus of Australian shrubs of the family Proteaceæ, named in honor of

Sir Joseph Banks. A few of the species become small trees. They have hard, dry leaves and present a remarkable appearance from the umbellate arrangement of their branches. These bear toward their extremities oblong heads of very numerous flowers, which secrete much honey. Some of the species are frequently grown as greenhouse plants in Great Britain. They are abundant in all parts of Australia, forming a characteristic feature of its vegetation, and are called honeysuckle trees. *Banksia grandis* exceeds all the rest of the genus in size, attaining a height of 50 feet.

BANK-SIDE. The south bank of the Thames, between Blackfriars and Waterloo bridges, London. Here stood the famous Globe Theatre in Shakespeare's time.

BANKS IS'LANDS. A group of islands in the Pacific, a dependency of New Hebrides (q.v.) (Map: Australasia, J 4). They number 17 and are situated in lat. 13° S. and long. 168° E. The most important of them are Vanua Lava, St. Maria, Ureparapara (with a good harbor), and Valua. Spices, corn, and coffee are among the important products, and the islands are famous for valuable rosewood. These islands were discovered by Bligh. There is a mission house on the small islet of Mota. The total area of the group is estimated at about 150 square miles, and the population at 5000.

BANKS LAND. An island in the Arctic Ocean, 70 miles southwest of Melville Island (Map: Arctic Regions, D 7). It is intersected by the parallel of 74° N. and by the meridian of 120° W. It was discovered by Parry in 1819.

BANKS STRAIT. See Map: Tasmania, E 1.

BANK SWAL'LOW, or SAND MAR'TIN. This familiar swallow is perhaps the most widespread of all land birds, ranging over most of the Northern Hemisphere. In North America it breeds as far north as the limits of trees and migrates south to Peru and Brazil. It is found also throughout Europe, northern Asia, and China, wintering in Africa, India, and the Indo-Burmese countries. It is known under one or another name throughout nearly the whole world, wherever the cut banks of streams give it an opportunity to make its burrowed nesting place. The common species of America, Europe, and Asia is *Clivicola* or *Riparia riparia*. From eastern India to southern China it is replaced by another species (*Clivicola* or *Riparia sinensis*), which migrates in winter to the Philippines and southern India. Egypt has another species (*Clivicola* or *Riparia shelleyi*); the brown-collared bank swallow (*Clivicola* or *Riparia cincta*) abounds throughout tropical Africa, and several other forms are recognized elsewhere, but all are closely alike in appearance and habits.

The bank swallow is easily distinguishable from all other American swallows by its lesser size and the absence of metallic lustre in its plumage, which is sooty brown-black above and white on the lower surface of the body, with a dusky band across the breast; the beak is very small and weak, and the tail short and not deeply forked. This swallow is migratory in the temperate zone, where it spreads in summer to the borders of the Arctic Ocean, and retires in winter not only to the tropics, but beyond them to the southern parts of South America and Africa, but its alleged breeding there is probably erroneous, arising from confusion with local resident species. Everywhere it is of local distribution, seeking the borders of water courses and lakes where steep banks of sandy earth afford it a chance to dig holes, which it does in companies sometimes numbering hundreds of pairs, whose homes are often crowded within a small space. Seven hundred holes have been observed in Alaska in the face of a single sand bluff. The nests are placed at the inner ends of deep burrows, each made by a pair of birds. In excavating the feet seem to be the principal instruments, scratching away the soil and scraping it out backward to the mouth of the hole, until the required calibre and depth are attained. Both sexes work at the task diligently, and the hole is sometimes 7 or 8 feet in depth—a wonderful achievement for a bird so weak and ill-provided with digging tools. A swallow of similar nesting habits, but otherwise quite different, is the Rough-winged (q.v.). See SWALLOW and Plate of SWALLOWS.

BANN. A river in Ireland, rising in the southern part of Downshire. It flows northwest, passing through Lough Neagh at its southwestern end, then passes between the counties of Londonderry and Antrim, and falls into the Atlantic at Port Stewart. The part of the river south of Lough Neagh is called the upper Bann and has a length of 25 miles, while the lower Bann, or the part north of Lough Neagh, is about 40 miles long. The Bann is navigable for light vessels and has salmon fisheries. It is connected with the Newry Canal at Portadown.

BANNATYNE (băn'ă-tīn) **CLUB.** A club founded in 1823 by Sir Walter Scott, who was its first president, and by other Scottish antiquarians, for the purpose of collecting and publishing all history and literature connected with their country. It was named after a sixteenth-century collector of Scottish poetry, and seems to have been discontinued in 1867. It printed 116 rare works in editions of 100 copies each, which were distributed among the members. A full set of these works brought £235 in 1887.

BAN'NEKER, BENJAMIN (1731–1806). A negro mathematician. He was a native of Maryland and was a protégé of Thomas Jefferson. His grandmother, an Englishwoman, taught him to read and write; and after his fiftieth year he began to study mathematics with special reference to astronomy. In 1792 he issued an almanac of his own making and continued the series annually throughout his life. He assisted in fixing the boundary lines of the District of Columbia and in laying out the city of Washington. For his biography, consult Latrobe (Philadelphia, 1848), and Morris (Baltimore, 1854).

BAN'NER (OF. *banere, baniere*, Fr. *bannière, bandière*, LL. *baneria, banderia*, from *bandum*, standard; cf. Goth. *bandwa*, sign, token, OHG. *bant*, band). Strictly, a kind of flag painted or embroidered with arms, and of a size proportioned to the rank of its bearer; often fringed with the principal metal and color of the arms. The chief distinction between banners and other flags, such as standards, pennons, etc., is that the former is square, or nearly so, while the others are, as a rule, elongated. See ENSIGN; FLAG; STANDARD.

BAN'NERET (OF. *baneret, banneret*, from *banere*, banner). A knight entitled to display a banner, as distinguished from a pennon. The honor was originally gained in feudal times by bringing a certain number of soldiers into the field, but later became the reward of heroic acts performed in the face of the enemy. The first

banneret in England, according to Froissart, was made by King Edward I, and the last by Charles I, after the battle of Edgehill, the recipient being John Smith, who had recovered the royal standard from the insurgents. There are three doubtful instances, however, of the bestowal of this honor in the eighteenth century. At the creation of a knight banneret the king, or his general at the head of his army drawn up under the royal banner in battle array after a victory, attended by all the officers and nobility of the court, received the banneret-elect, not necessarily a knight previously, led between two knights of note or other men famous in arms, carrying his pennon in his hand, the heralds walking before him and proclaiming his valiant achievements for which he deserved to be made a knight banneret and to be privileged to display his banner in the field. The king, or general, would then say to him, "Advance, banneret!" and cut off the point of his pennon, thus altering its shape to that of a banner (q.v.). The new knight, with the trumpeters sounding before him and the nobility and officers bearing him company, would next be sent back to his tent, where a noble entertainment, provided by the king, awaited him.

BAN'NOCK (Gael. *bonnach, bannach*). A cake of home-made bread formerly common in the country parts of Scotland and in the north of England. It is usually composed of pease-meal or pease and barley meal mixed; prepared without any leaven, it is baked on a circular plate of iron called a girdle. When made of mixed meal, it is called a "mashlum bannock." "Bannocks of barley meal" form the theme of a popular Scottish song.

BANNOCK. See BANAK.

BAN'NOCKBURN (Gael. the stream of the white knoll; *burn*, AS. *burna*, a small stream; cf. Ger. *Brunnen*, well). A village in Scotland, about 2¼ miles southeast of Stirling, on the Bannock Rivulet, the scene of a great battle, fought on June 24, 1314, in which Robert Bruce, with c.40,000 Scotch, gained a signal victory over Edward II with 100,000 English, and secured his throne and the independence of Scotland. The victory was due in great measure to the clever device of Bruce, who caused the ground in front of his position to be undermined in all directions. The English cavalry blundered into the hidden pits, were rendered helpless, and threw the rest of the army into confusion. The English are said to have lost 30,000, and the Scotch 5000, men. The "bore stone" on which Bruce is said to have fixed his standard on that day is still to be seen on an eminence near the scene of the fight. On the southeast of the field of Bannockburn, at Sauchie Burn, James III was defeated June 11, 1488, by his rebellious subjects, and assassinated after the battle at Beton's Mill, where he had taken refuge. See SCOTLAND.

BANNS (earlier also *bannes*, pl. of *ban*) **OF MARRIAGE.** The preliminary public announcement or proclamation constituting a part of the religious ceremonial of marriage. It was made compulsory throughout Christendom by a decree of Innocent III at the fourth Lateran Council of 1215 and is still employed, both in England and in most Roman Catholic countries, as an essential part of the religious celebration of matrimony. It is not necessary to the validity of marriage, however, which, in England and the United States at least, could always be effected by a civil contract without ceremony. The object of this publication was to give notoriety to the act, so that all who had valid objections to the marriage might be enabled to state them in time. By the English Book of Common Prayer the announcement is required to be made in the terms of the rubric prefixed to the marriage service, on three Sundays preceding the ceremony. If any valid objections are offered, it is the duty of the clergyman to proceed no further with the marriage; if, notwithstanding, he marries the parties, he will be liable to severe penalties by the ecclesiastical law, though it does not subject him to the ordinary criminal law of the land. According to the old English Canon Law the publication of banns might be made on holy days; but a change was made to Sunday by the first important English Marriage Act, the 26 Geo. II, c. 33—a provision which is still in force.

The custom was continued in the early history of the English Colonies in America and of the States formed from them. It is now practically obsolete in the United States, except in the Roman Catholic church, although it is still recognized in the statutes of some of the States (Stimson, *American Statute Law*, sec. 6120). See MARRIAGE, and consult the authorities there referred to.

BANQUETTE, băn-ket' (Fr. dimin. of *banc*, bench). A projection or raised ledge forming a platform on the inner side of the parapet of a rampart and designed to accommodate and protect the rifle fire of the defenders. Its dimensions vary according to circumstances. See FORTIFICATION.

BANQUO, băn'kwō. According to Holinshed, who probably drew his information from Boece, a Scottish warrior of the eleventh century and the progenitor of the royal house of Stuart. In 1066 he is said to have joined Macbeth in a conspiracy against King Duncan and to have been treacherously slain by his confederate. Shakespeare does not mention him as a conspirator, but only as Macbeth's victim. Boswell-Stone (*Shakespeare's Holinshed*, New York, 1896) says "Banquo and Fleance were, I suppose, creatures of Boece's imagination."

BAN'SHEE, or BEN'SHEE (Gael. *ban-sith;* from *ban*, woman + *sith*, Ir. *sighe*, fairy). An imaginary being in Irish and general Celtic folklore. The banshee is a female, called the wife of the fairies, who makes her presence known by wailings and shrieks, and thus gives warning of a death in the family, over which she is presumed to exercise a kind of guardianship. Not all Celtic families, however, enjoy this guardianship, which seems to be reserved for certain exclusive lines of descent.

BANSWARA, bân-swä'rä. A native state of Rajputana, India, in the west of Malwa, bordering on Gujerat (Map: India, B 4). It extends from lat. 23° 10′ to 23° 48′ N., and from long. 74° 2′ to °74 41′ E. Area, 1606 square miles. Pop., 1891, 181,000; 1901, 165,300; 1911, 165,463.

BANTAM, bân-tăm' *or* băn'tam. A seaport town in the western part of Java, situated in the residency of the same name on Bantam Bay (Map: East Indies, C 6). It was the capital of the kingdom of Bantam, which was a powerful state before the Dutch conquest. The town attained considerable commercial importance during the sixteenth and seventeenth centuries. Since the foundation of Batavia, Bantam has steadily declined, and only ruins of its former greatness remain.

BANTAM. A class of diminutive domestic fowls. See Fowl.

BANTAYAN, bän-tä'yän. A town on the island of the same name, belonging to the province of Cebu, Philippine Islands, situated 62 miles north of Cebu. Numerous shoals make navigation difficult. A leper colony inhabits a small island just off shore. Pop., 1903, 13,324.

BAN'TENG (native Malay name). An East Indian ox (*Bos sondaicus*), which inhabits southern Burma and the Malay Peninsula, Borneo, and Java, is by some considered only a local race of the gaur of India. It is smaller and of lighter build than the gaur, with a longer and sharper head, and the horns more slender and rounded; there is less of a dorsal ridge, and the cow is peculiar in being bright dun in color, while the bulls more nearly resemble gaurs. This wild ox inhabits the jungle and is exceedingly wary and pugnacious. It has been interbred with the zebu and other domestic cattle, yielding a serviceable hybrid, of which large herds are kept by the Malays of Java and Bali. Consult Wallace, *Malay Archipelago* (New York, 1869). See Plate of Wild Cattle, under Cattle.

BANT'ING SYS'TEM. See Obesity.

BAN'TOCK, Granville (1868–). An English composer and conductor. He was born in London, Aug. 7, 1868, and educated originally for the East India service. But his love of music caused him to change his plans. After a brief preparatory course under Dr. Saunders he entered the Royal Academy of Music in 1889, and there won the Macfarren Prize in his first year. From 1893 to 1896 he edited *The New Quarterly Musical Review.* He began his career as conductor in 1896, when he accepted a position with G. Edwardes's opera company. Concerts given by him in London in 1897 attracted attention from the fact that he brought out nothing but English compositions of the most recent date. In the same year he was appointed municipal director of music at New Brighton, where he established an orchestra and a choral society, which soon rose to a high level of excellence. In 1900 he became principal of the Birmingham and Midland Music School and in 1903 he added to educational duties those of conductor of the Liverpool Orchestral Association. In 1908 he became professor of music in Birmingham University. Bantock became known not only as one of the most energetic champions of modern English music, but also as one of the most prolific and distinguished composers of the day. After 1900 scarcely a year passed that a new work from his pen was not heard at one of the great English festivals. His principal works are the operas: *Cædmar* (1892), *The Pearl of Iran* (1896), and incidental music to his own five-act drama *Rameses II* (1891); an oratorio, *Christ in the Wilderness* (1907); the symphonic poems: *Thalaba* (1900), *Dante* (1902), *Fifine at the Fair* (1902), *The Witch of Atlas* (1902), *Lalla Rookh* (1903), *Dante and Beatrice* (1911); the overtures: *The Fire Worshippers* (1892), *Eugene Aram* (1895), *Saul* (1907), *Overture to a Greek Tragedy* (1911); vocal works with orchestra: *Wulstan* (1892), *Thorvenda's Dream* (1903), *The Spirit of the Times* (1904), *Sea-Wanderers* (1905), *Omar Khayyam* (two parts, 1906 and 1907); a choral symphony, *Atalanta in Calydon* (1912); and an *a Cappella* mass in B flat for male voices, male and mixed choruses; several smaller compositions for orchestra; a string quartet in C minor; Serenade for four horns; piano works and songs.

BAN'TRY (Ir. *Beantraighe,* descendants of Beann, of the royal race of Ulster). A seaport town and famous summer resort in the southwest of county Cork, Ireland, 44 miles west-northwest of Cork (Map: Ireland, B 5). It is at the head of Bantry Bay (q.v.), where in 1796 a French fleet anchored and an abortive attempt was made to land. The chief trade is the export of agricultural produce. Pop., 1901, 3109; 1911, 3159.

BANTRY BAY. An inlet of county Cork, in the southwest extremity of Ireland (Map: Ireland, B 5). It runs east-northeast, is 25 miles long, from 3 to 5 miles wide, affords safe anchorage for the largest ocean-going vessels, and is a naval rendezvous. The lighthouse on Ronacarrig Island at the east entrance of the bay has a fixed light which is visible 10 miles at sea. Consult Palliser, "Bantry Bay," in *United Service Magazine,* vol. xviii (London, 1898).

BANTU, bän'tōō (*Ba-ntu,* the people). A group of negroes of Central and South Africa, forming Class VI of Deniker (see Africa), in which they are divided into western, eastern, and southern. One language unites this people, which otherwise shows considerable diversity. More particularly, it is necessary to emphasize the fact that they do not constitute a single physical or racial type. They are capable and progressive, and great colonizers. With the exception of the Herero, who must be supposed to have lost the art, all the Bantu are tillers of the soil, the women everywhere attending to cultivation, while the men hunt and in many regions herd the stock. Maize has been introduced and has become the staple food in many territories, where the banana probably at one time held a similar position, as it still does in Uganda. In some districts millet is the most important food. A knowledge of smelting iron is shared by all the Bantu. Their clothing varies, including skin coverings, bark cloth, and loom-woven fabrics. Such arts as pottery, carving, and basketry flourish over wide areas. In a number of instances great nations have been founded by some conquering prince of exceptional ability, and in such cases there is a wonderful development of court offices and titles of nobility, recalling mediæval feudal conditions. However, these monarchies are rarely of long duration; with the decease of the founder they generally degenerate and are split up into smaller territories. For other cultural traits, such as religion, see Africa, *Ethnology.* The principal subdivisions of the Bantu are the following: Bakalai, Bakuba, Baluba, Balunda, Basuto, Bateke, Bechuanas, Bongo, Congo, Dualla, Fans, Herero, Lunda, Mpongwe, Nyoro, Ovampo, Rua, Sechuana, Swahili, and Zulu. Consult Deniker, *Races of Man* (London, 1900). On the languages Professor Meinhof is the leading authority.

BANUS. See Ban.

BANVILLE, bän'vēl', Théodore Faullain de (1823–91). A French poet, born at Moulins. A pupil of Hugo in prosody and rhetoric, he was a follower of Gautier in his passionless objectivity and hedonistic ethics. The titles of his volumes of poetry suggest the impassive nature of the contents: *Cariatides* (1842); *Stalactites* (1846); *Odelettes* (1856); *Odes funambulesques* (1857); and *Nouvelles odes funambulesques* (1869). The Franco-German War stirred him to a more passionate utterance in *Idylles prus-*

siennes (1871). He wrote also two charming dramatic sketches, *Gringoire* (1866), a sort of defense of poetry against the materialistic spirit of the Napoleonic régime, and *Socrate et sa femme* (1885). His prose pieces are poetry in all but form, whether they call themselves 'Fairy Tales' (*Contes féeriques*) or 'Parisian Sketches' (*Esquisses parisiennes*, 1859). His critical *Traité de la poésie française* (1872) won him the title of "Legislator of Parnassus." But it is as a poet alone that he survives—a poet of a disillusioned age, a product of the determinist philosophy of Taine and the cynical materialism of the Empire. In form, as in ethics, he is a sensualist, reviving the artificial stanzas of the fourteenth century and in this becoming a forerunner of Austin Dobson (q.v.). In his *Odes funambulesques* his muse dances on the wire that he has stretched for her, with an easy assurance that evokes an amused admiration. It is the perfection of fanciful frivolity, inexhaustible in the flow of its empty gayety, "with the one idea of expressing no idea" (Lemaître), but producing the desired impression by artful interlinking of rhymes and harmonious or peculiar succession of sounds. Banville had a marvelous gift of musical speech that sings itself into the ear with a strange melody, or provokes a cynic laugh by its metallic iteration. Such art of poetry is ill-adapted to serious subjects. It closes its eyes deliberately to the sterner half of life and finds its natural element in pagan myths, renascent ideals, and Bohemian manners. Of such subjects he will paint exquisite pictures, cameos whose clear-cut outlines rival the brilliancy of their color. He is the most ingrained pagan among modern French poets. Banville's *Œuvres* are published in 8 vols. (1873–78), with a posthumous volume *Dernières poésies* (1893). His *Ballades* were translated into English verse by A. T. Strong (London, 1913). He died in Paris, March 13, 1891. Consult: Dowden, *A History of French Literature* (1897); Pellissier, *Le mouvement littéraire au XIXème siècle* (1901); the works on French literature by Faguet, Doumic, Lanson, Brunetière, Tellier, Wells (1896), and the bibliography appended to the article FRENCH LITERATURE.

BANXRING, bănks'rĭng. A Javan tree shrew. See TREE SHREW.

BANYAN, băn'yan (Hind. *banya*, Beng. *baniya*, Skt. *vanij*, merchant; as the tree is used by native merchants as a market place), also spelled BANIAN, *Ficus benghalensis*. A tree, native of India, growing to a height of 70 to 100 feet, remarkable for its vast prop roots. The banyan tree is extensively planted, but occurs in a wild state only in the lower Himalayas and the Deccan Hills. It is a species of fig (q.v.); has ovate, heart-shaped entire leaves, about 5 or 6 inches long; and produces a fruit of a rich scarlet color, not larger than a cherry, growing in pairs from the axils of the leaves. The branches send roots downward, which, when they have rooted, become props, the tree in this manner spreading over a great surface and enduring for many ages. A famous banyan tree exists in the Botanic Garden at Calcutta, India. This tree is known to be about a century old. Its main trunk is 40 feet in circumference, and there are 230 prop roots 6 to 10 feet in circumference. One has been described as having no fewer than 350 prop roots, equal to large oaks, and more than 3000 smaller ones, covering a space sufficient to contain 7000 persons. The vegetation of the banyan seldom begins on the ground. The seeds are deposited by birds in the crowns of palms and send down roots which embrace and eventually kill the palm. As the banyan gets old, it breaks up into separate masses, the original trunk decaying, and the props becoming separate trunks of the different portions. The wood of the banyan is light, porous, and of no value. The bark is regarded by the Hindu physicians as a powerful tonic and is administered in diabetes. The white glutinous juice is used to relieve toothache, and as an application to the soles of the feet when inflamed. Birdlime is also made from it. Gum lac is obtained in abundance from the banyan tree. The banyan tree is beautifully described by Southey in his poem, "The Curse of Kehama." The banyan has been successfully conveyed to other lands, fine specimens being reported in Honolulu and elsewhere. The name "banyan tree" is often improperly applied to *Ficus indica*, a somewhat smaller tree. See Plate of BAMBOO, BALSAM, ETC.

BANYULS-SUR-MER, bȧ'nyul'-sur-mâr' (Fr. little baths on the sea). A fishing port and summer resort on the Mediterranean, in the department of Pyrénées Orientales, France. It exports honey, oranges, and cork, and the famous Roussillon, Guenache, and Ranio wines, which are made in the neighborhood. Pop., 1901, 3111; 1906, 3301; 1911, 3216.

BANYUMAS, băn'yōō-mäs', or **BANJOEMAS** (golden water). A residency and a town of Java, situated on the south coast of the island (Map: East Indies, C 6). Area of residency, 2146 square miles. Its population was 1,251,963 in 1900, including about 1000 Europeans and about 5000 Chinese. The town and seat of the resident is situated on the river Serajo, about 22 miles inland. It has a considerable trade and contains a population of about 6500.

BANYUWANGY. See BANJUWANGY.

BANZ, bänts (Goth. *bansts*, inclosure). A castle, belonging to one of the Bavarian princes, originally a Benedictine abbey, in Upper Franconia, Bavaria, near Lichtenfels, on the Main; situated on a mountain slope over 1400 feet high. The abbey was founded in the eleventh century and celebrated for the superior culture of its monks. During the Peasants' War in the sixteenth century the abbey was destroyed but immediately restored, again destroyed in the Thirty Years' War, and again restored. In 1802 is was broken up, the books and collections were scattered among German institutions, and the building turned to its present use. The castle contains a number of beautiful rooms, and also a very rare and valuable collection of petrified objects.

BAOBAB (bā'ō-băb) **TREE.** See ADANSONIA.

BAOUR-LORMIAN, bȧ'ōōr'lôr'myäN', PIERRE MARIE FRANÇOIS LOUIS (1770–1854). A French poet and dramatic author, born at Toulouse. His plays were much praised at the time of their performance, and his translations of *Tasso* (1795) and *Ossian* (1801) attracted the favor of Napoleon. In 1815 he was made a member of the Academy; but the reign of the classic style was over, and protesting to the end with feeble dialogues, *Le classique et le romantique, encore un mot*, the poet found himself the butt of epigrams. Upon his death, however, the Academy paid him extraordinary honors.

BAPAUME, bȧ'-pōm'. The chief town of a

canton, in the department of Pas-de-Calais, France (Map: France, N., H 2). Pop., 1901, 3013; 1906, 2946; 1911, 2917. In August, 1793, a detachment of the allied troops advanced to this place, after compelling the French to abandon their fortified position and to retreat behind the Scarpe. The town was also the scene of one of the severest and most closely contested battles of the Franco-German War. It was fought Jan. 3, 1871, both sides claiming the victory. The Germans, however, were compelled to retreat beyond the Somme.

BAPH'OMET. The name of a mysterious symbol which was alleged to be in use among the Templars. According to the oldest and most probable interpretation, the word is a corruption of Mahomet, to whose faith the members of the order were accused of having a leaning. Indeed, the Old Spanish form is *Mafomat*. The symbol consisted of a small human figure cut out of stone, having two heads, male and female, with the rest of the body purely feminine. It was environed with serpents and astronomical attributes and furnished with inscriptions, for the most part in Arabic. Specimens are to be found in the archæological collections of Vienna and Weimar and elsewhere. Joseph von Hammer-Purgstall, however, in the *Fundgruben des Orients* (Vienna, 1818), derives Baphomet from Gk. *βαφή, baphē*, baptism; and *μῆτις, mētis*, council or wisdom. He charges the knights with depraved Gnosticism and makes the word signify the baptism of wisdom. But this explanation is generally discredited. Other explanations even less probable are offered.

BAPTAN'ODON (Gk. *βάπτειν, baptein*, to dip, here referring to amphibian habits + *ἀν, an*, priv. + *ὀδούς, odous*, tooth). The only American representative of the aquatic ichthyopterygian reptiles, and a late development of the Ichthyosaurus race. The animal was fish-like in general appearance, like all the Ichthyosaurians, and was provided with paddles that were shorter and broader than those of the other members of the group. The jaws were without teeth, and this leads to the supposition that the animal fed upon the succulent plants that grew in the vicinity of its dwelling place. It was about 10 feet long, and it lived during Middle Jurassic times in the shallow marine waters of the Colorado-Wyoming Basin. The name "Baptanodon beds," given by Professor Marsh to the series of rocks containing this fossil, has recently been replaced by "Shirley Formation." See ICHTHYOSAURUS.

BAP'TISM (OF. *baptesme*, Gk. *βάπτισμα, baptisma*, from *βαπτίζειν, baptizein*, to dip). One of the sacraments of the Christian Church, performed by applying water to the person of the candidate in various modes, in the name of the Trinity. Its institution is referred by the Gospels to Christ himself (Matt. xxviii. 19; Mark xvi. 16). Modern criticism has sometimes questioned the correctness of this reference, upon the ground that Christ did not concern himself with outward institutions; but there is no objective warrant for this rejection of the texts, and the immediate observance of baptism upon the beginning of the Church at Pentecost implies previous and well-understood establishment of the rite. The name and the rite were not, however, altogether new when the ordinance was instituted by Christ. The Jewish law introduced the custom of washing or baptizing proselytes upon their admission into the Jewish church. John the Baptist baptized, not proselytes upon their renouncing heathenism, but those who by birth and descent were already members of the Jewish church, to indicate the necessity of a purification of the soul from sin—a spiritual and not a mere outward change. There has long been much controversy as to the proper subjects of baptism—whether adults only are to be baptized upon confession of their faith in Christ, or whether their infants are also to receive the ordinance. (See BAPTISTS; BAPTISM, INFANT.) The general practice of the Church, Greek, Roman, and Reformed, has been to baptize infants. Another controversy of long standing has been that as to the mode of baptism—whether immersion alone constitutes valid baptism, or whether other forms may be used. Those who favor immersion argue from the meaning of the word "baptize," from New Testament usage, from the symbolism of the doctrine, which they think has reference to the death, burial, and resurrection of Christ (Rom. vi. 3, 4), and from the acknowledged custom of the ancient and Oriental Church. Their opponents deny that the word "baptize" is exactly and solely equivalent in the New Testament to the word "immerse," dispute the definiteness of the testimony to the forms there referred to, restrict the symbolism to that of cleansing, and deny the whole cogency of the argument that apostolic example is, and was intended to be, binding upon the Church in purely formal matters. See BAPTISTS.

In the primitive Church the ordinary mode of baptism was by immersion, for which purpose *baptisteries* (see BAPTISTERY) began to be erected in the third, perhaps in the second century, and the sexes were usually baptized apart. But baptism was administered to sick persons by sprinkling; although doubts as to the complete efficacy of this *clinic* (sick) baptism were evidently prevalent in the time of Cyprian (middle of the third century). Baptism by sprinkling gradually became more prevalent; but the dispute concerning the mode of baptism became one of the irreconcilable differences between the Eastern and Western churches—the former generally adhering to the practice of immersion, whilst the latter adopted mere pouring of water on the head or sprinkling on the face, which practice has generally prevailed since the thirteenth century, but not universally, for it was the ordinary practice in England before the Reformation to immerse infants, and the *fonts* (see FONT) in the churches were made large enough for this purpose. This continued also to be the practice till the reign of Elizabeth; and the change which then took place is ascribed to the English divines who had sought refuge in Geneva, and other places on the Continent, during the reign of Mary. To this day the rubric of the Church of England requires, that if the godfathers and godmothers "shall certify him that the child may well endure it," the officiating priest "shall dip it in the water discreetly and warily"; and it is only "if they shall certify that the child is weak," that "it shall suffice to pour water upon it," which, however, or sprinkling, is now the ordinary practice.

Baptism was accompanied, from an early period in the history of the Church, with various forms and ceremonies, besides the simple rite of washing with water, and the pronouncing of the formula which declares it to be "in the name of the Father, and of the Son, and of the Holy

Ghost." These ceremonies are almost all retained in the Church of Rome, and also generally in the Oriental churches, but have been generally or almost entirely laid aside by Protestants. The Church of England retains the sign of the Cross made upon the forehead after baptism, but most of the other Protestant churches reject it. It was an ancient custom that the *catechumens*, as candidates for baptism were called while receiving instruction with a view to that sacrament, when they were to be baptized, publicly made a profession of their faith and a renunciation of the devil and all his works. The profession of faith is still retained by Protestant churches as the formal ground of the administration of baptism; the renunciation of the devil and his works is required by the Church of England of the person baptized, if an adult, or of the *sponsors* (q.v.) or "sureties" of a child. Sponsors were early admitted to answer for those who could not answer for themselves, and particularly for infants. The belief in the absolute necessity of baptism to salvation led even to baptism of the dead among the Montanists in Africa, in which sponsorship was also introduced. Presbyterian and Independent churches generally reject all sponsorship, and regard the profession made by parents as simply a profession of their own faith, which entitles their infants to baptism. The ancient practice of exorcism (q.v.) immediately before baptism has been rejected as superstitious by almost all Protestant churches; as have also that of immersing three times (*trine immersion*), or sprinkling three times, with reference to the three persons of the Godhead; that of breathing upon the baptized person, to signify the expulsion of the devil and to symbolize the gift of the Holy Spirit; that of anointing with oil (*chrism*, q.v.) to symbolize the same gift, or to indicate that the baptized person is ready, as a wrestler in the ancient games, to fight the good fight of faith; that of giving him milk and honey, in token of his spiritual youth and of his reception of spiritual gifts and graces; that of putting a little salt into his mouth, to signify the wisdom and taste for heavenly things proper to a Christian; that of touching his nostrils and ears with spittle, to signify that his ears are to be ever open to truth, and that he should ever feel the sweet odor of truth and virtue; and that of clothing him after baptism with a white robe (the *chrysome*), in token of the innocence of soul which by baptism he was supposed to have acquired. The white robe and the anointing with oil were retained in the Church of England for a short time after the Reformation. The giving of a name in baptism, however, is no essential part of the rite, but is a custom apparently derived from that of the Jews in circumcision (Luke i. 59–63). The Church of Rome prefers the use of holy water (q.v.) in baptism, but regards any water as fit for the purpose in case of necessity. Whether baptism may be administered in private has been much debated, both in ancient and modern times. The administration of baptism in private houses, and not in the presence of a congregation, was objected to by the Presbyterians in Scotland, and is discouraged, even while it is allowed, if there is "great cause and necessity," by the Church of England; yet it has become very frequent both in the Church of England and among the Presbyterians of Scotland, and also is not uncommon in the United States.

Although the administration of baptism is properly restricted, under ordinary circumstances, to the regular ministry of the Church, even the most rigid sacerdotal communions, like the Roman Catholic, have always held that in cases of necessity it might be administered by any one—a woman or an unbeliever. The reason of this apparent laxity is the belief in the necessity of the ordinance to salvation. Protestant churches, which do not hold this belief, generally insist upon the participation of the ordained ministry in the ceremony. But all Christians now generally hold the validity of any baptism which is seriously done in the name of the Holy Trinity.

The effect of baptism is taught by the Roman Catholic church to consist in the forgiveness of all sins before baptism and the removal of the guilt of original sin. (See SACRAMENT.) Some Protestant churches teach, or favor, this doctrine of baptismal regeneration. (See REGENERATION.) But the great body of the Reformed Protestant churches teach that baptism is a sign of the necessity of regenerating grace, a pledge upon the part of God to forgive the sins of the penitent, and an act of consecration and dedication upon the part of parents, and of profession of faith on the part of adults. It thus is the sign of something effected rather than the instrument for effecting anything.

Consult: Allen, *Christian Institution* (New York, 1897); article "Baptism," *Encyclopædia of Religion and Ethics* (New York, 1908–11); Harnack, *History of Dogma* (Boston, 1901); Dale, *Classic Baptism* (Philadelphia, 1867), *Judaic Baptism* (1871), *Christic and Patristic Baptism* (1874), and the reply, D. B. Ford, *Studies on the Baptism Question* (Boston, 1879); Hall, *The Services for Holy Baptism, Confirmation and Holy Communion* (London, 1909); Wilkinson, *Baptism, What Saith the Scripture?* 3d ed. (London, 1907).

BAPTISM, INFANT. The New Testament is silent upon this subject. The biblical argument in its favor is confessedly inferential. It is based on the fact that the Old Testament covenant included children with their parents, and infers that the New Testament covenant does the same, and that baptism takes the place of circumcision as the covenant seal. Equally inferential is the argument against it. This starts from the proposition that baptism is a profession of faith (Acts ii. 38), and, since faith is impossible to infants, denies the appropriateness of their baptism. Irenæus in the early Church gives explicit testimony to infant baptism, as does a letter of St. Cyprian and 64 bishops in council assembled. By the time of Tertullian it was evidently in general use.

The development of infant baptism in the Church is closely connected with the development of the idea of the necessity of baptism to salvation. The second century generally ascribed three effects to baptism: forgiveness of all previous sins, communication of the Holy Spirit, and the impartation of a living power carrying immortality with it. The tendency was to ascribe this efficiency to the baptism as an external transaction. Faith was not forgotten, but was left unadjusted to this really inconsistent premise. Hence the argument went unhindered forward to the assertion of baptismal regeneration. But if regeneration was effected by baptism, baptism is necessary to salvation. And hence infants, so many of whom die in infancy, must be baptized if they are to be saved. The entire

Christian Church was soon united upon this reasoning.

Two tendencies were soon marked. The Greek church emphasized more the effect of baptism upon the future, the impartation to the child of the gift of immortality, and the implanting in him of spiritual power. The Latin church looked back rather upon the past, and hence baptism was held to effect the forgiveness of original sin.

The turning point in the history of the subject was made by the teachings of Augustine. While there are two distinct periods in his doctrine, he is steadily more and more influenced by his doctrine of the Church. Membership in the visible Church is viewed by him as necessary to the reception of grace and so to salvation. Therefore baptism, as the door of the Church, is necessary to salvation. It is the sacrament of regeneration. At first Augustine taught that only actual sins were forgiven in baptism, but later he said that the guilt of original sin was also forgiven. Conversion, however, is necessary as well as baptism, and in his earlier treatises there is a degree of liberality in asserting the saving power of the former where the latter was involuntarily omitted. Later the necessity of baptism was more uncompromisingly asserted. Children must therefore be baptized, and in their case regeneration is wrought in baptism by the faith of the whole Church. While unbaptized children do not gain eternal bliss, they suffer no punishment.

At the Reformation the effort was made to extricate the doctrine from the externalism which had become fixed and intensified in the Roman church and to give a due place to the idea of faith. Luther held that faith was wrought in children; Melanchthon, that faith must come later to perfect the sacrament. The Anabaptists, who sought the most radical reform of the Church upon the basis of the New Testament alone, rejected infant baptism as not mentioned in Scripture and inconsistent with the requirement of faith. The same view of the subject arose among the radical element of the English Reformation, the Congregationalists, who divided in Holland upon this issue. Some of them, returning in 1611, formed the first Baptist church in London. (See BAPTISTS.) The large extension of the Baptists in the United States and their constant exposition of their position against infant baptism has led to a considerable neglect of it in denominations that still maintain and generally practice it. The necessity of baptism to salvation is now maintained only by the Roman Catholic church and by the sacramentarian party of the Lutheran and English churches.

Consult the books mentioned under BAPTISM, and the classical work W. Wall, *History of Infant Baptism* (new ed., 2 vols., Oxford, 1862); White, *Why Infants are Baptized* (Philadelphia).

BAPTISM BY HERETICS. See HERETIC BAPTISM.

BAPTIST. See JOHN THE BAPTIST.

BAPTIST CHURCH OF CHRIST. See BAPTISTS.

BAP'TISTERY (Gk. *βαπτιστήριον, baptistērion*, bathing place). A place where baptism is administered. A term used to designate a separate building, or the annex or part of the church used for that purpose, or even the baptismal font. In the Apostolic Age, it is true, converts were usually baptized in the nearest running water, and this remained permissible for a long time—as in Charlemagne's wholesale baptism of the Saxons and in most early missionary work. But as early as the second century Christian ritual required a separate building, provided with a basin or tank for immersion, and attached to an episcopal church, for baptism was connected with the abjuration of error and the hearing of mass. Baptisteries were of a well-defined form; their prototypes are the *frigidarium* in some of the smaller and private Roman baths, as at Pompeii and Stabiæ, which were circular rooms with a *piscina* or *baptisterium* in the centre; this central tank, also called *piscina* by Christian writers, was usually octagonal in form in the baptisteries and entered by a descent of several steps (usually three) from the floor level. The earliest baptisteries preserved are in the Roman Catacombs (q.v.), supplied by natural springs, and these were used during the persecutions; the best known is that of the Catacomb of Pontianus (third century). In the fourth century, beginning with Constantine, many large baptisteries were erected. As they were not allowed except in connection with a cathedral church, and as the rite of baptism was administered ordinarily only at certain seasons—Easter, Pentecost, and Epiphany—the baptisteries had to be so large that several thousand persons might be baptized on each occasion. These baptisteries, usually circular or polygonal in plan, rarely cruciform, were placed close to the church and connected with it, sometimes in front of the atrium, either on its central axis (Parenzo), or to one side (Torcello). The main hall, with the *piscina* or *fons* in its centre, was usually preceded by a closed *portico* (Aquileia, Lateran), where the ceremony of the Confession of Faith took place, and contained an altar, often placed in a special apse, for services to follow the baptism. The baptistery was, therefore, a church. It was commonly dedicated to St. John the Baptist. The baptismal basin itself was surrounded by columns, between which hangings were drawn which concealed from the crowd the actual scene of baptism. Above this central section usually rose a dome of masonry or wood, while around it was often an encircling aisle—sometimes two aisles—to accommodate the crowd. Early writers describe the magnificent decorations and furnishings of the baptisteries. That of St. John Lateran is said to be by Constantine, and is certainly not much later. It is an octagon, with an interior 69 feet wide, divided by eight columns into a centre and an ambulatory which is unique in being surmounted by a gallery. But in more unchanged condition is the contemporary (c.420) baptistery of the cathedral of Ravenna, an octagon inscribed in a square, whose walls and dome are completely covered with a wonderful decoration of mosaics, stuccoes, and marble slabs—one of the most perfect specimens of Early Christian art. Somewhat later the Arian heretics built a smaller baptistery for themselves (c.500) in Ravenna, on a similar plan. Several ruined baptisteries have been found connected with the interesting churches of the ruined cities of Syria, all of them of the fourth, fifth, and sixth centuries. That at Kalat-Seman is unique, not only in its four porticoes and four chambers symmetrically grouped around it, but in being set beside a small baptismal church, of basilical form. Of circular baptisteries, the most important is that at Nocera (fifth century) in southern Italy, measuring 70 feet inner diameter, with a peculiar brick dome supported on 15 pairs of coupled columns and surrounded by a vaulted aisle. The *piscina* at Nocera is unusually well preserved;

it is 20 feet wide and 5 feet deep, with two descending steps, a parapet with marble slabs, and eight surrounding columns for the hangings. The church of Santa Costanza, in Rome, similar to this and by many still regarded as a baptistery, was really the mausoleum of Constantia, the daughter of Constantine. Other interesting early examples are at Aquileia, Derseta and Moudjeleia in Syria, Albenga, Gravedona, and Sant' Aquilino, at Milan. Italy and the Orient alone have such early examples; among them the sixth-century baptistery of Hagia Sophia (St. Sophia) at Constantinople is still extant as an adjunct of the mosque. The period of decline from the seventh to the tenth centuries shows few of any importance. France has two examples at Fréjus and Poitiers. In the eleventh century the revival of architecture in Europe led to the building of superb baptisteries in Italy, but not elsewhere. Every free Italian commune had in its main square the group of three great religious structures—cathedral, tower, baptistery. The three most impressive of these groups are at Parma, Pisa, and Florence; others are at Pistoja, Novara, Cremona, Verona, Lucca, Volterra, and Siena. In the last named, the three are incorporated in one structure, the baptistery being set under the choir, owing to the steepness of the hill on which the cathedral stands. Its façade is one of the most perfect examples of Italian Gothic design. A superb Renaissance font rises from the centre of the octagonal base, which recalls the earlier piscina. Baptisteries of the mediæval period—eleventh, twelfth, and thirteenth centuries—are especially numerous in northern Italy; besides the above, there are others at Almenso, Casale, Monferrato, Bologna (San Stefano), Ascoli, Serravalle, Asti, and many more, while the south is represented only by Ruvo and Bari. Of all these baptisteries, that of Florence is the most noted for its internal decoration in mosaic and for its fine dome, its marble-figured pavement, and its wonderful bronze doors by Andrea Pisano and Ghiberti. That of Pisa contains Niccola Pisano's famous pulpit. The Parma baptistery is entirely filled with contemporary frescoes and sculptures. All three are exquisitely finished on the exterior with different colored marble incrustations, architectural details, and sculptures. In some cases the dome that surmounts the baptistery is allowed to show its outline on the exterior (Pisa); in other cases a straight wall is continued from the base of the dome to a height that entirely conceals it (Parma); or, as at Florence, to an intermediate height, to support a low pyramidal roof. The largest of these mediæval baptisteries far surpass the earlier examples in size and could hold large congregations. Besides such separate structures, there were cases where a part of the church itself was used for baptism, either in the form of a projecting chapel or of one forming a part of the regular plan. Such chapels were usually near the entrance, opening either on the narthex (q.v.) or on the interior. Such is the baptismal chapel opening out of the inner right-hand narthex at St. Mark's, Venice.

Before the Renaissance, however, the change in ritual from immersion to affusion and aspersion only made separate buildings unnecessary. The simpler rite could be performed in the church itself, and all that was required was a large holy-water vase. Renaissance artists executed many exquisite works of this sort during the fifteenth and sixteenth centuries. These works had been preceded by large sculptured immersion basins, as at San Frediano, Lucca, which had succeeded the simpler early tanks. In northern and western Europe no separate baptisteries seem to have been erected during the Middle Ages, except possibly in some of the French monasteries, though of these there are few if any traces extant. The general practice, even as early as the tenth century, was to set up a baptismal font in the north transept or in a chapel, and in England especially many of the mediæval fonts are still extant, often of great beauty. See BAPTISM; FONT; Plate of PISA.

BAPTISTS (Gk. *βαπτίζειν, baptizein*, to dip in water, baptize). A name first given in 1644 to certain congregations of English Separatists, who had recently restored the ancient practice of immersion. These congregations were the first in modern times to maintain that immersion is essential to valid baptism; other bodies had practiced immersion, but without such teaching. The prominence assumed by the doctrine of baptism among the Baptists was due to the opposition of the other English churches to their practice. Immersion was denounced as new-fangled, unnecessary, immodest, dangerous to health, etc. Naturally Baptists retorted that immersion was indispensable. When the continental Anabaptists had practiced immersion, no one had opposed their practice vehemently, and they were not tempted therefore to give special emphasis to its necessity. In general characteristics of doctrine and polity the English Baptists were agreed with the more sober and evangelical groups of Anabaptists and with the Mennonites. They held that loyalty to Christ and His teachings is the supreme duty of Christians; that these teachings are contained in the Scriptures, which are thus the sole and authoritative rule of faith and practice; that the religion of Christ is spiritual, and none can enter the kingdom of heaven, or should enter the Church on earth, unless he has been born anew of the Spirit of God; that only those should be baptized, therefore, who make personal profession of faith in Christ and give credible evidence of regeneration; that a true Christian church is the fellowship of such baptized believers; that each church has Christ as sole Head and Lawgiver; that no secular power should interfere with the spiritual interests of any believer or of any church. These tenets are not accidentally associated, but constitute a logically compact series, each member of which is necessary to the full validity of the rest. All Baptist churches have been and are agreed in holding them, whatever their differences on other points.

From the first there were two main bodies among the English Baptists, distinguished by their adoption of the theology of Arminius or of Calvin. The Arminian or General Baptists originated first. About 1606 a congregation of Separatists at Gainsborough fled to Holland to escape persecution and established themselves at Amsterdam. Their leader, John Smyth, had been a clergyman of the Church of England; now his contact with the followers of Arminius and with the Mennonites led him to the adoption of many new opinions. He became convinced that infant baptism is not warranted by the Scriptures, and he therefore baptized himself, no doubt by affusion. Several of his followers joined him, and a new church was organized, practicing the baptism of believers only. Smyth soon withdrew from the church, but others held to their faith,

and, returning to England in 1611, established the first General Baptist church in London. By 1626 there were 5 such churches in England, and by 1644 they had increased to 47.

The Calvinistic or Particular Baptists sprang from a congregation of Separatists, established in London in 1616. In 1633 some members of this congregation, who opposed the baptism of infants, peaceably separated from the main body, a part of them receiving a new baptism; and soon afterward John Spilsbury became the pastor of this new congregation. In 1640 a further division in the original church occurred by mutual consent, and some of those composing one of the new congregations soon became convinced that immersion is the true scriptural baptism. Knowing none in England who practiced such baptism, they sent one of their number, Richard Blount, to Holland. There was at Rynsburg a Collegiant Church of Mennonites, who had adopted immersion in 1619 (probably having received it from the Polish Anabaptists, who had possibly derived their practice from some of the Swiss Anabaptists). Having been baptized by them, Blount returned to England, and began the administration of the new baptism in 1641. The Spilsbury people seem to have disliked this method, which they considered a vain search after a baptismal "succession," and about the same time adopted the practice of immersion *de novo*. As their pastor pithily remarked, "Where there is a beginning, some must be first." In 1644 seven churches of the Calvinistic order united in a Confession of Faith, being joined also by one French congregation, in which baptism was for the first time defined as "dipping" or "plunging." The General Baptist churches gradually adopted the same practice, though some of them continued the use of affusion as late as 1653.

During the period of the Civil War and the Commonwealth the Baptist churches received a practically full toleration and increased with great rapidity. This was especially true of the Particular Baptists, who were in closest sympathy with the Puritan movement. At the time of the Restoration (1660), the General Baptists claimed to have 20,000 members, whence it may be fairly estimated that there were fully 50,000 Baptists in all at that time. The services of these churches to the cause of English liberty, civil and religious, were heartily recognized. Several of Cromwell's highest officers were Baptists; some of the most popular preachers of the time were of the same faith; others, like John Milton, avowed Baptist sentiments, but never were connected with the churches. A few so far forgot their principles as to accept livings in the Established Church, and were even members of Cromwell's Triers, or commission of visitation for the setting in order of the parishes. The great majority, however, remained faithful to their contention, from the first, that the Church as a spiritual body should be entirely separate from the state, and that complete religious liberty should be given to all, even to Roman Catholics and Jews. It required two centuries for England to approximate the adoption of this Baptist programme. After the Restoration the Baptists were severely persecuted, the Conventicle and Five-Mile acts being strictly enforced against them. The well-known prolonged imprisonment of John Bunyan is the most conspicuous instance. Some proved more pliable than he and by promise of silence obtained their release; some, like Hanserd Knollys, were in prison many times; others, like William Kiffen, enjoyed the royal favor and escaped with comparative immunity. Under these persecutions the Baptists declined in numbers, and the Revolution (1688) found them greatly depleted and discouraged. The Act of Toleration secured them from further persecution, but for a whole century thereafter their progress was very slow. A convention of the Particular Baptists, held in 1689, and representing over 100 churches, published what remained for generations their recognized standard of doctrine and practice. It was in the main a readoption of the Westminster Confession and differed from the Confession of 1644 chiefly in being silent on the question of baptism (immersion) before communion. Until the great Wesleyan revival, in the middle part of the eighteenth century, there was no further progress among the English Baptists. Among the Particular churches a form of hyper-Calvinism was common, which prohibited more than the preaching of the law to the unconverted and discouraged all direct appeals to men to accept Christ as their Saviour. The result was paralysis to most churches, and death to not a few. Among the General Baptists Socinian views made rapid progress, and in the end a large part of their churches became Unitarian. The Wesleyan revival greatly affected the Baptist churches. A more evangelical type of preaching was revived in both wings of the denomination. Under the leadership of Dan Taylor, a converted miner, the New Connection of General Baptists was organized and became a flourishing and influential body. But the most important result of this new quickening of spiritual life was the undertaking of work in foreign missions, under the leadership of William Carey. The English Baptist Missionary Society was organized Oct. 2, 1792, and the following year Carey was able to begin his labors in India. At his death, in 1834, not only had many converts been made, but versions of the Scriptures had been issued under his supervision in 40 different dialects, spoken by one-third of the people in the world; and 212,000 copies of these versions had been printed. The great increase of the modern missionary cause is directly traceable to the work of Carey and the English Baptists. The reflex influence of this missionary enterprise upon the English Baptists themselves is equally remarkable. More than 100 new churches were organized in the last two decades of the eighteenth century—nearly equaling the increase of the entire century preceding this time—while in the first half of the nineteenth century 700 new churches were constituted. The most important step in the unification of the English Baptists was the formation of the Baptist Union in 1832. Into this all the various societies for missionary and educational purposes have been merged; and, finally, in 1891, the long-separated General and Particular Baptists became one body. Of the men whom these churches have produced during the last 100 years three stand forth preëminent: Andrew Fuller (1754–1815), Robert Hall (1764–1831), and Charles Haddon Spurgeon (1834–92).

The first Baptist church in Wales of which record remains was formed at or near Swansea in 1649. The growth of Baptists in that principality was greatly promoted by the labors of Vavasor Powell, who was baptized about 1655 and thereafter preached throughout the land, establishing 22 churches, some of which had

several hundred members. The progress of Baptist churches in Wales was steady but slow until 1800. Of the 855 Welsh churches now in existence, 640 were founded in the nineteenth century. Until lately these churches have belonged to the strict communion wing; in recent years some of the city and town churches have adopted "open" principles.

The first Baptist church in Scotland was founded in Caithness in 1750, but progress was very slow until Archibald McLean and the Haldane brothers began their work as evangelists—the first quarter of the last century. Scotland is naturally Presbyterian, and the growth of Baptist churches has been very slow—an average of 10 to the decade for the last 100 years. Ireland has also been an unpromising field. The oldest church dates from 1653. Two-thirds of the existing churches have been established since 1850.

Baptists in America. There were among the early colonists those who held Baptist views, but the first church established was at Providence, R. I. Roger Williams, a minister of the Church of England, but an advanced Puritan, on coming to the Colony of Massachusetts, became almost at once a disturbing element there, by his advocacy of notions that the authorities of that Colony were not disposed to tolerate. He was condemned to banishment, Oct. 8, 1635, and, to escape being deported to England, made his way through the wilderness in midwinter, bought land of the Narragansett Indians, and founded the Colony of Providence, on the principle of complete civil and religious liberty. His study of the Scriptures convinced him that only believers are fit subjects of baptism, and others of the little Colony had come by March, 1639, to hold similar opinions. No minister being within call, this little band of 12 believers decided to originate baptism; one of their number, Ezekiel Holliman, baptized Williams, and he baptized the rest. In the following year, probably, another Baptist church was formed in the neighboring Colony of Newport. A company of Welsh Baptists emigrated in 1665 and established themselves in the Colony of Massachusetts, settling after some vicissitudes at Rehoboth in 1667. A Baptist church was formed in Boston in 1655, and in spite of severe persecutions succeeded in maintaining itself there. Until 1691 the Baptists of Massachusetts experienced repeated and severe persecutions—fines and imprisonments and whippings—and it was not until 1833 that they ceased to be taxed for the support of a State church. Up to the Great Awakening (1750) there were but eight Baptist churches in this region.

A group of churches, established a little later than these in the New England region, became the most influential centre for the propagation of Baptist ideas. In 1688 a Baptist church was formed at Pennepek, or lower Dublin, now a part of Philadelphia, and in the same year another church was organized at Middletown, N. J. Twelve such churches were in existence by 1770. The constituent members of these churches were English and Welsh Baptists, of the Calvinistic wing, and the establishment of the Philadelphia Association in 1707 made them the most compact and influential body of Baptists in America. Most of the churches of New York Colony, as they were constituted from 1712 onward, sought admission to this association, which also contained members in Virginia and the Carolinas, as far south as Charleston. The adoption of a Confession before 1742, ever since known as the Philadelphia Confession, furnished a standard of doctrine that has endured to the present day and multiplied the influence of this association.

From these two centres the extension of Baptist churches slowly proceeded until the Great Awakening, when new life and vigor was infused into the movement, and the progress of Baptists in all the Colonies became relatively rapid. This progress was not seriously checked even by the Revolution, save in certain localities. There were probably no more than 10,000 members in the Baptist churches existing at the outbreak of that struggle; but a careful estimate made in 1792 (an enumeration, in large part) put the number of members at 35,000, and at the close of the century the Philadelphia Association stated the number at 100,000, distributed among 1200 churches. The great westward movement of the population after the Revolution was the opportunity of the Baptists, and they promptly improved it. The churches and associations on the borders of the new country sent missionary preachers into the new settlements, and gradually local societies were formed for this work. This led to the organization of State missionary conventions, and in 1832 to the formation of a national organization, the American Baptist Home Mission Society, which now sustains over 1500 workers at a cost of more than half a million dollars a year. In 1813 a society for foreign missions was formed, called "The General Convention of the Baptist Denomination in the United States," which continued to be the general agent of the churches for this work until 1845, when differences between the Northern and Southern churches concerning slavery produced a division. The Southern churches formed "The Southern Baptist Convention," with separate home and foreign missionary boards and Sunday-school board; while the Northern churches organized "The American Baptist Missionary Union." The American Baptist Publication Society began merely as a tract society in 1824, but since 1840 has become a great denominational publishing agency.

The most important event in the recent history of Baptists was the unification of three separate interests through the formation in 1907 of the Northern Baptist Convention, a strictly delegated body from the churches, which elects the officers and executive boards of the various societies, receives and acts upon their reports, and prepares a national budget of missionary operations, which is apportioned to the various States and by their conventions is apportioned to the churches. This increases both the control of the churches over their missionary operations, and their responsibility for the maintenance of the work.

The progress of American Baptists during the nineteenth century was very rapid, in spite of many controversies and schisms that divided their forces and lessened their numbers. The most serious of these schisms was that resulting in the establishment of the Disciples as a separate body, beginning about 1815 among the churches of western Pennsylvania and Ohio. This controversy extended throughout the region of the Central West and had disastrous effects. Less serious was the division among the Eastern and Southern churches from 1835 onward on the issue whether missionary societies, Sunday schools, and other similar agencies for Christian work are authorized by the Scriptures. The es-

tablishment of the Old School or Primitive Baptists was the result. The educational work of Baptists was begun in the academy at Hopewell, N. J., in 1756, and was suspended during the Revolution. The Philadelphia Association brought about the chartering of Brown University (as Rhode Island College) in 1764. Waterville (now Colby) College was founded in Maine in 1818, and a literary and theological institution (now Colgate University) at Hamilton, N. Y., in 1820. From this time on, colleges and seminaries multiplied, not infrequently in excess of denomination needs or ability to support them, until, in 1912, the Baptists had 10 theological schools, 97 schools of collegiate grade, and 91 academies, with property valued at over $82,000,000, of which nearly half is productive. See also NORTHERN BAPTISTS and SOUTHERN BAPTISTS.

Baptist Theological Seminaries. In the order of their foundation these are as follows: 1. Hamilton, established at Hamilton, N. Y., in 1820, by the Baptist Education Society of the State of New York, as "The Hamilton Literary and Theological Institution." In 1846 the literary department was chartered as Madison University (since 1889 Colgate), and in 1893 the university took control of the seminary. 2. Newton Theological Institution, established at Newton Centre, Mass., in 1825, by the Massachusetts Baptist Education Society. 3. Rochester, established at Rochester, N. Y., in 1850, by the New York Baptist Union for Ministerial Education. A German department was added in 1852. 4. Southern, established at Greenville, S. C., in 1859; interrupted by the Civil War, the sessions were resumed in 1865, and in 1877 it was removed to Louisville, Ky. 5. The Divinity School of the University of Chicago, established in Chicago in 1867 by the Baptist Theological Union for the Northwest, as the "Baptist Union Theological Seminary"; in 1877 removed to Morgan Park, and in 1890 returned to Chicago and consolidated with the new university. In 1873 a Scandinavian department was added. 6. Richmond, established in 1867 at Richmond, Va., by the American Baptist Home Ministry for the education of negro young men (now a part of Virginia Union University). 7. Crozer, established at Upland, Pa., in 1868, by the family of John P. Crozer. 8. Kansas City, established at Kansas City, Kans., in 1901. 9. Southwestern, established at Waco, Tex., in 1901 as a part of Baylor University, but since removed to Fort Worth, Tex. 10. Pacific Coast, established at Berkeley, Cal., in 1905.

The Baptist Church in Other Countries. The earliest Baptist churches in the *Canadian* provinces were formed of settlers from New England. A church was founded at Horton, Nova Scotia, in 1763; but this and many of the earlier churches were of mixed membership, composed equally of Baptists and Congregationalists. The preaching of Henry Alleine, an evangelist of great gifts, resulted in the founding of many churches from 1775 onward. Baptist preachers from Vermont began soon after the Revolution to make converts and form churches across the line; and in a similar way churches sprang up along the shore of Lake Ontario, in Upper Canada. A considerable number of Scottish immigrants settled in the Ottawa region, and the churches there trace their origin to the labors of the Haldane brothers. The first association was formed in 1800 by the churches of Nova Scotia and New Brunswick, and a missionary society was formed as early as 1815 in the same region. In 1846 the societies of this region were consolidated into "The Baptist Convention of the Maritime Provinces." In the other provinces a like consolidation was effected in 1888 by the formation of the "Baptist Convention of Ontario and Quebec." Five boards conduct the various branches of work that were formerly conducted by as many different societies. In proportion to their number and means Canadian Baptists have also been active in educational work. Acadia College was founded in 1838, and Woodstock College in 1857. Toronto Baptist College was founded in 1881, was affiliated with the University of Toronto in 1885, and was chartered as McMaster University in 1887, Moulton College, for young women, having been previously affiliated.

The Baptists in *France* owe their origin to a mission established in that country in 1832 by the Triennial Convention of American Baptists. Progress was slow for many years, owing to persecutions and other difficulties; but in later years growth has been steady and sure. The establishment of a theological school in 1879, by the aid of their American brethren, did much to promote the welfare of French Baptists, but it has proved impracticable to maintain it. For many years the work has been left wholly to native preachers.

The founder of the *German* Baptist churches, Johann Gerhard Oncken, had come by study of the Scriptures to such views of doctrine and practice as are everywhere held by Baptists, without any knowledge on his part that there were such people in existence. In 1834 he and six others were baptized at Hamburg by Rev. Barnas Sears, an American Baptist then pursuing studies in Germany, and so the first German Baptist church was established. In spite of severe persecutions the progress of this work was rapid almost from the first and has gone on with ever-accelerating momentum. A publishing house was started in 1828, and a theological school was opened in 1880; both have been and are flourishing institutions. In 1849 the associations previously existing were combined to form the "German Baptist Union," which, not content with fostering the work at home, has been an active missionary body. Germans have preached and gathered converts in Denmark, Finland, Poland, Holland, Switzerland, Russia, Hungary, Bulgaria, and Africa, until the numbers in these missionary churches equal those in Germany itself.

The work of Baptists was begun in *Sweden* by two sailors, natives of that country—Gustaf W. Schroeder, who was baptized in New York in 1844, and Frederick O. Nilsson, baptized at Hamburg by Oncken in 1847. Andreas Wiberg was a worthy third in this field. Opposition by the state church and repeated fines and imprisonments did not deter these preachers from carrying on their work, and the progress of the Baptist churches was rapid. The numerical results would be much larger but for the fact that a good proportion of the converts made have emigrated to the United States. A theological school established in 1866 has done much to further the work of the Swedish Baptists. From Sweden the work has extended into *Norway* also.

With one exception the Baptist churches of

Africa are of missionary origin. The Baptists of the Cape colonies owe their beginnings to English Baptist immigrants, and their earliest church was formed in 1820. For another half-century their progress was very slow; but the last two decades have seen a great advance, 18 of their 25 churches having been constituted since 1880. A missionary society sustains 4 mission stations among the natives, and a Baptist Union, formed in 1877, promotes the interests of all the churches. Mission work is carried on also by the American Baptist Missionary Union, the Baptist Missionary Society of England, the Southern Baptist Convention, and the German Baptists; and 125 churches have been established, with 14,786 members.

The Baptists in *Asia* are wholly of missionary origin. The oldest mission is that begun by Carey and the English Baptists in India proper, and since extended to Ceylon. The Australian Baptists have joined in this work, and have taken Eastern Bengal as their especial field. American and Canadian Baptists maintain missions in southern India, among the Telugu people. The oldest American mission, however, is that in Burma, and gradually the work has been extended to Assam, Siam, China, and Japan. The Southern Baptists have a mission also in western China. The Asiatic missions of the various Baptist societies have been the most fruitful in the history of modern missions.

The last century has produced considerable change in the doctrines and practices of Baptists, but most of these are such as they have shared with all other bodies. They are no longer rigid Calvinists, though the general type of theology is distinctly Calvinistic. Strict communion is yet the prevalent theory among them, but there is little enforcement of it in practice, except in the Southern States, though there is also little direct encouragement of "open" communion. Baptist churches have never had a heresy trial, and for more than 50 years a schism has been unknown among them. In polity they are Congregational.

Baptists began the twentieth century with over 5,000,000 communicants, including only what are sometimes called the "regular" Baptists. The membership in 1912 was distributed as follows: In the United States, 5,529,573; in Canada, 132,261; in the Latin-American countries, 11,113; in Great Britain, 416,377; in Europe, 166,310; in Asia, 163,278; in Africa, 10,176; in Australasia, 28,611. Altogether they number about 6,516,000. Increase during the years 1905–13 throughout the States was about 1,000,000.

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Baptist Church of Christ. A denomination that originated in Tennessee, where the oldest congregations were formed about 1808. They have spread to six other States, all of them in the South. Their belief is a modified Calvinism, which makes room for a general atonement; they practice feet-washing as a religious ordinance. The census report for 1906 gave them 93 churches and 6416 members.

Baptists, Freewill, correspond in doctrine and practice to the General Baptists of England, but originated in this country. There are two distinct bodies known by this name. The older arose in North Carolina and formed an association in 1729. Some of these afterward joined the regular Calvinistic churches of the region, and those who remained true to their first principles were popularly called "Freewillers." This nickname was finally accepted by them; but later, to distinguish themselves from others, they took the name "Original Freewill Baptists." They differ from the regular Baptist bodies mainly in practicing feet washing and anointing the sick with oil. In 1912 they had 834 churches and 57,231 members.

The better-known body arose in New Hampshire. Benjamin Randall, a convert of the Whitefield revival, was practically though not formally excluded from fellowship because he did not believe and preach the doctrine of election. A church believing in free grace was organized in New Durham, N. H., in 1780, and Randall was ordained to the ministry. The strength of the denomination has from the first been in New England, but it has made considerable progress in the Central West. In 1827 a general conference was formed, at first meeting biennially, but of late years triennially. In 1841 the Free Communion Baptists (a body that originated among the Separates, or churches that sprang up as a result of the Whitefield revivals) united with them. The Freewill Baptists bore emphatic testimony against slavery, especially in 1845, and declined overtures for union with certain Baptists of Kentucky, because the latter defended slavery. The Foreign Mission Society of the denomination was organized in 1833, and a home mission society in 1834. They sustain a college at Lewiston, Me.; Hillsdale College, Mich.; theological seminaries at Lewiston, Me., and Hillsdale, Mich., and several academies. The official name was changed some years ago to

Free Baptists, and the older name is going out of use. In 1906 the Free Baptists of the Maritime Provinces united with the other Baptists in a "United Baptist Convention." In 1910 the Free Baptists and regular Baptists of the United States arranged for the union and consolidation of their missionary societies, leaving further union to the local churches. The Free churches are still separately enumerated, to the number of 1110 in 1912, with 65,440 members. Consult Stewart, *History of the Freewill Baptists* (Dover, N. H., 1862); J. J. Butler, *Christian Theology* (1861).

Baptists, Old School or Primitive, also known as Anti-Mission, and popularly called "Hardshell." A denomination whose members claim to be the original Baptists, from whose principles and practices all others have departed. In fact, this body originated about 1835 in an organized opposition to missionary societies, Sunday schools, etc. This opposition really grew out of the hyper-Calvinistic theology held by some of the Baptist churches, and these human societies were held by them to make the salvation of men depend rather upon human effort than on divine grace. They do not believe in a paid or educated ministry and sustain no colleges or theological seminaries. They were at one time quite numerous in the Middle States, but are now strongest in the mountain districts of North Carolina, Tennessee, and Georgia. It is difficult to say whether they are increasing or diminishing, since adequate statistical information is not to be had. In 1912, according to the official reports, there were 2922 churches and 102,311 members.

Baptists, Seventh-Day, are distinguished from others mainly by their observance of the seventh day as the Christian day of worship. They hold that the literal observance of the Fourth Commandment has never lost its obligation. Their first church was founded in the Mill Yard, London, in 1676, by Rev. Francis Bampfield, a graduate of Oxford, and prebendary of Exeter Cathedral. This church still survives, but others founded in the seventeenth and eighteenth centuries have become extinct. The first American church was founded by Stephen Mumford, at Newport, R. I., in 1671. In this country they have increased steadily though not rapidly, and are active in propaganda. In 1842 they formed a foreign missionary society, and they support a tract and publishing house at Plainfield, N. J. They have a college at Alfred, N. Y., and another at Milton, Wis., besides a college at Salem, W. Va. For 1913 they report 83 churches and 8113 members, distributed through 24 States.

Consult C. F. Randolph, *Seventh-Day Baptists in Europe and America: A Series of Historical Papers* (2 vols., Plainfield, N. J., 1910), which in its wide scope includes a condensation of the findings of Sachse, whose books (Philadelphia, 1895–99) are the authoritative works on German Seventh-Day Baptists in America. See also the *Seventh-Day Baptist Year Book* (Plainfield, N. J., 1913) for statistics and other information regarding this denomination.

Baptists, German Seventh-Day. A body confined to Pennsylvania, where it originated. The first church was founded at Germantown in 1728 by Conrad Beissel and was an offshoot of the Dunkards. Under the leadership of the founder they established a colony at Ephrata, near Lancaster, where they lived a very austere community life. They spread to several of the adjacent counties, and there are now six congregations of this order. For the early history, see the *Chronicon Ephratense.*

Baptists, Six-Principle, originated as a separate body in 1690, when five London churches, dissatisfied with the Baptist Confession of the previous year, met and formed an assembly of their own, on the basis of the six principles enumerated in Heb. vi. 1–2: repentance, faith, baptism, laying on of hands, the resurrection of the dead, eternal life. In fact, they differed only on the question of laying hands immediately on all baptized persons. They were composed of both Calvinistic and Arminian Baptists, but the former withdrew after a time, and the remainder became absorbed into the General Baptists. Six-Principle Baptists existed in Rhode Island from the foundation of the first Baptist church in Providence, some of the founders having been of that persuasion. This church was divided on the issue in question in the year 1653, and the Calvinistic half became extinct. In the year 1771 the surviving Six-Principle wing, which until then had been Arminian in belief, was persuaded by Rev. James Manning, then its pastor as well as the president of Rhode Island College, to adopt a Calvinistic Confession. The churches of this order are entirely confined to New England, and they are gradually becoming extinct. In 1913 the denomination reported 16 churches, 10 ministers, and 731 communicants.

Baptists, United. The name taken on their union by Baptist churches in the South once known as "Old Lights," and "Separates" or "New Lights." The divison arose in consequence of the Whitefield revival and was common to several denominations in the seaboard States. Most of the United Baptists came into full fellowship with other (regular) Baptists, with or without dropping the name; but in five Southern States they still maintain not only the name, but a separate organization. They had, in 1912, 196 churches and 13,698 members.

Baptists, Two-Seed-in-the-Spirit, a small body, extremely Calvinistic, owing their rise to certain theological vagaries of Elder Daniel Parker, a Baptist preacher of Tennessee from 1806 to 1836. It was sought to explain the doctrine of election by speculation of a Manichæan nature, the gist of which was that some of Eve's offspring were the seed of God and so elect to eternal life; while some, corrupted by Satan, were his seed and foreordained to the kingdom of eternal darkness. They incline toward Antinomianism, object to a paid ministry, and agree with the Primitive Baptists in reprobating "modern institutions." Their strength is in Kentucky, Arkansas, and Texas, though they are found also in 21 other States. In 1890 they had 473 churches and 12,851 members.

BAPTIST YOUNG PEO'PLE'S UN'ION OF AMER'ICA. A society organized in Chicago in 1891. It has its headquarters in Chicago and publishes a monthly magazine, *Service.* It has a large membership throughout the United States and Canada. Consult Bacon and Northrop, *Young People's Societies* (New York, 1900).

BAR. A town in the government of Podolia, Russia, on a tributary of the Bug, 106 miles northeast of Kamenetz-Podolsk. Brick making, leather dressing, and distilling are some of its

most important industries, and a trade in grain is carried on. Eleven fairs are held annually. Pop., 1885, 13,434; 1897, 10,614. The "Confederacy of Bar," under the leadership of Krasinski and Pulaski, was formed here, Feb. 9, 1768, with the object of maintaining the independence of Poland and checking the growth of Russian influence.

BAR. In heraldry (q.v.), one of the charges known as *ordinaries*.

BAR. In hydrography, a bank or shoal formed by the deposition of sand and silt from water. Bars frequently occur at the mouth of a river where the outflowing water with suspended mud is checked in its motion by the sea, the coarser material thus having a chance to sink to the bottom. The sand along the bank of a river, carried to its mouth by the wind and the water, and the sand that is carried inward from the sea by the tidal waves, also contribute to the formation of bars. When the river cuts its way through the obstructing mass at its mouth, a delta may be formed. The decreased velocity of current in portions of a river channel gives rise to bars, which are subject to removals and rebuildings and are capable of causing continual shifting of the river channels. The Mississippi in America, the lower course of the Rhine in Europe, and the Hoang-ho in China present excellent examples of this phenomenon. Bars also form along seacoasts that are swept by tidal currents wherever there is sufficient decrease of velocity to allow a deposition of silt. They occur here as barriers, often of considerable extent, which are separated from the shore by lagoons of salt or brackish water. See HARBOR; DELTA; JETTY; RIVER.

BAR. In law, a term originally applied to the rail which separated the court officials from the suitors, their advocates and friends. When an action was brought to trial, the suitors presented themselves at the bar, accompanied by their advocates, who addressed the court from that position. Hence the secondary signification of the term, as denoting those whose profession it is to appear at the bar on behalf of suitors. The advocates or counsel attached to a certain judicial circuit or practicing their profession in a certain county or State are known collectively as the bar of such circuit, county, or State. The term is also employed in a looser sense to designate all the lawyers of a country, as "the American bar," "the English bar," etc. From the word, in this sense, comes "barrister" (q.v.). See also ADVOCATE; ATTORNEY.

Bar, Plea in. A plea or defense, which, if supported by evidence, forms a conclusive answer to an action, such as a traverse, or denial, of all the allegations upon which a civil action or criminal prosecution is based. See PLEA.

Bar, Trial at. Formerly a trial before all of the judges of a superior court in England, a practice long since discontinued.

Bar Associations are voluntary organizations or unions of lawyers, having for their primary object the elevation of the bar. Some of them are local and, to an extent, coöperative. Such is the Association of the Bar of the City of New York. Its active membership is limited to lawyers residing or practicing in the city of New York, and it maintains a fine law library and building for the use of its members. It was established, however, not simply as a social club, nor as a library association, but "to maintain the honor and dignity of the profession of the law and to increase its usefulness in promoting the due administration of justice." There are also State bar associations, whose membership is limited to the lawyers of a particular State. On the other hand, to the American Bar Association any person is eligible who has been a member in good standing of the bar of any State for five years. See BAR ASSOCIATION, AMERICAN.

Bar Council. A body of elected barristers (q.v.) supported by the four Inns of Court (q.v.) as the voluntary representatives of the entire English bar, charged with the duty of dealing with all matters affecting the profession. They have no disciplinary authority, but they exercise a strong moral influence as guardians of professional etiquette and, in connection with the Attorney-General and benchers of the Four Inns, may secure the punishment of barristers who are guilty of misconduct.

BAR. In music, a vertical line drawn across the stave to divide a musical composition into portions of equal duration and to indicate the accent, which usually falls on the first note. Each of these small portions, called *Measures*, is also popularly termed a bar. The use of the bar dates from the fifteenth century. A double bar formed of two parallel vertical lines is always placed at the end of a composition or of a section thereof. Sometimes at the close of a section it is accompanied by dots, showing that a certain portion is to be played again. See MUSICAL NOTATION.

BAR, KARL LUDWIG VON (1836–1913). A German jurist, born at Hanover and educated at the universities of Göttingen and Berlin. He was professor at various times at Rostock, Breslau, and Göttingen. Both as a member of the Reichstag (1890–93) and in his capacity of jurist, he strongly advocated the introduction of publicity and of more humane procedure in criminal cases. He was made president of the Institute of International Law. His important works are: *Das internationale Privat- und Strafrecht* (1862; 2d ed., 2 vols., 1889, under the title *Theorie und Praxis des internationalen Privatrechts*); *Die Redefreiheit der Mitglieder gesetzgebender Versammlungen* (1868); *Die Lehre vom Kausalzusammenhang im Rechte* (1871); *Das deutsche Reichsgericht* (1875); *Staat und katholische Kirche in Preussen* (1883).

BARA, bä'rà, JULES (1835–1900). A Belgian statesman. He was born at Tournay and pursued the study of law in his native town, showing remarkable intellectual gifts and a fine power of oratory. Shortly after he had begun the practice of his profession he was summoned to be professor of law at the University of Brussels and presently established his reputation by a treatise on the relations of church and state, the *Essai sur les rapports de l'état et des religions au point de vue constitutionnel* (1859). He was chosen to the House of Deputies from Tournay in 1862 and affiliated himself with the Liberal party, then under the leadership of Frère-Orban. In the fierce conflicts between Liberals and Catholics Bara speedily obtained a reputation as one of the most effective debaters in the Chamber, and, upon the resignation of Tesch as Minister of Justice in 1865, he was appointed by the King to that position. In line with his extremely Liberal tendencies he attempted, in 1868, to bring about the abolition of capital punishment, but failed because of a

powerful opposition in the Senate: in the following year, however, he succeeded in effecting the abolition of imprisonment for debt. After the fall of the Frère-Orban cabinet in 1870 Bara reëntered the Chamber of Deputies and by his great power of invective caused the resignation of the Clerical Ministry of D'Anethau in 1871 and helped to overthrow the Ministry of Malou in 1878. This was followed by the accession of the Liberals to power, and Bara became once more Minister of Justice under Frère-Orban, resigning in 1884 after the overwhelming defeat of the Liberals at the polls. From 1884 to 1894 he was leader of the Opposition in the Lower Chamber, but in the latter year failed of reëlection, entering the Senate soon afterward. He died at Brussels, June 26, 1900.

BARABA-TATARE, bä'rä-bä-tä'tä-rä. A steppe in the governments of Tomsk and Tobolsk, West Siberia, between the rivers Irtish and Ob (Map: Asia, G 3). It is a large stretch of low, flat, stoneless land, covered by salt lakes and marshes and traversed by a number of rivers. The lakes all appear to be in process of desiccation, which supports the opinion that the steppe was once the bed of a large lake. The soil is generally fertile, with extensive forests in the north, but the climate is unhealthful. The first Russian settlements were established about 1730.

BARAB'AS. The principal character in Marlowe's tragedy, *The Jew of Malta,* a monstrous creature who delighted in slaying others. He poisons nunneries and devises instruments of torture and death. By accident he himself meets the terrible death plotted for a victim. Shakespeare's Shylock is a humanized copy of the character. The rôle was created by Edward Alleyn (q.v.).

BARAB'BAS. The name of a prisoner whom Pilate released at the Passover when he condemned Jesus to death. It is the Greek form of *Bar abba,* 'son of the father,' or 'son of the master.' The oldest witnesses as to the text in Matt. xxvii. 16 f. read Jesus before Barabbas, and it is therefore probable that his proper name was Jesus—'son of the rabbi' being added as a distinction. Mark seems to have derived from an earlier source the information that he had been arrested as participant in an insurrection (xv. 6–15). His release may have been particularly gratifying to the people because he was the son of a rabbi. On the text consult especially Adelbert Merx, *Das Evangelium Matthieus,* pp. 400 ff. (c.1902).

BARABOO, bâr'ä-bōō. A city and the county-seat of Sauk Co., Wis., 37 miles, by rail, northwest of the State capital, Madison; on the Baraboo River, and on the Chicago and Northwestern Railroad (Map: Wisconsin, D 5). It has a beautiful location, at an elevation of over 1000 feet, in a picturesque region, and is but 3 miles north of Devil's Lake. Two circuses make their winter headquarters here, and there are a historical museum and a library. The city is an important fruit market and has linen and woolen mills, a canning factory, iron mines, railroad shops, and creameries. Manufacturing interests are promoted by good water power. Settled in 1839, Baraboo was incorporated in 1882 and is governed by a mayor, elected biennially, and a municipal council. The water works are owned by the city. Pop., 1900, 5751; 1910, 6324.

BARABRA, bä-rä'brä, or **BER'BERINE** (Ar.). A mixed ethnic group, Nubian, Egyptian, and Arab, living on the middle Nile, between the First and the Fourth Cataract. Cephalic index, 76. The Dongolese belong to this group.

BARACOA, bä'rä-kō'ä. A seaport town in the province of Santiago de Cuba, on the northeast coast of Cuba, about 90 miles east by north of the city of Santiago (Map: Cuba, L 6). It has a landlocked harbor and exports cocoa, bananas, and other tropical fruits. The industries include the making of oil from the coconut and the manufacture of chocolate. The first settlement of white men on the island of Cuba was made at Baracoa by Velasquez, or Don Diego Columbus, in 1511. This town was the capital of Cuba from 1518 to 1522. Near here Maceo and his handful of followers inaugurated, in February, 1895, the revolution which terminated in Cuban independence. Pop., 1899, 4937; 1907, 5633.

BARADA, bä-rä'dä. Supposed to be the Abana of the Bible, and called Chrysorrhoas by the Greeks. A river of Syria, which rises in Antilibanus and, flowing southeastward, passes through Damascus, where it is divided into several branches and empties into the marshy Meadow Lakes, 18 miles east of the city (Map: Palestine, E 1). Its waters are used extensively for the irrigation of the gardens of Damascus.

BARADAS, bä'rä'dä', COUNT. A character in Bulwer's *Richelieu,* who conspires against the Cardinal. He is a favorite of Louis XIII, whom he also desires to slay. His plot to place the Duke of Orleans on the throne is discovered just as he is raised to the position of Prime Minister.

BARAGA, bär'ä-gä, FRIEDRICH (1797–1868). An Austrian Roman Catholic bishop and missionary. He was born in Carniola, Austria; came to this country in 1830, and spent the remainder of his life in the Chippewa and Ottawa missions in Michigan, becoming first Bishop of Marquette. He prepared a Chippewa grammar (1851) and dictionary (1851–53) and also wrote in Slovenian a work on the *History, Character, Manners, and Habits of the North American Indians* (1837), later translated into French and German, *Dušna Taśa,* a Slovenian prayer book, the tenth edition of which (1905) reached 84,000 copies.

BARAGUAY D'HILLIERS, bä'rä'gä'dē'yā', ACHILLE (1795–1878). A French general, the son of Louis Baraguay d'Hilliers. He was born in Paris, entered the army, and was wounded at the battle of Leipzig, 1813. He served in Spain in 1823, obtained in 1832 the appointment of lieutenant governor in the military school of St. Cyr, where he suppressed a republican conspiracy, and made a number of campaigns in Algeria. After the Revolution of February, 1848, he was chosen a member of the National Assembly, in which he joined the party of reaction. In the beginning of November, 1849, he went to Rome as commander in chief of the French army sent to sustain the authority of the Pope. He returned in 1850 and in January, 1851, obtained the command of the Army of Paris, in the place of Changarnier. Baraguay d'Hilliers concurred in the policy of the coup d'état of December, 1851, and was made a member of the Consultative Commission. During the Crimean War he received the command of the French Expeditionary Corps of the Baltic and coöperated with the British fleet in the capture of Bomarsund. He was afterward made a marshal of France and took part in the Italian

War of 1859, distinguishing himself at Solferino. In 1871 he was made president of the court appointed to investigate the conduct of the generals who had surrendered fortresses during the war with Prussia.

BARAGUAY D'HILLIERS, Louis (1764–1813). A distinguished general of the French Empire. He was born in Paris and, after serving under Custine and Menou, received an appointment in the Army of Italy from Napoleon, serving in the campaigns of 1796–97. He was made a general of division and, after the preliminaries of Leoben, April 18, 1797, became commandant of Venice. He accompanied the expedition to Egypt and headed a division in the Russian campaign of 1812, but on the retreat he incurred the displeasure of Napoleon. He was sent as Governor to Berlin, where he died soon afterward.

BARANOFF, bȧ-rä′nôf, Alexander Andreyevitch (1746–1819). The first Governor of Russian America. In 1796 he established a colony on Bering Strait; in 1799 took possession of the largest of the Sitka Islands (now Baranof Island, see below), began trade with the natives, and subsequently extended his operations to Canton, the Hawaiian Islands, Boston, New York, and other distant places. He founded a small colony in California, near the present San Francisco, but this was soon abandoned. He died at sea near Java, while on his return to Russia.

BARANOF (bȧ-rä′nôf) **ISLAND.** The most important island of the Alexander Archipelago, off the southwest coast of Alaska (Map: Alaska, N 7). It is about 100 miles long and 25 miles broad in its widest part. Sitka (pop., Sitkan District, 1910, 2210), once the capital of the Territory, is on the northwest coast of the island.

BARANTE, bȧ′rȧnt′, Amable Guillaume Prosper Brugière, Baron de (1782–1866). A French statesman and historian. While yet young, he was employed in political missions in Germany, Poland, and Spain, and was prefect at Nantes at the time of Napoleon's return from Elba, when he at once resigned. On the Second Restoration he was made Councilor of State and Secretary-General to the Minister of the Interior and was elected to the Chamber of Deputies. In 1819 he was made a peer of France and took an active part in the debates of the Chamber. After the Revolution of 1830 he was sent as Ambassador to Turin and in 1835 filled the same position at St. Petersburg. He supported Louis Philippe and retired from public life on the fall of the monarchy in 1848. His great work is the *Histoire des ducs de Bourgogne* (1824; 8th ed. 1858), which procured for him membership in the Academy. Among his other works are *Histoire de la Convention nationale* (6 vols., 1851–53), *Histoire du Directoire* (1855), *Etudes historiques et biographiques* (1857), and *Etudes littéraires et historiques* (1858). Consult *Souvenirs du baron de Barante,* edited by his grandson (Paris, 1890–99).

BARASINGHA, bär′ȧ-siŋ′gȧ. A swamp deer (*Cervus duvauceli*) of northern India—a native name adopted by sportsmen. See Swamp Deer.

BAR ASSOCIATION, American. An organization which includes in its membership nearly all the leading lawyers of the United States. It is composed of the State Bar Associations and was founded in 1878. The object of this organization is declared in its constitution to be "to advance the science of jurisprudence, promote the administration of justice and uniformity of legislation throughout the Union, uphold the honor of the profession of the law, and encourage cordial intercourse among the members of the American Bar." Annual meetings are held in different cities for the purpose of discussing matters of interest to the profession. Committees of the association have been engaged for several years in the study of methods for the reform of judicial procedure, uniform divorce laws, and other reforms affecting the legal profession. The annual meeting held in August, 1913, at Montreal had for its chief guest Viscount Haldane, the British Lord Chancellor. At this meeting William H. Taft was elected president. The association has a membership of over 5000 and is exercising a powerful influence in many ways. It has done much to elevate the standard of legal education and to promote uniformity in State legislation upon various subjects.

BARATARIA, bä′rȧ-tȧ-rē′ȧ. A name, signifying 'deception,' given to an island which appears in fairy tales. In Cervantes' *Don Quixote* Sancho Panza is made Governor of Barataria, but resigns his honors in disgust over his experiences at the inaugural feast, when appetizing dishes are placed before him, but removed before he has a chance to eat.

BAR'ATA'RIA, Pirates of. In American history, a company of outlaws who established themselves in and near the Bay of Barataria, La., on the west side of the Mississippi Delta, about 40 miles south of New Orleans, whence they emerged to commit depredations on the shipping of England and Spain. Under the leadership of the notorious Jean Lafitte (q.v.), they rapidly increased in numbers and audacity and succeeded in capturing large quantities of booty, which they disposed of through their agents at New Orleans. Their colony was broken up in September, 1814, by Commander Daniel T. Patterson, of the United States navy. Subsequently Lafitte and a number of his men volunteered for the defense of New Orleans against the British and served with gallantry under Jackson in the battle of Jan. 8, 1815. Consult two articles on "Jean and Pierre Lafitte," by Charles Gayarré, in vol. x of *The Magazine of American History* (New York, 1885).

BAR'ATHRON. A deep gorge outside of Athens, originally a quarry, and artificially enlarged, into which criminals condemned to death were hurled. Here the messengers sent by Darius to demand symbols of submission from the Athenians were put to death.

BARATIERI, bä′rȧ-tyā′rē, Oreste (1841–1901). An Italian general, born at Condino, in the Tirol. He fought under Garibaldi in Sicily in 1860 and after the war against Austria in 1866 joined the regular army. In 1891 he was made Governor of Eritrea, the new possession of Italy on the Abyssinian coast land, in Africa. In pursuance of the ambitious schemes of conquest entertained by the Italians, and in violation of a treaty concluded with the Negus Menelek in 1889, General Baratieri advanced into the highlands of the interior to the west and southwest of Massowah and after a long campaign captured Kassala, in July, 1894. Advancing thence into Tigré (q.v.), he twice defeated the *ras,* or prince, of that country in January, 1895. The conquests of the Italians finally drove Menelek to resistance; the latter's generals took the field with 100,000 men, and

Baratieri was forced to retreat from Adowa, the capital of Tigré, towards Adigrat. Fearing, however, to continue his retreat lest his forces should be thoroughly demoralized, he resolved to attack the Abyssinians, advanced once more on Adowa, and on the morning of March 1, 1896, joined battle on the heights near that place. So fierce was the onslaught of the Shouan forces of Menelek that the Italians were routed, with the loss of 250 officers, 7000 men, and all their artillery. General Baratieri was brought before a court-martial, which absolved him of criminal responsibility, but censured at the same time his conduct of the campaign. Baratieri left the army in the same year. In 1897 he published *Mémoire d'Africa* (1892–96), in the nature of a defense.

BARATINSKY, bä'rä-tĭn'skĕ, Yevgeny Abramovitch (1800–44). A Russian lyric poet and friend of Pushkin. He began writing at an early age, imitating the style of Pushkin and Byron most successfully. While serving as a soldier in Finland, he was impressed by the stern grandeur and picturesqueness of nature, and embodied these aspects in his poem *Eda* (1826), much admired by Pushkin. Generally, however, his poetry is of a most pessimistic character. His study of philosophy and the contemplation of the riddles of the universe had made him so disconsolate that even Pushkin lovingly called him "Hamlet Baratinsky"; and little of his writing, indeed, escaped the "pale cast of thought" that is associated with Shakespeare's Danish hero. Thus *Twilight*, a collection of his minor verse published in 1842, is steeped in melancholy. Finding himself at the parting of the ways, when the old school of Russian poets was about to be superseded, Baratinsky took a most gloomy view of Russian poetry itself. He even despaired of his art, seriously believing that the days of poetry were over. Hence *The Last Poet* elicited much adverse criticism, especially from Belinsky, the dean of contemporary literary critics, who wrote a very elaborate commentary on it. His best lyrical poems are *On the Death of Goethe, Finland, The Skull, The Last Death,* and *The Gypsy*, a popular poem picturing Russian high life. His complete works were published at Moscow (1827, 1835, and 1869; 4th ed., Kazan, 1884). Fiedler's *Russischer Parnass* (Dresden, 1889) contains several of his poems in German translation.

BARB (Fr. *barbe*, from *Barbarie*, Barbary). A distinct variety of the Arabian horse cultivated by the Moors of Barbary and introduced by them into Spain. Barbs are less remarkable for their beauty and symmetry than for their speed and endurance when stimulated by the excitement of a contest. The most celebrated barb to leave his mark upon the thoroughbreds of the world was the horse commonly known as the "Godolphin Barb," from the family name of his English owner, the Duke of Leeds (of the Godolphin family). Nearly every race horse of note on the English turf has a strain of the blood of this famous animal, who died in December, 1753, aged 29 years.

BARB (i.e., Barbary), **PIGEON,** etc. See the substantives.

BAR'BACAN. See Barbican.

BARBACENA, bär'bä-sā'nä. A town in the state of Minas-Geraes, Brazil, about 125 miles north-northwest of Rio de Janeiro (Map: Brazil, J 8). It is situated about 3600 feet above sea level in the Sierra Mantiqueira, and the surrounding district produces cane sugar, coffee, and grain. The town is a commercial centre, being the outlet for the product of mines in the district, but much of its importance has been lost with the development of transportation facilities. Barbacena is noted for its healthfulness and is a popular resort. Pop., about 6000.

BARBACENA, Felibeeto Caldeira Brant Pontes, Marquis of (1772–1841). A Brazilian soldier and statesman, born near Marianna, in what is now the state of Minas-Geraes. In 1823 he was appointed envoy to Portugal to negotiate the recognition of Brazilian independence. He became a member of the Constitutional Assembly, and was elected life Senator in 1826. When in command in 1827 of the Brazilian forces in Uruguay, he was defeated at Ituzaingó. In 1828 he accompanied to Lisbon Maria II, the young Queen of Portugal, whose rights he very skillfully maintained. He was Brazilian Prime Minister in 1829–30.

BARBACO'AN. A South American Indian linguistic stock, occupying the region of 1° and 2° N. lat., in southwest Colombia and northwest Ecuador. The chief tribes are the Barbacoas, Colorados, and Cayapas. Regarding the relation of some of these Indians to such semicivilized pre-Columbian peoples of the region as the Caras, etc., there is much difference of opinion. The Barbacoan stock is of interest from the fact that the famous name *Peru*, as Rivet points out, is probably derived from a word in one of its dialects, signifying 'river' or 'water.' These Indians and their languages have been studied recently by Seler (1886), Rivet (1896–1906, etc.), and Barrett (1909). Rivet seeks to make the Barbacoan a branch of the Chibchan stock. Consult Dr. P. Rivet's "Affinités des langues du sud de la Colombie et du nord de l'équateur" in *Muséon* (Louvain) for 1910.

BARBA'DOS, or **BARBADOES,** bär-bā'dōz (Portug. the bearded, from the bearded fig tree, *Ficus barbata*, found there in abundance). The most easterly of the West Indian islands, a possession of Great Britain, situated 78 miles east of St. Vincent, in lat. 13° 4′ N. and long. 59° 37′ W. (Map: West Indies, H 4). It has an area of 166 square miles. The surface, generally flat along the coast, which is surrounded by coral reefs, is elevated in the interior, where Mount Hillaby, the highest point, rises to about 1100 feet. Barbados has a healthful and, for a tropical island, a moderate climate, the mean temperature being about 80°. Earthquakes occur infrequently, but occasional hurricanes have caused great distress.

The soil is especially adapted to the cultivation of sugar cane, the staple product of the island. Of the 106,470 acres occupied by Barbados, about 100,000 acres are under cultivation, nearly one-third of which is devoted to sugar culture. Next in the rank of production come cotton, tobacco, coffee, indigo, and arrowroot. There are numerous sugar works and several rum distilleries, and the fishing interests are of importance. The imports of Barbados in 1911 were valued at £1,345,194 ($6,537,643), and exports £1,088,830 ($5,291,714). The principal articles exported were sugar, molasses, and rum; while the imports consisted largely of textiles, flour, rice, and fish. Manjak, a variety of bitumen, is exported to some extent.

The administration of the island is vested in a governor who is assisted by an executive committee, a legislative council of nine appointed members, and a house of assembly consisting

of 24 members, elected annually by popular vote. Education is under the direction of the government, which also subsidizes the various religious denominations represented on the island. Besides primary and secondary educational institutions, Barbados has Codrington College, which is in affiliation with Durham University, England. Barbados is the headquarters of the British troops in the West Indies. The island has 28 miles of railroad, 470 miles of roads, and 635 miles of telephone lines. The United States is represented by a consulate. The capital and principal port (the only harbor on the island) is Bridgetown (q.v.), which is also the see of a bishop of the Anglican church. The population of Barbados in 1891 was 182,306, and, in 1911, 171,892.

Barbados was first mentioned in the beginning of the sixteenth century and is supposed to have been visited by English seamen in 1605, but it was not colonized until 1625. After having been granted several times to different English noblemen, it was finally, in 1663, assumed by the crown. The continental wars of the eighteenth century were felt severely by Barbados, as the West Indies were the scene of important conflicts in the struggle between France and England. A period of prosperity succeeded the abolition of slavery in 1834. The riots of 1876, resulting from the proposed confederation of the Windward Islands, caused a considerable loss of life and property. Barbados has experienced several disastrous hurricanes, notably those of 1780 and of 1831, and, in more recent times, of 1898, all of which necessitated relief measures on the part of the Imperial government. (See BRITISH WEST INDIES.) Consult Stark, *History and Guide to Barbados* (Boston, 1893).

BARBADOS CHER'RY. The name given in the West Indies to the fruit of two small trees or shrubs, *Malpighia urens* and *Malpighia glabra*, which are cultivated for its sake. Clusters of fruit are produced from the axils of the leaves. The fruit of *Malpighia urens* is small; that of *Malpighia glabra* is like a Mayduke cherry in size and appearance, but inferior in flavor. Each fruit contains a three or four angled stone. The leaves of *Malpighia urens* have stinging hairs on the under side.

BARBADOS GOOSE'BERRY (*Pereskia aculeata*). A plant not belonging to the gooseberry tribe, but to the cactus family. It is a native of the West Indies and tropical America. The fruit is pear or egg shaped, edible, but possesses expectorant properties. Pereskia plants are of value in that they furnish stocks upon which are grafted other kinds of cacti. *Pereskia aculeata* is chiefly used for this purpose, although *Pereskia bleo* is more vigorous and therefore better suited for use with tall stocks.

BARBADOS LEG. COCHIN-CHINA LEG. The common names of elephantiasis, a disease endemic in tropical and subtropical countries, and due to obstruction of the lymph channels by the *filaria sanguinis hominis*. See ELEPHANTIASIS.

BAR'BARA, SAINT. A saint of the Roman Catholic church, who, according to legends, suffered martyrdom at Nicomedia, in Bithynia, about 236, or, according to other accounts, at Heliopolis, in Egypt, about 306. She was of good birth, and well educated by her father, Dioscorus. To avoid disturbance in her studies he had a tower built for her, where she spent her youth in the deepest solitude. While in this retirement she was induced to embrace Christianity. Her father, a fanatic heathen, learning his daughter's conversion and failing to induce her to renounce Christ, delivered her up to the governor, Martianus, to be dealt with by the law. Martianus, struck with the intelligence and beauty of the maiden, attempted first by arguments to make her relinquish Christianity and, when that failed, had recourse to the most exquisite tortures. At last the father offered himself to strike off his daughter's head. Scarcely was the deed done, when he was struck with lightning. Hence St. Barbara is to this day prayed to in storms. For the same reason she is the patron saint of artillery, and her image was at one time frequently placed on arsenals, powder magazines, etc. The powder room in a French ship of war is to this day called *Sainte-Barbe*. St. Barbara's day is December 4.

BARBARA AL'LEN'S CRU'ELTY. One of the old ballads in Percy's *Reliques of Ancient English Poetry* (q.v.). When her lover, Jemmy Groves, lay on his deathbed, all Barbara Allen said to him was: "Young man, I think you're dying!" For this heartless composure she suffered great remorse.

BARBARA FRIETCH'IE. A famous poem by John Greenleaf Whittier (1863), first published in the *Atlantic Monthly*. The poem is based on the report of a patriotic act of an aged woman in Frederick, Md., during the Civil War.

BARBA'REA. See CRESS.

BARBARELLI, bär'bâ-rĕl'lê, GIORGIO. See GIORGIONE.

BARBARI, bär'bâ-rê, JACOPO DE'. See JACOPO DEI BARBARI.

BARBA'RIAN (Gk. *βάρβαρος, barbaros*, non-Greek, barbarian). Among the Greeks, from the time of Homer, a designation for one who spoke a language other than Greek. This restricted signification prevailed until the Roman period. Plato, for example, divides the entire human race into Hellenes and Barbarians. The word is probably onomatopoetic in its origin, intended to represent a meaningless babble of sound, such as the Greeks conceived all foreign languages to be. It first began to acquire its secondary and invidious signification at the period of the Persian wars, when the Greeks, who always exhibited a proud consciousness of their superior intellect and privileges, employed the term to designate the character of their enemies. It then meant whatever was opposed to Greek civilization, freedom, intelligence, or morals; the Romans were naturally included by the Greeks under the general term, and Plautus, in his adaptations of the New Attic Comedy, uses *barbarus* humorously in the sense of 'Roman.' The adjective was not so used, however, by the Romans of themselves, but was employed by them to designate all peoples who differed from the Græco-Roman world in culture and language.

BAR'BAROS'SA. See FREDERICK I.

BARBAROSSA, HORUK and KHAIR-ED-DIN. Two pirate chiefs, brothers. They were renegade Greeks, natives of Mitylene, and as Turkish corsairs were the terror of the Mediterranean during the first part of the sixteenth century. They made themselves masters of Algeria and Tunis and brought these countries under the sovereignty of the Turkish Sultan. Horuk, the elder of the two, fell in battle against an army of the King of Spain (1518). The younger was more successful. He captured Tunis and fought under Sultan Solyman II

against Charles, defeating the Imperial Admiral Doria, and ravaged the Ionian Islands. He died in 1546. Consult: Lane-Poole and Kelley, *The Story of the Barbary Corsairs* (New York, 1890); Rang and Denis, *Histoire de Barberousse* (Paris, 1837).

BARBAROUX, bär'bȧ'rōō', CHARLES JEAN MARIE (1767–94). A French revolutionist. He was born in Marseilles, and as a youth eagerly embraced the doctrines of the Revolution. He was elected a special delegate from Marseilles to the Legislative Assembly in Paris. There he opposed the court and took sides with the Minister, Roland. Upon his invitation the famous battalion which brought the "Marseillaise" to Paris and led in the storming of the Tuileries on Aug. 10, 1792, set out from Marseilles. After the events of the 10th of August he returned to his native town, where he was received with enthusiasm and was soon after chosen delegate to the Convention. In the Convention he adhered to the Girondists and was among those who at the trial of the King voted for the death sentence. But though Barbaroux was among those leaders who refused a respite to the unfortunate Louis, he boldly opposed the party of Marat and Robespierre and even directly accused the latter of aiming at the dictatorship. Consequently he was proscribed as a royalist and an enemy of the Republic in May, 1793. He wandered about the country, hiding himself as he best could, for 13 months, but was taken and guillotined at Bordeaux, June 25, 1794. Barbaroux was a man of striking beauty and of great force of intellect, a sound economist and financier. His *Mémoires* were published in Paris in 1822 and 1866.

BARBARY APE. A monkey, native to north Africa and introduced on the rock of Gibraltar. See APE.

BAR'BARY POW'ERS, WARS WITH THE. From the time of the Middle Ages the Mohammedan powers on the north coast of Africa lived largely by piracy and blackmail, capturing and confiscating (or holding for ransom) the shipping of such nations as did not pay a liberal tribute. In 1785 they began to molest the American shipping, which before the Revolution had been protected by British passes; and the United States government, following the example of European powers, concluded treaties with Morocco (1786–87), Algeria (1795), Tripoli (1796), and Tunis (1799), securing immunity from attack by money payments. The corsairs continued arrogant, however; and in 1801 Tripoli, after having been denied a larger tribute, declared war. American squadrons were sent to the Mediterranean under Commodores Dale (1801), Morris (1802), and Preble (1804); the Tripolitan ports were blockaded and bombarded; a number of the piratical cruisers were captured; and in June, 1805, Tripoli was forced to make peace. The chief events of the war were the grounding and capture of the *Philadelphia* in the harbor of Tripoli (Oct. 31, 1803) and her destruction by Decatur (Feb. 16, 1804), the bombardment of Tripoli, and the celebrated land expedition under William Eaton in 1805. (See BAINBRIDGE, WILLIAM; DECATUR, STEPHEN; EATON, WILLIAM.) Renewed attacks by the Barbary vessels began with the abandonment (in 1810) of the restrictive policy exemplified in the embargo of 1807. (See EMBARGO.) Algeria formally declared war in 1812 and gave considerable assistance to the British in the years 1812–15. In 1815 Decatur, proceeding with 10 vessels to the Mediterranean, speedily brought Algeria to terms and in addition forced Tunis and Tripoli to sign treaties formally renouncing future exactions of tribute. The United States was the first power thus to check the aggressions of the pirates, and her example was soon followed by various countries of Europe. These wars gave an efficient training to the American sailors and demonstrated the futility of Jefferson's famous "gunboat system." Consult: Lane-Poole and Kelley, *The Story of the Barbary Corsairs* (New York, 1890); E. S. Maclay, *History of the Navy* (3 vols., New York, 1894–1901); Allen, *Our Navy and the Barbary Corsairs* (New York, 1905). An excellent account is also given in Henry Adams's *History of the United States from 1801 to 1817* (9 vols., New York, 1889–91).

BARBARY STATES (derived from *Berbers;* see below). The countries of Morocco, Algeria, Tunis, and Libya (Tripoli and Barca or Bengazi), in north Africa, known in Roman times as Mauretania, Numidia, Africa Propria, and Cyrenaica. They lie between long. 10° W. and 25° E., and lat. 25° to 37° N. The western half of this region is traversed by the Atlas Mountains, south of which lies the desert tract of the Sahara. Most of the region, while pertaining geographically to Africa, is not specially African in its characteristics; but in geological configuration, climate, flora, and fauna, belongs to the basin of the Mediterranean. It is watered by many small streams, which flow either into the Mediterranean or into a series of salt lakes that lie on the plateaus between the mountain elevations. A large portion of the country is capable of cultivation, and many of the products of the north, fruits and vegetables, are brought to great perfection, the Algerian grape being of particularly fine quality. Millet and other grains are largely grown. Sheep raising is an extensive industry with the Arabs. During the times of the Carthaginians, Greeks, and Romans the region was exceedingly productive, owing to the elaborate systems of irrigation which were constructed. Most of the natural conditions of its ancient productiveness still remain. Among the people, besides the French and other Europeans, several distinct races may be enumerated: Berbers—the ancient autochthonous race from whom comes the name—Moors and settled Arabs, Bedouins or wandering Arabs, Jews, Turks, Kuluglis, and negroes. The Berbers inhabit the open country, while the Moors reside in the towns. Jews settled here in ancient times, but the greater number of that race immigrated at the time of their expulsion from Spain. The Turks entered the Barbary states in the sixteenth century and soon extended their sway westward as far as the borders of Morocco. The Kuluglis (the children of Turks by native mothers) are excluded from the possession of all the paternal rights and privileges. The negroes are not natives, but are brought thither principally from the Sudan and Guinea. The great majority of the population is Mohammedan. Arabic is the language of commerce and intercourse and the mother tongue of Bedouins, Moors, and even Jews. The Berbers proper, in the highlands, to which they have been driven by foreign conquerors, use a peculiar speech.

In the oldest historical times the Mauri (the ancestors of the modern Moors) dwelt in the northwest; the Numidians occupied the interior and eastern parts; and Phœnician colonies were situated on the coasts. The Phœnicians founded

cities—among them Utica, Hippo, Hadrumetum, Leptis, and afterward Carthage—from about 1050 to 850 B.C. Confining themselves to the coast between the Great Syrtis and the Straits of Gibraltar, they maintained commerce with the people of the interior and the seaports of the Mediterranean. In the seventh century B.C. the Greeks founded Cyrene (q.v.) and colonized the plateau of Barca. While the Phœnician colonies held sway on the coast, the Mauri and the Numidians were divided into several independent tribes and, like their neighbors, the Gætuli, were wholly uncivilized. After the Second Punic War the Romans extended their sway over Carthaginian Africa, which became a Roman province at the close of the Third Punic War, when the city of Carthage was sacked and destroyed (146 B.C.). Numidia was annexed after the victory over Jugurtha, and Mauretania after the defeat of Juba and the Pompeians by Cæsar. The son of Juba, bearing the same name, was allowed to reign as a nominal sovereign by Augustus, but Mauretania was in fact a Roman province. The territory thus acquired by the Romans formed some of the largest and most flourishing provinces of their vast Empire. They built large towns, whose extensive ruins are still to be seen scattered over the land, even to the verge of the desert. Everywhere they executed important works, such as the cisterns and aqueducts at Rusicada, Hippo, and Cirta, and the temples and amphitheatres of Calama, Anuna, and Timgad, which clearly show that the inhabitants enjoyed the benefits of a secure civilization. Under Constantine north Africa was divided into nine provinces. (Consult Boissier, *Roman Africa*, Eng. trans., New York, 1899; Bouchier, *Life and Letters in Roman Africa*, Oxford, 1913. For distinguished men of letters in Africa or from Africa, see APULEIUS; FRONTO; TERTULLIANUS.) At the division of the Empire all of these, except one, the Regio Syrtica, fell to the share of the Western Empire. Christianity took a strong hold in Roman Africa, and in the three Mauretanias there were more than 160 dioceses. The decline of Roman power produced a state of anarchy in the African provinces, and they easily fell a prey to the Vandals under Genseric in 429 A.D. The Vandal kingdom continued until 533, when it was overthrown by Justinian's great general, Belisarius (q.v.). The Numidians and the Mauri made themselves masters of the interior and of the coast of Mauretania Tingitana, and the Byzantine territories were restricted to the neighborhood of Carthage and some points on the coast. Consult *The Cambridge Mediæval History*, vol. i (New York, 1911).

North Africa was swept in 647 by an Arabic invasion, impelled by the first Mohammedan impulse of conquest. The first invader, Abdallah-ben-Said, carried the banner of the Crescent through Tripoli. He was followed by Akbar (665–670), who completed the conquest of Tripoli to the edge of the desert. Hassan, the general of the Caliph Abd-el-Malek, in 692 destroyed the new Carthage. In the course of less than a century the greater part of the native tribes were converted forcibly to the faith of Islam. In 711 the Saracens crossed over from Africa into Spain, which they conquered within three years. In 789 the western provinces of Mohammedan Africa separated themselves from the others, and Edris-ben-Abdallah founded there the dynasty of the Edrisites. In 800 the Governor of the eastern provinces, Ibrahim-ben-Aglab, declared himself independent and founded the dynasty of the Aglabites. From this time down to 1269 the changes of dynasty in Barbary were frequent. Numerous independent states arose. At the close of the eleventh century the Almoravides, who had established their sway in Morocco, made themselves masters of Mohammedan Spain. In the middle of the twelfth century they succumbed to the Almohades. The conquest of the Moors in Spain by the Christians was followed by their settlement on the coast of north Africa, where they began their career of piracy, at first as a retaliation against their Christian foes, but ultimately as a barbarous profession. As early as the time of Ferdinand the Catholic the Spaniards sought to check their ravages, and invaded Africa on several occasions, capturing the ports of Ceuta, Melilla, Oran, Bugia (Bougie), the island before Algiers, and Tripoli. The Portuguese landed on the coast of Morocco, where at first they had great success; but they were ultimately compelled to leave the country. In the course of the sixteenth century Algiers, Tripoli, and Tunis were brought under the government of the Turkish Sultan. Tripoli came under the sovereignty of Italy by the Treaty of Ouchy, Oct. 18, 1912. The Dey of Algiers shook off the authority of Turkey about the beginning of the eighteenth century. The French established their sway in Algeria after a bloody war, which lasted from 1830 to 1847. In 1881 Tunis was placed under French protection. For an account of the modern states comprised within this region, see MOROCCO; TUNIS; ALGERIA; TRIPOLI; FEZZAN; BARCA.

BARBASTELLE, bär'bȧ-stĕl' (Fr. from Lat. *barba*, beard). A European long-eared bat. See BAT.

BARBASTRO, bär-bä'strō. A town in the province of Huesca, Aragon, Spain, on the Vero, 30 miles southeast of Huesca (Map: Spain, F 1). It is the terminus of a branch railway line with a junction at Selgua, 12½ miles distant. The town is an episcopal see, is surrounded by walls, and has a sixteenth-century cathedral, containing paintings by Antonio Galaran. Spirits and soap are manufactured, and wine, oil, grain, fruit, and vegetables are grown. Pop., 1897, 7194; 1900, 7033; 1910, 7202.

BARBATELLI, bär'bȧ-tĕl'lē. See POCCETTI, BERNARDINO.

BAR'BAULD, ANNA LETITIA (1743–1825). An English author. She was born, June 20, 1743, at Kibworth, Leicestershire, where her father, the Rev. John Aikin, a Dissenting clergyman, kept an academy. Her private education, the religious influence of her home, and secluded life in the country were well fitted to develop early her natural taste for poetry. In 1773 she published her first volume of poems, of which four editions were called for during the year. The same year appeared *Miscellaneous Pieces in Prose*, written conjointly with her brother, John Aikin. This volume was also several times reprinted. The next year she married the Rev. Rochement Barbauld, a Dissenting minister at Palgrave, in Suffolk, where they soon opened a boarding school for boys. The literary fame and exertions of Mrs. Barbauld soon made it known. During the 10 years in which Mrs. Barbauld was engaged in giving instruction here, she published *Early Lessons for Children* and the *Hymns in Prose*—works which have been often reprinted in England and translated into

several languages. Her *Devotional Pieces* was also published during this period. In 1792 she commenced with her brother the well-known series, *Evenings at Home*, which was completed in three years. In 1804 she edited the letters of Samuel Richardson, prefixing to them the best memoir of the novelist that has yet been written; and in 1810 she published a collection of the British novelists in 50 volumes, the task of editing which she had undertaken to divert her mind from the loss she had sustained two years before in the death of her husband. In 1811 she prepared, under the title *The Female Speaker*, a selection from the best English poets and prose writers. Her last published work was an ode, entitled *Eighteen Hundred and Eleven*. All her compositions are characterized by simplicity of feeling, an easy, flowing style, and pure and elevated sentiment. Her *Ode to Life* is an admirable lyric. She lived in quiet retirement until her death, March 9, 1825. Consult: Aikin, *Works of A. L. Barbauld*, with memoir (London, 1825); Mrs. Oliver (formerly Mrs. Ellis), *Memoir of Mrs. Anna Letitia Barbauld* (Boston, 1874); Mrs. Thackeray-Ritchie, *Book of Sibyls* (London and New York, 1883).

BARBE-BLEU, bärb'blē' (Fr. Bluebeard). 1. A light opera presented in 1866, libretto by Meilhac and Halévy, score by Offenbach. 2. Comic opera by Sedaine, with score by Grétry, performed in Paris, 1789. See BLUEBEARD.

BAR'BECUE. A term originally applied, in the Southern States especially, to the practice of roasting a hog, ox, or other large animal entire, by splitting it to the backbone and placing it on a rude gridiron of stakes. The use of the word is now extended to mean a large public entertainment, held in the open air, where animals are roasted whole, and food and drink of all kinds are provided in liberal quantities. The word was in use in Virginia before 1700. The origin of the name "barbecue" is disputed. Some think it comes from the Indians of Guiana, who used the word *berbekot* to denote the wooden grills on which they smoked or dried their meats and fish. Others would derive it from the Haitian *barbacóa*, identical in meaning with *berbekot*, while still others have traced the term to the French *barbe-à-queue*, i.e., 'from snout to tail.'

BARBED AND CREST'ED. Heraldic terms indicating that the gills and combs of a cock are of a different tincture from the body. The common English designation is "wattled and combed," with the name of the tincture.

BARBED WIRE. See WIRE.

BAR'BEL (LL. *barbellus*, dimin. of *barbus*, same meaning, from Lat. *barba*, beard). An Old World carp-like fresh-water fish of the cyprinoid genus *Barbus*, with four fleshy appendages (barbules) hanging from the snout and upper jaw, which project beyond the inferior mouth and are of use in plowing through the mud in search of food. The common one (*Barbus vulgaris*) is abundant in the streams both of England and continental Europe and may reach a weight of 15 to 18 pounds. It affords some sport to the angler, but its coarse flesh is seldom eaten. The genus is very numerous in edible species in the waters of Asia, the East Indian Archipelago, and tropical Africa, and some reach a length of 6 feet. The best known from the angler's point of view is the mahaseer (*Barbus mosal*) of the mountain streams of the Himalayas and other parts of Asia, the scales of which in large specimens are as large as one's hand. See Plate of CARPS AND ALLIES.

BARBE-MARBOIS, bär'bä' mär'bwä', FRANÇOIS, MARQUIS DE (1745–1837). A French statesman. From 1779 to 1785 he was connected with the French embassy in the United States. He married (1783) a daughter of William Moore, of Pennsylvania. In 1785 he was Governor of Haiti, where he introduced many reforms. In 1797 he was exiled to Guiana for political reasons, but was recalled in 1799 and made Minister of Finance in 1801. He negotiated the sale of Louisiana to the United States and obtained 30,000,000 francs more than Napoleon really asked, for which he was liberally rewarded. He was a member of the Senate in 1813 and favored the restoration of the Bourbons, for which Louis XVIII made him a Peer of France and Minister of Justice. After the Revolution of July he swore fealty to Louis Philippe. Among his works are writings on Santo Domingo and Guiana, on the treason of Arnold, and on the cession of Louisiana.

BAR'BER (ME. *barbour*, OF. *barbeor*, from Lat. *barba*, beard). One who shaves the beard and ordinarily includes hair cutting in his profession. The office is of great antiquity and is referred to by the prophet Ezekiel: "And thou, son of man, take thee a barber's razor, and cause it to pass upon thine head and upon thy beard." From ancient monuments and papyri we know that the Egyptians shaved both the beard and the head. In all Eastern countries, including China, the shaving of the whole or part of the head continues to be performed by barbers. The barber shops of Athens and Rome were great meeting places for idlers and gossips, and in provincial towns they continue to serve some such purpose up to the present day.

The most important and dignified portion of the history of barbers relates to the period when in all European countries they had the right to practice elementary medicine and surgery and were known as *barber surgeons*. Relics of this combination of functions are the brass basin, still hung out as a sign at the door of European barber shops, and the red band about the pole, which represents the bandage with which they stopped the bleeding incident to their operations. The existence of barbers as professors of the healing art can be traced in England as far back as 1461, when they were first incorporated. In 1546 they were united with the surgeons. The connection was dissolved by an Act of 1745, whose preamble asserts that the business or trade of a barber is "foreign to, and independent of, the practice of surgery"; at the same time the privileges of the barbers as a company or corporation were expressly preserved to them. In Markwell Street, Cripplegate, London, the ancient hall formerly used by the barber surgeons is still standing.

In France barber surgeons were organized in 1371 into a corporation which was under the jurisdiction of the King's barber and which existed until the Revolution. In the seventeenth century wigs (q.v.) became so elaborate that a distinct corporation was formed of *barbiers perruquiers*, who also shaved and cut the hair. In Germany, though the trade of the barbers was long connected with the art of surgery, they were not formed into a corporation until 1773 (in Prussia, 1779). This was dissolved in 1809, and new unions were formed in the middle of the century with strict regulations. In the

United States to-day the barbers are well organized in the International Union, which dates from 1887 and maintains an *esprit de corps* unsurpassed by any other labor organization. It not only regulates wages and the hours of labor, but fixes prices to be charged to patrons—a rare instance in which employees, rather than employers, make prices for the public. Every raise in barbers' wages must, under union rules, be followed by a corresponding increase in prices and vice versa. Consult *Annals of the Barber Surgeons of London* (London, 1890), and L'Espinasse, *Les métiers et corporations de la ville de Paris* (Paris, 1886–97). See BEARD; HAIR DRESSING.

BARBER. A widespread South African catfish (*Clarias capensis*). It reaches 50 to 60 pounds in weight, and young ones are esteemed as food; it is also one of the main resources of crocodiles. It takes the hook readily and gives some sport in overcoming its pluck and strength.

BARBER, FRANCIS (1751–83). An American soldier, born at Princeton, N. J. He graduated at the College of New Jersey (Princeton) in 1767, and in January, 1776, entered the American army as major of a New Jersey regiment. He became a lieutenant colonel in November of the same year, was adjutant-general successively under Lord Stirling and General Sullivan, and was seriously wounded at the battles of Monmouth and Newtown and the siege of Yorktown. In 1781 he was selected by Washington to break up a mutiny of the New Jersey and Pennsylvania troops—a duty he performed with singular tact and discretion. He was accidentally killed by a falling tree at Newburgh, N. Y., on Feb. 11, 1783. His order book during Sullivan's expedition against the Indians in 1779 is in the possession of the New Jersey Historical Society.

BARBER, JOHN WARNER (1798–1885). An American historian, born at Windsor, Conn. He published: *Historical Scenes in the United States* (1827); *Religious Events* (1832); the *Historical Collections of Connecticut* (1836) and of *Massachusetts* (1839); *Elements of General History* (1844); and *Our Whole Country, Historical and Descriptive* (1861). He also assisted Henry Howe in compiling the historical collections of New York, New Jersey, Virginia, and Ohio.

BARBERINI, bär'bâ-rē'nê. The name of a celebrated Italian family, prominent in connection with the history of the papacy in the seventeenth century. The Barberini settled in Florence in the eleventh century and became prominent in various ways. Francesco Barberini, a contemporary of Dante, was a jurist and poet. Raffaelle Barberini was an engineer and was employed by the Duke of Alva in a diplomatic capacity. The family became powerful through Maffeo Barberini, who was elected Pope in 1623 as Urban VIII. He appointed his brother Carlo commander of the papal forces; another brother, Antonio, was Cardinal and papal librarian. Francesco, a son of Carlo, was also Cardinal, and is known as the founder of the Barberini Library and the builder of the Barberini Palace at Rome. He was a man of learning and translated Marcus Aurelius. Taddeo, a brother of Francesco, became commander of the papal forces, was appointed Prefect of Rome, and received the principality of Palestrina. He attempted to wrest Castro from the Farnese family of Parma. Antonio, a brother of the two preceding, likewise a Cardinal, was invested with the duchy of Urbino. The wealth and power of the Barberini excited the jealousy of other Italian nobles, and when Urban's successor, Innocent X, ascended the papal throne, he called the nephews of Urban to account for the mismanagement of their various offices. They were forced to flee, and took refuge in France. Later the family regained their influence in Rome. The principality of Palestrina remained in possession of the Colonna branch of the Barberini family until 1889, when the male line became extinct. The title then passed by marriage to Marquis Luigi Sachetti, who assumed the name of Barberini and the title of Prince of Palestrina. Consult Reumont, *Beiträge zur italienischen Geschichte*, vol. v. (Berlin, 1867), and Thomus, *Francesco da Barberini* (Paris, 1883).

BARBERINI FAUN. A statue in Parian marble, an example of Greek sculpture, so called because once the property of the Barberini at Rome. It is now in the Glyptothek at Munich. It was found between 1627 and 1641, near the Castello di Sant' Angelo. Consult Heinrich Bulle, "Der Barberini Faun," in *Jahrbuch des kaiserlich deutschen archäologischen Instituts* (Berlin, 1901); Furtwängler, *Beschreibung der Glyptothek zu Munich*, pp. 199–206 (Munich, 1900).

BARBERINI PAL'ACE. The home of the Barberini in Rome, the erection of which was undertaken by Urban VIII, the most celebrated of the family. It was not completed, however, till 1640. Its picture gallery contains Guido Reni's "Beatrice Cenci"; Domenichino's "Adam and Eve Being Driven out of Paradise," and Albert Dürer's "Christ Disputing with the Doctors." Its library, which contains upward of 70,000 volumes and 10,000 manuscripts, now forms part of the library of the Vatican.

BARBER OF SEVILLE. See BARBIER DE SÉVILLE.

BAR'BER POET, THE. See JASMIN, JACQUES.

BAR'BER'RY (of uncertain origin). *Berberis.* A genus of plants of the family Berberidaceæ (q.v.), consisting of two subgenera that are sometimes ranked as genera. Those with simple leaves form the subgenus *Berberis*, and those with pinnate leaves, the subgenus *Mahonia*, or ash-leaved barberry. The species are low, ornamental shrubs and native to the temperate regions of both hemispheres. The flowers are yellow and have sensitive stamens. The leaves are various shades of green and are sometimes variegated. A yellow fungus, *Æcidium berberidis*, is very general upon the under side of the leaves. This is the "æcidium state" of the common grain rust (*Puccinia graminis*, q.v.), and hence in wheat-growing districts the planting of barberry is not advised. The fruit is a red, dark-blue, or black berry with two or three seeds. It is generally too acid to be eaten, but is sometimes used to make jelly and preserves —barberries cooked with molasses being an old-fashioned kind. Free malic acid is extensively prepared from the fruit in France. The fruit of the sweet barberry (*Berberis dulcis*), a native of Chile, resembles in size and color that of the black currant. *Berberis aristata* and *Berberis asiatica* also produce wholesome and pleasant fruits, which are dried like raisins. The yellow root of the barberry, especially the inner bark, is used for dyeing, as is also that of the stem and branches. The bark has also been used for tanning. *Berberis lycium*, a native of northern India, is particularly astringent, and an extract

prepared from it is used in ophthalmia. *Berberis vulgaris* is the most common species used for ornament. See Plate of BALSAM, ETC.

BARBERRY RUST. See RUST.

BAR'BER'S ITCH (*Tinea sycosis; sycosis parasitica;* ringworm of the beard). A parasitic disease of the bearded parts of the face, caused by the entrance into hair follicles of a fungus, the *trichophyton.* An eruption appears in the form of a ring, red and scaly, and increasing by the enlarging of the outer limits of the ring. Later the red area swells, and hard nodules form, which rupture and exude yellowish pus. This dries and forms crusts, covers the skin, and causes irritation and itching. The disease results in the destruction of the hair and may persist indefinitely unless treated thoroughly or may relapse repeatedly. The upper lip is very rarely attacked, the disease confining itself, as a rule, to the chin and adjacent parts of the neck and submaxillary regions. Barber's itch is contagious and is conveyed most commonly, as its name implies, by infected hands, towels, brushes, or razors.

BAR'BERTON. A mining town of the Vaal River Colony, South Africa, in the district of Lydenburg, about 70 miles west of Lourenço Marques, with which it is connected by rail (Map: Transvaal Colony, E 2). It lies in a mountainous region, 2800 feet above the sea, in the centre of the De Kaap gold fields. Barberton was founded in 1885 and grew rapidly. The town is a health resort. Pop., 1907, 2379. In the early part of the Boer War of 1899–1902 British prisoners were confined here until the Boers were driven out by the English troops.

BARBERTON. A city in Summit Co., Ohio, 7 miles south by west of Akron, on the Baltimore and Ohio, the Erie, the northern Ohio, and the Pennsylvania railroads and on the Ohio Canal (Map: Ohio, G 3). It manufactures matches and match machinery, boilers, chemicals, sewer pipe, valves and fittings, artificial lumber, rubber, porcelain, paint, etc. Barberton, originally known as New Portage, was settled about 1815 and was first incorporated in 1892. The government is vested in a mayor, elected biennially, and a unicameral council. The water works and light plant are owned and operated by the city. Pop., 1900, 4354; 1910, 9410; 1920, 18,811.

BARBES, bär'bĕs', ARMAND (1809–70). A French revolutionist. He was a leader of secret political societies, was at various times imprisoned, and in 1839 was sentenced to death as the main instigator of an attempted insurrection against Louis Philippe. While in prison he wrote *Two Days under Condemnation of Death.* He was pardoned and chosen (1848) to the Constituent Assembly, but in the same year, with Raspail and others, was sentenced to life imprisonment for inciting insurrection against the Assembly. When set free by Napoleon III in 1854, he refused to receive pardon, asking to be allowed to return to jail; but this was denied him, and he left the country. Consult La Brugère, *Le procès Armand Barbès.*

BAR'BET (Fr. from Lat. *barbatus,* bearded). Any bird of the tropical family Capitonidæ, so called in reference to the prominence of bristles about the mouth. The barbets, together with the honey guides, form the order Scansores. There are considerably over 100 forms, distributed through the tropical forests of both the Old and New Worlds, being absent only from the West Indies and Australia. They are stockily built birds, usually less than 6 inches in length and often gorgeously colored. The juxtaposition of most vivid and extreme pigments, however, produces an inharmonious and harsh effect. Barbets haunt the tree tops or climb about the branches in search of food, which consists mainly of insects and to a less extent of fruit. They nest in holes, excavating for themselves in soft or decaying wood. Three to five oval white eggs are laid. See Plate of TROGON, HOOPOE.

BARBETTE, bär-bĕt' (Fr. dim. of *barbe,* Lat. *barba,* beard). In military fortification, a term applied to the platform on the inner side of a parapet or rampart on which a heavy gun is mounted. It is built at such an elevation that the gun may be fired over the crest of the parapet instead of through an embrasure. In this way the gun may be moved in different directions. In the United States and British navies the term is commonly used to designate the armored structure surrounding and protecting the bases of guns or turrets, but which is more properly called a *barbette tower.* These towers are almost invariably of circular form, the armor extending down to the protective deck, except when it is protected by the armor on the ship's side, while the supporting framework, somewhat changed in form as it goes down, extends to the inner keel. Inside the tower is the machinery for operating guns and supplying them with ammunition. See FORTIFICATION; SHIP, ARMORED.

BARBETTE GUN. A gun mounted for firing over a breastwork or parapet and not through a porthole or embrasure. On board ship guns are mounted *en barbette* in barbette towers. See COAST ARTILLERY; GUNS, NAVAL; ORDNANCE.

BARBETTE TUR'RET. A revolving tower or turret mounted above a fixed barbette tower. Turrets are now generally oval or ovoidal in plan, and the side in rear of the guns projects beyond the walls of the barbette tower to form the "overhang". See TURRET.

BARBEY D'AUREVILLY, bär'bĕ' dō'rə-vē'yē', JULES AMÉDÉE (1808–89). A French writer, born at Saint-Sauveur-le-Vicomte (Manche). He was one of the founders (1858) and editors of the *Réveil* and for a number of years contributed literary articles to the *Pays.* His works, in both fiction and criticism, are original, sometimes grotesque in flavor. They include: *Du dandysme et de George Brummel* (1845; 3d ed., 1880); *Les prophètes du passé* (1851); *L'ensorcelée* (1854); *Portraits critiques* (1863); *Le chevalier Des Touches* (1864); *Goethe et Diderot* (1880). Consult Eugène Grelé, *Jules Barbey d'Aurevilly, sa vie et son œuvre* (1902).

BAR'BICAN (LL. *barbacana, barbicana;* perhaps akin to Ar. *barbakh,* aqueduct, sewer). A fortified advanced work protecting a passage, gate, or postern of a city or fortress, usually at the head of a drawbridge. The barbican was used in all well-fortified places to facilitate sallies or protect a retreat. It was built of wood or earth, or stone, provided with a ditch and often with a flying bridge. Usually it was semicircular. Even temporary camps had large barbicans to mask and protect manœuvres. The permanent examples in stone at Carcassonne (q.v.) are of unusual importance. Sometimes

they were closed across their end so as to make it difficult for the enemy to enter the city, even after it had been captured. The famous English castles of Alnwick and Warwick still retain their barbicans. In an assault the barbican was usually captured before the outer bailey. Sometimes the barbican took the form of parallel walls advancing from the outer gate and inclosing a narrow passage to hem in the attacking force; sometimes that of a double tower on each side of a gate or bridge, and it often also served as a watchtower. From the peculiar form of the long, narrow, flaring openings pierced in such works, the term "barbican" came to be applied to such shaped openings, loopholes, or embrasures, even when they were used in other structures to let in light, to ventilate, or to carry off water from foundations. See BAILEY; BASTION; CASTLE; FORTIFICATION.

BARBIÉ DU BOCAGE, bär'byā' dụ bō'kāzh', JEAN DÉNIS (1760–1825). A French geographer. He was born and died in Paris. After holding several important government positions he became professor in the Collège de France in 1809 and in 1821 was one of the founders of the French Geographical Society. His best-known works are his historical and geographical atlases. He also wrote, in conjunction with Sainte-Croix, *Mémoires historiques et géographiques sur les pays situés entre la Mer Noire et la Mer Caspienne* (1796).

BARBIER, bär'byā', ANTOINE ALEXANDRE (1765–1825). A French bibliographer. He was born at Coulommiers, studied at the Normal School, and took orders, but in 1793 left his curacy and in 1794 was appointed a member of the commission for the preservation of objects of art and science. He was delegated to collect and distribute among various libraries the valuable books obtained at the time of the Revolution through the suppression of ecclesiastical establishments. He was appointed librarian to the Directory and was also private librarian to Napoleon I, in which capacity he founded the libraries of Fontainebleau, Compiègne, Saint-Cloud, and the Louvre. At the Restoration he became director of the Crown Library and continued in that post until 1822. His bibliographic works include *Catalogue des livres de la bibliothèque du Conseil d'Etat* (2 vols., 1801–03), *Dissertation sur soixante traductions françaises de l'Imitation de Jésus-Christ* (1812), and, chiefly, *Dictionnaire des ouvrages anonymes et pseudonymes* (4 vols., 1806–09), a work of much value to the student of literature for the period it covers.

BARBIER, HENRI AUGUSTE (1805–82). A French poet and novelist, born in Paris. He is remembered chiefly for his satires, *Les iambes* (1831), political and social castigations of the predominant types in the bourgeois monarchy of Louis Philippe, though the morals of the aristocracy were not spared. These satires still possess a social and historical value. The most famous of them is *La curée.* Of his other works, *Il Pianto,* dealing with Italy, and *Lazare,* with Ireland, though greatly inferior, rank next in importance. Barbier was elected to the Academy in 1869 and died at Nice, Feb. 12, 1882.

BARBIER DE SÉVILLE, bär'byā' dẹ sā'vēl' (Fr. barber of Seville). 1. A work by Beaumarchais (q.v.), rejected (1772) as a comic opera, and subsequently given its present form as a comedy. (See FIGARO.) 2. A light Italian opera (*Il barbiere di Siviglia*): (*a*) by Paisiello, with adaptation of Beaumarchais's comedy as the libretto (given in St. Petersburg in 1780 and in Paris in 1789); (*b*) by Rossini, with book again adapted from Beaumarchais (given in Rome in 1816 and in Paris in 1819). At first unpopular, it has become one of the favorite operas.

BARBIERI, bär-byā'rē, GIOVANNI FRANCESCO. See GUERCINO.

BAR'BITON, or **BAR'BITOS** (Gk. *βάρβιτον, βάρβιτος*). A special form of the lyre, derived by the Greeks from Persia and much used on Lesbos and among the Ionians. It seems to have had more than seven strings, exceptionally long, and to have yielded a deep tone. It may be the instrument, with a small sounding board and long arms, which is carried by Alcæus and Sappho on a vase in Munich. See LYRE.

BARBIZON, bär'bē'sōn'. A village in the department of Seine-et-Marne, France, 5 miles northwest of Fontainebleau. It has given its name to a school of French landscape painters. (See BARBIZON, THE PAINTERS OF.) Its picturesque situation on the edge of the forest and association have made it a favorite resort for artists and tourists. Pop., 1906, 484; 1911, 507.

BARBIZON, THE PAINTERS OF. A group of French painters of landscape, animal, and peasant subjects, so called because they resided and practiced chiefly at Barbizon. They are often called the Barbizon school, but, properly speaking, they do not form a school, but were a group of men with similar aims and principles. Situated on the edge of the forest of Fontainebleau, Barbizon offered countless varieties of scenery, both wild and cultivated. The cardinal principles of these painters were twofold. 1. Each painting must be studied directly from nature. This gave them the firm grasp upon truth and life that has made their art permanent. 2. Every painting should express a mood or sentiment of the artist. The result was the poetic character which lends to their work its principal charm, each picture rising to the dignity of a hymn to nature. They belonged to the Romantic school of painting (see PAINTING, *History*), and their work represents the romantic principle applied to the landscape. They were not really revolutionaries, as has been represented, but took up the development of the landscape where the Dutch and English had left off. (See LANDSCAPE PAINTING.) The English influence, however, has been greatly exaggerated. It is maintained that the school owed its origin to the exhibition of Constable's (q.v.) works at Paris in 1822; but at that time Rousseau and Dupré were lads of 12, while Corot was still in Italy. They learned far more from the fine collection of Dutch paintings, especially those of Ruysdael, in the Louvre. Dupré alone visited England, where he was influenced by Constable. The pioneer and broadest genius of them all was Théodore Rousseau, who first went to Barbizon. Besides his the greatest names are those of Jules Dupré, their most pronounced Romanticist, Corot, the poet painter of morning and evening; Diaz de la Peña, painter of the sunny woodland, Daubigny, the painter of orchards, gardens, and river scenery, Troyon, the cattle painter, and Jean François Millet, greatest of

all peasant painters. See articles on these artists.

The painters of Barbizon are probably the most important group of landscape painters in the history of art; they depicted varied phases of nature, made great progress, and had a wide influence upon the general development. For their art not only affected landscape painting of northern Europe, but profoundly influenced that of the United States, which is for the most part essentially mood painting and unintelligible without Barbizon. They are better represented in American galleries, such as the Metropolitan Museum of Art and the Vanderbilt collection, New York, and the Quincy Shaw collection of Boston, than in any others in the world, except only the Louvre.

Consult the spirited narrative of Muther, *History of Modern Painting*, vol. ii (London, 1907), Van Dyke, *Modern French Masters* (New York, 1906), and the special works on the *Painters of Barbizon* by Mollet (London, 1895), D. C. Thompson (ib., 1902), Arthur Tomson (ib., 1908); La Farge, *The Higher Life in Art* (New York, 1908), an able and intimate account of the Barbizon men.

BARBON. See BAREBONES.

BARBOSA DU BOCAGE, bär-bō'sȧ dụ bō'käzh'. See BOCCAGE, MANOEL MARIA BARBOSA DU.

BARBOSA-MACHADO, bär-bō'zȧ-mä-shā'dụ, DIEGO (1682–1770). A Portuguese bibliographer. He was born in Lisbon, took holy orders in 1724, and received the appointment of abbot of the convent of Lamo-Adrião de Sever. Here he remained until his death, engaged in the preparation of a monumental work which contains biographical notices of all the Portuguese and Brazilian authors. It is called *Bibliotheca lusitana antiqua e nova, historica, critica e chronologica, na qual se comprehende a noticia dos autores portuguezzes, e das obras que compuzezão desde o tempo da promulgação da ley de graça, até o tempo presente* (4 vols., Lisbon, 1741–52). A summary of this was arranged by Bento José Farinha, *Sumario da Bibliotheca lusitana* (4 vols., Coimbra, 1820).

BARBOU, bär'bōō', JOSEPH GÉRARD (1715–1813). The most important representative of the firm of French printers of that name. Of his publications the best known are to be found in his continuation, in duodecimo, of the series of Latin classics begun by Antoine Coustelier, at the instance of the Abbé Lenglet Dufresnoy. These volumes of his are still justly noted for their careful text and excellent typography.

BARBOUR, bär'bēr, ERWIN HINCKLY. An American geologist. He was born near Oxford, Ohio, and was educated at Miami University and at Yale, where he graduated in 1882. He was assistant paleontologist to the United States Geological Survey from 1882 to 1888, and Stone professor of natural history and geology at Iowa College from 1889 to 1891. He became professor of geology in the University of Nebraska, acting State Geologist, curator of the State Museum, geologist of the State Board of Agriculture, and director of the annual Morrill geologic expeditions. Following his work in Nebraska he was engaged in United States geologic and hydrographic surveys.

BARBOUR, JAMES (1775–1842). An American politician. He was a member of the Virginia Legislature from 1796 to 1812; was Governor of the State for two terms, and was a member of the United States Senate from 1815 to 1825, when he became Secretary of War in the cabinet of President J. Q. Adams. He was appointed Minister to England in 1828, but was recalled by Jackson in the following year. He presented a bill to establish a United States Bank, was author of the anti-dueling act of Virginia, and presided over the national convention that nominated Harrison and Tyler.

BARBOUR, JOHN (c.1316–c.1395). The first of the early Scottish poets, regarding whom history has not much to record beyond the production of the national epic, entitled *The Brus*, the subject of which is Robert Bruce. The ascertained facts of Barbour's life may thus be summarized: Born about 1316, he was Archdeacon of Aberdeen in 1357 and held that office till his death; in 1357 he traveled into England, accompanied by three scholars, on a visit to Oxford; in 1365 he obtained a passport "to travel through England with six companions on horseback toward Saint Denis and other sacred places"; in 1368 he again received permission to travel through England with two servants and two horses, on his way for scholarly purposes to France; in 1373 he was clerk of audit of the household of King Robert II and one of the auditors of exchequer; in 1375 his great poem was more than half finished; in 1377 he had a gratuity of £10 from King Robert II; in 1378 he received from the same prince a perpetual annuity of 20s., which in 1380 he bequeathed to the dean and chapter of Aberdeen, under the condition that they should sing a yearly mass for the repose of his soul; in 1381 he had a gift from the crown of the wardship of a minor whose estate lay within the parish of which he was rector; in 1383, and again in 1385, he was one of the auditors of exchequer; in 1388 King Robert II granted him a pension of £10 a year; and he died probably on March 13, 1395. Besides *The Brus*, two other poems have, with reasonable certainty, been assigned to Barbour: *The Legends of the Saints*, and a poem on the Trojan War, of which only fragments remain. *The Brus* is distinguished by great purity and clearness of style, the language and versification contrasting advantageously with those of any contemporary English poet except Chaucer. Barbour's imagery is not rich, but he is seldom other than lively, simple, and energetic. He has depicted, in rough but faithful outline, the life, manners, and deeds of a truly heroic time and given to his country the first poem in her literature and the earliest history of her best and greatest king. Consult: *The Brus*, ed. by Skeat for Early English Text Society (London, 1870–89) and for the Scottish Text Society (Edinburgh, 1894); *Legends of the Saints*, ed. by Metcalfe for Scottish Text Society (Edinburgh, 1896); and Horstmann, *Barbour's Legendensammlung, nebst den Fragmenten seines Trojanenkrieges* (Heilbronn, 1881–82). Consult also Andrew Lang's *History of Scotland* (1900). See ENGLISH LITERATURE; SCOTTISH-GAELIC LITERATURE.

BARBOUR, OLIVER LORENZO (1811–89). An American lawyer and legal writer. He was born at Cambridge, N. Y., studied law, was in 1832 admitted to the bar, and was reporter of the New York Court of Chancery in 1847–49. From 1848 to 1876 he was reporter of the State Supreme Court. He published *Equity Digests* (1836–41), *Treatise on the Practice of the Court of Chancery* (1843), and many other works.

BARBOUR, PHILIP PENDLETON (1783–1841).

An American jurist. He was born in Virginia and studied law at William and Mary College. From 1812 to 1814 he was a member of the State Legislature, from 1814 to 1821 was in Congress, being Speaker of the House in 1821, and later was a judge of the Virginia General Court. Again, from 1827 to 1830, he was in Congress, and from 1836 until his death was an associate justice of the United States Supreme Court. He was a strong Southern partisan on the Missouri Question.

BARBOUR, Ralph Henry (1870–). An American author, born at Cambridge, Mass. He contributed verse and short stories to magazines under the pen name of "Richard Stillman Powell," but became best known under his own name for entertaining boys' stories. His writings include: *The Halfback* (1899); *Captain of the Crew* (1901); *On your Mark* (1904); *Four in Camp* (1905); *Four Afoot* (1906); *Holly* (1907); *Four Afloat* (1907); *Forward Pass* (1908); *Double Play* (1909); *Winning his "Y"* (1910); *Team Mates* (1911); *Cupid en Route* (1912); *The Junior Trophy* (1913); *Peggy-in-the-Rain* (1913).

BARBOURSVILLE. A town in Cabell Co., W. Va., 9 miles by rail east of Huntington, the county-seat; on the Guyandotte River and on the Chesapeake and Ohio, and the Guyandotte Valley railroads (Map: West Virginia, B 3). It is the seat of Morris Harvey College (Methodist Episcopal, South), opened in 1888, and the Kuhn Memorial Hospital, and is of historic interest as the scene of a conflict in the Civil War, July, 1861, which terminated in a Federal victory. Barboursville became a town by an Act of the Virginia Legislature in 1813, was incorporated in 1867, and formerly was the county-seat. The town has manufactories of lumber and brick and owns its water works and electric light plant. There are deposits of coal, oil, and gas in the vicinity. Pop., 1900, 429; 1910, 907.

BAR'BOURVILLE. A town and the county-seat of Knox Co., Ky., 188 miles by rail southeast of Louisville; on the Cumberland River, and on the Louisville and Nashville Railroad (Map: Kentucky, G 6). The principal industries are agriculture, coal mining, and lumbering; there are several saw and grist mills. Oil wells of considerable promise have been drilled, and the country is developing rapidly. Pop., 1890, 1162; 1900, 1010; 1910, 1633.

BAR'BOX BROTH'ERS. A short story by Charles Dickens in *All the Year Round* (1866). There is a second part entitled *Barbox Brothers & Co.*

BARBOZA. See Caldas-Barbosa.

BARBUDA, bär-bōō'dȧ (Portug. island of bearded men). One of the Leeward Islands in the British West Indies, situated 20 miles north of Antigua (q.v.), of which it is a dependency (Map: West Indies, G 3). The island, of coral formation, has an area of 73 square miles, with a generally level surface, which is to some extent covered with forests. The main occupation of the inhabitants is cattle raising. In 1911 Barbuda had a population of 775, mostly colored.

BARBUDO, bär-bōō'dō, or **BARBU,** bär-bōō'. Names given to the thread fins of the genus *Polydactylus,* within the family Polynemidæ and the suborder Rhegnopteri, small fishes of the warmer American seas allied to the sand launce. The commonest species (*Polydactylus virginicus*) is a food fish of some importance in the West Indies and Florida, found in abundance off sandy shores. It is illustrated on the Plate of Mullets and Allies.

BAR'BY. A town in the province of Saxony, Prussia, on the left bank of the Elbe, near the mouth of the Saale, 16 miles southeast of Magdeburg (Map: German Empire, D 3). It has a normal school and a home for the blind and is the seat of a district court. The manufactures include bricks, beer, and confections. The town is well built, has a mediæval castle, and was the seat of a countship. Pop., 1900, 5137; 1905, 5301; 1910, 5292.

BAR'CA, or **BARCE,** bär'sē (Gk. Βάρκη, *Barkē*). An ancient city in Cyrenaica, in the district of Barca, Africa. The ruins are now known as Medinet-el-Merj. It was founded by a Cyrenean colony about 554 B.C. The Persians captured and pillaged the city about 510 B.C., and many of its people were led off as captives into Bactria. Under the Ptolemies it assumed considerable importance as a seaport.

BAR'CA, or **BENGAZI.** Since Oct. 18, 1912, an Italian possession, part of Libia Italiana (formerly a Turkish mutessarifat) in north Africa, situated in long. 20° to 25° E., and lat. 29° to 33° N., between Tripoli, Egypt, and the Libyan Desert, and bounded on the north by the Mediterranean Sea (Map: Africa, G 1). It has an estimated area of 20,000 square miles and a population of about 300,000, consisting mainly of Berbers, Arabs, Turks, and Greeks. It is an arid, elevated plateau, for the most part covered with sand. A range of mountains reaching in Jebel Akhdar an elevation of 3300 feet traverses the northern part from east to west. A fringe of fertile plains of red alluvium on the borders affords good arable and pasture land and contributes to the principal industries —agriculture and cattle raising. Considerable quantities of grain and cattle are exported. The sponge fisheries are also important. The chief imports are textiles and drugs. In the time of Cyrus Barca became a state which proved dangerous to the neighboring state of Cyrene, but within a century it became subject to Egypt. In the Roman period its inhabitants were noted for their predatory incursions. It was afterward a province of the Byzantine Empire and had declared itself independent when the Arabs invaded and conquered it in 641. It became part of Tripoli, later a separate province under Turkish dominion. By the Treaty of Ouchy, signed by the Turkish and Italian delegates Oct. 18, 1912, it was formally recognized as a dependency of Italy; it forms with Tripoli the new Italian colony Libya (q.v.).

BARCA (Sp., It. bark). A small two-masted vessel. A *barca-longa* is a large Spanish coasting vessel having pole masts and lugsails; the name is also applied to a gunboat. Both terms are used in the Philippine Islands in the senses given.

BARCA, or **BAR'CAS** (Gk. Βάρκας, *Barkas;* Punic, lightning, gleaming; cf. Heb. *barak,* a gleaming, or gleaming sword). A surname which was applied to Hamilcar and other Carthaginian commanders.

BARCAROLLE, bär'kȧ-rōl (It. *barcarolo,* boatman, from *barca,* boat). A species of song peculiar to the gondoliers of Venice. Hence the name is applied to musical compositions of a similar character, usually for voice, more rarely for instruments.

BARCELLONA, bär'chĕl-lō'nȧ. A city in Sicily, on the Longano, 27 miles west of Messina (Map: Italy, K 9). It is famous for sulphur baths that are frequented from May to September. The suburb of Pozzo di Gotto is separated from the main town by a small stream, the Fiume di Castro Reale, supposed to be the Longanus of antiquity. Oil, manna, wine, and fruit are the most important products. There are fine forests on the near-by mountains. The chief commerce is in oil and fish. Pop., 1881, 15,000; 1901 (commune), 23,493; 1911, 26,172.

BAR'CELO'NA, *Sp. pron.* bär'thȧ-lō'nȧ (anciently, *Colonia Faventia Julia Augusta Pia Barcino*). The capital of the province of Barcelona (formerly capital of Catalonia); after Madrid the largest city in Spain and the most important maritime, commercial, and industrial centre (Map: Spain, G 2). It is situated in lat. 41° 21′ 44″ N., long. 2° 30′ 32″ E., on the Mediterranean coast, between the mouths of the Llobrégat and the Besós, in a fertile and well-populated valley surrounded by hills, 440 miles northeast of Madrid by rail, 310 miles in a direct line. It has a pleasant and equable climate (mean temperature, 61° F.) and a good municipal water supply. Barcelona consists of the old city, formerly surrounded by walls, which have been converted into promenades, and numerous suburbs of modern architecture containing the various manufacturing establishments to which the city owes a great deal of its importance. The only fortification of Barcelona is the Castillo de Monjuich, situated on an isolated mountain near the city and provided with large magazines and extensive barracks. In the older portion of the city, bounded by the *Dondas* and the *Salons*, which mark the site of the old walls, the streets, with the exception of the wide Rambla, the Calle de Fernando VII and the Calle de la Princesa, are narrow and crooked. They are lined with houses most beautiful in design, although of somewhat gloomy coloring. The Rambla, which begins at the Columbus Monument, near the harbor, and ends at the Plaza de Cataluña, is the favorite city promenade and contains most of the theatres, hotels, and shops. On the north side of the city is situated the magnificent public park, with its fine avenues, flower beds, lakes, and several museums, including the Museo de Reproducciones, containing a fine collection of plaster casts. The cathedral of Barcelona occupies the highest point in the centre of the old city, the site formerly of a Roman temple and a Moorish mosque. It is a magnificent building of Spanish Gothic, founded in the thirteenth century, with a spacious nave, ornamented with fine reliefs. Its 26 chapels date chiefly from the sixteenth and seventeenth centuries. The church of Santa María del Mar, in late Gothic, has a fine façade decorated with bronze statues and two towers. Among other churches may be mentioned that of San Pedro de las Puellas, dating from the tenth century, and the Gothic church of Santa María del Pino.

The secular buildings of Barcelona include the old palace of the counts of Barcelona, containing the archives; the Casa de la Diputación, erected in the fifteenth century and used by the chamber of deputies for the province; and the Casa Consistorial, containing the municipal archives. Among the more modern buildings are the exchange, the custom house, and the palace of justice. Barcelona is the seat of a supreme court, a bishop, and the captain-general of Catalonia. It has a large number of nunneries and monasteries, to which are attached numerous educational and benevolent institutions. The University of Barcelona was founded in 1430 and confirmed in its establishment by Nicolas V in 1450, partly removed in 1714 to Cervera, and again established at Barcelona in 1837. It has faculties of philosophy, law, natural sciences, mathematics, medicine, and pharmacy, with a total attendance of about 1900 students. Other educational institutions of Barcelona include schools of architecture, engineering, commerce, agriculture, war, theology, pedagogy, etc. Elementary education is under the control of the municipality and is compulsory, but only in theory. The provincial and the university libraries have together over 154,000 volumes, and the general archives of the kings of Aragon number nearly 4,000,000 documents. The Palacio de Bellas Artes, situated in the park, is used for exhibitions of paintings and sculptures. Barcelona has a considerable number of theatres, among which the Gran Teatro de Liceo is the largest, with a seating capacity of 4000. There is also a bull ring, with a seating capacity of 14,500.

Barcelona is one of the largest cotton-manufacturing centres of Spain. Its other important manufactures are woolen and silk fabrics, metal articles, paper, glass, leather, and chemicals. Barcelona's commercial importance dates from the Middle Ages. The shipping, including the coast traffic, exceeds 3,000,000 tons per annum. The total commerce of the port amounts to over 750,000,000 pesetas (about $150,000,000), of which about 300,000,000 pesetas ($60,000,000) represent imports from foreign countries.

The exports consist chiefly of wine, southern fruits, and manufactures. The imports are mostly grain from Russia and the United States, cotton from the United States, hemp, metal products, and foodstuffs. Barcelona has direct communication with Germany, Morocco, Great Britain, and the West Indies. It is the seat of a United States consulate and has consular representatives from every country of importance. Municipal enterprise has improved the harbor considerably since 1880 by means of extensive moles and lighthouses.

In its administration Barcelona is the most autonomous municipality in Spain. It is governed by a council, elected by all citizens above the age of 25, who have resided not less than two years in the commune. The term of office is four years, and the council is presided over by an *alcalde*, chosen by the members from their midst. The council has charge of all the departments of municipal administration and even exercises supervision over private charitable institutions. The death rate of Barcelona is below the average for the entire country, and its sanitary conditions are improving rapidly. The city is lighted by gas and electricity, supplied by private companies. The general progress of Barcelona was accompanied by a corresponding increase of population during the last quarter of the nineteenth century. Pop., in 1887, 272,481; in 1900 (after large annexation of suburbs and manufacturing quarters), 533,000; communal *de facto* population, Dec. 31, 1910, 587,411; *de jure* population, 581,823; est. population, 1919, 582,240. Consult Montpalais, *Memorias Históricax de Barcelona* (Madrid, 1779–92).

Barcelona was founded by the Phœnicians

and is said to have derived its early name of Barcino from Hamilcar Barca, who made it one of the centres of Carthaginian power in the peninsula. An important city under the Romans, Goths, and Saracens, Barcelona in the latter half of the ninth century became an independent sovereignty, under a Christian chief of its own, whose descendants continued to govern it (being known as the counts of Barcelona) until 1137, when Catalonia, by the marriage of its prince, Raymond Berengar, with the heiress to the crown of Aragon, became a part of that kingdom. During the Middle Ages Barcelona became a flourishing seaport, rivaled in the Mediterranean by Genoa only. To its commercial code, framed in the thirteenth century, much deference was paid by the whole of Europe. In 1640 Barcelona revolted from Philip IV, but in spite of the support of the French arms it was forced to resume its allegiance in 1652. In 1705 the fortress of Monjuich was surprised and captured by Lord Peterborough, and the city surrendered shortly afterward. In 1714, after a most heroic defense, it was stormed by the Duke of Berwick and given over to fire and sword. The French held it from 1808 to 1814. During the nineteenth century Barcelona took an active share in the political dissensions of the Spanish nation. It was the centre both of reactionary and radical agitations, and the scene of socialist and Carlist uprisings. It is here that modern Spanish anarchism has its nursery; strikes and riots are frequent within the town, and in Barcelona there is to be found much republican sentiment.

BARCELONA. The capital of the state of Barcelona, Venezuela, on the Neveri River, 3 miles from the Atlantic coast and 150 miles east of Carácas (Map: Venezuela, E 1). It is connected with the port of Guanta by a railroad. The city is at the northern limits of the fertile llanos and is regularly laid out, but is rather poorly built and unhealthful. Among prominent buildings are the government house, the Masonic Temple, a theatre, a market, hospitals, churches, and educational institutions. The city has coal and salt mines in the vicinity and is the seat of an extensive commerce in cotton, rope, and rum. Barcelona was settled in 1638 at the foot of the Cerro Santo, but in 1671 the settlement was removed to the present site of the city. It was the capital of the former state of Barcelona until 1881, when it became the capital of the state of Bermúdez, which was subsequently divided into the states of Barcelona and Sucre. The city formerly had a much larger population, which decreased considerably because its industry and trade suffered severely in the War of Independence. There is still considerable export of sugar, coffee, and tropical products. Pop., 1891, 12,785; 1899, about 9000; 1905 (est.), 13,000.

BAR'CLAY, Alexander (c.1475–1552). A poet and satirist. He was born about 1475, but whether in England or Scotland is not certain. He studied at one or both of the English universities and then obtained, through his patron, Bishop Cornish, an appointment as priest in the college of St. Mary Ottery in Devonshire. He afterward became a monk of the Benedictine Monastery of Ely, where he remained until its suppression in 1539. He died in June, 1552, six weeks after he had been presented to the rectory of All-Hallows, London. His claim to notice rests chiefly upon his famous poem, *The Shyp of Folys of the Worlde*—partly a translation, and partly an imitation, of the German *Narrenschiff*, originally by Sebastian Brandt—printed by Pynson in 1509 and since often reprinted. Barclay, however, knew nothing of the original, but founded his translation on a Latin version by Jacob Locher, entitled *Stultifera Navis*. The poem is interesting as showing the manners and customs of the times satirized. He published several works besides; among others, *The Myrrour of Good Maners*, *The Castell of Laboure*, *The Egloges*, the first eclogues that appeared in the English language; and also made a translation of Sallust's *History of the Jugurthine War*. In his lifetime he was admired for his wit and eloquence, and his writings exhibit a refinement not common in that age. Consult Barclay, ed. Jamieson, *The Shyp of Folys* (Edinburgh, 1874), and Hannay, *Satire and Satirists* (1854). See English Literature; Satire.

BARCLAY, John (1582–1621). A Scottish poet and satirist. He was born Jan. 28, 1582, at Pont-à-Mousson, in Lorraine, where his father, William Barclay, a Scotchman, was professor of civil law. His mother was a Frenchwoman, but Barclay always considered himself a Scotchman. It has been said that he was educated by the Jesuits, who tried to induce him to enter their order. Whether this is so or not, he had great antipathy to them. On the accession of James to the English throne (1603), Barclay came to London, where he published the first part of the *Satyricon*, a politico-satirical romance chiefly directed against the Jesuits and the Duke of Lorraine. In 1607 a second part appeared in Paris. This was followed by the *Apologia* (1611) and *Icon Animorum* (1614), which may be regarded as further continuations of the *Satyricon*. In the meantime Barclay had published a collection of graceful Latin poems bearing the title *Sylvæ* (1606). In 1615 he left England and went to Rome, where he died Aug. 15, 1621. In the same year his best-known work, the *Argenis*, appeared posthumously in Paris. It was written in Latin and has been translated into several languages. There are no fewer than three translations into English; the last appeared in 1772. It is a political allegory, containing clever allusions to the state of Europe, more particularly of France, during the time of the League. *Argenis* was admired by Cowper and Coleridge. Consult Dukas, *Etude bibliographique et littéraire sur le Satyrikon* (Paris, 1880). See English Literature; Satire.

BARCLAY, John (1734–98). A Scottish divine, the founder of a sect in the Scottish church called Barclayites, or Bereans—a name derived from the Acts of the Apostles, xvii. 2. He was assistant minister at Fettercairn, where he attracted crowds by his novel doctrines, but the Presbytery dismissed him from his position. The General Assembly sustained the Presbytery, whereupon Barclay left the church, but continued to preach in Edinburgh, London, and other cities. (See Bereans.) He published many tracts and pamphlets. One of the more important of his longer treatises is *Without Faith, Without God; or an Appeal to God Concerning His Own Existence* (1769). His *Works* were published with a memoir (1852).

BARCLAY, John (1758–1826). A Scottish anatomist. He prepared for the ministry, but became interested in natural science and devoted his life to the study of anatomy. He published, in 1803, *A New Anatomical Nomenclature*, and

in 1808 a treatise on the muscular motions of the human body. In 1812 appeared his *description of the Arteries of the Human Body*, a work of vast labor and accurate observation. In 1822 he published *An Inquiry into the Opinions, Ancient and Modern, Concerning Life and Organization*. He left to the Royal College of Surgeons in Edinburgh his admirable anatomical collection, for which a suitable hall was erected and named the "Barclayan Museum." Consult Waterhouse's "Memoir" in *Jardine's Naturalist's Library*, vol. viii (Edinburgh, 1843).

BARCLAY, ROBERT (1648–90). The celebrated apologist of the Quakers. He was born on Dec. 23, 1648, at Gordonstown, in Morayshire, Scotland. His father was the son of David Barclay, of Mathers, the representative of an old Scoto-Norman family; his mother was the daughter of Sir Robert Gordon, the premier baronet of Nova Scotia and historian of the house of Sutherland. Young Barclay received the rudiments of learning in his native country and was afterward sent to the Scotch College at Paris, of which his uncle was rector. Here he made rapid progress in his studies and excited the admiration of his preceptors as well as of his relative, who offered to make him his heir if he would remain in France and formally adopt the Roman Catholic religion, to the ceremonies of which he had been habituated during his residence there. This, however, Barclay refused to do and returned home in 1664. Though only 16, Barclay was an excellent scholar and could speak Latin with wonderful fluency and correctness. In 1666 his father became a Friend, and the next year Barclay followed him. He states in his *Treatise on Universal Love*, that his "first education fell among the strictest sort of Calvinists," those of his country "surpassing in the heat of zeal not only Geneva, from whence they derive their pedigree, but all the other so-called Reformed Churches"; that shortly afterward his transition to France had thrown him among the opposite "sect of Papists," whom after a time he found to be no less deficient in charity than the other; and that consequently he had refrained from joining any, though he had listened to several. The ultimate effect of this was to liberalize his mind by convincing him of the folly and wickedness of religious strife. In both Calvinists and Catholics he found an absence of "the principles of love," "a straitness of doctrine," and a "practice of persecution" which offended his idea of Christianity as well as his gentle and generous nature. He therefore allied himself gladly to the Friends, whose distinguishing feature was their charity and pure simplicity of Christian life, and soon became one of their most devoted adherents and their ablest advocate. In the course of his life he made several excursions into England, Holland, and Germany, earnestly propagating his peaceful views wherever he went and occasionally enjoying the companionship of William Penn.

His first publication was *Truth Cleared of Calumnies*. It appeared in 1670 and was intended as a refutation of the charges—many of them notoriously false—made against the new sect. In 1673 appeared *A Catechism and Confession of Faith*, the answers to the questions being, to avoid theological dogmatism, in the words of Scripture. This was followed by *The Anarchy of the Ranters* in 1676, and the same year he published in Latin his greatest work. In 1678 he published it in English, under the title *An Apology for the True Christian Divinity, as the same is Held forth and Preached by the People called in Scorn Quakers*. It contains a statement and defense of 15 religious propositions peculiar to the Friends. The leading doctrine which runs through the whole book is, that divine truth is made known to us not by logical investigation, but by intuition or immediate revelation; and that the faculty, if it can be technically defined, by which such intuition is rendered possible, is the "internal light," the source of which is God, or, more properly, Christ, "who is the light that lighteth every man that cometh into the world." In 1677 appeared his *Treatise on Universal Love*. It was the first of that long series of noble and gentle remonstrances against the criminality of war that has so honorably distinguished the Society of Friends. It was addressed to the ambassadors of the several princes of Europe, met at Nimeguen, and was composed in prison at Ury, near the city of Aberdeen, where he, his father, and many other Friends were confined for their faith's sake. He was released after five months and during the latter part of his life enjoyed court favor unmolested. In 1683 the Duke of York gave the Friends the patent of the province of East Jersey, and Barclay was made nominal Governor. He never came to America, however. In 1686 he published his last work, which was a defense of the doctrine of "immediate revelation." He died at Ury, Oct. 3, 1690. His estate remained in the possession of his descendants till the death, in 1854, of Robert Barclay Allardice. "The Apologist's Study," which remained much as he left it, was long an object of pilgrimage with members of the Society of Friends; but it was destroyed a few years ago, when the old house of Ury was pulled down. Barclay's works were published in a collected edition entitled *Truth Triumphant* (London, 1692; later ed., 1717–18, 3 vols.). For his biography, consult Wilson Armistead (Manchester, 1850). His *Apology* and *Catechism* and *Treatise on Church Government* (formerly called, as above, *The Anarchy of the Ranters*) have been reprinted by the Friends' Book Store (Philadelphia).

BARCLAY, ROBERT H. (?–1837). A Scottish naval officer. He served at Trafalgar and in 1813 fitted out the English fleet on Lake Erie. In command of this fleet he was defeated in the battle of Lake Erie, September 10, by Commodore O. H. Perry (q.v.). During the battle he was seriously wounded. Subsequently he was tried by court-martial for the surrender of his fleet, but was acquitted.

BARCLAY, SIR THOMAS (1853–). A British barrister, born at Dunfermline, Scotland. He was educated at University College, London, and at the universities of London, Paris, Bonn, and Jena. Having been sent to Paris in 1876 as correspondent of the London *Times*, he turned his attention (1882) to the study of French law practice. In 1900 he began agitation for a better understanding between England and France, in 1903 and 1904 visited the United States in the interest of an Anglo-American arbitration treaty, and in 1905 made addresses in Berlin in favor of improving British and German relations. The International Brotherhood Alliance (*Fraternitas inter gentes*) was founded by him in 1905. He was knighted in 1904, and in 1910 he became a member of Parliament. His publications include: *Companies in France* (2d ed., 1899); *The Hague Court and Vital Inter-*

ests (1905); *Problems of International Practice and Diplomacy* (1907); *The Turco-Italian War and its Problems* (1912).

BARCLAY DE TOLLY, bär-klā de tô-lē', Michael, Prince (1761–1818). A Russian general. He was descended from an old Scottish family settled in Livonia, and entered a Russian regiment of cuirassiers with the rank of sergeant. He fought with great bravery in the Turkish War of 1788–89, in the campaign against Sweden in 1790, and in those against Poland in 1792 and 1794. In the year 1806, at Pultusk, as major general, he commanded Bennigsen's advance guard. In 1808 he distinguished himself in Finland, and in 1809 he led a force across the frozen Gulf of Bothnia to Sweden. Although hated by the Russian national party as a foreigner, he was appointed Minister of War by the Emperor Alexander in 1810, an office which he held till 1813. In 1812 he was made commander in chief of the Army of the West. His retreat to Smolensk, and the loss of the battle fought there on the 17th of August, raised the hatred of the Russian national party to a greater height than ever, and he was obliged to yield the chief command to Kutusoff. Barclay's Fabian tactics, although extremely unpopular with the mass of Russians, in the end brought about the destruction of Napoleon. At the battle of the Moskva or Borodino he commanded the right wing. After the death of Kutusoff he again rose to prominence, did brilliant service in the battle of Bautzen (1813), and was once more placed in command of the army. He afterward took part in the battles of Dresden, Culm, and Leipzig. He was made prince and field marshal. He died at Insterburg, in East Prussia.

BAR'CLAY SOUND. An inlet on the west coast of Vancouver Island, British Columbia, Canada (Map: British Columbia, D 5). It extends eastward for about 35 miles and is continued inland three-fourths of the way across the island by the narrow fiord, Alberni Canal, which drains the Great Central, Sproats, and Nahmint lakes. The northern and southern extremities of the sound are called, respectively, Cape Beale, marked by a lighthouse, and Amphitrite Point. Broken Group and several other islands are in its waters. Deposits of iron-bearing ores exist on its shores.

BARD (Irish *bard*, Welsh *bardd*, Cornish *bardh*, Breton *barz*). A name commonly given to poets and singers among the Celtic peoples, and mentioned by classical historians as early as the second century B.C. But they disappeared early among the Gauls of the Continent, being replaced in ancient Ireland by the satirical or panegyrical poets called *filid*. Among the insular Celts they formed an important social class throughout the Middle Ages, and under modified conditions, the order exists to this day.

According to Strabo (*Geography*, vol. iv, pp. 4, 5), there were among the primitive Celts three classes of men who were the objects of extraordinary honors: the bards, the ovates, and the druids. The meagre information that we possess concerning the primitive bards permits us to believe that they were national poets or minstrels, and that they used the *chrotta*, a kind of harp.

In the old Welsh laws bards were recognized as important members of the community, with special rights and duties. They were organized in some fashion into a separate order, and it is traditionally believed that Gruffydd ap Kynan, King of Gwynedd, made rules for their government. But on this last point there is no satisfactory proof. It should be also said that there is no evidence at all for the claim that the bardic organization of the twelfth century was a survival of the ancient Druidic hierarchy. Mr. Stephens, in his *Literature of the Kymry*, has made it clear that the Druidism of the Middle Ages was confined to the bards and was of very recent origin; and the Druidism of the modern *Gorsedd* appears to be a later development still. The writings of the Welsh bards, which dealt with a large variety of subjects, both secular and religious, are treated elsewhere in the article on Welsh Language and Literature. The order of bards is still regularly maintained in Wales in connection with the Druids and ovates. From year to year, reunions (called *Eisteddfodau*, from *eisted*, 'to sit') are held, in which those who win certain prizes are granted a bardic name. Many of these are known by their fellow countrymen by no other title.

In Ireland the rank and privileges of poets were not dissimilar to those established in Wales. But the name *bard* was at first applied in Irish only to the lower order of popular rhymesters, while the poets of the schools were known as *filid* (singular, *fili*). This distinction disappeared, however, in the course of time, and the name *bard* came to be applied to all poets in Ireland as it was in Wales. Professional bardic schools were maintained down through the seventeenth century, and the old classical metres were taught in them to the end. (See Irish Literature.) But English rule was always unfavorable to the bards, and they practically disappeared in the course of the eighteenth century.

In Scotland, the name *bard* has been applied freely to poets down to the present time, but there does not appear to have been any regular bardic organization in the modern period.

Bibliography. Classical citations are brought together in Holder's *Altceltischer Sprachschatz* (Leipzig, 1896). Consult also for the bards of the Gauls: Dottin, *Manuel de l'antiquité celtique* (Paris, 1906); D'Arbois de Jubainville, *Cours de littérature celtique*, vol. i (Paris, 1883); *Les Druides et les dieux celtiques à forme d'animaux* (Paris, 1906). For the Welsh bards: Walter, *Das alte Wales* (Bonn, 1859); Stephens, *Literature of the Kymry* (London, 1873). For the Irish bards: Thurneysen, *Mittelirischen Verslehren*, in Stokes and Windisch's *Irische Texte*, vol. iii (Leipzig, 1880–1900); Douglas Hyde, *A Literary History of Ireland* (New York, 1906); Hull, *Irish Literature*, vol. ii (*London*, 1908). Among older treatises, Jones, *Relics of the Welsh Bards* (London, 1784), and Walker, *Memoirs of the Irish Bards* (London, 1786), may be cited.

BARD, or **BARD'ING** (Sp., Port. *albarda*, pack saddle, from Ar. *al-barda'ah*, a wooden pad placed under the saddle). The armor used for the protection of a horse; almost always used in the plural, bards or bardings. See Chamfron.

BARD. A village in north Italy, on the Dora Baltea River and the Turin-Aosta Railway, 51 miles north of Turin (Map: Italy, B 2). Near it and over the railway tunnel, at a height of nearly 1300 feet, towers Fort Bard, which commands the road over the Great and Little St. Bernard into the plains of Piedmont. It was built in the eleventh century, was seized by the French during the War of the Spanish Succession in 1704, and in 1800 was destroyed by them

after it had been defended by 400 Austrians who held Napoleon in check for a week before the battle of Marengo; it was afterward rebuilt. Pop. (commune), 1881, 437; 1901, 425; 1911, 390.

BARD, SAMUEL (1742–1821). An American physician. He was born in Philadelphia and was educated at Columbia College and the Edinburgh Medical School. He organized the medical school at Columbia College and became dean of the faculty. While New York was the seat of the Federal government, he was Washington's family physician. In 1813 he became president of the College of Physicians and Surgeons in New York. His published works comprise a study of the diseases of sheep, *The Shepherd's Guide* (1807); a treatise on *Angina Suffocativa*, and a *Manual of Midwifery* (1807). Consult John McVickor, *Life of Samuel Bard* (New York, 1822).

BARDAISAN, bär'dī-sän'. See BARDESANES.

BARDEEN, CHARLES WILLIAM (1847–). An American educator and editor, born at Groton, Mass., and a graduate of Yale University in the class of 1869. For three years before entering college he served in the Civil War, with the First Massachusetts Volunteers. After filling several less important educational positions, he was made (1872) superintendent of schools at Whitehall, N. Y. Two years later he became editor and publisher of the *School Bulletin* and continued as such for many years. Identifying himself prominently with a number of educational and scientific societies, he held for six years (1900–06) the presidency of the Educational Press Association of America. His publications, dealing mainly with subjects related to his profession, include: *Manual of School Law* (1875); *Some Facts about our Public School System* (1878); *Teaching as a Business for Men* (1885); *Organization and System Versus Originality* (1890); *The Song Budget Series Combined* (1894); *Geography of the Empire State* (1895); *Some Problems of City School Management* (1899); *Dictionary of Educational Biography* (1901); *The Woman Trustee* (1905); *Educational Journalism for the Past Fifty Years* (1906); *Fables for Teachers* (1909); *Tom and Tom Tit* (1911); *The Yellow Streak, and Other Stories about Schools* (1912).

BARDELEBEN, bär'de-lā'ben, ADOLF VON (1819–95). A German surgeon, born at Frankfort-on-the-Oder. He studied medicine in Germany and in France and in 1849 became professor of surgery at the University of Greifswald. During the War of 1866 he acted as surgeon general and in 1868 became professor of surgery in the University of Berlin. In 1870 he again acted as consulting military surgeon. His published works include an excellent *Lehrbuch der Chirurgie und Operationslehre* (1852; 8th ed., 4 vols., 1879–82).

BARDELL', MRS. A widow in Dickens's *Pickwick Papers*. She is plaintiff in the famous case of Bardell *v.* Pickwick. After the trial she is thrown into the Fleet Prison for inability to pay her lawyer's fees. See DODSON AND FOGG.

BARDESANES, bär'de-sā'nēz, or **BARDAISAN** (son of Daisan, a river) (154–c.223). A Syrian Christian poet and theologian. He was born at Edessa, of a good family, and lived for a time at the court of the Abgars. Our information concerning him is not extensive, and only fragments of his many writings have survived, but we know that he was a very influential figure in the Syrian church. He died at Edessa c.223. It was chiefly through his efforts that Christianity was first introduced into Edessa, which soon became an important theological centre. He fled into Armenia when Edessa was taken by Caracalla (217), but returned soon afterward. Writers like Eusebius and Jerome refer to Bardesanes in high terms, although the former represents him as having been for a time a Valentinian Gnostic. See VALENTINUS; GNOSTICISM. He popularized his views in the form of hymns, 150 in number, which were widely used and which justify us in regarding Bardesanes as one of the fathers of Christian hymnology. It is uncertain how much his son, Harmonius, contributed toward this enrichment of worship, but some ancient authorities rate his services very high. Ephraim, the Syrian, an orthodox writer of the fourth century, was alarmed at the influence these hymns still exerted in his day, so he composed others in their place, using Bardesanes as a model, but inserting nothing that was not strictly Catholic. It is difficult to decide just how far Bardesanes' teachings diverged from orthodoxy. He himself denied the charge of polytheism which was brought against him.

The book of *Laws of Countries—Cureton, Spicilegium Syriacum* (London, 1855), and the *Ante-Nicene Fathers*, vol. viii, pp. 723 ff. (New York, 1895)—is not the work of Bardesanes, as some have thought, but comes from one of his school and reflects his views. For the early references to Bardesanes consult Harnack, *Geschichte der altchristlichen Litteratur*, vol. i (Leipzig, 1893); for monographs on Bardesanes (in German), Hahn (1819), Merx (1863), and Hilgenfeld (1864). Consult in general, Hort, "Bardaisan," in Smith and Wace, *Dictionary of Christian Biography* (London, 1887).

BARDI, bär'dē, BARDO DE'. A blind scholar in George Eliot's novel, *Romola*. He is the father of the heroine.

BARD OF A'VON. A frequent title of Shakespeare, from his home at Stratford-on-Avon.

BAR'DOLPH. One of Falstaff's followers in Shakespeare's *Henry IV*, *Henry V*, and *The Merry Wives of Windsor*. He is, first, corporal, then lieutenant in his leader's "ragged regiment," everywhere conspicuous for his red nose.

BARDOUX, bär'dōō', AGÉNOR, pen name Agénor Brady (1830–97). A French politician and author, born at Clermont-Ferrand. He studied law in Paris and in 1871 was elected to the National Assembly. In 1876 he was elected to the Chamber of Deputies and from 1877 to 1879 was Minister of Public Instruction. He was elected a permanent Senator in 1882. He wrote *Les légistes et leur influence sur la société française* (1877), *Le comte de Montlosier et le gallicanisme* (1881), *La bourgeoisie française* (1886), *Chateaubriand* (1893), and *Guizot* (1894).

BARDOWIEK, bär'dō-vēk. A town in the province of Hanover, Prussia, on the Ilmenau River, 3 miles north of Lüneburg. In 1189, when it was destroyed by Henri the Lion, it ranked as the principal commercial centre of north Germany. The region is fertile, and Bardowiek is a centre for trade in farm products. Ruins of a cathedral of splendid proportions exist, incorporated with a fourteenth-century Gothic church. Pop., 1900, 2002; 1910, 2200.

BARD'SEN, IVAR (c.1300–c.1350). A Greenland magistrate. He was born in Oster Bygd,

or the East District of Greenland, and held the position of steward under the Bishop of Gardar. In 1339 he was sent with several vessels to relieve the sister colony of Vester Bygd, or the West District, which had been invaded by the Eskimos. The manuscript of his account of this expedition, with sailing directions, was found many years later in the archives at Copenhagen and was subsequently translated into various languages. The first English translation seems to have been made for Henry Hudson. Danish, Latin, and English versions may be found in Major's *Voyages of the Venetian Brothers, N. and A. Zeno* (1873), and an English version, with the original text, was published by the Hakluyt Society in 1873. Consult B. F. De Costa, *Sailing Directions of Henry Hudson, Prepared for his Use in 1608 from the Old Danish of Ivar Bardsen* (Albany, 1869).

BARDSTOWN. A city, and the county-seat of Nelson Co., Ky., 39 miles by rail south by east of Louisville, on the Louisville and Nashville Railroad (Map: Kentucky, E 4). It contains the St. Joseph's College (Roman Catholic) and Bethlehem Academy. The city is a shipping point for hogs, cattle, grain, and whisky, and has distilleries, flouring and saw mills, and cooperage, and manufactures chairs, brooms, and concrete. The water works and light plant are owned and operated by the city. Pop., 1900, 1711; 1910, 2126.

BARDWAN, bûrd-wän′ (Pers. formerly *Wardhamana*, the thriving, growing one). A city on the Damoda River, in the district and division of Bardwan, Bengal, British India, on the Grand Trunk Railroad from the Hugli to the northwest, in lat. 23° 12′ N. and long. 87° 56′ E., 74 miles from Calcutta (Map: India, E 4). It is a miserable place—an aggregate of second-rate suburbs—but contains numerous temples and a large palace. Pop., 34,500. The division of Bardwan has an area of 13,850 square miles. Pop., 1891, 7,689,300; 1901, 8,245,000.

BARE, bä′rā. An important group of tribes of Arawakan stock, occupying the upper Rio Negro in northwestern Brazil and the Casiquiare, Guainia, and Atabapo in the adjacent region of Venezuela. They are said to be absorbing the neighboring tribes, so that within the last century their language has become general throughout a wide area. Their centre is still the settlement of San Carlos, and according to Dr. Koch-Grünberg (1911) "they form the nucleus of the modern civilized Indian population of the greater part of the Rio Negro."

BAREA, bä′rā-ä (Abyss. slaves). The name of a negro tribe living in the mountains north of Abyssinia. They have suffered greatly from the continual raids of slave traders and are now much reduced in number. An account of this people is given in Munzinger's *Ostafrikanische Studien* (Schaffhausen, 1864), and a grammar of their language was published (Vienna, 1874) by Reinisch, who utilized Munzinger's manuscript collections. See AFRICAN LANGUAGES.

BARE'BONES, or **BARBON,** PRAISE-GOD (c.1596–1679). A London tanner, and member of the Parliament of 1653, who became known by his name. In 1660 he headed a procession of people to protest against the restoration of Charles II, and in consequence spent some time in the Tower in 1662. He had been chosen minister of a Baptist congregation shortly after 1630 and became very popular as a preacher.

BAREBONES PARLIAMENT. A name in derision applied to Cromwell's "Assembly of Nominees," from one of its members, the tanner, Praise-God Barebones. This Parliament was composed of 140 members selected by the general-in-chief and the council of the army from lists of nominees submitted by the Congregational churches in each county. It met on July 4, 1653; and Cromwell, in a long speech, impressed upon its members their responsibility as godly men. It was expected, apparently, to perform the functions of a kind of constituent convention, preparing the way for the election of a regular parliament into whose hands it was to resign its authority. Much ridicule has been cast upon it for its alleged unpractical character. Its attempt to abolish tithes and the Court of Chancery, without providing proper substitutes, has been especially criticised. As a matter of fact, it was a very respectable body, containing many able men. Several very wise measures were enacted. Among these was an ordinance providing for the civil-marriage celebration before justices of the peace and for civil-marriage registration by elected parish registrars. Its provisions were in harmony with the contemporary laws of the New England Colonies and anticipated the essential principles of the present English system by nearly 200 years. But the Assembly attempted constitutional legislation which Cromwell regarded as beyond its province; and so, on Dec. 12, 1653, the majority of its members placed their resignation in his hands. Consult: H. A. Glass, *The Barebone Parliament* (London, 1899); C. H. Fisch, *Oliver Cromwell* (New York and London, 1900); Gardiner, *History of the Commonwealth and Protectorate*, vol. ii (New York, 1903); Trevelyan, *England under the Stuarts* (London, 1904).

BARE'FOOT'ED (in Lat. *discalceati*, shoeless). An appellation given to certain monks and nuns who abstain from wearing any covering on the feet, either entirely (as the Alcantarines, who originated at Placentia, in Spain, in 1540), or for a specified period of the year (as the nuns of Our Lady of Calvary); or who, instead of shoes, wear merely sandals, i.e., soles of wood, leather, rope, or straw fastened by thongs. They do not constitute a separate order in the Roman Catholic church, but are to be found as representing a higher grade of asceticism with more or less severity of observance, among most of the orders, Carmelites, Franciscans, Augustines, Eremites, Capuchins, etc. This form of religious austerity is to be traced generally to the custom which prevailed among the Jews and Romans of putting off their shoes on the occurrence of public calamities, that in this condition of mourning and humiliation they might implore the Divine Being for deliverance; but perhaps more particularly to the command which Christ gave his disciples (Matt. x. 10; Luke x. 4).

BARÈGE, bà′rāzh′. A fabric of mixed yarns, gauze-like in texture, adapted for women's dresses, called in France *crêpe-de-barège*. The name is derived from the valley of Barèges, where they were first manufactured, the seat of the manufacture at present being at Bagnères de Bigorre. Barèges are usually a mixture of silk and worsted; an inferior kind being composed of cotton and worsted. They vary in color and are sometimes light in tint, with printed patterns. All are of light weight for summer wear. The best are manufactured in France.

BARÈGES, or **BARÈGES-AUX-BAINS,** ō′bĀN′. A watering place in the department of

Hautes-Pyrénées, France, picturesquely situated in the valley of the river Bastan, 4000 feet above sea level, 24 miles south of Tarbes. It consists of a single street of some 80 houses, running along the narrow, rugged glen. The springs are considered efficacious for rheumatism, scrofula, and old wounds. The bath establishment is a fine marble building. Other prominent institutions are the Military Hospital and the Ecclesiastical Charity Hospital of Sainte Eugénie. Extreme cold and the danger of frequent avalanches almost depopulate the town in winter.

BAREILLY, bâ-rā'lê, or **BARELI.** The capital of the Bareli district in the Rohilkhund division of the United Provinces, British India (Map: India, C 3). It is in lat. 28° 23′ N., and long. 79° 28′ E., 152 miles east of Delhi. It is pleasantly situated in a well-wooded country on the left bank of the Juâ, an affluent of the Ramgdanga, but possesses few structures of architectural beauty. Besides a brisk and lucrative commerce in grain, cotton, and sugar, the octroi on which is the chief source of municipal revenue, it has considerable manufactures, more particularly of ornamental chairs and tables. It is the seat of a well-attended government college and has a military cantonment. Bareilly became notorious during the mutiny of 1857 by the massacre of Europeans on the 31st of May. It was recaptured by Sir Colin Campbell, afterward Lord Clyde, in May, 1858. Pop., 1891, 121,000; 1901, 117,400; 1911, 129,462.

BARENTS, bâ'rents, Willem (?–1597). A Dutch explorer of the Arctic Ocean. He sailed from Holland in June, 1594, to find a northeast route to China, and explored a great part of Nova Zembla. In May, 1596, he went as pilot of two ships sent out by the city of Amsterdam. At Spitzbergen the ships separated, and Barents guided one of them around Nova Zembla. At Ice Haven it was frozen in, and here Barents and his companions were forced to remain for months, suffering terribly from the intense cold. Many of the crew died in the course of the winter. On June 14, 1597, the survivors started in open boats for the mainland. Barents and four of his companions soon succumbed, but the rest reached Lapland, where they found the other vessel and were rescued. Interesting relics of this expedition were discovered in 1871 by Captain Carlsen; they were found undisturbed after a lapse of 274 years. Consult Gerrit de Veer, *The Three Voyages of Willem Barents,* published by the Hakluyt Society (London, 1876).

BARÈRE DE VIEUZAC, bâ'râr' de vyē'zàk', Bertrand (1755–1841). A member of the French National Convention. He was born at Tarbes and practiced law at Toulouse. After acting as deputy in the States-General and editing a daily Revolutionary paper, *Le Point du Jour,* he was sent, in 1792, to the National Convention by the department of Hautes-Pyrénées. His eloquence was so poetical that he came to be known as "the Anacreon of the guillotine." He was reporter from the committee on war, where he sat with Danton, and presided over the convention when sentence was passed on Louis XVI, rejecting the King's appeal to the people, with the words, "The law is for death, and I am here only as the organ of the law." His inborn mildness warring with the instinct of self-preservation made him alternately a supporter of merciful measures and a bloodthirsty advocate of the guillotine; but his entire public career indicates a man of essential cowardice, far more selfish than patriotic. After the fall of Robespierre, whom he helped to overthrow, Barère proposed the continuation of the Revolutionary Tribunal, but was denounced, impeached, and sentenced to transportation. He was saved, however, by the general amnesty after the 18th Brumaire. Elected as deputy during the Hundred Days, he was banished after the second Restoration, and devoted himself to literary work at Brussels, till the Revolution of July permitted his return. In 1832 he was once more elected as a deputy from the Hautes-Pyrénées. His election, however, was annulled on account of errors in form, whereupon the government gave him an official position in his department, which he held till 1840. His *Mémoires,* which were published at Paris in 1834, have been translated into English by Payne (London, 1896).

BARETTA-WORMS, bâ'rē'tâ' vōrms', Blanche Rose Marie Hélène (1856–). A French actress, member of the Comédie Française. She was born at Avignon and entered the Conservatoire when only 12 years old, leaving it in 1872 with a second prize in comedy. After engagements at the Odéon and the Vaudeville she made her début at the Théâtre Français in 1875, as Henriette in *Les femmes savantes,* and the next year became a member of the company. Among her successes there have been her performances in *Le mariage de Victorine, La maîtresse légitime, Le fils naturel, Les corbeaux, Antigone, Le gendre de Monsieur Poirier,* and *Le jeu de l'amour et du hasard.* She was married to M. Worms, a colleague at the Théâtre, in 1883.

BARETTI, bâ-rēt'tê, Giuseppe Marc' Antonio (1719–89). The most important Italian critic of the eighteenth century, well known in England for his friendship with Reynolds, Burke, and Dr. Johnson and for his English works. After a roving life through the literary centres of Italy, he settled as a teacher of Italian in London (1751) and gave impetus to Italian studies by his many friendships and by his *Dissertation on Italian Poetry* (1753), his *Italian Library* (1757), and by his Italian grammar and dictionary (1753, 1760). In 1760 he returned to Italy as a private tutor, leaving a charming narrative of the journey in his *Lettere familiari,* published also in English, *A Journey from London to Genoa* (1770). In Venice (1763–64) he edited, under the pseudonym of Aristarco Scannabue, the *Frusta letteraria,* or 'Literary Scourge,' his most serious work, in which he attempted to thrash Italian letters into more serious channels. Again, in England in 1765, he published an *Account of the Manners and Customs of Italy,* and a *Discours sur Shakespeare et M. de Voltaire* (1777), in which he warmly defended the English dramatist. Soon after his return he killed a man in a street brawl, was tried for murder, and acquitted. In his later years, which he passed almost entirely in England, he acted as secretary of the Royal Academy and at one time rejected a professorship at Oxford. As a critic, Baretti stimulated the mutual understanding between England and Italy. He was singularly free from many of the cant prejudices of his contemporaries in Italy, especially in regard to academic literature. His literary taste in many of its aspects was a century ahead of his time. Yet his work is more of impulse, with moments of inspiration, than of profound penetration into the underlying principles of criticism. Consult L. Colli-

son-Morley, *G. Baretti with an Account of his Literary Friendships* (London, 1909), and B. Croce, *Problemi di estetica* (Bari, 1910). Selected works were published at Bari (1911 and afterward), edited by L. Piccioni, the leading authority on Baretti's life and works.

BARFLEUR, bär'flĕr' (projection on the channel, from Gael. *barr*, Scand. *bard*, projection, summit + Teut. *fleot*, *fliez*, flush of water, canal, Ger. *Fliess*, Dutch *vliet*, AS. *fleót* = Eng. fleet, a river). A seaport and summer resort in the department of La Manche, France, 16 miles east of Cherbourg (Map: France, N., D 3). There is good sea bathing, and some trade in timber and fish. Up to the time of Henry IV of England it was strongly fortified and a port of arrival from England. Pop., 1901, 1210; 1906, 1274; 1911, 1238.

BARFOD, bär'fôd, Paul Frederik (1811–96). A Danish historian, born at Lyngby (Jutland). In 1848–49 he was a member of the Constitutional Assembly, subsequently also of the Folkething, and an official in the Ministry of the Interior. In 1866 he became an assistant in the Royal Library at Copenhagen. He was an advocate of Scandinavian unity. His principal work is *Fortœllinger af Fœdrelandets Historie*, 'Tales from the History of the Fatherland' (4th ed., 1874).

BARFURUSH, bär'fu-rōōsh'. See Balfrush.

BARFUSS, bär'fōōs, Hans Albrecht, Count (1635–1704). A Prussian field marshal, born at Mögelin (Brandenburg). He first became prominent in 1678 as a colonel in the war against Sweden, and in the war against the Turks won much distinction as commander of the left wing at the storming of Buda in 1686. With an auxiliary force of 6000 he took a prominent part in the victory over the Turks at Slankamen (1691). Subsequently he was active in various cabals of the court, until expelled through the influence of his rival Von Wartenberg.

BAR'GAIN (OF. *bargaigner*, to chaffer, LL. *barcaniare*, to traffic, change about, from *barca*, bark, boat for traffic) **AND SALE.** A mode of conveying lands at common law, owing its efficacy to the Statute of Uses (q.v.). Technically the transaction was a bargain, or agreement, on the part of the vendor (hence called the *bargainor*), which amounted to a declaration of trust in favor of the purchaser (known as the *bargainee*), and which, being a "dry" or passive trust, was thereupon executed by the force of the statute, transferring the title of the property from the former to the latter. It was essential to the efficacy of a bargain and sale that it should be based upon a valuable consideration, in order that it should operate to create a trust or to transfer the legal title to the lands affected thereby. The correlative transaction, where such a bargain or declaration of trust was made without a material consideration to a blood relation of the vendor, was known as a *covenant to stand seised* to the use of the latter. This was said to be based on the consideration of blood and affection, and was described as a "good," as distinguished from a "valuable" consideration. It is to the prevalence of these forms of conveyance—which were by no means the only methods by which lands could be conveyed—that we owe the general but erroneous belief that a conveyance of lands not made to a relative of the grantor always requires a valuable consideration. The ancient conveyance by feoffment or livery of seisin (qq.v.) was effective without an actual or pretended consideration, and there is no sufficient reason to doubt that this is equally true of the modern conveyance by grant (q.v.). The caution of lawyers, however, has kept alive the practice of reciting a consideration in deeds of all kinds. In order to avoid the registration of a deed of bargain and sale required by the Statute of Enrollments (27 Hen. VIII, c. 16, 1535), the modern deed of *Lease and Release* was invented, which was in effect a bargain and sale of the lands to be conveyed, for a year, followed by a release (q.v.), or quitclaim (q.v.), by the vendor of his reversionary estate as landlord. In this form the conveyance by bargain and sale was the usual mode of transferring the title to lands in England for 300 years, and in the United States until the enactment of statutes during the last century substituting the more direct and convenient deeds of grant now generally in use. Deeds of bargain and sale and of lease and release, though infrequent and no longer necessary, may still be used. Consult: Blackstone, *Commentaries on the Laws of England;* Williams, *Principles of the Law of Real Property*, 17th International ed. (London, 1892; Boston, 1894); Tiffany, *The Law of Real Property* (St. Paul, 1903).

BARGE'BOARD (cf. LL. *bargus*, a sort of gallows). In wooden domestic architecture in England, and later in Switzerland, when the roof projects considerably over the wall of a house, the gable is generally furnished along its edge with a board which either covers a rafter or occupies the place of a rafter itself. These bargeboards were often very richly ornamented, particularly in the fourteenth and fifteenth centuries. They are sometimes termed *Vergeboards.*

BARGÈS, bär'zhĕs', Jean Joseph Léandre (1810–96). A French Orientalist. He was born at Auriol (Bouches-du-Rhône) and was educated at Marseilles. He was ordained to the priesthood in 1834 and three years afterward was appointed to the chair of Arabic at Marseilles. In 1842 he became professor of Oriental languages at the Faculty of Theology at Paris, which position he occupied until the suppression of that faculty in 1885. Among his numerous publications are the following: *Temple de Baal à Marseille, ou Grande inscription phénicienne*, etc. (1847); *Aperçu historique sur l'Eglise épiscopale de Tlemcen* (1848); *Hébron et le tombeau du patriarche Abraham* (1865); *Vie du célèbre marabout Cidi Abou Medien* (1884); *Recherches archéologiques sur les colonies phéniciennes établies sur le littoral de la Celto-Ligurie* (1878); *Notre-Dame des victoires pendant la Commune* (1889).

BAR'GHEST. A horrible goblin, with large teeth and claws, fabled to appear in the form of a huge dog or bear. Its appearance to any one is taken to portend imminent death or grievous misfortune. The barghest is still fancied to exist in the northern part of England. As to the origin of the name, opinions differ widely. The latter part, *ghest*, would seem to be identical with the German *Geist*, English *ghost.* Some think that "barghest" is for *berg-geist*, 'mountain demon'; others refer it to *Bär*, 'bear,' in allusion to its supposed form.

BARGIEL, bär'gēl, Woldemar (1828–97). A German composer and teacher of music. He was born and died in Berlin. He studied music in Leipzig under Moscheles, Hauptmann, and Gade,

and in 1850 began to teach in Berlin, where he made a reputation by publishing pianoforte and orchestral works. In 1859 he was made professor at the Conservatory of Cologne; in 1865 kapellmeister and director of music in Rotterdam, and in 1874 became professor in the Hochschule für Musik in Berlin. Bergiel was a devoted follower of Schumann (he was a stepbrother of Clara Schumann), and his works, though not numerous, are highly esteemed. He is best known by his overtures to *Medea* and *Prometheus*, and by his two choruses for female voices, *Spring Night* and the *XXIII Psalm*. Consult J. A. Fuller-Maitland, *Masters of German Music* (London, 1894).

BARHA'DAD I. King of Damascus, son of Tabrimmon. He reigned c.885–844 B.C. He was the ally of Asa of Judah (c.933–877) against Israel, and he fought against Ahab (c.872–851) with varying success. On the other hand he seems to have been able to cope with Shalmaneser III (860–825), both at Karkar in 854 and in 849–848. The Assyrian inscriptions refer to him as IM-'idri, which may be read either Biridri or Adad-idri, and the Hebrews as Ben Hadad. But the Zakir inscription published by Pognon (*Inscriptions Semitiques*, Paris, 1907) shows that the name of the son of Hazael, also given by the Hebrews as Ben Hadad, was Bar Hadad. He was probably murdered by Hazael, who usurped his throne, according to 2 Kings viii. 9–15.

BARHADAD II. King of Damascus, son of Hazael. He reigned c.804–774 B.C. The inscription of Zakir, King of Hamath and Laash, speaks of Bar Hadad, son of Hazael, as "King of Aram." This settles the question of his name; *Bar*, 'son,' has been translated into Hebrew *ben*. According to Zakir, Bar Hadad led a coalition of several kings and cities against him, but failed to capture Hazrak. (See HADRACH.) In 803 he was obliged, after a siege of Damascus, to pay tribute to Adad-nirari IV of Assyria (812–783 B.C.). He was a contemporary of Joash of Israel and of Joash and Amaziah of Judah.

BAR'HAM, RICHARD HARRIS (1788–1845). An English humorist, known as "Thomas Ingoldsby." He was born in Canterbury, Dec. 6, 1788, and died in London, June 17, 1845. He began to study law, left it for the Church, and was ordained in 1813. In 1821 he was appointed minor canon of St. Paul's, London, and three years later became one of the priests in ordinary of His Majesty's Chapel Royal. In 1837 he began, in *Bentley's Miscellany*, the publication of the *Ingoldsby Legends*, a series of comic tales in irregular verse, by which he gained immediate fame as a humorist. Yet his life was grave and dignified, and he was held in high respect. Though a Tory in politics, he was the lifelong friend of Sydney Smith, the prominent Liberal; and Theodore Hook was also among his intimates. He published two novels, *Baldwin* and *My Cousin Nicholas*, and contributed largely to the *Edinburgh Review* and the *Literary Gazette*. "His sound judgment and kind heart made him the trusted counselor, the valued friend, and the frequent peacemaker; and he was intolerant of all that was mean, base, and false." For his biography, consult Barham, *The Life and Letters of the Rev. R. H. Barham* (London, 1880).

BAR HAR'BOR. See MOUNT DESERT.

BAR'-HEBRÆ'US (1226–86). A distinguished and prolific Arabic and Syriac writer. His full name was Yuhanna Abulfaraj ibn Harun; as bishop he assumed the name of Gregorius. He was born at Malatia in Armenia, and from the fact that his father Aaron was a Jew by birth, or, at all events, of Jewish descent, the son became known as Bar-Hebræus, that is, 'son of the Hebrew.' Bar-Hebræus himself, however, was a Christian and an adherent of the Jacobite sect. At an early age he entered upon the study of Arabic and Syriac, as well as of philosophy, theology, and medicine, and acquired such distinction that he was known among his contemporaries as "the phœnix of the age." In 1243 he went to Antioch and commenced a monastic life; in 1246 he was made Bishop of Gubas (near Malatia) and the following year he was transferred to Lakabhin, another diocese adjacent to Malatia. There he remained until 1253, when he was transferred to Aleppo, though he did not assume full charge until 1258. In 1264 he was made *maphrian*, or catholicus, a position next in rank to that of the patriarch. He died at Maragha in Azerbaijan on July 30, 1286.

Despite the absorbing duties incident to the charge of a large diocese, Bar-Hebræus manifested an astonishing literary activity, ranging over history, theology, philosophy, grammar, and medicine. Among his theological works his critical and doctrinal commentary on the entire Bible, which he called the "storehouse of secrets," is the most important. Only portions of this compilation have been published. In the realm of philosophy he compiled an encyclopædic survey of the whole Aristotelian discipline, which he subsequently rewrote in an abridged form. Best known is his great chronicle of universal history, written in Syriac. Beginning with Adam, it is brought down to his own days. The first part of it, containing the history down to the establishment of the Church, was published in Leipzig in 1789 by Bruns and Kirsch, and again, in a better edition, by Bedjan (Paris, 1890). The second and third parts, dealing respectively with the patriarchate of Antioch and the eastern branch of the Church, were published by Abbeloos and Lamy (3 vols., Paris and Louvain, 1872–77). This work was rewritten by Bar-Hebræus in an abridged form in Arabic and published under the title of *History of Dynasties*, by Pococke, with a Latin translation, Oxford, 1663, and again at Beirut, 1890, by Salhani. His grammatical treatises, which are exceedingly valuable, were published by Abbé Martin in 1872 (*Œuvres grammaticales d'Aboul Faradj dit Bar Hebræus*, 2 vols., Paris, 1872). Besides this, there are numerous medical treatises, mostly unpublished, as well as astronomical and cosmographical writings, and also a number of poems and tales. On his commentary to the Bible, consult Göttsberger, *Barhebräus und seine Scholien zur Heiligen Schrift* (Freiburg, 1900).

BARI, bä'rē. An archiepiscopal city and flourishing seaport on the Adriatic, the capital of the province of Bari delle Puglie, south Italy (Map: Italy, L 6). It is on the Bologna-Brindisi Railway, 69 miles northwest of Brindisi. The old part of the town, which is on the tongue of land that divides the old harbor from the new, has narrow, crooked, gloomy streets. The new part of the town is on a rectangular plan, with broad avenues, squares, and gardens. The most interesting building is the church and priory of St. Nicholas, founded in 1087, and fin-

ished in 1139 by King Roger, a Norman. It was here that Pope Urban II in 1089 assembled a council of Greek and Latin bishops to discuss the theological differences that divided the East and the West. The building contains the splendid mausoleum of Bona Sforza, Queen of Poland and Duchess of Bari, who died here in 1558. In a vault under the silver altar in the crypt lie the bones of St. Nicholas, from which is said to exude a fluid, *manna di San Nicola*, which heals miraculously. The Saint's festival, on the 8th of May, is attended by thousands of pilgrims. The cathedral, which dates from the first part of the eleventh century, was spoiled by repairs made in the eighteenth. Its dome was renovated in 1905, and other alterations made. It contains paintings by Paolo Veronese, Tintoretto, and Calabrese. The church of St. Gregory, an eleventh-century edifice and the old palace chapel of the Byzantine Governor, is very interesting. The castle, built in the twelfth century, is now used as a prison and signal station. Bari also has a seminary, a lyceum, the Ateneo, containing a technical school and a provincial museum, a casino, a theatre constructed by Antonio Niccolini, and fine public squares and gardens. In the Piazza Umberto I there was erected in 1905 a monument to King Humbert. The new harbor is accessible to the deepest ships, and the town enjoys a growing maritime trade. There is regular steamboat communication with Venice, Ancona, Triest, Brindisi, Genoa, and Marseilles. Bari manufactures organs, pianos, mirrors, furniture, candles, soap, oil, and cordials, and has an extensive commerce in oil, wine, almonds, saffron, grain, fruit, cotton, and wool. The United States and other countries are represented by consular agents. Pop., 1881, 61,500; 1901, 77,478; 1911, 103,168.

The importance of *Barium*, Gk. *Βάριον*, *Barion*, in the third century B.C. is shown by its coins. Horace wrote of the *Barii mœnia piscosi*. In the Middle Ages Goths, Greeks, Franks, Saracens, Lombards, Venetians, and Normans fought for the possession of it. Bari was an independent duchy from the fourteenth century until it was united with the kingdom of Naples.

BARI. A negro tribe living on the White Nile, near Gondokoro. They practice agriculture to some extent, but their chief occupation is the raising of cattle. They are a warlike people and offered a stout resistance both to the slave traders and to the Egyptians, until they were subdued by Baker Pasha in 1871. The Bari are very tall and finely formed. Both sexes shave the hair and paint the body red. Consult Kaufmann, *Schilderungen aus Centralafrika* (Brixen, 1862), and for a grammar of their language, Mitterrutzrer (Brixen, 1867). See AFRICAN LANGUAGES.

BARIE, bār'ē (Gk. *βαρύς*, *barys*, heavy). The unit of pressure in the C. G. S. system (q.v.) adopted by the International Congress of Physicists at Paris in 1900, and corresponding to a pressure of 1 dyne to the square centimeter. The practical unit of pressure is the *megabarie*, or a pressure correspondinng to a megadyne (10^6 dynes) to the square centimeter, and very nearly equivalent to the pressure of 75 centimeters of mercury. The megabarie is also a useful unit in that it corresponds approximately to the pressure of 76 centimeters of mercury under normal condition, or "1 atmosphere." This pressure is equal to 1.0133 megabaries. See MECHANICAL UNITS.

BARILI, bä-rē'lē. A town on the west coast of Cebu, Philippines, 27 miles west of Cebu, the capital of the province (Map: Philippine Islands, D 5). Pop., 1903, 31,617.

BARILLA (Sp. *barrilla*, impure soda). A crude sodium carbonate obtained from the ashes of marine plants, which were formerly raised for that purpose in Spain, Sicily, Sardinia, the Canary Islands, and the Levant. The seeds were usually sown at the close of the year, and in the following September the plants were ready for cutting. A month later the barilla was obtained in the following manner. Holes were dug in the earth, capable of holding one or two tons of the soda, iron bars were laid across the cavities, and the dried plants, mixed with reeds, were placed upon them and burned. The molten mass containing the alkali dropped into the pit beneath. The operation was continued until the pits were filled, after which they were covered with earth. When sufficiently cool, the barilla was ready for shipment. The crude soda contained about 20 per cent of alkali, together with sodium, calcium, and aluminum chlorides and sulphates, with a little sulphur. It was formerly much used for the manufacture of soap, but since the introduction of the improved process for manufacturing soda from salt, its production has declined. *British barilla* is the name sometimes given to kelp.

BARING, bā'rĭng, *or* bār'ĭng. The firm of Baring Brothers was long one of the greatest commercial houses in the world. Its founder was John Baring, a German, who settled in a small business in Exeter, England, in the first half of the eighteenth century. Two of his sons, Francis and John, established in London in 1770 a banking house. In November, 1890, owing to the continued failures of the Argentine Republic to pay the interest due upon its debt, which had been guaranteed by the Barings, the firm was threatened with suspension, but was saved by the action of the Bank of England, which, in conjunction with the firm of Brown, Shipley & Co., advanced the sum of £13,000,000 to tide over the crisis. The house of the Barings has since been reorganized as a limited company for carrying on a regular banking business, though on a less extensive scale than before.—SIR FRANCIS BARING (1740–1810) became a director of the East India Company, and being a stanch supporter of Pitt, was created a baronet by that minister in 1793. He took an active part in the discussions relative to the Bank Restriction Act of 1797.—SIR THOMAS BARING (1772–1848), eldest son of the above, succeeded his father in the baronetcy. He was a member of the Commons in 1830–32. He appears to have taken no active part in the business of the firm and is known chiefly as an admirer and encourager of art. His magnificent collection of paintings was dispersed by public sale after his death.—SIR FRANCIS THORNHILL BARING (1796–1866), son of Sir Thomas, whom he succeeded, was educated at Oxford. He entered the Commons for Portsmouth in 1826, and under successive Whig governments was Lord of the Treasury, Secretary to the Treasury, Chancellor of the Exchequer, and First Lord of the Admiralty. He was created Baron Northbrook in 1866.—THOMAS BARING (1799–1873), another son of Sir Thomas, devoted himself early to commercial pursuits, and also to politics, siding with the Tories, contrary to the traditions of his family. He was,

however, much more widely known as the principal manager of the firm of Baring Brothers than as a politician.

BARING, Alexander, first Baron Ashburton (1774–1848). An English financier and statesman. He was born in London, Oct. 27, 1774, the second son of Sir Francis Baring. For many years he was commercially engaged in the United States and Canada in the service of the great London mercantile house founded by his father. While in this country he married, Aug. 23, 1798, Anne Louisa, eldest daughter of William Bingham, of Philadelphia, United States Senator; and to his alliance and to his American mercantile acquaintance he was much indebted in later life. On the death of his father, in 1810, he became the head of the firm of Baring Brothers & Co., and in 1812 was elected member of Parliament for Taunton. In the first administration of Sir Robert Peel (1834–35) he was President of the Board of Trade and Master of the Mint, and was created Baron Ashburton by patent in April, 1835. In 1842 Lord Ashburton's knowledge of business and thorough acquaintance with American institutions, customs, and modes of thought caused him to be appointed special Ambassador to the United States to settle the Northwestern Boundary Question and other disputes, which then threatened to involve the two countries in war. In August of the same year he concluded the famous Treaty of Washington, commonly called the Ashburton Treaty, by which the frontier line between the State of Maine and Canada was definitely agreed to. By this treaty seven-twelfths of the disputed ground and the British settlement of Madawaska were given to the United States, and only five-twelfths of the ground to Britain; but it secured a better military frontier to Britain and included heights commanding the St. Lawrence which the award of the King of Holland, who had been chosen arbiter, had assigned to the Americans. By the eighth and ninth articles provision was made for putting an end to the African slave trade, and the tenth article provided for the mutual extradition of suspected criminals. As an English statesman, Lord Ashburton opposed free trade, but strongly supported the penny-postage system when first proposed by Rowland Hill in 1837. His death took place May 13, 1848.

BARING, Evelyn, first Viscount Cromer. See Cromer.

BARING, Maurice (1874–). An English author and journalist. He received his education at Trinity College, Cambridge, and subsequently entered the diplomatic service in which he held various posts, being attaché to the British Embassy in Paris in 1898, Copenhagen in 1900, and Rome in 1902. From 1904 to 1909 he acted as special war correspondent for the *Morning Post* in Manchuria, Russia, and Constantinople. His writings comprise novels, essays, narratives, and poems, including *Hildesheim and Quatre Pastiches* (1899); *The Black Prince* (1892); *Gaston de Foix* (1903); *With the Russians in Manchuria* (1905); *Mahasena* (1905); *Desiderio* (1906); *Sonnets and Short Poems* (1906); *A Year in Russia* (1907); *Proserpine* (1908); *The Grey Stocking* (a comedy, 1908); *Russian Essays and Stories* (1909); *Orpheus in Mayfair* (1909); *The Story of Forget-me-not and Lily-of-the-Valley* (1909); *Landmarks in Russian Literature, Dead Letters, The Glassmender, Diminutive Dramas* (1910); *Collected Poems* (1911).

BARING-GOULD, Sabine (1834–). A very versatile and prolific English author, born at Exeter. He studied at Clare College, Cambridge, and in 1864 was appointed curate of Horbury (Yorkshire). In 1871 he became rector of East Mersea (Essex) and in 1881 of Lew-Trenchard (North Devon). From 1871 to 1873 he was editor of *The Sacristy*, a quarterly review of ecclesiastical literature and art. His opera, *The Red Spider*, was produced in 1898. The list of his published works is large in number and diversified in range. Valuable are his studies in the superstitions, legends, and folklore of the Middle Ages, such being *The Book of Werewolves* (1865), *Curious Myths of the Middle Ages* (2d series, 1866–67), and *Curiosities of Olden Times* (1869). His contributions to theology include *The Origin and Development of Religious Belief* (1869–70), *Lives of the Saints* (15 vols., 1872–77), and *The Lost and Hostile Gospels* (1874). In 1880 appeared his *Mehalah*, a powerful though somewhat uneven and melodramatic story (new ed., 1913), followed by *John Herring* (1883–86; 1913); *Court Royal* (1886–88), and *The Broom Squire* (1896; 1913); *Bladys of the Stewponey* (1897; 1910); *Virgin Saints and Martyrs* (1900); *A Book of Ghosts* (1904); *A Memorial of Nelson* (1905); *The Book of the Rhine from Cleve to Mainz* (1906); *A Book of the Pyrenees* (1907); *Cornish Characters* (1909); *Family Names and their Story* (1909; 1912); *Cornwall* (1910); *Cliff-Castles and Cave-Dwellings of Europe* (1911); *The Land of Teck* (1911); *Village Sermons to Simple Souls* (1912); new edition of the *Vicar of Morwenstowe* and of *Old Country Life* (1913).

BARINGO, bȧ-rĭŋ′gō. A lake in the East African Rift valley in lat. 0° 32′ N. (Map: Congo Free State, G 2). It lies at an altitude of 3675 feet, covers an area of 193 square miles, and although it is without visible outlet its water is fresh. Near the east shore are four small islands, and a larger island in the centre of this lake is inhabited. It was discovered in 1883 by J. Thomson.

BA′RITE. Natural sulphate of barium, also known as barytes, and heavy spar. The chemical formula is $BaSO_4$; analysis, 65.7 per cent BaO and 34.3 per cent SO_3; specific gravity, 4.3 to 4.6; hardness, 2.5–3.5. It crystallizes in the orthorhombic system, occurs in laminated and massive forms, usually white, opaque to translucent in color, resembles calcite, but easily distinguished by its weight and the fact that it is not acted on by acids. The massive cleavable forms decrepitate readily by heating, which offers a method of separating the mineral from sulphides having the same specific gravity. It rarely occurs pure, being generally associated with silica, lime, iron, and very often contains a small percentage of galena. The commercial sources are usually residual deposits in clay caused by the differential weathering of the inclosing limestone, in which the mineral was originally deposited by replacement, and sometimes veins; it also occurs as a gangue mineral with metallic ores. The production in the United States, which is decreasing, amounted to 37,487 tons in 1912, and came from Missouri and the southern Appalachian States. The value of the ore at the mine varies from $3 to $4, and the finished product from $12 to $22, depending on the grade.

The chief use of barite is in the manufacture of paints as an adulterant of white lead and in the manufacture of lithopone. When used alone as a pigment for paint, it is not satisfactory, as its crystalline nature renders it too transparent. Its large use in the manufacture of white rubber goods is rapidly being replaced by lithopone; the advantage claimed for lithopone is that it aids in vulcanizing. Its use in the paper industry is also decreasing. Other uses are in the manufacture of wall paper, leather, asbestos cement, and artificial ivory. The carbonate and chloride are used in cement to prevent efflorescence on bricks by forming insoluble sulphates with the sulphuric acid in the lime. Lithopone consists of a double precipitate of barium sulphate and zinc sulphide produced by calcining barite with coal, resulting in the formation of barium sulphide with some barium carbonate, dissolving the barium sulphide in water, filtering, and adding a solution of sulphate of zinc to the filtrate causing the precipitation of barium sulphate and zinc sulphide. This precipitate is calcined, ground, washed, dried, and pulverized. The adulterants of lithopone are usually china clay and gypsum. For complete bibliography see *United States Geological Survey Report* on "Baryte" for 1912.

BAR'ITONE. See BARYTONE.

BA'RIUM (Neo-Lat. from Gk. *βαρύς, barys,* heavy; alluding to its high specific gravity). A metallic element isolated in 1808 by Sir Humphry Davy. It is not found native, but occurs chiefly as the sulphate in barite, as the carbonate in witherite, and in other minerals of a more complex composition; also in mineral waters, the ashes of certain plants, and in sea water. Metallic barium was first obtained by Davy, who decomposed its hydrate with a powerful voltaic battery and obtained an amalgam of barium and mercury. The mercury of the amalgam was expelled by heating in an iron crucible. The metal itself (symbol, Ba; atomic weight, 137.4) was described by Davy as "silver-white," and by Bunsen as "golden-yellow" in color, so that it is questionable as to whether chemically pure barium has ever been obtained. It is a slightly lustrous, somewhat malleable metal, which melts at a red heat, but cannot be distilled. Its specific gravity is from 3.5 to 4.

The compounds of barium are used for a variety of purposes. Its peroxide, BaO_2, formed when the anhydrous monoxide is heated to a dull-red heat in a stream of oxygen, is used in the manufacture of peroxide of hydrogen. Barium peroxide may, further, be used as a bleaching agent as well as for preparing oxygen.

The monoxide of barium, called *baryta,* is found, in combination with carbon dioxide, as the mineral witherite, and in combination with sulphuric anhydride as the mineral barite, or heavy spar. It is prepared commercially by heating barium nitrate in a porcelain crucible or retort, or by igniting barium carbonate in the strong heat of a forge fire. It is a grayish white, extremely caustic, poisonous, and strongly alkaline mass, which finds its chief application in sugar refining, as it forms an almost insoluble compound with sugar when added to molasses or other saccharine solutions. Barium monoxide unites readily with water to form barium hydroxide.

Barium sulphate, the most important of the commercial salts of barium, is found native as the mineral barite or heavy spar (also called cawk or caulk). It is found in England, as in Derbyshire and Shropshire; also on the continent of Europe, and in the United States at various localities, but chiefly in Missouri, Tennessee, North Carolina, and Virginia. See BARITE.

Barium chloride, made by treating the native carbonate, witherite, with hydrochloric acid, is used in chemistry as a reagent, in the preparation of the artificial sulphate or permanent white, and for preventing incrustation in boilers.

Barium nitrate is prepared commercially by dissolving the native carbonate in dilute nitric acid and crystallizing the barium nitrate. It is largely used in pyrotechny, in the preparation of green fires, and in the manufacture of explosive compounds, as a substitute for potassium nitrate.

Barium salts, when brought into a non-luminous flame, burn with a yellowish-green color.

BAR'JE'SUS. See ELYMAS.

BARK (akin to Sw. and Dan. *bark,* LG. *borke;* possibly related to AS. *beorgan,* Ger. *bergen,* to cover). The term "bark" is a very indefinite one, for it is applied to different structures. In general, it is a structure that appears upon stems of shrubs and trees, and to understand its relation to other structures the structure of the stem must be described. The stem consists of a central vascular cylinder, invested by a cortex, and this in turn overlaid by the epidermis. The two regions of the vascular cylinder are the wood ("xylem") and the bast ("phloem"), the latter forming the outside of the cylinder and surrounding the xylem. Between xylem and phloem there is a layer of active cells called the "cambium," which forms new xylem on one side (within) and new phloem on the other. As a result, the so-called "annual rings" of wood (xylem) are laid down on the outside of the xylem cylinder, and new bast (phloem) is laid down on the inside of the phloem cylinder. This means a continual increase in the diameter of the stem, and it is very seldom that the epidermis grows in proportion. As a consequence, it is usually sloughed off, and in the meantime a new protective structure has been developed.

Either the outermost layer of the cortex or some deeper one becomes a cambium, and since its function is to form cork cells it is called "cork cambium" ("phellogen"). This cambium forms at its outer surface layer after layer of cork cells, a tissue peculiarly resistant to water. If the cork cambium is formed deep within the cortex, all the cortical cells outside of it die, since they are cut off from the water and food supply in the plant.

The two applications of the term "bark" are now obvious. In the one case bark includes all the structures outside the cork cambium, i.e., the layers of cork and more or less dead cortical tissue. In the other case bark includes all the structures outside the cambium of the vascular cylinder, i.e., phloem, living cortex within the cork cambium, the cork cambium itself, the layers of cork, and the dead cortical tissue. When bark is stripped from a tree, the easiest cleavage is through the vascular cambium, leaving the wood (xylem) exposed; and hence this more inclusive use of the term "bark" is more common in this country. In this case the two regions are distinguished as

"outer bark" (outside the cork cambium), which is dead and dry, and "inner bark" (between the two cambiums), which contains some living cells.

The cork cambium is often renewed year after year, and two prominent kinds of bark are formed. In one case the successive cork cambiums form zones completely around the stem, and the cork is deposited in concentric layers, forming "ringed bark." The cork oak is a notable example of ringed bark in which there is a very great accumulation of cork. In the other case the successive cork cambiums, instead of passing completely around the stem, run into the next outer one, thus cutting out segments which loosen and flake off, forming "scaly bark," as in hickory, apple, etc.

Tanning. The bark of many trees is capable of being used for tanning, but that is preferred which particularly abounds in tannic acid. Oak bark is principally used in Great Britain. See LEATHER.

The barking of trees can be accomplished with facility only in spring. The tree being felled, the rough, external, lifeless parts of the bark are removed as useless; the smaller branches are cut into lengths of about two feet, and their bark is loosened by beating with a mallet and is easily taken off; the bark of the trunk and main branches is cut by a chisel-like instrument or with an axe into similar lengths, each of which is divided longitudinally and finally stripped off by the aid of mallets, chisels, etc. The bark is sometimes dried in sheds, being placed on narrow shelves or frames in such a way that there may be a free circulation of air about it; sometimes in the open air, when it is very generally made to rest in a sloping position against trunks of trees placed horizontally at a little distance from the ground, the larger pieces of bark being placed so as to protect the smaller both from sun and rain. Great care is necessary in the drying of bark, as it is much damaged if allowed to get moldy and is liable to suffer injury from rain or from the exposure of its inner surface to the sun.

Medicinal Barks. The principal barks used in medicine will be found noticed in separate articles. (See ANDIRA [cabbage bark, Surinam bark]; ANGOSTURA BARK; EXOSTEMMA [Jamaica bark, St. Lucia bark, Pitou bark]; CASCARILLA [cascarilla bark, Eleuthera bark]; CINCHONA [cinchona bark, Peruvian bark, Jesuits' bark, Arica bark, Calisaya bark, Carabaya bark, Huamalies bark, Huanuco bark, Jaen bark, Loxa bark, Maracaibo bark, ash bark, crown bark, silver bark, yellow bark, tan bark, etc.]; CLOVE BARK; COPALCHE BARK; CULILAWAN BARK; WINTER'S BARK.) When bark is mentioned without any prefix, it is always cinchona, otherwise called Peruvian or Jesuits' bark, which is intended. Other barks used medicinally include cinnamon, which is used chiefly for flavoring; granatum, the bark of the pomegranate, used to expel tapeworms (see ANTHELMINTIC); and *Prunus virginiana*, or wild cherry, an ingredient of many cough mixtures. *Rhamnus purshiana*, or *Cascara sagrada*, is an important derivative of the bark of that plant. Ulmus, or slippery elm, is the inner bark of *Ulmus fulva*. It contains a large amount of mucilaginous material and is used as a demulcent. *Viburnum prunifolium*, a valuable uterine sedative, is obtained from the bark of the plant. See CINCHONA.

BARK, or **BARQUE** (LL. *barca*, *barica*, boat, probably dimin. of Gk. *βᾶρις*, *baris*, rowboat, Coptic *bari*, boat). A three-masted vessel, which is fore-and-aft rigged on the mizzenmast, the main and fore being square-rigged. A vessel of any kind, especially a sailing vessel of small size. The distinction between a *bark* and a *barkentine* is that the latter has only the foremast square-rigged, the main and mizzenmasts being fore-and-aft rigged.

BARKAL, bär'kăl, or **JE'BEL BARKAL.** An isolated mountain of sandstone in Nubia, near the Fourth Cataract of the Nile. It is situated about one mile from the river, is some two miles in circumference, and rises abruptly to the height of nearly 400 feet. The summit is flat, forming a broad plateau. In hieroglyphic inscriptions it is called "the holy mountain." Its appearance is most picturesque. Between Jebel Barkal and the river lay the ancient Ethiopian capital, Napata, destroyed by the Romans under C. Petronius, in 24 B.C. The site of the city is marked by the ruins of several large temples, among which that of the god Amon is the most conspicuous, and by groups of royal tombs, built in imitation of the Egyptian pyramids, though upon a much smaller scale. Excavations conducted at this place by the Egyptian government in 1862 yielded rich results in sculptures and hieroglyphic inscriptions of historic interest. The best representations of the monuments of Jebel Barkal are to be found in the fifth volume of Lepsius' *Denkmäler* (Berlin, 1842–45) and in Mariette's *Monuments divers* (Paris, 1872–89). For descriptions of the locality, consult Cailliard, *Voyage à Meroë* (Paris, 1819) and Hoskins, *Travels in Ethiopia* (London, 1835).

BARK BEE'TLE, BARK CHA'FER, or **ENGRAV'ER BEETLE.** A minute cylindrical beetle, of the family Scolytidæ. These beetles live in or under bark and in wood. Most of the very numerous species burrow between the bark and the wood, and a few forms tunnel through the wood. (See AMBROSIA BEETLE.) The female starts each series of engravings and deposits her eggs there. The young, on hatching, dig a series of burrows at angles with the original burrow of the parent. These beetles and their young are very destructive to trees, either killing them outright or injuring the value of the wood by means of their burrows. Several destructive species live in the United States, and one is extremely injurious to the pine forests of Germany.

There are some 150 species of the minute beetles belonging to this genus in the United States. A recent estimate of $100,000,000 annual damage to the forests of our country credits most of the harm to the Scolytidæ.

BARK'ENTINE. See BARK.

BARK'ER, ALBERT SMITH (1843–1916). An American naval officer, born at Hanson, Mass. He graduated at the United States Naval Academy in 1862, and during the Civil War took part in the capture of New Orleans and the siege of Port Hudson. He was promoted to be commander in 1877 and in 1892 to be captain. During the Spanish-American War he commanded the cruiser *Newark;* and afterward succeeded Admiral Dewey as commanding officer of the Asiatic Squadron. He was made a rear-admiral in 1899, commanded the Norfolk Navy Yard in 1899, the New York Navy Yard in 1900–03, and the North Atlantic fleet in 1903–05, when he was retired.

BARKER, Edmund Henby (1788–1839). An English classical scholar, born at Hollym, Yorkshire. He studied at Cambridge. Besides editions of Latin classics and numerous contributions to periodicals, particularly to the *Classical Journal,* he was led, during a residence with the famous philologist Samuel Parr, to undertake a revision of Stephanus' *Thesaurus Linguæ Græcæ* (12 vols., 1826). This gigantic work was violently assailed in the *Quarterly Review* by Blomfield, to whom Barker replied with his *Aristarchus Anti-Blomfieldianus* (London, 1818). In 1812 appeared the first volume of his *Classical Recreations.* He also supplied materials for the composition of Sturtz's *Etymologicum Gudianum.* He likewise translated some works of German philologists, among them Buttmann's *Greek Grammar for Schools.* He collected a mass of anecdote and criticism relative to his friend Dr. Parr, which was published in two volumes in 1828–29, under the title of *Parriana,* a work well-nigh unreadable from the superabundance and ill-digested nature of its matter. He also assisted Professor Dunbar in the compilation of his Greek and English Lexicon, published in 1831. He lost all that he had in a lawsuit, so that he was obliged to sell his fine library, and was put into the debtors' prison. He died in London in extreme poverty.

BARKER, Fordyce (1818–91). An American physician. He was born at Walton, Me.; graduated at Bowdoin in 1837, and studied medicine at Harvard, Paris, and Edinburgh. He was then professor of midwifery at Bowdoin and afterward in the New York Medical College; was president of the New York State Medical Society, and professor of clinical midwifery and diseases of women in Bellevue Medical College. He wrote, in 1872, a treatise on *Puerperal Diseases* and a number of papers on other subjects.

BARKER, George Frederick (1835–1910). An American scientist. He graduated at the Yale Scientific School in 1858 and was chemical assistant in Harvard Medical School in 1858–59 and 1860–61. He was then, successively, professor of chemistry and geology in Wheaton (Ill.) College, professor of physiological chemistry and toxicology in Yale, and professor of physics in the University of Pennsylvania, in 1879–1900, when he became emeritus professor. He was president of the American Association for the Advancement of Science; president of the American Chemical Society; vice president of the American Philosophical Society for 10 years; a member of the United States Electrical Commission; and for several years an associate editor of *The American Journal of Science.* He lectured in many cities and wrote a *Text-Book of Elementary Chemistry* (1870); a *Physics* (1892), etc.

BARKER (Harley) Granville (1877–). An English playwright who began his career as an actor and continued it as joint manager of the Court Theatre, London, and later as an author. He appeared in a number of Bernard Shaw's plays, and Shaw's influence on his work is obvious. He is a younger exponent of the realistic and revolutionary drama which would carry ideas into the theatre and make the stage responsive to the movements of thought and feeling that sway the world without. A criticism of moral, social, and political aspects of contemporary life is woven through his plays and voiced by characters who speak and act in the dispassionate, unromantic, rational, and "advanced" fashion of those who people the Shavian drama. His dramatic work is notable for technical skill and for a flexible and natural dialogue that produces the illusion of living speech, but tends in its abundance to smother or hamper the action. The plays of which Barker is sole author are: *The Marrying of Anne Leete* (1901); *The Voysey Inheritance* (London, 1905); *Waste* (London, 1907); *The Madras House* (London, 1910). He collaborated with Laurence Housman in *Prunella* (London, 1906), which was produced by Winthrop Ames in New York in 1913. With Berte Thomas he wrote *The Weather Hen,* and he paraphrased from the German Schnitzler's *Anatol* (produced New York, 1912). He collaborated with William Archer in writing a plea for *A National Theatre* (London, 1907).

BARKER, Jacob (1779–1871). An American financier and lawyer, born in Swan Island, Me., of Quaker parentage. He went to New York at the age of 16, engaged in trade, and soon amassed a considerable fortune. Early in the War of 1812 he was instrumental in securing a loan of $5,000,000 for the national government. In 1815 he founded the Exchange Bank of New York and subsequently became interested in many other large financial institutions in the city, including the Life and Fire Insurance Company, on the failure of which in 1826 he, with a number of others, was arrested on a charge of conspiracy to defraud. Barker at first conducted his own defense, but subsequently was represented by such eminent counsel as Benjamin F. Butler and Thomas A. Emmet. The jury disagreed on the first trial and convicted Barker on the second; but an appeal was granted, and the indictment was finally quashed. He removed to New Orleans in 1834, became prominent in financial circles, was admitted to the bar, and practiced with success in insurance cases. At the close of the Civil War he was elected to the United States Senate, but, Louisiana not having been readmitted to the Union, he was not allowed to take his seat. In 1867 he was declared bankrupt and spent the last few years of his life with his son in Philadelphia. He published *The Rebellion: Its Consequences and the Congressional Committee, Denominated the Reconstruction Committee, with their Action* (1866).

Consult: *Incidents of the Life of Jacob Barker from the Year 1800 to the Year 1855* (New York, 1855); Turner, *The Conspiracy Trials of 1826 and 1827: A Chapter in the Life of Jacob Barker* (Philadelphia, 1864); *The Speeches of Jacob Barker and his Counsel on the Trials for Conspiracy* (New York, 1826); and *The Trial of Jacob Barker, Thomas Vermilya, and Matthew L. Davis* (New York, 1827).

BARKER, J. Ellis (1870–). An English journalist and historian, born and educated at Cologne, Germany. He became known after removal to England as a contributor to the leading reviews of that country and as a lecturer before the Royal United Service Institution, the Medical Association, and other important societies. His writings include: *The Rise and Decline of the Netherlands* (1906); *British Socialism* (1908); *Great and Greater Britain: The Problems of Motherland and Empire* (new ed., 1910); *Modern Germany* (4th ed., revised, 1912).

BARKER, Lewellys Franklin (1867–). A Canadian-American anatomist, born at Norwich, Ontario. He studied at Pickering College and the University of Toronto, and in 1894–1900 was a member of the teaching staff at the Johns Hopkins University. He was head of the department of anatomy in the Rush Medical College of the University of Chicago, in 1900–1905, when he became professor of medicine at Johns Hopkins University, and chief physician at the Johns Hopkins Hospital. He received an honorary M.D. from the University of Toronto (1905) and an LL.D. from Queen's (1908) and from McGill (1911). In 1901 he became editor of the *American Journal of Anatomy.* His publications include: *The Nervous System and its Constituent Neurones* (1899); *Laboratory Manual of Human Anatomy* (1904); *Anatomical Terminology* (1907).

BARKER, Matthew Henry (1790–1846). An English writer of sea tales, born at Deptford. He shipped on an East Indiaman, afterward served in the Royal navy, and from 1827 to 1838 edited a newspaper at Nottingham. Under the pseudonym "The Old Sailor," he wrote a number of sea tales, exceedingly popular at that time. The list of his works includes: *Land and Sea Tales* (2 vols., 1836); *Topsail-Sheet Blocks* (3 vols., 1838); *The Naval Club* (3 vols., 1843); *The Victory* (3 vols., 1844), and a *Life of Nelson* (1836).

BARKER, Thomas Jones (1815–82). An English historical and portrait painter, born at Bath. He studied in Paris under Horace Vernet, in 1835–45 exhibited much at the Salon and subsequently at the Royal Academy. In his later life he was known especially as a military painter, and observed on the spot the Franco-Prussian War, of which, as well as of the Crimean War, he left numerous pictures. His works include "The Bride of Death" (1840); "The Meeting of Wellington and Blücher" (1851); "Wellington Crossing the Pyrenees"; "The Mêlée—Charge of Cuirassiers and Chasseurs" (1872); "Balaklava—One of the Six Hundred" (1874); "The Return through the Valley of Death" (1876).

BARKER, Wharton (1846–). An American financier and publicist, born in Philadelphia, Pa. He graduated from the University of Pennsylvania in 1866, but prior to this time had organized and commanded a company in the Civil War. As a member of the banking firm of Barker Bros. & Co., he was appointed (1878) special financial agent of the Russian government. In this capacity he was intrusted with the building of four cruisers and was called to Russia to advise in the development of coal and iron mines. He also obtained valuable railroad, telegraph, and telephone concessions (later withdrawn) from China. As early as 1869 he founded the *Penn Monthly,* a weekly devoted to political, economic, and social questions, which in 1880–1900 was published under the name of *The American.* In the field of politics Mr. Barker became known as the proposer for the presidency of the names of Garfield and Harrison, and as one of the chief opponents of a third term for General Grant. Having left the Republican party in 1896 to join the Populists, he showed himself so zealous that he was made their candidate for the presidency in 1900. He became a member of several learned societies.

BARK'ERS. See Jumpers.

BARKER'S MILL (Fr. *roue-à-réaction,* Ger. *Segners Wasserad*). A water wheel invented by a Dr. Barker towards the end of the seventeenth century. It is represented in its simplest or typical form in the cut. The water is supplied from a reservoir which opens into the upper part of the vertical tube, whence it issues from the lower orifices. The reaction caused by the water gushing from the arms forces them backward and gives to the whole machine a rotatory motion. This reaction is much the same as is seen in the recoil of a gun when fired, or in the pushing back of a small boat by the foot on stepping ashore.

BARKER'S MILL.

BARK'ING (AS. *Beorcingas,* descendants of Beorc). A town of Essex, England, a northeastern suburb of London, on the left bank of the Roding, 2 miles above its confluence with the Thames (Map: London, D 9). It has jute factories, manufactures coke, rubber, and chemicals, and vegetable gardening is extensively carried on for the metropolitan markets. The municipality owns electric and gas lighting plants, water works, and wharf; has provided artisans' dwellings, cottage allotments, recreation grounds, public baths, and free library, and maintains isolation hospitals and a cemetery. Its most notable edifice is the ancient and beautiful church of St. Margaret, and there are scanty remains of Barking Abbey, formerly one of the richest nunneries in England. It was founded in 670, by St. Erkenwald, Bishop of London, whose sister, St. Ethelburga, was the first abbess. It was burned by the Danes in 870, rebuilt by King Edgar in the tenth century, and dismantled by Henry VIII. Pop., 1891, 14,300; 1901, 21,500; 1911, 31,294. Consult *Barking Town: its Progress and Public Works* (London, 1897).

BARKING BIRD. See Guidguid.

BAR'KIS. A country carrier in Dickens's novel, *David Copperfield.* He marries David's nurse, Peggotty, to whom he proposes by sending her the message, "Barkis is willin'."

BARK LICE. See Coccidæ; Scale Insects.

BAR'-KOK'BA, Simon. The leader of the Jews in their great insurrection against the Romans, under the Emperor Hadrian, from 132 to 135 A.D. Hadrian's attempt to Romanize Judæa through the transformation of Jerusalem into a pagan city, and the gradual obliteration of Jewish customs, had awakened the fanatic zeal of the Jews all over the empire. Between 115 and 118 A.D., they rose in revolt in Cyrene, Egypt, Cyprus, and Mesopotamia, while in Palestine the only influence of the aged Joshua ben Hananiah retarded the outbreak. Under the inspiration of Akiba (q.v.), the successor of Joshua, secret preparations were begun for a rising of the entire nation. At the head of the movement stood Simon Bar-Koziba (i.e., of the

town of Koziba) to whom Akiba gave the name of Bar-Kokba, or, 'son of the star,' seeing in him the fulfillment of the prophecy, "There shall come a star out of Jacob" (Num. xxiv. 17). From all over the Orient Jews thronged to join his armies, which at the height of his power numbered no less than 400,000 men. He fought at first with great success against the Romans. Finnius Rufus could not resist the attack. The war spread over all the country of Palestine, and 50 towns, besides many villages and hamlets, came into the possession of the Jews. It is not probable, however, that Jerusalem fell into their hands. So important a fact would have been mentioned in the Jewish sources, but they do not refer to a capture of the holy city. But the success of the Jews was such that Publius Marcellus the legate of Syria was sent against them. He also was defeated. Hadrian then summoned his greatest general, Julius Severus, from Britain. The Romans are said to have fought 52 battles with the forces commanded by Bar-Kokba. Finally, in August, 135, Bethar, the last strong fortress held by them, was stormed by the Romans after a siege of nearly a year. According to Dio Cassius half a million of Jews perished in the assault and the massacre that followed, and among them fell Bar-Kokba. After the war many men were executed, thousands of women and children were sold into slavery, and cruel edicts were issued against the survivors. From this last struggle dates the final dispersion of the Jews over the face of the earth. The holy city was razed to the ground and rebuilt under the name of Ælia Capitolina. There can be no doubt as to the military genius and splendid patriotism of Bar-Kokba. But the disenchantment was so great, the punishment of the rebellion so severe, that the 'son of the star' was declared by many Jews to be 'the son of a lie,' with an allusion to the meaning of Koziba, which probably was the name of his birthplace. For a detailed account of the struggle, consult Münter, *Der jüdische Krieg unter den Kaisern Trajan und Hadrian* (Altona, 1821), and Schwarz, *Der Bar-Kochbaische Aufstand* (Brünn, 1885).

BARKS'DALE, William (1821–63). A Confederate officer in the Civil War in the United States. He was born in Tennessee, was educated at Nashville University, studied law, and served in the Mexican War. In 1853–61 he represented Mississippi in Congress as a pro-slavery Democrat, and upon the outbreak of the Civil War resigned his seat to take command of the Thirteenth Mississippi Volunteers. He was promoted to be brigadier general, and fell at Gettysburg.

BARK STOVE. See Hothouse.

BARLAAM, bär'lâ-ăm (?–c.1348). A learned Italian monk. He was born at Seminaria, Calabria, and entered the Order of St. Basil. He afterward studied at Thessalonica, joined the Greek church at Constantinople, and wrote his polemical *Liber contra Primatum Papæ*. He was sent by Andronicus III in 1339 on a diplomatic mission to Pope Benedict XII, to obtain the assistance of Western Christendom against the Turks. Failing in this, he returned to Greece and attacked the Hesychasts, or Quietists, of Mount Athos. At a synod held in 1341 the Hesychasts were so skillfully defended that he hastened to Italy, reëntered the Roman church, and was appointed Bishop of Gerace. His principal work is *Ethica secundum Stoicos*. Barlaam was a man of great learning, distinguished as philosopher, mathematician, and astronomer. Among his pupils was Petrarch. Consult G. Manlari, *Fra Barlaamo Calabrese, mæstro del Petrarca* (Rome, 1888).

BARLAAM AND JOS'APHAT. One of the most widely spread religious romances of the Middle Ages. It is a Christianized version of the legendary history of Buddha, agreeing with it in many details. The story is briefly as follows: Josaphat was the only son of a heathen king in India, named Avenier or Abenner. In order to prevent the fulfillment of a prediction that he would be converted to Christianity, Josaphat was brought up in close confinement under the care of heathen teachers and surrounded by every luxury. Being visited, however, by a Christian hermit, Barlaam, he learned of the strange faith and was baptized. So great was his piety that he converted many of his companions and finally even his father. On the latter's death he succeeded to the kingdom, but soon after abdicated in favor of his friend Barachias and went into the wilderness. There, after two years of painful search, he found again Barlaam and lived a holy life. The celebrated divine, John Damascene, was formerly regarded as the author of the original Greek MS., which was first published by M. de Boissonade in the fourth volume of his *Anecdota* (Paris, 1832) and translated into German by Liebrecht (Münster, 1847). But even in the Middle Ages a Latin version of this romance had been extensively circulated. About the end of the fifteenth century it was often printed in a detached form, and later it appeared among the works of John Damascene (Paris, 1609). This theory of its authorship is no longer accepted. Vincent de Beauvais wove the story into his *Speculum Historiale*. In a condensed form the story appears in the *Golden Legend* of Jacobus de Veragine. From the Latin version sprang three French poetical versions belonging to the thirteenth century and as yet unprinted. The Italian *Storia di S. Barlaam* (latest ed., Rome, 1816) may be traced to a Provençal original as early as the beginning of the fourteenth century. In Germany Rudolf von Ems derived his poem, *Barlaam und Josaphat*, first printed at Königsberg (1818), and later at Leipzig, from the Latin. There is also an Augsburg impression of a prose translation of the ancient Latin text belonging to the close of the fifteenth century. *Baarlaam and Josaphat* appears in Middle English, in both a prose and a poetical version, the former edited by C. Horstmann. The Spanish *Historia de Barlaam y Josaphat*, by Juan de Azre Solorzano (Madrid, 1608), the Polish poetical version, by Kulizowsky (Cracow, 1688), and also the Bohemian (Prague, 1593), are all borrowed from the Latin; while the Icelandic *Barlaams Saga*, and the Swedish popular tale, *Barlaam och Josaphat*, both from the fifteenth century, have a German source. A Norwegian version, printed from an old vellum MS. of the beginning of the thirteenth century, said to have been translated by King Hakon Sverreson, appeared in 1851 (Keyser und Unger, *Barlaams ok Josaphats saga*, Christiania, 1851). This romance has even been rendered into the Tagalog language of the Philippines and there printed (Manila, 1712). Consult: Liebrecht, *Zur Volkskunde* (Heilbronn, 1879); Max Müller, *Selected Essays* (London, 1881); H. Zotenberg, *Notice sur le livre de Barlaam et Joasaph* (Paris, 1886); Joseph Jacobs, *Barlaam and Josaphat* (London, 1896); Appel, *Gui von Cam-*

brai und Josaphas nach den handschriften von Paris und Monte Cassino (Halle, 1907).

BARLÆUS, bär-lē'ŭs, KASPAR, properly VAN BAERLE or BAARLE (1584–1648). A Dutch poet and historian, born at Antwerp. He studied theology at Leyden, was appointed professor of logic there in 1617, and in 1619 was deposed as a partisan of the Remonstrants. In 1631 he was called to the chair of philosophy and eloquence in the Athenæum of Amsterdam. He published *Poemata* (1645–46) and *Rerum per Octennium in Brasilia et Alibi Nuper Gestarum Historia* (1647).

BAR-LE-DUC, bär'le-dük', or **BAR-SUR-ORNAIN**, -sur' ôr'nāN' (Fr. the duke's citadel, from Gael. *barr*, summit, projection, fort). The capital of the department of Meuse, France, on the Ornain and the Canal de la Marne, 158 miles by rail east of Paris (Map: France, N., L 4). It is divided into three parts by the river and canal and has fine boulevards. Its chief buildings are the fine fourteenth-century church of St. Etienne or St. Pierre, the Hôtel de Ville, at one time Oudinot's mansion, the Café des Oiseaux, containing a collection of stuffed animals and birds, a commercial museum, library, and a theatre. The manufacturing establishments include cotton and woolen mills, tanneries, breweries, paper mills, foundries, and confectioneries. It produces excellent wine, and a variety of currant jam made there is an important article of commerce. Bar-le-Duc dates from the sixth century and was formerly the residence of the Dukes of Bar. Pop., 1896, 18,249; 1901, 17,693; 1906, 17,307; 1911, 17,068.

BARLETTA, bär-lĕt'tà (anciently, *Bardoli*, later *Barolum*). An island port in the province of Bari, south Italy, connected with the mainland by means of a bridge across the Adriatic (Map: Italy, L 6). It is on the Bologna-Brindisi Railway, 35 miles northwest of Bari, with which it is also connected by a street railway. It is surrounded by ancient turreted walls and has spacious squares and broad streets. The houses are high, with flat terraced roofs, and built mostly of sandstone. There are many beautiful Byzantine churches, among them the cathedral of Santa Maria Maggoire, in which Ferdinand of Aragon was crowned. Interesting palaces are that of unhappy King Manfred, now turned into a convent, and the great castle constructed under Charles V. On the large square, facing the harbor, and in front of the Gothic church of San Sepolcro, stands the celebrated bronze statue, 15 feet high, found in the sea and evidently of Roman workmanship, said to be a likeness of Heraclius, Constantine, or Theodosius. In another square is a monument to the statesman Massimo d' Azeglio, who died in 1866. The inner harbor is accessible to small vessels only; but there is good anchorage for larger vessels in the roadstead, which is protected by a mole, running out into the sea, on which stands a lighthouse. Barletta has regular steamboat communication with other Adriatic ports and exports wine, oil, leather, cheese, fruit, hemp, and tartar. Imports include cotton, sulphur, and fish. In 1503, during the war between Louis XII and Ferdinand the Catholic, when Barletta was besieged by the French, there took place outside the wall, according to the rules of chivalry, the famous combat between 13 French knights and 13 Italian knights, led by Bayard, *chevalier sans peur et sans reproche*, and Prospero Colonna respectively. Nine miles west of Barletta, on the Ofanto, is Canne, the ancient Cannæ, where in 216 B.C. Hannibal inflicted a disastrous defeat on the Romans. Pop., 1881, 33,179; 1901 (commune), 42,022; 1911, 44,233.

BAR'LEY (AS. *bærlic*, from *bere*, Eng. *bear*, barley + *leác*, a leek, plant). *Hordeum vulgare*. One of the most ancient of cultivated plants, of the Gramineæ, or grasses. Its cultivation is mentioned in the Bible. It was grown by the ancient Egyptians, the Greeks, and the Romans, and by the Chinese long before the Christian Era. Barley is found growing wild in western temperate Asia, and this region is considered as its original home. The range of latitude in which barley is cultivated is quite large, being grown as far north as Alaska, Iceland, and Norway, as well as in Algeria, Egypt, India, and other countries with an almost equatorial climate. In Switzerland and Chile it ripens at an altitude of 5000 feet, but it rarely ripens on the plateaus of Peru, which have an elevation of 9000 feet.

The preparation of the soil for barley does not differ materially from that for wheat. The land should be plowed fairly deep and thoroughly pulverized to form a well-prepared seed bed. The soil should be porous, well drained, and of good fertility. Barley grows best on sandy and calcareous loams in northern latitudes, but in southern countries soils containing a little more clay give the best results. The plant has a comparatively short growing period, ranging from 75 to 90 days, and the tilth and fertility of the soil should be such as to enable it to make a rapid growth. An excess of nitrogenous manures in the soil is injurious. When barnyard manure is applied directly to the crop, it should be well rotted. The best method, however, is to apply it to a previous crop, preferably corn. Barley is very responsive to a good rotation, generally giving better yields when it follows a hoed crop like corn and when clover is included in the succession of crops. For illustration, see Colored Plate of CEREALS.

In the United States and Canada, as well as in the greater portion of Europe, barley is sown in spring, and in the countries along the Mediterranean Sea it is sown in the fall. It is, however, also grown to some extent as a winter annual in the Southern States. The quantity of seed sown per acre varies from 2 to 3 bushels. Barley germinates at about the same temperature as wheat, but the young plant is more susceptible to cold than wheat; and a light frost, shortly after it is up, is often injurious. In the regions of the United States where spring wheat is grown, it is a common custom to sow it after wheat and before oats are sown. It is generally sown broadcast, but many farmers, especially in England, prefer to sow it in drills from 8 to 10 inches apart. The crop is now generally harvested with the self-binder. As soon as the sheaves are dry enough, they are stacked or hauled into barns to prevent exposure to rains or damp weather, which discolors the grain and materially reduces its value. Barley ripens earlier than spring wheat and is harvested usually just before that crop. When grown for malting purposes, it should not be harvested before it is thoroughly ripe.

The different varieties of barley, considered by many botanists as all belonging to one species, comprise four distinct types, viz., two-rowed barley, *Hordeum sativum distichon;* four-rowed

barley, *Hordeum sativum vulgare;* six-rowed barley, *Hordeum sativum hexastichon;* and naked barley, *Hordeum nudum.* Some authorities consider these different types as distinct species. The varieties of barley grown in the United States are generally of the six-rowed type, while in Europe the two-rowed type predominates. The finest varieties of malting barley, including Chevalier barley and the various selections made from it, which are the most popular for malting purposes, belong to the two-rowed type. The four-rowed varieties, frequently called "bere" or "bigg" in England, were formerly extensively used for malt, but are now being more and more replaced by the two-rowed varieties. The characters which determine a good malting barley are composition, capacity and energy of germination, plumpness and weight of grains, mealiness, proportion of husk (glumes adhering to grain), color, smell, and absence of mutilated kernels. In malting, barleys of a high starch content and a low protein content are sought. Quick and even germination produces the best malt, hence the brewer's interest in the state of ripeness and the absence of injured grains—conditions which directly affect germination. Plumpness and weight of the grains and the proportion of husk give indications as to a high or a low percentage of starch. Mealiness is important, as it insures a much more ready transformation of the starch into soluble compounds than when the grains are hard and flinty. A musty smell and a stained or discolored appearance of the grain are evidences of injury and materially reduce the value of barley from the brewer's point of view. The best malting barleys of the world are produced in eastern and southeastern England. The well-known Chevalier variety was originated in Suffolk in 1819.

From 35 to 40 bushels of barley per acre is considered a good yield, although under very favorable weather and soil conditions the yield often reaches 60 bushels per acre or even more. The legal weight per bushel in the United States is generally 48 pounds. The world's annual production of barley is about 1,400,000,000 bushels, the leading countries in order of yield being European Russia, the United States, Germany and Austria-Hungary. In the United States the production has largely increased during the last 60 years. The total yield of barley in 1912 was 223,824,000 bushels as compared with 5,167,015 bushels in 1849. In 1912 the following States ranked first in total yield: Minnesota, 42,018,000 bushels; California 41,760,000 bushels; North Dakota, 35,162,000 bushels; Wisconsin, 24,843,000; and South Dakota, 23,062,000 bushels. The average annual yield throughout the United States is about 25 bushels per acre. The average price per bushel on December 1 of each year for the years 1900 to 1909 was 47.9 cents.

Barley is affected in much the same manner as wheat by attacks of smut and rust. It is, however, much less liable to disease than any other cereal crop. The loose smut of barley *Ustilago nuda,* is the most serious disease of this crop in the United States. It may be controlled by soaking the seed for six or seven hours in cold water followed by 15 to 30 minutes in water heated to 52° C. (124.6° F.). The seed should then be sown on clean land. See RUST; SMUT; WHEAT.

Food and Feeding Value.—Barley grain, hay, and straw, and several milling and by-products from the grain, are used as feeding stuffs. The grain, like other cereals, contains a fairly large proportion of protein (12.4 per cent) and a large proportion of nitrogen-free extract (69.8 per cent), chiefly starch. The other constituents are: water (10.9 per cent), fat (1.8 per cent), crude fibre (2.7 per cent), and mineral matter (2.4 per cent). Barley is a common feeding stuff in the Old World, being satisfactorily used for the grain ration of horses, cattle, and pigs. Its use is not general in the United States, being confined largely to the Pacific slope, where it is fed especially to horses. Tests at different American experiment stations have shown that, either alone or mixed with corn or other grain, it gives fairly satisfactory results with cattle, pigs, and sheep. In experiment with pigs, 80.1 per cent of the dry matter, 81.4 per cent of the protein, and 86.6 per cent of the nitrogen-free extract of barley was found to be digestible. Barley is grown quite extensively for hay in some sections of the United States, being cut for that purpose before the grain is mature. The principal by-products are barley bran, barley feed (from pearled barley), screenings, malt sprouts, and brewer's grains (q.v.). The mill products are meal and pearled barley. As a food barley is used chiefly in the form of "pearled barley," i.e., barley with the husks removed, ground to a round form and polished.

Barley is used for thickening soups, for making cooling drinks for invalids, and for a number of other purposes. The ground grain does not make a satisfactory bread; for, although it contains a fairly large amount of proteid matter, it is deficient in gluten. Barley water is sometimes used in the treatment of infants for intestinal disorders, and special barley preparations are combined with cow's milk in preparing food for infants and invalids.

BARLEYBREAK. A popular amusement, very common in the reign of James I and, with certain modifications in name and practice, still existing among young persons in both England and Scotland. Originally it was played by six people, three of each sex, who were formed into couples. A piece of ground was then apportioned into three parts, and into the central one, called *hell,* a couple was doomed by lot. The sport consisted in the condemned couple's "catching" one of the other couples while they were in the act of changing places, when the couple thus caught had to go into the centre. It was no easy matter, however, for the two in the centre to capture another couple; for, by the rules of the game, they were bound to keep united, while the others, when hard pressed, might sever. This quaint game is poetically described in Sidney's *Arcadia* and Suckling's *Poems.*

BARLEYCORN, JOHN. A personification of the spirit of barley or malt liquor, used jocularly and in humorous poetical effusions as by Robert Burns. There exists a whimsical English tract of old date, under the title of *The Arraigning and Indicting of Sir John Barleycorn, Knt., printed for Timothy Tosspot,* in which Sir John is described as of "noble blood, well beloved in England, a great support of the Crown, and a maintainer of both rich and poor."

BARLEY RUST. See RUST.

BARLOW, FRANCIS CHANNING (1834–96). An American soldier and lawyer, born in Brooklyn, N. Y. He graduated at Harvard in 1855 and was admitted to the New York bar. In 1861 he enlisted in the Twelfth New York Na-

tional Guard, and after a three months' term became lieutenant colonel of the Sixty-first New York Volunteers. He participated in the battles of Antietam, Chancellorsville, and Gettysburg and was mustered out with the rank of brigadier general and brevet major general. From 1866 to 1868 he was Secretary of State for New York and in 1872–73 was Attorney-General of the State. In the latter capacity he directed the prosecution of William M. Tweed (q.v.) and other members of the notorious "Tweed Ring" in New York City. He subsequently practiced law and was one of the founders of the Association of the Bar of New York City.

BARLOW, JANE (1860–1917). An Irish novelist, daughter of Rev. J. W. Barlow, vice-provost of Trinity College, Dublin. She was born at Clontarf, near Dublin, Oct. 17, 1860. She has described, with rare sympathy and humor, Irish village life, employing sometimes verse, but usually prose. *Bog-land Studies*, verse (1892), has been followed by *Irish Idylls* (1892); *Kerrigan's Quality* (1893); *The End of Elfintown* (1894); *The Battle of the Frogs and Mice* (1894); *Maureen's Fairing* (1895); *Strangers at Lisconnel* (1895); *Mrs. Martin's Company* (1896); *Creel of Irish Stories* (1897); *From the East unto the West* (1898); *From the Land of the Shamrock* (1900); *Ghostbereft and other Stories* (1902); *From Beach and Bog Land* (1905); *Irish Ways* (1909, 1911); *Flaws: a Novel* (1911). She was made an honorary Doctor of Letters by Dublin University.

BARLOW, JOEL (1754–1812). An American poet and man of affairs. He was born at Redding, Conn., March 24, 1754, and was educated first at Dartmouth, then at Yale, developing early great poetical aspirations. In 1780, two years after graduating, he entered the army as chaplain, and after the peace studied law at Hartford, where, in 1786, he was admitted to practice. In the previous year he had edited a *Book of Psalmody* for the Congregational churches of Connecticut, which was used until his religious opinions became heterodox. He also took part in political and literary journalism and wrote verses with the other "Hartford Wits." In 1787 his rather pompous poem, *The Vision of Columbus*, greatly admired at the time, made him very well known. It brought him also the European agency of the Scioto Land Company, which had acquired redemption rights in 3,500,000 acres of land in Ohio and sought to market them abroad. On this fraudulent mission Barlow innocently went in 1788 to France, beginning a long exile in which his religious and political opinions were much liberalized. He also passed some time in London, associating with the advanced liberals; and here, as well as in France, he published political works, the most noteworthy of which is *Advice to the Privileged Orders*, proscribed by the British government. Late in 1792 Barlow returned to France and was active in politics till his defeat as candidate for the Convention in 1793. At this period he obtained the hint for *Hasty Pudding*, his most popular poem, a mock heroic that is still readable. He now embarked in commerce and made a considerable fortune. In 1795, with great self-sacrifice, he became consul at Algiers and rendered valuable services to American prisoners. Returning to Paris, he led a literary life, preparing historical works on the American and French revolutions, which were never completed, and expanding his *Vision of Columbus* into an epic, *The Columbiad*, which, when published in 1807, in a magnificent quarto, was at first regarded as remarkably fine, but soon fell absolutely flat, because of its pomposity and its absurd attempt to foist upon almost contemporary events the traditional allusions of classical mythology. In 1805, having never lost his patriotism, which he had shown during the X Y Z Affair, he returned to America, where he was cordially received by the Republicans, but vituperated by the Federalists. Until 1811 he resided at Kalorama, near Washington, cultivating literature and farming. He was then appointed commissioner to Napoleon and accepted the office only from a sense of duty. Going to meet Napoleon at Vilna, he became involved in the disastrous retreat of the French army from Russia, and died of exposure at a small Polish village, Dec. 24, 1812. Barlow's merits as a poet were small, but he was a fair prose writer, a cultivated and enterprising man of affairs, and a true patriot. Consult Todd, *Life and Letters of Joel Barlow* (New York, 1886), and Trent, *American Literature* (New York, 1903).

BARLOW, JOHN WHITNEY (1838–1914). An American soldier, born at Perry, N. Y. After graduating from the United States Military Academy in 1861, he served throughout the Civil War. He was breveted captain in 1862, major in 1864, and lieutenant colonel in 1865 for his services respectively in the battle of Hanover Courthouse, the Atlanta campaign, and the battles before Nashville, Tenn. After the war he directed various military engineering works and harbor improvements and conducted explorations of the headwaters of the Yellowstone and Mississippi rivers. From 1892 to 1896 he was in command of the United States engineers in marking the boundary between the United States and Mexico. Subsequently he served as division engineer of the southwest division, then of the northwest division, and finally he was a member of the United States Board of Fortifications.

BARLOW, WILLIAM HENRY (1812–1902). An English engineer. He was born and educated at Woolwich. In 1832 he went to Constantinople, where he planned the factory and machinery for the improvement of the Sultan's ordnance, and examined the lighthouses at the entrance to the Bosporus. For this service he received from the Sultan the decoration of the "Nichan." He was the engineer of the new bridge over the Tay (1880–87), and coöperated with Sir J. Fowler and J. Harrison in designing the Firth of Forth Bridge. He was president of the Institution of Civil Engineers in 1880. Among his publications may be mentioned: *Illumination of Lighthouses* (1837); *Diurnal Electric Tides and Storms* (1848); *Resistance of Flexure in Beams* (*Proceedings* of the Royal Society, 1855); *The Logograph* (1874).

BARLOWE, ARTHUR (c.1550–c.1620). An English navigator. In 1584 he and Philip Amadas (q.v.) were sent out by Sir Walter Raleigh to find a favorite location for a colony in America. Leaving England April 27, they reached the Canaries May 10, and one of the West Indian Islands June 10, and "on the 2d of July," says Barlowe, "we found shole water, wher we smelt so sweet and so strong a smel as if we had been in the midst of some delicate garden abounding with all kinds of odoriferous flowers." Two days later they sighted a part of the North Carolina coast. They returned to England, bring-

ing glowing accounts of the beauty and attractiveness of the new country. Barlowe wrote a detailed narrative of the voyage in a letter to Raleigh, which may be found in vol. iii of Hakluyt, *Principall Voyages, Traffiques, and Discoveries of the English Nation* (London, 1599–1600), and has been reprinted, in part, in vol. i of A. B. Hart, *American History Told by Contemporaries* (4 vols., New York, 1897–1901).

BAR'MECIDES, or BAR'MEKIDES. A Persian family, celebrated in history as the ministers of the early Abbasside caliphs. Khaled-bin-Barmek was the Chancellor of the Exchequer under Abu'l Abbâs as-Saffâh, the first Abbasside caliph; and his influence endured through the reigns of Al-Mansur and Al-Mahdi. Yahya, the son of Khaled, was intrusted by Al-Mahdi with the education of his son, the celebrated Harun al-Rashid, and was made vizier by Harun upon his accession to the caliphate (A.D. 786). By his military skill and wise civil administration he contributed largely to the prosperity of the reign, the caliph himself bestowing on him the appellation of "Father." Yahya's sons, Fazl and Ja'far (the Giafar of the *Arabian Nights*), were greatly beloved by the caliph, who appointed Ja'far vizier to succeed his father. But the splendor of the family and the unlimited power it enjoyed gained it many enemies, who persuaded Harun that the Barmecides were aiming at the crown. The caliph caused Ja'far to be executed, and the others to be thrown into prison. He carried his emnity so far as to forbid the mention of their name on pain of death; but their virtues and their glory are celebrated by the Mohammedan poets and historians, whose munificent patrons they were. Consult Muir, *The Caliphate* (London, 1891), and Weil, *Geschichte der islamitischen Völker* (Stuttgart, 1866).

BARMECIDE'S FEAST. A phrase which originated in a story related in the *Arabian Nights* (Story of the Barber's Sixth Brother). A poor man who had not had food for two days visited one of the rich Barmecides, the influential Persian family in the time of Harun al-Rashid, and asked for food. He was invited to dinner. One after another, empty dishes were brought in, and the host asked the man how he liked the food. All was taken good-naturedly until the wine was brought, when the guest, pretending to be drunk, boxed the host on the ear. This bit of humor thoroughly delighted the Barmecide, and he ordered that a real feast be placed before the man.

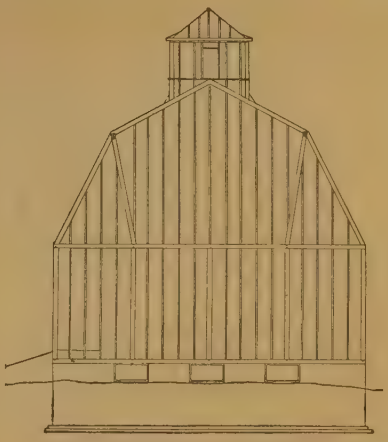
BAR'MEN. A city in the province of Rhenish Prussia, on the Wupper, about 25 miles northeast of Cologne (Map: German Empire, B 3). It is divided into upper, middle, and lower Barmen, includes several small villages, now united into one district, and its western boundary adjoins the city of Elberfeld. The city has clean and well-kept streets, the principal avenue being the Alleestrasse. The river, which flows through the length of the city, is crossed by many bridges. Among the noteworthy buildings are the old and the new Rathaus and the municipal theatre. There is only one park, which was formed from woodland purchased by the city. Barmen owns its water works, its gas works, and electric light plants, all of which net large profits to the city. It has numerous benevolent and charitable institutions, including a municipal hospital. Educational institutions consist of a gymnasium, several high schools, an industrial school, a natural-history museum, a library, and a picture gallery. The district adjoining the city is one of the most populous and prosperous in Germany. Barmen is the principal seat of the ribbon manufacture on the Continent, producing linen, woolen, cotton, silk and half-silk ribbons, and, in addition, cloth of various kinds, staylaces, thread, etc., all of which are widely exported. It has also considerable manufactures of soap, beer, pottery, candles, metal ware, buttons, machinery, organs, and pianofortes. There are, besides, in the valley, numerous bleachfields and Turkey-red dye works. Barmen has six railway stations and is in railway communication with all the principal German cities. Local traffic is served by several electric railways, including a novel aërial line built over and following the bed of the Wupper between Barmen and Sonnborn. Lower Barmen has a mineral spring and a bathing establishment. Pop., 1890, 116,000; 1900, 141,944; 1910, 169,214. Barmen was first mentioned in the eleventh century. By the fifteenth century the bleaching industry had become highly developed there, and its modern prosperity dates from its annexation to Prussia in 1815.

BAR'MOTE COURT (for earlier *bargemote, berghmote*, from *berg*, hill + *mote*, meeting). The name of local courts held in the lead-mining districts of Derbyshire, England, for the determination of the ancient rights and privileges of the inhabitants of those districts, in the lead mines, and for the settlement of disputes relating thereto. These courts are of great antiquity, but their jurisdiction and procedure are to a considerable extent regulated by statutes (14 and 15 Vict. c. 94). Consult *Encyclopædia of the Laws of England*, vol. ii, p. 18, and Bainbridge, *The Law of Mines and Minerals* (5th ed.; London, 1900).

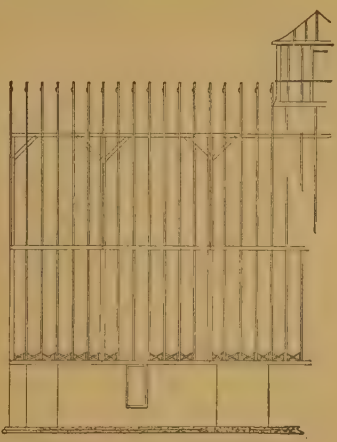
BAR'MOUTH. A picturesque watering place in Merionethshire, Wales, situated at the mouth of the Maw, 230 miles from London (Map: Wales, B 4). On the opposite shore lies Cader Idris, over 2900 feet high. It is a popular bathing and coaching resort. Pop., 1901, 2214; 1911, 2106.

BARN (AS. *berern, bern*, from *bere*, barley + *ern*, a closed place). A building used for the storage of feed, implements, machinery, and farm products, but more especially for the housing of stock, either under one roof or in separate, special buildings, depending on the size and type of farm. It is generally recognized that it is more convenient and economical of labor to make ample provision for all these purposes, except the housing of pigs, in one compact building on the farm of from 60 to 80 acres on which diversified farming is practiced. For larger farms or farms specializing in one or more lines it is often well to provide separate specially constructed buildings for the specialties.

Convenience and economy of labor make it desirable to have the barn centrally located, whether for general or special use, in as direct communication as possible with those fields or pastures to which its use is most closely related and at a convenient distance from the farmhouse though not so near as to be offensive or dangerous in case of fire. The location selected should be well drained either naturally or artificially, but away from the farmhouse or any source of water supply in use. A hillside facing the south furnishes an especially desirable site, since in addition to good drainage this makes possible a clean dry basement and warm dry stalls and

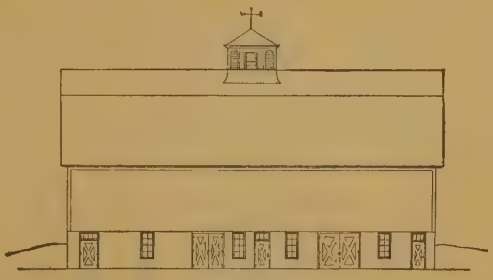


West elevation, showing framing.



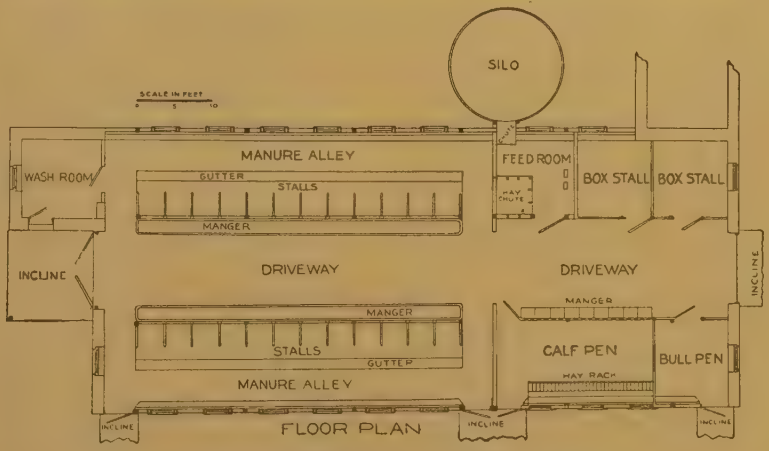
South elevation, showing framing.

West elevation.



South elevation.

Design and Construction of Typical American Horse and Cattle Barn, North Dakota Experiment Station.



Floor plan of modern dairy barn for twenty-four cows

yards, opening on the grounds to the south, and a driveway to the upper floors for the general barn.

The main portion of the general barn, which may have two or more stories, is utilized mostly for the storage of feed, some farm products, and some of the implements that are in general and constant use on the farm. It should be constructed with a view to convenience and economy of space as well as strength, durability, and economy of material, the frame and balloon style of construction being especially adapted to this purpose. The farm animals are preferably housed in the basement. Adequate provision for proper lighting and ventilation is necessary for the health and comfort of animals. It is desirable that the basement face south, that windows be placed on both east and west sides, and windows and doors on the south side of the basement, so that the sun strike some inside portion of the basement at all hours of the day, and that the stalls be arranged conveniently for feeding and removing litter in parallel rows. Ventilation may be induced by means of flues opening near the floor or ceiling, but care should be taken that no animal is subjected to a direct draft.

An abundant supply of good water is also essential. Individual troughs are more hygienic than a common trough, but a common tank or trough in the open court constantly supplied with fresh water is a common and very satisfactory arrangement. If spring or artesian water under pressure is not available, a supply may be provided by pumping from wells or, in extreme cases, by storing rain water in cisterns. A constant supply under pressure is desirable and may be obtained by means of a storage tank placed in an upper story, by a pneumatic storage tank placed in the ground below frost line next to the building, or by the auto-pneumatic system in which water is supplied fresh from the well or cistern on opening a hydrant. Windmills, internal combustion engines, or electric motors are well adapted to supplying the power for pumping as well as for grinding feed and other belt work.

Special stock barns demand good drainage and good lighting; ventilation and warmth are important. Each stall should be specially designed and constructed for the accommodation of a particular type and size of animal. Concrete floors, runways, drains, and feedways in up-to-date stock barns are provided with litter and feed carriers traveling on steel tracks to facilitate the work of feeding and litter cleaning. A practically water-tight concrete manure pit located conveniently to the stock barns in which both the solid and liquid manure may be collected and stored with as little handling as possible, is a valuable addition, as it preserves the manure for fertilizing purposes and prevents pollution of the neighboring soil. There are many arrangements of stalls, but the best arrangement depends on the number and kind of animals housed and the location of the building. Stock barns usually have wide, slightly sloping roofs supported by steel trusses. These buildings are now constructed of lumber, brick, concrete, and cement block, or combinations of two or more of these. The brick and concrete materials have the advantages of strength, durability, fireproofness, and ease of erection, and constitute a building cool in summer and warm in winter. The initial cost, however, is somewhat higher than that of lumber.

Special hay barns are usually constructed of lumber and often are merely roofed with the siding extending only a short distance down, leaving the lower part of the sides open. Combination hay and stock barns have a high, wide, and long hay space in the centre with long low-roofed sheds surrounding this space in which the stock may gather and feed on the hay. Up-to-date hay barns are equipped with a steel track, hay fork, and carrier for elevating and depositing the hay.

The plan and construction of a barn will vary with the purposes for which it is used. It should be completely planned, even though it is intended at first to construct only a part of it. There is an almost infinite variety of internal fixtures for both stock and general barns, ranging from the very simple and cheap to the very elaborate and costly. Every barn used for the housing of stock, however, should be provided with one or more box stalls for the use of animals with young. A silo (q.v.) is a valuable adjunct, especially to a stock barn; it should form part of the structure, if possible, or should be so located that it will be easy to fill and convenient to feed from. Silos are now constructed of wood, concrete, concrete blocks, hollow tile, reinforced monolithic concrete, and galvanized steel metal, and some are constructed all or in part under ground.

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BAR'NABAS (Gk. Βαρνάβας). The surname given by the Apostles to Joseph, one of the members of the early Jerusalem church and interpreted by the author of Acts to mean 'Son of Consolation' (Acts iv. 36), or 'of Exhortation.' He was a Levite and a Cyprian by race, though doubtless, in view of his aunt having her home in Jerusalem, he was at this time a resident of that city. He contributed to the community of goods among the disciples (Acts iv. 36, 37). He was sponsor for Saul (Acts ix. 27), an act which would seem not only to indicate the influential position which Barnabas held among the disciples, but to involve some previous acquaintance between Barnabas and Saul. This inference is borne out by his subsequent commission by the Church of Jerusalem to investigate the work at Antioch, from which place he went to Tarsus to secure the services of Saul. In this Antioch church he also quite naturally came to assume a prominent place, being represented at the head of the prophets and teachers who

were active there (Acts xiii. 1). Together with Saul, he was commissioned by the Antioch church to carry up to Jerusalem the relief prepared for the famine-stricken brethren of the city (Acts xi. 27–30), from which journey they returned only to be sent out by the home church upon missionary work for which they had been divinely selected (Acts xiii. 2).

Throughout this first missionary tour, embracing the southern region of Asia Minor, he was the efficient companion of Paul, returning with him to Antioch, where they became involved in the contention started by the Judaizing Christians (see JUDAIZERS) regarding the necessity of circumcision as a condition of salvation (Acts xv. 1), a contention to which the Jews had doubtless been aroused by the extraordinary success of the mission among the uncircumcised Gentiles. The question was brought by them before the Apostles and elders (Acts xv. 2). From this journey they returned to Antioch, where they again engaged in the work of the local church, until Paul suggested that they visit once more the churches which they had established on their missionary tour, when, owing to a dispute between them as to the efficiency of Mark, a nephew of Barnabas, in the work, they separated from each other, Barnabas taking Mark with him and going to Cyprus, his native place (Acts xv. 36–39). There had been previous difficulty between Paul and Barnabas, immediately after their return to Antioch from the council at Jerusalem (Gal. ii. 11–21), where Barnabas is shown to be somewhat out of harmony with Paul's broader Gentile views and is really included with Peter in Paul's severe rebuke. From this time Barnabas disappears from apostolic history, for Paul's mention of him in 1 Cor. ix. 6 merely implies that Barnabas was still engaged in active missionary work, not that he was again in Paul's company; while his reference to him in Col. iv. 10 would seem to indicate his death, since otherwise it is difficult to account for Mark's return to work with Paul.

The traditions concerning his subsequent life —that he proclaimed the gospel in Rome, even during the lifetime of Jesus; that he was founder and first bishop of the church at Milan; and that he suffered martyrdom at Salamis, on his native island of Cyprus—are valueless.

Tertullian assigns to him the authorship of the New Testament Epistle to the Hebrews (see HEBREWS, EPISTLE TO THE), referring to the current tradition of the Church as so accepting it, and quite evidently implying that he had MS. authority for his view. There is also a pseudepigraphical epistle which has come down to us under his name, and an apocryphal Acts, of late date, and an apocryphal Gospel, obscurely referred to, bear his name. See BARNABAS, ACTS, EPISTLE, AND GOSPEL OF.

BARNABAS, ACTS, EPISTLE, AND GOSPEL OF. 1. The apocryphal *Acts of Barnabas*, a work of late date, recounts his missionary tours and his death by martyrdom in his native Cyprus.

2. The extant *Epistle of Barnabas*, found in the Sinaitic MS., at the close of the New Testament writings, a didactic work, full of allegorical interpretations of the Old Testament and strongly anti-Jewish in its tone. Although Barnabas was held to be its author by early Christian writers from Clement of Alexandria on, the Epistle itself makes no such claim. In fact, while its contents disclose an Alexandrian rather than a Palestinian style of thought and to this extent support the traditional authorship, yet the clear evidence given by the Epistle that its author was a Jew by persuasion rather than by birth, together with its extravagant denial of all historical connection between Judaism and the Gospel, renders any ascription of origin to the missionary companion of Paul out of the question. The place of its origin, as well as of its earliest reception, is Alexandria, and the readers to whom it was addressed are to be found in Lower Egypt. It has been variously dated—from as early as 70–79 to about 130 A.D. In view of the obvious interpretation which is to be given to the apocalyptic passage in chap. iv, the earlier of the above dates is to be preferred.

3. The existence of an apocryphal *Gospel of Barnabas* is hinted at in several obscure references in ancient documents, as, e.g., in the *Decretum* of Pope Gelasius, 496 A.D. What it contained is unknown, the extended Gospel, found under this name in a single Italian MS. (edited, with an English translation, in 1907), being a Mohammedan product with Gnostic elements.

Bibliography. For text and English translation of the *Epistle*, consult: Lightfoot, *Apostolic Fathers*, ed. Harmer (London, 1893); G. Krüger, *History of Early Christian Literature* (Eng. trans., New York, 1897); A. Harnack, *Chronologie der altchristlichen Litteratur*, vol. i (Leipzig, 1897). Consult also "Barnabas," in Hastings, *Dictionary of the Bible*, vol. i (New York, 1898), and id. in Cheyne, *Encyclopædia Biblica*, vol. i (New York, 1899).

BAR'NABITES. An order of monks which sprang up at Milan about 1530. They were so called because the church of St. Barnabas in that city was granted them to preach in. They were approved of by Pope Clement VII (1533) and Pope Paul III (1535). Their official title is "Regular Clerks of the Congregation of St. Paul." Their special duties were to attend the sick, to preach, to instruct the young, and to take the charge of souls. They soon established themselves in Italy, France, Austria, and Spain and enjoyed the privilege of teaching theology in the schools of Milan and Pavia. Many eminent men have been sent forth by them. Besides the three usual monastic vows, they took a fourth, viz., not to sue for church preferments, or to hold any post outside of their order without the Pope's special permission. In France and Austria they were employed in the conversion of Protestants and engaged in missions in China and Burma. They were expelled from France in 1880, but still exist in Belgium, Austria, and Italy.

BAR'NABY, SIR NATHANIEL (1829–1915). An English naval architect. He was born at Chatham of a family long associated with the Royal Dockyard in that city. He was educated at Chatham, Sheerness, and Portsmouth, where in 1848 he received the admiralty scholarship. He took part in planning nearly all the war vessels constructed between 1855 and 1885 and was one of the founders of the Institution of Naval Architecture (established 1860). He introduced the change from iron to steel in English shipbuilding in 1872 and advanced the plan of subsidizing merchant vessels for use in war. In 1885 he was made a K.C.B. His principal publication is *Abridgments of Specifications Relating to Shipbuilding, etc., from 1618 to the Present Time* (1862).

BARNABY RUDGE. One of Dickens's novels (1841). It contains an account of the Gordon Riots in London, June 2–7, 1780. The principal character is a half-witted man, who gives the book its name. He is condemned to death as a rioter, but is finally reprieved.

BARNACLE. A popular name for the crustaceans of the order Cirripedia, notable for the fact that in their adult form they are always attached to some foreign object, such as ship bottoms, wharf piles, floating timbers, rocks, or even whales, or else live parasitically within other crustaceans. The ultimate origin of the word "barnacle" is unknown, but it was originally applied to the barnacle goose of northern Europe, and its transfer to these crustaceans was due to the fables formerly current in regard to the reproduction of the bird. (See BARNACLE GOOSE.) Considering the popular ignorance, both of the breeding habits of the geese and of the structure of barnacles, it is not extraordinary that the absurd tales in vogue should have found credence, the crustaceans be regarded as the young of the birds, and the name be transferred to them. Goose barnacles (*Lepas*) were thus the first cirripeds to which the name was applied, and in Great Britain it is even now restricted to them and to similar stalked forms. Elsewhere, however, the name "barnacle" is now used for the sessile forms also, and even more broadly as the English term for all cirripeds.

Structure. Barnacles may be broadly defined as attached or parasitic crustacea, with an indistinctly segmented body, surrounded by a mantle, which generally calcifies and forms more or less of a shell or case. As they are attached by the head end, the first pair of antennæ (adhering organs) are very minute, and the second pair are reduced. There are generally six pairs (less frequently three or four) of long, biramous, tendril-like feet, though in parasitic forms these are wanting. There are no heart and no blood vessels, and gills and other organs of respiration are therefore naturally wanting. Barnacles are generally hermaphroditic, but in some species dwarf males occur, living in the mantle cavity of the normal individuals. In a few species the sexes are separate and dimorphic. In their development barnacles undergo a most remarkable and very characteristic metamorphosis. The eggs hatch as minute, somewhat triangular larvæ, with three pairs of limbs, and a projecting horn or process on each side anteriorly. On the under side of the head is a prominent upper lip. This larva sheds its skin several times as it grows, and finally appears as a larger, but still actively swimming creature, provided with a bivalve shell, like that of a clam. The body is segmented, and there are six pairs of biramous feet. The antennæ are modified to serve as organs of adhesion, and a "cement" gland is formed and opens in their second joint. This larva attaches itself by these antennæ, and after a resting or pupa stage becomes transformed into the adult barnacle, as a caterpillar changes into a butterfly. There is this important difference between the two processes, however, that a butterfly does not grow, its size being no greater at death than when hatched, while barnacles continue to grow throughout life.

Classification. Barnacles are classified upon the manner of life and the method of attachment. The order Cirripedia is divided into five families, as follows:

1. Lepadidæ, having the head end elongated to form a flexible stalk.
2. Balanidæ, without a stalk, but having the body surrounded by a ring of calcareous plates.
3. Alcippidæ, without stalk, or ring of plates, only three or four pairs of feet.
4. Proteolepadidæ, without stalk, plates, or feet.
5. Kentrogonidæ, without stalk, plates, feet, mouth, or digestive system.

The last three of these families are parasitic, and their reduced structure is directly traceable to their mode of life. The anatomy and natural history of barnacles can be most clearly stated by treating each family separately, though it may be said once for all that all barnacles are marine, except a single brackish-water species of *Balanus*.

The Lepadidæ take their name from the Greek word λεπάς, a limpet, probably with reference to their being attached forms. The head end is more or less elongated to form the stalk by which the animal is attached. This stalk is fleshy, but tough and flexible; its length varies greatly, up to 10 or 12 inches. Within it are contained the cement gland, with its duct opening at the tip, and near the base the ovary, with oviduct opening above in the mantle cavity. The oral portion of the head, the trunk, and the appendages are contained within the mantle, which forms a laterally flattened sac, opening by a slit-like aperture at the upper or outer end, on the ventral side. The mantle is chitinous, but contains, deposited in its wall, the plates of lime which compose the shell. There are five of these plates, a median unpaired one (the *carina*) on the dorsal side, an anterior one on each side (*scuta*), and a posterior one to each side (*terga*). There may also be small accessory plates on each side. The animal is so placed within the mantle that the mouth opens on the upper side of the attached end, the trunk curving backward and upward, and bearing the curious tendril-like feet on the ventral side. These feet are thus above the mouth, and in life project more or less freely from the opening of the shell; they are very flexible, and by their movements are continually bringing particles of food into the mantle cavity and down to the mouth. There is a liver or digestive gland connected with the stomach, but a large part of the trunk is occupied by the male reproductive organs. On the ventral side of the body is a strong muscle, by means of which the shell can be tightly closed. The nervous system consists of a brain and a ventral cord; but sense organs, other than those of touch, seem to be wanting in all adults, though eyes are present in the larvæ. The Lepadidæ are very widely distributed, but occur chiefly in the warmer seas. They are popularly known as goose barnacles or goose mussels, the latter name referring to the superficial resemblance they have to the mollusks known as mussels (q.v.). Although this resemblance is very slight, barnacles were long classed as mollusks because of the presence of a shell. The number of species of goose barnacles is not large; but, owing to their becoming attached to the bottoms of ships, they are transported from one side of the globe to the other, so that the same species sometimes occurs in the harbors of Europe, Asia, Africa, Australia, and both coasts of America. Naturally, those which attach themselves to rocks or other fixed bodies have a much more restricted range. None of the Lepa-

didæ are of large size; the body is usually under an inch in length, though the stalk is sometimes 10 times as long. The colors are generally inconspicuous—the stalk and mantle pale brown, the calcareous plates pearly blue. None of the Lepadidæ have any economic value.

The *Balanidæ* take their name from the Greek word *βάλανος*, an acorn, in reference to the shape of the shell. In Great Britain these barnacles are usually called "acorn shells," but the name is not in common use in the United States. The shell is much more fully developed than in the Lepadidæ, and owing to this and the absence of a stalk, they differ superficially from that family to a marked degree. The mantle forms a truncated conical sac, attached by the base, and opening at the upper or posterior end. This opening can be closed by four plates which correspond to the scuta and terga of the goose barnacles. The mantle itself calcifies into six or more vertical plates, which are broadest at the base and which can be more or less drawn together at the top, over the scuta and terga. The internal anatomy is very similar to that of the preceding family, but the ganglia of the ventral nerve cord are fused into a single large ganglionic mass. The Balanidæ are even more widely distributed than the Lepadidæ and are more abundant in the colder oceans. They often incrust rocks, wharf piles, and other submerged timbers, and the bottoms of boats, and are frequently found on crabs, mollusks, and other marine animals. They are generally small, less than 2 inches in height; but the largest-known barnacle is *Balanus psittacus*, which is sometimes 9 inches high and 4 inches in diameter. This species is of additional interest from the fact that large quantities are gathered on the coast of Chile for food and export. Other species are also eaten, especially by the Chinese, and the Romans regarded some of the Mediterranean forms as great delicacies. The flavor is said to be like that of other crustaceans, as shrimps, lobsters, etc. The shells of the Balanidæ are very hard, and when clean are almost pure white.

The *Alcippidæ* are a very small family of minute species, which live in burrows in the shells of mollusks and some of the larger cirripeds. The mantle lines the burrow and is attached at one side by a horny disk. The sexes are separate, and the females are much larger than the males, which are generally found living within the mantle cavity of the females, but it is not certain that they remain there through life.

The *Proteolepadidæ* are a still smaller family. The species are minute, maggot-like animals, with no limbs, parasitic in other crustaceans. So degenerated is the adult female by its parasitic life, that its body consists only of a sac containing the reproductive organs, attached to the crab by numerous fine root-like processes. On account of these, which have arisen from the head of the young, these animals are also known as *Rhizocephala*, or 'root-headed' animals. The best-known genus is *Sacculina*, which has long stood as the extreme example of the degenerating effect of a parasitic life. The members of these last two families of barnacles would never be recognized as cirripeds at all from a study of their anatomy alone. But the study of their embryology and the knowledge of their life histories have revealed clearly their ancestry and relationship; for in early life the larvæ of both these families show the same essential characters as the larvæ of other barnacles, and it is only after they have taken up their abode in their host that the degeneration becomes marked. In *Sacculina* the males never become attached to a host, but remain in the larval condition throughout life, except for the development of the reproductive organs.

Barnacles have a special historical interest to every biologist, from the fact that the only extensive systematic work in zoölogy done by Darwin was done upon this group. The classical volumes entitled "monographs" of living and fossil Cirripedia, by Charles Darwin, published by the Ray Society of London in 1851–54, will always be invaluable to students of the Crustacea. Darwin spent eight years on this work, and it illustrates admirably his patience, thoroughness of investigation, and clearness of expression. Another important work on barnacles is part xxviii of the *Challenger* reports; Hoek, *Report on the Cirripedia Collected by H. M. S. Challenger* (London, 1884); Pilsbury, "On the Classification of Scalpelliform Barnacles," *Proceedings*, Academy of Natural Sciences of Philadelphia (Philadelphia, 1908); *Barnacles of Japan and Bering Sea* (London, 1911).

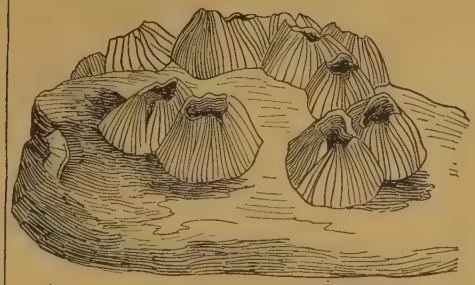
BARNACLE, Lord Decimus Tite. The extremely self-sufficient nobleman who, with his two sons, Clarence and Ferdinand, is in charge of the "Circumlocution Office," in Dickens's *Little Dorrit*.

BAR'NACLE EAT'ER. See Filefish.

BARNACLE (prob. *bernicle*) **GOOSE.** A goose (*Branta leucopsis*), common in northern Europe and Greenland, but rare in North America. The name arose from the fables of former days, which represented it as developing from a stalked or "goose" barnacle. In size the barnacle goose is smaller than the common wild goose, being only a little more than 2 feet long and weighing about 5 pounds. It is very prettily marked, having the forehead, cheeks, and throat white, the bill black, and a black stripe extending from it to the eye; the crown of the head, neck, and upper part of the breast black; the rest of the plumage, on the upper parts of the body chiefly ash-gray and black in undulating bars, on the lower parts white. This fowl is migratory in Great Britain and most of northern Europe, appearing in the fall and wintering, but passing northward to the Arctic regions to breed. It is much sought after by hunters and is highly esteemed for the table. Several other species of goose are closely allied to the barnacle and are often confounded with it, notably the brants (q.v.). In northern Asia the barnacle goose is replaced by the red-breasted goose (*Branta ruficollis*), a beautiful bird, the neck and upper part of the breast of which are of a rich chestnut-red. It is somewhat smaller than the barnacle goose and is rarely seen in Europe.

The Story of Barnacles and Geese referred to above is one of the most curious in the chronicle of superstition. It appeared, at least earlier than the eleventh century, in two forms—one that certain trees, always growing in the water, produced fruit, in form like apples, each containing the embryo of a goose, which, when the fruit was ripe, fell into the water; the other that geese were bred from a fungus growing on floating timber, in which they developed as a worm. The "fruit" and "worms" were quickly identified with barnacles that fastened themselves upon floating timber and trees, and many writers declared that they saw the birds inside the shells. Holinshed gravely affirms that such

BARNACLES



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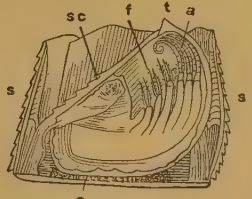

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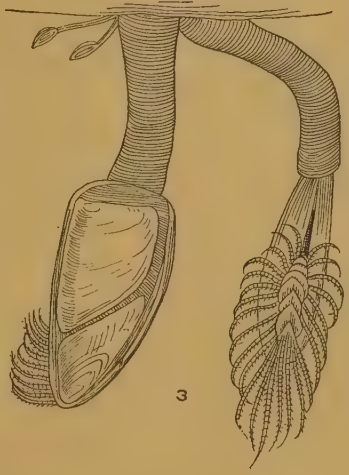

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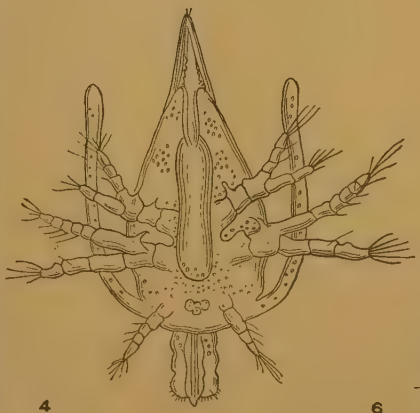

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1. SESSILE OR ACORN BARNACLE (Balanus).
2. PARTS OF A BARNACLE: *ss*, outer shell with its parts; *sc*, scutum; *t*, tergum; *o*, ovaries; *f*, feet; *a*, thoracic appendages.
3. GOOSE BARNACLE (Lepas anatifera).
4. EARLY LARVAL, OR "NAUPLIUS" STAGE OF A BARNACLE.
5. LATER LARVAL OR "CYPRIS" STAGE.
6. A MEDIÆVAL PICTURE OF THE SUPPOSED BIRTH OF GEESE FROM BARNACLES REPRESENTED AS FRUIT OF A TREE.

was the case; and the most learned men of their time were weak enough to give credence to the absurdity. Gerard, in his *Herbal* (1597), declares that after "a thing in form like a lace of silke finely woven, as it were, together"—which he correctly enough states to be "the first thing that appeareth" when "the shell gapeth open"—there next follow "the legs of the bird hanging out"; and at last the bird, increasing in size, "hangeth only by the bill," and "in short space after it cometh to full maturity, and falleth into the sea, where it gathereth feathers, and groweth to a fowl bigger than a mallard, and lesser than a goose," etc. An illustration of the process, reproduced from one of the old *Herbals*, will be found on the Plate of BARNACLES.

All this was represented as constantly taking place on the coast of Lancashire and the Hebrides, while other writers reported the same fabulous birth of geese on the Continent.

One extraordinary and laughable result of this belief was the very learned discussion which took place among theologians as to whether the geese so born were flesh or fish. To the Jews it was important, because the ceremonial manner of killing would be different, if they were fowls, from that if they were fish. The Church wished to settle it in order to know if they might be eaten, as could fish, on Fridays and fast days. Very high dignitaries took part in the decision of the question, which in the case of the Church was favorable to their being eaten when meat was forbidden; and it has been suggested that the astonishing persistence of this myth was largely due to the selfish influence of the priests, based on regard for this privilege. What was the origin of so *bizarre* a story has been widely discussed. Many theories have been propounded, none of them satisfactory. The latest student of the matter, Mr. Henry Lee, of the Zoölogical Society of London, suggests that "barnacle" (or bernicle) as applied to the cirriped, and the same term as applied to the bird, have nothing to do with each other and originated separately. The former is probably a modified diminutive of the Latin *perna*, while the latter originated in the vernacular of Scotland. "To arrive at the origin of the word . . . we must remember," says Lee (*Sea Fables Explained*, London, 1883), "that this bird, *Anser leucopis*, was formerly called 'brent,' 'brant,' or 'bran' goose [see BRANT], and was supposed to be identical with the species (*Anser torquatus*) which is now known by that name. The Scottish word for 'goose' is 'clake,' or 'clakes,' and I think that the suggestion made long ago (Gesner, 1558), by his correspondent Joannes Caius, is correct, that the word 'barnacle' comes from 'branclakis,' or 'barn-clake'—the dark-colored goose. . . . I agree with Dr. John Hill (*History of Animals*, London, 1752), that the whole matter that gave origin to the story is that the 'shell-fish' (cirripedes) supposed to have this wonderful production . . . have a kind of fibres hanging out of them, which, in some degree, resemble feathers."

BAR'NARD, LADY ANNE (1750–1825). The author of the ballad, "Auld Robin Gray" (q.v.). She was born in Fifeshire, Scotland, the eldest daughter of James Lindsey, Earl of Balcarres. In 1793 she married Andrew Barnard, son of the Bishop of Limerick, and secretary to Lord Macartney at the Cape of Good Hope. There Lady Anne lived until 1807, when, on the death of her husband, she returned to London. Her *Letters*, which were published in 1901, are extremely vivacious and entertaining.

BARNARD, DANIEL DEWEY (1797–1861). An American lawyer, born in Sheffield, Mass. He graduated at Williams College in 1818, and in 1821 was admitted to the bar at Rochester, N. Y. He was a member of Congress in 1828–30 and 1839–45 and also served in the State Legislature. From 1849 to 1853 he was Minister to Prussia. He published numerous speeches and reviews.

BARNARD, EDWARD EMERSON, LL.D. (1857–). An American astronomer. He was born at Nashville, Tenn., graduated in 1887 at Vanderbilt University (Nashville), and in 1887–95 was astronomer at Lick Observatory, Mount Hamilton, Santa Clara Co., Cal. Subsequently he became professor of astronomy at the University of Chicago and astronomer of the Yerkes Observatory, Williams Bay, Wis. He received, in 1892, the Lalande gold medal of the French Academy of Sciences; in 1898 was elected a foreign associate of the Royal Astronomical Society of Great Britain; was awarded the Janssen gold medal by the French Academy of Sciences (1900); and the Janssen prize by the French Astronomical Society (1906). He obtained excellent results in celestial photography and discovered 16 comets and the fifth satellite of Jupiter. In 1902 he published *Micrometrical Observations of Eros Made during Opposition of 1900–1901.*

BARNARD, FREDERICK AUGUSTUS PORTER (1809–89). An American mathematician and educator. He was born at Sheffield, Mass., graduated at Yale in 1828, and in 1831 became teacher in the Hartford Deaf and Dumb Asylum. He was professor of natural philosophy, mathematics, and English literature in the University of Alabama from 1837 to 1848 and of chemistry until 1854, when he took orders in the Episcopal church. In 1855 he was professor of astronomy and mathematics in the University of Mississippi, in 1856 president of that institution, and in 1858 chancellor. He became president of Columbia College, New York City, in 1864, and throughout nearly a quarter-century labored with great success for its advancement. He was United States Commissioner to the Paris Exposition of 1867 and to that of 1878 and in 1869 published a report on machinery and industrial arts. He wrote a *Treatise on Arithmetic* (1830), *Analytical Grammar with Symbolic Illustrations* (1836), *Letters on College Government* (1854), *Collegiate Education* (1854), *Art Culture* (1854), *History of the United States Coast Survey* (1857), *University Education* (1858), *Recent Progress of Science* (1869), *The Metric System* (1871), and contributed very extensively to the educational periodicals of his day. In 1860 he was one of the party sent to Labrador to observe an eclipse of the sun; in 1862 he was at work on the reduction of Gillis's observations of the stars of the Southern Hemisphere, and in 1863 he superintended the publication of maps and charts of the United States Coast Survey. He was one of the incorporators of the American Association for the Advancement of Science and its president in 1860; one of the incorporators of the National Academy of Sciences in 1863; a member of the board of experts of the Bureau of Mines in 1865, and a member of the American Institute in 1872. In the latter year he was editor in chief of *Johnson's Universal Cyclopædia.* He left the bulk of his property

to Columbia College. Barnard College, affiliated with Columbia University, is named after him—so named because of the interest which President Barnard took in the higher education of women. Consult Fulton, *Memoirs of Barnard* (New York, 1896); Winship, *Great American Educators* (Chicago, 1900); Van Amringe, *A History of Columbia University* (New York, 1904); and Sherwood, "Columbia University" in United States Bureau of Education, *Circulars of Information*, 1900, No. 3.

BARNARD, George Grey (1863–). An eminent American sculptor. He was born at Bellefonte, Pa., and derived his earliest training at the Art Institute of Chicago. He then studied for three years at the Ecole des Beaux-Arts, and for nine years in his own studio, in Paris. In 1894 he first exhibited at the Champs de Mars, upon which he was elected an associate of the Société Nationale des Beaux-Arts. In 1896 he removed to New York. The principal work of his early period is "The Two Natures," (1904), in the Metropolitan Museum of Art, New York. Other important productions are: "Sleeping Boy"; "Friendship" (a colossal group for a tomb in Norway); "The Hewers"; a clock-case, 12 feet high, carved in oak and illustrating Scandinavian mythology, a remarkable production; "Maidenhood," a marble of charming purity; the bronze "God Pan," on the green of Columbia University, New York; a large fountain in Tampa, Fla., and another at Cairo, Ill. His later commissions include the memorial of Governor Curtin and the soldiers of Centre County at Bellefonte, Pa., and the entire sculpture of the new State Capitol of Pennsylvania. Barnard was awarded gold medals at the Paris and Pan-American expositions and became professor of sculpture in the Art Students' League and an associate of the National Academy of Design. His work reveals a striking originality of conception and admirable technique, especially in marble. His sculpture, like the painting of Watts, is symbolic and idealistic. Consult Taft, *History of American Sculpture* (New York, 1903).

BARNARD, Henry (1811–1900). An American educational reformer. He was born at Hartford, Conn., graduated at Yale in 1830, and was admitted to the bar in 1835. From 1837 to 1840 he was a member of the State Legislature, where his career was marked by his energy in behalf of school and prison reform. Later, as school commissioner of Rhode Island (1843–49), he manifested the same zeal and virtually revolutionized the educational system of that State. From 1850 until 1854 he was superintendent of the Connecticut State schools; during the same period principal of the State Normal School at New Britain; from 1857 to 1859 president of the University of Wisconsin from 1865 to 1866 president of St. John's College, Annapolis; and from 1867 to 1870 the first United States Commissioner of Education. He organized the Bureau of Education and in his reports suggested or advocated nearly all of the reforms that have since been carried out in our educational system. Dr. Barnard, while secretary of the Connecticut School Board (1832–42), and later while superintendent, published the *Connecticut Common School Journal* and, while in Rhode Island, the corresponding journal in that State. In 1855 he founded the *American Journal of Education,* continuing as editor and chief contributor until 1886, when he published the *American Library of Schools and Education,* a collection of his own treatises numbering over 800 and filling 52 volumes. Dr. Barnard is to be ranked with Horace Mann as one of the greatest of American educational pioneers. Consult A. D. Mayo, *Henry Barnard* (Washington, 1898), and W. S. Monroe, *Educational Labors of Henry Barnard* (Syracuse, 1893).

BARNARD, John Gross (1815–82). An American officer and military engineer. He was born in Sheffield, Mass., graduated at West Point in 1833, and was employed as constructing engineer until 1846, rising to the rank of colonel of engineers and brevet major general. In the Mexican War he fortified Tampico and in 1851 was chief engineer of the Tehuantepec Survey. He was superintendent of West Point from 1855 to 1856 and for four years was in charge of the defenses of New York Harbor. In the Civil War he served successively as chief engineer of the department of Washington, as chief engineer (with the rank of brigadier general) of the Army of the Potomac, and chief engineer of the staff of General Grant. At the close of the war he was brevetted major general "for gallant and meritorious services in the field," and in December, 1865, became colonel of the Engineer Corps. He subsequently was a member of the boards having charge of fortifications and river and harbor obstructions. He published, among other works: *Phenomena of the Gyroscope* (1858); *Dangers and Defenses of New York* (1859); *Notes on Sea-Coast Defense* (1861); *The Confederate States Army and the Battle of Bull Run* (1862). Consult *Biographical Memoirs of the National Academy of Sciences* (1905).

BARNARD CAS'TLE. A market town in the county of Durham, England, situated on the Tees, 15 miles northwest of Darlington. On a rocky promontory near the river are the ruins of a castle built in the thirteenth century by Barnard Baliol, an ancestor of John Baliol, King of Scotland. Its townhall is noteworthy, and here are also a museum and a number of manufacturing establishments. It has a large grain market. Pop., 1901, 4421; 1911, 4757.

BARNARD COL'LEGE. The undergraduate college for women in the educational system of Columbia University (q.v.). The college proper was organized in 1889, as a result of the failure of President Barnard of Columbia and others to induce the trustees of Columbia College to admit women to that institution upon equal terms with men. The woman's college, then formed, had its own trustees and financial responsibility, but was closely affiliated with Columbia. The arrangement made at that time to exchange instructions was soon outgrown, and on Jan. 9, 1900, the following agreement was made: The president of the university to be ex officio president of Barnard and a trustee of Barnard; the internal administration of Barnard to be conducted under the direction of the president by its dean (Miss Virginia C. Gildersleeve, Ph.D., 1911–), who is entitled also to a vote in the university council; Barnard to retain its separate corporate existence and board of trustees, to provide for its own financial support, and to maintain complete separate undergraduate instruction; all Barnard degrees to be granted by, and in the name of, Columbia. At first Barnard College had charge of the women post-graduate students of the university, but since 1900 these students have registered directly in the university.

Although, as originally organized, Barnard had no further financial resources than the promise of a number of persons to pay a small sum annually for four years, it has been able, through subsequent subscriptions, to meet all the expenses of a rapidly growing college. In 1889 there were 36 students; in 1891–92, 62; in 1901–02, 431; in 1906–07, 624, and in 1911–12, 845. The buildings of the college are on Broadway, adjoining those of the Columbia corporation, and include Milbank Hall, the gift of Mrs. A. A. Anderson; Fiske Hall, given by Mrs. Josiah M. Fiske; and Brinckerhoff Hall, built mainly by the gifts of Mrs. Van Wyck Brinckerhoff. In March, 1902, the endowment of the college was increased by $500,000, $250,000 being given by John D. Rockefeller and $250,000 being obtained through numerous other gifts. In 1903 Mrs. Anderson provided for the future development of the college by the gift of the land lying between Broadway and Claremont Avenue and 116th and 119th streets, now known as Milbank Quadrangle. From a fund of $50,000 given in 1902 by Mrs. Anderson, to which, in 1906, an unknown donor added $150,000, a dormitory, Brooks Hall, was erected on 116th Street, which is to be one of a series of five dormitories facing on Milbank Quadrangle. The endowment of the college is about $1,300,000; the value of the buildings and grounds, about $3,000,000. The gross income is about $200,000.

BARNAR'DO, THOMAS JOHN (1845–1905). An English philanthropist, born in Ireland. While engaged in the study of medicine at London Hospital in 1866, he became interested in the condition of destitute children and established a place of refuge for them in Commercial Road in 1867. Since then 112 of these homes and many mission branches had been opened in various parts of England, Canada, and the Island of Jersey at the time of his death. In the "Village Home" at Ilford, Essex, about 65 cottages have been erected. These are under the supervision of "mothers," and girls are reared here as if they were in their own homes. There is also an emigration agency, which provides for the transportation of young people to Canada, where they are furnished with employment. In this way more than 60,000 orphan waifs have been rescued and instructed. Among the publications of Barnardo are: *Something Attempted, Something Done;* and *The Rescue of the Waif.* Consult J. H. Batt, *Dr. Barnardo: the Foster-father of "Nobody's Children"* (London, 1904); also a biography by his wife (1907).

BAR'NARD'S INN. An inn of Chancery, in London, dating back to 1451. It was destroyed in the last decade of the nineteenth century to make room for modern buildings.

BARNA'TO, BARNETT (1852–97). An English speculator, the so-called "King of the Kaffirs," commonly known as Barney Barnato. He was born in London, of Hebrew parentage. Early in his career he was connected with a circus and with traveling theatrical companies. In 1873 he went to Kimberley, South Africa, and in 1895 organized a remarkable "boom" in Kaffir mining stock. He was credited with being one of the richest men in the world and the most successful promoter of financial schemes. He committed suicide in 1897 by jumping from a vessel at sea. Consult Isaacs, *Life of Barnett Barnato* (London, 1897).

BARNAUL, bär'nâ-o͞ol'. The capital of a district in the government of Tomsk, Siberia, on the left bank of the upper Ob, 238 miles southwest of Tomsk, and 2046 miles east-southeast of Moscow (Map: Asia, H 3). It is the chief town and the administrative seat of the personal domains of the Czar in the Altai, and contains the Imperial smelting works, the annual output of which exceeds 13,000 pounds of gold and 5000 pounds of silver (troy). The district is rich in minerals, producing large quantities of lead, copper, iron, and silver. Barnaul's notable institutions are a meteorological station, founded in 1838, a well-equipped mining school and library, a mint, and a public museum, with fine zoölogical and botanical collections. Pop., 1897, 29,408.

BARNAVE, bär'nâv', ANTOINE PIERRE JOSEPH MARIE (1761–93). A champion and victim of the French Revolution. He was born at Grenoble, the son of an advocate. He adopted his father's profession and early attracted attention in the Parlement of Grenoble by the talents which he displayed. A pamphlet which he published against the feudal system led to his being returned as deputy from his province to the States-General in 1789. He zealously advocated the proclamation of the Rights of Man, was vehement in opposition to the absolute veto, carried through the confiscation of church property to the use of the nation, the emancipation of the Jews, and the abolition of the religious orders, and was mainly instrumental in the liberation of the slaves and reorganization of the colonies. He was the leading member of the Jacobin Club for the first two years of its existence. As a leader of the extreme party in the earlier stages of the Revolution, he became the idol of the people, particularly after his victory over Mirabeau in the question of the power of peace and war, which Mirabeau wished to leave with the King, and Barnave successfully claimed for the National Assembly. With Pétion and Latour-Maubourg he was sent to bring the royal family back from Varennes, where they had been intercepted on their flight to the border. It may be that personal contact with royalty softened his prejudices; but certainly it is true that he subsequently became inclined to a more moderate course, defended the inviolability of the King's person, and resisted the assertion by the National Assembly of power to remove ministers. This conduct led to his being regarded as a renegade from the National party. He retired to his native place on the dissolution of the National Assembly, but after the 10th of August, 1792, he was impeached, with Lameth and Duport-Dutertre, on account of correspondence with the court; was brought to Paris, tried before the Revolutionary tribunal, condemned, and guillotined on the 29th of November, 1793. Consult Janin, *Barnave* (Paris, 1860).

BARNAY, bär'nī, LUDWIG (1842–). A German actor, born at Pesth. He made his début in 1860 at Trautenau and appeared in his native city the following year, after which he had engagements of varying length in Gratz, Mainz, Vienna, Prague, Riga, Mainz again, Leipzig, and Weimar. From 1870 to 1875 he was at the Stadt-Theater of Frankfort-on-the-Main, and for the next five years at that of Hamburg, where he acted as director. For several years thereafter he traveled as a "star," visiting London with the Meiningen Court Company in 1881, and in 1882 making a successful tour in the United States. From 1887 to 1894 he managed

his Berliner Theater in Berlin. He has since made his home in Wiesbaden. Barnay's greatest talents have been shown in tragedy. Among his most noted rôles are Essex, Uriel Acosta, Othello, Antony, Tell, and Egmont. He was the leader in the movement which assembled the stage congress at Weimar in 1871, thus being founder of the "Association" (*Bühnengenossenschaft*), which has proved of such value to the German theatrical profession.

BARN'BURN'ERS. In American political history, a faction of the Democratic party in New York State after 1844, so called (in allusion to a Dutchman who was said to have burned his barn to free it of rats) from their supposed eagerness for radical reform measures, especially for such measures as would prevent the extension of slavery in the Territories. Unable to secure satisfactory recognition in the Democratic National Convention of 1848, they joined the Free-soilers, and with them nominated Van Buren for the presidency. Their vote, dividing the Democratic strength, secured the election of Taylor, the Whig nominee. In 1852 they reunited with their opponents, the Hunkers, though the two factions did not work together in harmony until several years later. Before this time the name "Softs," or "Soft-shells," had replaced the name "Barnburners." See VAN BUREN, MARTIN; HUNKERS; ALBANY REGENCY.

BARN'BY, SIR JOSEPH (1838–96). An English musician and composer. He was born at York, England, and was educated at the Royal Academy of Music. He was organist at St. Andrew's and St. Ann's, was conductor of the oratorio concerts at St. James's and Exeter Halls; succeeded Gounod as conductor of the Royal Albert Hall Choral Society in 1872; became musical director at Eton College in 1875, and afterward was elected principal of the Guildhall School of Music. In 1892 he was knighted. Among his numerous and popular compositions the motet, *King All Glorious*, and his oratorio, *Rebekah*, and *The Lord is King*—a setting of the 97th Psalm—are especially noteworthy.

BARN'DOOR' SKATE. The largest of North American skates (*Raja lævis*). It occurs along the Atlantic coast from New England to Florida, and may reach a length of 4 or 5 feet. See SKATE.

BAR'NEGAT BAY. An inlet of the Atlantic, in Ocean Co., N. J., extending from Bayhead to New Inlet. It is 27 miles long and 1 to 4 miles wide. It is separated from the ocean by Island and Long beaches. On the north end of the latter is Barnegat City (Map: New Jersey, D 4). The beaches are separated by Barnegat Inlet, about 1 mile wide. At the mouth is a lighthouse, 39° 45′ 52″ N., 74° 6′ 24″ W., with a light 163 feet above sea level, flashing white every 10 seconds and visible 19 nautical miles.

BARNES, ALBERT (1798–1870). An American Presbyterian theologian. He was born at Rome, N. Y.; graduated at Hamilton College and the Princeton Theological Seminary. He was pastor of the First Presbyterian Church, Philadelphia, from 1830 to 1867, and is best known for his *Notes* on the Bible. Of the *Notes on the New Testament* over a million copies were sold. During the disruption of the Presbyterian church he was tried for heresy and in the final separation went with the New School and was among the most liberal of its leaders. Besides the *Notes*, he wrote an introduction to *Butler's Analogy; Scriptural Views of Slavery* (1846); *The Way of Salvation* (1863); *Lectures on the Evidences of Christianity in the Nineteenth Century* (1868), and a series of Sunday-school manuals. A collection of his *Theological Works* was published in Philadelphia (1875).

BARNES, ALFRED SMITH (1817–88). An American publisher, born at New Haven, Conn. He entered the publishing business in Hartford, Conn., at an early age, and afterward went to New York (1838) and there published many of Professor Davies's mathematical works. He lived in Philadelphia from 1840 to 1845 and then settled permanently in New York and undertook the publication of schoolbooks. At his death Mr. Barnes left nearly $100,000 to educational and charitable institutions, $45,000 of it going to the construction of Barnes Hall, the home of the Christian Association of Cornell University.

BARNES, BARNABE (c.1569–1609). An Elizabethan lyrist, son of Dr. Richard Barnes, Bishop of Durham. He was educated at Oxford, was with Essex in Normandy against the Prince of Parma (1591), and took the side of Gabriel Harvey in the quarrel with Thomas Nash. In 1593 Barnes published a volume containing much beautiful verse, *Parthenophil and Parthenophe: Sonnettes, Madrigals, Elegies, and Odes* (reprint by Arber in *English Garner*, 1882); *A Divine Centurie of Spirituall Sonnets* (1595; ed. by Grosart, 1875) is less interesting. His rather remarkable and somewhat *outré* tragedy, *The Divil's Charter*, was performed before King James at Christmas, 1606–07.

BARNES, CHARLES REID (1858–1910). An American botanist, born at Madison, Ind. He received his education at Hanover College and subsequently studied botany at Harvard. In 1880 he was made professor of natural history at Purdue University and in 1886 professor of botany at the University of Wisconsin. In 1898 he became professor of plant physiology at the University of Chicago. He was made vice president of the American Association for the Advancement of Science in 1899 and president of the Botanical Society of America in 1903. Besides editing the *Botanical Gazette*, he wrote: *Handbook of Plant Dissection* (jointly with J. M. Coulter and J. C. Arthur, 1886). *Keys to the Genera and Species of North American Mosses* (1st ed., 1890; 2d ed., jointly with F. D. Heald, 1897); *Plant Life* (1898); *Outlines of Plant Life* (1900); *Textbook of Botany* (jointly with J. M. Coulter and H. C. Cowles, 1910); and a number of valuable papers on botanical subjects.

BARNES, EARL (1861–). An American lecturer and educator, born at Martville, N. Y. He received the degree of A.B. from Indiana University in 1889 and that of M.S. from Cornell two years later. In 1890–92 he was professor of European history at Indiana University, and from then until 1897 he held the chair of education at Leland Stanford, Jr., University. Subsequently he devoted his time to lecturing and writing. Among his books are: *Studies in Education*, vol. i (1889), vol. ii (1902); *Studies in American History* (1896); *Woman in Modern Society* (1912).

BARNES, HOWARD TURNER (1873–). A Canadian physicist. He was born at Woburn, Mass., but went to Canada with his parents in 1879. An early private education was succeeded by a course at McGill University, from

which he graduated in 1893. His research work in physics was recognized by the Royal Society, London, in 1898, when he was awarded the Joule studentship by that institution. He was appointed Macdonald professor of physics in McGill University in 1908, succeeding in that position Ernest Rutherford. The formation of ice in flowing water, and the ice problem considered with reference to engineering work in Canada were investigated by him. He invented improvements in thermometer construction, perfected a pyrometer which is used in the regulation of furnaces in factories, and he published *Ice Formation and Frazil* (1910).

BARNES, James (1806–69). An American soldier, born in Boston, Mass. He graduated at the United States Military Academy in 1829 and was assistant instructor in French there in 1829–30. Subsequently he was in garrison at Forts McHenry (Md.) and Monroe (Va.). With the rank of first lieutenant of artillery he resigned and was engaged in railway engineering from 1836 to 1857. During the Civil War he served in 1861–62 as colonel of the Eighteenth Massachusetts Volunteers in the defenses of Washington, and with the Army of the Potomac in the Virginia Peninsular campaign and the Maryland campaign. As a brigadier general of volunteers he was at the battles of Fredericksburg and Chancellorsville and commanded a division at Gettysburg. He was brevetted major general of volunteers in 1865 for meritorious services.

BARNES, James (1866–). An American author. He was born at Annapolis, Md., and graduated at Princeton in 1891. He was with *Scribner's Magazine* for some time, in 1894–95 was assistant editor of *Harper's Weekly;* from 1899 to 1901 was war correspondent for *The Outlook* in South Africa; and from 1905 to 1908 was editor of *Appleton's Booklover's Magazine.* He wrote: *Naval Actions of the War of 1812* (1896); *Yankee Ships and Yankee Sailors* (1898); *David G. Farragut* (1899); *Drake and his Yeomen* (1899); *The Giant of Three Wars* (1903); *The Blockaders* (1905); *Outside the Law* (1906); *The Clutch of Circumstance* (1908); *Rifle and Caravan* (1912).

BARNES, Joseph K. (1817–83). An American surgeon. He was born in Philadelphia, Pa., and was educated at Harvard and the University of Pennsylvania. In 1840 he joined the United States army as an assistant surgeon, and at the close of the Civil War was surgeon-general, being brevetted major general (1865). To him was due a large part of the efficiency of the medical department during the war. He was the founder of the Army Medical Museum and the library of the surgeon-general's office. He attended Presidents Lincoln and Garfield on their deathbeds.

BARNES, Joshua (1654–1712). An English classical scholar, born in London. In 1695 he was appointed Regius professor of Greek at Cambridge. Among his best-known works are: *Gerania; or, A New Discovery of a Little Sort of People Called Pygmies* (1675), which is said to have furnished to Swift some hints for his *Voyage to Lilliput;* and Αὐλικοκάτοπτρον (1679), a Greek paraphase of the biblical story of Esther. His editions of Greek authors—Euripides, Anacreon, Homer—are no longer used.

BARNES, Lady Juliana. See Berners, Lady Juliana.

BARNES, Thomas (1785–1841). An English editor. He was a schoolfellow of Leigh Hunt at Christ's Hospital, graduated in 1808 at Pembroke College, Cambridge, and wrote for the London *Examiner* a series of articles published over the signature "Criticus." In 1817 he became editor of the London *Times,* which he established as the foremost of English newspapers. He was a friend of Hunt, Lamb, and Hazlitt; and, as director of the political policy of the *Times,* wielded great influence. "Barnes," says Leigh Hunt in his *Autobiography,* "wrote elegant Latin verse, a classical English style, and might assuredly have made himself a name, in wit and literature, had he cared much for anything beyond his glass of wine and his Fielding."

BARNES, William (1801–86). A poet and philologist, born at Rushay, Bagber, Dorsetshire. He was for many years master of the grammar school at Dorchester. He was ordained in 1847 and was promoted from the curacy of Whitcombe to the rectory of Winterbourn-Came, in Dorset, in 1862. In the meantime he received the degree of B.D. from Cambridge. He died Oct. 7, 1886. He is the author of three collections of poems written in the dialect of Dorsetshire: *Poems of Rural Life, with a Dissertation and Glossary* (1844); *Homely Rhymes* (1859); and *Poems of Rural Life* (1893). He wrote also a collection called *Poems of Rural Life in Common English* (1868), which contains many attractive pieces. As a philologist, Barnes attempted to restore the ancient English speech. In his *Outline of English Speechcraft* (1878) he substituted for the usual grammatical nomenclature English compounds of his own coining. "Tenses" became *time-takings;* "adjectives," *mark-words;* and "grammar," *speechcraft.* Consult Lucy Baxter, *Life of William Barnes* (New York, 1887).

BARNES, William, Jr. (1866–). An American politician. He was born in Albany, N. Y., and graduated from Harvard University in 1888. In the following year he became owner and editor of the *Albany Evening Journal.* He took an aggressive interest in Republican politics, his forceful personality soon making him one of the leading political figures in New York State. In 1892 he became a member of the Republican State Committee, and in 1911 he was elected its chairman. Without being the holder of an elective office, or at any time a candidate for such an office, he virtually directed the course of the Republican party in New York until 1912, when the organization split into progressive and conservative sections. Identifying himself with the conservative wing, Barnes became a delegate to the 1912 National Convention of his party, and there bitterly opposed the attempt to make Theodore Roosevelt Republican candidate for the presidency. After the Democratic landslide of the following autumn he continued to control the "machine" of the regular Republican party in New York.

BARNES'BORO. A borough in Cambria Co., Pa., 40 miles west by north of Altoona, on the Pennsylvania Railroad (Map: Pennsylvania, D 6). It is in a coal-mining district and has lumber yards, bottling works, and an ice-cream factory. The borough contains a theatre and several hotels and owns its water works. Pop., 1900, 1482: 1910, 3535.

BARNES'VILLE. A town in Pike Co., Ga., 60 miles south by east of Atlanta, on the Central of Georgia Railroad (Map: Georgia, B 2). Barnesville is the seat of Gordon Institute and has a Carnegie library. It carries on a trade in

cotton and manufactures buggies. Pop., 1910, 3068.

BARNESVILLE. A city in Belmont Co., Ohio, 30 miles west by south of Wheeling, W. Va., on the Baltimore and Ohio Railroad (Map: Ohio, H 6). It manufactures glass, car wheels, cigars, bottles, shirts and overalls, and boxes. Barnesville was settled in 1800 and was first incorporated about 1836. The government is vested in a mayor, elected biennially, and a council. The water works are owned and operated by the city. Pop., 1910, 4233.

BAR'NET. A town in Hertfordshire, England, 11 miles north-northwest of London. Near the town is the site, marked by an obelisk, of the famous battle, fought April 14, 1471, between the Yorkists and Lancastrians, in which the latter, after a desperate struggle, were routed, and their leader, Warwick, "the king-maker," killed. An annual cattle fair is held here. Pop., 1891, 6400; 1901, 8359; 1911, 10,440.

BAR'NETT, JOHN (originally, BEER) (1802–90). An English composer, born at Bedford. After studying under various masters he early wrote a considerable number of songs and ballads, of which the best was the setting for the Rev. Charles Wolfe's "Burial of Sir John Moore." In 1834 appeared his *Lyrical Illustrations of the Modern Poets*, a song collection of unusual merit; and in the same year his opera, *The Mountain Sylph*, was presented in London. With the latter, many mark the beginning of the movement toward the founding of an English school of dramatic music. His *Fair Rosamond*, performed in 1837, failed, through the absurdities of the libretto, of any marked success. Others of his publications are an oratorio, *The Omnipresence of the Deity* (1830), and a *School for the Voice* (1844).

BARNETT, JOHN FRANCIS (1837–1916). An English musician and composer, born in London. He studied at the Royal College of Music, London, and the Leipzig Conservatorium; played at a Gewandhaus concert, Leipzig, in 1861, and first attracted attention as a composer by his symphony in A minor, performed in 1864 by the Musical Society of London. His most important work is the cantata, *The Raising of Lazarus*, given for the first time at the Hereford festival of 1876. He became a professor in the Guildhall School of Music and in the Royal College. Among his other works are the cantatas *The Ancient Mariner*, written for the Birmingham festival of 1867, and *Paradise and the Peri*, for that of 1870; *The Lay of the Last Minstrel*, for orchestra; quartets and quintets for strings; and several pianoforte and vocal solos.

BARNEVELDT, bär'ne-vělt, JAN VAN OLDEN (1547–1619). A Dutch statesman. He was born at Amersfoot, in Utrecht, and at an early age showed great ardor in the cause of his country's independence. He was an able ally of William the Silent in the struggle against Spain, and after the Prince's death succeeded, through wise alliances with England and France, in preserving the independence so dearly gained. As Advocate-General of the Province of Holland, he proved equally his insight into public affairs and his address in diplomatic negotiations. Penetrating the secret designs of the young Prince Maurice of Orange, whom he had caused to be made stadtholder of five provinces, he made himself the leader of the Republican party, which aimed at subordinating the stadtholder to the Legislature and saving the Netherlands from a monarchy. It was he, also, who opposed the warlike tendencies of Maurice and concluded a treaty with Spain (1609) which later saved the country from the horrors of the Thirty Years' War. The country was at that time split up into the rival factions of the Arminians or Remonstrants, who stood for the doctrine of Free Will and comprised the magistracy of the country, with Barneveldt at their head, and the Calvinists, who were known as Gomarists or Contra-Remonstrants, of whom Maurice for political reasons now assumed the leadership. With the view of obviating a civil war, Barneveldt caused an ecclesiastical assembly to be called, which established general toleration. The states at first concurred in this wise measure, but the partisans of the Orange faction brought about a change of views by representing the Remonstrants as secret friends of Spain. Barneveldt was attacked in scurrilous publications and was insulted, even in the meetings of the states, by the mob whose idol Maurice was. The strife between the Remonstrants and the Gomarists, i.e., between Barneveldt and Maurice, finally culminated in violence on the part of the Prince of Orange. On Aug. 29, 1618, Barneveldt was illegally arrested, together with Grotius and Hoogerbeets, and thrown into prison. In November Maurice procured the summoning of the Synod of Dort (q.v.), which condemned the Remonstrants with the utmost rigor. In March, 1619, while the Synod was still sitting, Barneveldt was brought to trial before a special commission of 24 judges, unlawfully appointed, who condemned as a traitor the innocent man to whom the country owed its political existence. The friends of Barneveldt, the Princess of Orange, and the French Ambassador interceded for him in vain. On May 13, 1619, the venerable man was executed. Four years after their father's death, Barneveldt's two sons, Wilhelm and Reinier, took part in a conspiracy against the life of Maurice. The conspiracy was discovered; Wilhelm escaped, but Reinier was seized and beheaded. Consult Motley, *Life of Barneveldt*, of which numerous editions have been published (London and New York, 1874).

BAR'NEY, JOSHUA (1759–1818). An American naval officer, born in Baltimore, Md. He shipped in 1772 in a brig trading to Liverpool and subsequently made several voyages to Europe. At the outbreak of the Revolutionary War he was appointed master's mate on board the sloop-of-war *Hornet*, which was assigned to Commodore Hopkins's squadron and participated in the capture of New Providence, Bahamas. Subsequently he entered on board the schooner *Wasp* and served on the sloop *Sachem*, the brig *Andrea Doria*, and the frigate *Virginia*. He was captured by the British in 1780 and sent to Mill Prison, Plymouth, England, whence he made his escape in 1781 and came to Philadelphia. In 1782, in command of the *Hyder Ali*, he captured off Cape May the British ship *General Monk* and in the same year sailed for France with dispatches to Franklin, then United States Minister, concerning the peace negotiations. From 1795 to 1800 he was a commodore in the French service; in 1814 commanded the American flotilla in defense of Chesapeake Bay, and in the same year participated in the battle of Bladensburg. Consult Barney, *A Biographical Memoir* (Boston, 1832).

BARN'FIELD, RICHARD (1574–1627). An English poet, born at Norbury, Shropshire. His

works include *The Affectionate Shepherd*, a pastoral based on Vergil's Second Eclogue (1594); *Cynthia, with certain Sonnets and the Legend of Cassandra* (1595); and *The Encomion of Lady Pecunia*, etc. (1598). The last volume contains "If music and sweet poetry agree," and "As it fell upon a day," which were long attributed to Shakespeare. They were again printed in *The Passionate Pilgrim* (1599). Barnfield's poems were edited by Grosart for the Roxburghe Club (1876), and by E. Arber (1882).

BAR'NIVELT, Esdras, Apothecary. The pseudonym of the author of a key to *The Rape of the Lock*. The "key" has been ascribed both to Pope and to Arbuthnot and was published in London in 1715.

BARN OWL. The barn owl is a familiar species named by Linnæus *Strix flammea*, and conservative ornithologists regard it as almost cosmopolitan in its distribution, counting the slight differences observable in those of Africa, the Orient, Australia, North and South America, as marking merely geographical races; others, however, prefer to separate these local forms into distinct species, and call that of the Americas *Strix pratincola*. The scientific terminology of many of the owls is still an unsettled matter, and while the American ornithologist speaks of his barn owl as *Aluco pratincola*, his British colleague insists on *Tyto alba*. The common names are not free from dispute, and in England the term "barn owl" is most often applied to the related tawny owl (*Strix stridula* or *aluco*), while the present species is usually called "screech owl." This type of owl is of comparatively small size (length, about 17 inches) and is characterized by the yellowish-red, irregularly marked plumage of the back; the "silky-white to bright tawny" hue of the under surface, dotted with black spots; and particularly by the heart-shaped form of the facial disks, which meet in a point below the beak and are fringed with bright rust color. The eyes are small and black, the legs long and clothed with short feathers only. Its quaint physiognomy has won for it the name "monkey-faced" in the Southern States.

Range and Breeding.—This owl is occasionally seen over most of the United States, but is most numerous in the southern portion and thence to Patagonia. It seems to be partly migratory, retreating in winter from its most northerly ranges. In the Old World it breeds mainly in church towers, ruins, and similar places, and its eerie hoot has contributed much to the poetry and fables connected with its race; but in less civilized or less ruinous parts of the world it chooses for a nesting place a cavity in an old tree, a crevice among rocky crags, or (as very frequently in the southwestern United States) a niche in some steep earthen bank. Even in the United States, however, it makes its home in belfries and stone buildings when it can. The nest is a bed of straw and feathers, and the eggs, 4 to 8, are white. "This owl," Fisher remarks, "is one of the most distinctively nocturnal of the tribe, but like all the others it can see perfectly well in the brightest daylight, when for any reason it is required to leave its retreat. It usually sleeps during the day, sitting upright in a dark nook or crevice, in the shadow of a bridge, or among the dense foliage of some grove or reedy marsh."

Food and Economic Value.—This species is perhaps the most beneficial of its tribe to the agriculturist, because its food consists almost wholly of the small rodents so injurious to him. Naturalists recognize this in all parts of the world. In the United States this owl subsists in the East mainly on rats and wild mice; in the South on the cotton rat, and certain mice doing great injury there; and in the West on gophers, ground squirrels, and rabbits, even those so large as the jack rabbit. Its services in the destruction of cotton rats and pouched gophers alone would entitle it to gratitude and protection. Consult Fisher, *Hawks and Owls of the United States* (Agric. Dept., Washington, 1893). See Owl, and Plate of Owls.

BARNS'LEY. A town in the West Riding of Yorkshire, England, about 21 miles north of Sheffield, on the Dearne (Map: England, E 3). Although the town is of great antiquity, most of its buildings are of a comparatively recent date. It was incorporated in 1869 and maintains public libraries, baths, and markets. It has a large number of educational and benevolent institutions and a public park of about 20 acres. It is situated within the coal district and has manufactures of linen, paper, glass, and steel wire. There are also iron and steel foundries, grain and saw mills, breweries, and dyeing works. It is on four railway lines and a canal, which facilitates its export of coal, mainly to Hull and London. The United States has a resident consular agent. Pop., 1891, 35,000; 1901, 41,000; 1911, 50,614. Barnsley dates from pre-Norman times. Consult Jackson, *History of Barnsley* (London, 1858).

BARNSTABLE, bärn'sta-b'l. A town and the county-seat of Barnstable Co., Mass., 73 miles by rail southeast of Boston, on Barnstable Bay, and on the New York, New Haven, and Hartford Railroad (Map: Massachusetts, G 4). It contains 12 villages, several of which are well-known summer resorts, and is principally engaged in boat building, oyster fishing, and cranberry cultivation. Within the town limits are several public libraries and a State normal school. Barnstable was first settled in 1639. In the part called West Barnstable, James Otis, Sr., lived, and James Otis, Jr., was born. The government is administered by town meetings. Pop., 1900, 4364; 1910, 4676. Consult "Annals of Barnstable," in Freeman's *History of Cape Cod* (Boston, 1860–69).

BARNSTAPLE, bärn'sta-p'l (locally known as Barum). A town in Devonshire, England, on the Taw, 6 miles from its mouth and 34 miles northwest of Exeter (Map: England, B 5). The Taw is here crossed by a bridge said to have been built in the thirteenth century. It consists of 16 arches and has been widened by ironwork on each side. Its noteworthy buildings are a parish church, dating from the fourteenth century; the old grammar school, at which the poet John Gay was educated; and some quaint old houses in Bontport Street. Before the silting of the river Barnstaple was a seaport of some importance. It has manufactures of lace, leather, gloves, and pottery, known as "Barum-ware," and there are shipyards, saw mills, and foundries. Barnstaple has existed since the reign of Athelstan, in the tenth century, who built a castle here, but was incorporated in the reign of Henry I. Pop., 1891, 13,000; 1901, 14,137; 1911, 14,485.

BARN SWAL'LOW. Two distinct species of swallow frequent barns and outbuildings in North America, but that to which the name

properly applies, and should be restricted, is the fork-tailed one which makes its nest inside the building, while the other, square-tailed one, which nestles on the outside of the walls, should be called cliff or eaves swallow. The barn swallow proper, then, is the one named by naturalists *Hirundo* or *Chelidon erythrogastra*, and it is among the most widely familiar birds of the whole continent. It is lustrous blue above, and below is pale reddish-brown, with the forehead, chin, and throat bright chestnut, bounded by a collar-like band of blue across the breast; the tail is deeply forked, and each tail feather, except the central pair, has a white spot on its inner web. These swallows arrive from the south, where they have wintered in the tropics, in May.

Nesting Habits.—Before the country was civilized, these swallows frequented only such parts of it as had rocky exposures, and they made their nests in niches on the face of a cliff, as they yet do in some remote parts of the western mountains. As soon, however, as stables and sheds were erected by white settlers, the swallows took possession, and this increasing and welcome acquaintance with man has continued as civilization pushed west and north, until now a barn-swallow dwelling in aboriginal fashion is a curiosity. The nest is composed of pellets of mud plentifully mixed with straw, and may sit flat upon a frame beam at a safe height, when it is a simple cup; or it may be plastered, in the form of a hollow bracket, against the rafters or higher walls. Invariably, however, the nest of this species is *inside* the barn or shed. It is bedded with soft grass and feathers and contains five rather elongated, buffy-white eggs, spotted about the large end with reddish and purple dots and splashes. These birds are not only perfectly harmless, but they consume a vast number of small insects which are more or less injurious or annoying. It is most unfortunate, therefore, that they seem an object of especial attack by the English sparrows, which not only seize upon many nests for their own breeding purposes, but wantonly tear many others to pieces, destroying eggs and young as if in a spirit of mere malicious mischief. In this way the barn swallows of the more northerly States and eastern Canada have been greatly reduced and in some places exterminated. They depart for the south in flocks earlier in the autumn than do most other migrants. See SWALLOW and Plates of SWALLOWS and of EGGS OF SONG BIRDS.

BAR'NUM, PHINEAS TAYLOR (1810–91). An American showman, born at Bethel, Conn. His father was a tavern keeper, and while attending the village school, Barnum traded with and played practical jokes upon his father's customers. At the age of 13 he was employed in a country store and at 18 went largely into the lottery business. When only 19, he married clandestinely and moved to Danbury, where he edited *The Herald of Freedom* and was imprisoned 60 days for a libel. In 1834 he removed to New York, where, hearing of Joyce Heth, alleged nurse of Washington, he bought her for $1000, and with the aid of forged documents and puffing exhibited her to considerable profit. Reduced again to poverty, he sold Bibles, exhibited negro dancers, and wrote for newspapers, until he bought the American Museum in New York, which he raised at once to prosperity by exhibiting a Japanese mermaid, made of a fish and a monkey, also a white negress, a woolly horse, and finally a noted dwarf, styled "General Tom Thumb," whom he exhibited also in Europe in 1844. In 1847 he offered Jenny Lind $1000 a night for 150 nights. The tickets were sold at auction, a single ticket bringing in one case as much as $650; and his gross receipts for 95 concerts were over $700,000. He built a villa at Bridgeport, in imitation of the Brighton Pavilion, and engaged in various speculations, one of which, a clock factory, made him bankrupt. Settling with his creditors in 1857, he engaged anew in his career of audacious enterprises and made another fortune. Two of his museums having been destroyed by fire, in 1865 and 1868, he established in 1871 his "Greatest Show on Earth," a traveling circus and menagerie, with many new features. He was an unsuccessful candidate for Congress in 1866, but was four times elected to the Connecticut Legislature. His *Autobiography* (1854, since greatly enlarged) has at least the merit of frankness. In 1865 he published *The Humbugs of the World*, and in 1869 *Struggles and Triumphs*.

BARN'WELL, ROBERT WOODWARD (1801–82). An American statesman. He was born at Beaufort, S. C., graduated at Harvard in 1821, and was admitted to the bar. He was in Congress from 1829 to 1833, and was Senator in 1850–51. After the secession of the Southern States he was sent as a delegate to the famous Montgomery Convention and cast the decisive vote in the election of Jefferson Davis. He was also a member of the Confederate Senate and was twice president of the University of South Carolina.

BAROACH, bâ-rōch'. A town in India. See BROACH.

BAROCCHIO, bâ-rōk'kê-ō, **BAROZZIO**, or **BAROZZI**, GIACOMO DA VIGNOLA. See VIGNOLA.

BAROCCI, bâ-rōt'chê, or **BAROCCIO**, -chō, FEDERICO (1528–1612). An Italian painter of the late Renaissance. He was born at Urbino and received his early training with his father, a sculptor, and from the painter Battista Franco. He then studied the works of Raphael at Rome, but was influenced less by these than by the paintings of Correggio. Upon his return to Urbino he executed many paintings, which survive for the most part in the churches of that city, the most important of these being "St. Sebastian," in the cathedral. Notwithstanding the flattering invitations of the Grand Duke of Tuscany, the Emperor Rudolph and Philip II of Spain, Barocci continued to reside in his native city. On a later visit to Rome he was employed in the decoration of the Belvedere in the Vatican, but during all the rest of his life suffered from the effects of a poison administered at that time by jealous rivals. Among his most important paintings at Rome is the "Burning of Troy," in the Borghese Palace; others are in the Vatican Collections and in the galleries of Florence. His "Christ Crucified," painted for the Doge of Genoa and now in the cathedral, is reputed his finest work. Barocci's importance consists in his opposition to the mannerism of his day, and in his careful drawings, his comparative fidelity to nature, and, above all, his emphasis on color. Consult R. H. Krommes, *Studien zu Federigo Barocci*, with bibliography (Leipzig, 1912).

BAROCCO, bâ-rōk'kō, or **BAROQUE**, bâ-rōk' (It. *Barocco*, Fr. *Baroque*, Sp. *Barrucco*). The origin of the word is uncertain, but in general it means 'irregular, imperfect.' In the fine arts the word applies to the last phase of the classic

revival in Italy and its derivatives elsewhere. The tendency of taste from 1560 on was away from classic refinement and restraint toward ostentation and restlessness, and all the arts underwent a profound change of spirit and expression. Much of the work was showy, meaningless, even vulgar, though redeemed occasionally by brilliancy and power.

In architecture, of the three great contemporaries, Vignola (1507–73), Palladio (1518–80), and Michelangelo (1475–1564), Vignola represents the still dominant classical refinement; Palladio the early symptoms of the new taste in his works at Vicenza; and Michelangelo in his work at St. Peter's, his sculptures of the Medici tombs at Florence, in his Sistine frescoes, and in his eccentric Porta Pia at Rome, displays an impatience of precedent and a striving after novel effects and powerful expression which, carried to an extreme by less masterly successors, became characteristic of architecture until late in the eighteenth century. Of these successors Lorenzo Bernini was the most gifted, both as architect and sculptor. His great colonnades in front of St. Peter's are magnificent, in the finest antique Roman spirit; but his baldachin in the same church is a huge structure of bronze in the worst possible taste. Carlo Maderno, or Maderna (1556–1629), in his façade of St. Peter's and F. Borromini (1599–1667) in his church of Sta. Agnese on the Piazza Navona, and both of these in other works, display the Baroque tendency to the extreme. Characteristic of all these works is a predilection for "colossal" orders—pilasters and columns running through two or more stories, with consequent bigness of scale in all the details; for large consoles and brackets, for broken, interrupted, and contorted entablatures and pediments, and for façades whose plans are bent in and out by multiplied curves and angles; in short, for large, even coarse details and agitated and broken lights and shadows and silhouettes. In interiors the use of stucco even for sculpture, of dark-colored marbles and showy inlays of *pietra dura* (q.v.), theatrical tricks of perspective in the decorative painting, and extravagantly attitudinizing sculpture, all exhibit the degenerate taste of the seventeenth century. The Jesuit order contributed to this by the encouragement it gave to sensational design and imitative shams in the many costly churches it erected during this period, so that the style as shown in churches (e.g., Sta. Maria Vittoria at Rome or Gli Scalzi at Venice) is sometimes called the Jesuit style. Both the façade and the interior of St. Peter's show the influence of these tendencies, of which the earlier phase may be recognized in the three fine palaces on the Capitol at Rome begun by Michelangelo but not completed till long after his death. Not all his successors yielded to the Baroque spirit: many works of G. della Porta and D. Fontana show classical dignity and restraint, while such late works as Longhena's palaces and his Church of the Salute at Venice, and Galilei's fine façade of S. Giovanni in Laterano at Rome, are designs of much dignity and artistic worth.

The Baroque fashion spread to Germany and Austria, where its products were for the most part heavy and tasteless, and to France, where under Louis XIV there was much more of classical restraint and cold stateliness than in Italy (e.g., St. Sulpice, Paris, and the Palace of Versailles); and where in the eighteenth century it developed the fantastic style of interior detail known as "Rococo" (q.v.), "genre Rocaille," and "Louis Quinze." The only distinctively Baroque monument in England is the fantastic porch of St. Mary's at Oxford. The extravagant Spanish Churrigueresque style (q.v.) is the Iberian version of the Baroque, and its influence is traceable in Latin America in church façades and altarpieces. See articles on architects named. Consult also the various histories of architecture; also Gurlitt, *Geschichte des Barockstiles in Italien* (Stuttgart, 1887); Ricci, *Baroque Architecture and Sculpture in Italy* (London, 1912).

BAROCHE, bȧ'rôsh', Pierre Jules (1802–70). A French politician, born in Paris; became an advocate in 1823 and in 1847 was sent to the Chamber of Deputies from Rochefort. After the Revolution of 1848 he was elected to the National Assembly. He voted at first with the adherents of the Republic, but later favored the policies of Louis Napoleon. In March, 1850, he succeeded Ferdinand Barrot as Minister of the Interior. In April, 1851, he was appointed Minister of Foreign Affairs. He became Minister of Justice and Public Worship in 1863, a senator in 1864, and resigned his portfolios in 1869. Upon the downfall of the Second Empire Baroche fled to Jersey, where he died.

BARÓ'DA. A fortified city of Gujarat, India, capital of a district, and of the native state of the same name. It is 248 miles north of Bombay, with which it is connected by railway (Map: India, B 4). It stands on the Vishvomitri, which is here crossed by four stone bridges, one of singular construction—an upper range of arches resting on a lower one. Baroda, because of its importance as a railroad centre between the coast and the interior, has considerable trade in the produce of the surrounding districts, grain, flax, cotton, and tobacco. The city is intersected by two wide streets, which meet at right angles in a central market place. The chief native structures of interest are the old palace, the Naulakhi Well, and the modern Lakshmi Villas palace, which dominates the town. There are several fine European buildings, including the Anglican Church, dating from 1824, the Baroda College, the Anglo-Vernacular School, the Baroda State Library, and the Dufferin Hospital. The town has a splendid modern system of water works since 1892, supplied from a distance of 18 miles by the artificial lake covering 4.71 square miles. Baroda is the residence of the Gaikwar, a protected Mahratta prince. In 1875 Sayaji Rao III replaced Malhar Rao, the preceding ruler, who was accused of misrule and oppression and suspected of an attempt to poison the British resident. The state has been tributary to Great Britain since 1802. Pop. of town, 1891, 116,400; 1901, 103,800; 1911, 99,345. These figures include a military cantonment of 5000 troops. Area of state, 8100 square miles. Pop., 1891, 2,415,400; 1901, 1,952,692; 1911, 2,032,798.

BAROGRAPH. See Aneroid.

BAROM'ETER (Gk. *βάρος, baros*, weight + *μέτρον, metron*, measure). An instrument for measuring the elastic pressure of the atmosphere. Plato and Aristotle maintained that the atmosphere has weight; Galileo and Torricelli knew that pressing upon the water in a well forced a portion of it to rise up the bore of a pump as fast as the piston rose. The fact that water could not be made to rise more than 33 feet in this manner showed to Galileo's mind the limit-

ing pressure of the atmosphere, viz., about 15 pounds to the square inch. In 1643 his pupil and successor, Torricelli, desiring to find a convenient method of measuring the variations of atmospheric pressure, asked Viviani to use a short glass tube closed at one end, filled with mercury, and inverted in a basin of that heavy liquid, as in Fig. 1. As he predicted, so it was found that a column of mercury 30 inches high, corresponding to the atmospheric pressure (15 pounds to the square inch), was held up by the air pressure, and the upper portion of the glass tube was empty. This vacant space was called

Among the important forms of the mercurial barometer may be mentioned the siphon barometer illustrated in Fig. 3. If the diameter of the tube is perfectly uniform, the capillary effects at the upper and lower ends of the column partially neutralize each other, but not entirely so, because the mercury in the lower end is exposed to the air, and its capillary reaction differs from that of the mercury in the vacuum. Moreover, the superficial film exposed to the air changes by oxidation, and its surface tension is altered with lapse of time. The measurement of the barometric column is facilitated by having

Fig. 1. — Torricelli's experiment.

Fig. 2. — Ordinary household barometer.

Fig. 3. — Siphon barometer.

Fig. 4. — Fortin barometer.

Fig. 5. — Section of cistern of standard barometer. (Green pattern.)

the Torricellian Vacuum. According to Hellmann, this simple apparatus was first called a barometer by Boyle.

With the modifications and auxiliary apparatus necessary to secure the accuracy in measurement demanded by modern science, the mercurial barometer is now considered the standard instrument for measuring the elastic pressure of gases. In the normal barometers constructed for the International Bureau of Weights and Measures at Paris provision is made for measuring the temperature of the top and bottom of the mercurial column, the temperature of the metallic measuring scale, the imperfection of the vacuum, if any, the capillary effect at the surface of the mercury in the basin and in the tube, the verticality of the measuring scale, the errors of pointing and reading, the exact density of the mercury, and every other source of error that has been suggested.

the upper and lower arms of the siphon in the same vertical line, as shown in the illustration. In some barometers the mercury of the open end is protected from the air and dust by a convenient flexible covering, such as a film of oil, or by tying a loose india-rubber bag over the open end of the tube. When the barometric tube is of large bore, for example an inch or more, the capillary depression of the column at the centre is inconsequential.

The standard form of portable barometer is that illustrated in Fig. 4, as first constructed by Fortin, and now very generally copied by makers throughout the world. In this form the measuring scale extends from an ivory point (p in Fig. 5) upward, usually as a part of a brass cylinder inclosing and protecting the whole tube. By means of the screw S the mercury in the cistern may be raised or lowered until its surface just touches the point p. The observer

sights across the upper end of the column of mercury, and the corresponding reading on the scale is the height of the mercurial column above the point *p*. When this barometer is to be carried about, the screw *S* is turned until the mercury completely fills the cistern and is pushed up to the very top of the glass tube. The barometer is then inverted and carried or kept bottom up until wanted. In order to prevent the accidental rise of small bubbles of air within the tube of the barometer, Bunsen invented a so-called air trap, which consists simply of forming a slender internal constriction within the tube near the lower end. This slender point projects downward, and its narrow end opens within the mercury occupying the slightly enlarged portion of the main tube below the trap. Any bubbles of air slipping up the tube are almost certain to be caught in this trap and will escape back into the open air when the barometer is turned upside down for transportation. The most accurate barometers and the newest patterns are now made by Fuess, of Berlin, Green, of New York, and Casella, or Negretti & Zambra, of London. The normal barometers of Paris, Berlin, and St. Petersburg are read by means of reading microscopes so adjusted that a direct and a reflected image of a scale division or a pair of suitable cross wires appear in the field of view. By optical principles the mercury surface causing the reflection lies midway between the two images, and its position may thereby be accurately ascertained. The ordinary barometers of laboratories and meteorological stations are read by means of a vernier (q.v.) sliding up and down the scale, and by sighting across the edge of the vernier plate to the top of the mercurial column.

Liquids of small density as water, glycerine, and the like may be used to secure barometric effects upon a greatly enlarged scale. Methods of optical or mechanical magnification may also be employed, but while relative *changes* of air pressure may be obtained thereby, the *absolute* pressure cannot generally be determined accurately by such means.

Barometric pressures are properly expressed only in standard units of force or dynes, but it is more common to express them in inches or millimeters, meaning thereby the force or pressure corresponding to weight of a mercurial column of that height; but this pressure depends, not merely upon the height of the column of mercury, but also upon its density and on the force of gravity. The former varies with the temperature; the latter varies with latitude and slightly with the height above sea level. Moreover, the surface tension or so-called capillarity of the mercury in the glass tube and the cistern affect the height of the column of mercury. Corrections for these sources of error must therefore be made, and, by vote of the International Congress, meteorologists now follow the example of the physicists in reducing all barometric measurements to the standard density of pure mercury at zero degrees, Centigrade, and to standard gravity at the latitude of 45° and sea level. A standard pressure of 750.06 mm. (29.53 inches), corresponds to a force of 1,000,000 dynes. The suggestion of Bjerknes Sandström and others that this force be named one Bar and adopted as a new unit of pressure is generally accepted and is already in some use, notably by the United States Weather Bureau in its Weather Map of the Northern Hemisphere, and by the British Meteorological Office. The subdivisions of the new unit are, decibar, centibar, and millibar. The latter is ¾ of a millimeter on the ordinary scale. The barometer has many important uses and applications in science and is constantly employed in hypsometry, or the measurement of heights, meteorology, and investigations in physics. (See METEOROLOGY; HYPSOMETRY.) The mercurial barometer was made to register its own indications by Samuel Moreland as early as 1670 or 1680, and many improved forms have since been devised, registering by the help of photography, electrically, mechanically, or by gravity. The best of these appears to be the sliding-weight barograph, as perfected by Sprung in Germany, and a mechanical siphon barograph of great precision by Marvin in the United States. When the branches of a siphon tube are properly proportioned, the level of the mercury in the open arm is unaffected by changes of temperature. This automatic compensation is realized in the Marvin barograph. As a substitute for the mercurial barometer, a form called the aneroid (q.v.) was devised by Vidi, and a similar form, sometimes called the pressure gauge (see MANOMETER), was devised by Bourdon.

Bibliography. For many details as to the history and construction of the instrument and corrections for sources of error, consult Abbe, *Treatise on Meteorological Apparatus and Methods* (Washington, 1887). For an interesting account of the invention and development of the barometer, with illustrations showing early instruments, consult Gerland and Traumüller, *Geschichte der physikalischen Experimentirkunst* (Leipzig, 1899). The ordinary student manuals of practical physics contain descriptions of barometers and their use, while further information can be obtained from the circulars and bulletins of the United States Weather Bureau.

BAROMETER, WATER. A barometer in which water is used instead of a column of mercury. As water has about one-fourteenth of the specific gravity of mercury, the pressure of the atmosphere will support a column nearly 14 times as high, consequently the movement caused by variations in atmospheric pressure will be over a more extended scale. The chief disadvantage of this arrangement is due to the water vapor in the upper part of the tube exerting a pressure on the liquid below and causing a shortening of the column. The tension of the aqueous vapor depends upon the temperature, and changes in the reading may be produced independent of variations in the atmospheric pressure. Glycerine and sulphuric acid have also been used in similar barometers with much smaller errors.

BARO'MET'RIC LIGHT. A faint electric light produced in the vacuum of a mercurial barometer by swinging the instrument to and fro, causing friction of the mercury against the inside of the tube. The phenomenon was first noticed by Jean Picard of Paris in 1675, and an instrument to produce this light was devised by John Bernouilli for Frederick I of Prussia in 1700. Using an air pump to produce a vacuum, Francis Hauksbee constructed a jar in which a bright light was obtained by the friction of falling mercury with the glass. A description of the apparatus and his explanation of the phenomenon are given in the *Philosophical Transactions* of the Royal Society of London for

1705 and 1706. Consult also Tyndall, *Lessons in Electricity* (London, 1876).

BARON, băr'on (ML. *baro,* from Kelt. *bar,* man, or AS. *beorn,* OHG. *baro,* man, vassal. The notion of nobility later attached to *baron* came through the intermediate stage: the man of a lord). The title applied to the lowest degree of the English hereditary nobility. The rank of baron forms a species of landing place, corresponding amongst noblemen, in a certain sense, to that of a gentleman at a lower stage of the social pyramid. It was in this sense that the word was used in former times to include the whole nobility of England, because all noblemen were barons, whatever might be the higher grades in the peerage which they occupied. The word "peer" has recently come to be used with the same signification, perhaps because it is no longer necessarily the case that every nobleman must be a baron, there being instances in which earldoms and other honors have been given without a barony being attached to them, and in which the barony has been separated from the higher degree by following a different order of descent. The general theory of the Constitution, however, still is, that it is as barons that all the peers sit in the Upper House; and it is on this ground that the archbishops and bishops are said to sit in virtue of their baronies. The distinction into *greater* and *lesser* barons was commonly used in the twelfth and thirteenth centuries. At first the *greater barons* were those whose estates were considerable enough to be taxed as a *barony* in the Exchequer, who led their own vassals in war, and who received individual summonses from the King to attend his councils and military gatherings; all other tenants in chief were the *lesser barons,* whose summonses and payments were only general. Later, as the royal councils developed into Parliament, and this body became more influential, the King called to it from the baronage only the greater barons, and indeed only a select group of them. Thus the *lesser barons* ceased to be called barons at all, and the term was gradually restricted to those who were regularly summoned to Parliament. The custom of conferring the rank of baron by letters patent, by which it was converted into a mere title of honor apart from the possession of landed property or of territorial jurisdiction, was first introduced by King Richard II, who in 1387 created John de Beauchamp, of Holt Castle, Baron of Kidderminster. In Germany the old barons of the empire, or *Freiherren,* were for the most part raised to the dignity of *Grafen* (counts) and princes; while the lesser, in place of passing into the ranks of the untitled gentry, as in England, constituted a grade of the lower nobility, to which no duties were assigned and scarcely any political privileges belonged.

When a baron is first summoned to the British House of Lords, a letter in the Sovereign's name directs him to repair to the Parliament to be holden at a special time and place, to advise with the Sovereign, the prelates, and nobles about the weighty affairs of the nation. On the arrival of the new peer he is presented by two barons to the Lord Chancellor, his patent or writ being carried by a king-at-arms. This is read by the Chancellor, who congratulates him on becoming a member of the House of Peers and invests him with his robe. The oaths are then administered by the clerk of Parliament, and the new baron is conducted to a seat on the barons' bench. Between creation by writ and by patent there is this distinction, that in the case of the former it is necessary for a man actually to take his seat in the House of Lords before the title may vest. On account of the difficulties attending this mode of procedure, creation by writ is practically obsolete. But though creation by patent is in general the surest way of insuring the hereditary character of the peerage, it labors under one disadvantage as compared with a creation by writ, viz., that whereas in the latter case the dignity once assured by possession passes to the heirs of the holder without any words to that purpose, in the former there must be words to direct the inheritance, else the dignity endures to the grantee only for life. Where the patent, again, in place of being silent as to the succession, expressly sets forth that the dignity of baron is for life merely, it was held, in the Wensleydale Case, that it does not make the grantee a lord of Parliament at all.

The coronation and parliamentary robes of a baron differ very slightly from those of an earl. The right of wearing a coronet was conferred on barons for the first time by King Charles II, their headdress till then having consisted of a cap of crimson velvet, lined with ermine, and having a plain gold band. A baron's coronet as now worn is adorned with six pearls, set at equal intervals on the chaplet. Coronets are worn only on great occasions of state ceremonials. A baron has the title of "right honorable lord," etc., and is addressed as "my lord" or "your lordship." His wife has also the title of "right honorable," and is addressed as "madam" or "your ladyship." The barons of the Exchequer (q.v.) and of the Cinque Ports (q.v.) are examples still existing of the ancient barons by office.

Consult: *Cyclopædia of Political Knowledge* (London, 1853); Stubbs, *Constitutional History of England,* vol. ii (Oxford, 1891); Pike, *Constitutional History of the House of Lords* (London, 1894); Badeau, *Aristocracy in England* (New York, 1886). See PEER.

BARON, bȧ-rōn', JULIUS (1834–98). A German jurist, born at Festenberg, Silesia. He studied at Breslau and Berlin and was appointed professor in 1880 at Greifswald, in 1883 at Bern, and in 1888 at Bonn. His works include *De Judiciorum Constitutione in Veteris Saxoniæ Urbibus* (1855); *Die Gesamtrechtsverhältnisse im römischen Recht* (1864); *Abhandlungen aus dem römischen Civilprozess* (3 vols., 1881–87); *Die Börsenenquete* (Berlin, 1894); *Pandekten* (1872; 9th ed., 1896).

BARON, bȧ'rōn', or **BOYRON,** bwä'rôn', MICHEL (1653–1729). A celebrated French actor and playwright, a pupil and friend of Molière. Endowed with great beauty and an unusually fine voice, he soon became the favorite of the Paris public, excelling both in tragedy and in comedy, but he was inordinately vain of his personal appearance and was frequently connected with the scandals of the time. He retired from the stage in 1691 and on his reappearance in 1720 had lost none of the great charm and power of his talents. He was stricken with apoplexy while on the stage and died soon afterward. He wrote several comedies, of which *L'Homme à bonne fortune* (1686) held the stage for more than a century. Some of his other plays are *Le rendez-vous des Tuileries* (1685); *Les enlèvements* (1685); *La coquette ou la fausse prude* (1686); *Le jaloux* (1687).

BAR'ON AND FEME, fĕm *or* făm (Fr. *femme*, woman, wife, from Lat. *femina*, woman). Norman-French words employed at the common law to denominate husband and wife (q.v.). They are rarely used in the United States.

BARON AND FEME. In heraldry, the expression used to designate the bearing by which the arms of husband and wife are carried per pale, or marshaled side by side on the same shield. The husband's arms are always carried on the dexter side. Where the wife is an heiress —i.e., the representative of her father's house— her husband carries her arms, not per pale, but in a shield of pretense; and they are quartered with the paternal coat by the issue of the marriage. See HERALDRY.

BAR'ONET (Fr. dimin. of *baron*). The lowest degree of hereditary honor in Great Britain. The name "baronet" or "bannaret" was originally applied to the lesser barons of the kingdom, but passed out of use with time. The order of baronets was created in 1611 by King James I, for the ostensible object of promoting the plantation of Ulster, in Ireland; but in reality for the purpose of refilling his depleted exchequer. The sum exacted, with the fees of honor due to the officers, amounted to upward of £1000 on each patent. Every person, however, who sought the dignity of a baronet was compelled to give proof that he was a gentleman of blood and had an annual income of more than £1000. It was part of the bargain that no title should be created between a baronet and a baron, and that the number of the former should be permitted to diminish as the families of the original 200 died out. The latter stipulation was very speedily departed from. Irish baronets were created until 1800, since which period all baronetcies are of the United Kingdom. There is no limit to the creation of baronets but the will of the sovereign. At investiture there is no ceremony. The rank is communicated by patent or writ. According to the patent the rank may be confined to direct heirs-male; or extended to heirs-male collateral, and sometimes, in default of direct male heirs, to the husbands of heirs-female. The rank of baronet does not raise a person above the rank of commoner. Baronets of Scotland and Nova Scotia were instituted in 1625 by Charles I for the purpose of encouraging the settlement of Nova Scotia. There are no new additions to this branch of the baronetage, the latest creation having been in 1707, the year of the union of Scotland and England. Though created for a mercenary object, the order of baronet has always constituted a conservative force in the political and social life of Great Britain, as it consists of men of wealth and influence. Consult: *The Baronetage under Twenty-seven Sovereigns, 1309–1910; A Dated Catalogue of Events* (London, 1911).

BARO'NIUS, CÆSAR (1538–1607). An eminent Roman Catholic ecclesiastical historian. He was born at Sora in the old kingdom of Naples, Oct. 30, 1538, and educated at Naples and Rome. He was one of the first pupils of St. Philip Neri, who founded the Congregation of the Oratory, of which Baronius became superior in 1593. Baronius soon after became father confessor to the Pope, apostolical prothonotary (1595), cardinal (1596), and librarian of the Vatican Library (1597). On the death of Clement VIII in 1605, and on that of Leo XI, his successor, he was, against his will, a candidate for the papacy. Having already evinced his great diligence and learning as a church historian, he was commissioned by Philip Neri, while still a young man, to prepare the Roman Catholic counterpart to the Protestant "Magdeburg Centuries" (q.v.). Baronius entered upon this commission with great energy and in a position most favorable for access to authorities, composing his *Annales Ecclesiastici a Christo nato ad annum* 1198 (12 vols., Rome, 1588–1607), in which work he labored till his death, June 30, 1607. His polemical purpose affects his use of material, but still the material itself is so enormous and often so recondite that his work is a storehouse of learning of permanent value. He made many mistakes of all kinds, of course, especially in chronology. These were to a considerable extent corrected by A. F. Pagi. O. Raynaldus and others prepared a continuation of the *Annales* down to 1646. The best edition of the *Annales* is that by A. Theiner (37 vols., Bar-le-Duc and Paris, 1864–83), but as it is not complete, the one best to use is that by Mansi (Lucca, 1738–57). Both editions contain Pagi's corrections and the continuation, although the latter is of inferior value.

Consult: Rauschen, *Jahrbücher der christlichen Kirche unter dem Kaiser Theodosius dem Grossen: Versuch einer Erneuerung der Annales Ecclesiastici des Baronius für die Jahre 378–95* (Freiburg im Br., 1897); Baronius' *Martyrologium Romanum* (1586) is also worthy of separate mention. There is a life of Baronius by Hieronymus Barnabeus (Rome, 1651; 2d ed., Vienna, 1718), and one by Kerr (London, 1898).

BARON MUNCHAUSEN, mŭn-chą'sen. See MÜNCHHAUSEN.

BARONS OF THE EXCHEQ'UER. The honorary title of the judges of the Court of Exchequer in England. Originally the revenue board of the crown, attended by the great men of the realm, the Court of Exchequer, in the course of time, became one of the three ordinary tribunals, sharing with the King's Bench and the Common Pleas the common-law jurisdiction of the kingdom. It consisted of six judges, a chief baron and five *puisne* barons. Its judges, whether peers of the realm or not, continued to be distinguished by the title of baron until 1875, when the Court of Exchequer was merged in the High Court of Judicature. See COURTS.

BARONS' WAR. See MONTFORT, SIMON DE.

BAR'ONY (OF. *baronie*). A term of somewhat indefinite signification in the feudal system of land tenure. We know that it was compounded of many knight's fees held directly of the king by a single title, and that it was therefore usually of great extent; and we know also that the holder, or "tenant," of a barony was a baron, a peer of the realm, and entitled to a seat in the Parliament. But whether all manors (see MANOR) were capable of being held as baronies, or only great manors, or whether the term was limited to an estate made up of several manors, commonly known as an "honor" (q.v.), we do not know. It is certain that every lord of a manor who was entitled to hold a court-baron (q.v.) was not a baron in the strict sense of the term, any more than he was a lord in the strict sense of that term. But a barony, however constituted, always involved the idea of a general jurisdiction to be exercised through courts maintained by the lord of the estate. It was decided in 1660 that baronies by tenure were extinct in England and could not be revived, and this decision was reaffirmed by the House of

Lords in the celebrated Berkeley Peerage case in 1863. Consult Pollock and Maitland, *History of English Law* (2d ed., Cambridge, Eng., and Boston, 1899). In Scotland any large freehold estate, even when held by a commoner, is known as a barony.

The term *barony* is also applied to the hereditary title or degree of nobility which in England entitles the holder to a seat in the House of Lords. See BARON.

BAROQUE ART. See BAROCCO.

BAROTAC NUEVO, bä'rō-täk' nwā'vō. A pueblo in the southeast part of the island of Panay, in the province of Iloilo, Philippines. It is on the left bank of the Jalaur River, 14 miles north-northeast of the town of Iloilo. It is in a fertile region and trades in trepang and rice. Pop., 1903, 9904. The town of Dumangas, on the right bank of the river, was annexed to Barotac Nuevo in 1903. Its population at that time was about 15,000.

BAROTSE, bä-rōt'sē. A former kingdom of South Africa, now a part of Rhodesia (q.v.).

BAROZZI, bä-rōt'sē, GIACOMO. See VIGNOLA.

BARQUISIMETO, bär-kē'sē-mā'tō. An episcopal city, capital of the State of Lara, Venezuela, on the Barquisimeto River, 90 miles southwest of Puerto Cabello (Map: Venezuela, D 2). The city is in a plain, 2000 feet above sea level. It is the seat of a college and other educational institutions and has several fine buildings, among which are the government palace, the barracks, the cathedral, and the market. It is the centre of a fertile agricultural and stock-raising district and, owing to its excellent transportation facilities, controls important commercial interests. The principal articles of trade are coffee, cacao, sugar, and rum. Barquisimeto, one of the oldest settlements made by the Spaniards in America, was founded in 1552. It was almost completely destroyed by the great earthquake of 1812 and suffered severely during the War of Independence and the later civil wars. From 1830 to 1881 it was the capital of the state of the same name. Pop., 1891, about 30,000 (with the district); 1894, 31,476; 1910 (est.), 32,500.

BARR, AMELIA EDITH (HUDDLESTON) (1831–1919). An Anglo-American novelist. She was born at Ulverston, England, March 29, 1831, and married Robert Barr in 1850. In 1854 she removed to Texas and in 1869 to New York, where she took up literature as a calling. She has written some 30 novels, among them *Romance and Reality* (1872); *Jan Vedder's Wife* (1885); *A Daughter of Fife* (1886); *A Bow of Orange Ribbon* (1886); *Friend Olivia* (1891); *Birds of a Feather* (1893); *The Lone House* (1894); *Bernicia* (1895); *A Knight of the Nets* (1896); *Trinity Bells* (1899); *The Maid of Maiden Lane* (1900); *Souls of Passage* (1901); *The Lion's Whelp* (1901); *The Black Shilling, The Belle of Bowling Green* (1908); *The Strawberry Handkerchief* (1908); *The Hands of Compulsion* (1909); *The House of Cherry Street* (1909); *Sheila Vedder* (1911). A full list of her books would comprise more than 60 titles. She is best in historical tales with a flavor of religious persecution, and in scenes of Scotland, the north of England, and Dutch New York. Consult her autobiography, *All the Days of my Life* (1913).

BARR, ROBERT (1850–1912). An English novelist, born at Glasgow, Scotland. He was educated at the Normal School of Toronto, Canada, was headmaster of the Central School, Windsor, Ontario, and in 1876 became a member of the staff of the *Detroit Free Press*, in which his contributions appeared under the signature "Luke Sharp." He was from time to time a resident of the United States and drew freely upon American life for his scenes and characters. In 1881 he removed to London, to establish there the weekly English edition of the *Free Press*, and in 1892 joined Jerome K. Jerome in founding the *Idler* magazine, from whose coeditorship he retired in 1895. Barr displays much shrewd observation in *A Woman Intervenes* (1896), a story of love, finance, and American journalism. He essayed the historical novel in the *Countess Tekla* (1899). *In the Midst of Alarms* (1894, 1900, 1912), a story of the attempted Fenian invasion of Canada in 1866, has enjoyed wide popularity. Other publications are: *In a Steamer Chair* (1892); *The Face and the Mask* (1894); *The Unchanging East*, travels (1900); *The Victors* (1901); *A Prince of Good Fellows* (1902); *The Tempestuous Petticoat* (1905–12); *Stranleigh's Millions* (1909); *The Sword Maker* (1910); *The Palace of Lōgs* (1912); *The O'Ruddy*, with Stephen Crane (posthumous, 1913).

BAR'RA. A small island of the outer Hebrides, Inverness-shire, Scotland (Map: Scotland, A 3). It is 8 miles long and 2 to 4 miles broad, with deep inlets of the sea. The inhabitants (about 2500) are Roman Catholics and speak Gaelic. Their main occupations are cattle raising and fishing. South of Barra is the islet of Berneray, with the highest lighthouse in Great Britain, 683 feet above high water and visible for 33 miles.

BARRACKPUR, bär'rak-pōōr' (Eng. *barrack* + Skt. *pur*, city). A native town and military cantonment in Bengal, British India, on the east bank of the Hugli, 15 miles north of Calcutta and on the East Bengal Railway (Map: India, E 4). It is the capital of a sub-district which was formed in 1904. Many inhabitants are employed in the mills, which are just outside the town. Pop., 18,000. From the salubrity of its air Barrackpur is a favorite retreat for Europeans from Calcutta and is the country residence of the Governor-General. Barrackpur is historically prominent among the centres of the mutinies of 1824 and 1857. See INDIA.

BAR'RACKS (Fr. *baraque*, It. *baracca*, Sp. *barraca*, a tent; origin uncertain). A permanent structure for the housing of troops, as distinguished from temporary cantonments or camps. In England the practice of billeting or quartering soldiers on the citizens had in 1792 become a great burden; added to which was the effect on the morals of the community, caused by the dissolute character of the soldiery of the period. Consequently George III obtained the consent of Parliament for the construction of new barracks, not without considerable opposition, however; as it was urged that the liberty of the subjects might possibly be endangered by separating the soldiers from the citizens and placing them in the hands of the ruling power. At first, barracks were built without much regard to the health of the troops, the only consideration apparently being their local usefulness. In the United States great care is taken in the selection of site and in the building of military barracks or forts. Good elevation, water, and clean environment are of the first importance; after which, in the design and construction, an abundant supply of fresh air is

made an important factor. The name is used as a part of the official designation of a number of important military posts in the United States, the best known of which are: Columbus Barracks, Jackson Barracks, Jefferson Barracks, Madison Barracks, Plattsburg Barracks, San Diego Barracks, and Washington Barracks (qq.v.).

BARRACUDA, bär'rȧ-kōō'dȧ, or **BARRACOOTA** (native name). 1. A large, pike-shaped, predatory, marine fish of the teleost family Sphyrenidæ (allied to the mullets), occurring in all tropical and sub-tropical seas and common on both coasts of America. It is known as the Barracoota, or giant Australian mullet, off the Australian coast. The great barracuda or picuda (*Sphyræna barracuda*) frequents our southern coasts. "It sometimes," says Dr. Theodore Gill, "attains a length of 8 feet and a weight of about 40 pounds. . . . It is a carnivorous fish, and destructive to the finny tribes generally. As a food fish it is under suspicion. . . . It seems, however, only under special conditions that the flesh is poisonous, for generally it can be eaten with impunity and is quite savory." This fish is really a source of danger to swimmers, and many mutilations or deaths credited to sharks are probably the result of a barracuda's attack. See Plate of MULLETS.

The barracuda of the southern California coast (*Sphyræna argentea*) is 3 feet long, and an important food fish, caught in summer and especially esteemed when dried and salted. The species seen in the North Atlantic, the becuna, spet or sennet (*Sphyræna spet*), is smaller.

2. The snook (q.v.) of the Cape of Good Hope.

BARRA DO RIO NEGRO, bär'rȧ dô rē'ô nā'grô. See MANÁOS.

BARRAMUNDA, bär'rȧ-mŭn'dȧ (native Australian name). An extraordinary lungfish (*Ceratodus* or *Neoceratodus fosteri*) of the rivers of Queensland, Australia, where it is sometimes called native salmon, on account of the reddish hue of its flesh, and also flathead. It is an ugly, dark-colored creature, 3 to 6 feet long, looking more like a huge salamander than a fish, though clothed with large scales. It frequents muddy ponds and streams, and when the water is too foul to yield a sufficient supply of oxygen to its gills, the fish comes to the surface or crawls out upon the muddy shore, and at this time the lungs begin to function, and respiration takes place by this means alone. It feeds on fallen leaves and decayed vegetation and it produces eggs in a gelatinous envelope like those of amphibians. Its flesh is highly prized by the aborigines. The principal interest of it lies in the fact that its two species represent a family, Ceratodontidæ, constituting an order, Monopneumona, of dipnoans. Fossil remains show that in the early ages the family was distributed nearly all over the world, but now it is restricted to Queensland. It is a survival of the Paleozoic Age. The name is given also to the *Osteoglossum leichhardtii* and many other varieties of river fish. See DIPNOI.

BARRANDE, bȧ'rȧnd', JOACHIM (1799–1883). An eminent French geologist and paleontologist, born at Saugues, department of Haute-Loire. He made a study of the Silurian formations in Bohemia, on which he wrote his principal work, *Système silurien du centre de la Bohême* (1852), and his investigations brought out new and valuable information concerning the trilobites. His works include: *Colonie dans le bassin silurien de la Bohême* (1860); *Représentation de colonies de la Bohême dans le bassin silurien du nordouest de la France* (1853); *Céphalopodes, études générales.*

BARRANQUILLA, bär'rȧn-kē'lyȧ. A seaport of Colombia, situated just above the delta of the Magdalena River (Map: Colombia, C 1). The town is not very well built, but is the terminus of river traffic, as the Magdalena is not navigable at its mouth. Barranquilla is connected with the coast by a railroad to the port of Sabanilla, 14 miles to the northwest, and is the seat of a United States consulate. River trade has brought prosperity to the town. It exports coffee and hides, principally to European countries. In 1909, during a revolt, the port was blockaded by the government. Pop., 1912, 48,907.

BARRANQUITAS, bär'rȧn-kē'tȧs. A village on the north coast of Porto Rico, 4 miles northwest of Aibonito (Map: Porto Rico, D 3). It has several schools and a church and is in a rich agricultural district. Pop., 1910, town, 772; municipality, 10,503.

BARRAS, bȧ'rȧs', PAUL FRANÇOIS JEAN NICOLAS, COUNT DE (1755–1829). A distinguished character of the French Revolution. He was born in Provence and in his youth served as a lieutenant against the British in India. He eagerly joined the Revolutionary party, but was not, as is generally but erroneously stated, a member of the States-General in 1789. He was actively concerned in the storming of the Bastile and the Tuileries, and was appointed administrator of the department of Var and afterward of the county of Nice. In the Convention he voted for the execution of the King, without delay or appeal, and on May 31, 1793, declared against the Girondists. The siege of Toulon, and the triumph of the Revolutionary party in the south of France, were in a great measure owing to his activity and energy; and after the victory he was deeply concerned in all the bloody measures that were adopted. Yet he was hated by Robespierre and the Terrorists as one of the less-decided Revolutionists; and their overthrow was accomplished mainly by him, the Convention appointing him commander in chief and virtually investing him with a dictatorship for the time. While holding this high office, in which he acted with great decision and vigor, and on the same day on which Robespierre fell (9 Thermidor, July 27, 1794), he paid a visit to the Temple and provided for the better treatment of the King's son. He hastened also to the Palais de Justice and suspended the order for the execution of a large number of persons who had been condemned to death. On subsequent occasions, as president of the Convention, he acted with decision both against the intrigues of the Royalists and the excesses of the Jacobins; and on 13th Vendémiaire (Oct. 5, 1795), being again appointed commander in chief by the Convention, he called his young friend Bonaparte to his aid and crushed the sections with merciless discharges of artillery. The Directory being appointed in November, 1795, Barras was nominated one of the five members, and in this capacity he procured the nomination of Bonaparte as commander in chief of the army in Italy. It was he who arranged the marriage of Bonaparte with the widow Beauharnais after 18th Fructidor (see FRUCTIDOR; FRANCE), Sept. 4, 1797, when the Royalist intrigues were crushed by Napoleon, the authority of Barras became prepon-

derant in the Directory, and he affected the pomp of a king, and began to give splendid entertainments in the palace of the Luxembourg. This continued for about two years, till the decline of the power of the Directory. After the 30th Prairial (June 18, 1799) Sieyès and he had the whole executive power in their hands; and while Barras secretly negotiated, it is said, with the Bourbon princes, demanding a large reward for their restoration, Sieyès, in secret understanding with Bonaparte, brought about the Revolution of 18th Brumaire (Nov. 9, 1799), which replaced the Directory by the Consulate. Notwithstanding the favors he had formerly conferred on Bonaparte, he was now, perhaps unavoidably, an object of suspicion to him; was compelled to remove from the neighborhood of Paris; resided in Brussels, then in Marseilles; was banished to Rome, and then sent to Montpellier, being kept under constant surveillance of the police and actually found to have been engaged in conspiracies for the restoration of the Bourbons. After the Restoration he returned to Paris and purchased an estate in the neighborhood, where he died. After remaining inaccessible for nearly 70 years, his memoirs were published in Paris and New York, 1895–96. They are of the first importance in throwing light on the history of the Revolution.

BAR'RATRY (Fr. *barateria*, LL. *barataria;* cf. Eng. *barter*, OF. *barater, bareter*, to deceive, cheat, barter). At the common law, the offense of frequently stirring up groundless suits and quarrels. Common barratry is rated as a public nuisance and is punishable, generally, as a misdemeanor. It is not a crime for a man to bring frequent lawsuits without success unless they are vexatious and without reasonable cause. Nor does the institution or instigation of a single groundless and malicious suit make the wrongdoer a common barrator, although his act may amount to the offense of champerty (q.v.) or maintenance (q.v.) and may render him liable to a civil action for damages. In order to convict him of barratry, proof must be given that he has excited groundless litigation in at least three instances. If the offender is an attorney, he may be disbarred as well as punished criminally. Consult Pollock and Maitland, *History of English Law* (2d ed., Cambridge, Eng., and Boston, 1899).

Barratry. In maritime law barratry is any wrongful act willfully committed by the master or crew of a vessel with intent to defraud the owner or charterer; every palpable violation by him or them of trust to the prejudice of the ship and cargo. Negligence does not amount to barratry, unless it is so gross as to constitute fraud. Barratry may be insured against. In *bills of lading* it is excepted frequently from the shipowner's liability. In the absence of such exception the shipowner is liable for the barratry of his agents and servants to the cargo owner. A willful breach of blockade, or sailing out of port without paying port dues, whereby the ship and cargo become liable to forfeiture, is barratrous. Consult Arnould, *Treatise on the Law of Marine Insurance and Average* (7th ed., London, 1901).

BARRATT, JOHN OGLETHORPE WAKELIN. An English pathologist, born in Birmingham. His education was obtained from University College, London, and the universities of Göttingen and Munich. In 1873–76 he was engaged in experimental work in physiology and pathology at University College, and in 1897–99 was research worker in neuropathology at the London County Asylums laboratory. After serving as pathologist and research student at several other important institutions, he became in 1906 research worker in the department of cytology and cancer research at the University of Liverpool. Of this institution's cancer research laboratory he was appointed director in 1909. He contributed many articles on pathological subjects to German and English medical journals.

BARRE, bär'rê. A town in Worcester Co., Mass., 22 miles northwest of Worcester, on the Boston and Maine, and the New York Central railroads (Map: Massachusetts, C 3). It is the seat of the Elm Hill School for the feebleminded, the Stetson Home for poor boys, and has a library and museum. The industries include a cotton, two wool, and a sash and blinds factory, and novelty works. Organized about 1775, the town was named after Colonel Barre, who defended the American Colonies in the British Parliament. The water works are owned by the municipality. Pop., 1890, 2239; 1900, 2059; 1910, 2957.

BARRE. A city in Washington Co., Vt., 6 miles southeast of Montpelier, on the Montpelier and Wells River, and the Vermont Central railroads (Map: Vermont, D 4). It is widely noted for its large granite interests and contains the Aldrich Public Library, Goddard Seminary, Burns Monument, and Spaulding High School. Barre was settled about 1788, was organized as a town in 1793, and was chartered as a city in 1894. Under the charter of 1895 the government is vested in a mayor, elected annually, and a city council, of which the mayor is a member. The city owns and operates its water works and sewage system. Pop., 1900, 8448; 1910, 10,734; 1920, 10,008.

BARRE, bär, ANTOINE JOSEPH LE FÈVRE DE LA. See LA BARRE.

BARRÉ, bär'ê, ISAAC (1726–1802). A British officer and politician, born at Dublin. He was a lieutenant colonel in Wolfe's army and was wounded at the capture of Quebec in 1759. He was chosen to Parliament in 1761 and attracted attention by a violent personal attack upon Pitt, who led the opposition to Bute's administration. He opposed the Stamp Act in 1765, supported the appeal of the Colonies, and strenuously defended the American cause, for years making himself conspicuous in the various debates by his remarkable powers of invective. The "Sons of Liberty" derived their name from a chance allusion to the Americans in one of his speeches. He held various offices of importance and was in Parliament until 1790, when he retired in consequence of blindness resulting from his wound received at Quebec. He was among those to whom the Junius Letters were attributed.

BAR'REL (It. *barile;* Fr. *baril* = *barrique*, Gael, *baraill*, Ir. *bairile*, Slav. *barilo*). Primarily a large cylindrical vessel for holding liquids, and then, by extension, a certain *measure*, but varying in every locality and almost for every liquid. In the old English measures the barrel contained 31½ gallons of wine, 32 of ale, and 36 of beer, the wine gallon itself differing from that of ale and beer. In imperial gallons their contents would be: old wine barrel = 26¼ gal.; ale barrel, 31½; beer, 36½. The Italian *barile* varies from 7 to 31 English gallons; the French *barrique* of Bordeaux = 228 French litres = 50 English gallons. Four barriques

make a tonneau. In many cases, barrel signifies a certain *weight* or other quantity of goods usually sold in casks called barrels.

In the United States the usual barrel for liquids contains 31½ United States wine gallons of 231 cubic inches. A standard barrel of fermented liquors for tax purposes (Revised Statutes 3339) contains not more than 31 gallons and is the basis upon which the internal revenue tax is collected, while the return of the number of gallons of proof spirit distilled is made on a basis of 40 gallons to the barrel (Revised Statutes, 3309). The United States government has also prescribed a standard barrel for apples by Act of Congress approved Aug. 3, 1912, of which the dimensions, measured without distension of its parts, are as follows: Length of stave, 28½ inches; diameter of head, 17⅛ inches; distance between heads, 26 inches; circumference of bulge, 64 inches, outside measurement, representing as nearly as possible 7056 cubic inches. Steel barrels containing the interior dimensions provided for above are to be construed as a compliance therewith. The statutes of the various States provide for the dimensions of barrels and casks used for various commodities; for example, in the Consolidated Laws of the State of New York it is provided: that casks for flour and meal shall be of two sizes only. One size shall contain 196 pounds of flour or meal, with staves 27 inches long and each head 16½ inches in diameter; and the other size shall contain 98 pounds, with staves 22 inches long and each head 14 inches in diameter, or with staves 27 inches long and each head not more than 12 inches in diameter. Another typical statute is that of the State of Wisconsin, which provides that a barrel shall contain 31½ gallons and a hogshead two barrels, . . . a barrel of flour measured by hundredweight shall contain 196 pounds; a barrel of potatoes, 172 pounds; a barrel of unslacked lime, 200 pounds; a barrel of apples or pears shall represent a quantity equal to 100 pounds of grain or dry measure, etc. Numerous attempts have been made to secure a greater uniformity in barrels, especially those employed for agricultural products, and much progress recently has been made in that direction. See COOPERAGE.

BARREL, GUN. See ORDNANCE, SMALL ARMS.

BARREL BULK. A measure equal to 5 cubic feet, or one-eighth of a ton. It is used in estimating capacity for freights, 40 cubic feet being taken as one ton in estimating freight charges, where the latter are not based upon the weight.

BAR'REL-MAK'ING MACHIN'ERY. See COOPERAGE.

BARREL ORGAN. A musical instrument generally portable, in which the music is produced by a revolving barrel or cylinder, set with pins and staples, which open valves for admitting wind to pipes from a bellows worked by the same revolving cylinder. The pieces are played with an harmonic accompaniment. Barrel organs are mostly used by itinerant musicians, and their repertoire is limited. The *orchestrion* is a very large barrel organ, established chiefly in restaurants, dancing halls, and carrousels.

BARREL VAULT. An architectural term for a continuous semi-cylindrical vault whose section may be semi-circular, semi-elliptical, segmental, or pointed. In engineering works it is commonly called a tunnel vault. See VAULT.

BAR'REN IS'LAND. A volcanic islet in the Bay of Bengal, 60 miles east of Andaman Islands (Map: Burma, B 4). It is conical in shape, about 2 miles in diameter, and its cone rises to a height of 1158 feet. The volcano is in a semi-dormant state, emitting at intervals water and sulphurous gases.

BARREN MEAS'URES. See CARBONIFEROUS SYSTEM; COAL.

BAR'RENNESS. See STERILITY.

BARRÈS, bȧ'rĕs', MAURICE (1862–). A French novelist, born at Charmes-sur-Moselle. His early works, *Sous l'œil des barbares* (1888); *Un homme libre* (1889), and *Le jardin de Bérénice* (1891), are obscure, uneven, and decadent. His intentional lack of unity, his fondness for interspersed and sporadic criticism, must be held to have influenced George Moore in his remarkable, yet tantalizing, *Confessions of a Young Man.* In his later efforts Barrès works himself out of aristocratic dilettantism and writes the "romance of national energy," urging young men to remain in the provinces and build up national traditions. This is expressed in his cycle of three stories, *Les déracinés* (1897), *L'Appel au soldat* (1900), and *Leurs figures* (1902). Still carrying on the gospel of national energy comes a new series, "Ramparts of the East," of which the first volume, *Au service de l'Allemagne* (1905), deals with Alsace. Later of his writings include *Le voyage de Sparte* (1906); *Colette Bandoche* (1900); *La maîtresse servante* (1911); *En Italie* (1912). In 1906 he was elected to the Academy and reëlected, as a Nationalist, to the Chamber of Deputies, which he entered in 1889. Consult, for criticism, Kahn, *Symbolistes et décadents* (Paris, 1902) and J. G. Huneker, *Egoists, a Book of Supermen* (New York, 1909); and for biography Barrès himself, *Vingt-cinq années de vie littéraire* (Paris, 1908).

BAR'RETT, BENJAMIN FISK (1808–92). An American Swedenborgian minister. He was born in Maine and graduated at Bowdoin in 1832 and at Harvard Divinity School in 1838. He was pastor of the First New Church (Swedenborgian) in New York from 1840 to 1848, at Cincinnati from 1848 to 1850, and at Philadelphia from 1864 to 1871. He edited the *New Church Monthly.* His works include a *Life of Swedenborg* (1841); *Lectures on the New Dispensation* (1878); *Letters on the Divine Trinity* (1873); *The Golden Reed* (1855); *A New View of Hell* (1872; 1886).

BARRETT, CHARLES SIMON (1866–). An American agriculturist, and president of the Farmers' Union. He was born in Pike Co., Ga., received a normal-school education, and engaged in teaching and farming until 1897, when he became an organizer among the farmers. In 1905 and 1906 he was president of the Georgia Farmers' Union, in the latter year becoming head of the national organization, which comprises 2,500,000 members in 31 States. He was a member of Roosevelt's Country Life Commission and a delegate to the National County Life Congress of 1911. He published *Mission, History, and Times of the Farmers' Union* (1909).

BARRETT, JOHN (1866–). An American journalist and diplomat, born at Grafton, Vt., in 1866. He graduated from Dartmouth College and, after teaching for some time, was associated with several important newspapers on the Pacific coast. He was appointed Minister to Siam in 1894, resigning in 1898 to act as war correspondent in the Philippine Islands. He was

Minister to Argentina (1903–04), to Panama (1904–05), and became Minister to Colombia in 1905. Mr. Barrett has done much to promote American commercial interests both in Asia and in South America. In 1906 he became director-general of the International Bureau of Pan-American Republics, later the Pan-American Union. He published *Admiral George Dewey* (1899); *Pan-American Union: Peace, Friendship, Commerce* (1911); *The Panama Canal and What it Means* (1913).

BARRETT, LAWRENCE (1838–91). An American actor, born at Paterson, N. J. For a time he worked in a dry-goods shop at Detroit, Mich., and in that city, in 1853, as Murad in *The French Spy*, made his first stage appearance. In 1857–58, at New York and Boston, he supported Edwin Booth, E. L. Davenport, and other prominent players. In 1861 he served in the Federal army as captain in the Twenty-eighth Massachusetts Volunteer Infantry. Subsequently he became the leading member of Edwin Booth's company during a remarkable series of performances at the Winter Garden, New York City. For several years he managed, with heavy pecuniary loss, the Varieties Theatre, New Orleans, La., but in 1869–70 won brilliant artistic and financial success as copartner with John McCullough of the California Theatre, San Francisco. At Booth's Theatre, New York City, he appeared in 1875 as Cassius and the King, in magnificent revivals of *Julius Cæsar* and *King Lear*. In 1884 he was favorably received during a brief visit to England. From 1887 until his death he was associated with Edwin Booth in one of the most significant enterprises in the history of the American drama. His greatest part was that of Cassius; but he was likewise highly effective as Hamlet, King Lear, Shylock, Richelieu, Lanciotto, and the Man o' Airlie. In general, it may be said that his work was marked by fine conscientiousness and high intellectual force, although not credited by the critics with the touch of distinctive genius displayed by his coworker, Booth. He was an energetic manager, did much to encourage dramatic authorship, and wrote a discriminating and very readable *Life of Edwin Forrest* (1881), and an admirable sketch of Edwin Booth in *Edwin Booth and his Contemporaries* (Boston, 1886).

BARRETT, WILLIAM FLETCHER (1844–). An English physicist, born in Jamaica, West Indies. From 1862 to 1866 he was assistant to Professor Tyndall at the Royal Institution, London; in 1867 was appointed instructor in science at the International College; in 1869 lecturer in physics at the Royal School of Naval Architecture, and from 1873 to 1910 he was professor of experimental physics at the Royal College of Science, Dublin. He helped found, in 1882, the Society for Psychical Research, whose purpose was defined as "an organized attempt to investigate that large group of debatable phenomena designated by such terms as mesmeric, psychical, and spiritualistic." In 1885 he established in the United States a branch of the society. He is known for original investigations in magnetism and radiant heat, which include discussions of the contraction of nickel by magnetization, sensitive flames, and the recalescence of iron. His publications, in addition to numerous contributions to the *Philosophical Magazine* and other periodicals, include *Lessons in Science* (1880); *A Monograph on the So-called Divining Rod* (1897–1900); *Early Chapters in Science* (1899); *Introductory Practical Physics* (with W. Brown, new ed., 1906); *A New Form of Polarimeter* (1909); *Open-Scale Isothermal Air Barometer* (1910); *Creative Thought* (1911); *Swedenborg, the Savant and the Seer* (1913).

BARRETT, WILSON (1846–1904). An English actor, manager, and playwright. He was born in Essex, Feb. 18, 1846, and went upon the stage at Halifax in 1864. After playing in different provincial towns he became manager of the Amphitheatre, at Leeds, and of other playhouses. In 1879, three years after his first appearance in London, he took the management of the Court Theatre, the next year securing Madame Modjeska for her first English appearance. He became manager of the Princess's Theatre in 1881 and produced *The Lights o' London*, which ran for 286 nights. In 1882 came *The Silver King*, with Barrett's rôle of Wilfred Denver, which had an even longer run. His *Hamlet* was first presented in London in October, 1884. This was his best Shakespearean part, the other most notable being *Othello* (1897). In 1886 he produced *Clito*, a tragedy written by himself and Sydney Grundy. His own drama of *Nowadays* he brought out in 1889, and his *Pharaoh*, at Leeds, in 1892. The most successful of his own plays was *The Sign of the Cross*, founded on legends of the early Christian martyrdoms under Nero. Produced in America in 1895, it met with great popular favor, and though severely dealt with by some of the critics, had a run of more than a year at the Lyric Theatre, London, which Barrett took in 1896. There, in February, 1897, he produced his *Daughters of Babylon*. He also produced his own adaptations of several novels, among them Hall Caine's *Deemster* (as *Ben my Chree*, 1888), *The Bondman* (1893), *The Manxman* (1894), and Sienkiewicz's *Quo Vadis?* (at Edinburgh, May, 1900). He was author or joint author of several works of fiction, among them novels based on *The Sign of the Cross* and *Daughters of Babylon*.

He came to America for more or less extended tours in 1886, 1888, 1889, 1893, and 1897. In 1898 he visited Australia. In 1899 he became manager of the Lyceum. Consult Scott, *The Drama of Yesterday and To-day* (London, 1899).

BARR'HEAD. A police burgh in Renfrewshire, Scotland, 3½ miles southeast of Paisley. Cotton mills, bleaching, weaving, dyeing, engineering, and other works combine with its railway facilities to make it a busy and thriving town. It was founded in 1773. Pop., in 1911, about 10,000.

BAR'RI, GIRALDUS DE. See GIRALDUS DE BARRI.

BARRIAS, bȧ'rē'-ȧs, ERNEST (1841–1905). A French sculptor, born in Paris. He was a pupil of Cavelier and Jouffroy. In 1861 he won the *Prix de Rome*. He gained his first noteworthy success in 1870 with a "Young Girl of Megara" (Luxembourg). His best-known work is "The First Burial" (1883, Hôtel de Ville; a bronze replica in Metropolitan Museum, New York City); and his later productions include the "Young Mozart" (1887, Luxembourg); "The Girl Spinning"; the celebrated monument of Victor Hugo (1902, Paris); and "Joan of Arc as a Prisoner" (1903). His style is marked by an attempt at compromise between academic classicism and modern naturalism.

BARRIAS, FÉLIX JOSEPH (1822–1907). A French historical and portrait painter, brother of the preceding. He was born in Paris. He

studied with Léon Cogniet and in 1844 took the *Grand Prix de Rome* with "Cincinnatus Receiving the Deputies of the Senate." For half a century he was known as one of the most earnest champions of academic tendencies, especially in historical painting. For 60 years he was an almost annual exhibitor in the Salon. Among his chief works of this class are "Pilgrims going to Rome for the Jubilee of 1300" (1855), "Socrates Bidding Farewell to his Friends" (1873); "The Death of Chopin" (1885). Between 1860 and 1875 he was especially active in mural decorations, of which specimens are to be seen in the Hôtel du Louvre, the churches of St. Eustache and the Trinité, and the foyer of the Opéra, Paris; and at Grosvenor House, London.

BAR'RICADE' (Fr., Sp. *barricada*, literally, made of barrels, from *barrica*, barrel). An improvised defensive work, employed to bar narrow passages, streets, roads, etc. When built by regular troops, use is made of beams, chains, *chevaux-de-frise*, and other specially adapted materials; if erected by civilians or mobs, any available material that may be at hand is used. Barricades have been used since the earliest times, but are perhaps better known in connection with the insurrections in the city of Paris. (See below.) After his ascension to the throne Napoleon III widened the principal streets of Paris and laid them with asphalt, so as to render the successful erection of barricades next to impossible.

BARRICADES, The Days of the. A phrase applied to popular uprisings in Paris. The first was May 12, 1588, when the people rose against the Duc de Guise and barricaded the streets; another, Aug. 5, 1648, when the people rose at the commencement of the Fronde; others, again, in July, 1830, and in February, 1848.

BAR'RIE. The capital of Simcoe Co., Ontario, Canada, 63 miles northwest of Toronto on the Grand Trunk, the Canadian Pacific, and the Hamilton and Northwestern railways, and on Lake Simcoe (Map: Ontario, D 3). It is a favorite summer resort and is the centre of a grain-raising district. The manufactures include carriages, leather, and wicker work, and there are foundries, breweries, woolen, flour, and planing mills, etc. There is a business college at Barrie. Pop., 1901, including Allandale, 5949; 1911, 6420.

BARRIE, Sir James Matthew, Bart. (1860–). One of the most popular of contemporary novelists and dramatists, born at Kirriemuir, Scotland. The sketches and stories which he contributed to papers and periodicals soon after his graduation from Edinburgh University in 1882 brought him to the attention of the British public and made him within a few years first without a second among the recent writers who have found their material in the village and country life of Scotland. In 1885 he moved to London. With the publication of *Auld Licht Idylls* (1888) and *A Window in Thrums* (1889) the author's success was assured. *The Little White Bird* (1892) and *Sentimental Tommy* charmed his old readers and won him a host of new ones. These four books represent and measure the distinctive genius or talent of their author. The painting of homely Scotch life, the tricksy wit, the fresh vernacular style, the pervasive sentiment, the overflowing pathos —these were the making of the *Idylls* and *A Window in Thrums*, while his tenderness for child life, his poetic fantasy, and his whimsical invention created *Sentimental Tommy*, *The Little White Bird*, and their like. Many successes followed the "Thrums" idylls; among them, in addition to the books already named, *My Lady Nicotine* (1891), *The Little Minister* (1891), and *Tommy and Grizel* (1900). By 1900 the struggling journalist of the early nineties had become one of the most popular writers of his time. And other laurels in a new field had been won. In 1892 his farce, *Walker, London*, scored a success, and one of the actresses who had a part in that play became his wife in the following year—a marriage that ended in a divorce in 1909. Other plays, some of them based on his work in fiction, were still more successful: *The Professor's Love Story* (1895); the stage version of *The Little Minister* (1897); *Quality Street*, *The Admirable Crichton*, and *Little Mary*, all produced in the year 1903. *Peter Pan*, a fantasy elaborated from an episode of *The Little White Bird* and worthy of Hans Andersen, belongs to 1904, and *Alice-Sit-by-the-Fire* and *What Every Woman Knows* respectively to 1905 and 1908. He was made a baronet in 1913. As a dramatist Mr. Barrie is not in the main current of present-day dramatic activity, which runs to the problem play; his sphere is the comedy of manners and the fantasy, and within this sphere his freshness of invention, his stage craft, the spontaneity of his humor, his genial if not incisive satire, and an engaging personality have secured him a distinguished place. A sound criticism of Barrie is contained in Stevenson's comment in a letter (Dec. 22, 1892) to Henry James, "There was genius in him, but there was a journalist on his elbow." If not weighty, deep, or searchingly sincere in either novel or drama, his work has a kindly humanity, a whimsical humor, a grace of sentiment, and a bizarre fancy that have cast an unfailing spell over a vast and varied audience. The following, with the books already named, comprise the bulk of his work: *Better Dead* (1887); *When a Man's Single* (1888); *An Edinburgh Eleven* (1888); *Margaret Ogilvie* (1894); *The Wedding Guest* (a play, 1900); *Peter Pan in Kensington Gardens* (1906); *George Meredith* (1909); *Half an Hour*, *The Will*, *The Adored One* (or *Leonora*)—the first and third of these produced in London, the first two in New York, 1913, and *Leonora*, 1914, with Maude Adams. A 10-volume edition of Barrie's *Works* was published in London, 1913. For biographical and critical material, consult J. A. Hammerton, *Barrie and his Books* (New York, 1900), which contains a list of articles on Barrie and his work. Consult also *English Illustrated Magazine*, vol. xxix (N.S.), p. 208, for bibliography of Barrie's work to May, 1903.

BARRIÈRE, bȧ'ryâr', Jean François (1786–1868). A French publicist, born in Paris and educated at the Academy of St. Barbe. He held various journalistic positions and in 1833 became associated with the *Journal des Débats*, to which, until his extreme old age, he was one of the most active contributors. He devoted himself principally to historic sketches and studies of the eighteenth century and the Revolutionary period. Among his principal works are the following: *Mémoires de Mme. Campan* (2 vols., 1823); *Bibliothèque des mémoires relatifs à l'histoire de France pendant le XVIII^e siècle* (12 vols., 1846–49).

BARRIÈRE, Théodore (1823–77). A French

dramatic author, born in Paris. His first notable success was a dramatization of Murger's *La vie de Bohême* (1851). This was followed by two other of his best plays—*Les filles de marbre* (1853) and *Les faux bonshommes* (1856). *Le Gascon* (1873) was a great success. He also published *Les Scandales d'Hier* (1875); *Les Demoiselles de Montfermeil* (1877), and also many plays in collaboration with E. Capendu, Ed. Plouvier, V. Sardou, and others.

BAR'RIER FORTS, The. A series of batteries built by the Chinese on the Chu-kiang River, several miles south of Canton, and so named because at this point, during the "Opium War" with England in 1840–42, a barrier of heavy piles and sunken vessels was constructed to keep out foreign shipping. On Nov. 15, 1856, the Chinese fired without provocation on several American officers, including Captain (later Rear-Admiral) A. H. Foote, who were approaching the forts in an open boat; and in retaliation, Commodore Armstrong, then commanding the American fleet in Chinese waters, captured the forts by storm, on the 21st, the Americans losing 29 in killed and wounded, the Chinese fully 300. The forts were later demolished by the Chinese. See Bogue Forts; Boca Tigris.

BARRIER REEF, The Great. A chain of coral reefs off the eastern coast of Queensland, Australia (Map: Queensland, E 4). It extends from Sandy Cape to Torres Strait, a distance of about 1000 miles in a general northwest direction. It follows rather closely the windings of the coast as far as Cape Direction (12° 51′ S.). Here it diverges in a northerly direction to Anchor Cay (9° 22′ S., 144° 6′ E.), which is its northwestern extremity. Yule and Olinda entrances are possible for navigation, but are not very safe. The Pandora passage is more advantageous. The greatest distance of its outer edge from the coast is 140 miles from Port Clinton, and its nearest approach is 12 miles north of Cape Melville. The sea between the coast and the reefs is calm, and the channel is used by steamers, but is dangerous for sailing vessels. The reefs protrude above the surface at low tide, and even at high tide, when invisible, their location is indicated by the turbulent state of the water. The area covered by the reefs is estimated at 100,000 square miles. Pearls, pearl-shells, and trepang are obtained from the reefs and surrounding waters. The name is given also to a similar formation extending along the coast of New Guinea from Cape Suckling to South East Cape and along the southern and eastern shores of the Louisiade Archipelago. Consult *Australia Directory*, vol. ii (6th ed.), comprising the East Coast from Port Jackson to Cape York, etc. (London, 1907).

BARRIERS, Battle of the. A battle fought between the French and the Allied troops under the walls of Paris (1814), in which the latter were victorious. After this battle Napoleon abdicated.

BARRIER TREA'TY. A treaty framed in 1715 after the Peace of Utrecht, confirming treaties concluded between England and the Netherlands in 1709 and 1713. Consult Dumont, *Corps diplomatique* (Amsterdam, 1726–31).

BARRILI, bär-rē'lē, Antonio Giulio (1836–1909). A popular and highly prolific Italian novelist, author of some 70 romances (published by Treves, Milan), of which *Come un sogno* is representative.

BARRINGER, băr'rĭn-jēr, Rufus (1801–95). An American lawyer, born in Cabarrus Co., N. C. He graduated at the university of his native State, studied for the bar, and afterward settled at Concord to begin the practice of the law. He was elected to the Legislature in 1848 and became a State Senator in 1850. Although strongly in favor of the continuance of the Union, he nevertheless, when the Civil War broke out, cast in his lot with his native State, joined a cavalry regiment, and gradually rose to the rank of brigadier general. After the war, he returned to the practice of law at Charlotte, where he remained until 1884, when he retired and thereafter until his death devoted himself to the management of his farm.

BAR'RING-OUT'. A prank once common among schoolboys in Great Britain. On the eve of a holiday the boys would attempt to bar the master out, it being understood that if they succeeded in preventing his entrance for three days they might dictate terms regarding holidays and recreation for the ensuing year, but if they failed they were at the master's mercy. Even the gentle Addison is reported by Johnson to have been a leader in an escapade of this kind at Lichfield. Though not unknown in the United States, barring-out has been here practiced for pure mischief, with no ulterior purpose.

BAR'RINGTON, Daines (1727–1800). An English lawyer and antiquary. He was called to the bar at the Inner Temple, from 1751 to 1753 was marshal of the High Court of Admiralty, and in 1764 became recorder of Bristol. From 1778 to 1785 he was second justice of Chester. He also held appointment as King's counsel and as commissary-general of the stores at Gibraltar. His antiquarian papers, read before the Society of Antiquaries and the Royal Society, deal with a multitude of varied subjects, from the antiquity of playing cards to Julius Cæsar's landing in Britain. His learning was more extensive than accurate, and his curious blunders, due often to his gullibility, exposed him to no little ridicule. His edition (1773) of Alfred the Great's Anglo-Saxon version of *Orosius*, with a translation, has been discredited. The best known and most valuable of his writings is the *Observations on the Statutes* (1766), a discursive work, with no evidence of arrangement, but still valuable for its ingenious and learned notes. He corresponded with Gilbert White, of Selbourne, whose *Natural History*, it has been asserted, was prepared at his suggestion. After he had become a bencher of the Inner Temple, he was much in the Temple Gardens, where he was familiar with Charles Lamb, who calls him "another oddity," and says that "he walked burly and square." Consult Nichols, *Literary Anecdotes of the Eighteenth Century* (9 vols., London, 1812–15).

BARRINGTON (properly, **WALDRON**), George (1755–c.1840). An Irish author, born at Maynooth, county Kildare. He attended schools there and at Dublin and in 1771 joined a band of strolling players. Subsequently he set up in London as a polite pickpocket, his most noted professional exploit being the theft from Prince Orloff of a snuffbox roughly valued at £30,000. He was sentenced in 1790 to seven years' transportation, but during the voyage to Botany Bay he frustrated an attempted mutiny and in 1792 received the first emancipation warrant ever granted. He was long superintendent of convicts, and afterward high constable at

Parramatta. For the opening of the theatre at Sydney with the presentation by the convicts of Dr. Young's *Revenge*, he wrote the prologue containing the well-known lines—

> "True patriots we, for be it understood,
> We left our country for our country's good."

He published *A Voyage to Botany Bay* (1801), *The History of New South Wales* (1802), and *The History of New Holland* (1808).

BARRINGTON, John Shute, first Viscount (1678–1734). An English lawyer and polemical writer. He was born in London and was educated at the University of Utrecht, where he remained for four years. After his return to England in 1698 he published two treatises, *An Essay upon the Interests of England in Respect to Protestants Dissenting from the Established Church* (1701) and *The Rights of Protestant Dissenters* (1704–05). He was one of the commissioners sent to Scotland to win the support of the Presbyterians for the union between the two kingdoms, and in 1708 he was appointed a commissioner of customs. He was a member of the House of Commons from 1715 to 1723. Swift described Barrington as "the shrewdest head in England." He was the author of numerous religious essays, collected and published by the Rev. George Townsend, under the title of *The Theological Works of the First Viscount Barrington* (3 vols., 1828).

BARRIOS, bär'rē-ōs, Rufino (1835–85). A Guatemalan politician, born at San Lorenzo. In 1871 he was prominent in the overthrow of President Cerna, and under President Granados became commander in chief of the army of Guatemala. He was president of Guatemala from 1873 until his death. Despite many dictatorial measures he did much to promote civil order and prosperity. He attempted to unite the five Central American States in a confederation; but Salvador, Nicaragua, and Costa Rica leagued against him, and during an invasion of Salvador he was killed at Chalchuapa.

BAR'RISTER (earlier *barester, barraster*, from *barre*, bar). The distinctive name by which the advocates at the English and Irish bars are known. (See Bar.) They are admitted to their office under the rules and regulations of the Inns of Court, and they are entitled to exclusive audience in all the superior courts of law and equity, and generally in all courts, civil and criminal, presided over by a superior judge. In the county courts attorneys are allowed to practice without the assistance of counsel; also at petty sessions, though at the quarter sessions where four counsel attend, the justices always give them exclusive audience. In Scotland the same body are styled advocates, and they have the same exclusive privileges that barristers enjoy in England and Ireland. Of barristers there are various ranks and degrees, and among each other they take precedence accordingly, the general name, "counsel," being, in the practice of the court, common to them all. But they may be divided into two leading groups—barristers and King's counsel. The ancient order of serjeants-at-law, formerly a well-marked third group, was distinguished by the *coif* and other peculiarities, but has now ceased to exist. (See Serjeant-at-Law.) Besides these three orders of gradations of rank at the English bar, the crown sometimes grants letters patent of precedence to such barristers as his Majesty may think proper to honor with that mark of distinction, whereby they are entitled to such rank and pre-audience as are assigned to them in their respective patents. Persons who desire to become barristers must secure admission to one of the Inns of Court and, after keeping a prescribed number of "terms," must pass a "call examination" successfully and thus entitle themselves to be called to the bar. The fees which the candidate must pay on being called, before signing the roll of barristers in the King's Bench Division of the High Court of Justice, are quite onerous, ranging from £90 to £100. He remains subject to the discipline of his Inn, which has the power to "disbar" him upon criminal conviction or for gross professional misconduct.

The professional ethics, or etiquette, of the bar is carefully and accurately defined. Its principal rules are as follows: "(1) That fees are divided between a leader (who ought to be a King's counsel, a sergeant, or a barrister with a patent of precedence) and a junior in the proportion of three-fifths to the former and two-fifths to the latter; (2) that no barrister accepts business upon a circuit to which he does not belong, except for a special fee; (3) that all litigious business must come through a solicitor, though a barrister may advise a client, directly and personally, as to non-litigious matters (such as making his will, or a settlement of his property); (4) a barrister's fee is an *honorarium*, not recoverable by legal process." As a barrister cannot enforce payment for his services, the law exempts him from liability for negligence in the performance of his professional services.

There is no distinct order of counsel corresponding to barristers in the United States, the functions of counsel, or advocate, and of attorney, or solicitor, being performed by the same person.

BARROIS, bȧ'rwä', Charles (1851–). A French geologist and paleontologist. He was born at Lille and was educated at the university there, where he afterward held the chair of natural sciences. He had charge of the official geological corps in Brittany, and contributed important papers descriptive of the geological structure and the fossils of that region. He was an active member of the Société Géologique du Nord and of the Société Géologique de France and served as general secretary, and as secretary of committees of the International Geological Congress. Among his literary contributions to the sciences are: *Traité de Paléontologie*, 5 vols. (Paris, 1883–93), which is a translation of Zittel's *Handbuch der Paläontologie*. The following monographs embody the results of part of his researches on the geological formations of France and the neighboring countries: *Le terrain crétacé supérieur de l'Angleterre et de l'Irlande* (1876); "Les terrains anciens des Asturies et de Galice," in *Mémoires Soc. Géol. du Nord*, vol. ii (1882); "Faune du calcaire d'Erbray (Loire-Inférieure), contribution à l'étude du terrain dévonien de l'ouest de la France," in *Mémoires de la Société Géologique du Nord*, vol. ii (1889); "Mémoire sur le terrain crétacé du bassin d'Oviédo (Espagne)," in *Annales des Sciences Géologiques*, vol. x (1879); "Mémoire sur la distribution des graptolites en France," in *Annales de la Société Géologique du Nord* (1892); "A Geological Sketch of the Boulonnais," in *Proc. of the Geologists' Association*, vol. vi (1880); "Sondages aux environs de

Lille," in *Annales de la Société Géologique du Nord*, vol. xxvi (1897). He became a member of the Institute in 1904.

BAR'RON, JAMES (1769–1851). An American naval officer. He was born in Virginia, went to sea at an early age, commanded several merchantmen, and in 1798 entered the United States navy as first lieutenant. In 1806 he was promoted to be commodore and in the following year commanded the *Chesapeake*, when that vessel was attacked and forced to surrender three of her crew, alleged to be British deserters, by the British frigate *Leopard*. (See CHESAPEAKE, THE.) Barron, though only in part to blame for the tame submission of his vessel, was bitterly attacked throughout the country, was tried by court-martial, and found guilty of "neglecting, on the probability of an engagement, to clear ship for action," and was suspended from active service for five years. Though he was subsequently assigned to shore duty, he never afterward was in active service and never regained his old professional status. Believing himself to be the victim of persecution at the hands of a cabal of officers, headed by Decatur, he challenged the latter and on March 22, 1820, mortally wounded him in a famous duel at Bladensburg, Md. Barron, though also seriously wounded, finally recovered and in 1839 became the senior officer in the United States navy.

BARRON, SAMUEL (1763–1810). An American naval officer. He was born at Hampton, Va., and was the brother of James Barron. He commanded a fleet of 10 vessels in the operations against Tripoli in 1805, but in consequence of ill health resigned his command in favor of Commodore John Rodgers. Just before his death Barron was made commander of the Gosport Navy Yard.

BARROS. A town in Porto Rico, 11 miles northwest of Aibonito, and 31 miles northeast of Ponce (Map: Porto Rico, D 3). It is situated in the midst of beautiful mountain scenery. The inhabitants are engaged chiefly in raising fine cattle and in the growing of coffee. Pop., 1899, 14,845; 1910, 15,028.

BARROS (bär'rôs) **ARANA,** DIEGO (1830–). A Chilean historian, born at Santiago. He was forced by ill health, in 1849, to abandon the practice of the law, for which he had been prepared, gave himself up to historical studies, and became known as an authority on the history of his country. He was a constant traveler and collected information from all possible sources on his favorite subject. In 1863 he was made rector of the Instituto Nacional. Among his publications are: *Estudios históricos sobre Vicente Benavides y la compañas del sur 1818–21* (1850); *Historia de la independencia de Chile* (1854–58); *Historia de la literatura* (1870); *Histoire de la guerre du Pacifique* (1881, written by order of the government); and *Historia general de Chile* (12 vols., 1884–93).

BARROS, JOÃO DE (1496–1570). One of the most important of the early Portuguese historians. He was born at Vizeu and became page to the Crown Prince (afterward John III), for whose amusement he wrote his three-volume romance, *Cronica do Emperador Clarimundo* (Coimbra, 1520). After the accession of King John III Barros was appointed successively captain of the fortress São Jorge de Mina, governor of the Portuguese possessions in Guinea, and in 1533 treasurer and general agent for Portuguese India. In 1539 he received from the King a grant of a province in Brazil, but an attempt to colonize it proved so ruinous that he was glad to return the grant. Barros's chief work was his *Decadas* (1552–53, 1560, 1602), a history of Portuguese India, written in fulfillment of a royal commission, left unfinished at his death and completed in 1602 by Diogo do Couto, who added eight more volumes. In this work De Barros had both an artistic and a scientific point of view. He has a keen sense of the picturesque and of the psychological, makes a critical use of his sources, judges with penetration men and events, holding in view the correlation of facts and striving for synthetic effects. A complete edition appeared at Lisbon in 24 vols. (1778–88). Consult Manoel Severin de Faria, *Vida de João de Barros* (Lisbon, 1624), A. Loiseau, *Histoire de la litérature portugaise*, chap. ix (Paris, 1887), and Ross's trans. of Bouterwek, *History of Spanish and Portuguese Literature* (London, 1823).

BARRO'SA, or **BOROSA.** A village of Spain, 16 miles south-southeast of Cadiz, celebrated as the place where General Graham, in March, 1811, with a handful of English troops, succeeded in gaining over the French, after his Spanish allies had retreated, one of the earliest victories of the Peninsular campaign. In its results the battle was indecisive, and the only thing the English gained was the glory of victory.

BARROT, bä'rō', CAMILLE HYACINTHE ODILON (1791–1873). A French statesman. He was born at Villefort, Lozère, July 19, 1791. In 1814 he became an advocate in the Court of Cassation at Paris, soon acquiring a high reputation as an eloquent pleader, becoming one of the most influential leaders of the Liberal opposition. He was president at this time of the Society Aide-toi (q.v.). After the Revolution of 1830 he was appointed Prefect of the Department of Seine, and in Lafayette's ministry a member of the Council of State. In a few months, however, he resigned his office of Prefect and declined the post of Ambassador at Constantinople, offered him by Louis Philippe. After Casimir-Périer became Minister, he also lost his place in the Council of State. He now began his career in the Chamber of Deputies as the leader of the so-called "dynastic opposition," and became the hope of all who desired the carrying out of the principles of the July Revolution. He essentially contributed to the removal of the Doctrinaires (q.v.) from office, in February, 1836, and energetically opposed the ministry of Molé, even supporting the Doctrinaires in accomplishing its overthrow, in 1839. The same year he visited England and Scotland. When, in 1840, Thiers was placed at the head of the government, Barrot for the first time declared himself in favor of the ministerial policy on the Eastern Question. On the return of Guizot to office, his opposition to the government was renewed. Taking a conspicuous part in the reform movement of 1847, he attended several of the provincial reform banquets which preceded the Revolution of 1848. On the outbreak of the struggle of February 23, when Louis Philippe called upon Thiers to form a new ministry, Barrot was appointed President. His advice to the King to withdraw his troops proved fatal to the throne of July. In the last sitting of the Chamber of Deputies Barrot supported the claim of the Comte de Paris to the throne, and the regency of the Duchesse d'Orléans. Under the presidency of Louis Napoleon he was for

some time a minister, and conducted the government with success till Oct. 31, 1849, when he retired from active political life. He accepted no office under the Second Empire, but took part in the conference in favor of Poland, held at Paris in 1864. In 1872 he was made a Councilor of State and Vice President of the Council. Consult his *Mémoires posthumes* (Paris, 1875–77).

BAR'ROW. A term applied to several geographical points in honor of the famous traveler, Sir John Barrow (q.v.). The most important of these are Point Barrow, in lat. 71° 23′ N. and long. 156° 31′ W., marking the northern extremity of America; Cape Barrow (q.v.), on Corondion Gulf; Barrow Strait, a channel extending west of Baffin Bay from lat. 73° 45′ to 74° 40′ N., with an average breadth of 40 miles (Map: America, North, C 2). It is a continuation of Lancaster Sound, connecting Baffin Bay with Melville Sound. It was discovered by Parry in 1819.

BARROW. A river in the southeast of Ireland, and next to the Shannon the largest in the island (Map: Ireland, E 4). It rises in the Slieve Bloom Mountains and after a short flow eastward turns south to the Atlantic, where it forms, in conjunction with the Suir (q.v.), the Waterford harbor. Its entire length is about 120 miles, and it is navigable for 300-ton steamers as far as New Ross, about 25 miles from its mouth. Barges ascend as high as Athy, the head of navigation, where the Barrow is connected with the Grand Canal. Its principal tributary is the Nore.

BARROW. An artificial mound of earth or stone, usually erected as a sepulchral monument or tumulus, common in Great Britain. See EUROPE, PEOPLES OF.

BARROW, CAPE. See BARROW, 1.

BARROW, or **BARROWE,** HENRY (?1550–93). An English church reformer. He took a B.A. degree at Cambridge in 1570, became a member of Gray's Inn in 1576, was interested by John Greenwood in church reforms, and influenced by the works of Robert Browne, founder of the Brownists. In 1586, while studying theology, he visited Greenwood in the Clink Prison and was thereupon seized. He was three times examined by the ecclesiastical authorities and with Greenwood was imprisoned in the Fleet. In collaboration with Greenwood he wrote several tracts and books. He also published the interesting *Brief Discovery of the False Church* (1590). With Greenwood he was, in 1593, indicted for various alleged offenses and hanged at Tyburn. By many he has been regarded as one of the founders of Congregationalism. For an exposition of this view, consult H. M. Dexter, *Congregationalism of the Last Three Hundred Years as Seen in its Literature* (New York, 1880).

BARROW, ISAAC (1630–77). An eminent English theologian and mathematician. He was born in London and was educated at the Charterhouse and the University of Cambridge. He was appointed professor of geometry at Gresham College in 1662 and in the following year was made Lucasian professor of geometry at Cambridge. He resigned the latter appointment in 1669 in favor of his pupil, Isaac Newton. In 1672 he became master of Trinity College and to his efforts is due the foundation of the valuable library of that institution. In 1675 he was nominated vice chancellor of the university. He died two years later at the age of 47. Of his original mathematical works, the principal are his *Lectiones Geometricæ* (London, 1669) and *Lectiones Opticæ* (Cambridge, 1674). Noteworthy are also his *Euclidis Elementa* (1655), *Archimedis Opera* (1675), and *Apollonii Conicorum, lib. iv* (1675). A Latin edition of his mathematical works, some of which exist also in English translations, was prepared in 1860 by Whewell. The best edition of the *Theological Works* of Barrow, including his Latin poems and a notice of his life by Whewell, has been prepared by the Rev. A. Napier (9 vols., Cambridge (1859). The Davy Manuscripts in the British Museum contain another excellent biography of Barrow. The mathematical contributions of Barrow paved the way for the introduction of the differential calculus, his treatment of tangents approaching closely the methods of the fluxional calculus of Newton. In another field his *Treatise on the Pope's Supremacy* (posthumous) is generally recognized as one of the very best works of its kind, and no less celebrated are his sermons.

BARROW, SIR JOHN (1764–1848). An English traveler and writer, born at Ulverston. At an early age he devoted himself to the study of mathematics and astronomy. He visited Greenland with a whaler about 1784 and from 1786–91 taught mathematics at Greenwich. In 1792 he received an appointment as private secretary and keeper of accounts to Lord Macartney, Ambassador to China, and availed himself of this opportunity to learn the Chinese language and to collect valuable materials afterward published in part in the *Quarterly Review* and in his *Travels to China* (1804). When Lord Macartney became Governor of Cape Colony, Barrow made extensive excursions in the interior of the country, which he described in his *Travels in South Africa* (2 vols., 1801–04). He returned to London in 1804 and was appointed by Lord Melville Secretary to the Admiralty, which post he continued to hold till 1845. He published: *A Voyage to Cochin-China in the Years 1792 and 1793* (1806); *The Life of Macartney* (2 vols., 1807); *A Chronological History of Voyages into the Arctic Regions* (1818); *An Autobiographical Memoir* (1847); *Sketches of the Royal Society.* More than almost any other Englishman of his time, he promoted Arctic discoveries. His name was given to Barrow Strait, Cape Barrow, and Point Barrow. With him also originated the idea of the Royal Geographical Society, founded in 1830, of which he was vice president till his death.

BARROW, POINT. See BARROW, 1.

BARROW-IN-FURNESS. A seaport and county borough in Lancashire, England, on the southwest coast of Furness Peninsula, on the Irish Sea (Map: England, C 2). It is 8 miles southwest of Ulverston and 18 miles northwest of Lancaster. The town is built on a rectangular plan. The chief of several fine public buildings is the town hall, and the handsome Gothic church of St. George. The municipality maintains a public and branch libraries, a school of science and art; owns its water works, gas, and electric light plants, markets, abattoirs, and cemetery. Its importance as a great manufacturing centre dates from the discovery in 1840 of rich hematite ore in the neighborhood and the subsequent establishment of mines and smelting works. There are several fine docks, and among the numerous industrial establishments are foundries, engineering works, extensive ship-

building yards, ship-armor and wire works, jute and paper factories. Copper as well as iron ore is obtained in considerable quantities near Barrow. The chief export trade is pig iron, steel rails, and ore. Its imports include timber from Sweden and Canada, coal from Wales, and preserved provisions from the United States. A large cattle trade is carried on with Belfast. There is regular steam communication with Glasgow and Belfast and the Isle of Man. The town takes its initial name from Barrow Island, a traditional burial place of Norse rovers, and now the central point of the harbor and the seat of its shipbuilding industries. The interesting and picturesque ruins of the twelfth century Cistercian Abbey of Furness are within 2 miles of the town, and there are ruins of an ancient castle on Piel Island. The island of Walney lies opposite Barrow, and in 1904–05 the British government built there a fort and undertook the erection of a bridge across the narrow channel separating the island and the mainland. In 1847 Barrow was a fishing village of 300 inhabitants. Pop., 1891, 51,712; 1901, 57,584; 1911, 63,775. Consult Richardson, *Furness, Past and Present* (Barrow, 1880).

BARROWS, David Prescott (1873–). An American ethnologist and educator. He was born in Chicago and graduated from Pomona College, Cal., in 1894. Post-graduate studies he took at the University of California, Columbia University, and the University of Chicago, receiving from the last-named institution the degree of Ph.D in 1897. He spent a number of years in the Philippines, as superintendent of the schools at Manila (1900), chief of the Bureau of Non-Christian Tribes (1901), and as director of education in the islands (1903–09). In 1910 he became professor of education and dean of the Graduate School at the University of California and a year later accepted the chair of political science at that institution. Besides reports on the ethnology of the Philippines and on the progress of education in those islands, he wrote *The Ethno-Botany of the Coahuilla Indians* (1900), and *A History of the Philippines* (1903; new ed., 1912).

BARROWS, Elijah Porter (1807–88). An American clergyman, educator, and author, born at Mansfield, Conn. He graduated at Yale in 1826, was ordained in 1832, and from 1835 to 1837 was pastor of the first Free Presbyterian Church in New York City. From 1837 to 1852 he was professor of sacred literature in Western Reserve College, Ohio, and from 1853 to 1866 professor of Hebrew language and literature at the Andover Theological Seminary. He was appointed in 1872 to the chair of Hebrew at Oberlin College, Ohio. The degree of D.D. was conferred upon him in 1858 by Dartmouth College. He contributed extensively to the *Bibliotheca Sacra;* was an editor of the *Bible With Notes* of the American Tract Society, and published a *Companion to the Bible* (1867), *Sacred Geography and Antiquities* (1872), and *Manners and Customs of the Jews* (1884).

BARROWS, John Henry (1847–1902). An American clergyman and educator, born at Medina, Mich. He graduated at Olivet College, Mich., in 1867, studied at Yale, Union, and Andover theological seminaries, and, after holding pastorates at Lawrence, Mass., and East Boston, Mass., was pastor of the First Presbyterian Church of Chicago from 1881 to 1896. He organized and was president of the unique World's Parliament of Religions, held at Chicago, in 1893. In 1896–97 he lectured throughout the Indian Empire. He was Morse Lecturer at the Union Theological Seminary in 1898 and in the same year was elected president of Oberlin College, Ohio. As a pulpit orator and occasional speaker, he was widely and most favorably known. His publications include: *The Gospels Are True Histories* (1890); *I Believe in God* (1891); a *History of the World's Parliament of Religions* (2 vols., 1893); a *Life of Henry Ward Beecher* (1893); *The Christian Conquest of Asia* (Morse Lectures, 1899). Consult M. E. Barrows, *John Henry Barrows: A Memoir* (New York, 1905).

BARROWS, (Katharine) Isabel (Hayes) Chapin (1845–1913). An American editor and penologist, born at Irasburg, Vt. After graduating from Adams Academy at Derry, N. H., in 1862, she studied medicine in New York City and received the degree of M.D. Two additional years of study she spent at the universities of Leipzig and Vienna. In 1863 she was married to William Wilberforce Chapin, a missionary to India. He died in 1865, and two years later she became the wife of Samuel June Barrows (q.v.). In early life she was employed by the Department of State at Washington as a stenographer, the first woman to hold such a position in the department. For 20 years she edited the *Proceedings of the National Conference of Charities and Correction*, and for 16 years she was assistant editor of the *Christian Register*. Notable service was rendered by her also as phonographic secretary to the National Prison Association and, during 17 years, as secretary to the Lake Mohonk conferences. Mrs. Barrows was well known as an editorial contributor to *The Independent*, *The Outlook*, *The Survey*, etc. She wrote *The Shaybacks in Camp*, with S. J. Barrows, and *A Sunny Life: The Biography of Samuel June Barrows* (1913).

BARROWS, Samuel June (1845–1909). An American author and philanthropist. He was born in New York City, May 26, 1845. After finishing his school days he learned telegraphy and shorthand and became a newspaper reporter. From 1867 to 1869 he was secretary to William H. Seward; in 1870 and 1871, in the bureau of rolls and archives, State Department, Washington; 1871–74, a student in the Harvard Divinity School, Cambridge, Mass., acting also as Boston correspondent of the *New York Tribune*, and in the summer of 1873 he went in this capacity on the Yellowstone Expedition with Generals Stanley and Custer, and in that of 1874 on the Black Hills Expedition. In 1874 and 1875 he was a student in Leipzig. In 1876 he became pastor of the First Church (Unitarian), Dorchester, Boston, Mass.; in 1881, editor of *The Christian Register*, Boston; in 1896, commissioner of the United States on the International Prison Committee. He was a member of the Fifty-fifth Congress (1897–99), and represented the House of Representatives at the Interparliamentary Congress on Arbitration at Brussels (1897), Christiania (1899), and Paris (1900). In the autumn of 1900 he became corresponding secretary of the Prison Association of New York. Besides editing the biography of Rev. Thomas J. Mumford (Boston, 1879), an antiquarian report on the *Records of the First Church, Dorchester, 1634–1736* (1880), the memorial of Ezra Abbot, D.D., LL.D. (Cambridge, 1884),

and Theodore Parker's *West Roxbury Sermons, 1837–48* (1892), and writing elaborate reports for the United States government on penological matters, he published: *The Doom of the Majority of Mankind* (1883); *A Baptist Meeting-House; The Staircase to the Old Faith, the Open Door to the New* (1885); and (with Mrs. Barrows) *The Shaybacks in Camp* (1887); *The Isles and Shrines of Greece* (1898); *Reports* of International Prison Conferences (1900–05).

BARROW STRAIT. See BARROW, 1.

BARRUNDIA, bär-rōōn'dē-ä, JOSÉ FRANCISCO (1779–1854). A Central American statesman, born in Guatemala. He was prominent in the revolt against Spain and in 1813 was condemned to death for treason, but made his escape. In 1823–24 he was a member of the first Constitutional Convention of Central America and introduced the measure which effected the abolition of slavery. He was President of Central America in 1829–30 and of the Confederation of Honduras, Nicaragua, and Salvador in 1851–52. In 1854 he came to the United States as envoy from Honduras, with the purpose of negotiating for the annexation of that state to the American republic, but died before anything had been accomplished.

BAR'RY. A seaport town and railway terminus in Glamorganshire, Wales, 7 miles southwest of Cardiff. It has fine docks, the largest of which was opened in 1889, and a tidal basin covering 90 acres between the mainland and Barry Island. There is a large export trade in coal, and iron and its manufactures. The municipality is particularly progressive; it owns gas and water works, abattoirs, cemeteries, and maintains public schools, a public library, and reading rooms, a large market, now used as a concert hall, garden allotments, parks, several hospitals, and a sanatorium. It initiated the prohibition of unlicensed houses for lodging seamen and instituted a system of licensed houses. Pop., 1891, 13,300; 1901, 27,000; 1911, 33,763.

BARRY (Fr. *barré*, p.p. of *barrer*, to bar). In heraldry, the term applied to a shield which is divided transversely into a certain even number of equal parts by bars of two alternating colors. *Barry-bendy* is where the shield is both barred and bended so as to present a lozenged surface. *Barry-pily* is where the shield is divided by bars and diagonal lines so as to show piles or wedge-shaped figures.

BARRY, ALFRED (1826–1910). An English bishop. He was born in London and was educated at King's College, London, and at Trinity College, Cambridge. He was head master of the grammar school at Leeds from 1854 to 1862 and became principal of Cheltenham College in 1862 and of King's College, London, in 1868. He was appointed examining chaplain to the Bishop of Bath and Wells in 1869, became canon of Worcester in 1871, and canon of Westminster in 1881. From 1884 to 1889 he was primate of Australia, metropolitan of New South Wales, and Bishop of Sydney. He was made canon of Windsor in 1891 and Assistant Bishop in West London in 1897. He was rector of St. James's, Piccadilly, in 1895–1900. He wrote: *Introduction to the Old Testament* (1856); *Lectures on Christianity and Socialism* (1890); *England's Mission to India* (1895); *Hulsean Lectures* (1895); *The Position of the Laity* (1903); *The Christian Sunday* (1905); *The Law of Faith Perfected in Christ* (1908).

BARRY, SIR CHARLES (1795–1860). An English architect. He was born at Westminster, May 23, 1795. Educated at private schools in Leicestershire and Bedfordshire, he was indentured to a firm of architects at Lambeth. At the age of 22 he went to Italy. A wealthy compatriot, attracted by the beauty of his drawings, took him in 1818 to Egypt. He also visited Greece and Palestine. On his return to England, in 1820, he designed a church at Brighton, the Sussex County Hospital, and the Manchester Athenæum, a building in the Grecian style, and built King Edward's Grammar School at Birmingham, the latter esteemed the most beautiful of his works. In London he designed the very successful Traveler's Club (1832) and the Reform Club (1837), both in Pall Mall, and the College of Surgeons, Lincoln's Inn Fields. After the burning of the old Houses of Parliament in 1834, in a public competition Barry's design for the new building was adjudged the best (1836). The work was commenced in 1840, and on Feb. 3, 1852, Queen Victoria opened the Victoria Tower and Royal Gallery in state and on the occasion knighted the architect. Chosen a Royal Academician in 1844, Sir Charles was also a Fellow of the Royal Society, of the Society of Arts, and of the Institute of British Architects.

BARRY, bä'rē', COMTESSE DU. See DU BARRY.

BAR'RY, EDWARD MIDDLETON (1830–80). An English architect, the son and pupil of Sir Charles Barry, whom he succeeded as architect of the Houses of Parliament. He built the new Covent Garden Theatre, the new opera house in Malta, the Charing Cross and Star and Garter hotels, and the New National Gallery in London.

BARRY, ELIZABETH (1658–1713). A famous English actress, whose dramatic powers seem to have been latent until awakened by her lover, the Earl of Rochester. Though she was more than once dismissed as unfit for the stage, he wagered, so the story goes, that in six months he would make her a first-rate actress. When, after his tuition, she at length appeared at Dorset Garden as the Queen of Hungary in *Mustapha* (1673?), her success justified his prediction. She came to be considered the greatest actress of her time and created, it is said, 112 different rôles. As Monimia, which she played to Betterton's Castalio in *The Orphan*, and as Belvidera in *Venice Preserved*, she was perhaps most celebrated and delighted the heart of their author, Otway, who was devoted to her. Among her other tragic parts were Isabella, in Southerne's *Fatal Marriage;* Zara, in Congreve's *Mourning Bride;* Cassandra, in Dryden's *Cleomenes;* and Calista, in *The Fair Penitent.* She succeeded also in comedy and created the character of Lady Brute, in the *Provoked Wife* of Vanbrugh. Her power of exhibiting every emotion was extraordinary. The utterance of her phrase, "Ah, poor Castalio!" in *The Orphan,* was particularly famous for being always accompanied by her own tears as well as those of the audience. She is stated, on the authority of Cibber (*Apology*, ch. v.), to have been the first actress to receive a "benefit," which in her case was by royal command. She became wealthy and retired from the stage to the village of Acton some three years before she died. Consult: Genest, *History of the English Stage* (Bath, 1832); Cibber, *Apology*, ed. Bellchambers (London, 1822); Doran, *Annals of the*

Stage, ed. Lowe (London, 1888); Baker, *English Actors from Shakespeare to Macready* (New York, 1879); Galt, *Lives of the Players* (London, 1831); Fyvir, *Tragedy Queens of the Georgian Era* (New York, 1909).

BARRY, JAMES (1741–1806). An Irish historical painter. He was born at Cork, Oct. 11, 1741, the son of a sea captain and innkeeper, and studied art in the drawing school of West at Dublin. One of his early paintings attracted the attention of Burke, who brought him to London and enabled him to study for five years in Rome. After his return to London in 1770 his classical paintings caused great controversy and obtained him few commissions; but he was elected to the Royal Academy in 1773. On his own offer he painted, on the walls of the great room of the Society of Arts at the Adelphi, six colossal canvases representing the "Progress of Human Culture." They were all 11 feet 6 inches in height, and the largest were 42 feet long. During the six years required by this work he received no pay, supporting himself by engraving at night. In 1782 he was appointed professor of painting to the Royal Academy, but his criticisms and controversies with the members caused his expulsion from the institution in 1792. After this he lived in poverty and retirement until his death, Feb. 22, 1806. His other paintings, besides the decorations mentioned above, include "Philoctetes in the Isle of Lemnos," "Adam and Eve" (South Kensington Museum), and "Venus Rising from the Sea."

Barry was a man of high ideals, but lacked the technical ability necessary for their expression in painting. A thoroughgoing classicist, he went so far, in his "Death of General Wolfe," as to depict all the figures nude. He was also an etcher and a writer of some force. His letters and writings were collected and published with a memoir in 1809. Consult Colvin, "James Barry," in *Portfolio* (London, 1873); Cunningham, *Lives of the Most Eminent British Painters, Sculptors, and Architects* (London, 1820–33).

BARRY, JOHN (1745–1803). An American naval officer. He was born in Ireland, came to America about 1760, and, settling in Philadelphia, acquired wealth as master of a merchant vessel. He was appointed to command the brig *Lexington* in 1776 and captured the tender *Edward*, the first ship ever taken by a commissioned officer of the United States navy. In 1777 he captured a British war vessel in the Delaware and in 1778 was given command of the *Raleigh*, which was soon afterward pursued and driven ashore by a British man-of-war. In 1781, while returning from France, he captured two vessels, but was severely wounded. He was first senior officer, with rank of commodore, after the reorganization of the navy in 1794. Consult Martin I. J. Griffin, *Commodore John Barry* (Philadelphia, 1903).

BARRY, JOHN DANIEL (1866–). An American playwright, essayist, and writer of novels, born in Boston, Mass. He graduated from Harvard University in 1888 and two years later began literary and journalistic work in New York City, acting for a time as dramatic critic for *Harper's Weekly* and later for *Collier's*. He was made instructor in diction and interpretation at the American Academy of Dramatic Arts, and lecturer on literary and social subjects for the New York City Board of Education. Several plays written by him were produced successfully in New York and other cities. Besides short stories and essays contributed to magazines, his writings include: *The Intriguers* (1896); *Julia Marlowe* (1899; 1907); *A Daughter of Thespis* (1903); *The Congressman's Wife* (1903); *Our Best Society* (1905); *Idea and Other Allegories* (1913); *Intimations*, a book of essays (1913); *Outlands* (1914).

BARRY, SIR JOHN WOLFE-WOLFE (1836–). An English engineer, born in London, and educated at Trinity College, Glenalmond, and at King's College, London. He was resident engineer during the construction of the bridges over the Thames and the stations at Charing Cross and Cannon Street and afterward built the present bridge over the Thames at Blackfriars, the Barry Dock, near Cardiff (the largest in Great Britain), the Tower Bridge, and numerous railroads and other engineering works. During a visit to the Argentine Republic in 1872 he planned the railroad from Buenos Ayres to Rosario. He was consulting engineer on the underground railway of Glasgow and in 1903–05 was Royal Commissioner of London Traffic. His publications include: *Railway Appliances* (in the series entitled "Text-books of Science," 1874–92); *Lectures on Railways and Locomotives* (1882); *The Tower Bridge* (1894).

BARRY, MARTIN (1802–55). An English physiologist, born at Fratton, Hants. He studied medicine in London, at the University of Edinburgh, and under Tiedemann at Heidelberg. He wrote much on physiological subjects and especially on animal development and embryology. Until the publication of his papers in the *Philosophical Transactions* of the Royal Society of London in 1840–43, it was not known that spermatozoa actually penetrate the ovum. He also first demonstrated the segmentation of the yolk in mammals. His means being ample, Barry gave his professional services freely to the poor. He acted as house surgeon to the Edinburgh Royal Maternity Hospital.

BARRY, SPRANGER (1719–77). A British actor, born in Dublin. He first played at the Theatre Royal in his native city in February, 1744, and remained there two years. On Oct. 4, 1746, he appeared for the first time in London, as Othello at the Drury Lane Theatre, where his gifts were quickly recognized, and it was not long before he and Garrick were playing Macbeth and Hamlet in alternation upon the same stage. But Garrick had control of the house, and in 1750 Barry withdrew to Covent Garden. There he and Mrs. Cibber played Romeo and Juliet, while Garrick and Mrs. Bellamy were appearing in the same piece at Drury Lane, a rivalry continued to the weariness of the town, as expressed in the well-known line, "A plague o' both your houses!" In 1758 Barry planned a new theatre in Dublin and three years later one in Cork; but as a manager he did not succeed, and he returned to London. For a time he played at the Haymarket and then, after 1767, under Garrick's management at Drury Lane. He married Mrs. Dancer in 1768 and went with her in 1774 to Covent Garden. Barry won many laurels in Shakespearean tragedy and created a number of parts, among them Mahomet, in Johnson's *Irene* (1749); Young Norval, in Home's *Douglas* (1757); and Evander, in Murphy's *The Grecian Daughter* (1772). Consult: Genest, *History of the English Stage* (Bath, 1832); Doran, *Annals of the Stage*, ed.

Lowe (London, 1888); Pollock, in *Actors and Actresses of Great Britain and the United States*, ed. Matthews and Hutton (New York, 1886).

BARRY, Mrs. Spranger (1734–1801), born Ann Street; afterward successively Mrs. Dancer, Mrs. Barry, and Mrs. Crawford. An English actress. She was born at Bath, but her connection with the stage began probably in York or Portsmouth, her early career as an actress being spent with her first husband, Mr. Dancer. In November, 1758, she appeared as Cordelia with Spranger Barry in *Lear*, at his new theatre in Dublin. After several years there she went with him to London (1767), married him the next year, and played with him until his death. Afterward she married a Mr. Crawford, and continued upon the stage for about 20 years, playing in London and for a time (1781–83) in Dublin. She was a powerful actress, with a voice which at vehement moments made an extraordinary impression. Her acting of Desdemona was considered almost a creation of the part, which up to that time had been little thought of. The list of her notable rôles includes also, besides Cordelia, Monimia, in *The Orphan*, and Lady Randolph, in *Douglas*, in which she is said to have made her last appearance, some three or four years before her death. Consult the authorities referred to in the preceding article.

BARRY, Thomas Henry (1855–1919). An American soldier, born in New York City. He graduated at the United States Military Academy and served on frontier and on garrison duty. In 1900–01 he was chief of staff of the Division of the Philippines, and he was made a brigadier general, United States army, in 1903. He was promoted to the rank of major general in 1908, commanded the army of Cuban pacification in 1907–09, and was superintendent of the United States Military Academy from 1910 to 1912.

BARRY, William Farquhar (1818–79). An American soldier, born in New York City. He graduated in 1838 at the United States Military Academy, assisted Major Ringgold in the organization of the first battery of light artillery in the United States army, and served (1846–48) in the Mexican War. He also served in the Seminole War from 1852 to 1853; he was on frontier and garrison duty from 1853 to 1861 and in 1858 was a member of the board for the revision of the system of light-artillery tactics. He entered the Civil War as major of the Fifth Artillery; from 1861 to 1862, with rank of brigadier general of volunteers, was chief of artillery of the Army of the Potomac, and in 1863–64 was chief of artillery of the defenses of Washington, D. C. From 1864 to 1866 he was chief of artillery on the staff of General Sherman (Military Division of the Mississippi) and in 1866 was mustered out of the volunteer service as colonel of the Second Artillery and brevet major general United States army. From 1866 to 1867 (at the time of the attempted Fenian raids into Canada) he was in command of the northern frontier; and from 1867 to 1877 he was in command of the artillery school for practice at Fort Monroe, Va., and from 1877 to 1879 of Fort McHenry, Md. With Gen. J. G. Barnard, he published *Reports of the Engineer and Artillery Operations of the Army of the Potomac* (1863).

BARRY, William Francis (1849–).

An English Roman Catholic clergyman and author. He was born in London and was educated at Oscott and the English College, Rome. From 1873 to 1877 he was vice president and professor of philosophy at Birmingham Theological College and professor of divinity at Oscott, 1877–80. From 1883 he was in charge of the small parish of Dorchester, near Oxford, and devoted his time largely to literary work. He delivered addresses in America in 1893. He was appointed rector of St. Peter's, Leamington, in 1908. Besides a large number of articles on metaphysical and ethical subjects, he wrote: *The News Antigone*, a powerful study of modern views in regard to marriage (1887); *The Place of Dreams* (1894); *The Two Standards* (1898); *Arden Massiter* (1900); *The Wizard's Knot* (1901); *The Dayspring* (1903); *Newman* (1904); *Heralds of Revolt* (1904); *Renan* (1905); *The Papal Monarchy from St. Gregory the Great to Boniface, 590–1303* (1902); *The Papacy and Modern Times* (1911).

BARRY, William Taylor (1785–1835). An American politician and jurist. He was born at Lunenburg, Va., graduated at William and Mary College, and practiced law at Lexington, Ky. Having already served in the State Legislature, he was in 1810 elected to Congress. He fought in the War of 1812, entered the Senate in 1814, and in 1816 resigned to accept an appointment as justice of the State Supreme Court. In 1829–35 he was Postmaster-General, and was the first incumbent of the office to sit in the Cabinet. In 1835 he was appointed Minister to Spain and died on the voyage to that country.

BARRY CORN'WALL. See Procter, Bryan Waller.

BARRY LYNDON, lĭn'don. The title of one of Thackeray's lesser novels. It appeared serially in *Fraser* (1844) and narrates the career of an Irish adventurer. It was published in book form in 1853.

BAR'RYMORE, Ethel (Mrs. Russell T. Colt) (1879–). An actress born in Philadelphia. She attracted general attention in Clyde Fitch's *Captain Jinks* in 1900. She played in London in the title rôle of *Cynthia* in 1904, starred in *A Doll's House* in 1905, and in Barrie's *Alice-Sit-by-the-Fire* (1906), played the part of Mrs. Jones in *The Silver Box* in 1907, Zoë Blundell in *Mid-Channel* in 1910, and Stella Ballantyne in *The Witness for the Defense* in 1911. The following year she appeared in *The Twelve-Pound Look*, a satire by James M. Barrie, and *Cousin Kate*, and in 1913 in *Tante*, a comedy by C. Haddon Chambers (from a novel by Anne Douglas Sedgwick).

BARRYMORE, Maurice (1847–1905). An actor and playwright, named Herbert Blythe. He was born in India and educated at Cambridge, England, but, having gone upon the stage, came to America in 1875, where he played with many of the best-known actors. The next year he was married to Georgiana Drew of the well-known actor family. His first season here was at Boston in *The Shaughraun*. In 1882 he became leading man for Madame Modjeska; in 1887, for Mrs. Langtry; in 1893, for Mrs. Bernard Beere; and the following season for Olga Nethersole. In 1899 he supported Mrs. Fiske, in *Becky Sharp*, playing very effectively the part of Rawdon Crawley. He wrote *Nadjeska*, which was produced by Madame Modjeska in 1884, and other plays. Consult Coward, in *Famous American Actors of To-day*, ed. McKay and Wingate.

(New York, 1896), and Montrose J. Moses, *Famous Actor-Families in America* (New York, 1906).

BAR SHOT. A double-headed shot, in shape like a dumb-bell, consisting of a bar, with a half ball or round head at each end. Bar shot were formerly employed in naval warfare for the purpose of destroying masts and rigging.

BARSU'MA, or **BARSUMAS I** (?–c.489). A Nestorian (q.v.), who became Bishop of Nisibis and Metropolitan, 435. He induced the King of Persia to expel the Christians who followed the Greek fathers and to put Nestorians in their place (462). He founded the theological school at Nisibis, which sent missionaries to various countries. He married a nun (Mammæa) and maintained the right of all priests to marry. In Persia the Nestorians venerate him as the founder of their faith.

BAR-SUR-AUBE, bär'sụ'rōb' (Fr. Bar on the Aube). A town in the department of Aube, France, on the right bank of the river of that name, 34 miles by rail east of Troyes. It is an ill-built, ancient town, numerous old coins and urns attesting that the Romans must have had a station here. Bar-sur-Aube was destroyed by the Huns in the fifth century, but was rebuilt soon after, when it became a place of commercial importance. A chapel on the bridge which crosses the Aube marks the spot from which the Bastard of Bourbon was hurled into the river by command of Charles VII in 1441. Bar-sur-Aube is noteworthy as the place where the council of the allied sovereigns, which decided the plan of the campaign ending in the first fall of the Empire, was held on Feb. 25, 1814; and where, two days after, the French were defeated by the allies under the chief command of Schwarzenberg. The leading manufactures include leather, flour, and agricultural implements, and there is trade in wine, grain, and wool. Pop., 1896, 4548; 1901, 4339; 1906, 4507; 1911, 4533.

BAR-SUR-SEINE, sụr-sān', (Fr. Bar on the Seine). An ancient town of France, in the department of Aube, pleasantly situated on the left bank of the Seine, 21 miles by rail southeast of Troyes (Map: France, N., K 4). The river is here crossed by a double bridge. The town possesses a small museum, and its most noteworthy building is the church of St. Etienne, dating from the sixteenth century. Bar-sur-Seine was fortified until the end of the fifteenth century and has been sacked several times. Pop., 1901, 3062; 1906, 3187; 1911, 3107.

BART, JEAN. See BARTH, JEAN.

BARTAS, bär'tâ', GUILLAUME DE SALLUSTE DU (1544–90). A French Huguenot poet, diplomat, and soldier. He was born at Montfort and died from wounds received in the battle at Ivry. His *La création* (1578), a religious poem, was widely esteemed, passing through 30 editions in six years. He wrote also *Judith Urania, la seconde semaine de la création*, parts of which, as of *La création*, were translated by King James VI, Thomas Hudson, William Lisle, and Thomas Winter. Joshua Sylvester's version of *La création* (1598) was once very widely read in both England and America. The original has lines of fine inspiration emerging from a maze of dreary absurdity.

BARTELS, bär'tĕls, ADOLF (1862–). A German journalist and poet, born at Wesselburen, in Holstein, and educated at Leipzig and Berlin. His poetic and dramatic works include: *Gedichte* (1889); *Dichterleben* (1890); *Aus der meerumschlungenen Heimat* (1895); *Der dumme Teufel*, a mock epic (1896); and *Martin Luther*, a trilogy (1903), and some historical novels. His collected poems appeared in 1904. In the field of criticism and literary history he published *Friedrich Gessler* (1892); *Die deutsche Dichtung der Gegenwart* (1897); *Geschichte der deutschen Litteratur* (2 vols., 1901–02); *Adolf Stern* (1905); *Heinrich Heine* (1906); *Gerhart Hauptmann* (1906); *Deutscher Litteratur Einsichten und Aussichten* (1907); *Deutsches Schrifttum* (1911).

BARTENSTEIN, bär'-ten-stīn. A town of East Prussia, situated on the Alle, 35 miles south of Königsberg (Map: German Empire, J 1). It possesses a gymnasium, several churches, a synagogue, an orphan asylum, a military school, and is the seat of a provincial court. There are manufactures of stoves and wagons, machine shops, iron foundries, breweries, and saw mills, and considerable trade in grain. Bartenstein is noted chiefly as the place where the treaty was concluded between the Prussians and the Russians on April 26, 1807. Pop., 1900, 6779; 1910, 7343.

BARTENSTEIN, bär'ten-stīn, JOHANN CHRISTOPH, BARON (1689–1767). An Austrian statesman, born at Strassburg. In 1727 he became Secretary of State under the Emperor Charles VI. He retained this position under Maria Theresa until Kaunitz was summoned to the Ministry of Foreign Affairs. His efforts to obtain European recognition of the Pragmatic Sanction of Charles VI proved unsuccessful, and his policy under Maria Theresa led to the humiliating treaties of peace negotiated at Breslau, Dresden, and Aix-la-Chapelle.

BAR'TER (OF. *barater, bareter*, to cheat). In commerce and political economy, the exchange of one commodity for another commodity, as contrasted with the sale of commodities for money. Among primitive peoples barter was doubtless the only method of exchange and is still pursued in trading with savage peoples. The trade of modern times, with its development of credit, is largely a system of barter in a modified form. This is seen most clearly in the exchanges between nations, where merchandise imports are balanced off against merchandise exports, and differences only liquidated by shipment of coin or bullion. The important difference between this modern barter and that of primitive peoples lies in the fact that money intervenes as a standard by which the commodities are measured, even though little money changes hands.

Barter in Law. Some courts have held that a statute which refers in terms to a sale of goods has no application to a barter of them, while other courts have held the opposite view. A power to an agent, or representative of the owner, to sell property is construed strictly, and hence the possessor of such a power, it is generally held, cannot barter the property. For most purposes, however, the rules governing sales are equally applicable to barter or exchange transactions. Indeed, courts of the highest authority have used barter and sale as interchangeable terms. Consult authorities referred to under SALE.

BARTET, bär'tâ', JEANNE JULIE REGNAULT (1854–). A French actress. She was born at Paris and studied at the Conservatoire (1871–72). She was then engaged at the Vaudeville,

and made her début in *L'Arlésienne*. She created the part of the Countess Zicka in Sardou's *Dora* (1877). Her first appearance at the Théâtre Français was as Mademoiselle Henderson in *Daniel Rochat* and before the end of the same year (1880) she was elected a member of the company. She has since appeared with success in *Ruy Blas, Iphigénie, Le roi s'amuse, L'Etrangère, Dénise, La souris, Thermidor, La paix du ménage, La loi de l'homme*, and *Grosse fortune*.

BARTFELD, bärt'fĕlt (Hung. *Bártfa*). An ancient town of Hungary, in the county of Sáros, on the Tapola, about 28 miles north of Eperies (Map: Hungary, G 2). Its chief edifices are the fine thirteenth-century Gothic church of St. Ægidius, and a handsome Rathaus dating from the fifteenth century. A statue of Empress Elizabeth was set up here in 1903. There is a considerable trade in linen. About 2 miles to the north of the town, in the midst of pine forests, are the celebrated and much-frequented chalybeate springs. Pop., 1901, 6102, mostly Slovaks.

BARTH, bärt. A seaport in Pomerania, Prussia, on the bay of the same name, 17 miles northwest of Stralsund (Map: German Empire, E 1). It has a good harbor, and among its institutions are a school of navigation and an establishment for single ladies of rank. It is the seat of a district court and has a church dating from the thirteenth century. Among its industries are shipbuilding, beer brewing, fish curing and packing, and the manufacture of sugar, leather, and cigars. It also has iron foundries, saw mills, and machine works. Pop., 1890, 5550; 1900, 7100; 1910, 7505.

BARTH, bärt, *Fr. pron.* bär, Auguste (1834–). A French Orientalist. He was born at Strassburg, March 22, 1834. He is best known by his work in connection with the religions of India. His volume, *Les religions de l'Inde* (Paris, 1879), was translated into English by Wood (London, 1882). Mention may also be made of his *Inscriptions sanscrites recuellies au Cambodge* (Paris, 1885) and of numerous monographs and reviews in *Journal asiatique, Mélusine, Mémoires de la Société de Linguistique*, etc. His annual reports on researches into the history of Indian religions, in *Revue de l'histoire des religions* (1880), are especially valuable. He is a member of the French Institute.

BARTH, Heinrich (1821–65). A German explorer and traveler. He was born at Hamburg and received his education at the University of Berlin. After visiting Italy and Sicily he embarked in 1845 at Marseilles and made excursions into Tunis, Tripoli, and Barca. He afterward extended his researches into Egypt, Sinai, Palestine, Asia Minor, and Greece, and in 1849 he published, at Berlin, *Wanderungen durch die Küstenländer des Mittelmeeres*. Late in that year he and Dr. Overweg again sailed from Marseilles as the scientific companions of James Richardson, intrusted by the British government with a political and commercial mission to Central Africa. Starting from Tripoli, the travelers crossed the Great Desert with much difficulty and danger. In January, 1851, they separated, and Dr. Barth pursued his researches, for the most part, by himself. In March of the same year Richardson, and in September, 1852, Overweg, having succumbed to the climate, Barth thenceforward was entirely alone. He, however, continued his explorations, which, when he returned to Tripoli in September, 1855, had extended over 24° of latitude and 20° of longitude, from Tripoli in the north to Adamawa in the south, and from Baghirmi in the east to Timbuktu in the west—upward of 12,000 miles. The range of his investigations and the scientific manner in which he pursued them placed him in the front rank of African explorers. The result of his researches was given in his *Travels and Discoveries in North and Central Africa* (5 vols., 1857–58, published in both English and German). Afterward he made several journeys in Greece, Turkey, Asia Minor, and other countries on the Mediterranean. He also published *Reise von Trapezunt durch die nördliche Hälfte Kleinasiens nach Skutari* (1860); *Sammlung und Bearbeitung zentral-afrikanischer vokabularien* (1862–66); *Reise quer durch das Innere der Europäischen Türkei* (1864).

BARTH, or **BART,** Jean (1651–1702). A French naval hero. He was born at Dunkirk and at an early age entered the Dutch navy, but on the outbreak of war between France and Holland he passed over to the French service. As persons not of noble birth could not then obtain the rank of officer in the navy, he became captain of a privateer. In this capacity he displayed astonishing bravery, so that Louis XIV dispatched him on a special mission to the Mediterranean. He became a terror to the Dutch navy and a serious menace to the commerce of Holland. On one occasion, with six vessels, he broke through a blockading fleet, shattered a number of the enemy's ships, and convoyed a transport of grain safely into Dunkirk harbor. His exploits overcame the disadvantages of his birth, and he was made lieutenant and soon after captain in the regular navy. In an action against a superior English force he was taken prisoner and carried to Plymouth, from which he made his escape in an open fishing boat to France. He cost the English and the Dutch merchants many millions, and their navies many ships. He was later ennobled by the King. Consult Badin, *Jean Bart* (Paris, 1867), and Landelle, *Jean Bart et son fils* (Paris, 1874).

BARTH, Karl Heinrich (1847–). A German musician. He was born at Pillau, Prussia, and was a pupil of Von Bülow, Bronsart, and Tausig. He was long a member of the well-known trio, Barth, De Ahna, and Hausmann, whose chamber-music recitals were widely celebrated. In 1868 he was instructor in Stern's Conservatory, and since 1871 in the Königliche Hochschule in Berlin.

BARTH, Paul (1858–). A German sociological writer. He was born at Baruthe in Silesia, Aug. 1, 1858. He is editor of the *Vierteljahrsschrift für wissenschaftliche Philosophie und Soziologie*, and a professor (*ausserordentlich*) in the University of Leipzig. He has written on philosophical subjects, but his *Philosophie der Geschichte als Sociologie*, the first volume of which appeared in 1897, is the best historical sketch of the development of sociological theory which has been published in Germany. Among Dr. Barth's other writings should be mentioned: *Geschichtsphilosophie Hegels und die Hegelianer bis auf Marx und Hartmann* (1890); *Tiberius Gracchus* (2d ed., 1893); *Beweggründen des sittlichen Handelns* (1899); *Erziehungs- und Unterrichtslehre* (1906); *Geschichte der Erziehung in Sociolo-*

gischer und geistesgeschichtlicher Beleuchtung (1911).

BARTH, THEODOR (1844–1909). A German journalist and politician, born in Duderstadt, and trained in the law at the universities of Heidelberg, Leipzig, and Berlin. He entered on the practice of his profession in Bremen in 1871, for four years was a magistrate in Bremerhaven, and after that served in the latter city until 1883 as secretary of the chamber of commerce. Having founded *Die Nation* in Berlin, he was its editor for 24 years, until it ceased publication in 1907. He joined the Liberal Union party, was elected to the Reichstag as member from Gotha in 1881, and later represented other districts up to 1898. Both in politics and as an editor he attracted much attention by his advocacy of the principles of free trade and by his opposition to the high protectionist policy of Bismarck and of the Junkers or Agrarian party. Not believing the Liberal Unionists sufficiently aggressive, he left them to join the *Deutsch-freisinnig* party in 1898 and in the same year became a member of the Prussian Landtag. From 1901 to 1903 he was again a member of the Reichstag, and in the latter year he even went so far as to unite with the Socialists in opposition to the reactionary forces in German politics. He made his last visit to the United States in 1907. His publications include: *Gegen den Staats-sozialismus* (1884); *Amerikanisches Wirtschaftsleben* (1887); *Amerikanische Eindrücke* (1896).

BARTHEL, bär'tel, MELCHIOR (1625–72). A German sculptor. He was born at Dresden, and studied with his father and with Johann Boehme, of Schneeberg (1640–45), and, after a long sojourn in Italy, including 17 years in Venice, settled at Dresden, where he was appointed sculptor to the court. His principal works are the colossal tomb of the Doge Giovanni Pesaro (Santa Maria dei Frari, Venice), the statue of John the Baptist (Oratory of Santa Maria, Nazareth), and a tomb in SS. Giovanni e Paolo, Venice. His numerous ivory carvings in the Green Vault at Dresden are considered superior to his more elaborate works, which are all in the manner of Bernini.

BARTHÉLEMY, bär'tā'l'-mē', ANTOINE. See PROUST, ANTONIN.

BARTHÉLEMY, AUGUSTE MARSEILLE (1796–1867). A French poet and politician. He was born at Marseilles, studied in the Jesuit College of Juilly, and came to Paris with some reputation as a poet after the Restoration. He speedily acquired fame as a satirist, and his light but stinging verse made all Paris laugh and many statesmen wince. The ministers of Charles X were especially his prey, and satirical epics named after them, *Les Sidiennes, La Villéliade, La Corbiéréide, La Peyronnéide,* followed each other in close succession. Imprisoned for expressing Napoleonic sentiments, he was liberated by the Revolution of July and turned at once to the support of Louis Philippe. With time his popularity waned, but he continued to pour out an endless stream of brilliant verse to the day almost of his death. His fine talents, however, were too often at the disposal of the highest bidder; and he sang Napoleon III as he did the Revolution of 1830. Of his serious work, *L'Insurrection* and *Napoléon en Egypte* deserve mention.

BARTHÉLEMY, FRANÇOIS, MARQUIS DE (1747–1830). A French statesman. He was born at Aubagne, in the department of Bouches-du-Rhône, and after serving in the Bureau of Foreign Affairs under the Duc de Choiseul, acted as Secretary of Legation in Switzerland, Sweden, and England. The reputation he gained as negotiator of the treaties of Basel (q.v.) led to his being chosen one of the five directors in 1797. But his royalistic sympathies and his connection with the Clichians (a club of reactionaries) brought about his downfall on the 18th Fructidor (Sept. 4, 1797) and his transportation to Guiana. He escaped from there, returned to France after the 18th Brumaire (Nov. 9, 1799), and was made a senator by Napoleon, whom Barthélemy sedulously fawned upon till 1814, and then expeditiously deserted. Louis XVIII made him a Minister of State and a Marquis. In 1819 he proposed the restriction of the electoral franchise, a measure which was carried the following year. His position, however, had made him so unpopular that he was forced into retirement, where he remained until his death in 1830. Barthélemy was a man of considerable ability but slight political integrity. Consult Kaulek, *Papiers de Barthélemy* (Paris, 1887).

BARTHÉLEMY, JEAN JACQUES (1716–95). A French Hellenist and antiquarian, born at Cassis and remembered for his *Voyage du jeune Anacharsis* (1788), on which he labored 30 years. The voyage, or journey, of the Scythian Anacharsis involves an account of the customs, government, and antiquities of Greece, as they might have appeared to a classical traveler. The experiences of the youth are supplemented by dissertations on literature, music, economy, etc. The learning is not profound, but it is wide; the character of the supposed narrator is well sustained, and though now superseded, the work was immediately and immensely popular. It brought its author a seat in the Academy and such general regard that, though arrested during the Reign of Terror, he was immediately released by the Committee of Public Safety. He died in Paris, April 30, 1795. A modern attempt to imitate the *Anacharsis,* which was translated into English (1791) and many other languages, is the *Charicles* of Wilhelm Adolf Becker (q.v.), which has greater learning, but less charm.

BARTHÉLEMY SAINT-HILAIRE, bär'-tā'l'-mē' sĂN' tē'lâr', JULES (1805–95). A French Orientalist, classical scholar, and statesman, best known for his commentaries and translations of Aristotle (1837–70). He was born in Paris, and in early life played an active part in radical political journalism, but became in 1838 professor of Greek and Roman philosophy in the Collège de France. He took office during the Revolution of February, 1848, but retired for a time from public and professorial life after the coup d'état of Dec. 2, 1851. He was reconciled later to the Empire and resumed his professorship in 1862. From 1871 he was again active in politics—as deputy, senator for life (1876), and Minister of Foreign Affairs (1880–81). He died in Paris. His chief works, besides the Aristotelian translations and essays, are: *De l'école d'Alexandrie* (1845); *Rapport sur le concours ouvert pour la comparaison de la philosophie morale et politique de Platon et d'Aristote, avec les doctrines des plus grands philosophes modernes*

(1854); *Sur les Védas* (1854); *Du Bouddhisme* (1855); *Mahomet et le Coran* (1867); *La philosophie dans ses rapports avec les sciences et la religion* (1889); *Étude sur François Bacon* (1890).

BARTHEZ, bär'tâs', or **BARTHES,** PAUL JOSEPH (1734–1806). A celebrated French physician. He studied medicine at Montpellier, became professor in the university in 1759, and acquired European renown as a practitioner and lecturer. In his principal work, *Nouveaux éléments de la science de l'homme* (1778), he set forth a new theory of life. According to this, there is in the living organism a *vital principle*, which should be distinguished, on the one hand, from the conscious and thinking mind; on the other, from the physical forces producing material transformations in the body. The life of each separate organ is but a *modus*, a particular manifestation of the "vital principle," and should not be regarded as a component part of the latter. Barthez was a keen thinker; he produced no experimental facts that might render his hypothesis immediately valuable to the biologist; yet his enlightened views had the effect of imparting a new and powerful impulse to the progress of science. He wrote also *Nouvelle mécanique des mouvements de l'homme et des animaux* (1798) and *Consultations de médecine* (1810).

BARTHOLD, bär'tôlt, FRIEDRICH WILHELM (1799–1858). A German historian, born in Berlin. He studied theology and history at the universities of Berlin and Breslau and was appointed professor of history at Greifswald in 1831. His principal productions are the following: *Geschichte von Rügen und Pommern* (5 vols., 1839–45); *Geschichte der deutschen Städte und des deutschen Bürgertums* (4 vols., 1850–52); *Geschichte der deutschen Hansa* (3 vols., 1853–54); *Geschichte des grossen deutschen Kriegs vom Tode Gustav Adolf's ab* (3 vols., 1841–43).

BARTHOLDI, bär'tôl'dê', FRÉDÉRIC AUGUSTE (1834–1904). A French sculptor. He was born at Colmar, Alsace, and at first studied painting under Ary Scheffer, but soon abandoned it for sculpture under Soitoux's influence, working thereafter by preference on a colossal scale and with architectural effects. Among his best-known works in this style are the colossal figure of "Liberty Enlightening the World," presented by France to the United States (1886; see LIBERTY, STATUE OF); a colossal group presented by France to Switzerland; the Lafayette Statue in New York (1873); and those of Lafayette and Washington in Paris (1892); and the "Lion of Belfort," an immense monument commemorating the defense of the place in the Franco-Prussian War. This last is generally considered his masterpiece.

BARTHOLDY, bär-tôl'dê, JAKOB SALOMO (1779–1825). A Prussian diplomat. He was born in Berlin, of Jewish parentage, and was educated at the University of Halle. He fought in the Austrian army against Napoleon, afterward entered the diplomatic service of Prussia, and accompanied the Allied armies to Paris in 1814, whence he was dispatched to Rome in the following year as Prussian Consul-General. He was a great patron of the arts. The revival of fresco painting was due largely to his influence and example. His valuable collection of antiques was bought for the Berlin Museum of Art, while the frescoes of his mansion at Rome, the so-called Casa Zuccari, were transferred in 1887 to the Berlin National Gallery.

BARTHOLIN, bär'tô-lên. A family of Danish scholars, of whom the first to win distinction was KASPAR (1585–1629). He was successively professor of rhetoric, medicine, and theology at the University of Copenhagen and published in 1611 *Institutiones Anatomicæ*, a text-book of anatomy used throughout Europe in the seventeenth century in German, English, French, and other translations. Of his sons, JAKOB (1623–53) was a distinguished Orientalist, and THOMAS (1616–80), a noted physician, naturalist, and philologist, who revised his father's *Anatomy* (1641) and was a warm defender of Harvey's doctrine of the circulation of the blood. Thomas had two sons, KASPAR (1655–1738), a distinguished anatomist, who discovered the function of the lymphatic glands and the sublingual duct and the seminal gland of the female; and THOMAS (1659–90), an antiquarian, author of *Antiquitatum Danicarum Libri Tres* (1689), a standard work. Consult J. Petersen, *Bartholinerne og Kredsen om dem* (1898).

BARTHOLIN'S GLANDS (named after Kaspar Bartholin, who discovered them). Two small, mucous glands, about the size of a pea, situated one on either side of the vagina. They are of the racemose type (see GLAND) and are the homologues of Cowper's glands in the male. They are of medical interest chiefly because they are prone to painful inflammation, as a result of gonorrhœal infection, and occasionally become the seat of cysts.

BARTHOLOMAE, bär-tô'lô-mă, CHRISTIAN (1855–). A German philologist and Iranian scholar. He was born at Bayreuth, June 21, 1855. After graduating from the Bayreuth Gymnasium in 1872, he studied classical philology and general philosophy at the universities of Munich, Leipzig, and Erlangen. He returned to Leipzig in 1874 to devote himself to comparative philology and Oriental studies. In 1879 he went to Halle as a member of the faculty and thence to an extra professorship at Münster, in Westphalia, in 1885. In 1898 he accepted a call to the professorial chair of Sanskrit and Indo-Germanic philology at Giessen. In 1909 he passed to the University of Heidelberg. Among his numerous and important contributions in the field of Aryan linguistics may be mentioned: *Das altiranische Verbum* (Munich, 1878); *Handbuch der altiranischen Dialekte* (Leipzig, 1883); *Arische Forschungen* (3 vols., Halle, 1882–87); *Studien zur indogermanischen Sprachgeschichte* (Halle, 1890–91); two important articles in Geiger and Kuhn's *Grundriss der iranischen Philologie* (Strassburg, 1895–96); an etymological dictionary of Avestan and Old Persian, *Altiranisches Wörterbuch* (Strassburg, 1904); *Die Gathas des Awesta* (1905); *Ueber ein Sassanides Rechtbuch* (1910).

BAR'THOLOMÆ'US ANGLICUS, ăn'glĭ-kŭs (Lat. *Anglicus*, English). An English scholar of the thirteenth century, erroneously styled DE GLANVILLE, author of the great mediæval encyclopædia, *De Proprietatibus Rerum*, "On the Nature of Things." He studied and taught theology at Paris and about 1230 entered the Minorite Order. His work was a source of common information on natural history and was translated into French in 1372, English in 1398, and Spanish and Dutch in the fifteenth century, and often printed. Consult *Histoire littéraire de la France*, vol. XXX (Paris, 1888).

BARTHOLOMÉ, bär'tô'lô'mā', Paul Albert (1848–). One of the most prominent contemporary French sculptors. He was born at Thiverval (Seine et Oise) and studied law until the age of 23. He then took up painting under Menn in Geneva and Gérôme in Paris and from 1869 to 1876 was a successful painter of genre subjects. On the death of his wife in the latter year he retired to strict seclusion and devoted himself, without a teacher, to the mastery of sculpture. After a year he completed the beautiful monument to his wife in the village churchyard of Bouillant (Oise). He then began a monument designed to represent the grief of humanity for the dead, the complete model of which, under the name "Aux Morts," was exhibited in the Salon of 1895. At the joint expense of the state and the city of Paris it was carved in limestone and erected in 1899 at the entrance of Père Lachaise Cemetery. It is one of the most sublime achievements of modern sculpture. Into the portal of a pylon-shaped mausoleum enter the nude figures of man and wife, bewailed on either side by a passionate group of mourners; within a lower entrance, typifying the grave, presides the genius of death. Among the best of his other works are: a bronze "Weeping Child" (1894, Musée du Luxembourg); a series of beautiful female nudes, such as that adorning the fountain in the Musée des Arts Decoratifs, Paris, "The Secret" (Leipzig), and the "Girl Plaiting her Hair" (Albertinum, Dresden). He also carved many portrait busts and several very original grave monuments in various Paris cemeteries, and is represented by sculptures in the museums of Marseilles, Béziers, Brussels, Mühlhausen, Düsseldorf, and Dresden. Bartholomé is par excellence the sculptor of the nude in the attitude of grief. Consult Demaison, *M. Bartholomé et le monument Aux Morts* (Paris, 1900).

BARTHOL'OMEW, Edward Sheffield (1822–58). An American sculptor. He was born at Colchester, Conn., worked first as a bookbinder and a dentist, and studied a year in the Art Academy, New York. In 1845–48 he was curator of the Wadsworth Gallery, Hartford, Conn. When ready to go on farther with his studies, he found that he was color blind, and therefore he decided to devote himself to sculpture. On the point of his departure for Italy he was stricken with smallpox, his illness finally resulting in lameness for life. He later did go to Italy, and, with the exception of two visits to his native land, spent the remainder of his life there. His most important work, "Eve," together with his "Sappho" and "Genius of Connecticut," are in the Wadsworth Gallery, Hartford. Among his other works are "Ruth," "Naomi," "Morning Star" and "Evening Star," and "The Shepherd Boy of the Campagna." Bartholomew was a genuine artist, but was handicapped by inadequate training and continuous ill health.

BARTHOLOMEW, John George (1860–1920). An English geographer and cartographer, born at Edinburgh, Scotland. He was educated at Edinburgh University, and in 1884 was one of the founders of the Royal Scottish Geographical Society. He introduced improvements in map making, especially notable being his layer system of contour coloring in topographical maps. His publications include: *Survey Atlas of Scotland* (1895–1912); *Citizen's Atlas* (1898–1912); *Survey Atlas of England and Wales* (1903); *Atlas of World's Commerce* (1907); *Handy Reference Atlas of the World* (8th ed., 1909); *Atlas of Zoögeography* (1911).

BARTHOLOMEW, Massacre of Saint (Fr. *La Saint-Barthélemy;* shorter for *La Nuit de Saint-Barthélemy*, the night of St. Bartholomew). The massacre of the Huguenots, perpetrated on Aug. 24–25, 1572, which grew out of the feud in France between the house of Guise and the Catholics, on the one hand, and the house of Condé and the Huguenots on the other. (See Catharine de' Medici.) From the tower of the royal palace the signal was given for a carnival of blood which lasted for several weeks and extended throughout France. The mortality cannot be determined with even approximate accuracy, as the different estimates, varying from 2000 to 100,000, show. Coligny, sought out by Guise himself, was among the first to fall. The two young Huguenot princes, Condé and Henry of Navarre, are said to have ransomed their lives by denying their religion. It is not likely, however, that this would have saved them, had not Catharine perceived that their death would have reacted against her by demoralizing the party opposed to Guise and leaving him with unlimited power—a thing she had no intention of permitting. Guise, although he had been the chief instrument in carrying out the plot, was unwilling to assume the ignominy attached to it, and Catharine induced her son to acknowledge before the Parlement his sole responsibility for the deed. The real part which the King took is hard to determine. Very reluctant at first to give his consent, he later, it is said, took a fiendish delight in the proceedings; but, on the other hand, some would have it that he died with remorse for the massacre. But whatever the other factors may have been, Catharine's imperative will and his own natural weakness leave little room for doubt as to the actual responsibility. The Pope ordered a medal to be struck in commemoration of the event and sent Cardinal Orsini to convey in person his felicitations to the Queen Mother.

For further reference, consult: White, *Massacre of St. Bartholomew* (London, 1868); Baird, *History of the Rise of the Huguenots of France* (New York, 1879–83); Baumgarten, *Vor der Bartholomäusnacht* (Strassburg, 1882); Lavisse, *Histoire de France*, vol. vi (Paris, 1904).

BARTHOLOMEW, Saint (Gk. Βαρθολομαῖος, *Bartholomaios*, from Heb. *bar*, son + Tolmai). One of the Twelve Apostles, mentioned in each one of the four lists (Mark iii. 18; Matt. x. 3; Luke vi. 14; Acts i. 13) and generally identified with the Nathanael of the Fourth Gospel, on the ground that otherwise he would be the only disciple mentioned in the opening chapter of the latter Gospel who did not become an apostle, and the only one mentioned in its closing chapter who was not an apostle; while the close relationship shown in the first chapter to have existed between him and Philip would agree with the coupling of his name with Philip's in the lists of the Synoptists, by whom Nathanael is never mentioned, as Bartholomew is not by the Fourth Gospel. Bartholomew, which is a patronymic ('son of Tolmai'), would thus be a distinguishing name added to Nathanael, as Barjona ('son of Jona') was to Simon. In case, however, the identification be rejected, the name would be an independent proper name, like Barnabas. The traditions which assign him as a missionary to many countries and

make him to have suffered many martyrdoms are worthless. This disposes of the legend, which Eusebius repeats, that he preached the Gospel in "India" (properly Arabia) and left behind him there the Gospel of Matthew written in Hebrew—a story which has figured in the discussion of Papias' statement that Matthew wrote his Gospel in that language. (See MATTHEW, GOSPEL OF.) It was on his day in the Roman Calendar, August 24, that the massacre of the Huguenots in Paris took place in 1572. In the Syriac translation of Eusebius' History the name Tolmai (Bartholomew) is substituted for Matthias (I, xii. 3; II, i. 1; III, xxv. 6, xxix. 4), the apostle appointed by the Church in the place of Judas (Acts i. 23–26). In case this identification also be accepted, there would be in the final apostolic list two of the same name.

BARTHOLOMEW BAYOU, bi'ōō. A river or bayou (q.v.) of the United States (Map: Arkansas, D 4). From its source in the southeastern part of Jefferson Co., Ark., it flows in a tortuous course southeast, then south, and, crossing into Louisiana, takes a southwesterly direction and empties into the Ouachita River in Ouachita Parish, La. It is about 275 miles long and is navigable for 200 miles.

BARTHOLOMEW FAIR. The great annual market, a relic of the Mediæval Ages, formerly held at West Smithfield, London. It dates from a charter of 1133 granted by Henry I to his jester, Rahere, who had turned monk and founded the priory of St. Bartholomew. The fair began annually on St. Bartholomew's Day (August 24, O.S.; September 3, N.S.), and lasted 14 days, but in 1691 was curtailed to four days and afterward to three days. It was abolished in 1855. Consult: Morley, *An Historical Account of Bartholomew Fair* (London, 1810); id., *Memoirs of Bartholomew Fair* (London, 1859).

BARTHOLOMEW'S (SAINT) **HOS'PITAL,** Smithfield, London. Originally it formed part of the priory of St. Bartholomew, founded in 1123 by Rahere, the King's minstrel, who was the first prior of the convent of Augustinian Canons, founded by him in Smithfield. At the dissolution of the religious houses it was founded anew by Henry VIII, and the endowment has been subsequently enlarged from various sources, public and private. St. Bartholomew's is one of the three great endowed hospitals of London, the other two being St. Thomas's and Guy's. The hospital contains 675 beds and affords relief to 150,000 patients annually. There is a medical school attached, in which about 400 students are gathered; and a convalescent home accommodating 75 patients.

BARTHOU, bär'tōō', LOUIS (1862–). A French statesman, born at Oloron-Sainte-Marie. He was educated at the Lycée de Pau. He early entered public life and occupied many important positions in the French government. He acted in several cabinets as Minister of Public Works, chief in the cabinet of the Ministry of the Interior, and Minister of the Interior. He was appointed Minister of Justice in the first cabinet organized by President Poincaré in 1913, under the premiership of Aristide Briand. On the fall of this ministry on March 18, 1913 (see FRANCE, *History*), he was appointed Premier and Minister of Public Instruction. This office he resigned in December of the same year. He published *L'action syndicale* (1904) and *The Life of Mirabeau* (1913).

BAR'TIZAN. A small stone closet, thrown out upon corbels over doorways and on other parts of mediæval castles, generally for defense, but sometimes only for convenience to the inmates and defenders. The word, probably a Scotch corruption of *bratticing* or *bretticing*, was not used before Scott.

BARTLESVILLE. A city and the county-seat of Washington Co., Okla., about 125 miles (direct) from Oklahoma City, on the Atchison, Topeka, and Santa Fe and the Missouri, Kansas, and Texas railroads (Map: Oklahoma, F 1). It contains a Carnegie library, county courthouse, Elks Home, a fine city hall, and Silver Lake. Bartlesville is the centre of an important oil region known as the Mid-Continent Oil Field, which produces about 59,000 barrels a day. Washington County itself produces one-third of this amount. There are also zinc ore smelting interests and large deposits of natural gas. The commission form of government was adopted in 1919. Pop., 1900, 235; 1910, 6181; 1920, 14,417.

BARTLET, J(AMES) VERNON (1863–). An English church historian, born at Scarborough. He was educated at Exeter College, Oxford, and after several years as fellow and lecturer he became professor of church history at Mansfield College, Oxford, in 1900. Besides his special contributions to reviews and works of reference, he is author of *Early Church History* (1894); *The Earlier Pauline Epistles* (1901); *The Apostolic Age* (1902); *Studies in the Synoptic Problem* (1911); *Evangelical Christianity* (1912).

BARTLETT, HOMER NEWTON (1845–1920). An American composer, organist, and teacher. He was born at Olive, N. Y., Dec. 28, 1845, and was one of the best known as well as most prolific of modern American musicians, his compositions and arrangements numbering nearly 200. He exhibited unusual precocity and in 1861 began his studies with S. B. Mills, Max Braun, Jacobson, and others. At the same time he commenced his career as a composer and subsequently held various positions in New York City and vicinity as organist, etc. Among his most popular compositions are a *concert polka* for pianoforte; an organ *toccata;* violin and orchestra *concerto;* tenor song, *L'amour;* and a cantata for chorus and orchestra, *The Last Chieftain.* He was particularly successful in his glees and part songs for men's and women's voices.

BARTLETT, JOHN (1820–1905). An American editor and publisher, born at Plymouth, Mass. He became senior member of the firm of Little, Brown & Co., Boston, in 1878. He compiled a well-known and valuable collection of quotations from poets and prose writers, entitled *Bartlett's Familiar Quotations* (1855), which has passed through many editions. He also published in 1894 an exhaustive concordance to Shakespeare.

BARTLETT, JOHN RUSSELL (1805–86). An American bibliographer, lexicographer, and ethnologist. He was born in Providence, R. I.; passed his early life at Kingston, Canada; became a banker in Providence, and later a bookseller in New York, and returned to Providence in 1850. From 1850 to 1853 he served on the commission appointed by President Taylor to fix the boundary between the United States and Mexico, in accordance with the Treaty of Guadaloupe-Hidalgo, and from 1855 to 1872 was Secretary of State for Rhode Island. He was a

voluminous writer, among his publications being *The Progress of Ethnology* (1847); *A Dictionary of Americanisms* (1848), which went into many editions and was long a standard book of reference; *A Personal Narrative of Explorations and Incidents in Texas, New Mexico, California, Sonora, and Chihuahua* (2 vols., 1854); and *Memoirs of Rhode Island Officers in the War of the Rebellion* (1867). In addition he compiled a number of valuable works, chiefly bibliographical, including *Records of the Colony of Rhode Island and the Providence Plantations* (10 vols., 1856–65); *Bibliography of Rhode Island* (1864); *Literature of the Rebellion: A Catalogue of Books and Pamphlets Relating to the Civil War and to Slavery* (1867), and a four-volume *Catalogue of the John Carter Brown Library.*

BARTLETT, Josiah (1729–95). An American statesman, born at Amesbury, Mass. After but slight study he began medical practice at Kingston, N. H., in 1750, and in 1754 successfully introduced Peruvian bark in treatment of *angina maligna.* From 1765 to 1775 he was a member of the State Legislature. In this capacity he frequently criticised the Governor, and it was to check his influence that he received from the royal Governor, Sir John Wentworth, appointments as a magistrate and as commander of a militia regiment, but in 1775 was deprived of both in consequence of his Whig activities. A delegate in 1775 and 1776 to the Continental Congress, he was the first member to vote for the Declaration of Independence, and the first, after the President, to sign the document. He became chief justice of the New Hampshire court of common pleas in 1779, a judge of the State Supreme Court in 1784, and chief justice in 1788. From 1790 to 1793 he was President of New Hampshire, and in the latter year, under the new constitution, was elected Governor. He was the principal founder (1791) of the New Hampshire Medical Society.

BARTLETT, Paul Wayland (1865–). An eminent American sculptor. He was born at New Haven, Conn., the son of Truman H. Bartlett, sculptor and art critic. At 15 he began the study of sculpture in Boston under Frémiet, and afterward he studied with Cavelier in the Ecole des Beaux-Arts. He was at first interested in animal sculpture, his best work of this period being the "Dying Lion." Other examples are in the Jardin des Plants, Paris. He received honorable mention at the Salon in 1887 for the "Bear Tamer," now in the Metropolitan Museum, New York. Among notable works of this sculptor are the "Ghost Dancer" (Pennsylvania Academy) and, in Fairmount Park, Philadelphia, an equestrian statue of General McClellan; the statue of Gen. Joseph Warren in Boston; the equestrian statue of Lafayette, presented by the school children of the United States to France, and now in the square of the Louvre, Paris; statues of Columbus and Michelangelo in the Congressional Library at Washington. Other works are in the public art collections of Philadelphia, Boston, and Chicago, and in the Luxembourg in Paris. Later productions than those already named include a door for the tomb of ex-Senator W. A. Clark in Woodlawn Cemetery, New York; a statue of Benjamin Franklin at Waterbury, Conn.; a marble group for the pediment of the House wing of the National Capitol, and six heroic figures for the central entrance of the New York Public Library. Upon the last two commissions the sculptor was in 1913 still engaged. Bartlett's work for the most part represents a preference for the specific rather than the symbolic in sculpture. His highly modern technique is essentially French in character. He was chosen a corresponding member of the Institut de France and an officer of the Legion of Honor (1908). In 1913 he was appointed director of sculpture in the Glasgow School of Fine Arts.

BARTLETT, Robert Abram (1875–). An American explorer, born at Brigus, Conception Bay, Newfoundland, and educated at the Methodist College at St. John's and at the Halifax Nautical Academy. A qualified master of British ships, he accompanied Robert E. Peary on an Arctic expedition in 1897–98 and in 1905–09 commanded the *Roosevelt* in the voyages leading up to Peary's discovery of the North Pole. On the final dash he accompanied Peary on land as far north as the 88th parallel. Bartlett became a naturalized American citizen in 1911. Early in the summer of 1913 he sailed with the Stefansson Arctic expedition, in command of the Canadian vessel *Karluk;* the object of the expedition was to explore the regions bordering on the North Pole and to define the limits of the new continent believed to exist there. In December of the same year Arctic mariners returned to Seattle with the news that Bartlett's ship had been carried far out into the Arctic Ocean during September and had not since been heard from.

BARTLETT, Samuel Colcord (1817–98). An American clergyman and educator, born at Salisbury, N. H. He graduated at Dartmouth College in 1836 and at Andover Theological Seminary in 1842; was ordained to the ministry in 1843, and for the next three years was pastor of the Congregational Church of Monson, Mass. He was professor of intellectual philosophy at Western Reserve College (1846–52); pastor of the Franklin Street Congregational Church, Manchester, N. H. (1852–57) and of the New England Church, Chicago (1857–58); and was professor of biblical literature in the Chicago Theological Seminary (1858–77). From 1877 to 1892 he was president of Dartmouth College, which during his administration was greatly expanded as to curriculum, buildings, and funds. He received the degree of D.D. from Dartmouth and that of LL.D. from Dartmouth and Princeton. A distinguished biblical scholar, he published, in addition to contributions to the *Bibliotheca Sacra,* the *Princeton Review,* and other periodicals: *Life and Death Eternal* (1866); *From Egypt to Palestine* (1879); *Sources of History in the Pentateuch* (1883); *The Veracity of the Hexateuch* (1897).

BARTLETT, Willard (1846–). An American jurist, born at Uxbridge, Mass. He received his education at New York and Columbia universities. He practiced law from 1869 to 1883, during part of this time acting also as dramatic critic of the New York *Sun,* was a justice of the Supreme Court of New York in the Second Judicial District from 1884 to 1906, and in the latter year became associate judge of the court of appeals. He was appointed professor of medical jurisprudence at the Long Island College Hospital in 1898. In 1913 he was elected chief judge of the court of appeals of New York State.

BARTLETT, William Francis (1840–76). An American soldier. He was born at Haverhill,

Mass., and studied at Harvard for three years, but left college in 1861 to join the Federal army. He received a captain's commission in August, served in the battle of Ball's Bluff, and at the siege of Yorktown received a wound which necessitated the amputation of his leg. By the spring of 1862 he had recovered sufficiently to graduate with his class at Harvard. He organized the Forty-ninth Massachusetts Volunteers in September, 1862, and served as colonel in General Banks's Louisiana expedition. He was wounded at Port Hudson and again in the Wilderness campaign, was taken prisoner at the explosion of the Petersburg mine, was confined for a time in Libby Prison, and after his release was placed in command of the First Division of the Ninth Army Corps. In June, 1864, he was raised to the rank of brigadier general of volunteers, and in March, 1865, was brevetted major general of volunteers for "gallant and meritorious services during the war." As a soldier he was noted for his intrepidity, coolness, and daring in action. After the war, until the time of his death, he was engaged in business in Richmond, Va., and Pittsfield, Mass. Consult Palfrey, *Memoir of William Francis Bartlett* (Boston, 1878).

BARTLETT, William Henry (1809–54). An English topographical draughtsman. He was born in London, and began his career as an assistant to John Britton, the architect, for whose *Cathedral Antiquities of England* (1814–32) he furnished numerous sketches. A series of volumes, containing more than 1000 of his drawings made during extended travel in Europe and the Orient, were published by Dr. Beattie, his companion on several of these voyages, and others. Between the years 1836 and 1852 Bartlett made four voyages to the United States and Canada, the fruits of which appeared in *American Scenery* (1840), and *Canadian Scenery* (1842), with text by N. P. Willis. Besides his frequent contributions to works of art, he published the well-known books: *Walks about Jerusalem* (1844); *Forty Days in the Desert* (1848); *The Nile Boat: or Glimpses of Egypt* (1849); *Footsteps of Our Lord and His Apostles in Syria, Greece, and Italy* (1851); *The Pilgrim Fathers* (1853); *Jerusalem Revisited* (1855).

BARTLETT, William Holmes Chambers (1809–93). An American soldier and scientist, born in Lancaster Co., Pa., and educated at West Point, where he graduated in 1826. Being assigned to the engineers, he served as assistant professor at West Point from 1827 to 1829, and again from 1834 to 1836 as acting professor of natural and experimental philosophy. From 1828 to 1832 he was engaged in construction work at Fort Monroe, and from 1832 to 1834 was assistant to the chief engineer at Washington, D. C. In 1836 he resigned his lieutenancy in the army and became full professor of natural philosophy at West Point, which office he held until he retired from active service in 1871. He was an original member of the National Academy of Sciences. His works include: *Treatise on Optics* (1839); *Synthetical Mechanics* (1850–58); *Acoustics and Optics* (1825–59); *Analytical Mechanics* (1853–59); *Spherical Astronomy* (1855–58).

BARTOL, Cyrus Augustus (1813–1900). A Unitarian minister, born at Freeport, Me. He graduated at Bowdoin College, 1832, and at the Cambridge Divinity School, 1835, and from 1837, for 50 years, was a pastor in Boston. His works include *Radical Problems* (1872), *The Rising Faith* (1875), and *Principles and Portraits* (1880).

BARTOLI, bär'tô-lē, Adolfo (1833–94). An Italian scholar, born at Fivizzano. He at first studied law, but afterward became associate editor of the *Archivio storico italiano* (1856–59), principal of the gymnasium in Alessandria, director of the naval academies at Leghorn, principal of *licei* at Piacenza and Venice, and professor at the *Instituto degli studi superiori* at Florence (1874). While at Venice he was one of the founders of the periodical *Archivio Veneto* (1871–) and fostered the project of publishing the monumental *Diaries* of Marin Sanudo. Besides his valuable editions of the earlier Italian authors he published several original works, among which may be mentioned: *I viaggi di Marco Polo* (1859); *I primi due secoli della letteratura italiana* (1870–80); *I precursori del Boccaccio* (1876); *Storia della letteratura italiana*, vols. i–viii (1878–89), and *Scenari inediti della commedia dell' arte* (1880), all pioneer works in the modern school of historical criticism.

BARTOLI, Daniello (1608–85). A learned Italian Jesuit. He was born at Ferrara and died at Rome. He was for many years rector of the Jesuit College at Rome, but is best known as author of an *Istoria dell Compagnia di Gesù* ('History of the Jesuits'), vols. i–iii covering the history of the order in Africa, China, and other parts of the East, and vols. iv–v, England and Italy. He also wrote numerous biographies, books on religion and morals, and on physical phenomena. His works have no longer any scientific or historical value, but they are highly interesting in style, wherein he is often compared with D'Annunzio. His book, *Il torto e il diritto del non si può*, is a distinct contribution to the theory of æsthetics. Consult Trabalza, *Storia della gramatica italiana* (Padova, 1907, chap. xi), Morandi, *Antologia della critica*, p. 627 (Città di Castello, 1895), and Boero, *Lettere edite ed inedite di D. B.* (Bologna, 1865). His complete works appeared at Turin (34 vols., 1823–44).

BARTOLINI, bär'tô-lē'nē, Lorenzo (1777–1850). An Italian sculptor. He was born at Vernio, near Savigniana (Tuscany), the son of a smith. He labored at Florence as alabaster carver and went as such to Paris, where he studied under Lemot. With a bas-relief of "Cleobis and Biton" he obtained a prize at the Institute, which brought him commissions for a relief for the Vendôme Column and a bust of Napoleon for the Institute. In 1808 the Emperor sent him to Carrara to establish there a school of sculpture. Bartolini was, after Canova, the most celebrated of Italian sculptors of the Napoleonic era. After his patron's fall he was appointed professor of sculpture in the Florentine Academy. Although his work had hitherto been in the classical style of the First Empire, he now sought to reform this by the application of the realistic principles of the fifteenth-century Florentines. Their influence is evident in his later works, which thus form a transition from classicism to modern realism. Among the principal are the statues of "Charity," in the Pitti Palace, Macchiavelli in the portico of the Uffizi, and three important tombs in Santa Croce, Florence; "Neoptolemus Casting Astyanax from the Walls of Troy," the masterpiece of his classic period, and "Faith," often reproduced, now in the Poldi Pezzoli Museum,

Milan; two colossal statues of Napoleon, now at Bastia (Corsica) and in the United States, and many busts, including those of his friend Ingrès, Madame de Staël, Byron, Rossini, Cherubini, and Thiers.

BARTOLOMMEO, bär'tô-lŏm-mā'ô, **Fra** (1472–1517). One of the principal painters of the Florentine Renaissance. The son of a mule driver from Genoa, he was born, March 14, 1472, near the gate of San Piero Gattolino, whence before becoming a friar, he was called Baccio (Bartolommeo) della Porta ('gate'). On the advice of Benedetto da Majano, who discovered his precious talent, he was placed in the atelier of Cosimo Roselli. There he came into contact with Piero di Cosimo, who, according to Berenson, was his master, and formed his lifelong friendship with Albertinelli (q.v.). With all the fervor of a pious nature he embraced the cause of Savonarola; of this devotion the well-known portrait of the reformer, long cherished by the brethren of San Marco, but now in the Academy, bears eloquent testimony. At the celebrated "Burning of Vanities" ordered by the Prophet, he destroyed all his pictures not of a strictly religious character. To the same period belongs his fresco of the "Last Judgment" (in Santa Maria Nuova, finished by Albertinelli, now in the Uffizi), when Bartolommeo entered the cloister. For after Savonarola's death he renounced painting and in 1500 joined the Dominicans at San Marco. Yielding to the persuasion of his prior, the learned Sante Pagnani, he took up the brush again in 1504, and created the beautiful "Apparition of the Virgin to St. Bernard" (Florentine Academy). He was much influenced by the works of Leonardo and by the young Raphael, whom he, in turn, influenced to a still greater degree. A visit to Venice in 1508 was epoch making for his art. The influence of Bellini and Giorgione transformed him into one of the chief colorists of the Florentine school. From 1509 to 1512 he was again associated with Albertinelli; among their joint works are the "Madonna and Saints" in the Pitti and the "Assumption" in Berlin, but the fine "Marriage of St. Catharine" in the Louvre is by Bartolommeo alone. On a brief visit to Rome (1514) his art was transformed by the Sistine frescoes of Michelangelo, whose colossal forms he thenceforth imitated. Like his friend Albertinelli, he was stricken with malaria, to which he finally succumbed at Pian di Mugnone, a convent house of the Dominican Order, Oct. 31, 1517. After his return to Florence occurred the well-known episode of his "St. Sebastian," the nudity of which proved so disturbing to the good brethren of San Marco as to cause its removal; it is now in private possession at Pézenas. The art of Fra Bartolommeo's early period may be best studied in his admirable drawings, of which a great number survive in the collection of prints of the Uffizi, the Louvre, Munich, British Museum, and that of Weimar. They show infinite diligence and a very remarkable talent for composition. Paintings of the early period are scarce; but an excellent example is the fresco of "Christ at Emmaus" (1507) in San Marco. The period following his visit to Venice is that of his finest paintings. Among the best are: "Madonna with Saints John and Stephen" (1509), and "Saints Mary Magdalen and Catherine Adoring God" (1509), both in the cathedral of Lucca; the "Madonna with Six Saints" (1509) in San Marco, Florence; the "Betrothal of St. Catherine" (1511) in the Louvre, and another in the Pitti Palace, both showing the influence of Leonardo in composition. Under the influence of Michelangelo his color deteriorated and the figures became empty of their former spiritual content; although the best are still masterpieces. They include the "Madonna della Misericordia" (1515) at Lucca, the well-known "St. Mark" (1517), "Salvator Mundi" (1514), and "Pietà," all in the Pitti Palace. He was the first to portray with highest excellence that majestic combination of character, form, and strict architectural composition so characteristic of the High Renaissance. He excelled especially in draperies and was among the first to use the lay figure, which he is said to have invented. He was one of the greatest masters of composition Italy ever produced. Although the color in his paintings has suffered much through his use of dark shadows, it is rich and delicate and belongs to the very best achieved by Florentine painters. Consult the biographies by Frantz (Regensburg, 1879), Scott (London, 1881), Gruyer (Paris, 1886), and Knapp (Halle, 1903).

BARTOLOZZI, bär'tô-lôt'sê, **Francesco** (1727–1815). An Italian engraver, who practiced chiefly in England. He was born at Florence, the son of a goldsmith, and studied at the Florentine Academy, excelling especially in drawing and anatomy. Among his fellow pupils was his lifelong friend and future associate Giovanni Battista Cipriani (q.v.). After studying the antique at Rome he was apprenticed for six years to the engraver Wagner at Venice. He then practiced at Rome, engraving Domenichino's "Life of St. Nilus" and other seventeenth-century masters, and more successfully at Venice, where he formed a brilliant style well adapted to the rendition of seventeenth-century Venetian masters, especially Tiepolo. In 1764, on the invitation of Dalton, librarian to George III, he removed to London, where he was welcomed by Cipriani. He was appointed engraver to the King and was one of the original members of the Royal Academy in 1768. In Dalton's employ he completed a fine series of etchings of Guercino's drawings, probably his best etched work. He is especially known for his prolific work in the "red chalk manner of engraving," so called because of its resemblance to red chalk drawings, but in reality a kind of stippling (q.v.). Although he did not, as reputed, invent this process, he greatly improved it and made it so popular that it almost replaced other varieties of engraving in Great Britain. In this manner he reproduced many paintings, mostly classical subjects by Angelica Kauffmann and his friend Cipriani, and also engraved his celebrated *Imitations of the Original Drawings by Hans Holbein in the Collection of His Majesty*, 1792, which were tinted as well as stippled. Of greater importance are his line engravings, such as "Clytie," after Annibale Carracci, Carlo Dolci's "Mater Dolorosa," and a number of plates for Boydell's Shakespeare. In 1802 Bartolozzi was made head of the Royal Academy at Lisbon, where he remained in charge of the school of engraving until his death. He was an artist of great facility and diligence, but his work was often superficial, owing to its great volume and the frequent assistance of pupils. But in his best work he is an engraver of high order, whose prints are still much prized. He formed a large and important school in London, which continued his work after his departure. Con-

sult Tuer, *Bartolozzi and his Works* (London, 1882); Brinton, *Bartolozzi and his Pupils in England* (ib., 1904); "Bartolozzi and Other Stipple Engravers" in *Great Engravers Series* (ib., 1906); Bailly, *Bartolozzi* (ib., 1907).

BARTOLUS, Osso, or **BARTOLUS A SAXOFERRATO** (1314–57). A celebrated Italian jurist, professor of civil law in the University of Perugia, and the most famous master of the dialectical school of jurists, the Postglossators, also called, after him, the Bartolists. His influence on the progress of legal science was considerable, and he won great reputation by his lectures and writings; among the latter are treatises *On Procedure* and *On Evidence* and a *Commentary on the Code of Justinian* (1588–89). His magnificent monument in the church of San Francisco at Perugia bears simply his name. His complete works were published in 1596. Consult John Neville Figgis, *Bartolus and the Development of European Political Ideas* (London, 1905).

BARTON, bär'ton, Andrew (?–1511). A Scottish naval commander, who in 1506 completely cleared the coast of Scotland of the Flemish pirates who had infested it. He is said, on this occasion, to have packed the heads of the slain in three barrels, which he sent to King James in evidence of the effectual manner with which he had executed his task. In 1508 he was sent to the assistance of Denmark in the war with Lübeck, but somewhat later was accused of piracy, and after a desperate naval battle was killed in an encounter with Sir Thomas and Sir Edward Howard, who had been sent out by Henry VIII to capture him. His ship, *The Lion*, was brought as a trophy to the Thames, and became the second man-of-war in the English navy; the first vessel of this kind to be constructed having been the *Great Harry* (1504). The defeat of the celebrated mariner is commemorated in the old ballad of "Sir Andrew Barton."

BARTON, Benjamin Smith (1766–1815). An American naturalist. He was born at Lancaster, Pa.; studied at Philadelphia, London, Edinburgh, and Göttingen, and was professor of natural history, botany, and materia medica in Philadelphia College, now the University of Pennsylvania. Besides many papers in the philosophical and medical journals, he published *Observation on Some Parts of Natural History* (1787), *New Views of the Origin of the Tribes of America* (1797), *Elements of Botany* (1803), *Collections toward a Materia Medica of the United States* (1819), and other medical works.

BARTON, Bernard (1784–1849). An English poet, sometimes called "the Quaker Poet." He was born at Carlisle, Jan. 31, 1784. In 1810 he became clerk to a banking house at Woodbridge, where he remained till his death. His first volume of verse, *Metrical Effusions* (1812), brought him into correspondence with Southey. *Poems by an Amateur* (1818) and *Poems* (1820) increased his reputation and gained him the friendship of Lamb. *Napoleon and Other Poems* appeared in 1822 and was followed within five years by several other productions. All the poems of Barton are pervaded by pious sentiment, and some passages display much natural tenderness and religious fervor; but he is, on the whole, rather a fluent, pleasant versifier than a poet. Some years before his death he received, through Sir Robert Peel, what was at that time regarded in England as a large pension, of £100. Among his later works are *Fisher's Juvenile Scrap-book* (1836 ff.), *The Reliquary* (1836), and *Household Verses* (1845). He died Feb. 19, 1849. Consult Barton, *Poems and Letters*, ed. L. Barton, with a memoir by E. FitzGerald (London, 1849), and Lucas, *Bernard Barton and his Friends* (London, 1894).

BARTON, Clara (1821–1912). An American philanthropist. She was born at Oxford, Mass., was a teacher in early life, and the founder of various free schools in New Jersey. In 1854 she had a clerkship in Washington, but resigned at the beginning of the Civil War and went into hospital service. After the war she originated and carried on, at her own cost, a systematic search for missing soldiers. Going to Europe, she assisted in establishing hopitals in the Franco-German War, followed the German army, and was honored with the Gold Cross of Baden and the Iron Cross of Germany. By her efforts the American Red Cross Society was formed, 1881, and she was its president until 1904. In 1905 she became president of the National First Aid Association. In 1883 she was appointed superintendent and steward of the reformatory prison for women at Sherborn, Mass. In 1884 she represented the United States at the Red Cross Conference and at the International Peace Convention in Geneva. It was her suggestion that led to a change of the rules of the Red Cross Society permitting relief in other calamities than that of war. She superintended relief work in the yellow fever pestilence in Florida (1887), the Johnstown flood (1889), the Russian famine (1891), among the Armenians (1896), in the Spanish-American War (1898), and in the Anglo-Boer War (1899–1902). The last work of which she took personal direction was the relief of sufferers from the flood at Galveston in 1900. She wrote a *History of the Red Cross* (1883), *History of the Red Cross in Peace and War* (1898), *Story of the Red Cross* (1904), *Story of my Childhood* (1907). Consult Adams and Foster, "Clara Barton," in *Heroines of Modern Progress* (1913).

BARTON, Sir Edmund (1849–). An Australian statesman. He was born at Glebe, a suburb of Sydney, New South Wales, studied law, and was called to the bar in 1871. He was long a leading figure in the legislative council and assembly and was Speaker and Attorney-General. He was a member of the Federal Convention of 1891 and was senior representative for New South Wales at the Convention of 1897–98. Upon the creation of the Australian Commonwealth, for which he had ardently labored, he became Prime Minister and Minister for Foreign Affairs in the first Federal cabinet (1901), retiring in 1903 to become a member of the Federal High Court.

BARTON, Elizabeth (1500?–34). An English impostor, commonly known as the "Holy Maid," or "Nun of Kent." She was born, according to her statement, in 1506. About 1525 she was employed as a tavern servant at Aldington, where she developed religious mania after a severe nervous illness. In prolonged trances she "told wondrously things done in other places, whilst she was neither herself present nor yet heard no report thereof." The fame of these revelations spread, and Archbishop Warham sent two monks to examine her. One of these, Edward Bocking, or Bockling, saw in her abnormal faculties an opportunity for increasing the pres-

tige of the Roman Catholic religion. He influenced and instructed her, and by assumed "prophecies" she deceived persons of all ranks and men of intellect. In 1527 she became a nun at Canterbury and in 1532 inveighed against Henry VIII's intention to divorce Queen Catharine, predicting his death within a month of his remarriage. This excited the King's wrath, and she lost popular confidence by the non-fulfillment of her prophecy. She was arrested and ultimately confessed that her visions and sayings were "feigned of her own imagination only, to satisfy the minds of those which resorted to her and to obtain worldly praise." With Bocking she was executed at Tyburn, April 20, 1534. Consult Froude, *History of England*.

BARTON, George Aaron (1859–). An American clergyman and Orientalist, born at East Farnham, province of Quebec. He was educated at Haverford College and Harvard University. He became a minister of the Society of Friends in 1879, professor of Biblical literature and Semitic languages at Bryn Mawr College in 1891, and in 1902 director of the American School for Oriental Study and Research in Palestine. Among his publications are: *A Sketch of Semitic Origins, Social and Religious* (1902); *The Haverford Library Collection of Cuneiform Tablets, or Documents from the Temple Archives of Telloh* (2 parts, 1905–09); *The Heart of the Christian Message* (1910; new ed. revised, 1912); "Commentary on Job" in the *Bible for the Home and School* (1911).

BARTON, William (1748–1831). An American soldier, born in Rhode Island. On the night of July 9, 1777, he led a small party across Narragansett Bay, eluded three British war vessels, and near Newport captured the English General Prescott. For this act Congress gave him a sword and a colonel's commission.

BARTON, William Eleazar (1861–). An American clergyman and writer, born at Sublette, Ill. He graduated from Berea College in 1885, and from Oberlin Theological Seminary in 1890. Ordained to the Congregational ministry, he first filled several pastorates in Ohio and Tennessee, then served the Shawmut Congregational Church of Boston in 1893–99, and afterward the First Church of Oak Park, Ill. The Chicago Theological Seminary appointed him in 1905 lecturer on applied practical theology, and in 1911 lecturer on ecclesiastical law. He was also associate editor of *Bibliotheca Sacra*, editor of the pastor's department of *The Advance*, and a member of *The Youth's Companion* staff. A full list of his books would comprise over 40 titles. Among these are: *Life in the Hills of Kentucky* (1889); *A Hero in Homespun* (1897); *The Psalms and their Story* (1898); *The Old World in the New Century* (1902); *Jesus, His Life and the Scenes of His Ministry* (1904); *The History and the Religion of the Samaritans* (1906); *Bible Classics* (1911); *The Young Folks' Bible Library* (editor, 8 vols., 1911); *Day by Day with Jesus* (1913).

BARTON, William Paul Crillon (1786–1856). An American botanist. He was born in Pennsylvania, graduated at Princeton in 1805, and received the degree of M.D. from the University of Pennsylvania (1808). He organized the United States naval bureau of medicine and surgery, succeeded his uncle as professor of botany in the University of Pennsylvania, was for several years professor of materia medica and botany in Jefferson Medical College, and at his death was senior surgeon of the navy. He published *Vegetable Materia Medica of the United States* (1817–25); *Compendium Floræ Philadelphicæ* (2 vols., 1818); *Flora of North America* (3 vols., 1821–23).

BARTOW, bär'tō. A city and the county-seat of Polk Co., Fla., 43 miles by rail east of Tampa, on the Atlantic Coast Line and the Seaboard Air Line railroads (Map: Florida, E 4). It is the seat of the Summerlin Institute, and contains a Carnegie library, county jail, opera house, and a fine county courthouse. The leading industries are phosphate production and fruit cultivation, and there are marble works, a planing and shingle mill, cigar, wagon, and concrete factories, and bottling works. The electric light plant and water works are owned by the city. Pop., 1890, 1386; 1900, 1983; 1910, 2662.

BAR'TRAM, John (1699–1777). The first American botanist of eminence. He was born of Quaker parentage, near Darby, Pa. He secured an appointment as American botanist to George III, and Linnæus, with whom he corresponded, pronounced him "the greatest natural botanist in the world." For many years he carried on an extensive correspondence with the most eminent of European naturalists, to whom he sent large plant collections in exchange for books, and at his home near Philadelphia he received as his guests many foreigners attracted thither by his reputation for learning and hospitality. In 1728 he established at Kingsessing, on the Schuylkill, the first botanical garden in America. In addition to several papers which he contributed to the *Transactions of the Philosophical Society*, he wrote a small but very interesting book, entitled *Observations on the Inhabitants, Soil, Divers Productions, Animals, etc., Made by John Bartram in His Travels from Pennsylvania to Onondaga, Oswego, and the Lake Ontario* (1751). His *Journal Kept Upon a Journey from Saint Augustine up the Saint Johns* was published in William Stork's *Description of East Florida* (1769). Consult William Darlington, *Memorials of John Bartram and Humphrey Marshall* (Philadelphia, 1849).

BARTRAM, William (1739–1823). An American botanist and ornithologist. Son of John Bartram. He was born at Kingsessing, Pa., Feb. 9, 1739, and died there, July 22, 1823. He prepared the most complete list of American birds before Alexander Wilson and wrote *Travels through North and South Carolina, Georgia, and East and West Florida* (Philadelphia, 1791).

BARTSCH, bärtsh, Adam von (1757–1821). An eminent Austrian engraver and writer on art. He was born in Vienna, where he studied engraving under Schmutzer and was appointed custodian of the Imperial collection of engravings. He practiced both as an engraver and an etcher and produced 505 plates, partly of his own invention, partly after the original designs of famous masters. His chief title to fame consists in the authorship of *Le Peintre-graveur* (21 vols., 1802–21; new ed., 1866–70), a critical catalogue of engravings of still undisputed authority. In this work he laid the foundations of the modern science of engraving. Of great importance also are the reproductions of Dürer's engravings, executed by him and under his direction and published at Vienna (1796–99).

BARTSCH, KARL FRIEDRICH ADOLF KONRAD (1832–88). A German philologist. He was born at Sprottau, Silesia, Feb. 25, 1832. From 1858 to 1871 he was professor at Rostock, where he established the first Germanic Seminary in Germany. From 1871 until his death he was head of the department of German and Romance philology at the University of Heidelberg. In 1868 he succeeded Pfeiffer as editor of *Germania*. As a scholar, Bartsch was distinguished by versatility and industry. His attention was divided between Middle High German and Provençal poetry, in both of which he edited numerous texts, accompanied by exhaustive investigations of metre, literary relations, etc. Probably his most important single contribution is his study of the Nibelungenlied (1865), which was followed by several editions of the poem and a translation into modern German (1867). His study of the early literatures of Germany and France enabled him to discover many important connections between the two. Among his many other works may be mentioned introductions to the study of Old French and Provençal; *The Song of Roland* (1874); a translation of Burns (1865), of Dante's *Divine Comedy* (1867), and of old French folk songs (1882). Bartsch's latest work was the preparation of a catalogue of the Old German MSS. of the University Library in Heidelberg (1886). Bartsch was an original poet as well as a scholar and in 1874 published a volume of lyrics. While much of his work is now antiquated, he will always be remembered as one of the most brilliant scholars and teachers that Germany has ever possessed. For biography, bibliography, and criticism, consult *Germania*, vol. xxxiii (1888).

BARTTELOT, bär'tlō', EDMUND MUSGRAVE (1859–88). An English officer. He served in the Indian army and participated in the Afghan campaign and afterward received an appointment as major in the Egyptian army, in which capacity he joined the Stanley Expedition of 1887 for the relief of Emin Pasha. On June 11, 1888, after vainly waiting for the carriers promised by Tippoo Tib and notwithstanding the sickness and famine in his camp, Barttelot began his journey into the interior. In a mutiny among his followers, within a week of his departure, he was shot by one of his men. The accusation of barbarous cruelty, afterward brought against him by Stanley, was refuted by Barttelot's brother, Maj. Walter G. B. Barttelot, in the volume entitled *The Life of Edmund Musgrave Barttelot* (London, 1890).

BARU, bä-rōō' (Malay). See GOMUTI.

BARUCH, bā'rŭk (Heb. the blessed; cf. *Benedict*). The son of Neriah, and member of an illustrious family (cf. Jer. li. 59). He was the person to whom the prophet Jeremiah dictated some of his oracles (Jer. xxxvi. 4 seq.), and who also read Jeremiah's prophecies before the people who were present in the chamber of Gemariah in the Temple (ib., xxxvi. 10). During the siege of Jerusalem by Nebuchadnezzar, both he and the prophet were by their own countrymen imprisoned on suspicion of aiding the Chaldæans (Jer. xxxvii. 13; xliii. 3; Josephus, *Ant.* x, 9, 1), but obtained from the conqueror freedom and permission to choose their own residence. Baruch remained for some time in Palestine; but when the people, in spite of Jeremiah's remonstrances, went down to Egypt, the prophet, as well as Baruch, accompanied them (Jer. xliii. 6; Josephus, *Ant.* x, 9, 6). His subsequent history is unknown.

BARUCH, BOOKS OF. There are several works claiming to come from the pen of Jeremiah's secretary, mentioned in Jer. xxxvi. 4 ff.; xlv. 1. The most important among them are:

1. *The Book of Baruch*, which has a place in the Greek Bible between Jeremiah and Lamentations. This is one of the deutero-canonical books counted by the Protestants and the Greek Orthodox church in Russia as apocryphal. Besides the Greek text found in Codd. Vaticanus, Alexandrinus, Marchalianus, Venetus, and at least 20 minuscles, we possess Syriac, Old Latin, Coptic, Ethiopic, Arabic, and Armenian versions. The original was written in Hebrew. Origen supplied it throughout with asterisks and obeli according to the Hexaplaric Syriac. (See BIBLE.) Codex Ambrosianus of the Syriac text has in some places the remark "This is not in the Hebrew" (i. 17; ii. 3). After an introduction (i. 114) describing the origin and purpose of the book, the first part (i. 19–iii. 8) consists of a confession of the sins of the people which led to the captivity and a prayer for the restoration of national independence; the second part (iii. 9–iv. 4) contains a eulogy of wisdom, synonymous with the law, in the style of Proverbs viii and the later "wisdom" literature; and the third part (iv. 5–v. 9) offers consolation to the exiles. Some scholars hold that these sections come from different hands, but there is not enough evidence to make the documentary analysis convincing. According to i. 2 Baruch wrote the book in the fifth year, by which probably 581 B.C. is meant, the fifth year from the capture of Jerusalem by Naburzaradan. An appendix to the Book of Jeremiah, drawn apparently from an old and reliable source, informs us (Jer. lii. 30) that there was a second deportation of exiles in 581. This seems to be the occasion the author of the Book of Baruch has in mind. He assumes that the final destruction of Jerusalem took place then, and that Baruch was carried away to Babylon, where he read the words of the book to Jehoiakim and the nobles, with the effect that a collection was taken and sent to Joachim, the high priest, together with the temple vessels that were returned, and a counsel to the people of Jerusalem to offer sacrifices on the altar there and to pray for Nebuchadnezzar and his son. But this exhortation to pray "for the life of Nebuchadnezzar and for the life of his son Balthasar" (i. 12) clearly shows that Baruch cannot have written the book. Balthasar is the Aramaic form of Belshazzar (Dan. v. 1), who is undoubtedly identical with Bilsharusur, the son of Nabuna'id, the last native King of Babylon, and not of Nebuchadnezzar. (See BELSHAZZAR.) Baruch would also have written this king's name Nebuchadrezzar, and not Nebuchadnezzar, as was done in later times. The influence of the Book of Daniel, or at least the legend which meets us for the first time in this book, written in 165 B.C., is manifest, as is that of Isaiah xl.–lv. and Job (see ISAIAH and JOB). If a date subsequent to 165 B.C. is therefore probable, it is not necessary to suppose that Baruch iv., v. are quotations from the Psalter of Solomon (c.48 B.C.), as the Psalmist may have quoted Baruch. Many scholars maintain that the reference to Nebuchadnezzar and Balthasar is an evidence that the author had in mind Vespasian and his son Titus and would place the composition of the book after 70 A.D.

But if it is assumed that the author reflects upon the historic situation at his own time and counsels exiled Jews to send gifts to Jerusalem, to offer sacrifices upon the altar there, and to pray for the Roman emperors, it is difficult to render such advice plausible in the circumstances following the fall of the city in 70 A.D. It seems more probable that he lived in the second century B.C., and simply placed himself back, with more or less success, into the historic situation of Baruch, expressing the feelings that would be natural to him. Consult Reusch, *Erklärung des Buches Baruch* (1853); Ewald, *Die Propheten des alten Bundes* (1868); Kneucker, *Das Buch Baruch* (1879); Gifford, in *Speaker's Commentary* (1888); Cornely, *Introductio in V. T. Sacros libros*, ii. 2 (1897); Marshall, in Hastings, *Dictionary of the Bible* (1898); Bevan, in Cheyne's *Encyclopædia Biblica* (1890); Rothstein, in Kautzsch, *Pseudepigraphen d. A. T.* (1900); Toy, in *The Jewish Encyclopædia* (1902); Schneedorfer, *Das Buch Jeremias, des Propheten Klagelieder, und das Buch Baruch* (1903); Whitehouse, in Charles, *Apocrypha and Pseudepigrapha of the Old Testament*, vol. i (1913).

2. *The Syriac Apocalypse of Baruch.* An apocryphal book extant as a whole only in a Syriac text. Chapters lxxviii–lxxxvi were already printed in the Paris Polyglot (1629–45); the rest of the work was not known until Ceriani published a Latin translation in 1866, and then the Syriac text in Codex Ambrosianus in 1871, and, in photolithographic reproduction, in 1883. A fragment of the Greek version was published by Grenfell and Hunt in *The Oxyrhynchus Papyri*, iii. (1903). It was probably written originally in Hebrew, as Charles and Wellhausen have shown, and then translated into Greek, from which our Syriac text is a version. The book claims to contain revelations that came to Baruch in the twenty-fifth year of Jeconiah, by which this king's lifetime is evidently meant, consequently in 589, and also after the destruction of the city. Baruch, however, cannot have written this book; for the author is aware of a later destruction of Zion (xxxii. 3), forgets that Baruch was still in the land (lxxxv. 2 f.), is familiar with the doctrines of a heavenly Jerusalem (iv. 2 ff.), a Gehenna (lxxxv. 13), a Messiah (xxix. 3; xxx. 1 ff.; xxxix. 7; lxxii. 2), and a resurrection from the dead (xlix.–li.), and reveals in other ways that he lived in a later time. His doctrinal attitude is that of the Pharisaic party, and salvation through obedience to the law is strongly emphasized; but there is no evidence of acquaintance with the teachings of Paul or conscious polemics against them. The author seems to be familiar with Daniel and Enoch i.–xxxvi., but it cannot be shown that he had before him the Apocalypse of Ezra. (See EZRA, BOOKS OF.) He probably wrote between 70 and 90 A.D. Kabisch, De Faye, and Charles have been struck with the sad tone that prevails in some sections and the cheerful look into the future that characterizes others and have assigned these to different authors. Charles has also noticed the absence of references to the Messiah, the resurrection, or the restoration of Israel, where he would expect it, and has suggested that there were at least seven authors living at different times before and after 70 A.D. whose works were drawn upon in the compilation of this apocalypse. These arguments, however, do not appear valid to all scholars. That an author living after the terrible experience of 70 A.D., writing in the name of one who had seen the destruction of Jerusalem in 586 B.C., should lament, sing elegies and look with anxiety for the signs of the time, is not extraordinary and is not to be ascribed to pessimism; nor is it inconsistent in the same man to rise to fervid hopes for the future, and the argument from silence is especially precarious in a case like this. The Epistle to the Nine and a Half Tribes (lxxviii.–lxxxvi.) has the appearance of being a later addition; the Epistle to the Exiles in Babylon referred to in lxxvii. 12, 17, 19 may once have formed a part of the book, though now lost; and there are probably some interpolations. But in the main the book is likely to be the work of one author. In the visions and the prophecies as well as in the laments there are many passages that show true poetic inspiration. Consult: Ceriani, *Monumenta sacra et profana*, v. ii (1866); Langen, *De Apocalypsi Baruch* (1867); Hilgenfeld, *Messias Judæorum* (1869); Rosenthal, *Vier apocryphische Bücher* (1885); Kabisch, in *Jahrbücher für protestantische Theologie* (1891); De Faye, *Les Apocalypses juives* (1892); Ginzberg, in *The Jewish Encyclopædia* (1902); Wellhausen, *Skizzen und Vorabeiten*, vi (1899); Ryssel, in Kautzsch, *Apokryphen und Pseudepigraphen des A. T.* (1900); Charles, *Apocalypse of Baruch* (1896); id., in *Apocrypha and Pseudepigrapha of the Old Testament* (1913).

3. *The Greek Apocalypse of Baruch.* An apocryphal book referred to by Origen (*De Principiis*, ii. 3, 6), discovered by Butler in the British Museum in 1896, and published by James in 1897. A shorter Slavonic version had already been published by Novakovic in 1886. Both the Greek and the Slavonic manuscripts come from the sixteenth century. It claims to be a revelation given to Baruch when he sat weeping over the captivity of Jerusalem near the beautiful gates where the Holy of Holies lay. He is said to have been carried by the angel Phanuel through the heavens on a 185 days' journey. Originally there was probably an account of all the seven heavens, referred to in Testaments of the Twelve Patriarchs, Slavonic Enoch, and Ascension of Isaiah. The Slavonic version mentions only two heavens. Of special interest is the description of the bird Phœnix which may show Indian influence, as well as the rôle assigned to the angel Michael as the mediator between God and men and the holder of "the keys of the kingdom of heaven." The author seems to be acquainted with Slavonic Enoch, written in the second half of the first century A.D., and probably wrote in Greek. There is a long Christian interpolation in chap. iv., occasioned by the remark in the text that the fruit of the vine caused the fall of Adam, and intended to reconcile the harmfulness of wine with its use in the Eucharist, and also a quotation from Matt. xxv. 20 in xv. 4. In all probability the book was written toward the end of the second century A.D. Consult: Stojan Novakovic, in *Starine*, vol. xviii (1886); Bonwetsch, in *Nachrichten der K. Gesellschaft der Wissenschaften zu Göttingen* (1896); James, in *Texts and Studies*, vol. v (Cambridge, 1897), giving the Greek text; Morfill, ib., giving an English translation of the Slavonic text; Ryssel, in Kautzsch, *Apokryphen und Pseudepigraphen d. A. T.* (1900); Ginzberg,

in the *Jewish Encyclopædia* (1902); Hughes, in Charles, *Apocrypha and Pseudepigrapha of the Old Testament* (1913).

4. *The Rest of the Words of Baruch.* An apocryphal book of which the Greek text was first published in *Menæum Græcorum* (Venice, 1609), then by Ceriani, *Monumenta sacra et profana*, v, i (1868) under the title "Paralipomena Jeremiæ prophetæ," and finally by Rendel Harris in 1889, the Armenian version in a collection of *Uncanonical Books of the Old Testament*, vol. i (Venice, 1896), and the Ethiopic version by Dillmann in 1866 as *Reliquæ Verba Baruchi.* It tells of the concealment of the sacred vessels by Jeremiah, his deportation to Babylon, and Baruch's stay in Jerusalem; how before the fall of the city Abimelech (Ebedmelech, Jer. xxxviii. 7 ff.) was sent to Agrippa's vineyard to get figs, fell asleep and did not wake up until 66 years later; of the letter that Baruch sent to Babylon with the figs that were still fresh after 66 years, and the return of the exiles led by Jeremiah, and how Jeremiah died, but rose again from the dead after three days and praised the redemption that had come through Jesus Christ. Aside from the obvious Christian interpolations, the work is clearly of Jewish origin and is supposed by many scholars to have been written soon after 135 A.D. Consult the Greek text in Rendel Harris, *The Rest of the Words of Baruch* (1889); the Ethiopic text in Dillmann, *Chrestomathia Æthiopica* (1866); German translations of the Ethiopic text by Prätorius, in *Zeitschrift für wissenschaftliche Theologie* (1872) and König in *Studien und Kritiken* (1877); cf. also Schürer, *Geschichte des jüdischen Volkes* (4th ed., 1909).

BARUCH, Bernard Mannes. Financier and industrial organizer. He graduated at the College of the City of New York in 1889, and was for many years a member of the New York Stock Exchange. After a highly successful financial career, he entered the government service in the war with Germany and was placed in charge of the purchases for the War Industries Board and for the Allies. He was chairman of the War Industries Board, March 5, 1918–Jan. 1, 1919, and later chairman of the raw materials division of the Supreme Economic Council and economic adviser for the American Peace Commission. He was regarded as one of the ablest organizers of war time.

BARUCH, Simon (1840–1921). German-American physician, served with distinction in the Confederate army in the Civil War, then practiced medicine at Camden, N. J. till 1881, and after that in New York. He became especially known for his diagnosis of "perforating appendicitis" (1889). It was through his efforts that New York was induced to make provision for free municipal baths. By the College of Physicians and Surgeons of Columbia University Dr. Baruch was appointed professor of hydrotherapy. Besides numerous papers contributed to medical journals, his writings include *Uses of Water in Modern Medicine* (1892), and *The Principles and Practice of Hydrotherapy* (3d ed., 1908). Both these books have been translated into German.

BARUGO, bä-rōō′gō. A town in the province of Leyte, Philippines, 18 miles northwest of Tacloban, the capital of the province. Pop., 1903, 12,360.

BA′RUS, Carl (1856–). An American physicist, born at Cincinnati, Ohio. He was appointed professor of physics in Brown University in 1895 and in 1903 became dean of the Graduate Department. For the Geological Survey he made researches in physical geology, for the Weather Bureau in atmospheric moisture, and for the Smithsonian Institute in aëronautics. He was elected a member of the National Academy of Sciences and was in 1895 one of the committee selected by Congress to determine the electrical standards of the United States. He prepared a report on high-temperature measurement, as submitted to the International Congress of Physicists at the Paris Exposition in 1900. He contributed valuable papers to the bulletins of the United States Geological Survey, including *The Electrical and Magnetic Properties of the Iron-Carburets* (1885), *Subsidence of Fine Solid Particles in Liquids* (1886), *Measurement of High Temperatures* (1889); *Experiments with Ionized Air* (1901), *Nucleation of the Atmosphere* (1905), *Condensation of Vapor as Induced by Nuclei and Ions* (4 vols., 1907–10), *Elliptic Interferences* (1911).

BAR′WOOD. See Camwood.

BARY, bä′rē, Heinrich Anton de. See De Bary, Heinrich Anton.

BARYATINSKI, bär′yä-tēn′skē, Alexander Ivanovitch, Prince (1815–79). A Russian field marshal. After the accession of Alexander II he received chief command of the Army of the Caucasus (1856), and after directing three successful campaigns led the storming of Ghunib (1859), where he captured the Caucasian leader Shamyl. In recognition of these services he was appointed field marshal, but, owing to ill health, was compelled to retire soon afterward.

BARYE, bä′rē′, Antoine Louis (1795–1875). A celebrated French sculptor of animals. He was born in Paris, Sept. 24, 1795. He inherited his artistic gift from his father, who was a proficient silversmith from Lyons. He began his practice of art by working with an engraver and a goldsmith. He was conscripted in 1812 and during his service is said to have modeled several relief maps for the government. He turned his attention to sculpture in 1818, when he studied modeling under Bosio and drawing under Gros. In 1819 he took a second prize at the Ecole des Beaux-Arts and a little later began devoting himself to the study of animals, and in this branch of sculpture he achieved fame. In the Salon of 1831 Barye exhibited his famous "Tiger Tearing a Crocodile" (Louvre). He gained even greater success with his "Lion Battling with a Serpent" (1832), purchased by the state for the Tuileries Garden, and found in the Duke of Orleans a liberal patron. Sometimes rejected by the jury, and not receiving the recognition by his fellow artists that he believed his due, Barye ceased sending to the Salon and gave himself finally to the production of bronzes for commerce. By this, through public appreciation, which was not lacking for his work, he raised this industry to the plane of art, and it is through these little masterpieces that he is most widely known. The posthumous exhibition of his drawings at the Beaux-Arts was the talk of Paris for the wonderful accuracy and research displayed in the studies of the anatomy, character, and movements of the various animals which he represented. Some of his work is heroic in size and ornaments public parks in France. The architect of the Louvre employed him to make four groups for the pavilion on the Place du Carrousel. Barye re-

ceived many honors—was a member of the Institute, artist at the Jardin des Plantes, and an officer of the Legion of Honor. He died in Paris, June 25, 1875. Barye's sculptures are very popular in the United States. They are most completely represented in the large collection of small bronzes and drawings in the Brooklyn Institute Museum. The Metropolitan Museum of New York is also rich in his bronzes, and Mount Vernon Place, Baltimore, is adorned by a whole series. Consult the works of Alexandre (Paris, 1889), De Kay (New York, 1889), and Ballu (Paris, 1890).

BARY'TA. See BARIUM.

BAR'YTONE, or **BARITONE** (Gk. *βαρύς, barys,* heavy, deep + *τόνος, tonos,* tone). That species of the male voice which lies between the bass and the tenor, but is, in quality or tone character, more like the former. Its compass is G to F sharp, and composers assign to it parts that are characterized by manly vigor, power, and solidity. Barytone further means a singer possessing the barytone voice. Barytone clef, in musical notation, means the now obsolete F clef on the third line.

BAS, bäs, or **BATZ.** An island of the department of Finistère, France, 2½ miles distant from the north coast, in the English Channel (Map: France, N., A 4). It is about 3 miles long and 2 miles broad; is defended by two forts and four batteries; and has a lighthouse at an elevation of 212 feet. Kernoc Haven affords good anchorage. It is inhabited by fishermen and contains three villages. Pop., 1901, 1291; 1906, 1340; 1911, 1363.

BASALT' (Lat. *basaltes,* an African word). A volcanic rock of basic composition, characterized by a fine texture and having generally one or more of the feldspathoid minerals, lime-soda feldspar, nephelite, or leucite, associated with pyroxene or hornblende, and magnetite or ilmenite; frequently also with olivine. According as one or the other of these minerals predominates, the chemical composition varies between wide limits, so that an average for basalt would have little significance. Basalts are distinguished as olivine basalts, nepheline basalts, leucite basalts, or as basalts proper, when containing as essential constituents only lime-soda feldspar and pyroxene or hornblende. The terms *dolerite, anamesite,* and *basalt* were used to distinguish basalts of coarse, medium, and fine grains, respectively; but since the introduction of the petrographical microscope has made accurate rock study possible, these terms have fallen into disuse, and others, describing the intimate texture of the rocks as revealed by microscopic study, have taken their place. In the preliminary study in the field, however, they have still some value for cartographical purposes.

Basalts are in all cases the products of consolidation of molten magmas, and generally of lavas which were poured out at the surface of the earth. In contrast with rhyolites and trachytes, which in their genesis they resemble, basalts, when molten, flow as comparatively thin fluids, which travel rapidly down a slope, and on solidifying ultimately build up mountains which have comparatively gentle slopes. Thus the Hawaiian Islands, which are built up of basalt from the sea bottom, have, in contrast with the slopes of the American Cordilleran volcanoes, which are generally rhyolite or andesite, exceedingly gentle slopes. Masses of basalt, when solidified at the surface, have, quite generally near the original upper surfaces, a separation by cracks into layers parallel to the surface; whereas at greater depths there is produced a series of columns, generally hexagonal in section, and with their columnar axes perpendicular to the original surface. The upper surfaces of a basalt outflow being curved, the columns generally radiate from some point near the bottom of the mass. As the upper layers of rock have been removed by erosion in all save the most recent extrusions of lava, the platy parting is less commonly observed than is the columnar. The Giant's Causeway, in the north of Ireland, is the best-known example of columnar joints in basalt. In common with most other lavas basalt exhibits all varieties of cellular and scoriaceous texture, depending upon the quantity of steam the lava had absorbed and upon the opportunities afforded this steam to expand when it reached the surface. (For illustrations, see GIANT'S CAUSEWAY; STAFFA.) Very similar rocks to basalt are diabase, melaphyre, and augite porphyrite.

BASANITE, băz'ă-nīt. A name long used to designate certain fine-grained black rocks of varied character and origin. It was originally applied to the basalts. It was also used for a fine compact quartz rock that served as a touchstone by which the jeweler tested the fineness of gold. The name is now applied by petrographers to certain varieties of basic volcanic rocks that differ from basalt in having a considerable amount of leucite or nepheline in addition to the usual augite, olivine, and plagioclase. The basanites have a rather limited distribution. See TOUCHSTONE.

BASARISK. See CACOMISTLE.

BAS'COM, FLORENCE. An American geologist, daughter of Dr. John Bascom. She was born in Williamstown, Mass. In 1882 she graduated with the degrees of A.B. and B.L. at the University of Wisconsin, from which institution she also received the degree of B.S. in 1884. She continued her studies at the University of Wisconsin, taking her master's degree there, and at Johns Hopkins University, where she received the degree of Ph.D. She became a member of the American Academy for the Advancement of Science and of the Philadelphia Academy of Science, and assistant editor of the *American Geologist.* She was made professor of geology in Bryn Mawr College in 1906. After 13 years of service as a member, she became a geologist of the United States Geological Survey in 1909. She published (1904) *Water Resources of the Philadelphia District* and (1905) *The Piedmont District of Pennsylvania.*

BASCOM, JOHN (1827–1911). A distinguished American educator, born at Genoa, N. Y. He graduated at Williams College in 1849, was a tutor there from 1852–53, and graduated at the Andover Theological Seminary in 1855. He was professor of rhetoric at Williams from 1855 to 1874, when he was chosen president of the University of Wisconsin. At Wisconsin, in addition to the presidency, he also held the chair of mental and moral philosophy. He withdrew from the university in 1887 and returned to Williams to accept the chair of political science, which he held until he retired in 1901. Dr. Bascom was prominent as a speaker and a writer on both religious and secular subjects. His works include a textbook of *Political Economy* (1859), *Æsthetics* (1862), *The Principles of Psychology* (1869), *The Philosophy of English*

Literature (1874), *Philosophy of Religions* (1876), *Ethics* (1879), *Problems in Philosophy* (1885), *The New Theology* (1891), *Social Theory* (1895), *The Growth of Nationality in the United States* (1899), and *God and His Goodness* (1901).

BASCULE BRIDGE. See BRIDGE.

BASE, bās (Fr. and It. from Lat. *basis,* Gk. *βάσις, basis,* a stepping, step). In architecture, the foot or lowest part or division of any architectural construction, such as a wall, pier, or column. The base as an architectural feature had a progressive development in the styles of classical antiquity. The Egyptian column had no base, or only (rarely) a plain round plinth or disc; and the Ægean or Mycenæan base was likewise of the simplest sort. The Greek Doric order employed no base; but the Ionic developed in Asia Minor in the sixth century B.C. an elaborate type which in a somewhat simpler form became the typical base of the Attic-Ionic style and has been ever since known as the Attic base. It consists of two tori or convex moldings (the upper slightly smaller than the lower), separated by a scotia or concave molding between two narrow fillets, the whole resting on a flat square plinth. The total height is normally about half the column diameter. The Attic base was used by the Greeks for the Corinthian as well as the Ionic order. The Asiatic Ionic bases varied considerably, often omitting the plinth or one torus and exaggerating the scotia, fluting the moldings, etc. The Romans adopted the Attic base, but elaborated it variously, making a special Corinthian base by substituting two small scotiæ separated by a double bead for the single scotia of the original type. They devised simpler bases for the Tuscan and Doric orders—a large torus on a thick plinth for the first, a bead and torus on a less massive plinth for the second. In the later Imperial age the Attic and Corinthian bases were sometimes elaborately carved with foliage. The ancient Persians in the sixth and fifth centuries B.C. employed for their columns a high bell-shaped base carved with palm leaves and surmounted by a torus and bead. In mediæval architecture the Attic type was the most prevalent, from the earliest Christian times, but in and after the tenth century it was greatly modified in its proportions, flattened or heightened according to its position below or above the eye, the profiles made with elliptical or hyperbolic instead of circular curves, and (in the Romanesque styles) spurs, claws, or leaves carved above the plinth to conceal the flat triangular areas at its corners. In the Lombard style the columns of porches and pulpits often rested on the backs of symbolic sculptured lions or monsters. In the Gothic styles the plinth is often high, octagonal, sometimes beveled at the top; the spur leaves are omitted and the Attic profiles sometimes replaced by a profile like a high inverted Greek Doric echinus. In the later Gothic the height of the plinth is greatly exaggerated, and it is often mounted on a high sub-plinth, while each shaft of a cluster has its own separate compound plinth. Renaissance architecture reverted to classic types, and these have been found so perfectly adapted to their purpose that even the most progressive modern architecture has ventured on only the most trivial variations of their details, except in the more extreme phases of the *Art Nouveau* (q.v.) and *Moderne Kunst* in France, Germany, and Austria. See ATTIC; COLUMN; ORDERS OF ARCHITECTURE.

BASE. In chemistry, any substance containing one or more hydroxyl groups (OH) and capable of combining with acids to form salts. The inorganic bases are nearly all metallic hydroxides (e.g., potassium hydroxide, KOH), and those soluble in water turn red litmus paper blue—a reaction now attributed to their hydroxyl ions, i.e., hydroxyl groups charged with negative electricity. The organic bases, too, are assumed to contain hydroxyl ions in aqueous solution. Thus aniline, $C_6H_5NH_2$, is supposed to change in water to $C_6H_5NH_3OH$ and then to be partly broken up into $C_6H_5NH_3$ ions and OH ions. The "strength" of bases is now measured principally by comparing their electrical conductivities. See AMINES; ALKALOIDS; PTOMAINES; ACIDS; DISSOCIATION; SOLUTION; ELECTRO-CHEMISTRY, GENERAL.

BASE. See HERALDRY.

BASE. See BASS.

BASEBALL (named from the "bases"; see below). A game of ball—America's national game. Ball playing was a favored form of recreation in the days of the ancients, and frequent reference is made to it by the Greek and Roman writers, but the modern game of baseball, at whose shrine millions gather every year, came into being suddenly and soon saw itself established as the most popular branch of athletics in the United States.

It was not until 1907 that any real attempt was made to investigate the circumstances surrounding the birth of the present game, although it was generally agreed that baseball sprang from the old English game of *rounders* (q.v.). The game played by the early American settlers, which was known as "town ball," undoubtedly was a direct offspring of rounders. But more radical variations in the original sport were not long in appearing, upon which were bestowed such names as "three-old cat," "four-old cat" and "scrub." To a combination of these pastimes baseball probably owes its inception.

The purpose of the research, made in 1907, however, was primarily to determine who actually laid the foundations for the present scheme of playing the game and when they were laid. To determine these historical facts a commission was appointed by those interested in the professional end of the game, consisting of A. G. Mills of New York; Arthur P. Gorman, former United States Senator from Maryland; Morgan G. Bulkeley, former Governor of and United States Senator from Connecticut; N. E. Young, A. J. Reach, George Wright, and James E. Sullivan. This body, after several months' work in collecting evidence, reported that according to their findings the "national game of baseball" originated with the Knickerbocker Club, organized in New York City in 1845, and that the first person to prepare a diagram of the playing diamond was Abner Doubleday of Cooperstown, N. Y., in 1839.

The Knickerbocker Club, or first organized baseball club in the world, was in existence 30 years. Its first rival, a group of players calling themselves "The New York Nine," was founded early in 1846 and soon afterward challenged the Knickerbockers to play a match game for a dinner. This, the first contest of its kind, took place in Hoboken, N. J., June 19, 1846, the challengers winning by a score of 23 to 1. According to the rules then in vogue the victory

was decided when either team scored 21 *runs*, and in the Hoboken contest this required only four *innings*. The rules at that time also provided that the *batter* was *out* if the ball he hit was caught on the first bounce or if, when running between the bases, he should be struck with the ball thrown at him by a member of the opposing team. Another interesting feature was that the *pitcher* delivered the ball to the batter with a straight-arm motion. He was, in fact, a "pitcher" and not a "thrower" as now.

In 1850 another team appeared, known as the "Washingtons," and later as the Gotham Club, which had grounds in Yorkville. Other clubs soon sprang up, and, by 1858, 25 organized teams were playing baseball in and about New York City. It was in 1858, too, that the National Association of Baseball Players was founded and a new code of playing rules adopted. That year also was noteworthy in baseball history as the one in which an admission fee (50 cents) to a game was first charged, the occasion being the match on July 20 between New York and Brooklyn teams at the Fashion Race Course.

The next stage in the development of the game was the organization in 1869 of the first professional club, the Cincinnati "Red Stockings." This team during 1869 and 1870 traveled 12,000 miles and played to more than 200,000 persons, thus giving the first indication of the popularity the sport was destined to attain. A natural outcome of this first experiment in professional ball playing was the organization in 1871 of the National Association of Professional Baseball Players by the members of 10 clubs and the arrangement of a series of contests between them. Only eight teams finished the season. They were the Athletics of Philadelphia, the Bostons, the White Stockings of Chicago, the Haymakers of Troy, the Mutuals of New York, the Forest Citys of Cleveland, the Nationals of Washington, and the Forest Citys of Rockford.

Gambling and drinking and the occasional "throwing" of games brought on a crisis in 1875 and most of the professional clubs were on the verge of bankruptcy. A movement headed by W. A. Hurlbert, A. G. Spalding, and others for the renovation of the sport and for placing it on an honorable basis resulted in the National League of Professional Baseball Clubs. But the most serious crisis occurred in the spring of 1920 when several of the members of the Chicago American League Club confessed that they had received money from a gambling combine to "throw" games in the world's series with the Cincinnati National League Club which was contested in October, 1919. As a result, the Chicago Grand Jury indicted eight of the star players of the Chicago Club and Charles A. Comiskey, president of the Club, expelled them. This scandal dealt such a blow to the national game that it was determined to effect a thorough reorganization and place the supreme control in the hands of a competent and disinterested person. Kenesaw Mountain Landis, a Federal Judge of Chicago, was chosen. One of Judge Landis's first moves was to issue an edict that the players of the Chicago American League Club, who had been involved in the world's series scandal of 1919, should be barred forever from playing with any club in organized baseball. This prompt action together with certain reforms in the politics of the game restored baseball to popular favor.

Morgan G. Bulkeley became the first president of the league, and the clubs represented were: Boston, Cincinnati, Hartford, Chicago, Louisville, New York, Philadelphia, and St. Louis. The first pennant race was won by Chicago, with Hartford second. Other pennant winners in the National League have been: 1877, Boston; 1878, Boston; 1879, Providence; 1880, Chicago; 1881, Chicago; 1882, Chicago; 1883, Boston; 1884, Providence; 1885, Chicago; 1886, Chicago; 1887, Detroit; 1888, New York; 1889, New York; 1890, Brooklyn; 1891, Boston; 1892, Boston; 1893, Boston; 1894, Baltimore; 1895, Baltimore; 1896, Baltimore; 1897, Boston; 1898, Boston; 1899, Brooklyn; 1900, Brooklyn; 1901, Pittsburgh; 1902, Pittsburgh; 1903, Pittsburgh; 1904, New York; 1905, New York; 1906, Chicago; 1907, Chicago; 1908, Chicago; 1909, Pittsburgh; 1910, Chicago; 1911, New York; 1912, New York; 1913, New York; 1916, Brooklyn; 1917, New York; 1918, Chicago; 1919, Cincinnati; 1920, Brooklyn; 1921, New York.

The National League was the forerunner of hundreds of other leagues throughout the United States and Canada, all being conducted under the same general principles. Of these organizations the most important are American League, International League, American Association, Southern League, Eastern Association, Western League, Pacific Coast League, and New England League. Of these leagues the strongest is the American League, which was founded in 1900. Starting as a rival league to the National, the American later entered into an agreement with the older body, and the two work in harmony.

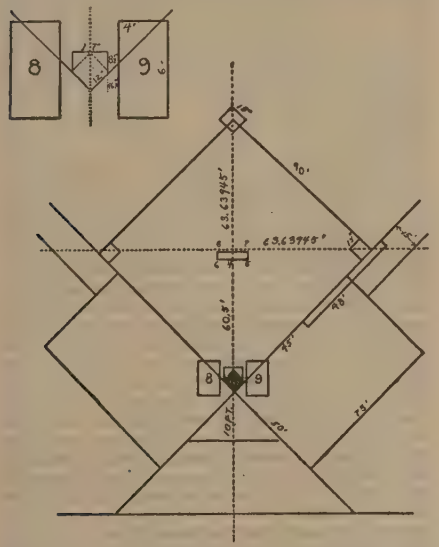
The pennant winners in the American League have been: 1900, Chicago; 1901, Chicago; 1902, Philadelphia; 1903, Boston; 1904, Boston; 1905, Philadelphia; 1906, Chicago; 1907, Detroit; 1908, Detroit; 1909, Detroit; 1910, Philadelphia; 1911, Philadelphia; 1912, Boston; 1913, Philadelphia; 1916, Boston; 1917, Chicago; 1918, Boston; 1919, Chicago; 1920, Cleveland; 1921, New York.

The principal event in the professional baseball world is the playing of a series of games between the winning teams of the two strongest leagues for the world's championship. These contests, which began in 1884, attest in no uncertain way the great popularity of baseball with the masses of the people. They attract as a rule more than 150,000 spectators, and the receipts, which are divided between the players, clubs, and National Commission, often amount to more than $300,000. The first world's championship was won by the Providence National League team in 1884, the opposing team being the Metropolitans. Other holders of the world's title have been: 1886, St. Louis (A. A.); 1887, Detroit (N. L.); 1888, New York (N. L.); 1889, New York (N. L.); 1892, Boston (N. L.); 1894, New York (N. L.); 1895, Cleveland (N. L.); 1896, Baltimore (N. L.); 1897, Baltimore (N. L.); 1903, Boston (A. L.); 1905, New York (N. L.); 1906, Chicago (A. L.); 1907, Chicago (N. L.); 1908, Chicago (N. L.); 1909, Pittsburgh (N. L.); 1910, Philadelphia (A. L.); 1911, Philadelphia (A. L.); 1912, Boston (A. L.); 1913, Philadelphia (A. L.); 1916, Boston (A. L.); 1917, Chicago (A. L.); 1918, Boston (A. L.); 1919, Cincinnati (N. L.); 1920, Cleveland (A. L.); 1921, New York (N. L.).

In 1874, a team from the United States played several games in Great Britain. In 1888–89 two American teams visited New Zealand, Australia, Egypt, Italy, France, and Great Britain.

In the American colleges baseball early became a favorite game. The first recorded intercollegiate match was played at Pittsfield, Mass., July 1, 1859, between Amherst and Williams, the former winning by a score of 66 to 32. Before the game it was agreed to play until one of the teams scored 65 runs, and it is interesting to note that it required four hours to finish the contest. Various attempts have been made to establish an intercollegiate baseball league patterned after the professional organization, but they have invariably met with failure. This fact makes it impossible to determine definitely which of the colleges turns out the best team from year to year, and the college championship title is always in dispute. The colleges which have made the best showings in baseball, often developing teams which have gained victories over strong professional clubs, include Princeton, Harvard, Yale, Williams, Brown, Virginia, Georgetown, and Pennsylvania. Many of the best professional players are men who gained their knowledge of the game while in college.

The Game—Baseball is played by nine men in each team, on a level field, on which is laid out



the form of a "diamond" 90 feet square, with bases at each of the four corners (see diagram). One of these bases is called the home plate, and the others (beginning with the right) first, second, and third respectively. Within the diamond, in front of the home plate and 60.5 feet from it, is the pitcher's position, or "box."

The home team has the choice of innings—which team shall take the position "in the field" or "take the bat." The fielders are divided into the *battery* (pitcher and catcher), the *infield* (the three basemen and shortstop), and the *outfield* (left, centre, and right fielders).

The fielding side having taken position, the pitcher delivers the ball to the batsman standing at the home plate, who endeavors to hit it out of the reach of the fielders and thereby succeed in reaching first base before the opposing side can field the ball to the baseman standing there. If the batsman fails to reach the base, he is called "out." If he should reach the first base, and think it safe to do so, he next tries to reach the second base, and the third, or even the home plate. When he has stopped at any base, another batsman of his side is put in, and he in turn attempts to hit the ball so as to allow the first batsman to advance around the bases, while he, in his turn, attempts to reach the first or any succeeding base. Then a third batsman of the same side comes up, and so on, until three men are put out in any way, when the other side takes its turn at the bat. A circuit of the bases is called a "run," and if any player makes it on a single hit it is called a "home run." A "strike" is called (1) when the batsman fails to strike at a ball that passes over the home plate between his knee and shoulder; (2) if he strikes at any ball and fails to hit it; (3) in case of a foul hit, i.e., one that drops or rolls outside the lines from the home plate to first and third bases, but the third strike, however, is not called on a foul.

The batsman becomes a base runner (1) after three strikes are called; (2) when he makes a fair hit, the ball traveling between the above-mentioned lines until after it passes first or third base; (3) after four balls have been called by the umpire, a "ball" being a pitched ball which is not struck at by the batter and which passes outside the limits required for a strike; (4) if he is hit by the ball, unless he has made no effort to avoid it; and (5) if prevented from striking by the interference of the catcher. In the last three cases he cannot be put out before reaching first base. He is put out (1) when his third strike is held by the catcher or fielded to first base ahead of him; (2) when a ball hit by him is caught by a fielder before it touches the ground; (3) when touched with the ball in the hands of a fielder while between bases; (4) when, if forced to run to any base, the ball is held by a fielder on that base before the runner reaches it; and (5) when hit by a batted ball. Nine innings for each side constitute a game, and the team scoring the greater number of runs wins. In case of a tie at the end of the ninth inning the play is continued until one side scores more than the other in the same number of innings.

For complete rules and other information concerning baseball, consult Chadwick, "Official Baseball Guide," in the *Spalding Athletic Library* (New York, annually). For practical instruction: Chadwick, *Art of Pitching, Fielding, and Base-Running* (New York, 1886); J. M. Ward, *Baseball* (Philadelphia, 1888); A. G. Spalding, *America's National Game* (New York, 1911).

BASE-COURT, bās'kōrt (Fr. *basse-cour*, low court). The lower or outer court of a mansion, corresponding to the outer bailey of a castle (q.v.); the service court.

BASEDOW, bā'ze-dō, or **BASSEDAU,** Johann Bernhard, often called Bernhard von Nordalbingen (1723–90). A German educational reformer of the eighteenth century. He was born at Hamburg and studied philosophy and theology at the University of Leipzig. He became professor of moral philosophy in the Academy of Sorö in Denmark in 1753; was transferred to the gymnasium at Altona in 1763, but was soon again compelled to give up teaching, though he retained his salary. At both Sorö and Altona Basedow had fallen into difficulties on account of his extremely unorthodox

religious views, expressed in both his teaching and his writings. While at Altona he came under the influence of Rousseau's *Emile*, and in 1767 definitely abandoned theology for educational affairs. His important position in education was due to his attempt to interpret and put into practical application the revolutionary ideas of Rousseau, by proposing a general reform in education in Germany in respect to organization, methods of instruction and the training of teachers. In 1768 he issued *An Address to the Friends of Humanity and to Persons in Power, on Schools, on Education, and its Influence on Public Happiness*, which included the plan for his *Elementarwerk*, a complete new system of primary education. This was received with favor, and his appeal for funds with which to publish the proposed treatise met with generous response. The *Elementarwerk*, an illustrated work in four volumes, was issued in 1774 and exerted a wide influence. The ideas underlying the work were a combination of the methods of the *Orbis Pictus* of Comenius (q.v.) and the general principles advanced by Bacon and Rousseau. It contained a vast amount of general information arranged in dialogue form and designed to direct and train, but never to suppress, the natural desires of children. Public approval of the ideas advanced was generous, and Basedow immediately outlined a plan for the training of teachers for the new education.

The resulting institution was the celebrated *Philanthropinum*, founded at Dessau in 1774 and soon imitated in various parts of Germany. Basedow was unfit for the management of such an institution, however, and failed in carrying out his own ideas. The *Philanthropinum*, under more competent hands, continued to exist until 1793 and exerted a wide influence on the education of children throughout the Teutonic world. Basedow passed the last year of his life in private tutoring. The fundamental idea of the reform was "education according to nature," which was interpreted to mean that children should be treated as children, not as adults; that language should be taught by conversational methods, not through grammatical studies; that physical exercise and games should find a place in the child's education; that early training should be connected with "motion and noise," since the child naturally loves these; that each child should be taught a handicraft, for reasons partly educational, partly social; that the vernacular, rather than the classical languages, should constitute the chief subject-matter of education; that instruction should be connected with realities rather than with words. Many of the reforms suggested by Basedow were carried out by more practical and less erratic reformers, such as Pestalozzi and Froebel. Prof. Max Müller, Basedow's great-grandson, contributed a "Life" of the reformer to the *Allgemeine deutsche Biographie*. A comparison of Basedow and Comenius by Petru Garbovicianu (Bucharest, 1887) is commended by Quick.

Consult: Quick, *Educational Reformers* (New York, 1890); Barnard, *German Teachers and Educators* (New York, 1861); Pinloche, *L'Education en Allemagne au dix-huitième siècle* (Paris, 1889); Diestelmann, *Basedow* (Leipzig, 1897).

BASEDOW'S DISEASE', GRAVES'S DISEASE, or EXOPHTHALMIC GOITRE. A disease characterized by palpitation of the heart, rapid pulse, enlargement of the thyroid gland, anæmia, general nervousness, fine tremor and prominence of the eyeballs. It was first fully described by Von Basedow in 1840. The etiology is obscure; the exciting cause may be mental or physical shock, or anxiety or grief, fright, fatigue, sexual excess in those with a nervous inheritance; but the disease is always associated with increased activity of the thyroid gland—hyperthyroidism. It is 8.3 times as frequent in females as in males. The modern treatment of this affection is very satisfactory. The gland may be reduced in size and the symptoms relieved by the application of the X-ray; serum therapy cures many cases, and surgery attacks the problem by ligating the superior thyroid arteries, resecting the hypertrophied portions of the gland, or removing the cervical sympathetic ganglion. Consult article by Dock in *Osler's Modern Medicine*, vol. vi (New York, 1909); for early literature, article by same author in the *Jour. Amer. Med. Assoc.*, p. 1121 (1908); Mannheim, *Der Morbus Gravesii* (Berlin, 1894).

BASEILHAC, bâ'zâ'lyâk', JEAN (1703–81). A French surgeon, better known as Frère Côme. He was educated at the Hôtel-Dieu, Paris, and for some time was physician in ordinary to the Archbishop of Bayeux. He invented the "trocar," used in cystotomy, and wrote *Recueil de pièces importantes concernant la taille faite par le lithotome caché* (1751) and *Nouvelle méthode d'extraire la pierre de la vessie urinaire par dessus de pubis* (1779).

BASEL, bä'zel, or **BÂLE**, bäl (anciently, *basilia*, royal residence, from Gk. *βασιλεύς, basileus*, king; *basula* in the Middle Ages). The capital of the half-canton of Basel-Stadt, Switzerland; lying on both sides of the Rhine, near the northern boundary of Switzerland (Map: Switzerland, B 1). The city is situated in a charming plain over 800 feet above the sea level and is divided by the river into Grossbasel and Kleinbasel. The former, the higher portion of the city, is on the left bank and is connected with Kleinbasel by three bridges, one of which, a fine granite structure, was completed in 1905, replacing the wooden Alte Brücke (Old Bridge), which was built in the early part of the thirteenth century. The city proper shows its mediæval origin, but about it are charming suburbs, occupied by the richer classes. The old ramparts have been leveled to form walks and promenades. In the Eschenplatz stands the Sankt Jakob Monument, to the memory of the Swiss who opposed the Armagnac invaders in 1444. Other memorials are the Strassburg Monument, by Bartholdi, commemorating the aid given by Switzerland to the women and children of that city after the siege of 1870, and the Holbein Fountain, restored in 1887.

Basel abounds in fine buildings, both mediæval and modern. Among these may be mentioned the Rathaus or Town Hall, built in the first quarter of the sixteenth century, and restored early in the twentieth; the Minster, said to have been begun by Emperor Henry I, and the cathedral of the bishopric of Basel until 1529; and the large Barfüsser Kirche, dating from the fourteenth century. The latter has a very high choir and is now the quarters of the Historical Museum, which vies with that of Zürich as the finest in Switzerland. Other notable buildings are the church of St. Elizabeth, the church of St. Paul, the Natural History and Art Museum, the Kunst Halle, containing a

collection of modern paintings, the theatre, and the post office.

Basel has a university which dates from 1459. (See BASEL, UNIVERSITY OF.) The botanical gardens and the institute of natural sciences, as well as the clinics attached to the city hospitals, are affiliated with the university. Besides the university there are several high schools and an industrial school and museum. The Historical Museum, which has been mentioned, contains some portions of the celebrated Danse Macabre, formerly a fresco in the Dominican burial ground and removed in 1805, besides a fine collection of mediæval furniture and plate. Basel was the home of the Holbeins, and the museum contains a valuable collection of their works and those of their pupils. There are several literary, musical, historical, and scientific societies. A notable organization is the Association for Public Welfare, which cares for schools and other institutions designed for the bettering of the condition of the poor and the afflicted, such as the blind, stuttering, etc. Basel's hospitals include a Polyclinic supported by the state, while its mission house and Bible Institute are world-famous.

Basel has long been the leading commercial town of Switzerland and an important manufacturing centre. For more than 200 years ribbon making has been an important occupation. Other branches of industry are paper making, silk and thread spinning, dyeing and dye making, and the preparation of the "Baseler Leckerli," or honey cakes. Total number of factories in Basel-Stadt in 1911, 287; with 15,639 work people (9723 men, 5916 women). The position of the city on the boundaries of Switzerland, Alsace, and Baden, and its location on the Rhine, here navigable, give it great advantages for trade, and it receives more than 50 per cent of the total imports of Switzerland. It is an important centre for the transport of the native products of the country, and as a result Basel is the most powerful financial city of Switzerland. Besides the communications given by the Rhine and the Rhine-Rhone canals, railroads from various parts of Switzerland form a junction in Basel, permitting connections with France.

The Basel-Stadt demicanton consists of the city and two rural communes; the cantonal councils have general jurisdiction over the city. In 1888 the population of the city was 74,245; in 1900, 112,885; according to the census taken Dec. 1, 1910, the *de facto* population of the city was 132,577 (*de jure*, 132,276), and of the rural communes 3771 (3672). Of these over two-thirds are Protestants, less than one-third Catholics, with about 3000 Jews.

Basel had its origin in the *Basilia* of the Romans, a frontier post situated near the town of Augusta Rauracorum. It was taken in turn by the Alemanni and the Franks, and on the partition of Charlemagne's Empire passed to Louis the German. In the eleventh century it enjoyed great prosperity as a free Imperial city, ruled by its bishop and the chief nobility. In the course of many years the burghers acquired a large share in the municipal government, while at the same time the authority of the city, by purchase and conquest, was extended over a broad stretch of territory. Basel fought with the Swiss confederates against the Hapsburgs in 1444 and formally joined the Confederacy in 1501. The Reformation made rapid progress in Basel. The government of the city became thoroughly democratic, but towards the inhabitants of the rural districts of Basel a policy of consistent selfishness was followed, in that they were allowed no share in the political life of the community for nearly three centuries. Under the impulse of the French Revolution equality of rights was established, but the city became supreme again after 1814. Civil war broke out as a result in 1831 and continued until 1833, when the Federal government intervened and brought about the division of the canton into *Basel-Stadt* and *Basel-Land*. The latter immediately established democratic institutions, but Basel-Stadt maintained its reactionary character till well into the second half of the nineteenth century. Consult *Guide to Basel and Environs* (Basel, 1895).

BASEL, CONFESSION OF. 1. Written by Oswald Myconius (q.v.), and published in 1534, still used in Basel. 2. The First Helvetic Confession (1536), also called The Second Confession of Basel, because there drawn up. It was too Lutheran and so was supplanted by the Second Helvetic Confession (1564). Consult Schaff, *Creeds of Christendom* (New York, 1884).

BASEL, COUNCIL OF. A memorable and important ecclesiastical council, held in the city of Basel from 1431 to 1449. It was summoned by Pope Martin V, by a bull dated Feb. 1, 1431, and constituted after a fashion on February 27, but after the Cardinal legate, Julian Cesarini of Sant' Angelo, who had been charged with the conduct of the council, arrived, Sept. 9, 1431, more life was put into it. Its chief business being to conciliate the Hussites, it at once opened negotiations with them. But the new Pope, Eugenius IV, disliked the proceedings, and requested Cesarini on November 12 to dissolve the council and call another a little later at Bologna. Ere the letter came the council had formally constituted itself (December 14), and when the Pope's letter arrived it flatly refused to dissolve, and reaffirmed the decree of the Council of Constance, asserting the right of a general council to exercise authority over the Pope himself, and on his persevering to issue bulls for its dissolution, caused a formal process to be commenced against him and cited him to appear at its bar. It assumed the papal powers, and exercised them in France and Germany, where its authority was acknowledged. It concluded a peace, in the name of the Church, with the Calixtines, the most powerful section of the Hussites, by the so-called Compactata of Prague of Nov. 30, 1433, granting them the use of the cup in the Lord's Supper. By this the Emperor Sigismund was greatly aided in recovering possession of Bohemia; and he in return sought to reconcile the council with Eugenius IV, who, being hard pressed by insurrections in the States of the Church, and, afraid of losing his whole influence in France and Germany, came to a temporary agreement with the council Aug. 1, 1433. Desirous, however, of limiting the papal prerogatives, the council restored to the chapters of cathedrals and collegiate churches the free right of election to stalls and benefices, of which the Pope had assumed the right of disposing; and with a view to the reformation of gross abuses, restricted the practice of appeals to Rome and prohibited *annats* and other grievous exactions. It left the Pope the right to dispose of those benefices only which belonged to the diocese of Rome and prohibited

the bestowal of reversions to ecclesiastical offices. It also appointed punishments for certain immoralities in the clergy; and prohibited "festivals of fools," and all the indecencies which had been commonly practiced in churches at Christmas. It adopted decrees concerning the election of Popes and for the regulation of the College of Cardinals.

Eugenius, exasperated to the utmost, complained loudly to all sovereign princes. At this time the prospect was opened up of the union of the distressed Greeks with the Church of Rome, and both the Pope and the council endeavored to make use of this for the advancement of their own interests and influence. Both dispatched galleys for the Greek deputies; but through the intrigues of his agents, the Pope was successful and brought the Greek deputies to Ferrara. The Archbishop of Taranto, a papal legate at Basel, circulated an ordinance in the name of the council, and sealed with its seal, recommending Udine or Florence as the place of conference. This was a high-handed proceeding, as not the council, but only a minority of the council, desired such a transfer, and the use of the seal was unauthorized. The Archbishop of Taranto was arrested, but he escaped. Yet the Pope followed the minority and issued a bull calling a council at Florence.

This proceeding put an end to forbearance on the part of the council, which, on July 31, 1437, again summoned the Pope to its bar and, on his failing to appear, not only declared him contumacious (Oct. 11, 1437) but, on his transferring the council to Ferrara, went so far as (on Jan. 24, 1438) to decree his suspension from the functions of the papacy. His party was, however, so strong that this decree could not be carried into effect; while some of those who had been among the more influential members of the council, the Cardinal legate Julian himself, and the greater number of the Italians, had shortly before left Basel and gone over to the Pope's side. All the more resolutely did Cardinal Louis d'Allemand, Archbishop of Arles, a man of most superior understanding, courage, and eloquence, now guide the proceedings. On May 16, 1439, the council declared the Pope a heretic for his obstinate disobedience to its decrees; and on June 25, 1439, formally deposed him for simony, perjury, and other offenses, and elected in his stead Amadeus VIII of Savoy, who called himself Felix V (q.v.).

In the latter part of 1443 Felix V left Basel and went to Lausanne. On May 18, 1448, Frederick III forbade the city of Basel longer to harbor the council. So, on June 25, it decreed its transfer to Lausanne; and there, on April 25, 1449, it decreed its dissolution. The council had shown itself powerless to effect the reforms in the Papal Curia with which it had set out and was on the whole a failure. Its reforming decrees are held to be invalid by the Roman Catholic canonists; but extreme Gallicans, such as Richer, recognize it as ecumenical all through, and the more moderate ones, with Natalis Alexander, up to the prorogation to Ferrara.

Consult: *Monumenta Conciliorum Generalium Sæculi XV* (Vienna, 1857–96), *Concilium Basiliense; Studien und Quellen zur Geschichte des Konzils von Basel*, edited by Von Haller (3 vols., Basel, 1896–1900); also C. J. Hefele, *Konziliengeschichte*, vol. vii (Freiburg, 1891).

BASEL, Treaties of. Two important treaties of peace, concluded at Basel on April 5, and July 22, 1795, the first between France and Prussia, the second between France and Spain. Prussia withdrew from the coalition against France, took under her protection all the states of northern Germany which should, like herself, relinquish the war in which the German Empire was engaged, and gave up her possessions beyond the Rhine. The treaty is important in that it put back for some time all possibility of German unity. Spain gave up her portion of Haiti and prepared the way for that alliance with France which was afterward productive of consequences so important during the Napoleonic wars.

BASEL, University of. A university authorized by a papal bull in 1459 and opened in 1460. During the Reformation it was reorganized on a Protestant basis and became the stronghold of Protestant scholarship and as such exerted an influence throughout the world. Erasmus, who came to Basel in 1520, and Œcolampadius, who came in 1523, were among the famous teachers, and, at a later day, Euler and the Bernoullis were renowned professors of mathematics there. Basel is now the chief seat of theological study in Switzerland. It has also faculties of law, medicine, and philosophy, a library of over 250,000 volumes and 4000 MSS., chiefly dealing with the Reformation, besides other valuable collections and museums. There were in 1912–13 nearly 950 students in attendance.

BASE LEV'EL. See Physiography.

BASE LINE. See Geodesy and Surveying.

BASEL'LA (probably a native name in Malabar). A genus of tropical plants belonging to the family Chenopodiacæ. The genus is now believed to consist of but one species, *Basella alba*. Various forms of this are cultivated in the tropics as pot herbs, and in the neighborhood of Paris plants are sometimes raised in hotbeds and planted out as a substitute for spinach.

BASE'MENT (Fr. *bas*, low; cf. Eng. *base*, low, mean). In architecture, the lower story of a building when not its main story. It is usually distinguished from the rest of the house by a simpler and more massive architectural treatment. Mediæval and Renaissance palaces were almost invariably built with basements, which contained porter's lodge, storerooms, offices, etc.; the windows were smaller than those of the other stories and often barred. In many cases this basement itself consisted of two stories, the upper one being a mezzanine where the servants had their quarters. In modern public buildings generally the main first story is usually raised above a basement of more or less importance. In American city residences (especially in New York) the names "American," "English," and "French" are applied to different types of basement, with reference to their interior arrangement; but these terms are arbitrary and local.

BASE OF OPE'RA'TIONS. The base or point from which active operations against an enemy are directed or organized, and from which are issued such stores and munitions of war as may be required by the force whose base it is. In countries sparsely populated, armies, and particularly the invading army, must be victualed and supplied from their own base. Lines of operation therefore follow navigable rivers or railroads; and the base is fixed at such a point on the line or route as to be as secure as possible from molestation and yet, if necessary, give protection and shelter to the troops, should

they be driven back. The more important field hospitals are also stationed at the base. To separate or cut off an army from its base is practically to defeat it; the attainment or defeat of such an end being a consummation ardently sought for. The history of the American Civil War (1861–65) is full of instances of such manœuvring. Grant's operations against Vicksburg in December, 1862, are a case in point. In the British-Boer War of 1899–1902 England was forced to keep nearly twice as many troops as there were Boers actually in the field for the sole purpose of guarding the various bases of supplies and operations. This was due to the wide area of the theatre of operations, the absence of available rivers, and the necessity of transporting the large quantities of food and ammunition required for the vast armies in the field. In the case of an invading army operating across the sea, a base must be captured by some means and held securely as a preliminary to the campaign. The Japanese in the war against Russia (1904–05) first established a base at Chemulpo, then at Dalny, where all their supplies were landed and whence they were distributed to the army. The capture of this base would have meant disaster to the army.

BASEY, bä'sā. A town on the north shore of San Pedro Bay in the province of Samar, Philippines. It is 35 miles southeast of Catbalogan. Pop., 1903, 13,504.

BASH, BERTHA RUNKLE. See RUNKLE, BERTHA.

BASHA. See PASHA.

BA'SHAN (Heb. rich soil, in Gk. *Basán*, *Basan*), or **BAT'ANÆ'A.** A district of Palestine stretching from Mount Hermon in the Antilibanus on the north to the brook of Jabbok (the modern Nahr el Zerka) on the south, and from the Jordan on the west to the boundaries of the Geshurites and Maachathites on the east (Map: Palestine, E 2). Ashtaroth, Edrei, Golan, and Salchah were its chief cities. According to the account in Num. xxi. 33–35, and Deut. iii. 1–3, the last of its Amorite rulers was the giant Og, who with all his sons was killed by the Israelites under Moses at the battle of Edrei and the land given to the half tribe of Manasseh (Josh. xiii. 29–31). Bashan, as a rich pasture land, was famed for its sheep and oxen, which, because of their large size, suggested to the prophets types of oppressors (Amos iv. 1). The oak plantations of Bashan also seem to have made a strong impression on them (Ezek. xxvii. 6; Isa. ii. 13). Bashan corresponds to the district now called Hauran. In Roman times Batanæa formed one of its five provinces, the others being Ituræa, Gaulanitis, Trachonitis, and Auranitis. See HAURAN.

BASH'FORD, JAMES WHITFORD (1849–1919). An American educator, born at Fayette, Wis. He graduated at the University of Wisconsin in 1873, studied at the theological school of Boston University, and from 1875 to 1889 was pastor of Methodist Episcopal churches at Boston and Auburndale, Mass., Portland, Maine, and Buffalo, N. Y. In 1889 he was appointed president of the Ohio Wesleyan University and held the office till 1904, when he was made bishop of the Methodist Episcopal church. He took an active part in organizing missionary work and relief measures for the famine in China. He published: *Outlines of the Science of Religion* (1891); *The Awakening of China* (1906); *China and Methodism* (1906); *God's Missionary Plan for the World* (1907).

BASHI, bäsh'ī (Turk. *bashi*, head, chief). A generic title for Turkish military officials. Some of the most prominent are: *Toptchjy-Bashi*, general of artillery and inspector of forts, etc.; *Solaki-Bashi*, commander of the archers (now practically extinct); *Sanjak-Darlars-Bashi*, chief of the 50 color bearers; *Konadji*, or *Konakji-Bashi*, quarter master-general (or chief of the barracks); *Boyuk-Bashi*, great high chief, or colonel of a regiment of 1000 militia. Other military and civil Turkish titles are: *Pasha*, general—which title, however, may be conferred as a distinction on naval officers or distinguished professional men in the civil walks of life. It is the Turkish equivalent of the European "Lord," or "Baron," and is the title of viceroys, provincial governors, etc. *Bey*, a civil title equivalent to the English baronet or knight, which may be conferred on all classes, civil or otherwise. *Effendi*, the courtesy title of a gentleman, used in the same relation as the English word "esquire." *Bimbashi*, or *Hinbashi*, is the title adopted in the Anglo-Egyptian army for the colonel of a battalion or regiment; its native usage is "leader of a thousand." *Beg*, or *Beik-Bey* is a title commonly applied to all military and naval officers and distinguished visitors. It applies also to the governor of a small district, who displays a horsetail as an insignia of rank.

BASHI-BAZOUKS, bäsh'i-bä-zōōks' (Turk. *bashi*, head, headdress, appearance + *bozug*, spoilt, disorderly, from *boz*, to spoil, damage, destroy). Turkish irregular troops; natives chiefly of the wretchedly governed pashalics of Asiatic Turkey, and possessing the worst reputation of any body or class of fighting men in the world. They are wild, turbulent, and wholly undisciplined, more ready to plunder and kill than to fight, and speak a debased Turkish *patois* not easily understood. Physically, they are, as a rule, men of splendid proportions, their tall red fez adding to their apparent height, while the uniform *ensemble*, not unlike the Scottish Highlander, adds to their picturesque appearance. Their equipment consists mainly of a great number of knives and swords, completely loading the waist belt and compelling them to adopt a gait, peculiar to themselves, caused by the necessity of swinging the arms and legs clear of their equipment. Such rifles as they usually possess are of patterns long since obsolete. They are willing to attach themselves to any leader who understands their jargon and who can promise them plunder, and are frequently used by municipal governors depending on pillage and plunder for their pay. It was thought, during the Crimean War of 1854, that they could be usefully employed against the Cossacks, particularly in the sort of irregular warfare usually waged by them. Consequently, in 1855, when the British government took into its pay a Turkish contingent, a corps of Bashi-Bazouks was put under the command of an officer of the British-Indian army. The experiment, so far as the Bashi-Bazouks were concerned, proved a complete failure, as the war ended before they were even partially reduced to discipline. They frequently torture their enemies and mutilate the dead. It is a matter of record that in May, 1876, under the leadership of Achmet Agha, they slew in cold blood over 1000 defenseless Bulgarians who had sought shelter in a church.

BASHI (bä'shē) **ISLANDS.** A small group

of islands, the northernmost of the Batan group in the Philippines. Bashi Channel separates the islands from Formosa.

BASHKIRS, bâsh-kērz'. A Finno-Tatar people of Mongolian stock (height, 1.650 meters), living in the Orenburg District of Russia, along the slopes of the Urals. They number about 1,000,000 and subsist on their flocks and herds. In faith, the Bashkirs are Mussulmans. Deniker (1900), who terms them "a tribe mixed with Turkish, Mongol, and Ugrian elements," classes them in the central group of his Turko-Tatar stock, along with the Kirghiz, etc. Consult Ujfalvy, *Les Bachkirs* (1880), and Katarinskij, *Dictionnaire baschkire-russe* (Orenburg, 1900).

BASHKIRTSEV, bâsh-kēr'tsĕf, Marie Konstantinovna (1860–84). A Russian artist and writer, one of the most individual characters in the literary annals of the nineteenth century. She was born near Poltava, Russia, and died of inherited consumption in Paris. Her parents were very wealthy and of noble descent, and their daughter, who was gifted with beauty, an unusual voice, and a mind of remarkable maturity, had the advantage of residence in Rome, Nice, Paris, and other cities, where she moved in the highest society. A weakness of the throat, followed by deafness, obliged her to abandon the hope of achieving fame as a singer, and in her seventeenth year she began the study of art in Paris under Robert-Fleury, pursuing it later under Bastien-Lepage until her death, and producing, in spite of her physical disabilities, paintings of rare merit. Her distinctive work, however, was a journal begun in her thirteenth year and faithfully continued through life. It was designed for publication after her death, and intended to be, to use her own words, "the transcript of a woman's life—her thoughts and hopes, her deceptions, weaknesses, good qualities, sorrows, and joys." She herself believed it to be unparalleled in literature, and the same opinion was expressed by Gladstone, one of her many sympathetic reviewers (*Nineteenth Century*, October, 1889). Consult: *Journal de Marie Bashkirtseff* (Paris, 1887) and the full translation of the same (Chicago, 1890); *Lettres de Marie Bashkirtseff* (Paris, 1891), and *Further Memoirs* (London, 1901). The suppressed portions of her diary have appeared in the *Revue des Revues* (1900).

BA'SIC BES'SEMER STEEL PROC'ESS. See Iron and Steel, Metallurgy of.

BASID'IOMYCE'TES, bâ-sĭd'ĭ-ō-mī-sē'tēz (*basidium*, see below + Gk. *μύκητες, mykētes*, mushrooms, fungi). One of the three great groups of true Fungi, second only to the Ascomycetes in number of species, of which approximately 20,000 are known. The group is characterized by the presence of a "basidium," which produces spores ("basidiospores") in a characteristic way. A young basidium is a cell that contains two nuclei; these nuclei fuse, and this fusion is followed by two successive divisions, resulting in four nuclei. In connection with these nuclear divisions cross-walls may form, so that the mature basidium may be four-celled, or it may remain as one cell with four nuclei. Those Basidiomycetes whose basidia are four-celled are called "Protobasidiomycetes"; while those whose basidia are one-celled are called "Autobasidiomycetes." The mature basidium puts out a delicate branch ("sterigma") for each nucleus (or cell), and into the tip of each sterigma a nucleus migrates. The tip of each sterigma is rounded off to form a spore (basidiospore), which contains the nucleus. Often only two spores are formed, as in the case of the common field mushroom (*Agaricus campestris*), but in this case two of the four nuclei remain in the basidium.

The orders of Basidiomycetes are numerous, but they may be considered under three great groups. The principal forms in one group are the smuts (Ustilaginales, q.v.) and the rusts (Uredinales, q.v.), which are very different from other Basidiomycetes. They have the four-celled basidium (Protobasidiomycetes), but the chief difference is that the basidium is a separate plant, produced by a spore and producing spores (basidiospores).

The two other groups produce a special structure upon the mycelium (the body of the fungus), in connection with which the basidia are formed. In other words, the basidia are a part of the body and not separate individuals. This special structure is a complex "sporophore," formed by many branches from the mycelium. The numerous orders are distinguished by the character of this sporophore.

In one of the groups the basidia, a layer of which is called the "hymenium," are exposed upon the sporophore. Those orders with an exposed hymenium are called "Hymenomycetes," and the representative and largest order is Agaricales, to which the mushrooms, toadstools, and bracket fungi belong. The ordinary form of the sporophore is the toadstool form, with its stalk ("stipe") and cap ("pileus"); but the bracket-like and hoof-like sporophores are also very common. There are three arrangements for exposing the hymenium: one is to expose it as a layer upon the surface of "gills," and hence the family of "gill fungi" (Agaricaceæ); another is to expose the hymenium as a layer lining tubes which open by pore-like openings upon the surface, and hence the family of "pore fungi" (Polyporaceæ); the third is to expose the hymenium as a layer upon the surface of tooth-like projections, and hence the family of "tooth fungi" (Hydnaceæ). Many of these forms are very destructive to forest trees, the mycelium penetrating the wood and causing various kinds of "rot." They invade the trees either by the spores getting into wounds or by a direct invasion of the mycelium in the soil into the roots of the trees.

In the other group the hymenium is completely inclosed by the sporophore, and such orders are called "Gasteromycetes." The representative Gasteromycetes are the puffballs (Lycoperdales). The globular sporophore is differentiated into two regions: a tough jacket ("peridium") and the tissue within ("gleba"). The gleba contains numerous chambers lined with hymenium. So numerous are the basidiospores that when the gleba dries out and the peridium bursts they are puffed out in clouds.

A remarkable order of Gasteromycetes is formed by the "nest fungi" (Nidulariales), in which the sporophore opens into a cuplike structure, and the persistent and separated chambers of the gleba are revealed lying like eggs in a nest. The most highly specialized sporophore among Gasteromycetes is that of the "stink horns" (Phallales), in which a hollow stalk develops within the gleba and elongating rapidly bursts through the peridium, carrying the chambered gleba at its summit like a cap. The gleba thus exposed deliquesces into a slimy, dripping

mass with the odor of carrion, which attracts carrion flies, by whose agency the imbedded spores are dispersed. See Plate of Fungi.

BASIL, băz'il (Gk. *βασιλικός, basilikos,* royal) (*Ocimum*). A genus of plants of the family Labiatæ (q.v.). The species are all natives of the tropics, or of the warmer temperate parts of the world, and are generally characterized by a pleasant aromatic smell and taste. Sweet basil (*Ocimum basilicum*) is an annual plant, a native of the East Indies, about 1 foot high, with ovate or oblong leaves, which has long been cultivated in Europe for seasoning food. Bush basil (*Ocimum minimum*) and tree basil (*Ocimum gratissimum*), also natives of the East Indies, are cultivated in gardens for the same purpose. *Ocimum campechianum* is a native of Florida and tropical America. Basil is a common name for *Pycnanthemum,* a North American genus of many species; also of *Calamintha clinopodium* of Europe and North America. *Acinos vulgaris* (now *Calamintha acinos*) is a native British plant known as basil thyme. Basil is used largely as a seasoning herb in southern Europe, and is becoming more common in the United States, as the Greeks and Italians grow it quite commonly.

BASIL I (c.812–886). Byzantine Emperor from 866 to 886, and founder of the Macedonian dynasty. He was of Armenian descent, and when a boy entered the service of Michael the Drunkard (q.v.) as a groom. By his strength and bravery he attracted the Emperor's notice and won his favor. He was promoted rapidly until he was made protostrator. He was the Emperor's boon companion, and after the murder of Bardas, in which he had a share, he was chosen by Michael, in 866, to be his associate in the Empire. The next year Basil, who had obtained a firm control of the government, caused Michael to be murdered. The deed was unrevenged, no party took up the cause of Michael's children, and Basil ruled, until 886, with remarkable ability. Syracuse was lost, but in 878 elsewhere his armies and fleets were successful. At home he reformed the finances, began a recodification of the laws (see Basilica, 2), and worked earnestly to improve administration. He reinstated Ignatius (q.v.) as Patriarch, and sought to end the schism between the Eastern and Western churches; but in this he failed. The Macedonian dynasty ruled at Constantinople for 190 years. Consult Bury, *Eastern Roman Empire* (London, 1912), and Vogt, *Basile I* (Paris, 1908).

BASIL II (957–1025). Byzantine Emperor, the son of Romanus II, at his father's death was only two years old. First his mother, Theophano, then Nicephorus Phocas (963–969), and finally John Zimisces (969–976) ruled the Empire as the guardian of, or co-Emperor with, Basil and his brother. He and his brother Constantine actually became emperors in 976, but Constantine left the government to Basil, who was obliged to carry on almost incessant wars. He suppressed a formidable revolt in Asia Minor in 979, recovered Calabria and Apulia in Italy, and had several conflicts with the Saracens in Sicily. For many years he waged war against the Bulgarians, whom he finally subdued in 1018. Basil, for this victory, won the surname of Bulgaroctonus, "Slayer of Bulgarians." His reign of almost half a century was a period of victory for the Byzantine Empire. Consult Schlumberger, *L'épopée byzantine* (Paris, 1897), and Gibbon, vol. v.

BA'SIL THE GREAT (c.330–379). Bishop of Cæsarea in Cappadocia, founder of Eastern monasticism, theologian, and doctor of the Church. He was born at Cæsarea, of Christian parentage, about the year 330 A.D., and died there, Jan. 1, 379. He is often grouped with his brother, Gregory of Nyssa (q.v.), and Gregory of Nazianzus (q.v.), under the general title of "the three Cappadocians," all being distinguished leaders of Trinitarianism and successors of Athanasius. Basil received a careful education, under such teachers as the rhetorician Libanus, at Constantinople, and Himerius, at Athens. Here (351–355) two of his fellow-students and friends were Gregory of Nazianzus and Julian, afterward Emperor. Returning to Cæsarea, Basil entered with zest into the social life of the city and thus aroused the anxiety of his pious sister, Macrina, who wished him to embrace the religious life. This he was soon led to do. He first visited the famous hermits of Syria, Palestine, and Egypt, and then took up his abode in a picturesque spot on the banks of the Iris, in Pontus, where he gathered a few sympathizers about him and spent several years in severe asceticism. His monastic period falls between 357 and 364. The rule of St. Basil is still the standard of the Oriental monks. It was less systematic than that of St. Benedict (q.v.), which arose later in Italy and controlled the monastic development of western Europe, but it included the characteristic features of monachism, viz., a union of active labor and quiet devotion with strict asceticism.

Basil was made presbyter of Cæsarea in 364. His intense activity and devotion to the people soon gave him an influence greater even than that of the local bishop. He went about establishing new communities of monks and founding hospitals, orphanages, etc. During a particularly severe famine (368) his labors were little short of heroic. All this time his theological position was becoming more clearly defined. He had originally sympathized with the mediating party in the Arian controversy (see Arius), though his primary interest was not in dogma, but in the practical religious life. But his antagonism to the thoroughgoing Arians led him ever closer to the orthodox side. This attitude aroused hostility, and when the bishopric of Cæsarea became vacant (370), and he was a candidate for the position, there was violent opposition. He was, however, elected, and his administration proved to be vigorous and successful. The office carried with it a virtual primacy of the churches in that part of Asia Minor. He was Metropolitan of Cappadocia and Exarch of Pontus, having many bishops under him, who were often opposed to his policy. But firmness and patience overcame opposition, even from the Arians, his greatest foes. A notable instance of Basil's courage was his withstanding the demands of the (Arian) Emperor Valens, in 372, when, in spite of threats of deposition, the bishop refused to surrender his orthodoxy or grant any favors to heretics. The Emperor is said to have been so impressed by Basil's dignity and courage that he left him in peaceful possession of his see.

As a theologian, Basil ranks below Athanasius and below his brother Gregory. In common with the other Cappadocians he emphasized the trinity rather than the unity of the Godhead. The completed Trinitarian formula asserted one substance (*ousia*) and three persons (*hypostases*).

In the form in which Basil taught this doctrine it laid him open to the charge of tri-theism. One of Basil's greatest disappointments arose from his failure to secure doctrinal harmony between Eastern and Western Christendom. In support of Catholic orthodoxy he was compelled to look toward the West, but his overtures were received with marked coolness at Rome. Pope Damasus never forgave Basil for his failure to recognize the Roman claim to primacy; and Jerome accused him of stubborn pride in thus persistently refusing Damasus due honor. Moreover, Basil's orthodoxy was for a long time under suspicion, for in his early life he had been known to have friends among the Arian heretics. He died before East and West came to an agreement.

Basil was master of a fine literary style. His works include expositions of the Bible, dogmatic, moral, and ascetic treatises, liturgical pieces, and letters. *The Liturgy of St. Basil* is not wholly his work. Some 370 letters are preserved. The best complete edition of his works is the *Benedictine* (3 vols., Paris, 1721–30; reprinted in Migne's *Patrologia Græca*, vols. xxix, xxxii). His chief works are translated into English in the *Nicene and Post-Nicene Fathers*, 2d series, vol. viii (New York, 1895), with valuable prolegomena containing a sketch of his life and an analysis of his works. His most important work, *De Spiritu Sancto*, was edited by Johnston (Oxford, 1892). Consult, in general, Smith and Wace, *Dictionary of Christian Biography*, art. "Basilius of Cæsarea" (London, 1887).

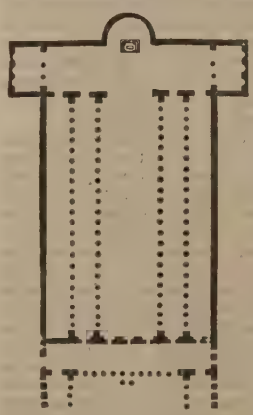
BASILE, bâ-zē'lâ, Giovan Batista, Count of Torone (c.1575–1632). An Italian author, born at Naples. His literary productions in the Neapolitan dialect are most valuable. His *Pentamerone overo lo cunto de li cunti, trattenemiento de' peccerille di Giov. Alesio Abbatutis* (Naples, 1634–37), a collection of 50 folk tales resembling in substance the *Hausmärchen* of Grimm and in manner the works of Perrault and Rabelais, is one of the most popular books of its kind. It has been translated into various European languages and has been extensively imitated by such artists as Lippi, Salvator Rosa, Carlo Gozzi, and Wieland. Neglected by the author, *Lo cunto de li cunti* was much read in Italy in the seventeenth and eighteenth centuries and became universally famous through the criticism of Grimm and the translation of Liebrecht (1846). Much admired by Sir Walter Scott (1832), the tales have become familiar to English-speaking peoples in the translations of Keightley and Taylor and in the latest of R. Burton (London, 1893). Consult B. Croce, *Studi sulla letteratura italiana del Seicento* (Bari, 1911).

BASIL'IAN ART. See Monastic Art.

BASILIAN ISLANDS. A group of about 60 islands constituting a part of Mindanao, Philippines. They lie off the south coast of the peninsula of Zamboanga, are of volcanic and coral origin, and have a total land area of about 350 square miles. The population is estimated at about 8000. Fishing and a little weaving are the principal occupations. Fruit, sugar, grains, hemp, cotton, tobacco, and fine timber grow. The capital, Isabella, is on the northwest shore of Basilian Island and is about 575 miles from Manila.

BASILIAN MONKS, or **MONKS OF SAINT BA'SIL.** An order founded by St. Basil, Bishop of Cæsarea, in 358; it grew to large numbers before the death of the founder (379). The greater portion of the monks of the Greek church are of the order. In the Western church Basilian monasteries existed, and the order became strong after the Reformation in Spain and Italy. A modern Basilian order, founded in France in 1822, devoted to education, has colleges in Canada and the United States. There are also Basilian nuns, who call Macrina, the sister of Basil, their founder. The records of the order show that it furnished 14 popes, many cardinals, and nearly 12,000 martyrs. The rule of Basil is the foundation of that of Benedict, the great founder of Western monasticism.

BASIL'ICA (Lat. from Gk. *βασιλική, basilikē*, royal, scil. *στοά, stoa*, porch). The large colonnaded building used by the Romans for the transaction of business and legal affairs; also the common type of the early Christian churches. The name is derived from the *stoa Basileios*, or king's portico, at Athens. Vitruvius (q.v.) says: "Basilicas ought to be built in the warmest quarters of the market places, in order that, in winter, the merchants assembling there may not be inconvenienced by bad weather"; and elsewhere he speaks of the tribunal projected like a hemicycle from the main building, so "that those who stand near the magistrates may not be disturbed by those doing business in the basilica." These buildings varied in proportions and arrangement. Vitruvius, who built one himself at Fanum, says that they should be oblong, their width being between one-third and one-half of their length, and divided into three parts by two rows of columns, the central part being three times as wide as the two sides, which are called porticoes. A second story is made over the porticoes by a second series of shorter columns forming a gallery with a marble parapet, which usually extends also across the short ends and was used for promenaders and spectators. At one of the short ends a tribunal projects in the form of a semicircular or square apse. Here sits the judge, or prætor, surrounded by his assessors or jurymen; it is often partly screened off from the main body of the building by smaller columns and is on a higher level. On either side of it is a small room connected with it—cabinet or robing room. There are many variations from the three-aisled type described by Vitruvius. Some are halls with a single nave, without porticoes or galleries, as at Aquino and Palestrina; others—and these the most splendid—have as many as five aisles, with four rows of columns; e.g., the Basilicas Julia and Ulpia; others have two hemicycles, one at each end, as Trajan's Basilica Ulpia; others are virtually

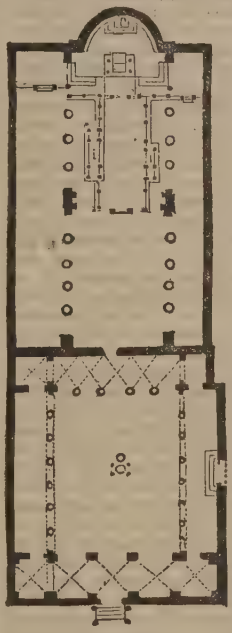


PLAN OF THE OLD BASILICA OF ST. PETER AT ROME.

square in form, as at Otricoli; others—and these are the majority—have no upper galleries; others, finally, have heavy piers and vaults in place of colonnades and wooden roof, as the colossal Basilica of Constantine. The tribunal end appears to have had a solid wall, but on the other three sides the building was often open, with either a simple colonnade (Ulpia) or a mixed arcade with engaged columns and entablature (Julia) such as we are familiar with in the Coliseum. Some, however, were inclosed by walls on three sides, as the Ulpian, or on all sides, as at Pompeii. For 500 years the Romans built basilicas (c.200 B.C. to 300 A.D.) as one of their most characteristic and sumptuous monumental expressions, alongside of their memorial arches, aqueducts, and *thermæ*. Until 184 B.C. their commercial and judicial business had been mostly transacted in the open forum. But in that year the Basilica Porcia was built (burned in 52 B.C.); in 179 the Fulvia; in 169 the Sempronia; in 121 the Opimia; in 46 the Julia. Pliny calls the Æmilia and the Julia two of the four most superb monuments of Rome. They flanked the Forum on opposite sides, and their ruins have recently been studied with great care. Everywhere that Roman colonies were established under the late republic and the Empire basilicas were built in connection with the forums. They were the necessary outward sign of the Roman law, the seat of justice as well as of trade. The earliest basilica in good preservation is that at Pompeii, which has excited the greater interest because it may represent the original Greek type; it has an open porch, five doors, three aisles, a portico across both ends, and a well-preserved, raised, oblong tribunal at one end. Other examples exist: in the Orient, at Palmyra; in Germany, at Treves. In Rome itself the two most famous examples built under the Empire were the Ulpia, erected by Trajan in his forum, and that begun by Maxentius and finished by Constantine, unique for its immense vaulting of tunnel and groin vaults; for all other known basilicas appear to have had wooden roofs except the Ulpian, whose roof was of bronze. It is a common error to suppose that they were roofed only over their side aisles or porticoes with the central space open to the sky; this may, however, have been the case at Pompeii.

The Roman public basilica was therefore a sort of covered forum. The term was, however, extended to other colonnaded halls and porticoes of similar plan, but connected with theatres, baths, temples, and even palaces and villas. The largest room in sumptuous houses, with a higher roofed central section with windows and two rows of columns forming lower side aisles (as in Domitian's palace on the Palatine), frequently served wealthy converts to Christianity in the earliest times as a place of worship.

As the only type of covered structure suitable for large gatherings, it was natural that both the type and the name of the basilica should be adopted for Christian churches. The arrangements suited the requirements of the Christian liturgy. The hemicycle became the apse; the bishop and presbyters sat upon the bema, where the judge and his assessors had been; in place of the altar of a pagan god, the tomb of a martyr or saint stood in front of the bema; the congregation could conveniently be arranged along the side porticoes or aisles—men on one side, women on the other (or, in the East, men below and women in the galleries). The main change at first was the omission of the cross colonnades across the short ends. Later an atrium (q.v.) was often added at the front, and in some cases a transverse hall or arm intersected the nave in front of the bema (q.v.) or apse. The most splendid examples of the early basilican type of church were the three vast five-aisled basilicas of the fourth century in Rome dedicated respectively to St. Peter, St. Paul (outside the walls), and St. John (at the Lateran), of these the first was demolished (see ST. PETER'S); the second, burned in 1823, has been reconstructed with great splendor; the third, though standing, has been completely transformed by successive remodelings. The most perfect of early Christian basilicas extant in Rome is that of Santa Maria Maggiore, built in 432 and but little altered. The older (sixth century) portion of San Lorenzo, in two stories, shows the mediæval practice of piecing together unrelated members torn from pagan temples and ruins. The basilica of San Clemente (1096–1108) with a fine atrium, alone preserves the mediæval arrangements and furnishings of the choir, ambones, ciborium, and apse (see these terms respectively). In Italy the primitive type was preserved as late as the twelfth and thirteenth centuries in certain provinces, especially around Rome and in Tuscany, with its oblong plan; two (or four) rows of columns (or very seldom square piers) dividing the nave from the aisles and supporting sometimes a straight architrave; sometimes a row of narrow arches; and thin walls supporting only wooden roofs, with the rafters and frame showing. Sometimes there was a narthex or portico at the entrance, and at the opposite end, in the largest basilicas, a cross-nave intervened in front of the apse, in the centre of which stood the altar. Marble incrustations, mosaic pictures and emblems, and inlaid pavements adorned the finer basilicas. The early basilicas had but a single apse, but by the sixth century a smaller apse was often added on either side, developed from the two side chambers of the ancient basilica, which had become sacristy and treasury in the earliest churches. Until the sixth century the basilican form ruled everwhere; then the Orient adopted Byzantine models, employing the dome, while in the north of Italy in the tenth century under Lombard influence, and later in western Europe generally, the scarcity of antique columns ready-made and of marble, the substitution of heavy clustered piers, large arches, and thick walls for the



PLAN OF BASILICA OF SAN CLEMENTE AT ROME. THE ONLY SURVIVING BASILICA WITH AN ATRIUM.

serried columns, small arches and thin walls of the basilican type of church, and, above all, the introduction and development of vaulting, completely transformed the aspect of the churches, to which one can no longer apply the adjective "basilican," although they still retain the fundamental elements of the basilica plan. (See ROMANESQUE ARCHITECTURE.) Besides the important basilicas already mentioned one may note from the early period Santa Sabina and Sant' Agnese at Rome; Church of the Nativity at Bethlehem; Sant' Apollinare Nuovo, Sant' Apollinare in Classe, San Francesco, and San Vittore at Ravenna; St. John at Constantinople; St. Demetrius at Salonica, the Crocifisso at Spoleto; the cathedrals at Parenzo, Triest, and Grado. In central Syria, where there are remarkable ruined Christian towns deserted ever since the Mohammedan invasion in the seventh century, there are important basilicas at Shakka, Tafka, Sueideh, Kerbet-Hass, Rueiha, Der-Seta, Bakuza, Kalb-Luzeh, Turmanin, Kalat-Seman, etc. Of later date are the following at Rome: San Giorgio in Velabro (682), Santa Prassede (ninth century), Santa Maria in Trastevere and the nave of San Lorenzo (twelfth century); and elsewhere San Miniato at Florence, cathedrals at Torcello and Murano, and two churches at Toscanella, besides many others which combine basilican and Romanesque elements in varying degrees. See CHURCH; Plate of PAESTUM.

BASILICA (Gk. neut. pl. of *βασιλικός*, *basilikos*, royal). A legal code published by Leo VI of the Byzantine Empire at the close of the ninth or the beginning of the tenth century. Its name is equivalent, in the opinion of some, to imperial law; but others think it was given in honor of Basil, the father of Leo, who began the work. It was composed of 60 books. The materials used were Greek translations of the *Corpus Juris Civilis* of Justinian, commentaries on the *Corpus*, and some later laws. In it the influence of Christianity is very marked, especially with regard to family relations. The best edition is Heimbach: *Basilicorum Libri LX Gr. et Lat.* (6 vols., Leipzig, 1833–70), completed by Zachariæ von Lingenthal, who published the *Prolegomena* in 1846 and a supplement in 1870. But only about two-thirds of the whole work are extant. Consult Heimbach, "Griechisch-römisches Recht," in Ersch und Gruber, *Encyklopädie*, part lxxxvi, and Mortreuil, *Histoire du droit byzantin* (3 vols., Paris, 1843–47).

BASILICA ÆMIL'IA. The finest basilica of Rome, built by L. Æmilius Paulus in 54 B.C. at a cost of $2,400,000, supplied by Cæsar, for the purpose of enlarging the Forum. It stood on the north side of the Forum near the Curia, or Senate House. After a fire it was restored in 14 B.C. at the expense of Augustus, and adorned with splendid columns of Phrygian marble, which were later set up in St. Paul's without the Walls and destroyed by fire in 1823. Within the last 10 years much of the building has been excavated (consult Hülsen-Carter, *The Roman Forum*, Rome, 1906). The building whose ruins are now visible was on the site of an older structure, known as the Basilica Fulvia et Æmilia, begun in 179 B.C., by M. Fulvius Nobilior and M. Æmilius Lepidus.

BASILICA JU'LIA. A great basilica on the south side of the Roman Forum, begun by Julius Cæsar in 54 B.C., and opened after the battle of Thapsus in 46 B.C. It was several times destroyed by fire and rebuilt. Its walls were of solid marble, and the pilasters which divided its nave and four aisles were of travertine sheathed with marble. The eastern end is crossed by the Cloaca Maxima. In the Basilica Julia the sessions of the Court of the Centumviri (q.v.) were held. In the sixth century the western vestibule was made into the church of Santa Maria de Foro; in the eleventh, rope makers took possession of it; and in the fifteenth century it was given over to lime burners, who set up in it their kilns and turned its marbles into lime. Later, it was used as a hospital burying ground, which covered its surface with a layer of human bones 6 to 8 feet deep. The basilica, like other buildings, has from time to time been despoiled of its materials, which have been used in the construction of other edifices, and the remains at the present time represent chiefly modern restorations. Consult Hülsen-Carter, *The Roman Forum* (Rome, 1906).

BASILICA OF CON'STANTINE. See CONSTANTINE, BASILICA OF.

BASILICA PORCIA, pôr'shĭ-ȧ. See BASILICA, 1.

BASILICA UL'PIA. See BASILICA, 1.

BASIL'ICON (Lat. from Gk. *βασιλικόν*, *basilikon*, a black plaster, properly neut. of *βασιλικός*, *basilikos*, royal, i.e., of great virtue). A name given to an ointment composed of yellow wax, black pitch, resin, and olive oil or lard. The ointment has also been called *unguentum tetrapharmacum* (from the Gk. *τέτταρα φάρμακα*, *tettara pharmaka*, i.e., four drugs). Basilicon ointment, or resin cerate, as it is otherwise known, is used as a gently stimulant application to ulcers, burns, scalds, chilblains, and boils.

BASIL'ICON DO'RON (Gk. *βασιλικὸν δῶρον*, *basilikon dōron*, royal gift). The title of a treatise written by James VI of Scotland (afterward James I of England) for the instruction of his eldest son, Prince Henry, who died before his father. It was first printed in 1599. The work is divided into three books, which treat severally of a king's duty toward God, his duty in his office, and his duty in indifferent things. In the first book is laid down the divine right of kings, a doctrine whose practical application proved so disastrous to the Stuarts.

BASILIDES, bās'ĭ-lī'dēz (Gk. *Βασιλείδης*, *Basileidēs*). A famous Gnostic Christian of Alexandria, who flourished during the reign of Hadrian (117–138 A.D.). Few details of his life are known. We are told, on doubtful authority, that he was a pupil of the heretical Menander at Antioch, and that he taught in Persia, where his dualistic system was later revived by Mani (see MANICHÆISM). Basilides himself claimed to be a follower of one Glaucias, "the interpreter of Peter," but no such person is known to us from any other source. The otherwise unknown prophecies of Barkabbas and Barkoph, to which Basilides refers, have been conjectured to be apocryphal Zoroastrian books. Basilides wrote a Gospel commentary, called the *Exegetica*, in 24 books. Origen speaks of a "Gospel according to Basilides," but it is improbable that Basilides did more than edit some kind of a gospel for the use of his followers. He shows some acquaintance with material included in our Matthew, Luke, and John. His son Isidore wrote several books, three of which are mentioned by Clement of Alexandria, and from others of the Basilidian school there come various incantations and odes. None of these writings are known to us except through opponents of the

movement. Agrippa Castor was one of the first to attack Basilides, but his book has perished. Irenæus, Clement of Alexandria, Hippolytus, and Origen discuss Basilides' doctrine at some length, but they do not agree in their accounts of what he taught. Following their divergent opinions, some modern scholars hold that Basilides constructed his system on Greek models, especially Aristotle; others, that he drew from the Orient, especially from the Persian dualism of Zoroaster. Criticism inclines at present towards the latter view.

Basilides' teaching should be studied in comparison with that of other Gnostics. (See GNOSTICISM.) He taught an elaborate cosmology, a system less perhaps like emanation than like evolution from the great Original. Basilides' system was not acceptable to the Church at large and was pronounced heretical. His followers, however, were quite numerous, and we hear of them as late as the fourth century, although they never attained any importance outside of Egypt. An illustration of how widely the Basilidians departed from the principles of their founder may be drawn from the fact that some of them practiced a gross licentiousness, while Basilides was inclined toward asceticism.

Bibliography. Uhlhorn, *Das basilidianische System* (Göttingen, 1855); Mansel, *Gnostic Heresies*, ed. Lightfoot (London, 1875); Hort "Basilides," in Smith and Wace, *Dictionary of Christian Biography* (London, 1887); Schaff, *History of the Christian Church*, vol. ii, pp. 466–472 (New York, 1891). See GNOSTICISM.

BASILIO DA GAMA, bȧ-zēl'yô dä gä'mȧ, José. See GAMA, JOSÉ BASILIO DA.

BAS'ILIS'CUS (Gk. Βασιλίσκος, *Basiliskos*). Emperor of the East from 476 to 477. He was brother-in-law of the Emperor Leo I. In 468 he had led the great African expedition against Genseric, the Vandal, which ended disastrously. His reign was uneventful. He was deposed by Zeno in 477 and died the following year.

BASILISK, băz'ĭ-lĭsk (Gk. βασιλίσκος, *basiliskos*, dimin. of βασιλεύς, *basileus*, king; Lat. *regulus*, little king; so named, according to Isidor, because it was the king of serpents, but perhaps by reason of the crest on its head). A fabulous creature, resembling a serpent, and supposed by the ancients to inhabit the Libyan Desert. It was described as being of a yellowish color, with spots of white, and as having a pointed head, whereon stood one or more prominences, also white, resembling a diadem. Its breath was considered to be especially poisonous and its glance fatal. The word *basilisk* is now applied to a sort of lizard, having an erectile crest along the middle of the back and tail and a dilatable pouch on the head.

BASILIUS, JOHANNES. See BESSARION, JOHANNES.

BASIL'IUS VAL'ENTI'NUS. See VALENTINUS, BASILIUS.

BA'SIN (OF. *bacin*, from LL. *bachinus*, from *bacca*, water vessel). In geology and hydrography, a depression of the earth's surface or of the strata constituting the crust of the earth; also the drainage area of a river system. Basins originate in several ways, and may be grouped under two general heads, those formed by crustal movements and those due to erosion. Most basins are due in part to both agencies. Basins formed by movements of the earth's crust are apt to be of great extent according as they owe their origin to either localized or continental movements. The Mississippi valley, previous to Tertiary time, was occupied by a shallow arm of the sea that covered the central portion of the North American continent. Elevation of the continent raised the district above sea level and drained the marine waters from the land, and orogenic movements partially surrounded it with mountains, with the result that an extensive interior basin was formed, the larger part of which is now drained by a single river system, that of the Mississippi. Other portions of the same basin are drained by the St. Lawrence River and by the rivers that flow into the Arctic Ocean. We have here an example of a geologic basin that contains several hydrographic basins.

The inclosed basins of Utah, Nevada, Arizona, and Mexico have been formed by local movements, folding, and faulting of the crust, that have culminated in the elevation of mountains inclosing plains. The elevation of the mountains has cut these plains off from the supply of moisture-laden winds, and arid desert conditions have largely ensued. During a former more humid period in Pliocene time great lakes occupied many of these basins, but their waters have disappeared largely through evaporation and lack of supply by rains, and concentrates of alkali, salt, and gypsum now cover large areas of their desert bottoms, while traces of their former shore lines are to be found far up on the mountain sides. See LAKE BONNEVILLE; LAKE LAHONTAN; GREAT SALT LAKE.

Another form of basin results when a section of the earth's crust subsides between two nearly parallel great faults or dislocations, to form what is known as a "rift valley." The most striking basins of this kind are found in western Asia and eastern Africa. The largest basin in this region begins north of the Dead Sea, and extends southward through the valleys of the Dead Sea, the river Jordan, and the Red Sea, whence the rift is continued in a southerly direction across Eritrea in Africa, to a point near Mount Kilimanjaro. This may be considered a continuous single depression or rift-valley basin, with a length of about 3500 miles and a maximum width at the Red Sea of 200 miles. Another such depression extends westward of the Victoria Nyanza for nearly 1500 miles in a general southerly direction and includes the valleys of the Albert Nyanza, Tanganyika, and Nyassa, terminating at the coast in the vicinity of the mouth of the Zambezi River. The amount of displacement of the bed of this latter rift has been enormous, the vertical throw of the faults having been at least 5000 feet in the vicinity of Lake Tanganyika. In volcanic regions basins filled by lakes often occur in the craters of extinct volcanoes. Crater Lake, in Oregon, is a good example.

In coal-mining regions the term "basin" is applied to synclinal depressions of the coal-bearing strata that have been produced by the folding of the beds incident to their elevation into mountains. Such a stratigraphic basin in the crust of the earth is not usually coextensive with a hydrographic basin on the surface, for the reason that synclinal depressions generally occupy ridges. The anticlinal upfolds have been worn away by weathering and are now replaced by valleys or hydrographic basins.

Basins formed by erosion are of two kinds, those formed by the work of rivers and those due to the wearing action of glacier ice. The former are the larger and more common, though the

latter often constitute prominent features of the landscape of northern countries. The basin of a river, when considered hydrographically, consists of the entire area drained by the main stream and its tributaries. This hydrographic basin may be in large part the result of orogenic movements; but its present boundaries have been determined entirely by the cutting power of its streams, and accordingly a hydrographic basin may consist of one or more geologic basins. The Hudson River system furnishes a good example of such a complex basin. The lower Hudson River, from New York City to Peekskill; the upper Hudson, from Peekskill to the Adirondacks; the Schroon River in the Adirondacks; the Mohawk River; the Schoharie, Esopus, and Catskill creeks, in the Catskill Mountains; and the Rondout in the Shawangunk Mountains—all drain distinct geological basins, the divides between which have been cut down by the rivers, till now the entire region is included in a single hydrographic system.

Glacial basins have been formed by the eroding power of ice acting on the floor and sides of valleys already formed by some other means. The basins usually hold lakes that form parts of river basins. Such are the "finger lakes" of central New York. Round lakes occupying shallow, bowl-shaped depressions on glaciated surfaces are common. A basin may also be formed when a landslide or moraine obstructs a valley. Such a basin and its contained lake is of an evanescent character, the extent of its duration depending upon the rate at which the overflow can cut down or remove the obstruction.

Basins tend in time to become shallower through the accumulation upon their floors of débris worn from the surrounding mountains. This process would, if continued without interruption, eventually fill the basin to its brim with deposits of gravel, sand, and silt, and a plain would result which, under conditions of sufficient moisture, would be of great fertility. Such waste-filled basins are common in the Pacific States. The discussion of the origin and characteristics of oceanic basins is reserved for the article on OCEAN. See also RIFT VALLEY; LAKE; RIVER; HYDROGRAPHY; PHYSIOGRAPHY.

BASINGSTOKE, bā'zĭng-stōk (stock or place belonging to the Basings). A market town and railway junction in Hampshire, England, 48 miles by rail southwest of London, at the junction of five main roads from the south and west of England to the metropolis, and on the Basingstoke Canal, which connects it with the rivers Wey and Thames (Map: England, E 5). It has a handsome parish church, town hall, municipal corn exchange, and owns its water works, markets, and cemetery. The chief trade is in corn, malt, coal, and timber, and it has manufactures of agricultural implements, clothing, malt liquors, etc. In the neighborhood are the ruins of Basing House, belonging to the Marquis of Winchester, which withstood the forces of the Commonwealth for four years, but was at last taken by Cromwell and burned to the ground in 1645. Pop., 1891, 8200; 1901, 9800; 1911, 11,540.

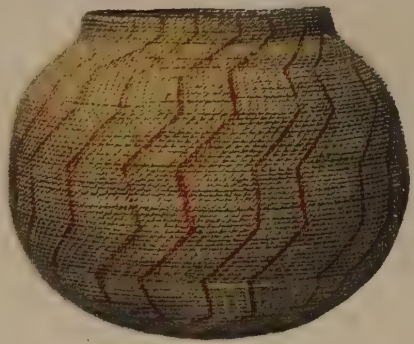
BAS'KERVILLE, JOHN (1706–75). A noted English printer, born at Wolverley, Worcestershire. Originally a footman, he afterward became successively a stonecutter and a writing master, and from 1740 manufactured japanned ware with much success at Birmingham. There, in 1750, he began costly experiments in type founding and, having obtained a satisfactory letter, published in 1757 his quarto *Vergil*, ranked by Dibdin (*Introduction to the Knowledge of Editions of the Greek and Latin Classics*, 1827) among the "most finished specimens of typography." In 1758 he was appointed for 10 years printer to the University of Cambridge, in which capacity he executed (1763) his famous edition of the Bible. From 1770 to 1773 he imprinted the splendid series of Latin classics. His type, not unqualifiedly praised by contemporaries, is now much admired. He manufactured his paper and devised a method of preparing a rich and uniform ink. Specimens of his work are now very scarce and valuable. Among his friends was Benjamin Franklin, with whom he corresponded regarding the sale of type-founding and printing establishments to the French government.

BASKET (Lat. *bascauda*, an article of furniture, made of basket work; probably of Celtic origin; cf. Welsh *basged*, *basgawd*). A vessel made of willow, thin strips of wood, reeds, grasses, or similar flexible materials woven together in a great variety of forms and used for many different purposes. Baskets have been in use from the very earliest times. The first mention of baskets in the Bible is in connection with the interpretation of Pharaoh's dreams by Joseph, and specimens of coiled basketry have been dug up from near Abydos in middle Egypt that are over 6000 years old. Remnants of baskets have been obtained from the Swiss lake dwellings, and similar finds are had from the remains of prehistoric peoples in America. There are two distinct types of technic in basketry: (1) *hand-woven* basketry which is built on a warp foundation, and (2) sewed or *coiled* basketry, which is built on a foundation of rods, splints, or straws. According to Mason, woven baskets are of (1) checkerwork—the warp and the weft having the same width, thickness, and pliability; (2) diagonal or twilled basketry—two or more weft strands over two or more warp strands; (3) wickerwork—inflexible warp; slender flexible weft; (4) wrapped weft, or single weft wrapped—the weft strand is wrapped, or makes a bight about the warp at each decussation, as in the Mohave *Kiho;* (5) twined or wattled basketry—weft of two or more elements. He divides coiled basketry into (1) coiled work without foundation; (2) simple interlocking coils; (3) single-rod foundation; (4) two-rod foundation; (5) rod and welt foundation; (6) two-rod and splint foundation; (7) three-rod foundation; (8) splint foundation (9) grass-coil foundation; (10) Fuegian coiled basketry. Basketry is studied from the point of view of materials. These naturally vary with the locality, for some plants are to be found only in certain localities; thus among the Chinese and Japanese bamboo is the chief stock used. Baskets are frequently ornamented with animal products, as fur and feathers, and sometimes with minerals. The manufacture involves the harvesting of the materials, their preparation, and the various processes of weaving, tools used, etc. The ornamentation is an important item, and the study of the symbolism shown in the designs is an important source of information, serving certainly in the United States as a key to Indian lore. Baskets are used in food, dress, house, furniture, arts, and industries, as expressions of æsthetic culture, in social customs, and religion. According to Mason, "from the cradle to the grave they are present." Their distribution is

INDIAN BASKETS

CALIFORNIA

APACHE, ARIZONA



PIMA, ARIZONA

HOPI, ARIZONA

HOPI, ARIZONA

MARICOPA, ARIZONA

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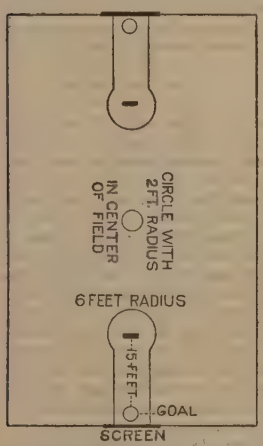
world-wide, and they have developed wherever the environments furnished the necessary materials. In the eastern United States only traces of early basketry remain except perhaps in the beautiful Chetimacha specimens of Louisiana, but among the Western Indians, notably the Apaches, the art of basket making is still extensively practiced, and perhaps even more conspicuously among the Indians of the Pacific slope, yielding the Klikitat, Hupa, Pomo, and Tulare baskets. The great interest in the art of making baskets has in recent years led to their manufacture by amateurs, and the subject is now taught in most arts and crafts schools. Unfortunately not always wisely for aboriginal designs and forms tend under such circumstances to disappear and lose their original significance. The great museums of the world have collections of baskets, and in the United States those at the National Museum in Washington and in the American Museum of Natural History in New York are worthy of mention. There are also many private and special collections. For the ordinary commercial utensils of this kind the materials most extensively employed are thin split strips of ash and oak, willow and rattan. Consult *Directions for Collectors of American Basketry* (Washington, 1902) and *Aboriginal American Basketry: Studies in a Textile Art without Machinery* (1904), both by Otis T. Mason, and *Indian Basketry*, by George Wharton James (Pasadena, 1901).

BASKET BALL. A game that may be played on any ground or floor on which an oblong space not exceeding 4000 square feet can be marked. The goals, at each end of the floor or field, are hammock nets of cord, suspended from metal rings 18 inches in diameter (inside) at a height of 10 feet above the ground in the centre. The ball is a round, inflated bladder, covered with leather, from 30 to 32 inches in circumference, and weighing from 18 to 21 ounces. The game is played in halves of 20 minutes (actual play) between teams of 5 players each (a left and a right guard, a centre, and a left and a right forward). The teams change baskets at the end of the first half. The ball is put in play by being thrown by the referee into the centre of the field at right angles from the side lines and to a greater height than either of the centres can jump. The players who are to jump for the ball must keep their feet within the two-foot circle shown on the diagram. Each team endeavors to throw the ball into the basket of the other and to prevent its opponents from making a similar goal. The ball must be thrown, batted, or held with the hands only. It may not be kicked, punched or carried. Not more than one player on either side shall touch the ball at the same time. A player may not tackle, hold, push, shoulder, kick, or hack an opponent, and intentional roughness will disqualify. The penalty for these and other offenses gives the opposing team a free throw for the basket from a distance of not less than 15 feet. A goal so made counts one point; an ordinary goal from the field, two points. The foregoing are the principle regulations for the game as commonly played by men, though there are also Intercollegiate Rules, used chiefly by men, and Rules for Women (adopted in 1899) which provide for some modifications of the usual game.



The game is regulated by the Amateur Athletic Union, which has drawn up the official rules for its practice. It enjoys the unique distinction of having been invented by a single brain at one sitting. In 1891 a lecturer on psychology in the training school of the Young Men's Christian Association at Plainfield, Mass., speaking of the mental processes of invention, proposed the example of a game with its limitations and necessities. The same night, James Naismith, a member of the class, worked out basket ball as an ideal game to meet the hypothetical case; and the next day in the lecture room it was put in practice with the aid of the members of the gymnastic class. Thence it spread to other branches of the Young Men's Christian Association, and in two or three years to other athletic clubs and to the general public. Consult *Spalding's Official Basket Ball Guide for 1913–14* (New York, 1913); also Dudley and Kellor, *Athletic Games in the Education of Women* (New York, 1909), and Hill, *Athletic and Out-Door Sports for Women* (New York, 1903).

BAS'KET FISH'. A group of echinoderms of the same class (*Ophiuroida*) as brittle stars, but of the genus *Astrophyton*, characterized by dichotomously branched arms, in some species so numerously subdivided that when they are curled up the creature seems inclosed in a basket. The five-sided disk varies in size with age and species, but may be 3 inches broad, while the arms may be 10 to 15 inches in length. The upper side of the disk has 10 radial ribs, bearing short, blunt spines. The animal is wholly covered with an epidermis, granulated above, but smooth beneath, except that it seems to have a double line of stitches under each arm. The general color is light buff; but the interbrachial spaces in the living animal vary from dark purple to bright pink. The mouth is on the under side and central, and is set with spiniform bristles hiding numerous thorn-like teeth. From around the star-shaped mouth branch 5 stout arms, each of which is divided at the edge of the disk. Each of these 5 main branches is divided into two, making 10; each of the 10 is divided, making 20, and so indefinitely down to the least visible filament. An English naturalist counted 81,920 of these "small sprouts, twigs, or threads" in one species. On capture or disturbance the creature instantly folds its arms closely about its body, shrinking from the touch like a sensitive plant and assuming the basket shape from which it gets its familiar name. The attempt to untwist these coils generally ends in breaking the delicate but tenacious threads. The basket fish is probably a vegetable feeder, and its peculiar arms serve possibly for its protection from its enemies. The microscope shows each arm and spine to terminate in a minute but sharp hook. The animal, in moving, lifts itself on the extreme end of its long arms, standing as it were on tiptoe, so that "the ramifications form a kind of trellis work all around it reaching to the

ground, while the disk forms the roof." A number of species of basket fish are known; perhaps a dozen are valid. They are found in moderately deep water in most parts of the ocean, especially in the tropics, though the best-known species are of the north Atlantic. See BRITTLE STARS.

BAS'KET WORM'. See BAGWORM.

BASK'ING FISH, or **BASKING SHARK.** See SHARK.

BASLE, bäl. See BASEL.

BASNAGE DE BEAUVAL, bâ'nâzh' de bō'vâl', JACQUES (1653–1723). A French statesman and writer on theology; the most distinguished of a French family known as supporters of the Protestant cause. In 1709 he settled as stipendiary minister of the Walloon church in The Hague, having gained the friendship of the Grand Pensionary, Heinsius. Here, while zealously discharging his religious duties, he was called upon to take an active part in state affairs, particularly in negotiating the defensive alliance concluded between France, England, and the States-General, Feb. 14, 1717. He died at The Hague, Dec. 22, 1723.

His chief works, which have been frequently laid under contribution without being named, are: *La communion sainte* (1688), a work approved even by Roman Catholics and often reprinted; *Traité de la conscience* (2 vols., 1696); *Histoire de l'Eglise* (2 vols. fo., 1699), in four parts, of which the fourth reprints his *Histoire de la religion des églises réformées* (2 vols., Rotterdam, 1690, 3d ed., 1725). It was a Protestant reply to Bossuet's *Variations of Protestantism,* to show that Protestantism is the true successor of the Apostolic Church; *Histoire des Juifs* (5 vols., 1706), one of Basnage's best productions and translated into English by Th. Taylor (1708); *Dissertation historique sur les duels et les ordres de chevalerie* (1720). Consult his *Life* by E. A. Mailhet (Geneva, 1881).

BASOCHE. See BAZOCHE.

BASQUE, bâsk (Fr. *Biscayan,* Lat. *Vascones,* whence Fr. *Gascons,* ML. *Biscaini, Busci,* Basque *Euskaldun* or *Eskalkun*). An isolated language of southern France and northern Spain, of entirely unknown affinities, spoken by about 440,000 persons. It is most plausibly supposed to be the sole representative of the ancient Iberian languages, which were superseded by Latin when the Romans conquered Spain and Gaul. In structure Basque belongs to the so-called polysynthetic or agglutinative type of languages, since it incorporates into the verb the pronominal elements for subject and object. In this respect it bears a marked resemblance to certain dialects of the Caucasian group and even to some North American Indian languages. All attempts to trace a real connection, however, between Caucasian and Basque have thus far proved unsuccessful, while parallels between Basque and American Indian are probably to be regarded merely as accidental coincidences. The late Georg von der Gabelentz sought to trace an affinity between Basque and the Berber dialects, but this theory also is open to grave doubts. It seems safest, in the present stage of linguistic knowledge, to regard this language as forming a family by itself.

Basque is divided into several dialects, of which the chief are those of Guipúzcoa, Biscay, Labourdin, and lower Navarre, all of which adopt the Roman alphabet, conforming their orthography to either the Spanish or the French, according to their position south or north of the Pyrenees. Basque words are accented, as a rule, on the final syllable, which ends in a vowel, or in *s, r, l, n,* and once in *t.* It possesses nouns, adjectives (which have no radical affinity with the nouns), pronouns, and verbs. Grammatical gender is lacking, while the verb, like the Germanic, has, properly speaking, but two tenses, present and past. The noun has two numbers and seven cases—nominative-accusative, instrumental, genitive, dative, locative, sociative (*gison-are-kin,* 'with the man'), and caritive (*gison-a-gabe,* 'without the man'). The article, originally, as in Indo-Germanic, a demonstrative, stands between the noun stem and the flectional ending (*gison-a,* 'the man'; genitive, *gison-ar-en;* dative, *gison-ar-i*). Similarly the adjective, which follows the noun, alone receives inflection (*ur garbi,* 'pure water'; genitive, *ur garbi-ar-en*). The Basque verb is either transitive, in which case the object can never be omitted, or intransitive, and both classes are strong or weak according to the absence or presence of the auxiliary verb. In the intransitive verb the subject precedes, while the order of the transitive is object, verb, subject (*h-a-bil,* 'thou goest'; but *h-a-kar-t,* 'thee bear I'). The substantial agent of a transitive verb is denoted by the instrumental (*gison-a-k yan du,* 'the man has eaten it'; literally, 'by the man was its eating'), forming a curious partial analogy to the usage in many modern Indo-Iranian languages as well as in the Australian dialect of Encounter Bay. In addition to the indicative mood the verb has an optative and an imperative. The rather meagre tense system of the Basque is supplemented by a future and a future perfect, nearer and remoter perfect, as well as pluperfect by analogical influence from the Romance languages, as *ibiliko n-ais,* which is almost exactly equivalent to the English *I have to be a-going,* or the French *irai,* 'I have to go,' from Lat. *ire habeo.* The numerical system, as in the Central American languages, is primarily vigesimal. Basque literature is not extensive and is mostly of a popular character, poems, quasi-dramatic compositions somewhat resembling the mystery plays of the Middle Ages, and the like, together with translations of religious literature. The oldest Basque book that we know, the *Linguæ vasconum Primitiæ,* is a collection of mediocre religious poems and love poems, and dates from 1545. The earliest-known Basque of distinction who wrote in his own language was Pedro de Axûlar, who flourished about the middle of the seventeenth century and wrote on religious subjects. Although it has adopted numerous loan words from French and Spanish, it has maintained its own remarkably against its Romance neighbors.

Consult: Müller, *Grundriss der Sprachwissenschaft,* vol. iii (Vienna, 1887), where an excellent summary of Basque grammar is given; Gerland, "Die Basken und die Iberer," in Gröber, *Grundris der romanischen Philologie,* vol. i (Strassburg, 1892–98; 2d revised and enlarged ed., Strassburg, 1904–06, with rich bibliography); Rev. Wentworth Webster, *Basque Legends, with an Essay on the Basque Language by M. Jul. Vinson* (London, 1877); Julien Vinson, *Le folk-lore du pays basque* ("Les littératures populaires de toutes les nations," vol. xv, Paris, 1883); Mahn, *Denkmäler der baskischen Sprache, mit einer Einleitung über das Studium derselben* (Berlin, 1857); De Azcue, *Euskal Izkendea; Gramática euskara formada y traducida* (Bilbao, 1891), Basque and Spanish; Van Eys, *Dictionnaire*

basque-français (Paris, 1873); Van Eys, *Grammaire comparée des dialectes basques* (Paris, 1879); Van Eys, *Outlines of Basque Grammar* (London, 1883); Vinson, *Essai sur la langue basque par François Ribáry, traduit du hongrois* (Paris, 1877); *Essai d'une bibliographie de la langue basque* (Paris, 1891); Campion, *Gramática de los cuatro dialectos de la lengua euskara* (Toulouse, 1884); Aizquibel, *Diccionario basco-español* (Toulouse, 1882–85); Larramendi, *Diccionario trilingüe Castellano, Bascuence y Latin* (2d ed., 2 vols., San Sebastian, 1853); Michel, *Le pays basque, sa population, sa langue, ses mœurs, sa littérature et sa musique* (Paris, 1857); Linschmann and Schuchardt, *Leiçarraga's Baskische Bücher von 1571, Neues Testament, Kalender, und Abc, im genauen Abdruck* (Strassburg, 1900); Lewy d'Abartiague, *De l'origine des basques* (Paris, 1896, reprinted from *La Nouvelle Revue*, Dec. 15, 1895).

BASQUE PROVINCES. A division of northeast Spain, containing the provinces of Vizcaya (Biscay), Guipúzcoa, and Álava. The total area is 2739 square miles. The surface is very mountainous, particularly in the province of Álava, which is everywhere cut up into deep, narrow valleys by offsets from the main chain of mountains. The rivers of Vizcaya and Guipúzcoa empty, after a short course, into the Bay of Biscay; those of Álava flow down the opposite slopes into the Ebro, which carries their waters to the Mediterranean. The climate is, on the whole, mild and salubrious. The general aspect of the country is very picturesque, the hills in most cases being covered to the summit with forests of oak, beech, and chestnut. The soil in the valleys and plains, while not very rich, has been rendered productive by the energy of the people, although agricultural methods in the heart of the Basque Provinces are of the most primitive kind. The farms are small, usually of only about four or five acres, and rarely more than can be managed by the farmer and his family. The products are wine, barley, maize, flax, hemp, and some wheat. Iron is found in abundance (output, 1905, 5,302,344 tons, nearly all from Vizcaya); also copper and tin, marble, porphyry, and jasper. The sea fisheries are productive. *De facto* pop., 1900, 603,596; census of Dec. 31, 1910, 673,788 (*de jure*, 672,884). Consult Whiteway, "Customs of the Western Pyrenees," in *English Historical Review* (London, 1800), and Fabié, *Estudio sobre la organización y costumbres del país vascongado* (Madrid, 1897).

BASQUE RACE. The Basque race is of mixed physical type, with considerable variety in stature, color of hair, eyes, etc. Two types of skull are distinguished—brachycephalic or sub-brachycephalic, among the French Basques, and mesocephalic, or sub-dolichocephalic, among those of Spain. The Basque race is not confined to the Basque Provinces or to the southern side of the Pyrenees. On the French side of the Pyrenees, three cantons of the department of Basses-Pyrénées, i.e., Labourd, Basse-Navarre, and Soule, are inhabited by Basques.

The Spanish Basques are a simple, brave, and independent people, willing to undergo any hardships rather than surrender their mountain freedom. No invader was ever able effectually to subdue or to expel them. The Basque Provinces retained, until 1876, a separate constitution guaranteeing them many political and fiscal privileges not possessed by the rest of Spain. (See FUERO.) But on the suppression of the Carlist insurrection, which had its stronghold in the Basque Provinces and in Navarre, the old immunities were abolished. The Basques are even prouder than the Spaniards, and the mere fact of being born in their territory secures the privilege of "universal nobility." *Escualdunac* is the name the Basques give themselves, a word which has been taken to mean either "eaters of acorns" or "dwellers in oak forests," but which signifies "those who speak *Eskuara*." Their country they call *Escualeria;* and their language, which is peculiarly their own, *Escuara*. The language has many dialects (as many as 25 have been noted by some authorities), but they can be grouped under three or four heads. The Basques are among the people to whom the curious custom of the "couvade" (q.v.) has been attributed.

The Basques are generally considered to be a variety of the Mediterranean branch of the white race, but their language is distinctly non-Aryan and forms an independent family of speech, no connection with any other tongue having yet been proved to exist. Finck, in his *Die Sprachstämme des Erdkreises* (Leipzig, 1909) voices a common opinion of ethnologists in stating (p. 43) that "Basque is the descendant of the ancient Iberian, or a dialect of it," but it has a considerably Aryan (French-Spanish-Latin) element. The relation of the Basques to ancient Iberian culture, and to the Celtic element in the Spanish Peninsula has not yet been determined.

There are at present about half a million Basques in Spain and France, three-fourths of whom are in the Basque Provinces. It is said that in addition to these some 200,000 Basques emigrated during the last half of the nineteenth century to South America, to which they have contributed a most desirable element in the population ever since the beginning of Spanish America, on account of their great bodily strength, good habits, and industry. Many eminent Spaniards have come from the Basque Provinces, the most noted being Ignatius Loyola and St. Francis Xavier. For a more particular account of the Basque race, consult: Vinson, *Les Basques et le pays basque* (Paris, 1882), the same writer's *Le folk-lore du pays basque* (Paris, 1883), and *Essai d'une bibliographie de la langue basque* (Paris, 1891); Collignon, *La race basque* (Paris, 1895); De Aranzadi, *El Pueblo Euskalduna* (San Sebastian, 1889), and other works; Webster, *Basque Legends* (1877); Marrast's edition of the Humboldt, *Recherche sur les inhabitants primitifs de l'Espagne* (Paris, 1866); Hübner, *Monumenta Linguæ Ibericæ* (Berlin, 1893); Michel, *Le pays basque* (Paris, 1857); and Baudrimont, *Histoire des Basques* (Paris, 1867). For a résumé and critique of the more recent literature on the Basque question, consult Schuchardt's article, "Zur gegenwärtige Lage der baskischer Studien," in *Anthropos* for 1911. On the archæological side consult also Siret's *Questions de chronologie et d'ethnographie ibériques* (Paris, 1913).

BASRA, bäs'rä, **BUSRA,** bŭs'rä, or **BASSORA,** bäs'so-rä (Pers. and Ar. *Basrah*, fortress). A town of Asiatic Turkey, the capital of the easternmost vilayet of the same name (area, 53,591 square miles; pop., 433,000), on the Ashar or Basra Creek, about 3 miles from its confluence with the Shat-el-Arab, 60 miles from the Persian Gulf (Map: Turkey in Asia, M 7). Situated at

the head of navigation, Basra is the centre of transhipment from river boats and caravans to ocean steamships and is therefore a place of great commercial importance. It is the port of Bagdad and has regular steamer communication with Europe and Indian ports. The chief imports from India are coffee, indigo, rice, wood, and drugs; and from Europe, and especially Great Britain, manufactured articles. The surrounding country is very fertile and yields vast quantities of fruit. This is one of the leading ports in the world for the export of dates, and upward of 60,000 tons are shipped annually. The town is surrounded by a wall in imperfect repair; its most notable buildings are two fine mosques and the tomb of Zobeir. It is a military station, with a dockyard and a factory, and is the seat of a British consul and of a United States consular agent. The consulates and mercantile establishments line the river bank in the Margil suburb. The climate is malarious and unhealthful, and the water supply bad. The population of Basra, which in the eighteenth century was estimated at 151,000, is now about 55,000, and consists chiefly of Arabs, a few Europeans and Indians, and some 3000 Persian merchants and employees, 2000 Jews, and 400 Armenians.

BAS-RELIEF, bä'rê-lēf' (Fr. low relief). See Relief Sculpture.

BASS, bās, or **BASE** (Fr. *bas*, fem. *basse*, It. *basso*, low, from LL. *bassus*, low, short). The deepest or lowest part in a musical composition and the deepest or lowest tone in a chord. It is next to the upper part in the independence and originality of the melodic design, and in respect to harmony it is the most important part, containing more frequently the fundamental notes of the chords; on it, moreover, is formed the effective musical figure known as organ point (q.v.). *Bass* or *basso.*—The lowest male voice, generally with a compass of F to d′, all in the chest register (q.v.). Some exceptional voices have even a larger range, going down to C or B_1; these are called *basso profundo.* For origin of word, see Alto. *Bass.*—The name of an old bow instrument with five or six strings, intermediate between the cello and double bass. In older scores the word "basses" or *bassi* refers to both cellos and contrabasses, for which only one part was written. In modern scores, where cellos and double basses generally have different parts, the word "basses" denotes double basses only. (See Double Bass.) *Basso ostinato,* or ground bass, is a figure of one, two, or four measures constantly repeated. *Basso continuo* means thorough or figured bass (q.v.). For bass clef, see Musical Notation.

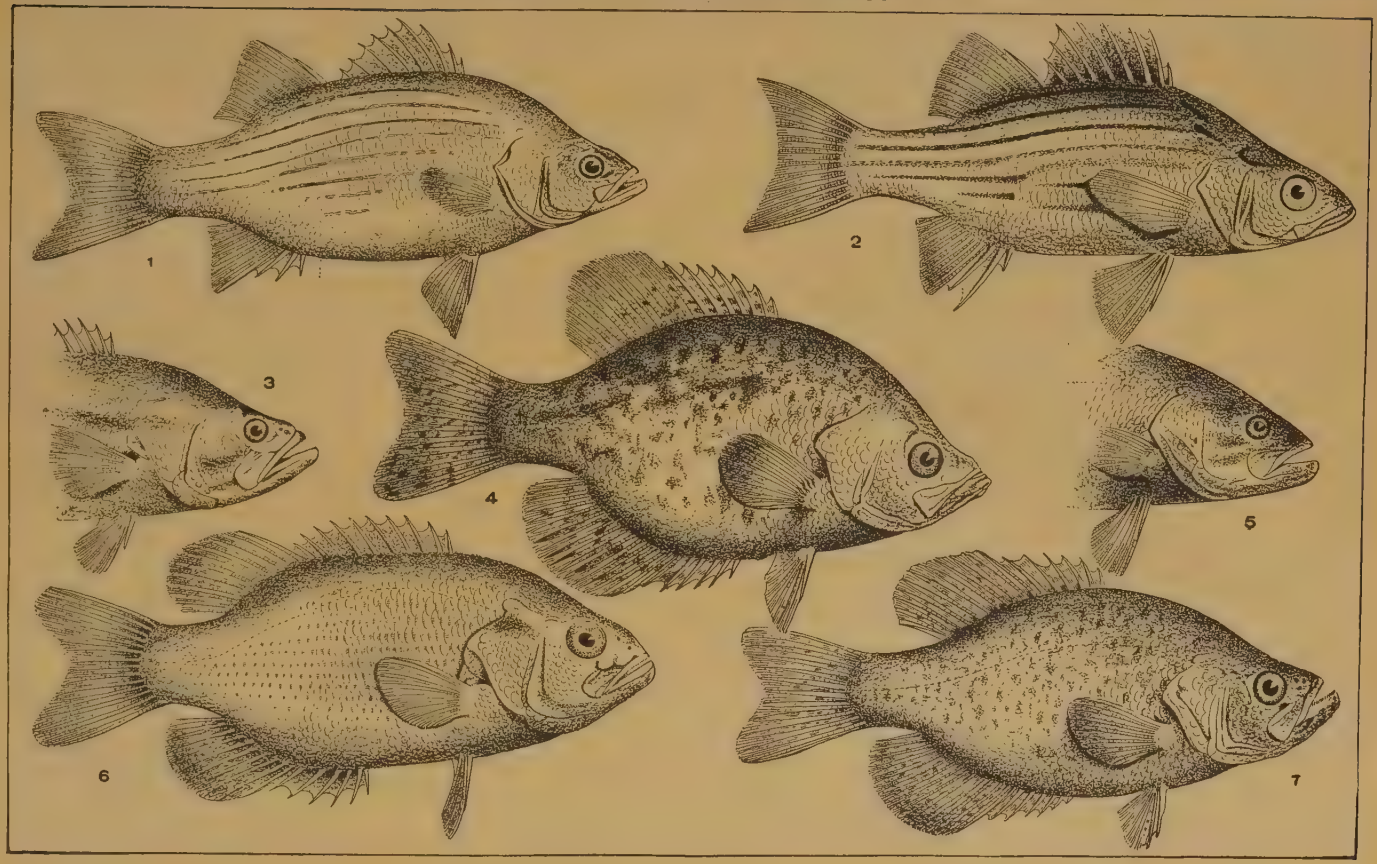
BASS, bās (originally *barse*, AS. *baers*, the perch). The name of many fishes, chiefly and most correctly applied to those of the perciform families Serranidæ and Centrarchidæ. The former family include the *Salt-water Bass*, represented typically in Europe by the sea perch (*Morone labrax*, formerly called *Labrax lupus*), to which the old English name "basse" was first applied. This is common in the Mediterranean and in British and Dutch waters, swimming in shoals and entering estuaries and streams to spawn. It may reach 2½ feet in length and is highly esteemed as food. The nearly related American striped bass, or rockfish, *Morone lineata* (see Colored Plate accompanying Trout), often reaches a weight of 30 to 90 pounds, is distributed along the entire east coast of the United States, ascending at times 30 to 50 miles above the tide-water line, is very abundant, and enters rivers in the spring to spawn. It is one of the most important American food-fishes, and has been introduced by the United States Fish Commission to the Pacific coast, where it has now become numerous and valuable. Angling for this fish is one of the foremost sports along the eastern coast as far north as the Bay of Fundy, where they congregate in great numbers. Various methods are employed, as trolling, in Chesapeake Bay, etc.; but the customary method is to cast in the surf with a rod and reel, the former like a salmon rod, and the reel capable of holding 200 to 300 yards of line. The season is July, August, and September, when the fish approach close to the shore, schooling in the surf and entering bays and rivers. Hence such rocky shores as those from New York City to Cape Cod are favorable; and the finest of sport is enjoyed from out-reaching rocks at the entrance of Buzzard's and Narragansett bays, where expensive stagings are often erected for convenience. Living bait of great variety is used, and very long and skillful casting is required, success being rewarded by an exciting tussle with this strong and spirited fish, calling for the highest skill. In the upper waters of the tidal rivers, when found resting below the rapids, it will take a gaudy fly very greedily and give fine sport.

The yellow bass (*Morone interrupta*) of the lower Mississippi valley, the white perch (*Morone Americana*) of the Atlantic coast (but also sometimes landlocked), and the white bass, or white perch (*Morone* or *Roccus chrysops*), of the Great Lakes and Mississippi valley, are all excellent food fishes and are true bass. Other marine fishes are sometimes styled bass, as the weak-fish and various relatives, which are "sea bass," one (*Cynoscion nobilis*) being the "white sea bass" of the Californian markets. In the Southern States the drum (Pogonias) is so known.

The *Fresh-water Bass* belong to the sunfish family, Centrarchidæ, and are prominently represented by the two black bass of sportsmen—the small-mouthed (*Micropterus dolomieu*) and the large-mouthed (*Micropterus salmoides*). In waters east of the Alleghenies they are imported fish, getting into the Hudson through the Erie Canal as early as 1825. They were first planted in the waters of eastern New York and the other Middle States nearly 50 years ago, a small quantity having been brought in 1853 from the Youghiogheny River and planted in the Baltimore and Ohio Canal, whence they found their way into the Potomac, Susquehanna, Delaware, and other rivers. The small-mouthed bass prefers clear, running streams, but the large-mouthed prefers quiet waters. The latter grows to a larger size, an extreme weight being 20 pounds, a not uncommon weight 6 to 10 pounds. Both are variable in color and highly esteemed for food, and both are among the best, if not the *very* best, game fish of the United States.

Special tackle has been developed for bass fishing, the fly rod being as light and comely as that for trout, though somewhat heavier tackle must be used on lakes than along streams, where a 7½-ounce rod 10 feet long suffices, with a fine line, very strong leaders, and hooks less than No. 2. The flies used are

AMERICAN FRESH-WATER BASS



1. WHITE BASS (Roccus chrysops).
2. YELLOW BASS (Morone interrupta).
3. BIG-MOUTHED BLACK BASS (Micropterus salmoides).
4. CALICO BASS (Pomoxis sparoides).
5. SMALL-MOUTHED BLACK BASS (Micropterus dolomien).
6. ROCK BASS (Ambloplites rupestris).
7. CRAPPIE (Pomoxis annularis).

larger than those for trout, brown, red, and black "hackles" being recommended for general use. A shorter and, by a trifle, heavier rod is used for minnow casting. The time for bass fishing in the Gulf States is in autumn and winter; in the Northern and Central States in May and June or in September and October.

Other species in this family are the rock bass or redeye (*Ambloplites rupestris*) and the calico or grass bass (*Pomoxis sparoides*), both good food fishes and much used in the Mississippi valley. Consult the bibliographies under ANGLING. See Plate of FRESH-WATER BASS and Colored Plate of TROUT; FISHERIES.

BASS, bȧs, EDWARD (1726–1803). The first Protestant Episcopal Bishop of Massachusetts, his native State. He graduated at Harvard in 1744, was ordained in England by Bishop Sherlock in 1752, and on his return became and remained through life rector of St. Paul's at Newburyport. In 1797 he was consecrated first Bishop of Massachusetts, his jurisdiction being afterward extended over New Hampshire and Rhode Island. Consult D. D. Addison, *Life and Times of Edward Bass* (Boston, 1897).

BASS, ROBERT PERKINS (1873–). An American public official, born in Chicago. After graduating from Harvard in 1896, he studied for two years in the graduate and law schools of that university. He became interested in farming and in real estate, and devoted particular attention to the advancement of forestry in New Hampshire. Preceding his election in 1911 as Governor of New Hampshire, he had been for two years a member of the State Senate, and for four years before that a member of the State House of Representatives. During all this period he had been one of the leaders in opposition to the Republican "machine" in New Hampshire, and when he came to be chosen to the highest office in the State, it was on a platform that pledged him to carry out important legislative reforms. In a measure his efforts were successful. (See NEW HAMPSHIRE, *History*.) In 1912, however, he was not a candidate for reëlection on the Republican ticket, but left that party to head the Progressive movement in the State. Before the formation of a separate Progressive party he was one of the seven Governors who signed a petition to Theodore Roosevelt, asking the latter to become a candidate for the presidential nomination at the Republican Convention.

BASSANIO, bȧs-sȧ'nē-ō. Portia's lover in Shakespeare's *Merchant of Venice* (q.v.). He chose the leaden casket and won her for his wife.

BASSANO, bȧs-sȧ'nō (anciently *Bassanum*). A city in the province of Vicenza, north Italy, on the Brenta River, and the Padua-Bassano Railway, 30 miles north of Padua (Map: Italy, F 2). It has a castle and high walls and is picturesquely situated at the foot of the Alps. In the cathedral and the other churches and in the museum are paintings by J. Bassano; Canova's "Death of Socrates" is in the Villa Rezzonica. Bassano manufactures leather and majolica, has a great printing establishment, and there is an active commerce in silk, leather, oil, wine, and asparagus. In 1796 Bonaparte defeated the Austrians here. Pop., 1901 (commune), 15,443; 1911, 17,130.

BASSANO. A family of Italian painters, so called from their residence, a town near Vicenza; their real name was Da Ponte. FRANCESCO, founder of the family, was probably a pupil of Bartolommeo Montagna at Vicenza. The most prominent member of the family was his son and pupil JACOPO (Giacomo) DA PONTE (1510–92), who was, however, more influenced by his study of the works of Bonifazio and Titian at Venice. Practically all his life was spent in his native town, where he acquired much wealth, was accorded freedom from taxation, and even chosen chief magistrate (consul). After his return from Venice to Bassano he formed an individual style, suggested by his rustic environment, and became the founder of genre painting, properly so called, in Italy and Europe. His earliest works are of a conventional religious character, but by far the greater number of his latest and best productions are scenes from peasant life, often in beautiful landscapes. Under the guise of some scriptural title the sacred personages appear in these scenes as peasants. Assisted in patriarchal fashion by his four sons, he conducted an atelier the output of which was enormous. It is almost impossible to distinguish the authorship of most of these paintings; only the very best examples may be safely attributed to him. He also painted a few portraits. The most striking technical features of his painting are the bold play of light and the gem-like effect of his coloring. Two of his best works from scriptural subjects are in his native town; the museums of Vienna, Dresden, and Paris are particularly rich. A fine example, "Lazarus and Dives," belonging to Mr. Dan Fellows Platt of Englewood, N. J., was shown in the Metropolitan Museum of Art, New York City (1913). The painter had four sons, of whom the most noted were FRANCESCO (1545–97) and LEANDRO (1558–1623). Francesco's best-known work is a painting on the ceiling of the Ducal Palace, Venice, "The Capture of Pavia by Night." Consult Berenson, *Venetian Painters* (New York, 1894).

BAS'SARIS, or BASARISK. The Cacomistle (q.v.).

BASS (bȧs) DRUM. See DRUM.

BASSEDAU, JOHANN BERNHARD. See BASEDOW.

BASSEIN, bȧs-sān' (Hind. *Wassim*). A town in the presidency of Bombay, India, situated on an island of the same name, 28 miles north of the city of Bombay; lat. of island, 19° 20′ to 19° 28′ N. In 1720 the town had over 60,000 inhabitants, but through war, plague, and other causes has decayed until its population had dwindled to 9598 in 1911. It still exports considerable quantities of rice. In 1534 it was ceded to the Portuguese; in 1765, after a possession of 231 years, it was wrested from them by the Mahrattas; in 1780 it surrendered to the British after a siege of 12 days. The island contains about 35 square miles; it is separated from the continent by a narrow channel, which, as a shelter for shipping, constituted its value in the eyes of the Portuguese. Bassein is of historical interest, having been promised, though never delivered, as part of the dowry of Charles II's Portuguese consort.

BASSEIN, or BASSIM. The capital of the district of Bassein in lower Burma, on the left bank of a mouth of the Irrawaddy, 90 miles from the sea (Map: Burma, B 3). Its inland water connection and the opening of a railway in 1903 have enhanced its importance as a centre of commerce. The principal trade is in rice. The United States is represented by a consular

agent. The place is of military importance also, as it commands the navigation of the river. It was captured by the British in 1852. Pop., of town, 1901, 31,864; 1911, 37,081; area of district, 4127 square miles; pop., 1891, 311,260; 1901, 383,100; 1911, 440,988.

BASSELIN, bȧs'lăN', or **BACHELIN,** OLIVIER (c.1350–c.1419). A French poet, born in the Val-de-Vire, Normandy. Songs on convivial themes, ascribed to him, but now attributed to Jean le Houx (*Livre des chansons nouveaux et Vaux-de-Vire,* 1610 and 1858), are usually regarded as the origin of modern vaudeville. The song "To my Nose," celebrating its ruddy efflorescence, is the best known. Consult Gasté, *Etude sur Olivier Basselin et les compagnons du Vau de Vire* (Caen, 1866), and Gasté, *Olivier Basselin et le Vau de Vire* (Paris, 1887).

BASSES-ALPES, bȧs'ȧlp'. A southeastern department of France, bordering on Italy (Map: France, S., L 4). It has an area of 2697 square miles; is mountainous, is watered by the Durance, and has much pasture land. The climate is severe, but the natural beauties attract visitors. The valleys are fertile, and much fruit is grown. Meagre transportation facilities hinder the development of manufacture and commerce. Pop., 1896, 116,028; 1906, 113,126; 1911, 107,231. Capital, Digne.

BASSES-PYRÉNÉES, bȧs'pē'rā'nā'. A southwestern department of France, bordering on Spain and the Bay of Biscay (Map: France, S., D 5). Area, 2978 square miles. The chief rivers are the Nive and the Odour. The southern part is wholly mountainous; the remainder is composed of wild heath land and fertile valleys. Agriculture, pasturing, lumbering, quarrying, and the manufacture of woolen goods, leather, paper, etc., are the leading industries. There is considerable domestic commerce, and export trade in minerals, lumber, wine, etc. A large part of this passes through Bayonne, the chief port. Pop., 1896, 421,955; 1906, 425,817; 1911, 433,318. Capital, Pau.

BAS'SET, or **BAS'SET HOUND.** See BADGER DOG; HOUND.

BASSET, RENÉ (1855–). A French Orientalist, born at Lunéville. He studied in Paris at the School of Oriental Languages and in 1880 became professor of Arabic at the Ecole supérieure des Lettres in Algiers. Much of his work covers a study of the languages, history, archæology, geography, and folklore of the tribes living in the French possessions of Algeria and northwest Africa. His publications include: *Prière des mussulmans chinois, traduite sur l'original imprimé à Canton* (1878); *La poésie arabe antéislamique* (1880); *Etudes sur l'histoire d'Ethiopie* (1882); *Contes populaires berbères* (1887); *Nouveaux contes berbères* (1897); *Rapport sur les études berbères et haoussa* (1902); *Contes populaires d'Afrique* (1903). He also translated *Les Apocryphes éthiopiens* (1893–99) and was editor of the *Encyclopædie des Islam.*

BASSETERRE, bȧs'târ (Fr. lowland). The capital of the British West Indian island of St. Christopher, or St. Kitts, situated on the southwestern coast (Map: West Indies, G 3). It is well built and possesses several churches, a botanical garden, and a library. There are manufactories of sugar, and this commodity is the leading article of trade. Pop., 1901, 9962; 1911, 8200.

BASSE-TERRE. The capital and political centre of the French West Indian island of Guadaloupe, situated on the southwest coast, at the mouth of the Rivière-aux-Herbes (Map: West Indies, G 4). Its commercial importance is small because of an open harbor. Basse-Terre is the seat of a bishop, is well built, its streets are lighted by electricity, and it contains a number of fine public buildings. Pop., 1903, 7464.

BAS'SETT, JAMES (1834–1906). An American missionary, born near Hamilton, Ontario. He graduated in 1856 at Wabash College and in 1859 at Lane Theological Seminary, served as chaplain in 1862–63 in the Federal army, and from 1863 to 1871 held various pastorates. In 1871 he became a missionary for the Presbyterian Board and traveled widely throughout Europe, spending many years in Turkey and Persia, in which latter country he was a pioneer missionary worker. He is believed to have been the first American to penetrate as far east as the tomb of Harun al-Rashid at Meshed, eastern Khorasan. He founded the mission in eastern and central Persia, and did much to effect the appointment of a United States legation to Persia. His publications include: *Hymns in Persian* (1873); *Among the Turcomans* (1880); a translation into Gaghatti Tatar of the *Gospel According to Matthew; A Grammatical Note on the Simnuni Dialects of the Persian* (1884); *Persia, the Land of the Imâms* (1886).

BASSETT, JOHN SPENCER (1867–). An American historian, born at Tarboro, N. C. He graduated at Trinity College, N. C., in 1888, was appointed professor of history there (1893), and in 1906 became professor of history at Smith College. His publications deal with the history of North Carolina, and include: "The Constitutional Beginnings of North Carolina 1663–1729" (1894); "Slavery and Servitude in the Colony of North Carolina" (1896); "Slavery in the State of North Carolina" (1899); "The Federalist System" (1905)—all included in the *Johns Hopkins University Studies in History and Political Science;* a *Life of Andrew Jackson* (1911); *A Short History of the United States* (1913).

BASSI, bȧs'sē, PADRE UGO (1800–49). An Italian priest and patriot, active in the revolutionary movement. He stirred up the people for the defense of Rome against the French and during the siege displayed great personal heroism. He was taken prisoner by the French (April 30, 1849), but soon released. When resistance proved hopeless, he accompanied Garibaldi, whose chaplain he had become, to Casena. Their ships were scattered, and Bassi fell into the hands of the Austrians, by whom he was taken to Bologna and after cruel tortures was shot. His last words were "God save Italy." Consult Zironi, *Vita del Padre Ugo Bassi* (Bologna, 1879), and F. Venosta, "Ugo Bassi, Martire di Bologna" in the *Pantheon dei Martiri Italiani* (Milan, 1863).

BAS'SIA. See BUTTER TREE.

BASSIM. See BASSEIN.

BASSO, bȧs'sō. See BASS.

BASSOMPIERRE, bȧ-soN'pyâr', FRANÇOIS DE (1579–1646). A marshal of France. He was born at Harouel, in Lorraine, and at an early age gained the favor of Henry IV, whom he resembled greatly in character. He fought in Savoy (1602), in Hungary (1603), at La Rochelle (1628), at the Pass of Susa (1629), and in Languedoc (1631). He was also sent on

diplomatic missions to Spain, to England, and to Switzerland. Made marshal in 1622, he awakened the suspicion and resentment of Richelieu, who, in 1631 caused him to be cast into the Bastille, from which he was not liberated until the death of Richelieu, in 1643. His *Memoirs* (Cologne, 1665), written in the Bastille, though unreliable in detail, provide a good reproduction of the society in which he lived.

BASSOON' (Fr. *basson*, It. *bassone*, from *basso*, low, called in Italian *fagotto*, bundle). A musical instrument of the double-reed variety, the bass of the wood-wind family of instruments. In 1539 Afranio, a canon of Ferrara, conceived the idea of bending double the long *bombardo* then in use, so as to make it easier for handling, hence the Italian name. It is made of maple wood or plane tree, with a long S-shaped metal mouthpiece, and is provided generally with 8 holes and 10 keys. Its enormous compass of 3 octaves, B_1 to c^3, contains 3 registers: the lower powerful, solemn, and majestic; the middle sweetly expressive, but weak; and the upper register sorrowful. In addition, it possesses certain tones that are comic to grotesqueness, as in the famous "honor" monologue in Verdi's *Falstaff*. These combined qualities make the bassoon one of the most serviceable and frequently employed of the wind instruments in an orchestra. The notes for the bassoon are written on the bass clef for the lower register and on the tenor clef for the higher. There are several sizes of bassoons, the most important among them the tenor bassoon, a fifth higher (now almost obsolete), and the double bassoon, an octave lower, than the ordinary bassoon. Bassoon is also the name of an organ stop the pipes of which are made to imitate the tones of the instrument. Consult Teuchert and Haupt, *Musikinstrumente in Wort und Bild* (Leipzig, 1911).

BASSORA, bȧs'so-rȧ. See Baṣra.

BASSO-RILIEVO, bäs'sō rē-lyā'vō. See Relief Sculpture.

BASS ROCK. A rocky islet in the Firth of Forth, 1½ miles off the coast of Haddingtonshire, Scotland (Map: Scotland, F 3). It rises precipitously 320 feet above the sea and is about 1 mile in circumference. Of volcanic origin, and geologically interesting, its chief importance arises from its historical associations. As a fortress and state prison, the principal event in its history was the siege sustained by 24 of James II's supporters against the forces of William III during 1691–94, which ended in an honorable capitulation. It is the resort of innumerable flocks of sea fowl, especially solan geese, which form a profitable source of revenue. A lighthouse with a six-flash lantern of 39,000 candle power was established on the rock in 1902.

BASS STRAIT. The channel separating Tasmania from Australia (Map: Tasmania, C 1). It is about 185 miles long and from 80 to 150 miles broad and contains many small islands. The name of the strait is derived from that of Dr. George Bass, who first proved that Tasmania was an island by circumnavigating it in 1798.

BASS (bās) **TU'BA.** See Tuba.

BASS'WOOD. See Lime Tree.

BAST (origin obscure). An old term formerly applied to the fibrous tissue of the inner bark (q.v.), but now used as synonymous with "phloem" (q.v.). The vascular bundles of plants always include two regions, the "xylem" (wood) and the "phloem" (bast). In ordinary stems the vascular bundles form a cylinder, the xylem being the inner region of the cylinder and the phloem the outer region. The characteristic vessels of the xylem are the "tracheæ," through which the water ("sap") moves as it ascends the stem. The characteristic vessels of the phloem are the "sieve vessels," in which various foods of the plant are stored temporarily, being available for use at any time.

In stems that increase in diameter a "cambium" is formed between the xylem and phloem, a tissue which has the power of adding new tissue to the xylem and to the phloem. The new xylem is laid down in concentric rings ("annual rings"), thus increasing the diameter of the xylem cylinder. The new phloem is also laid down in concentric rings, but the older outer rings are pressed against the cortex by the increasing xylem, so that the older phloem becomes more or less disorganized. When the bark of such a stem is removed, it is peeled off down to the cambium, so that the innermost part of the bark consists of the removed phloem. It was to this phloem constituent of the bark that the term "bast" was originally applied, but, since it has become synonymous with "phloem," it applies wherever vascular bundles occur, as in stems without bark, veins of leaves, etc.

The principal bast fibres in commercial use are those derived from the flax, hemp, jute, ramie, or China grass, sunn hemp, and Cuba bast, or related species of *Hibiscus*. See Fibre and the names just mentioned.

BAST. See Bark.

BAS'TABLE, Charles Francis (1855–). An Irish political economist, born at Charleville, Cork. He studied at Trinity College, Dublin, and in 1882 was appointed professor of political economy in Dublin University. In 1888–93, and 1897 he was an examiner for the University of London, and became in 1902 professor of jurisprudence and international law and in 1908 regius professor of law at Dublin. He wrote *The Commerce of Nations* (1892; 5th ed., 1911), *Public Finance* (1895), *The Theory of International Trade* (1897; 3d ed., 1903).

BAS'TARD (OF. *bastard*, Fr. *bâtard*, probably from LL. *bastum*, OF. *bast*, Fr. *bât*, pack saddle; equivalent to OF. *fils-de-bast*, son of a pack saddle, bastard, referring to the use of pack saddles as beds in taverns, by muleteers). An illegitimate child, one neither begotten nor born in lawful wedlock; specifically, one born of a spinster, of a widow whose husband has been dead such a length of time as to make it impossible for him to be the father, or of a married woman when proof positive is produced that the paternity is other than of the husband. Where the mother is married, the presumption of the law is exceedingly strong in favor of the legitimacy of the offspring. The old English law went so far as to make the presumption conclusive in case the husband was, at the presumed time of conception, "within the four seas" surrounding Great Britain. But illegitimacy may now be proved in England as well as in this country, by evidence establishing the fact beyond a reasonable doubt. Under the Roman or civil law, a child born before the marriage of its parents was legitimated by their subsequent marriage. This principle is followed in the law of those countries which were

grounded in the Roman rather than the English common law; viz., Scotland and the nations of the continent of Europe; and in Louisiana, the province of Quebec, and the states of Central and South America. In most of the United States the civil-law rule has been adopted by statute. The common law recognized no such principle, and it was expressly repudiated in the famous Statute of Merton, enacted by Parliament in 1235 (20 Hen. iii, chap. 9). The bishops having "instanted the lords that they would consent that all such as were born afore matrimony should be legitimate, as well as they that be born within matrimony, as to the succession of inheritance, forasmuch as the Church accepteth such for legitimate, . . . all the earls and barons with one voice answered that they would not change the laws of the realm which hitherto have been used and approved." This continues to be the English law, the only exception to it being the case of a *bastard eigné* (Old Law French), where a son born before marriage succeeded without opposition to the father's estate, although the latter had a legitimate heir; if the possession of the so-called *bastard eigné* was undisputed during his lifetime, and his legal heir claimed the estate, it was no bar to that claim to prove the bastardy of the father.

An illegitimate child is, in the old law phrase, *filius nullius*, the son of no one. His parents are not under any parental obligation to him, and it is only in the interests of the parish and at the instance of the authorities thereof that they can be compelled to support him. He has, at least under the common law, no legal name until by reputation he acquires one, and he has no right of inheritance as an heir. Furthermore his own heirs at law can be only those of direct descent from him. If he die intestate, leaving no children or grandchildren, his property will not by law become that of his father or mother, brother or sister, or uncle or aunt, but will escheat to the state, and in the United States may be claimed by the public administrator. But several of the States have by statute allowed an illegitimate child to inherit from his mother and in some cases his mother to inherit from him as heir or next of kin. The maintenance of an illegitimate child devolves by common law in the first instance upon his mother; but in order that the child may not be a burden on the public, statutes in England and similar enactments in all of the States in this country allow proceedings to be taken to compel the father to aid in supporting the child. This procedure is based, not on the theory that the child has a right to his support, but solely to prevent the burden of support from falling upon the parish or county. The usual practice in such a proceeding is for the alleged paternity to be established by direct evidence (the testimony of the mother being admitted as of strong, though not conclusive, weight), after which the putative father is called on to give bond to the magistrate or overseers of the poor to contribute a fixed sum for an agreed time to the support of the child. (See AFFILIATION.) The custody of the child belongs primarily to the mother, but the court may determine the time during which such custody may last. In all civil and criminal rights not connected with the law of inheritance, or of support from parents, the status of the bastard is the same as that of any other person. He may hold and dispose of real and personal property, may sue and be sued, may devise by will, and may claim the protection of the state in all respects as though he were legitimate. In questions of settlement arising under poor laws, it has been held that his legal domicile is that of the mother, not, as with legitimate children, of the father, until he attains a settlement of his own. It has also been held that the ordinary right of a father to appoint by will or deed a guardian for his minor child does not exist in the case of a bastard.

The term has not always been one of contempt and humiliation. William the Conqueror was not ashamed to sign himself "Guillaume Bastard"; and the title has been borne without reproach by many other characters famous in history, as Don John of Austria, and Dunois, "the Bastard of Orleans." Consult the *Commentaries* of Kent and Blackstone; also, Schouler, *Treatise on the Law of the Domestic Relations* (5th ed., Boston, 1895); Nicholls, *History of the English Poor Law*, vol. i (London, 1854). See ILLEGITIMACY; POOR LAWS.

BASTARD BAR, or **BAR SINISTER.** See HERALDRY.

BASTARD OF ORLEANS. See JEAN DUNOIS.

BASTARD SAFFRON. See SAFFLOWER.

BASTIA, bȧs-tē'ȧ (It. fortress, bastion). The chief commercial town of the insular department of Corsica (Corse), France, on the east coast, opposite the Isle of Elba, 98 miles northeast of Ajaccio by rail (Map: France, S., M 6). Its streets are narrow and crooked, but its buildings are comparatively modern; it has two harbors, the new and the old, and a fine marine parade, adorned with a marble statue of Napoleon by Bartolini. The citadel and the cathedral of San Giovanni Batista are noteworthy. Its public institutions are a lyceum, a library with over 30,000 volumes, and fine collections of natural history. Wax candles, liqueurs, macaroni, tobacco, and soap are manufactured, and marble quarries, tanyards, and dye works give employment to many operatives. Bastia is an important trade centre and exports fruit, vegetables, minerals, and fish. The town is the seat of a United States consular agent. Bastia was built by the Genoese in 1380 and derives its name from the strong fortress or bastion which they built to protect it. After its cession to France in 1769 it became the capital, but in 1811 Ajaccio was selected in its place. Pop., 1901, 25,425; 1906, 27,338; 1911, 29,412.

BASTIAN, bäs'tē-an, ADOLF (1826–1905). A German traveler and anthropologist. He was born at Bremen, June 26, 1826, and was educated as a physician, studying at Berlin, Heidelberg, Prague, Jena, and Würzburg. His authority as an anthropologist rests upon an immense storehouse of facts, gathered during a series of extensive journeys in Asia, Africa, Australia, and America. In 1866 Bastian became docent at the University of Berlin and subsequently was made professor of ethnology. In 1869, with Virchow and R. Hartmann, he became editor of the *Zeitschrift für Ethnologie*, the organ of the Berlin Anthropological and Ethnological Society, of which he was one of the founders. He became in 1886 director of the new Museum für Völkerkunde. In 1901 he was editor of the *Ethnographisches Notizblatt*, published in Berlin. Bastian was a prolific writer, since 1859 having published nearly 60 works, comprising more than 80 volumes, dealing with various

subjects in anthropology. Within that province his range is extremely wide, his works embracing both ethnographic studies in the narrow sense as well as philosophic investigations in race and human psychology. A partial list of his works may serve to indicate the broad sweep of his acquirements in anthropology: *Der Mensch in der Geschichte* (3 vols., 1860); *Die Völker der östlichen Asien* (1866–71); *Das Beständige in den Menschenrassen* (1868); *Beiträge zur vergleichenden Psychologie* (1868); *Ethnographische Forschungen* (2 vols., 1871–73); *Schöpfung oder Entstehung* (1875); *Die Vorgeschichte der Ethnologie* (1881); *Der Buddhismus in seiner Psychologie* (1882); *Amerikas Nordwestküste* (1883); *Inselgruppen in Oceanien* (1883); *Indonesien* (1884–94); *Der Fetisch an der Küste Guineas* (1884); *Die Seele indischer und hellenistischer Philosophie* (1886); *Ueber Klima und Acclimatisation* (1889); *Ideale Welten* (1893); *Vorgeschichtliche Schöpfungslieder* (1893); *Ethnische Elementargedanken* (1895); *Die mikronesischen Kolonien* (1899–(1900); *Die Völkerkunde und der Völkerverkehr* (1900).

BASTIAN, băs'tyan, HENRY CHARLTON (1837–1915). An eminent English physiologist. He was admitted to the Royal College of Surgeons in 1860, was assistant curator in the Museum of the University College in London from 1860 to 1863; professor of pathological anatomy in the same college from 1867 to 1887; professor of principles and practice of medicine from 1887 to 1897; and physician to the University College Hospital from 1867 to 1897. In 1898 he was elected emeritus professor of the principles and practice of medicine at University College, London. He is recognized as an authority in the pathology of the nervous system and was one of the ablest defenders of the theory of spontaneous generation. He published: *The Modes of Origin of Lowest Organisms* (1871); *The Beginnings of Life* (1872); *The Brain as an Organ of the Mind* (1880); *Paralysis: Cerebral, Bulbar, and Spinal* (1886); *Various Forms of Hysterical or Functional Paralysis* (1893); *A Treatise on Aphasia and Other Speech Defects* (1898); *The Nature and Origin of Living Matter* (1905); *Evolution of Life* (1907); *Origin of Life* (1911).

BASTIAT, bà'styà', FRÉDÉRIC (1801–50). An eminent French political economist. He was born at Bayonne, June 20, 1801. His father was a merchant and educated his son with a view to the same pursuit. His first appearance as an author was in 1844, when he published, in the *Journal des Economistes*, an article entitled "De l'influence des tarifs français et anglais sur l'avenir des deux peuples." It contained in germ the theory of political economy subsequently developed by Bastiat, who from that moment was known as a decided opponent of the system of protection. Subsequently, in the same journal, he combated the economic fallacies of Socialism. During a visit to England he made the acquaintance of Cobden, and on his return to France he translated (1845) the speeches of the Free-Trade advocates, which he published in Paris with an introduction, entitled *Cobden et la ligue; ou l'agitation anglaise pour la liberté des échanges*, in which he presented a complete summary of the arguments against the protective system. Bastiat continued to propagate his views with considerable success. He became secretary of the societies and chief editor of the journal established to vindicate the principles of Free Trade. After the Revolution of 1848 he was elected successively a member of the Constituent and Legislative assemblies. In 1850 he came forward as the antagonist of the Socialist writer, Proudhon. Suffering from pulmonary disease, he repaired to Italy for change of climate, but died at Rome on Dec. 24, 1850. Besides the writings mentioned, Bastiat published *Sophismes économiques; Propriété et loi; Justice et fraternité; Protectionisme et communisme; Harmonies économiques;* and several other important treatises, all of which exhibit extensive knowledge of the subjects discussed, convincing logic, and a power of sprightly and biting satire. The *Harmonies économiques* and the *Sophismes* have been translated by J. P. Stirling. The fundamental thesis of Bastiat's system of economics is that unrestricted competition necessarily produces a universal harmony of interests. While the writings of Bastiat have had great influence, his main thesis has not found general acceptance. A new edition of his works in seven volumes was published at Paris in 1881. Consult Bondurand, *Frédéric Bastiat* (Paris, 1879), and Von Leesen, *Frédéric Bastiat* (Munich, 1904).

BASTIDE, bà'stēd', JULES (1800–79). A French publicist and politician, born in Paris. In 1821 he became one of the first members of the French Carbonari, and after the July Revolution he was conspicuous among the writers of the radical opposition. On the reconstruction of the National Guard he was elected commandant in chief of the legion of artillery and took part in the two insurrectionary movements, for the second of which—the *émeute* in Paris, June 5, 1832—he was condemned to death, but escaped to London. Pardoned in 1834, he returned to Paris and again devoted himself to politics, contributing articles to a daily journal, the *National*, of which he became editor in 1836. In 1847 he founded the *Revue Nationale*. He was one of the principal agitators in the Revolution of 1848 and became Minister of Foreign Affairs. After the coup d'état he withdrew from political life. He published: *De l'education publique en France* (1847); *La république française et l'Italie en 1848* (1858); *Histoire des guerres religieuses en France* (1859).

BASTIEN-LEPAGE, bàs'tyăN' le-pàzh', JULES (1848–84). A French painter. He was born of peasant stock at Damvillers, a village of Lorraine, Nov. 1, 1848. His early bent towards art was wisely fostered by his father. After graduating from the College of Verdun, he went to study in Paris in 1867. Here he was at first a student by day, and at night a postal agent, and then entered the class of Cabanel at the Ecole des Beaux-Arts. He was little influenced by this training, but more by the works of Manet (q.v.). The first of his pictures to command attention were in the Salon in 1874, where he exhibited "The Song of Spring" and a "Portrait of My Grandfather," which struck a new note in portraiture. It was painted *en plein air* and full of delicate outdoor light, very truly recorded. The attitude of the figure was unconventional; the model was in the act of snuff taking. This was the first of a series of triumphs, which brought him several medals, election to the Legion of Honor, and recognition in other countries; but he always remained a loyal son of his native village, where he painted the peasant scenes, which are his most ambitious

productions. Constantly in delicate health, he died of cancer of the stomach at Paris, Dec. 10, 1884, and was interred in the church of his native village. His last years were brightened by the friendship of his pupil Marie Bashkirtseff (q.v.), whose death preceded his by only one month. His chief canvases are "The Haymakers" (1878), in the Luxembourg (Paris); "The Potato Gatherers" (1879); "Joan of Arc Listening to the Voices" (1880), Metropolitan Museum of Art, New York. Mention should also be made of "The Beggar" (1881), "Love in a Village" (1883), and his last dated work, "The Forge" (1884). His numerous portraits are remarkable for strong characterization, attained through the closeness of their drawing. Among his notable subjects are Mme. Sarah Bernhardt, Albert Wolff, the Prince of Wales (Edward VII), and Gambetta on his deathbed. Bastien-Lepage was a thoroughgoing realist, whose art represents the application of the *plein air* methods of the Impressionists to figure and bust subjects. His color resembles theirs in its high scale, but he pays more attention to detail and lacks their facility. His pictures vary much in quality. Consult: Marie Bashkirtseff, *Journal intime* (Paris, 1890); the biographies by Theuriet (Paris, 1885), and De Fourcaud (ib., 1888); Arnic, *J. Bastien-Lepage, lettres et souvenirs* (Evreaux, 1896).

BASTILLE, bȧs-tēl′ (Fr. fortress, from OF. *bastir*, to build). A name originally applied in France to any building constructed of masonry, with towers or bastions adapted for defense. These fortresses were once very numerous, especially at Paris; but Cardinal Mazarin, as a part of his anti-feudal policy, allowed only a few of them to remain standing, among these being the Castle of Paris, to which the name Bastille was at last exclusively applied. This castle developed from two towers on either side of the road which entered Paris by the Faubourg Saint-Antoine. By the orders of Charles V Hugues Aubriot converted the towers into a castle of four bastions, connected by thick walls, the whole being surrounded by a moat 25 feet deep. The number of bastions was subsequently doubled, and the area of the whole correspondingly increased. The Bastille, from its commanding position, was closely connected with important affairs in French history and was occupied by the Guises in 1588, by Henry IV in 1594, the Frondeurs in 1649, and Condé in 1652. During its entire history it was utilized as a state prison, there being cells and dungeons for as many as 80 prisoners—a limit often reached. There was undoubtedly considerable severity exercised at different times, but whether the treatment there was any more strict than the customary prison discipline of the age, it is hard to determine. It seems established that many of the noble prisoners, at least, were treated with considerable lenity; but accounts of cruelty, some of which were probably well founded and others exaggerated, and the association of the Bastille with the use of the *lettres-de-cachet* (q.v.), which kept so many in confinement without trial, caused this prison to be regarded as the symbol of oppression. It was natural, therefore, that the Bastille should be one of the first objects of attack at the outbreak of the Revolution. On July 14, 1789, the populace of Paris, recruited chiefly from the Faubourg Saint-Antoine, attacked the fortress and stormed it after a half-hearted resistance by the Governor, De Launay, and a handful of Swiss. The Governor and seven of his men were killed, the archives of the prison scattered, and the prisoners, seven in number, were carried through the streets and hailed as victims of tyranny and martyrs in the people's cause. The building itself was torn down, and the key sent by Thomas Paine as a present to George Washington. The anniversary of the taking of the Bastille is celebrated every year as the national holiday of France. Its site is marked by a bronze column.

Consult: Arnold, *Histoire de la Bastille* (Paris, 1845–59); Bingham, *The Bastille* (London, 1888); Davenport, *History of the Bastille* (London, 1837); Funck-Brentano, *The Bastille*, (Eng. trans., New York, 1900). The documentary records which escaped destruction are contained and explained in Ravaisson, *Les archives de la Bastille* (6 vols., Paris, 1866–73).

BAS'TINA'DO (Sp. *bastonada*, Fr. *bastonnade*, from OF. *baston*, Fr. *bâton*, cudgel). The name given by Europeans to the punishment in use in the Orient, which consists in blows inflicted with a stick, generally upon the soles of the feet, but sometimes also upon the back.

BAS'TION. A tower or projecting portion of the walls of a fortification, and the most important part of the fortifications of the *enceinte* (q.v.). The rampart forming a bastion is constructed as if on four sides of a pentagon, two of which (called the *faces*) form an angle with the point toward the exterior; the other two sides (the *flanks*) connect the extremities of the faces with the adjacent curtains. The fifth (supposed) side of the bastion is left open, the intervening space being known as the *gorge*. The bastion system dates back to the first rude means used in fortification, which probably consisted of nothing more than simple inclosures, surrounded with palisades; a device still employed by the natives of semi-civilized states. High walls with breastwork or parapets undoubtedly followed, to enable the defenders to examine the surrounding country. The bastion as it is known to-day, however, is of Italian origin, the most ancient at present existing bearing the date of 1527 and being situated at Verona. Bastions are generally designated by numbers, as are also the guns and the fronts. The numbers are according to the fronts and begin with the first one to the right of the exit of the main gate and continue with the sun. The advantage thus afforded is that it enables any particular gun to be specified, even if its number be unknown. Thus, the first gun on the right face of the second bastion, etc.

The relation which bastions bear to the general system of attack and defense is noticed under FORTIFICATION, where is given the historical development of methods of defense, illustrations, and a list of works treating this subject.

BASU'TOLAND. A British South African dependency, situated between the Orange Free State, Natal, and the Cape province, covering an area of 11,716 square miles (Map: Cape Colony, J 7). It has an elevated surface and a very rich soil, being considered one of the best grain-producing countries in South Africa. The climate is considered the most healthful in that section of the Continent. The principal products are cereals and live animals. Minerals are supposed to exist, judging from some indications, but so far coal is the only one

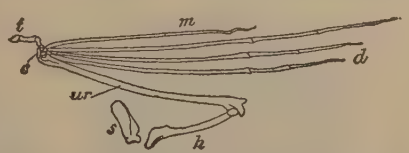
to be exploited. Basutoland is a member (since 1903) of the South African Customs Union. The imports consist chiefly of clothing and blankets, agricultural implements, metal products, and groceries. The imports and exports for the year 1908 amounted to £239,830 and £193,122 respectively. Basutoland is administered by a resident commissioner, under the High Commissioner for South Africa. It is divided into seven districts, subdivided into wards administered by hereditary chiefs. The administration of justice is also, to a very large extent, left in the hands of native judges. The revenue of the colony is derived chiefly from a native hut tax, license fees, post-office receipts, and an annual contribution from the Cape province. The revenue and expenditure for 1910–11 amounted to £145,500 and £134,888 respectively. Education is well advanced, and is carried on almost exclusively by missionaries. A railway from Maseru connects with the South African railway system.

The population of the colony was 404,507 in 1911. The natives (403,111) are a Bantu people, composed of several coalescent tribes, short in stature, regular in features, and with thinner lips than the Kaffirs, whom they resemble. They have advanced remarkably through the efforts of French missionaries and are becoming a civilized Christian nation, taking up readily modern ideas. Their language was reduced to writing by missionaries and forms a considerable literature. The capital of the colony is Maseru, with a population of about 861 natives and 500 whites. Basutoland was established as a separate state at the beginning of the nineteenth century by Moshesh, a powerful native chief, who clashed with the British government in 1852 and was worsted in the ensuing struggle. In 1856 a boundary dispute arose between the Basutos and the Orange Free State, which was continued for about two years without definite results. In 1866 a part of Basutoland was ceded to the Orange Free State, whose authority was recognized by the Basutos. But this settlement did not mark the termination of hostilities, which continued for several years. As the result of an appeal from the Basutos to Great Britain, Basutoland was annexed to Cape Colony in 1871. For the next 12 years the territory was in an almost uninterrupted state of rebellion, culminating in its disannexation from Cape Colony in 1884; since which time it has been administered under the direct authority of the crown. About four miles from Maseru a leper settlement was formed in 1912; the proportion of lepers in the territory is about .91 per thousand, and the disease is spreading. Consult: Mrs. Barkley, *Among Boers and Basutos* (London, 1900); Lagden, "Basutoland and the Basutos," in *Colonial Institute Journal*, vol. xxxviii (London, 1901); Bryce, *Impressions of South Africa* (London, 1899); Widdicombe, *Fourteen Years in Basutoland* (London, 1892); M. Martin, *Basutoland; Its Legends and Customs* (London, 1903); Lagden, *Basutos: the Mountaineers and their Country* (New York, 1910); Ellenberger, *History of the Basuto* (London, 1912).

BAT (OE. *back, balke;* cf. Swed. *natt-bakka*, nightjar, Dan. *aftenbakke*, evening bat, Icel. *lepr-blaka*, leather flapper, from *blaka*, flap, flutter). A small furry mammal of the order Chiroptera, having membranous wings and almost exclusively aërial in its habits. The power of flight, which resembles that of birds or insects, is the distinguishing feature of these animals, which in most other respects resemble the Insectivora. Their whole organization has been modified towards the perfection and the pursuit of an aërial life. Most of them are small, though a few are of considerable size, and have a spread of wings measuring 5 feet.

Structure. The vertebral column is short and compact, the thorax capacious, to make room for the proportionately very large heart and lungs, and the breastbone (which is keeled like that of birds) and shoulder girdle are very large and strong to afford attachment to the great muscles operating the wings; while the pelvic girdle is small and weak. Reversing the rule among mammals, the fore limbs are developed vastly in excess of the hind ones, which, although provided with perfectly formed feet, are practically useless for locomotion on the ground, though of service in climbing, and particularly in clinging to some support, from which the creature hangs head down when at rest—its customary attitude of repose. The bones of the limbs are permeated by medullary canals so large as to make them practically hollow; other bones are light and slender, and the ribs much flattened.

Wings.—The modifications of the limbs with reference to flight are very great (see illustration). The shoulder bones (clavicle and scapula)



SKELETON OF BAT'S WING.

s, scapula; *h*, humerus; *ur*, ulna-radius; *c*, carpus (wrist bones); *t*, thumb; *m*, metacarpal bones; *d*, digits (fingers).

are much enlarged and strengthened. The humerus (*h*), though long, is scarcely two-thirds as long as the forearm, where the radius (*ur*) is so lengthened that in some species it is as long as the head and body together (the ulna is rudimentary and firmly soldered to the radius); the wrist or carpal bones (*c*) are compact, and more or less soldered together at the radial joint; the metacarpals (*m*, equivalents of the bones of the "back" of the human hand) are prolonged to lengths varying in the different families, but always equaling or exceeding the length of the body, and terminate in fingers (*d*) consisting of a varying number of phalanges. An exception to this, however, is made by the thumb (*t*), which is very short, free from the wing membrane, and terminated by a strong claw greatly used by the animal in climbing or holding on to a support. Thus the length of the arm and hand may be 15 or 20 times as great as the breadth of the shoulder.

The position of the bones is changed, so that, while ability for a rotatory motion is lost, greater power for an up-and-down (i.e., dorsoventral) motion is gained. The hind limbs are also lengthened in the leg bones; but here the notable change is in the lateral position and spread gained through a twisting outward so extensive that the knee is directed backward in-

stead of forward. Upon this light, strong framework, moved and controlled by powerful pectoral muscles, is stretched a flexible, leathery, nearly hairless membrane (patagium), which is double and is really an extension of the skin. It envelops all the bones of the arm and hand and thence stretches to the hind leg (leaving the foot free) and in most families to, or nearly to, the end of the tail; but its relative size and shape vary. Stretching this great membrane and beating the air with it, the bat flies with more than the agility of a bird, though more slowly, and when it rests it folds the membrane somewhat like a fan against its sides, or wraps it about its body like a protecting mantle.

Sense Organs.—The brain and nervous system of bats are comparatively low in organization, but their sensory faculties are remarkably developed in adaptation to their crepuscular and nocturnal habits. "As blind as a bat" is a mistaken simile. All have efficient eyes, those of the Oriental fruit-eating sorts being of a size natural to their foxlike countenances. In our more familiar insect-eating species they are likely to be small, bead-like, and nearly hidden in the very soft fur with which these animals are clothed; the old English and German names, "flitting mice," were not bad ones. The senses of smell and taste are probably well developed. The sense of hearing is no doubt exceedingly acute and largely depended upon. All bats have prominent and very mobile ears, and in many of the insect eaters, the external ear expands in an enormous membrane, sometimes many times larger than the whole face, supplemented by appendages, ribbed, crinkled, and otherwise modified, and in some forms able to be folded down out of the way of harm. These expansive ears are evidently of more utility than simply to catch waves of sound and are related to the extraordinary sense of touch, which perhaps is carried to a higher degree of delicacy in these than in any other animals. In addition to them a large section of the order possesses "nose leaves"—more or less wrinkled and complicated upright growths of thin skin from the end of the nose, which often give to the face a most grotesque appearance. Two of the most extraordinary examples are shown on the accompanying Plate—the flower-nosed bat (Fig. 7), a native of the Solomon Islands; and Blainville's chin-leafed bat (Fig. 5) of South America. On the other hand, in some species such appendages are wholly absent, as in the ugly naked bat (Fig. 3) of the Malay countries.

All these membranes, as well as those of the wings, are filled with blood vessels and numerous ramifications of fine nerves, which take the form elsewhere seen in especially sensitive surfaces, and they are regarded as apprising the creature, in a way not fully understood, of the nearness of obstacles and giving other useful information. This was illustrated by the celebrated experiments of Spallanzani about 1775. He blinded bats with varnish and let them fly in a chamber filled with stretched and dangling strings. These and other obstacles they avoided; they turned corners, found holes for escape or concealment, and behaved as though eyesight were unnecessary; stoppage of the ears, however, caused them some embarrassment. Other observations have confirmed their ability, apparently through extreme sensitiveness of the exposed membranes, to sense objects without sight or actual touch.

Distribution. Bats are distributed in all parts of the world and, as might be expected from their powers of flight, inhabit many remote islands, such as Bermuda and New Zealand—the only indigenous mammals of the latter being two species of bats. They are absent, however, from the coldest parts of the world and are most numerous in the Eastern tropics, to which some groups are confined; in fact, the race is characteristically tropical. In rather cold climates, such as that of Canada, some species have acquired a habit of migration, going south to some extent in the autumn, as the northern winters are too long to be survived in a state of uninterrupted hibernation. This seems to be the case, according to Merriam, with two species of North American bats, both of which habitually rest in trees instead of in the warmer recesses of caves. The number of kinds of bats is so great that about 450 species are now recognized; and the enormous companies of certain species that congregate in favorable places are unrivaled elsewhere among gregarious mammals and recall the great flocks of sea birds to be seen in certain nesting localities.

Ancestry. Few fossil remains of bats are known. In the Upper Eocene deposits of Aix, France, has been found a well-developed bat's wing, and in other portions of the Tertiary deposits of the same country have been found skulls of species that very closely resemble those of modern forms. In North America their remains are known in fragmentary condition from the Eocene, Miocene, and Post-Tertiary deposits, and in South America they have been recognized in the cave deposits of Brazil. All these differ little from living genera.

Classification and Habits. Bats are classified as an order, divisible into two sections, Megachiroptera and Microchiroptera.

Megachiroptera.—These are lowest in rank and include the large-sized, fruit-eating species, mainly of the Oriental tropics. The lowest in rank are the fox bats or "flying foxes" of the family Pteropodidæ. They are described under the titles Fox Bat and Fruit Bat.

Microchiroptera.—In this division are found all other bats—the ordinary bats of temperate climates as well as many tropical ones—which agree in being of small size, in living, as a rule, upon insects to which their dentition is suited, and in having more or less of a tail enveloped in an interfemoral membrane. The first family is that of the horseshoe bats (Rhinolophidæ), whose snouts bear such appendages as have been described, differing according to species. They are scattered throughout southern Asia, where many species are well known, and a few extend into Europe and the British Isles. Most of them are of the ordinary brown color, but an Australian species is bright orange in the male and yellow in the female. A family having still more prominent growths about the nose and ears is that of the leaf-nosed bats proper (Nycteridæ). Two genera inhabit eastern Asia, represented by the lyre bat (*Megaderma lyra*), whose vast ears are joined together above the head, and which sometimes attacks and kills other bats and small mammals and, according to good authority, frogs, sucking their blood. In the next family, Vespertilionidæ, are grouped the "true," or familiar, small, naked-faced bats of all countries. They feed almost exclusively on insects, which they capture in flight, and which their sharp and numerous teeth are fitted to hold and crush; they spend the hours of daylight in

BATS

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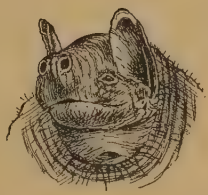

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1 A TYPICAL BAT, showing parachute.
2. TUBE-NOSED FRUIT BAT (Harpyia).
3. MALAYAN MASKED BAT (Cheiromeles torquatus).
4. INDIAN FALSE VAMPIRE (Megaderma lyra).
5. CHIN-LEAFED BAT (Mermops megalophylla).
6. AMERICAN FALSE VAMPIRE (Vampyrus spectrum).
7. FLOWER-NOSED BAT (Anthops ornatus).
8. HAMMERHEAD (Hypsignathus monstrosus).

eaves, ruins, hollow trees, garrets, and similar hiding places, sometimes resorting to caverns in vast numbers and so continuously that thick deposits of valuable guano are formed, as is the case in certain parts of Texas. At dusk they sally forth, alone or in pairs, and hunt the air for their minute prey. In cold climates they spend the winter hanging in some retreat (each species exercising a preference in this matter) in a semi-torpid state and occasionally appear during warm spells. One, or sometimes two, young are born in the spring, and carried about clinging to the mother's breast, where two nipples yield milk. The commonest European bats, in regard to which much folklore and no little of foolish superstition are related and still believed among the ignorant, are the long-eared (*Plecotus auritus*), the barbastelle (*Barbastellus communis* or *Synotus barbastellus*), the pipistrelle or flittermouse (*Vesperugo pipistrellus*), abundant all over Europe and Central Asia, and the serotine (*Vesperugo serotinus*), which is almost world-wide in its distribution. Here belong also the common North American bats, of which the most frequently seen in the northern United States are the little brown bat (*Vespertilio* [*or Myotis*] *subulatus*) and the red bat (*Lasiurus borealis*). All these have a long tail extending a spacious triangular membrane, which is further sustained by two bones springing from the "heels" of the hind feet, and which serves a most useful purpose in these dodgings through the air so characteristic of the bat's flight.

The remainder of the bats form the Emballonurine section of the group. The typical family, Emballonuridæ, consists of small tropical and subtropical species of both hemispheres, which have a naked muzzle, in which the nostrils project beyond the lower lip, and a tail sometimes longer than the interfemoral membrane. Many are South American. One section embraces the molossine, or mastiff bats, of which a sooty brown species dwells in southern California. They are noted for the thickness and freedom of the hind limbs and tail. Another family, the Phyllostomatidæ, is confined to Central and South America, where it represents the nose-leafed bats of the Old World, having many appendages about the nostrils. Many of them eat fruit or suck the blood of animals as well as feed upon insects, and one, called *Vampyrus spectrum*, is the largest and most repulsive of American bats; it is a fruit eater. (See Colored Plate of MAMMALIA and Plate of BATS.) Here, however, are classed the true vampires of the genus *Desmodus*. See VAMPIRE.

Bibliography. For the bats of the Old World, consult the standard works, and Dobson, *Catalogue of the Bats in the British Museum* (London, 1878); for North American species, Merriam, *Transactions, Linnæan Society of New York*, vol. i (New York, 1882); Allen, *Bats of North America*, Bulletin No. 43, U. S. National Museum (Washington, 1893); and the writings of Waterton, Gosse, Bates, Belt, Wallace, Poey, and Hudson for bats of tropical America. For the East Indian fruit bats, consult Wallace, *Malay Archipelago* (New York), and Blanford, *Fauna of British India: Mammals* (London, 1888–91); Miller, "The Families and Genera of Bats," U. S. Nat. Museum, *Bulletin* (Washington, 1907); Hahn, "Some Habits and Sensory Adaptations of Cave-Inhabiting Bats," in *Bulletin*, Marine Biological Laboratory, vol. xv (Lancaster, Pa., 1908). See FRUIT BAT; HAMMERHEAD BAT; HARPY BAT; LYRE BAT.

BATABANÓ, bä-tä'bä-nō'. A town of Cuba, situated in the province of Havana, on the south coast of the island, 37 miles by rail from Havana (Map: Cuba, C 4). This port is one at which coasting steamers touch, and is the nearest point in Cuba to the Isle of Pines. The natives are engaged in sponge fishing. Diego Valesquez in 1514 founded San Christóbal de la Habana on the present site of Batabanó. Pop., about 6500.

BATAC, bä-täk'. A town of Luzon, Philippines, the largest in the province of Ilocos Norte, 10 miles south of Laoag. It was founded in 1587 and is a flourishing trade centre. Pop., 1903, 19,524.

BATAK, bä'täk. A nomadic pygmy tribe living in the vicinity of Tinitian, Palawan Island. They are of lighter complexion than the Negrito and show other evidences of being mixed bloods. Although they sometimes practice agriculture in a crude fashion, they subsist chiefly on forest products and the game they are able to secure with their blowgun and poisoned darts. See PHILIPPINES.

BATALEUR, bä'tä'lēr'. See EAGLE.

BATAN, bä'tän. A town of Panay, Philippines, in the province of Capiz, 17 miles west of Capiz. Pop., 1903, 14,315.

BATANÆA. See BASHAN.

BATANES, bä-tä'nās. A Malayan people inhabiting the Batanes Islands, which lie between Luzon and Formosa. Their dialects belong to the Philippine group of languages. See PHILIPPINES.

BATANGAS, bä-täng'gäs. A seaport town, the capital of the province of the same name, on the island of Luzon, Philippines (Map: Luzon, F 12). The province covers an area of 1108 square miles on the peninsula opposite the island of Mindoro and had a population, 1903, of 257,715. It contains a number of high mountains and Lake Bingabon, or Taal, with the volcanic mountain of Taal in its centre. The province produces extensively sugar, coffee, rice, hemp, corn, oranges, bananas, and coconuts. There are forests of pine wood on the mountains, and the region is rich in mineral waters. The only important industry is the manufacture of dyestuffs, and silk, abaca, and cotton fabrics. The capital of the province, 72 miles south of Manila, lies at the mouth of the Calumpang River, on the east shore of Batangas Bay. It has a fine harbor. The city is well built, and among its prominent buildings are a royal palace, a prison, and a convent. A number of annual expositions are held in the city. Pop., 1903, 33,131.

BATAN ISLANDS (bä'tän) (Sp. *Islas Batanes*). A group of islands in the northern part of the Philippine Archipelago, situated north of the Babuyan group, between lat. 20° and 21° N. (Map: Philippine Islands, F 1). The principal islands are Ibayat, 35 square miles; Sabtan (Seminanga), 12; and Batan, 27 square miles. The total area of the group is 81 square miles. The population is about 10,000. Administratively the group forms a subdivision of Cagayan Province, with Santo Domingo de Basco (2347) on Batan as capital.

BATATAS, bä-tä'täs. See SWEET POTATO.

BATA'VI. The name of a German people who anciently inhabited a part of the present Holland, particularly the island which is called after them, Insula Batavorum. Their cavalry

was particularly good, and was often employed by the Romans. Their capital was Lugdunum Batavorum, now called Leyden. The first writer who terms the insular district inhabited by the Batavi, Batavia, is Zosimus.

BATA'VIA, *Dutch pron.* bä-tä'vē-ä. Properly the name of the island occupied by the ancient Batavi. At a later date it became the Latin name for Holland. The name BATAVIAN REPUBLIC was given to the Netherlands on their new organization by the French in May, 1795, and they continued to bear it till they were converted into the Kingdom of Holland, under Louis Bonaparte, in June, 1806.

BATA'VIA (*Batavia,* 'good land,' the ancient name of modern Holland, the motherland of the city in Java). The capital and chief city of the Dutch East Indies. It is situated on the north coast of Java, in lat. 6° 7′ S. and long. 106° 50′ E. (Map: East India Islands, C 6). It lies on the Bay of Batavia in a low and marshy plain, which is mainly devoted to the cultivation of rice. The temperature is warm and approximately uniform. Like most Colonial cities, Batavia consists of two parts, the old and the new city. The former is situated near the water and is occupied chiefly by business houses and factories and the residences of the natives and Chinese. In former years the Europeans also lived in the lower part of the city, but the excessive mortality from fever compelled them to remove to the upper and more elevated part. The modern city is built after the fashion of Dutch towns, with a few modifications to suit the exigencies of the climate. Streets and canals intersect, and houses are spacious and wide apart and are surrounded by luxurious gardens filled with the choicest tropical plants. The government buildings are of magnificent architecture. The Königs Plein is a parade ground one square mile in extent and surrounded by beautiful residences and fine public buildings, including the Governor-General's palace and the Museum of the Batavian Society of Arts and Sciences. The latter is a beautiful structure in Greek style, and contains, besides an extensive library, the largest collection of representative Javanese art in all its branches. The Batavian Society, in conjunction with the Dutch government, has contributed considerably to the science of archæology by the excavation of the ancient Javanese temples. The military buildings are extensive and well built. In regard to public utilities, Batavia is in no way inferior to any European city of its size. It has good steam tramways, electric railways, telephones, electric lighting, and all other accessories of a modern city. Among its educational and charitable institutions are a gymnasium, a number of government and private high schools, an orphan asylum, a medical school for natives connected with the military hospital, and a number of scientific societies. Commercially Batavia is the most important city of the East Indies. It is the chief outlet for the numerous products of the Dutch East Indies, of which the most important are coffee, sugar, tea, rice, different spices, timber, dyewoods, diamonds, drugs, minerals, etc. Batavia stands in direct communication with the Netherlands, Great Britain, Germany, and Australia. A state railway connects the old town with the harbor, and a private line runs into the interior. About 36 miles south of the city is Buitzenzorg, the residence of the Governor-General.

The first European settlement on the site of the present city of Batavia was founded by the Governor-General Pieter Both, in 1610. Originally only a factory, it became the chief commercial centre of the Dutch East Indies, under the name of Jacatra, during the administration of the Governor-General, Coen (1618–32), who removed his seat from the Moluccas to the new settlement and erected some fortifications. In 1619 it was attacked by the joint forces of the kings of Bantam and Jacatra, assisted by the English, who were defeated, after a siege of five months, by Governor-General Coen. Since then the city has been known by its present name, and has grown rapidly, becoming by the end of the seventeenth century the foremost city of the East Indies. After the eruption of Mount Salak in 1699 the streams were choked with mud, the site became very unhealthful, and the centre of European population gradually shifted southward, where the modern city of Batavia is situated. The inhabitants of Batavia in 1900 numbered 115,887, of whom 9423 were Europeans, 26,433 Chinese, and 2828 Arabs. An enumeration in 1905 returned a total population of 138,551, of whom 8777 were Europeans, 99,320 natives, 28,150 Chinese, and 2058 Arabs. Batavia is the seat of a United States consul. Consult Conscience, *Batavia* (Paris, 1880).

BATA'VIA. A city in Kane Co., Ill., 44 miles west of Chicago, on the Chicago, Burlington, and Quincy and the Chicago and Northwestern railroads and on Fox River (Map: Illinois, D 2). It manufactures windmills, engines, pumps, wagons, and foundry products and also has important limestone-quarrying interests. Batavia was settled in 1833 and is governed under a charter of 1902, which provides for a mayor, elected biennially, and a unicameral council. Pop., 1900, 3871; 1910, 4436.

BATAVIA. A town, and the county-seat of Genesee Co., N. Y., 36 miles (direct) east of Buffalo on the New York Central, the Erie, and the Lehigh Valley railroads, and on Tonawanda creek (Map: New York, B 4). It is the seat of the State School for the Blind and has a public library, the Holland Purchase Museum and Land Office, which contains relics of the early history of this part of the State, good public and parochial schools, and an anti-masonic monument. The town is an important manufacturing centre, producing agricultural implements, shotguns, shoes, rubber tires, paper boxes, carriage wheels, shell goods, and interior woodwork. The water works and electric light plant are owned by the municipality. Pop., 1910, 11,613; 1920, 13,541. Batavia was founded by Joseph Ellicott in 1801 and incorporated as a village in 1823. Here lived William Morgan (see ANTI-MASON), who is said to have been abducted and killed by members of the Masonic Order in 1826 because of his intention to reveal the secrets of Masonry. Consult Seaver, *A Historical Sketch of the Village of Batavia* (Batavia, 1849).

BATCH'ELLER, GEORGE SHERMAN (1837–1908). An American soldier, jurist, and diplomat, born at Batchellerville, N. Y. He graduated in 1856 at the law department of Harvard University, was admitted to the bar in 1858, and was elected a member of the New York State Legislature in 1859, 1873, 1885, and 1889. During the Civil War he served in the Virginia campaigns, and at the siege of Charleston was appointed deputy provost-marshal-general of the Department of the South, and rose to be lieu-

tenant colonel of volunteers. In 1875 he became judge, representing the United States in the international tribunal of Egypt, and was elected presiding justice. After having been, in 1889–90, First Assistant Secretary of the Treasury, and in 1891 Minister to Portugal, he was reappointed to the international tribunal in 1897 and again in 1902.

BATCH'ELOR, George (1836–). An American Unitarian minister. He was born at Southbury, Conn., and graduated at Harvard College, the Meadville Theological School (1863), and was secretary of the American Unitarian Association from 1894 to 1898, of the National Conference from 1870 to 1880, and chairman of that body in 1893–94. He was editor of the *Christian Register* from 1897 to 1911. Besides numerous sermons he published, in 1887, *Social Equilibrium.*

BATCHIAN, bät-shyän'. See Batjan.

BATE, William Brimage (1826–1905). An American soldier and legislator. He was born near Castilian Springs, Tenn. He served as a volunteer during the Mexican War and afterward edited a newspaper at Gallatin, Tenn., where he also began to practice law in 1852. Previously he had been sent to the State Legislature, and from 1854 to 1860 held the office of Attorney-General for the Nashville District. He joined the Confederate army as a private and rose to the rank of major general. The confiscation of his property while he was still in the army left him penniless, and he had personal obligations amounting to $30,000, but he declined to take advantage of the bankruptcy law and had paid the amount in full by 1882.

BATEAU, bä'tō'. See Boat.

BATE'MAN, Sir Alfred Edmund (1844–). An English economist and public official. He was born in Nottinghamshire and received his education at Repton and at Brighton College. After allying himself with the ecclesiastical commissioners (1863) and the board of trade (1865), he studied law and in 1872 became a barrister. He served as secretary successively to the French commissioners of treaty negotiations (1877, 1881, 1882), to the international sugar conferences (1887–89), and to the trade and treaties committee (1890–92). In 1892, and again two years later, he was British delegate for the Portuguese and Spanish commercial negotiations. In 1897 he was president of the Royal Statistical Society, and in the same year he was appointed treasurer of the International Statistical Institute, serving in this position until 1909. For a time he was Comptroller-General for commerce, labor, and statistics at the British board of trade, and later he served as joint manager of the Imperial Institute, as chairman of the labor arbitration courts, and as chairman of the London advisory committee of labor exchanges. He received a jubilee medal in 1897 and three years later was created a K.C.M.G.

BATE'MAN, Sir Frederic (1824–1904). An English physician and scientific writer. He graduated at the University of Aberdeen in 1850 and in 1876 was elected fellow of the Royal College of Physicians. His appointments included that of consulting physician to the Norfolk and Norwich Hospital. His *Aphasia and the Localization of Speech* (1870) was crowned by the Academy of Medicine of France. He published also *Darwinianism Tested by Language* (1877) and *The Idiot and his Place in Creation.*

BATEMAN, Kate Josephine (Mrs. Crowe) (1842–1917). An American actress. She was born at Baltimore, Md., the daughter of Hezekiah Linthicum Bateman, an actor and theatrical manager. Her mother was also an actress. With her sister, Ellen (later Mrs. Greppo), she appeared on the stage almost in infancy and exhibited unusual talent. In 1862 she began her career in New York as Julia, Pauline, Juliet, and Lady Macbeth, and made a remarkable success in London in 1863 as Leah. She married George Crowe, the former editor of the London *Daily News,* in 1866, and temporarily abandoned the stage, but returned to it in 1868, making a success in *Medea* in 1872, and with Henry Irving in *Macbeth* in 1875. The next year she played the title rôle in Tennyson's *Queen Mary.* In and after 1892 she conducted a school of acting in London and appeared in subordinate rôles in many well-known plays.

BATEMAN, Newton (1822–97). An American educator. He was born at Fairfield, N. J., graduated in 1843 at Illinois College, studied at Lane Theological Seminary, and from 1847 to 1851 was professor of mathematics at St. Charles College, Missouri. He was principal of the Female College at Jacksonville, Ill., from 1851 to 1857. From 1858 to 1868 he was State superintendent of public instruction for Illinois, and from 1875 to 1893 was president of Knox College. Besides these official activities he was interested in many educational societies.

BATES, Arlo (1850–). An American author. He was born at East Machias, Me., and was graduated from Bowdoin (1876). He became the editor of the Boston *Sunday Courier* (1880–93) and afterward professor of English in the Massachusetts Institute of Technology. Among his novels are *The Pagans* (1884), *The Wheel of Fire* (1885), *The Philistines* (1888), *The Puritans* (1899), and *Love in a Cloud* (1900). His poems are collected in *Berries of the Brier* (1886), *Sonnets in Shadow* (1887), *A Poet and his Self* (1891), *Told in the Gate* (1892), *The Torchbearers* (1894), and *Under the Beech Tree* (1899); his criticisms in *Talks on Writing English* (1897), *Talks on the Study of Literature* (1898), *The Diary of a Saint* (1902), *Talks on Teaching Literature* (1906), and *The Intoxicated Ghost* (1908). In 1912 he wrote an introduction for E. P. Whipple's *Charles Dickens* (2 vols.).

BATES, Blanche (1873–). An American actress, born at Portland, Ore. She made her début in San Francisco in a benefit performance of Brander Matthews's *This Picture and That.* Among her early successes were her Mrs. Hillary in *The Senator,* Phyllis in *The Charity Ball,* and Nora in *A Doll's House.* She joined Daly's company in 1898 and the next year at Daly's Theatre, New York, played Mirtza in *The Great Ruby.* In 1901 she appeared as Cigarette in *Under Two Flags* at the Garden Theatre in New York. Thereafter devoting herself to the productions of David Belasco, she won great success in *The Darling of the Gods* (1902) and *The Girl of the Golden West* (1905). Consult Strang, *Famous Actresses of the Day in America* (Boston, 1899).

BATES, Charley. A pupil of the Jew Fagin, and companion of the "Artful Dodger," in Dickens's *Oliver Twist.*

BATES, Charlotte Fiske (Mme. Rogé) (1838–). An American writer, born in New York City. She published a volume of verse,

under the title *Risks and Other Poems* (1879), contributed many articles to magazines, and edited the *Longfellow Birthday Book* (1881), *The Seven Voices of Sympathy* (1881), and the *Cambridge Book of Poetry and Song* (1882). In editing the first-named works she coöperated with the poet Longfellow, whom she also assisted in compiling his *Poems of Places*. In 1891 she married M. Adolphe Rogé, who died in 1896.

BATES, Edward (1793–1869). An American lawyer and statesman. He was born in Belmont, Va., of Quaker parentage. He was appointed judge of the St. Louis land court in 1853, presided over the Whig National Convention in 1853, and subsequently became one of the leaders of the Republican party. At the national nomination convention in Chicago in 1860 his name was proposed for the presidency, and he received 48 votes on the first ballot. From 1861 to 1864 he was a member of Lincoln's cabinet as attorney-general, and worked indefatigably to secure the success of the Union cause during the Civil War. Afterward, until his death, he devoted himself wholly to the practice of his profession.

BATES, Henry Walter (1825–92). An English naturalist and traveler, born at Leicester. He became acquainted with A. R. Wallace, and in 1848 he and Wallace went to the Amazon, paying their expenses by the sale of duplicate specimens. Bates spent three years at Pará and seven years on the upper Amazon. At Ega, on the upper Amazon, he found 550 new species of butterflies. He returned to England in 1859, having found 8000 species new to science. Like Darwin, he suffered much from dyspepsia after his return, but published *The Naturalist on the River Amazons* (London, 1863), a work which has become a classic. In his "Contribution to Insect Life of the Amazon Valley: Lepidoptera; Heliconidæ" (*Linn. Soc. Trans.*, vol. xxiii, London, 1862), he considers the phenomenon of mimicry and gives a philosophical explanation of it. After reading it, Darwin wrote: "I rejoice that I passed over the whole subject in the *Origin*, for I should have made a precious mess of it." In 1864 he was made assistant secretary of the Royal Geographical Society, a position entailing much executive work, which he administered with great credit. He edited several of the *Transactions*, as well as many books, including Belt's *Naturalist in Nicaragua*. He was elected a fellow of the Royal Society in 1881. He married Sarah Ann Mason in 1861. A large part of his collections are in the British Museum. Consult *The Field*, London, Feb. 20, 1892.

BATES, John Coalter (1842–). An American soldier, born in St. Charles Co., Mo. He was educated at the Washington University in St. Louis, and joined the Federal army in 1861 as a lieutenant in the Eleventh Infantry. He was on General Meade's staff from Gettysburg to the close of the war, was made a colonel of the Second United States Infantry in 1892. He served for 30 years chiefly in the Indian country. At the outbreak of the war with Spain he was a brigadier general of volunteers, and he was promoted to the rank of major general of volunteers during the Santiago campaign. He was military governor of Cienfuegos in 1899 and went that year to the Philippines, where he conducted the negotiations with the Sultan of Sulu. In April, 1900, he commanded the department of southern Luzon. He was made a brigadier general in February, 1901, a major general in July, 1902, and in February, 1906, lieutenant general and chief of staff, to succeed General Chaffee. The following April he retired.

BATES, Joshua (1788–1864). An American financier, born at Weymouth, Mass. In 1828 he became associated with the great house of Baring Brothers & Co., of London, of which he eventually became the senior partner. He was umpire of the commission convened in 1853 to arbitrate the claims of American citizens arising from the War of 1812. In 1852 he founded the Boston Library by giving $50,000 for that purpose, with the provision that the interest of the money should be expended for books of permanent value, and that the city should make adequate provision for at least 100 readers. He afterward gave 30,000 volumes to the institution, the main hall of which is named "Bates Hall" in his honor. Consult *Memorial of Joshua Bates* (Boston, 1865).

BATES, Katharine Lee (1859–). An American author, born at Falmouth, Mass. She graduated at Wellesley College (1880) and taught there after 1885, becoming professor of English literature in 1891. She wrote: *Rose and Thorn* (1889), juvenile stories; *Hermit Island* (1891), a story for girls; *The College Beautiful and Other Poems* (1887); *The English Religious Drama* (1893, 1902); *A History of American Literature* (1898); *Spanish Highways and Byways* (1900, 1912); *From Gretna Green to Land's End* (1907); *Story of Chaucer's Canterbury Pilgrims* (1909); *America the Beautiful and Other Poems* (1911); *In Sunny Spain* (1913). She edited many texts, including *Early Poems of Alice and Phœbe Cary* (1903) and Tennyson's *Princess* (1904), and prepared, with Lilla Weed, *Shakespeare; Selective Bibliography and Biographical Notes* (1913).

BATES, Lindon Wallace (1858–). An American civil engineer, born at Marshfield, Vt., and educated at Yale College. After the completion of engineering studies he was appointed assistant engineer for the Northern Pacific and Oregon Pacific railways, and subsequently was contracting engineer or manager of a number of important contracts in connection with the building of transcontinental railways. His advisory services were employed by the governments of Belgium, Great Britain, and Russia in such large undertakings as the improvement of the port of Antwerp, the enlargement of the Suez Canal, and the increasing of Black Sea harbor efficiency. For the authorities of Queensland, South Australia, and India he designed a number of harbors and planned the regulation of several rivers. A scheme for the improvement of the port of Shanghai was also prepared by him, working in coöperation with other engineers of international reputation. In the United States one of Bates's big contracts was the raising of the grade at Galveston after the flood there, and it was he who designed the "three-lake" plan for the Panama Canal. In 1900 the French government conferred on him a *Grand Prix* and decoration for "distinguished services to science"; and he was chosen to membership in various foreign as well as American engineering societies. He wrote: *The Navigation Interests of Nations in Ports and Waterways* (1900; Fr. trans., 1900); *The Panama Canal* (1905); *Retrieval at Panama* (1907).

BATES, Samuel Penniman (1827–1902).

An American educator and writer, born in Mendon, Mass. He graduated at Brown University in 1851. In 1860 he was made deputy State superintendent of schools and in 1866 State historian of the State of Pennsylvania. His numerous lectures and reports did much to further the cause of education. He published: *Lives of the Governors of Pennsylvania* (1873); *Life of Gen. O. B. Knowles* (1878); *Battle of Gettysburg* (1878); *Battle of Chancellorsville* (1882). His educational works include *Lectures on Moral and Mental Culture* (1860), *Liberal Education* (1865), *Method of Teachers' Institutes* (1862), and *History of Colleges in Pennsylvania.*

BATE'S CASE. At the beginning of his reign James I of England, following the bad example set by Mary and Elizabeth, laid duties or "impositions" on certain goods, including currants and tobacco, without securing a parliamentary grant. In 1606 John Bate, a London merchant and member of the Levant Company, refused to pay these charges on a cartful of currants and was promptly committed to the Marshalsea for contempt of the King's officers. The Commons sided with Bate; but the King's "sole prerogative" to levy impositions on exports and imports was declared by a unanimous decision of the barons of the Court of Exchequer. An unconstitutional practice was thus sustained by a decision which is generally regarded as wrong. The Bate Case is, therefore, an incident of great historical significance, marking the beginning of the long and bitter struggle with the Stuarts to maintain the constitutional right of Parliament to grant all supplies. Consult Gardiner, *History of England,* vol. ii (London and New York, 1889).

BATES COLLEGE. An undenominational institution for both sexes, at Lewiston, Me., opened in 1863, chartered in 1864, an outgrowth of Maine State Seminary, chartered in 1855. Bates was the first Eastern college to afford collegiate education to women, and her first woman graduate, 1869, became a professor in Vassar College. Abstinence from intoxicating drinks is a condition of student membership. The courses of study cover the usual range of undergraduate work. All candidates for degrees (A.B. and B.S.) make their selections of subjects under a system of majors and minors arranged in three groups—languages, philosophy, sciences. Alone among New England colleges Bates has no secret fraternities. It has 15 buildings and well-equipped chemical, physical, and biological laboratories. The libraries contain about 40,000 volumes. The campus covers 60 acres and with the buildings has a value of upward of $500,000. The invested funds amount to $760,000. The college has 99 scholarships and shapes its entire policy with a view to aiding students of limited means. In 1913 it had 33 officers and instructors and 450 students. Bates has won special distinction by the success of her students in intercollegiate debates—27 victories in 32 contests. Of the 1839 graduates, about 43 per cent have become educators. President, George C. Chase, D.D.

BATESVILLE, bāts'vĭl. A city and the county-seat of Independence Co., Ark., 114 miles by rail north by east of Little Rock, the State capital, on the White River, and on the St. Louis, Iron Mountain, and Southern Railroad (Map: Arkansas, D 2). The city has transportation facilities by water, as the White River is navigable for a considerable portion of the year. A system of locks and dams, estimated to cost $1,000,000, has been built by the Federal government to insure permanent navigation for a distance of about 100 miles above the city. Seven more, to cost $2,000,000, are contemplated. Batesville is the seat of Arkansas College (Presbyterian), opened in 1872, the Masonic Home and School, and the Odd Fellows Home and School for Widows and Orphans. It has extensive quarries of manganese ore, phosphate rock, sandstone, limestone, and marble; makes large shipments of building stone, cotton, and lumber; and manufactures staves, flour, lumber products, carriages, wagons, etc. The water works and electric light plant are owned by the municipality. Pop., 1890, 2150; 1900, 2327; 1910, 3399.

BAT'FISH. 1. One of the small, pediculate fishes of the family Malthidæ, related to the angler or fishing frog. The commonest American species is *Malthe* (or *Ogcocephalus*) *vespertilio,* the sea bat or diablo of West Indian waters, which is grayish brown above, covered with bony tubercles, and reddish below, and abounds in the warmer regions of the Atlantic, where it sits on the bottom, supported by its fins, much in the attitude of a toad. Its remarkable abnormality arises from the excessively large and broad head compared with the short, slender trunk and the leg-like form of the pectoral fins. It is regarded as venomous by the ignorant. It has curious relatives in the deep sea. For illustration, see Plate of ANGLERS AND BATFISH. 2. One of the sting rays of the Pacific coast (*Myliobatis californicus*). (See RAY.) 3. A flying fish (q.v.). 4. A flying gurnard of the Atlantic (*Cephalacanthus spinarello*). See GURNARD.

BATH, băth. By bathing is usually understood the immersion of the body, or a part of it, in water. In a more extended signification it means the surrounding of the body with any medium differing in nature or temperature from its usual medium; thus we speak of a vapor bath, a cold-air bath, an earth bath. A fourfold division may be made of baths: (1) According to the substance with which the body is surrounded—whether liquid, gaseous, or mixed, water, oil, wine, milk, blood, gas, sand, mud, and other baths; (2) according to the manner of application—into river, plunge, shower, dropping, vapor, electric, and douche baths; (3) according to the parts of the body subjected to the application—into whole, half, sitz, foot, and eye baths; and (4) according to the temperature of the substance applied—into cold, tepid, warm, and hot baths.

The most ancient historical accounts as well as popular myths make mention of bathing. Among the Egyptians the bath was practiced as a religious rite; and in general we find the opinion prevailing, throughout antiquity, that purification of the body symbolized moral purity. In making the bath a religious ordinance, Moses may have had in view the prevention or more speedy cure of those skin diseases so prevalent in the East. The Mosaic law prescribes expressly, in some cases, the use of running water, which has given rise, through a misunderstanding, to the deleterious cellar baths of the Jews. In Palestine the wealthier Jews had private baths in their houses, and ponds in their gardens—an arrangement which prevailed in all the civilized parts of the East, and still obtains. There were, besides, public bath houses among the Jews, as among other nations.

Greece. Among the Greeks, also, bathing was very early in use. They early used both fresh water and salt, took advantage of natural hot springs, and employed water artificially heated. A bathroom containing a clay tub was found in the prehistoric palace at Tiryns, and in Homer the warm bath is frequently used for refreshment and is part of the entertainment offered an honored guest. Bathtubs, for which water was heated, were used, and the washing was followed by an anointing with oil. Bathing among the Greeks was a religious rite and was connected with the preparations for sacrifice, for the reception of oracles, for marriage, etc. It was at Athens that the luxury of warm baths was especially developed after the fifth century B.C. There were public baths where a slight fee was required, baths conducted by private enterprise at higher rates, baths in the wealthy private houses, and others connected with the gymnasia. The Athenians knew the vapor, hot, plunge, and douche baths preceding the cold baths. Allusions in the ancient writers, as well as scenes on the vase paintings, show that the bathers frequently stood beside a large basin on a high stand. We also find men and women bathing under douches, the water pouring from spouts in the wall. There were swimming baths for each sex, but there is no reason to believe that the later Roman custom of promiscuous bathing ever prevailed in Greece. The baths never reached such splendor of construction or such importance in the daily life of the Greeks as they did in that of the Romans.

Rome. Among the Romans the public baths were long the only ones in use and consisted of but two halls, one for each sex. Every town and even village had one bath or more. In Rome itself there were over 800 in the fourth century A.D. This number does not include the magnificent imperial *thermæ*, which were much more than baths; nor the private baths, without which no house of any pretensions was complete. At first the Romans bathed but seldom; Seneca says they washed their arms and legs every day, their whole bodies once a week. Scipio Africanus Maior had a warm bath in his villa at Liternum. Sergius Orata, about a century before Augustus, was the first to make a bathroom over a *hypocaust*, or basement filled with hot air—a discovery which was developed into a system of hot-air chambers beneath the floor and in the side walls of the *calidarium*, or room for the hot bath, giving an even, hot temperature. Probably the increase of comfort due to this invention was the cause of the growth in both the number and the popularity of baths towards the close of the republic. Mæcenas was the first to have a swimming tank of hot water, and Agrippa was the first to build immense thermæ on an elaborate and systematic plan, with all the luxuries of Græco-Oriental tradition improved by Roman practical inventiveness. The type of the Augustan age can be studied in the descriptive text of the Roman architect Vitruvius. The later Imperial thermæ became the centre of the public leisurely life of Rome, including libraries, lecture rooms, gardens, porticoes, gymnasia, running tracks, and every variety of incentive to luxurious ease. They were thus combinations of the Greek gymnasia and elaborate bathing establishments. The principal Imperial establishments of this kind were those of Titus, Trajan, Caracalla, and Diocletian. They covered enormous spaces in the heart of the city.

It is worth while to note that the Romans called a bathing vessel *balneum*. Later, they applied this word, or *balineum*, or *balnearium*, to a bathroom, properly to a simple room in a private house. The plural forms, *balneæ* and *balineæ*, were applied to the ordinary public baths. The term *thermæ*, which properly denoted hot springs, was used of the luxurious bathing establishments of the Imperial age, described above.

The system of bathing in all the various classes of bathing establishments was fundamentally the same, except when special treatment was prescribed by medical advice. Galen recommended the following succession: (1) hot-air bath in laconicum, or sweating room; (2) hot-water bath; (3) cold bath; (4) massage. That other great physician, Celsus, recommended: (1) sweating, dressed, in tepidarium; (2) sweating, disrobed, in calidarium; (3) douche bath, first hot, then tepid, then cold; (4) scraping, rubbing, and anointing. The essential parts of the bathing establishments were: (1) a vestibule for loungers, servants, and attendants, and sometimes an atrium; (2) an undressing room, or apodyterium, though often the bathers undressed in the larger bathing rooms; (3) the frigidarium, or hall for cold baths, with a sunken basin at one end or in the centre, often large enough for a swimming tank; often the bathers contented themselves with the cold bath; (4) the tepidarium, a hall not used for bathing, but kept at a moderate temperature to serve as transition between the hot and the cold bathrooms, used for dressing and undressing, anointing and waiting; it was fitted out with a sunken tank for hot water at one end, and a raised basin at the other for cold water; (5) the calidarium, or hall for hot baths; under it was the hypocaust, or hollow floor filled with hot air from the furnace, which was conveyed also into the hollow walls around the calidarium. With the furnace were connected three boilers, the lower one containing hot water, the middle one warm, and the upper cold water, so connected by pipes that when hot water was drawn off from the lower boiler it was replaced by tepid water from the one above, and that again by cold from the uppermost. The scraping off of the perspiration by strigils, and the anointing with oil, which at first took place in the calidarium, were afterward transferred to the tepidarium, or to a special hall called the unctorium, the last hall toward the exit. Connected with the calidarium was the laconicum, or sweating room.

There are many remaining examples of Roman baths of the various classes. Those at Pompeii form the most interesting and varied group outside of Rome. That of the Villa of Diomedes shows the type followed in the wealthy private house (open-air bath; dressing room; frigidarium; tepidarium; calidarium); the public ancient baths, which show two complete sections, one for each sex, show the normal plan of the age of Vitruvius, before the development of the elaborate Imperial thermæ. (Consult Mau-Kelsey, *Pompeii*, New York, 1902.) One of the best preserved of these public baths of moderate size is in Germany, at Badenweiler, also with its two sex divisions, perhaps the most interesting example of their perfectly symmetrical arrangement. Special arrangements are, of course, to

be found in famous curative thermal establishments, such as those at Baiæ. The most monumental ruins of Roman baths are those of Caracalla and of Diocletian. The tepidarium of the latter was transformed by Michelangelo into the church of Santa Maria degli Angeli. It was an immense hall 300 feet long and 92 feet wide, covered with a groin vault in three compartments. The halls of Caracalla's thermæ, though not so large—the tepidarium being 170 × 82 feet—were better proportioned and more artistic in decoration. These thermæ had a profusion of marble columns, surface decoration of rich marble slabs, coffered ceilings, rich cornices, mosaic floors, a wealth of decorative statuary and paintings.

The process of bathing was usually as follows: After undressing in the apodyterium, the bather was anointed in the elæothesium with oil and then proceeded to a spacious court devoted to exercises of various kinds, among which games at ball held a prominent place. After exercise he went through the tepidarium into the calidarium to sweat and take a hot bath; he then returned to the frigidarium, took a cold bath, and returned to the calidarium or laconicum for another sweat. He was then rubbed and anointed by the attendants and resumed his clothing. Sometimes the bather went at once to the hot room and followed the sweat with a cold plunge and a rubbing and anointing.

The public baths for women were much frequented, even by the most respectable. The women bathed in company, like the men. When there were no separate baths for women, they seem to have had the exclusive use of the public baths at special hours. At Rome the great baths were for men only, but were frequented by dissolute women. The irregularity of men and women bathing together is also alluded to by ancient writers; several emperors legislated against it. In later times the baths in general became the scenes of all sorts of debauchery, as was the case at Baiæ. Consult Lanciani, *Ancient Rome in the Light of Recent Discoveries* (New York, 1888).

The Orient. The barbarian invasions and wars finally put an end to Roman culture in the West in the sixth century A.D., and with its fall the sumptuous baths were abandoned. There were still baths on a small scale in connection with churches and monasteries, and the sacrament of baptism preserved the religious symbolism of the bath. The habits of monasticism and of asceticism combined, however, with northern rudeness in discouraging the luxurious aspects of bathing. It was not so in the East, for the Byzantine Empire continued in this as in most respects the traditions of Rome; and life in Constantinople, in the time of Justinian and Theodora and their successors, was no less pleasure loving than it had been in Rome. The Byzantines preserved there, for eight centuries more, all the various processes of Roman bathing, and initiated into them the conquering Arabs when, after founding the caliphate of Bagdad and the great kingdoms of Egypt and Spain, the Mohammedans adopted all the traditions of advanced civilization around them. From the eighth century to the present day all the Mohammedan cities of the East have been provided with public and private baths on a large scale. The baths at Broussa, for example, show how the main divisions of the Roman bath—frigidarium, tepidarium, and calidarium—had been handed down unimpaired. A typical city, Adrianople, had some years ago 22 public baths. The private houses at Cairo, Damascus, and other cities show how common it has been for the wealthy Orientals to have baths. The peculiarities of the Russian bath were also inherited through the Byzantines. The reason for this was both religious and sanitary.

Turkish Baths. Islam enjoins on the believer the careful preservation of corporal purity and for this purpose prescribes repeated daily ablutions. Besides these, certain circumstances and times make the use of the bath ritually obligatory on both men and women. For this end not only did the rich erect splendid baths in their houses and gardens, but bath houses for the people in general were established in every town in which there was a mosque. The public baths of the Turks of the present day are a copy of those ancient Arabian baths. The construction of those Oriental baths, imitations of which are now to be found in most cities, is as follows: The building is of stone; the bathrooms have a floor of marble, which is heated from below, and tubes in the walls conduct the heat in all directions. The bather undresses, wraps himself in a sheet, puts on wooden slippers, to protect him from the heat of the floor, and enters the bathroom. Here a general perspiration soon breaks through the skin, which is washed off with cold water. The body is then rubbed with woolen cloths and smeared with a soap or salve beneficial to the skin. This is generally accompanied by the operation of "kneading." The bath attendant stretches the bather on a table, pours warm water over him, and manipulates and scrubs his whole body. He then dries the body with a haircloth, rubs off the hard skin of the feet with pumice stone, anoints the bather with soap and perfumes, and finishes by cutting his hair and beard. This treatment lasts some three-quarters of an hour. After bathing, the bathers repose in a cooler room, stretched on couches, and finally partake of coffee, sherbet, or lemonade.

Europe. In England, France, and Germany, public establishments for bathing were long unknown. It was during the Crusades, which brought the East and the West into contact, that Europeans first became acquainted with the baths of the Asiatics; and the want of such institutions came to be more sensibly felt from the leprosy and other skin diseases which intercourse with Asia introduced into western Europe. The evil was at first sought to be met by establishing hospitals, but as these were found insufficient, baths and bathrooms were erected, which gradually became public establishments. Still, very little has been done to bring back the antique millennium until this century. It was not until the eighteenth century that the custom of sea bathing and mineral-water bathing began in England, followed by Germany at the close of the century, and by Italy and France early in the nineteenth century. (See BATH HOUSES, MUNICIPAL.)

Russia. Besides the kinds of baths already described, there are now to be found in the larger cities of Europe and America, generally in connection with water baths, an improvement upon the vapor baths which have been long in common use in Russia. The Russian bath consists of a small apartment built of wood, with broad benches running round it, on which the people lie undressed. By throwing water upon

glowing hot pebbles a dense hot steam is produced which envelops the bathers and throws them into such a heat that the perspiration breaks out over the whole body. In this atmosphere of steam the thermometer often rises to 112°–140° F. After they have sweated for some time, and from time to time cooled themselves again, by having cold water poured over them, the skin is rubbed with soap and with towels made of inner bark or with brushes; they are flogged with softened birch twigs and then washed with tepid and afterward with cold water, and at last have cold water dashed over them. A bather will also go direct from the sweating bath and plunge into a river or a pond or roll himself in the snow. These baths are a necessity in Russia and are to be found in every village. The German vapor bath differs in this, that the steam is produced in a boiler, and that the bather remains for some time in an adjoining room of moderate temperature, wrapped in blankets, to allow the perspiration to go on and the blood to become calm. A ruder kind of sweating bath, in a hole in the earth or in a baking oven, is practiced among many nations —among the Finns, the natives of Mexico and South America, and others.

Therapeutic Baths. As regards detergence, the *vapor bath* is the only kind of bath that is really effectual. If the skin is exposed to the action of hot water vapor, the scurf becomes softened and loosened, and is more easy to remove by simple rubbing. In the vapor bath, as in the Turkish bath, in which dry heat is used, the person is cooled by having tepid or cold water dashed upon him. The vapor bath is useful in certain diseases of the skin and kidneys as well as in chronic rheumatism. Its temperature is usually over 99° F. The *continuous bath*, in which the patient remains partly or wholly submerged in warm water for extended periods of time, was first introduced into this country by Dr. A. Rose of New York in 1873. Erysipelas and cerebro-spinal meningitis were treated in this way with marked success. Later the continuous warm bath was introduced by Dr. E. C. Dent into insane asylums, where it was found to calm maniacal patients and induce sleep, replacing sedative drugs and the crude methods of forcible restraint. The continuous bath is used in several foreign health resorts, notably in Leuk in the Alps and in Kewanaka in Japan. Here patients remain in the water for days or weeks at a stretch. Prolonged immersion in warm water stimulates metabolism and increases the elimination of waste products from the body.

The cold sponge bath is useful as a daily tonic to most people. It is a stimulant to nutrition, circulation, and nerve action. It should be brief and followed by brisk friction with the towel. By exhausted, and generally by aged, as well as by thin, nervous, and sensitive persons, cold baths should be avoided, and tepid ones taken instead. A bath in the sea is productive of good in most cases in persons of good physique. Wrapping a patient in a wet sheet and then covering with a blanket (the "wet pack") is sometimes substituted for the cold bath. The hot bath is stimulant, relieving pain and limiting inflammation, controlling convulsions, and inducing sleep. It is useful also in some diseases by causing sweating. At sanitariums and bathing establishments, salt-rubs, electro-chemical, electro-thermal, and other baths are given. The *Roman bath* consists of an application of oil or vaseline, with massage.

A *medicated bath* is one in which some substance intended to act as a medicine has been mixed with the liquid. This is an ancient and almost obsolete method of bringing remedies to bear upon the system. The mineral substances used were common salt, chloride of lime, nitric acid, corrosive sublimate, the hydroxides and carbonates of sodium and potassium, ashes, soap, iodine, sulphur, iron, etc.; the vegetable were wine, vinegar, solutions of essential oils, infusions of thyme, rosemary, lavender, wormwood, willow, oak, Peruvian bark, etc. *Mercurial baths* are used in syphilis. They are baths in which vapor of mercury is applied to the whole surface excepting the head. The application must be made in a fumigating box, in which the body alone is inclosed along with the vapor, in order that the respiratory organs may not be incommoded. *Animal baths*, used by the ancients, enjoyed a great reputation in cases of lameness. Either the whole or part of the body of the patient was wrapped in the skin of a newly slaughtered animal. Sometimes smaller animals were killed, split up, and immediately applied to the diseased part. Of *gas baths*, the most generally used are those of sulphureted hydrogen and carbonic acid gas, which are to be had at certain mineral springs. In recent times, at Ischl and other places, the vapors that arise from the mineral springs loaded with saline particles are received in close rooms, in which the patients walk about and allow the vapors to act upon the lungs and skin. Consult A. Rose, *Carbonic Acid in Medicine* (New York, 1905). See BATH HOUSES, MUNICIPAL; HYDROTHERAPY.

Te terms *water bath* and *sand bath* have been adopted in chemistry to signify a contrivance by which vessels are heated without being brought into immediate contact with the flame, but receive their heat through the medium of hot water or sand.

BATH, bâth (Celt. *Caer-badon*, city of baths, AS. *Bathan, Bathum*, short for *æt thæm hâtum bathum*, at the hot baths; the Roman *Aquæ Solis*, baths of the sun). The chief city of Somersetshire, England, beautifully situated in a wooded valley, inclosed on the north and east by a high range of hills, on the Avon (which is here crossed by four bridges), 20 miles from its mouth, and 108 miles west by south of London (Map: England, D 5). The houses are built of white freestone—"Bath Oölite"—worked in the neighboring quarries. The city has a finer appearance than any other in England, the variety of levels giving commanding sites for its fine and regular streets, crescents, and public buildings. The beauty and sheltered character of its situation, the mildness of its climate, and especially the curative efficacy of its hot chalybeate springs, have long rendered Bath a favorite fashionable resort. The springs, which are four in number, were known to the Romans, who built baths on the spot in the first century, of which extensive remains were discovered in 1775. The temperature of the springs varies from 116° to 120° F.; they rise near the river bank, in the centre of the city, and discharge more than half a million gallons of water daily. The water is most useful in bilious, nervous, and scrofulous complaints, palsy, rheumatism, gout, and cutaneous diseases. Bath has many handsome public buildings, among them being the pump room which incloses some of the springs

and which has been improved in recent years; the guild hall, containing in addition to the municipal offices, technical schools, an art gallery and reference library; and the Royal Literary and Scientific Institution, containing several fine scientific collections and a library. The abbey church of St. Peter and St. Paul is a cruciform building in the perpendicular style, dating from the sixteenth century. It has a tower 162 feet high and on account of the number and size of its windows has been called the "Lantern of England." Among many other churches those of St. Swithin's and St. Thomas of Canterbury are the most interesting. There are several fine parks, including the Victoria Park of about 50 acres, containing a botanical garden and an excellent theatre. The city is well lighted by electricity, which the corporation supplies. It also maintains a museum, public baths, and markets. Bath is amply supplied with educational facilities. In addition to the technical school maintained by the corporation there is a grammar school founded by Edward VI, at which De Quincey was educated, Lansdown Royal School, for Officers' daughters, and Wesleyan College. Its charitable institutions include numerous hospitals and an eye and ear infirmary. Its three railway lines, and the Kennet and Avon Canal connecting the city with the Thames River, furnish excellent means of communication. It is a parliamentary borough and sends two members to Parliament. Bath was a royal residence in Anglo-Saxon times. Richard I and Edward III granted it many privileges. In the eighteenth century Richard Nash (q.v.) made it the most fashionable resort in England. Pop., 1901, 49,800; 1911, 50,729. Consult: "Municipal Roman Baths at Bath," in *Municipal Journal*, vol. viii (London, 1899); Bath Committee, *Handbook to Bath* (Bath, 1900); Perkins, *The Abbey Churches of Bath, Malmesbury* (London, 1901); Barbeau, *Une ville d'eaux anglaise au xviii^e siècle* (Paris, 1904); Green, *Eighteenth Century Architecture of Bath* (Bath, 1904).

BATH. A city, port of entry, and the county-seat of Sagadahoc Co., Me., on the Kennebec River, 12 miles from the sea, and 36 miles northeast of Portland (Map: Maine, C 5). It is on the Maine Central Railroad and has steamboat connections with Boston, Augusta, and Boothbay Harbor. Ship building is the main industry, and several vessels for the United States navy have been built here. There are also brass and iron foundries, machine shops, boiler works, and manufactures of lumber, manganese bronze, gasolene engines, steam windlasses, shirts, etc. Bath contains a public library, a hospital, a soldiers' and sailors' orphans' home, and two homes for aged persons. The charter was adopted in 1847 and the city ordinances revised in 1899. The charter limits the mayor's term to one year and provides for a bicameral city council. The majority of administrative officers are elected by the city council, though the mayor exercises some appointive power, subject to the consent of the board of aldermen. The superintendent of schools is chosen by the school committee, which is elected by the people. Pop., 1890, 8723; 1900, 10,477; 1910, 9396; 1920, 14,731.

The first settler within the present limits of Bath was probably Robert Gutch, a missionary to the Indians, about 1660. In 1781 the settlement was incorporated as the town of Bath, and in 1847 a city charter was obtained. Consult Reed, *History of Bath and Environs* (Portland, 1894).

BATH. A village and the county-seat of Steuben Co., N. Y., 75 miles south-southeast of Rochester, on the Erie, the Lackawanna, and other railroads, and on Cohocton River (Map: New York, C 6). It contains the Davenport Public Library, Davenport Orphan Asylum, the New York State Soldiers' and Sailors' Home, three parks, a soldiers' monument, and the various county buildings. The principal industries are agriculture, lumbering, wine storage, and the manufacture of aëroplanes, automobile engines, sashes and blinds, harness, tables, motor cycles, etc. Settled as early as 1793, Bath was first incorporated in 1816. The government, under a charter of 1895, is vested in a mayor, annually elected, and a village council. Pop. (exclusive of inmates in Soldiers' and Sailors' Home), 1900, 4994; 1910, 3884.

BATH, bâth, EARL OF. See PULTENEY, WILLIAM.

BATH, ORDER OF THE. The name of the largest English order, and the highest to which a commoner can attain. Its name was evidently derived from the initiatory ceremony of bathing, which used to be practiced at the installation of a knight, as an emblem of the purity henceforth required of him by the laws of chivalry. It is asserted by Froissart that in 1127 Henry I made Geoffrey of Anjou and five others "Knights of the Bath," and Burke relates that Lord Willoughby received "knighthood by bathing" from Edward II. The last creation of Knights of the Bath in the ancient form was at the coronation of Charles II in 1661. From that period till the accession of the House of Hanover, the order fell into oblivion. It was revived by George I in 1725 and is now the second order in rank in England, the first being the Garter. The order was military till 1847, when it was reorganized by the admission of civil Knights, Grand Cross, Commanders and Companions. As constituted at present, the order comprises three classes—Knights Grand Cross (G.C.B.), Knights Commanders (K.C.B.), and Companions (C.B.), the two former including also honorary members. For illustration, see Plate II of ORDERS.

BATH BRICK. See BRICK; ABRASIVES; BRISTOL BRICK.

BATHGATE, bâth'gāt. A town in the centre of Linlithgowshire, Scotland, 17 miles west-southwest of Edinburgh (Map: Scotland, E 4). The old town lies on a steep slope, and the new on a more level site. The celebrated gas-coal called Torbanehill mineral is worked here, and the district is rich in minerals. Bathgate manufactures paraffin, flour, glass, and paper, but mining is the chief occupation of the inhabitants. Pop., 1871, 6942; 1901, 6786; 1911, 8226. In 1668 King Charles II granted Bathgate a charter, from which time it was a free burg of barony until it was incorporated as a police burg in 1865. In the vicinity is the site of an ancient castle, which Margaret, daughter of Robert Bruce, brought as a part of her dowry to her husband, Walter, great steward of Scotland, who died here.

BATH HOUSES, MUNICIPAL. Liverpool was the first modern European city to construct inclosed bath houses with appliances for furnishing both hot and cold water. This was in 1842. In 1846 Parliament passed an act to encourage the establishment of public baths and washhouses, and since that time the movement in

favor of public baths has rapidly spread in Great Britain, until now every borough with a population of over 50,000 has municipally owned bath houses, and very many smaller cities are well supplied with such facilities. The cities of continental Europe do not possess so many public baths. The Public Health Exhibition of 1883 in Berlin, Germany, aroused public sentiment to the need of cheap baths for the people, and in 1900 Germany had municipal bath houses in 45 of its cities having a population of over 50,000. France has fewer, and in Austria, Norway, and Sweden baths have been erected in only the larger cities. In Vienna the first people's bath was built in 1887. At the close of the century the city operated 11 such establishments. In Russia people's baths are very common, even in the smaller villages, but these are not owned by the municipality and are often most unsanitary. The city of Tokio, Japan, is said to have 1000 public bath houses.

The movement in favor of municipal baths scarcely began in America until the close of the nineteenth century. The need of municipal baths in the larger cities was pointed out in the Report of the Federal Bureau of Labor in 1893, which showed, among other things, that in certain selected districts bathroom facilities were possessed by only 2.83 per cent of the population in Chicago and New York. At this time there were no all-the-year municipal baths in operation in the United States. Ten years later a list of 39 such baths was published in the report of the bureau, besides 59 beach or floating baths open in summer. In Statistics for the Cities for 1907, 32 cities report baths and bathing places valued at $1,541,733, of which 78 were all-the-year baths. The total bathing attendance was 29,204,838. In 1874 Massachusetts enacted a law permitting the public funds to be used for the erection of public baths and washhouses. But New York was the first American State to enact legislation making the erection of public baths compulsory. In 1895 a law was passed that all cities having a population of more than 50,000 should establish and maintain such free public baths as the local board of health might deem to be necessary, and that any city or village having less than 50,000 inhabitants might loan on its credit or appropriate of its funds for this purpose. The baths must be open 14 hours a day, and both hot and cold water must be provided. The maintenance of river, lake, or ocean-front baths is not to be considered a compliance with this act. The first bath house erected under the act was opened in Buffalo in 1897.

Of public baths there are four general types —beach baths, floating baths, pool baths, and shower baths. One of the best and most popular of the beach baths, as also the oldest, is the one which was constructed in 1866 on the L Street Beach, South Boston.

A floating bath usually consists of a platform placed upon floats, in the centre of which is a pool surrounded by dressing rooms. The pool is constructed of slats in such a manner that the water has free circulation through its sides and bottom. The floating bath may be moored at any convenient point along the water front and is especially suited for smaller cities located upon bodies of clean water. In large cities the increasing pollution of the water renders a suitable location for floating baths more and more difficult to find.

Pool baths were first built in 1885, in Philadelphia, as a substitute for floating baths, which the city was compelled to give up on account of the polluted water. Subsequently pool baths were built in Chicago, Holyoke, Boston, Newark, Utica, and Kansas City. Such a bath consists simply of a pool or tank surrounded by dressing rooms, and may or may not be roofed in.

The shower bath is entirely different, in both form and object, from the three types of baths already described. The former are open during the summer months only and are chiefly useful as places of wholesome exercise and recreation. But the shower bath is open throughout the year and furnishes hot as well as cold water, and its only object is cleanliness. The typical shower consists of an overhead douche or ring in which the water supply is controlled by a valve so arranged that the cold water comes out first and the temperature of the supply is controlled by the user. The floor under this spray is inclined so that the water rapidly runs off into a drain. Each bather is provided with a separate dressing room, opening into the bathroom. Shower baths are rapidly displacing the old-time tub or "slipper" baths in both Europe and America. Their advantages are obvious: they require less room, less water, and less attendance, and are therefore cheaper; they are also more easily kept in a sanitary condition, and the shower is a more healthful form of bath than the tub. The city of Baltimore late in 1908 made an interesting experiment in a so-called "portable bath house." This was located in a tent with a temporary connection with the city mains and was equipped with shower baths. So successful was the experiment that three such baths were operated in 1911. They are especially useful where large groups of people are temporarily collected, as at camps or where extensive work is going on.

A recent extension of free baths is their introduction into the public schools. This movement, like that for municipal baths in general, began in Germany, being established by Professor Flugge and Mayer Merkel in the schools of the German university town of Göttingen in 1885. Boston has introduced the institution into this country by constructing a number of public baths in the Paul Revere School, in the north end of the town, in 1900, and other cities are following its example.

Consult *Bulletin No. 54* of the United States Bureau of Labor (Washington, 1904); Reports of Free Public Bath Commission, Baltimore; William Paul Gerhard, *Modern Baths and Bath Houses* (New York, 1908); Alfred W. Cross, *Public Baths and Washhouses* (London, 1906).

BATH'-KOL' (Heb. daughter of the voice, from *bath*, daughter + *kol*, voice). An expression which signifies simply a sound and which is also used to designate an echo. Its specific application, however, in rabbinical theology is to a manifestation of the divine will by means of a voice distinctly heard and announcing an order on the decision of some disputed point. It corresponds therefore to an oracle, only that the source of the voice is regarded as hidden. This usage of the term reverts ultimately to such a phrase as is found in Daniel (iv. 31): "A voice fell from heaven." Similarly in the New Testament, heavenly voices are referred to at the baptism of Jesus (Matt. iii. 17; Mark i. 11), at His transfiguration (Matt. xvii. 5; Mark ix. 7; Luke ix. 35), before the Passion (John

xii. 28), and in the same way Paul and Peter hear voices from heaven. According to the views expressed in the Talmud, Bath-Kols were sent to Israel from time to time throughout its history, and numerous examples are instanced, and in theory such "voices" were regarded as decisive factors after the extinction of divine prophecy in Israel. So it is reported that, as late as the days of Hillel and Shammai, the differences between these two schools of interpretation of the Jewish law were decided by a Bath-Kol in favor of Hillel (Berachoth 3b). In general, however, the tendency developed not to be guided by supposed "voices," and so Bath-Kol came to be practically a term indicating the decision of a disputed question by rabbis whose authority was recognized. Consult: F. Weber, *Jüdische Theologie* (2d ed., Leipzig, 1897); Hamburger, *Real-Encyklopädie für Bibel und Talmud*, ii. s. h. v. (Strelitz, 1883); Bacher, *Die Agada der Tannaiten* (2d ed., 1903); Louis, "Ancient Traditions of Supernatural Voices: Bath-Kol," in *Transactions of the Society of Biblical Archæology*, vol. ix, p. 18.

BATH'OLITH, Bathylite, Bathylith (Gk. *βάθος, bathos*, depth, or *βαθύς, bathys*, deep + *λίθος, lithos*, stone). A great, poorly defined mass of plutonic rock that affords evidence of having been formed far within the depths of the earth's crust during early periods of geological time, and of having attained its present condition of exposure at the surface through the agency of erosion. Such masses are common among rocks of the Archæan or pre-Cambrian age, and often measure miles in extent. Evidence of the deep origin of batholiths is furnished by the coarsely crystalline texture of the constituent rocks—a structure produced only by slow cooling and solidification at great depths in the crust. This hypothesis is also confirmed by the fact that such batholiths appear to have been fused from below upward and to have incorporated within their mass portions of the overlying and surrounding rocks. See Igneous Rocks; Pre-Cambrian Formations.

BATHOM'ETER (Gk. *βάθος, bathos*, depth + *μέτρον, metron*, measure). An instrument invented by C. Williams Siemens, for indicating the depth of the sea beneath a moving vessel. The density of sea water is about 1.026, while that of solid earth or rock has an average of about 2.75. Hence the attraction of the water which lies beneath the ship is less than that which would be exerted by earth or rock occupying the same relative position, and the greater the depth of water, the less the attraction. The weight of a given mass on board the ship will be greater, therefore, when the ship is in a harbor or in shallow water than when on the deep sea by an amount which may be determined by an instrument of sufficient delicacy, and this change in weight becomes a recognizable function of the depth of water. Dr. Siemens filled with mercury a vertical steel tube of small bore, fitted below with a cup-shaped expansion closed with a corrugated steel-plate diaphragm. The pressure of the mercury upon the upper surface of the diaphragm is opposed by a plate adjusted to bear upon the centre of its upper surface, and this plate is supported by steel spiral springs, which are attached to the top of the column. In the construction of the instrument care was taken to compensate for the variations caused in the density of the mercury and in the elasticity of the steel springs by change of temperature. The pressure of the mercury in the diaphragm causes an extension of the steel springs by an amount depending on the force of attraction acting on the mass of the mercury. This extension of the spring is so magnified by a micrometer screw that the apparatus indicates a change of a fathom in depth of water for each division on the scale of the micrometer.

BÁTHORY, bä'tô-rê. A noble family of Hungary. Stephen Báthory (1533–86), was elected Prince of Transylvania in 1571 and King of Poland in 1575. He married Anna, sister of the last of the Jagellons of Poland. He introduced reforms in the administration of Poland and waged war successfully against Russia. His right hand in the government of Poland was the distinguished statesman, Zamojski.—His brother, Christopher, was Prince of Transylvania from 1576 to 1581. He was a friend of the Jesuits, by whom his son and successor, Sigismund Báthory (1572–1613), was instructed. The latter in 1595 married a daughter of the Archduke Charles of Styria, an uncle of Rudolph II. In 1598 he transferred the principality of Transylvania to Rudolph, as he intended to enter the priesthood. He soon regretted his renunciation of the territory, however, and while the Imperial commissioners were still negotiating the terms of acceptance, suddenly appeared disguised at Klausenburg and arrested them, sending Bocskay to Prague to pacify the Emperor. He was compelled to resign in 1602.—Gabriel Báthory (1589–1613), a son of Stephen, King of Poland, was elected Prince of Transylvania in 1608. In consequence of his cruelty the magnates of his realm, as well as the Saxon element of the country, rose against him, and during the war which ensued he fled to Grosswardein, where he was murdered.—Elizabeth Báthory, niece of Stephen Báthory, King of Poland, is celebrated as a type of fiendish cruelty. She is said to have slaughtered 650 young girls, in whose blood she used to bathe, to increase the fairness of her skin. She died in prison in 1614.

BA'THOS (Gk. *βάθος*, depth). A term employed by critics to designate a ludicrous descent from a lofty thought to a mean one, or a sinking below the ordinary level of thought in a ridiculous effort to aspire. (See Anti-climax.) A good example of bathos is the well-known couplet:

> "And thou, Dalhousie, the great god of war,
> Lieutenant-colonel to the Earl of Mar."

Consult Pope, "The Art of Sinking in Poetry," in the *Scriblerus Papers* (London, 1729).

BATHSHEBA, băth-shē'bà *or* băth'shê-bà (Heb. *bath*, daughter + *sheba*, oath; daughter of an oath). 1. The wife of Uriah, and afterward mother of Solomon. 2. The name under which Charles II's mistress, the Duchess of Portsmouth, appears in *Absalom and Achitophel*, a satire by Dryden. 3. The heroine of Thomas Hardy's *Far from the Madding Crowd*.

BATHS OF TI'TUS. See Titus, Baths of.

BATH (bâth) **STONE.** A building stone extensively used in England on account of its beauty and obtained from quarries in the Lower Oölite of Wiltshire and Somersetshire. It is fine-grained, of a rich cream color, and is composed of carbonate of lime, with a little carbonate of magnesia, but without silica. The name is derived from the city of Bath, in the vicinity of which the stone is largely quarried.

BATHURST, bȧth'ûrst. A city and a county of New South Wales, Australia, 145 miles west of Sydney (Map: New South Wales, E 3). The city was founded in 1819 and was the first settlement beyond the Blue Mountains (q.v.), which were long believed to be impassable. In 1851 there were discoveries of gold here, and this, with copper and silver, is the chief mineral product. Fine statuary marble is quarried. The county is bounded on the northeast by the Macquarie River and on the southeast by the Lachlan. The whole district is admirably adapted to pastoral pursuits, and about a quarter of a million acres are under cultivation. Corn, barley, wheat, fruit, and tobacco are the chief products. It is well watered and, being 2150 feet above sea level, has a moderate temperature. Bathurst, the principal city in the western district of New South Wales, has handsome public buildings and various important industries. It was created a municipality in 1862. It is the see of Anglican and Roman Catholic bishops, has science and art schools, a museum, and a government agricultural experiment station. Pop., 1901, 9578; 1911, 8575.

BATHURST. The principal settlement of the British colony of the Gambia, West Africa, situated on the island of St. Mary at the mouth of the Gambia, in about lat. 13° 24′ N. and long. 16° 36′ W. (Map: Africa, C 3). The town is exceptionally clean and contains government houses, barracks, and a hospital. Facing the river are the stores of the European merchants. The exports consist of gum, wax, hides, rice, tobacco, cotton, groundnuts, rubber, and fruit. Medicinal roots and herbs and vegetables of all kinds are grown. There are a number of expert shipbuilders in Bathurst. The population in 1911 numbered about 5000. This included the Jollofs, which tribe inhabits the district in the vicinity of the town.

BATHURST. A port of entry on Nepisiguit Bay, at the mouth of a river of the same name, in Gloucester Co., New Brunswick, Canada (Map: New Brunswick, D 1). It is 211 miles north by east of St. John, is on the Intercolonial Railway, and is a popular summer resort. Bathurst has a good harbor, and its principal industries are connected with lumbering and fishing. The rivers emptying into the harbor are noted for fine salmon. The town is the seat of a United States consular agent. Pop., 1901, 1044; 1911, 960.

BATHURST, Allen, first Earl of Bathurst (1684–1775). An English statesman, born in London. He entered Parliament in 1705 and distinguished himself as a supporter of the union of England and Scotland. In 1711 Queen Anne made him a baron, and he won further distinction in the Upper House by impeaching the directors of the notorious South Sea scheme. Bathurst was a determined opponent of Walpole and on that minister's resignation in 1742 was made a member of the Privy Council. In 1757 he became treasurer to the Prince of Wales, who, as George III, elevated him to an earldom in 1772. He was a generous patron of literature, and the friend of Congreve, Vanburgh, Swift, Prior, Rowe, Addison, Pope, Arbuthnot, Gay, and others. Pope dedicated his *Epistles on the Use of Riches* to Lord Bathurst and complimented him in characteristic lines. His son Henry, second Earl Bathurst (1714–94), was Lord Chancellor of England, 1771–78. Henry, third Earl Bathurst (1762–1834), son of the second Earl, was English Colonial Secretary, 1812–27, and Lord President of the Council, 1828–30.

BATHURST, Ralph (1620–1704). The uncle of the first Lord Bathurst, an English physician, prelate, and wit. He rose to eminence in medicine and in the time of the Commonwealth was appointed physician to the state. After the Restoration he abandoned medicine, took holy orders, was chaplain to the King, and afterward Dean of Wells. In 1664 he was made president of Trinity College, Oxford, and in 1691 was nominated to the see of Bristol, but declined the place. He was master of ridicule and, like Dr. Jowett in recent times, made that his weapon to correct college delinquents. Some of his verses in the *Musæ Anglicanæ* are excellent of their kind. Consult Warton, *Life and Literary Remains of Bathurst* (London, 1761).

BATHURST IN'LET. An indentation of Coronation Gulf, in the Arctic Ocean, which projects 75 miles south into Canada, 300 miles northeast of Great Slave Lake (Map: Northwest Territories, H 1). The explorer Harry V. Radford wrote from this place, on June 5, 1912, that he had nearly completed his survey of the unexplored coast of the inlet. He and his comrade were killed a few days later.

BATHURST IS'LAND. An island off North Australia, about lat. 12° S. and long. 130° E., 2°, 120 miles west of Port Essington, with Melville Island between (Map: Australasia, E and F 4). Its length and greatest breadth are 30 miles. The island is mountainous and densely wooded, except at the west end.

BATHURST ISLAND. A large island in the Parry Archipelago north of North America, intersected by the 100th meridian of west longitude and situated immediately beyond the 75th parallel (Map: America, North, H 2). Sherard Osborn here found the vertebræ of an ichthyosaurus—one of the few instances of organic remains discovered in the polar basin on the American side.

BATHYÁNI, bŏt'yä-nê. See Batthyányi.

BATHYCLES, băth'ĭ-klēz (Gk. Βαθυκλῆς). A Greek sculptor, born at Magnesia about 600 B.C. He has become celebrated through a colossal throne which he executed for the Spartans. This throne was decorated with reliefs which have been described by Pausanias. It was carved for the sanctuary of Apollo at Amyclæ and inclosed the rude statue of the god.

BATIGNOLLES, bȧ'tê'nyôl'. A former commune in the department of the Seine, France, now a part of Paris, forming with Ternes the seventeenth arrondissement. It is the Parisian equivalent for the Whitechapel of London and the East Side district of New York.

BATISTE, bȧ-tēst'. A fine linen or cotton lawn originally made in France, and said to have been named from its inventor, one Jean Baptiste. See Cambric.

BATJAN, bȧt-yän'. One of the Moluccas, lying west of Gilolo and east of Celebes. Batjan has a total area of 914 square miles (with adjacent isles, 1020 square miles), and a population estimated at 12,000 to 13,000, of which a few hundred are Chinese, Arabs, and Europeans, and the rest mostly Alfuros. The soil is fertile, and the main industry is the cultivation of spices, as on most of the Moluccas. It belongs to the Dutch, but is governed by a native sultan. There are several settlements, and on the western coast is situated Fort Barneveld.

BATLAPI, bȧt-lä'pê. A Bechuana tribe of

the Bantu family, living between Taungs and Vryburg; formerly a powerful tribe, now weakened by wars with the Boers and Matabeles. Though still the most numerous of the Bechuana group, they are under British control.

BAT'LEY. A town in the West Riding of Yorkshire, England, 8 miles southwest of Leeds, and about 1 mile from Dewsbury, with which it unites in sending one member to Parliament. The town was incorporated in 1868, and owns its gas and water works. It also maintains public baths, markets, a library, and a cemetery. There are an ancient grammar school, and a technical school supported by public subscription, with a municipal appropriation. Batley is the centre of the heavy woolen trade and manufactures army cloth, shoddy, drugget, etc. Coal is mined, there are stone quarries, and manufactures of iron and machinery. Pop., 1891, 28,800; 1901, 30,300; 1911, 31,429.

BATNA, bät'nȧ. The chief town of an arrondissement, department of Constantine, Algeria, 62 miles south-southwest of Constantine. It is situated at the foot of Mount Tugurt, which is covered with fine cedar wood. The town contains a church and a mosque and is an important military post and trading station between the Sahara and Tell. Pop., 1896, 8381; 1901, 6914; 1911, 8890.

BATN-EL-HAJAR, bät'n-el-hă'jär (Ar. womb of rocks). A stony district of Nubia, along the Nile, in lat. 21° N., where the river forms its second cataract.

BATON, or **BEND SIN'ISTER.** See HERALDRY.

BATONI, bȧ-tō'nē, or **BATTONI,** POMPEO GIROLAMO (1708–87). An Italian painter. He was born at Lucca and worked first with his father, a goldsmith. His artistic education consisted chiefly in the independent study of Raphael and of the monuments of classic antiquity at Rome, where he passed most of his life. He was the friend and associate of Raphael Mengs and Winckelmann, but was less classical than the former in his art, retaining the charm of the Rococo, particularly in his color. He was the most celebrated painter of his day, and his works were sought after throughout Europe. Among the most important of these are the portraits of the popes Benedict XIV, Clement XIII, and Pius VI, and of the Emperor Joseph II and Leopold II, Grand Duke of Tuscany; "Marriage of St. Catharine" (Quirinal, Rome); "Achilles" (Uffizi, Florence); "Choice of Hercules" (Turin Gallery); "Madonna" (Louvre, Paris); "Magdalen," his best-known painting; "John the Baptist" and "The Fine Arts" (Dresden Gallery); "Marriage of Cupid and Psyche" (Berlin Museum). Consult O. Boni, *Elogio del cavalieri Pompeo Batoni* (Rome, 1787).

BATON ROUGE, bät'on rōōzh (Fr. red baton or stick). The capital of Louisiana, 79 miles by rail northwest of New Orleans, on the eastern bank of the Mississippi River, on the Louisiana Railway and Navigation Company line, and on the New Orleans, Texas, and Mexico, Morgan's Louisiana and Texas, and the Yazoo and Mississippi Valley railroads (Map: Louisiana, D 3). It is a picturesque city, built on the river bluff, and contains the State University, organized in 1860, State educational institutions for the deaf, dumb, and blind, orphan asylums, State penitentiary, and State agricultural experiment station. Other features of interest are the State Capitol, Hill Memorial Library, Elks' Home, city hall, post office, high school buildings, several monuments, and a national cemetery. Baton Rouge is a port of entry and, on account of its fine harbor, carries on a large shipping trade. It also has extensive manufacturing interests, including the largest southern refinery of the Standard Oil Company, oar, box, and brick factories, sugar refineries, artificial ice plant, and cottonseed oil and lumber mills. The city adopted the commission form of government in 1913. Pop., 1900, 11,269; 1910, 14,897; 1920, 21,782.

Baton Rouge was one of the earliest French settlements in Louisiana. At the beginning of the Revolution it was strongly garrisoned by the English, but in September, 1779, was taken by a large Spanish force under Governor Galvez. The city became the capital of the State in 1849, and on Jan. 26, 1861, the Louisiana ordinance of secession was adopted here. On Aug. 5, 1862, Baton Rouge was the scene of a fierce encounter between a Union force under Gen. Thomas Williams and a strong Confederate detachment under Gen. John C. Breckenridge, the latter being repulsed after two hours of severe fighting, though Williams lost his life.

BATRACHIA, bȧ-trā'ki-ȧ (Gk. *βάτραχος, batrachos,* frog). A word synonymous with Amphibia (q.v.).

BATRACHOMYOMACHIA, bät'rȧ-kō-mī'ō-mā'kī-ȧ (Gk. *βατραχομυομαχία,* Battle of Frogs and Mice, from *βάτραχος, batrachos,* frog + *μῦς, mys,* mouse + *μάχη, machē,* battle). A Greek mock-heroic poem, erroneously bearing the name of Homer. Plutarch said that its actual author was Pigres of Caria, brother of Queen Artemisia, who joined Xerxes in his invasion of Greece. The poem is a parody on the *Iliad,* in which the military preparations and contests of beasts, single combats, intervention of the gods, and other Homeric circumstances are described with much humor. Chief critical edition by Ludwich (Leipzig, 1896).

BATSHIAN, bȧt-shyän'. See BATJAN.

BATTAKS, bät'tȧks, or **BATTAS,** bät'tȧz. The natives of the northern interior of Sumatra. Physically they are somewhat darker, taller, and stronger than the coast Malays and are mesocephalic in head form. One of the most individual of East Indian peoples, they present marked contrasts of culture and seeming savagery. A well-developed village life, agriculture (even including a plow), cattle breeding of a notable sort, metal working (even gold weaving), and the arts of reading and writing, with an alphabet modified from the characters of the Asoka inscriptions (the writing is characteristically on pieces of bamboo, from bottom to top), flourish on the one hand; while on the other there exist debt slavery, permissive polygamy, exocannibalism, and man eating as a punitory institution, together with primitive ancestor and spirit worship, influenced, as the mythological names, etc., indicate, by Hindu sources. The house architecture of the Battaks, solider than the general Malay type, is a modification of the pile dwelling of a shore people, to suit the highlands, while in parts of the area the primitive tree house still survives. Their palisaded kampongs (villages) and other war devices are of interest. A collection of 60 views of houses, landscapes, natives, etc., from the Battak country was published in 1880 by the Penang Photographic Studio. In 1908 a "Battak Institute" was established at Leyden for the

study of the Battak country, people, etc. (the encouragement of agriculture and the spread of the use of the Dutch language among the Battaks were some of its objects). In 1909 a "Battak Society" was founded at Medan. Much is being done to advance the condition of the natives and their relations with European colonists. Since the account of the Battaks by Junghuhn in 1847 there have been several studies of this interesting Malay people, the chief of which are: Schreiber, *Die Battaländer in ihrem Verhältnis zu den Malaien auf Sumatra* (Barmen, 1347); Brenner, *Besuch bei den Kannibalen Sumatras* (Würzburg, 1893); Modigliani, *Fra i Batacchi indipendenti* (Rome, 1892); Hagen, *Beiträge zur Kenntnis der Battareligion* (1882); Wameck, *Die Religion der Batak* (Leipzig, 1909); Volz, *Die Batakländer* (Berlin, 1909).

BATTALION (Fr. *bataillon;* for derivation, see BATTLE). INFANTRY. A separate body of men with a distinct organization, and generally the unit of command in the organization or manœuvring of an army. Originally the battalion was supposed to comprise the largest number of men, who, when drawn up in battle order, could hear the word of command or trumpet-call. The modern battle formation, and consequent army organization, is a direct result of the improved firearms with which modern infantry is equipped, the principle now underlying the strength of the battalion as a unit of command being generally the largest number of men capable of effective control as a unit in action. Modern expert military opinion, based on the experience of recent wars, would seem to indicate the necessity of still further reducing the strength of the unit of command in "attack" formation, a single company, when extended for "attack," covering over half a mile of ground. This, together with the fact that the present complement of officers is not enough to insure complete control, is a difficulty which increases with the battalion, and correspondingly with the strength of the battalion. It also is reflected in the difficulty of obtaining a rapid ammunition supply along the firing line and renders more arduous the task of the hospital corps and stretcher bearers. The reader is referred to the infantry drill regulations of the various armies.

In the United States regular army there are three battalions to a regiment, each commanded by a major. The following instances show the battalion strength in the armies of the greater European Powers:

England.—Battalion consists of 8 or 10 companies, corresponding in strength to the United States regiment.

France.—Battalion consists of 4 companies; 3 battalions to a regiment.

Germany.—Battalion consists of 544 men, raised in war to 1002, and divided into 4 companies. There are 3 battalions in a regiment.

Russia.—The battalion consists of 4 companies; the regiment of 4 battalions, or 17 companies in all, including the non-combatant company.

Italy.—Four companies to a battalion; 3 battalions to a regiment.

The name "battalion" is also given to engineers and various departmental corps, consisting of two or more companies. See ARMY ORGANIZATION; TACTICS, MILITARY; INFANTRY.

BATTAS. See BATTAKS.

BATTENBERG, bät'ten-berK (anciently, *Mons priscus Batavœ gentis,* ancient hill of the Batavian tribe). A town of Prussia in Hesse-Nassau, on the Eder, 15 miles north-northwest of Marburg. Before 1866 it belonged to Hesse-Cassel. The title of Prince of Battenberg dates from 1858, when it was conferred on the issue of a morganatic marriage of Prince Alexander of Hesse with the Countess von Hauke. Their second son, Prince Alexander, was called to occupy the throne of Bulgaria. (See ALEXANDER I.) Pop., 1900, 950.

BATTENBERG, HENRY MAURICE, PRINCE OF (1858–96). Son of Prince Alexander of Hesse by a morganatic marriage with the Countess von Hauke. In 1885 he married Princess Beatrice, youngest daughter of Queen Victoria. He took part in the Ashanti Expedition in 1895 and died of fever. His eldest daughter, Princess Victoria Ena, became the wife of Alfonso XIII of Spain in 1906.

BATTENBERG, LOUIS ALEXANDER, PRINCE OF (1854–). A British prince and admiral, born at Gratz, Austria, and eldest son of Prince Alexander of Hesse. In 1868, having been naturalized as a British subject, he entered the Royal navy as a cadet. Promoted to be lieutenant in 1876, he was made commander in 1885 and captain in 1891. In the Egyptian War of 1882 he served with distinction. In 1884 he married his cousin, Princess Victoria, the daughter of Louis IV, Grand Duke of Hesse, and of Princess Alice, the daughter of Queen Victoria. From 1902 to 1904 he served as director of naval intelligence, and was then made rear-admiral with the command of the Second Cruiser Squadron. He was second in command of the Mediterranean Fleet from 1906 to 1908, commander-in-chief of the Atlantic Fleet from 1908 to 1910, and commander of the third and fourth divisions of the Home Fleet in 1911. He became Second Sea Lord (1911) and First Sea Lord (1912); upon his resignation (1914; see WAR IN EUROPE) he was made Privy Councilor.

BAT'TERING-RAM' (Eng. *batter,* Fr. *battre,* to strike). An engine of war used in ancient times and in the Middle Ages. It consisted of a beam of wood, with a mass of bronze or iron on one end, resembling the head of a ram (in Lat. *aries*). In its simplest form it was borne and impelled by the hands of the soldiers; afterward it was suspended in a frame and made to swing. Another form moved on rollers. The alternating motion was communicated by ropes. To protect those working it, a wooden roof (*testudo*) was constructed over it, and the whole was mounted on wheels. The beam of the ram varied from 60 to 120 feet in length, the head sometimes weighed above a ton, and as many as 100 men were at times employed in impelling the machine. When the blows were long enough continued, hardly any wall could resist. The besieged tried to drop stones on the testudo and on the ram itself, or to render it useless by catching it with grappling irons, or by undermining the testudo and the frame from which the ram was swung. When or where it was invented is unknown. It is mentioned by Ezekiel. The Romans received it from the Greeks.

BAT'TERSEA (St. Peter's Isle, from AS. *ēg,* island). A metropolitan borough of Greater London (Map: London and Vicinity, E 6).

BATTERSEA PARK. A park of 185 acres in the southwestern part of London, on the Thames, laid out in 1852–58. It contains a subtropical garden of four acres, artificial lakes, and other attractions.

BAT'TERSON, Hermon Griswold (1827–1903). An American Episcopalian clergyman. He was born at Marbledale, Litchfield Co., Conn., and was educated privately. In 1860 he was ordained to the ministry. He was pastor of St. Mark's Church, at San Antonio, Tex., rector of Grace Church, Wabasha, Minn., of St. Clement's and of the Church of the Annunciation, Philadelphia, and of the Church of the Redeemer, New York. He was the author of several works, all of which have been frequently reprinted, such as the following: *The Missionary Tune-Book* (1868); *Christmas Carols and Other Verses* (1877); *Sketch-Book of the American Episcopate* (1876); *Pathway of Faith; Vesper Bells.*

BAT'TERY (Fr. *batterie*, from *battre*, Lat. *batuere*, to batter, beat). A term pertaining to the artillery arm of the military service. The armament pertaining to land forces may be conveniently divided into two classes: *fixed* and *movable.* The fixed armament consists of guns and mortars of various classes mounted on stationary carriages in groups of two or more of the same calibre and power, these groups being called "batteries." The term "battery" includes not only the work itself, with its slopes, guns, platforms, ammunition hoists, galleries, rooms, passages, and magazines, but also all material used in connection with the service of the pieces, and the *personnel* assigned to the work and its appurtenances. Such a battery in a coast fort is a *seacoast battery;* in any other fort a *fortification battery;* it may also be called a *mortar battery,* if composed of mortars; a *rapid-fire battery,* if composed of rapid-fire guns, etc.

Batteries are sometimes designated according to the purpose for which they are employed or the manner in which they are mounted as: *barbette battery,* if mounted *en barbette,* or so as to fire over a parapet; *blinded battery,* if protected by armored or bomb-proof defenses; *breaching battery,* one designed to make a breach in the enemy's defenses; *cavalier battery,* situated within the bastion (q.v.); *counter battery,* one designed to disable such guns of the defense as interfere with the breaching batteries; *enfilading* (q.v.) *batteries; floating battery; masked* or *fascine battery,* one concealed by fascines or other artificial device; *redan* (q.v.) *battery; sunken battery; water battery,* one close to high-water mark.

The movable armament consists of guns, mortars, and howitzers mounted on wheeled carriages on which they are transported and from which they are fired, or of guns carried on the backs of animals. Groups of guns used in an attack on a fortified place, which is being besieged, become *siege batteries.* These are usually composed of the heaviest guns designed to be habitually transported from place to place with an army in the field and are therefore the least mobile and most restricted in their movements. The *matériel* for siege batteries in the United States army are in the hands of coast artillery companies, but batteries are not organized as such until actual operations demand their use. *Field batteries* consist of four or more guns with full equipment of men, horses, carriages, caissons, etc., designed and organized for service with troops in the field. *Horse artillery batteries* are the most mobile of all and act with the cavalry. In this the gunners are mounted. *Mountain, mule, bullock,* or *elephant batteries* consist of guns and carriages so constructed that they may be taken apart and transported on the backs of animals, the gun ordinarily forming a load for one animal—the carriage for one or more; but sometimes a *jointed* gun is used which is carried by two or more animals. (See Mountain Artillery.) Movable batteries are organized into battalions, regiments, brigades, etc., while fixed batteries are units of combat in themselves or are organized into *fire commands* and *battle commands.*

Battery, in a naval sense, is used to denote all the guns of a ship; all the guns on one side, as the *starboard battery,* the *port battery;* a certain part of the guns, as the *gun-deck battery, rapid-fire battery, six-inch battery;* all the heavy guns, those of 8" calibre and upward, constitute *the main battery;* all smaller rapid-fire guns, the *secondary battery,* etc. See Artillery; Coast Artillery; Field Artillery; Cannon; Siege Guns; Armor Plate; Fortification; Ships, Armored; Tactics, Military.

BATTERY. See Assault and Battery.

BATTERY (in electricity). See Voltaic Cell; Galvanic Battery; Electricity.

BATTERY, The. A tract of 21 acres forming the southern point of the city of New York, the site of fortifications erected by the Dutch, and later a public park. In the early history of the city the north side of the Battery was lined with the most aristocratic residences. The view of the rivers and bay from the Battery wall is unsurpassed, and the park is still a much-frequented pleasure ground, though much disfigured by the elevated railroads which cross it. The park contains the Barge Office, Castle Garden, now the Aquarium, and a statue of Giovanni da Verrazano, who is believed to have reached the mouth of the Hudson River in 1554, though it remained for Hudson to demonstrate the extent and importance of the river.

BATTEUX, bȧ'tē', Charles (1713–80). A French philosopher and writer on æsthetics. He was born at Alland'huy, near Vouziers (Ardennes), and studied theology at Rheims. Upon his ordination as priest he went to Paris, where he became professor of Greek and Latin philosophy at the Collège de France. His works, chiefly on æsthetics, enunciate the principle that art is not an imitation of nature as such, but of the element of the beautiful in nature, the faithful imitation or interpretation of which is regulated by the innate sense of taste. This theory (*Theorie der schönen Künste*) may be traced in *Cours de belles-lettres* (5 vols., 1765), a later edition of which appeared under the title of *Principes abrégés de la littérature* (6 vols., 1824). This work is an amplification of an earlier work entitled *Les beaux-arts réduits à un même principe* (1746).

BATTHYÁNYI, bŏt'yä-nyē. A celebrated Hungarian family. It traces its origin back to a companion of Arpád, the Magyar invader of Hungary (about 894). It has given to Hungary many warriors and statesmen. The surname is derived from lands obtained in the fourteenth century.—Francis Batthyányi (died 1566) distinguished himself at the battle of Mohács, 1526.—Balthazar Batthyányi, who was the head of the family in the latter half of the sixteenth century, fought with distinction in the Turkish wars.—Prince Charles Batthyányi, a lieutenant field marshal of the empire, distinguished himself in the Austrian War of Succession, particularly by a victory over the French and Bavarians at Pfaffenhofen, on April 15, 1745.—Count Casimir Batthyányi, a mem-

ber of the principal branch of the family, was born June 4, 1807. He was Minister of Foreign Affairs in Hungary during the Revolution of 1848–49, in which he also distinguished himself as a military governor. After the triumph of the Austrians, he fled with Kossuth into Turkish territory, where he remained until 1851. He then went to France, and died in Paris, July 13, 1854.—Count LOUIS BATTHYÁNYI, belonging to another branch of the same family, and born at Presburg in 1809, espoused the national cause, yet sought to maintain the connection with Austria and his allegiance to the Austrian sovereign. He was appointed President of the Ministry when Hungary obtained a ministry of its own, in March, 1848. When the breach between Hungary and the Hapsburgs widened into open war, he resigned and afterward took part in public affairs, chiefly as a member of the Diet. After the Austrians entered Pesth he was arrested, in January, 1849, and on October 6 was executed. Consult Horváth, *Graf Ludwig Batthyányi* (Hamburg, 1850).

BATTI'ADÆ (Gk. Βαττιάδαι, *Battiadai*, descendants of Battus). Kings of Cyrene for eight generations. 1. BATTUS I, founder and first King of the Greek colony of Cyrene in Libya. He came from the island of Thera and was directed to the site of Cyrene by the Delphic oracle. The generally accepted date—not historically certain—of the settlement is about 630 B.C. Battus I ruled 40 years, according to Herodotus. 2. ARCESILAUS I, son of Battus I, and second King of Cyrene. According to Herodotus, he ruled 16 years. 3. BATTUS II (called "The Blessed," or "The Wealthy," Ὁ Εὐδαίμων, son of Arcesilaus I, and third King of Cyrene. In his reign immigrants were invited from Peloponnesus, Crete, and elsewhere, under the promise of a new division of lands. These lands were taken from the Libyans, who turned for aid to the Egyptian King, Apries. A battle was fought in 570 B.C. at Irasa, in which the Cyrenæans were victorious. Cyrene now increased greatly in power and importance. 4. ARCESILAUS II (called "The Oppressive," Ὁ Χαλεπός), son of Battus II, whom he succeeded on the throne. He began to rule, according to Herodotus, about 560 B.C. Dissensions arose between him and his brothers, in consequence of which the latter withdrew from Cyrene and founded Barca. He met with a severe defeat at the hands of the Libyans and was finally murdered by his brother Haliarchus, or Learchus (550 B.C.). His murder was afterward avenged by his wife, Eryxo. 5. BATTUS III (called "The Lame," Ὁ Χωλός), son and successor of the preceding. In his reign the Cyrenæans, despairing of the condition of the state, invited, by advice of the Delphic oracle, Demonax of Mantinea to their city to govern their affairs. At this time under his guidance a constitution was framed, by which the powers and privileges of the King were greatly curtailed. 6. ARCESILAUS III, son and successor of Battus III. Attempting to overthrow the power of Demonax, he was unsuccessful and fled to Samos. He there, with the help of Polycrates, collected a large army and, returning to Cyrene, wreaked terrible vengeance on his enemies. After Cambyses had subjugated Egypt, Arcesilaus submitted to the Persian King. Afterward he withdrew to Barca and was there slain by the King, Alazir. His death was avenged by his mother. 7. BATTUS IV, son of the preceding, and seventh King of Cyrene. 8. ARCESILAUS IV, son and successor of Battus IV, was the last King of Cyrene. He won a chariot race at the Pythian Games in 462 B.C. and is celebrated therefor in Pindar's fourth and fifth Pythian odes. He is also said to have won a victory at the Olympic Games in 460 B.C. Shortly after this a revolution broke out at Cyrene, and he fled to Euhesperides and was there slain.

BAT TICKS. See FOREST FLY.

BATTLE (Fr. *bataille*, from Lat. *batuere*, to beat, strike). An engagement or combat between opposing military bodies. All strategic operations in war must culminate in the *battle*, for that alone can give them significance. Whether a commander will attack or fight a defensive battle depends on the previous strategical and tactical operations, on the general plans of the commander-in-chief, and on the condition and the particular situation in which his army finds itself at the time it meets the adversary. The tactical offensive is usually preferred as promising more decisive results; but the tactical defensive is often forced on an army. When the hostile armies meet, the commander of the column in question is properly with the advance guard (q.v.). The leading battalion forms line of company, columns of sections, and advances with a light skirmish line in front; the engineers and bridge train halt, and the battery of the advance guard takes up a preparatory position.

A *defensive* battle may be purely defensive, or (the usual case) it may be only temporarily defensive, its object being to gain time. The first consideration is a good position, and this must be carefully intrenched, provided there is time; but all intrenchments should be entirely hidden from the enemy. This position is not occupied at the beginning, but the troops are first assembled in a preparatory position. The positions available for the artillery usually decide the grouping of the forces, except in covered country, when the infantry line has the preference, and the artillery finds positions in rear. As the battle advances, it takes more and more the character of a truly offensive action. Retreats are difficult, even when voluntary. When night intervenes after the battle, a considerable distance may be placed between the two forces and the units somewhat reorganized. The artillery usually furnishes the first support against pursuit, and it is protected by the cavalry, and this leads gradually to the formation of a rear guard.

Reference should be made to the article TACTICS, MILITARY, where will be found an account of the strategy and tactics used in active military operations, including a complete bibliography. That article also discusses the tactics peculiar to the various arms. See ARMY ORGANIZATION; ADVANCE GUARD; ATTACK; RECONNAISSANCE; COAST DEFENSE; FORTIFICATION; OUTPOST; ETC.

BATTLE, TRIAL BY, or WAGER OF. The determination of a controversy by a physical combat, conducted in the presence of judges and according to fixed judicial rules. Although "it prevails among all the races from which Britain derived its Teutonic blood," it was not a legal institution of Anglo-Saxon England, but was introduced into Britain by William the Conqueror. Sir James Fitzjames Stephen has expressed the opinion that "trial by battle was only private war under regulations." This view is rejected by Pollock and Maitland, however, as well as by other writers, who consider it a

social process for the discovery of the truth. "What triumphed was not brute force, but the truth. The combatant who was worsted was a convicted perjurer." Such was the theory underlying this form of trial.

It was employed both in criminal and civil controversies, but by Bracton's time it was limited to appeals of felony in criminal cases and to the writ of right in civil cases. In the former the combat was between the prosecutor of the felony and the alleged felon, unless one or the other was of unfit age or sex, where his or her place might be taken by a champion. In the civil proceeding by writ of right (the final remedy by a claimant of real property who could not rely on recent possession), either party could appear by champion. This led to the use of professional pugilists and to the business of training and keeping such champions for hire. By the time of Edward I any defendant to whom trial by battle was offered could decline and demand a trial by jury. On the other hand, the defendant, at least in an appeal of felony, retained the legal right to compel his prosecutor to do battle, until 1819, when the Statute of 59 George III, c. 46, enacted that "all appeals of treason, murder, felony, or other offenses shall cease," and that there should be no wager of battle either in criminal or civil controversies. Attempts had been made during the reigns of James I and Charles I to abolish trial by battle, but without success, and its abolition in 1819 was due to the decision of the Court of King's Bench, in Ashford *v.* Thornton (reported in 1 Barnewall and Alderson, 405) that the defendant in an appeal of felony, who had demanded trial by battle, was entitled to it as "his lawful mode of trial." In Scotland this mode of trial came to an end late in the sixteenth century, and throughout Britain it was practically obsolete from that time. Consult: Stephen, *History of the Criminal Law of England* (London, 1883); Pollock and Maitland, *History of English Law* (2d ed. Boston, 1899); Neilson, *Trial by Combat* (London, 1890).

BATTLE. A market town of Sussex, England, 7 miles northwest of Hastings (Map: England, G 6). Pop., 1901, 2991; 1911, 2924. Its name and title to distinction arise from the celebrated Battle Abbey, founded by William the Conqueror to commemorate his victory over Harold, the Saxon King, in 1066. Although generally called the Battle of Hastings (q.v.), the conflict took place on Senlac Hill (now Battle Hill), and the abbey is supposed to mark the spot where Harold fell. At the Reformation the abbey was converted into a private residential mansion; it is open to visitors once a week. The "Roll of Battle Abbey" contained a list of the Norman nobles in the suite of the Conqueror. It was formerly deposited in the abbey and was destroyed in the burning of Cowdray House in 1793. Ten copies exist, but the "roll" is considered to have been of apocryphal origin. Consult: Walcott, *History of Battle Abbey* (London, 1867); Hawthorne, *English Note-Books* (Boston, 1870); Duchess of Cleveland, *The Roll of Battle Abbey* (London, 1889).

BATTLE ABOVE THE CLOUDS, THE. In United States history, the name applied to that part of the battle of Chattanooga which resulted in the capture of Lookout Mountain by General Hooker, Nov. 24, 1863. See CHATTANOOGA, BATTLE OF.

BAT'TLE CREEK. A city in Calhoun Co., Mich., 121 miles by rail west of Detroit; at the confluence of the Kalamazoo River with Battle Creek, and on the Michigan Central and the Chicago and Grand Trunk railroads (Map: Michigan, D 6). The public-school library (20,000 vols.) occupies a fine building. Other prominent structures include the post office, the central school and city hall buildings, the Sanitarium, Post Tavern, Post Building, Ward Building, and Post Theatre. There are four parks, one of which, at Goguac Lake, is a popular summer resort, and a school museum. The city was formerly the headquarters of the Seventh-Day Adventist denomination, which still maintains here a widely known sanitarium, with a hospital and dormitory, homes for children and the aged, and a college. The tabernacle of this denomination has an auditorium with a seating capacity of 3500, one of the largest ecclesiastical halls in the State. Battle Creek is the centre of a fertile agricultural district and controls a considerable trade in the products of the region, principally grain, fruit, live stock, and wool, as well as in its most important manufactured products; threshing machines and other agricultural implements, pumps, engines, flour, printing presses, and hose fixtures. The city enjoys a national reputation for its cereal foods. The repair shops of the Chicago and Grand Trunk Railroad are situated here. Manufacturing interests are promoted by excellent water power. Settled about 1835, Battle Creek was incorporated as a village in 1850, and nine years later received a city charter. It adopted the commission form of government in 1913. The water works are the property of the municipality. Pop., 1890, 13,197; 1900, 18,563; 1910, 25,267; 1920, 36,164.

BAT'TLEFORD. A trading town in the province of Saskatchewan, Canada, at the confluence of the Saskatchewan and Battle rivers, and on the Canadian Northern and Grand Trunk Pacific railroads (Map: Northwest Territories, H 4). It is the centre and supply station for a large farming and grazing district, is the headquarters for a troop of Canadian mounted police, and is the seat of an Indian Agency. From 1876 to 1883 this town was the capital of the Northwest Territories. Pop., 1901, 797; 1906, 800; 1911, 1335.

BAT'TLE HYMN OF THE REPUB'LIC, THE. A stirring poem by Julia Ward Howe (1862), published in the *Atlantic Monthly*. The music is that of the song, "John Brown's Body."

BAT'TLEMENT (evidently from unrecorded OF. **bastillement*, from OF. *bastiller*, to fortify, *bastir*, Fr. *bâtir*, to build; cf. *bastille*, fortress). A term describing the parapet of mediæval de-

BATTLEMENT.

fensive towers and walls. The parapet is formed by a number of rising parts known as *cops* or *merlons*, the intervening spaces called *crevelles*. The soldier would take shelter behind the *merlon*, while he fired through the *crevelle*. Good examples are found on the towers of old castles throughout Europe; and on churches, armories, and other public buildings in the United States, where they are employed for their architectural value.

BATTLE MON'UMENT. 1. An abbey erected on the site of the battle of Hastings by William the Conqueror. The remains of it exist to this day. 2. A monument, 72 feet high, erected in 1815, at Baltimore, Md., in memory of those who defended the city against the British in September, 1814.

BATTLE OF HAST'INGS. See HASTINGS, BATTLE OF.

BATTLE OF IS'SUS, THE. A battle fought 333 B.C., in which Alexander defeated Darius, King of Persia, with great loss. The Persian Queen and her family were captured. The Macedonian loss was estimated to be only 300 foot and 100 horse. The battle was made the subject of a famous mosaic, which was once in the House of the Faun at Pompeii and is now preserved at the Museo Nazionale, Naples. For the mosaic, consult Mau-Kelsey, *Pompeii* (New York, 1902). See ALEXANDER THE GREAT.

BATTLE OF SHARPSBURG. See ANTIETAM, BATTLE OF.

BATTLE OF THE BAL'TIC. See COPENHAGEN.

BATTLE OF THE BOOKS. The title of a famous book by Jonathan Swift, which grew out of the controversy over the comparative merits of ancient and modern literature. The controversy was started in France by Charles Perrault (q.v.). In 1687 he read before the Academy a poem called *Le siècle de Louis le Grand*, in which he aroused the classicists by placing the moderns above the ancients. He was assailed by Boileau in *Réflexions sur Longin* (1693) and in other works. Perrault subsequently elaborated his position in the *Parallèle des anciens et des modernes* (1688–96). The dispute was taken up by English scholars. Sir William Temple sided with the ancients, and William Wotton to some degree with the moderns. The dispute developed into a literary controversy over the Epistles of Phalaris, in which Dr. Bentley showed his learning at the expense of Charles Boyle. Swift burlesqued the whole affair by giving a "full and true account of the battle fought last Friday between the ancient and modern books in Saint James's Library," of which Richard Bentley was librarian. See BENTLEY, RICHARD.

BATTLE OF THE FROGS AND MICE. See BATRACHOMYOMACHIA.

BATTLE OF THE KEGS. See HOPKINSON, FRANCIS.

BATTLE OF THE SPURS. See COURTRAI; GUINEGATE.

BATTLESHIP. In old naval parlance a line-of-battle ship was a vessel carrying batteries of guns on two or more covered decks and intended, in a fleet action, to lie in the line of battle. The modern battleship is a vessel of war in which are combined the greatest possible offensive and defensive powers and as great speed as can be given without serious reduction of these powers. The development of the modern battleship will be found under SHIPS, ARMORED; for other information concerning it, see NAVIES; CRUISER; UNITED STATES, *Navy;* FRIGATE; ETC.

BATTONI, bät-tō'nē. See BATONI, POMPEO.

BATTONYA, bŏt'tō-nyŏ. A market town of the county of Csanád, Hungary, about 60 miles east of Szegedin. Its principal industries are connected with the production of tobacco and wine, and the cattle raising of the district (Map: Hungary, G 3). Pop., 1910, 13,011.

BATTUE, băt'tū (Fr. from *battre*, to beat, strike). The method adopted in many parts of the world for driving wild animals to a point where the huntsman is secreted ready to kill them. Specifically, battue means to-day the spreading of beaters over the moors of Scotland, Ireland, and the north of England in a wide circle and gathering them to a narrower one, whereby the grouse are driven past groups of gunners and shot at from cover. Similar tactics are employed with partridge, particularly in the open lands of the east of England; and the woods and coppices in England are beaten to drive the pheasants out of the timber and undergrowth and over the guns stationed on the adjacent pastures. In India modifications of this method are used in tiger hunting, and in driving elephants into inclosures from which they cannot escape. In Patagonia the natives surround the guanacos in the same way.

In Australia rabbit driving has been frequently resorted to in regions where the animal has become a pest, and the same applies to certain of the western United States, where wolf driving is also practiced when necessary. Generally speaking, the driving of game in the European fashion is considered unsportsmanlike in America, this sentiment being reflected by the prohibition in most States of the hounding of deer. See HUNTING.

BAT'TUS. See BATTIADÆ.

BATUA. See BATWA.

BATU KHAN, bä-tōō'kän (?–1256). The leader of the Mongols in their invasion of Europe in the thirteenth century, grandson of Genghis Khan and nephew of Ogotai Khan. Given command in 1235 of the Mongol army destined against Europe, he marched westward, crossed the Volga River, and dividing his forces sent one southward to bring the Bulgarians to submission, while with the main army he advanced into the heart of Russia. On Dec. 21, 1237, he assaulted and took the city of Riazan. After this he captured Moscow, Vladimir, and, in 1240, Kiev, his followers everywhere perpetrating horrible atrocities. "The villages disappeared, and the heads of the Russians fell like grass before the sickle." The Russian princes were forced to bow to the Mongol yoke. In 1241 Batu Khan advanced into Hungary and overwhelmed the army of Béla IV. At the same time another Mongol army advanced against the Poles. It ravaged Poland and destroyed Cracow. On the memorable field of the Wahlstatt, near Liegnitz, the forces of the Silesian duke and the Teutonic knights succumbed to the Mongols, who, however, were unable to pursue their progress owing to their heavy losses. From the German frontier to the Volga, hardly a town survived the passage of this tornado of war. In 1242 Batu Khan was recalled to Asia by the news of the death of Ogotai. He died in 1256 in the midst of preparation for further conquests. In his campaigns Batu's main army was preceded by a body of 40,000 men, who cut roads and acted as pioneers through the terribly diffi-

cult country. The secret of the military success of the Mongols was the incredible speed with which they marched, often covering, it was said, a distance of nearly 300 miles in three days. The khanate which Batu governed was Kiptchak, a region extending from the Jaxartes in Turkestan to the limits of Russia of the thirteenth century and comprising the region north of the Caucasus. Batu's army was named the Golden Horde (q.v.), because of his tent, which was richly covered with embroidery and gilded leather. The *sira ordu*, or silken palace, made the great encampment by the Volga known as Sarai, the capital of the Golden Horde. The cause of the Mongol success lay in the fact that the whole Tatar nation was a standing army, which struck Europe in a time of feudalism, when patriotism was parochial, Russia without national unity, only the nobles and free men armed, and the number of monks, hired servants, and slaves in overwhelming majority. On the other hand, the Tatar cavalry was superbly disciplined, with admirable tactics, while their weapons were far superior to anything then known in Europe. Their arrows were longer and heavier, and their engineering skill far in advance of that of their foes. Their horses were of the Tatar breed, which could find food for themselves by brushing the snow away with their noses, where Western horses would starve. Consult: Howorth, *History of the Mongols* (London, 1880); Hammer-Purgstall, *Geschichte der Goldenen Horde in Kiptschack* (Pesth, 1840); Banking, *Wars of the Mongols* (London, 1827).

BATUM, bȧ-tōōm′, or **BATOUM.** Formerly a Turkish fortified city, now a Russian port in the province of Batum (area, 2700 square miles; pop., 1911, 166,300), on the southeastern shore of the Black Sea, about 8 miles north of the Turkish frontier (Map: Russia, F 6). The Berlin Congress of 1878, in sanctioning the cession of Batum to Russia, stipulated that it should not be made into a naval station, but should remain an essentially commercial port. It remained a free port until 1886. After the collapse of a quay in 1911 extensive improvements have made the harbor one of the best on the east coast of the Black Sea, and the city is a naval station. The climate is warm and mild, almost tropical; lemons, oranges, camelias, and even palms thrive in the open air. The city has but few well-appointed houses, and its sanitary conditions are very imperfect, but there is a fine park, and a cathedral completed in 1903. An extensive trade is carried on, Batum being a great emporium for the export of petroleum, which is extensively transported by means of pipe lines and tank cars. Other articles of commerce are petroleum products, wool, timber, tin plate, bricks, wheat, manganese ore, and articles from Transcaucasia. It is the seat of a United States consul. Pop., 1889, 23,200; 1897, 28,509; 1911, 30,008, composed chiefly of Russians, Turks, Greeks, Armenians, and Persians.

BATWA, bät′wȧ. A pigmy tribe in the mountainous country of the Wissmann Falls district, southern Central Africa. According to Verner, they are sometimes less than 4 feet high; their heads are small and well shaped, their eyes small, bright, and deeply set, and their color chocolate; they are trimly built and symmetrical, with leg muscles well developed, and arms less so; the feet and hands are small and well formed; the hair is kinky, and there is no beard. The villages are not regularly laid out; the houses are beehive-shape. The Batwa are under the protection of the Bakuba, who have taught them to cultivate a few vegetables. They are by habit meat eaters. In addition larvæ of insects and wild roots are eaten. Their weapons are bows, arrows, and knives. The boys are taught to hunt, and the girls dig edible roots. Household furniture consists of a few Bakuba earthern pots, a bed of sticks woven together, baskets, quivers, nets, and bamboo fish traps. They do not make pottery, weave, or work metals, and have no musical instruments. The bruised root of a species of Euphorbia furnishes arrow poison. Their knowledge of the habits of wild animals is remarkable, and sight, smell, and hearing are well developed. They are monogamous and faithful and affectionate toward their children. Charms and amulets are worn. In their funeral customs the men abstain from hunting and dancing, while the women remain in the huts and weep. The name "Batwa," also written "Batua," has in addition a much wider application, being used of a considerable number of different pigmy tribes, especially those sprinkled over the Congo region. Native usage of the term has, however, occasionally produced confusion, inasmuch as tribes shorter than the speakers are designated as Batwa without necessarily falling into the category of pigmies.

BATYUSHKOV, bä′tūsh-kôf, KONSTANTIN NIKOLAYEVITCH (1787–1855). A famous Russian elegiac poet, the forerunner of Pushkin. He was born at Vologda and educated at St. Petersburg. Here he mastered the Italian, German, and French languages and very early began to write poetry. He entered the military service; took part in 1807 in the Niemen campaign; later was in Finland, and entered Paris with the Army of the Allies in 1814. His unbounded admiration for Voltaire and France had received a rude shock when Moscow was burned by "the modern Vandals"; but the sight of Paris made him forget it all, and he immediately went to Voltaire's grave. In 1818 he was appointed attaché of the Russian Embassy at Naples, and the dream of his life—to visit sunny Italy—was realized; but his happiness did not last long. In 1822, after years of mental aberration, he fell a victim to a brain disease. In addition to his elegies, of which *The Death of Tasso* is perhaps his chief, his original works include epistles and narrative and lyric poems. He also made excellent translations from the Latin of Tibullus, the French of Parny, the Italian of Petrarch, and the German of Matthisson. His whole life was devoted to the formal perfection of Russian poetry—a struggle from which he came out victorious—so that he is the real teacher of Pushkin in this respect. His prose includes essays on poetry, ethics, and religion. (*On the Influence of Lighter Poetry upon Language* and *A Word about Morals Based on Religion* are two of his titles.) The first collection of his works appeared as early as 1817, when the author was barely 30, under the title, *Experiments in Verse and Prose.* Complete editions were published in 1834 and 1850. The best edition of his works is that by his brother, P. N. Batyushkov (3 vols., St. Petersburg, 1877), with an exhaustive biography by L. N. Maykoff and commentaries by the latter and V. I. Saitov.

BAUAN, bou'ân, or **BAUANG,** bou'âng. A town of Luzon, Philippines, in the province of Batangas (Map: Luzon, F 12). It is situated at the head of Batangas Bay, 4 miles northwest of Batangas, the capital of the province. The town manufactures piña cloth embroidery and is a centre for the marketing of agricultural products. Pop., 1903, 39,094.

BAU'BO (Gk. Βαυβώ, *Baubō*). A mythical woman of Eleusis, whom Hesychius calls "the Nurse of Demeter" and about whom there are many stories. These seem to have been the inventions of later times, coined for the purpose of giving a mythical origin to the jokes in which women used to indulge at the festival of Demeter. She was in some way connected with the Eleusinian Mysteries and is introduced by Goethe into the second part of *Faust* as the type of feminine lust.

BAUCHER, bô'shâ', FRANÇOIS (1796–1873). A French hippologist, born in Versailles. He published a new system of equestrian training, under the title of *Méthode d'équitation basée sur des nouveaux principes* (1842)—a unique work, which occasioned considerable comment and which has been translated into several European languages (Eng. trans. under the title *A New Method of Horsemanship*, Philadelphia, 1856). Under Napoleon III Baucher was appointed to a position in the Imperial *manège*.

BAU'CIS. See PHILEMON AND BAUCIS.

BAUDELAIRE, bôd'lâr', CHARLES (1821–67). A French poet, born in Paris, April 9, 1821. He was the forerunner of the decadent and even degenerate school in modern French poetry, and in his kind greater than any of his successors. His parents sought to turn him from literature by travel in the Orient, and, as might have been foreseen, confirmed him in his perversity. The imagery, the colors, the odors of those scenes, that splendid nature, new and strange, fired his eccentric imagination and seemed to command a poetic expression. Yet at first this morbid hyperæsthesia, which was to rise at times to emotional hysteria, was controlled by a strong critical bent. Baudelaire's early essays show remarkable keenness and prescience in regard to the trend of lyric poetry, and his translations of Poe's *Tales* (1856) made that author almost as much a classic of French as of American romantic fiction. But Baudelaire's cardinal work in French literature is the *Fleurs du Mal* (Flowers of Evil), 1857, in which the restless reaction from the confident outlook of scientific determinism finds its first, its most morbidly pessimistic, and possibly its strongest-expression. Baudelaire lived for 10 years longer, "cultivating hysteria with delight and terror," as he tells us, and died in a hospital at last after a year of semi-lunacy induced by the excessive use of nervous stimulants. Baudelaire's topsy-turvy ethics regard nature as evil, the natural as ugly, decay as a release, and death as a blessing. Possibly he was insincere; certainly he was intentionally brutal, and strained after effects in "the last convulsions of expiring individualism," as though drunk with the lees of romantic wine. There are 151 of these rank night-shade *Flowers*, all short poems, compactly built, with a mastery of technique unsurpassed in France, carefully polished and elaborated moral paradoxes, in which a shuddering at the vileness of life alternates with futile aspirations for an emancipation from it. In this respect he is the predecessor of Paul Verlaine (q.v.), of whom it has been said: "He often sat down, reeking with the odors of the foulest of Parisian *gargotes*, to pour out in verse of almost superhuman sweetness the aspirations of a soul profoundly touched with religious yearning." And what Baudelaire was as a poet, that Joris-Karl Huysmans was as a writer of remarkable prose. (See HUYSMANS, J. K.) Even while Beaudelaire worshiped Satan, he clung to the Cross and became towards the close of his life as morosely ascetic in resolution as he was extravagantly hedonistic in action. In his prose, as in his verse, the philosophy of science and the ethics of materialism coexist with the mysticism of mediæval demonology. His ethics are pessimism reduced to the absurd, his æsthetics are a reduction to the absurd of art; yet his poetry, in spite of all its artistic theory and ethical teaching, has a perverse poisonous originality that like arsenic preserves his memory green. The *Fleurs du Mal* have scattered their seeds wide, and Baudelaire is often called the father of the decadent Symbolists. Baudelaire's known works were published in 7 vols. (Paris, 1868); but certain poems that were suppressed under this Empire appeared in a recension by Mallarmé, *Le Tombeau de Ch. Baudelaire* (Paris, 1896); while the Vicomte de Louvenjoul (q.v.) edited the curious revelation *Mon Cœur Mis à Nu* (Paris, 1908). A considerable literature has sprung up around the life and writings of Baudelaire, and it is possible here to mention only the most important works, such as Henry James, *French Poets and Novelists* (London, 1884); Asselineau, *Ch. Baudelaire: sa vie et son œuvre* (Paris, 1889); G. Kahn, *Les Symbolistes et les Décadents* (Paris, 1902); F. Gautier, *Ch. Baudelaire* (last ed., Brussels, 1904); and the essays by Paul Bourget. Several attempts have been made to render some of the *Fleurs du Mal* into English verse, the most successful being that of A. Symons (London, 1905). One should also read the strangely morbid yet fascinating picture of Baudelaire given by Huysmans in the character of Des Esseintes in *A Rebours* (Eng. trans., London, 1897). See also MALLARMÉ, STÉPHANE; and FRENCH LITERATURE.

BAUDENS, bô'dăn', JEAN BAPTISTE LUCIEN (1804–57). A French surgeon. He was born at Aire, in the department of Pas-de-Calais, and studied at the medical school in Paris. In 1823 he became connected with the hospital at Lille and afterward lived in Strassburg. In 1826 he was made a surgeon to the military hospital in Paris, and from 1830 acted as army surgeon at Algiers, where he founded a hospital for instruction. His writings include: *Clinique des plaies d'armes à feu* (1836) and *Nouvelle méthode des amputations* (1842). His original contributions consisted mainly in improvements of the surgical treatment of bullet wounds.

BAUDHAYANA, boud-hā'yà-nâ. An early Hindu teacher or lawgiver. See APASTAMBA; GAUTAMA; VASISHTA.

BAUDIN, bō'dăn', CHARLES (1784–1854). A French admiral, born at Sedan. In an engagement fought in Indian waters between the French ship *Sémillante* and the English frigate *Terpsichore* in 1808 he lost an arm and was shortly afterward promoted lieutenant of the vessel. In June, 1812, while convoying a fleet of 12 French transports laden with ammunition to Toulon, he was pursued by English cruisers, but effected his escape and subsequently inflicted heavy damage upon a brig attached to the Eng-

lish squadron. After the battle of Waterloo Baudin volunteered to conduct the Emperor successfully through the cordon of English cruisers that guarded the coast of France. He was appointed rear-admiral in 1838, was intrusted with the command of the fleet of 23 vessels sent against Mexico, and on Nov. 27, 1838, bombarded San Juan de Ulúa, the defenses of Vera Cruz, which capitulated the following day. He retired from active service in 1849.

BAUDISSIN, bou'dĭs-sĭn, *Fr. pron.* bō'dē'-sĂN', WOLF HEINRICH, GRAF VON (1789–1878). A German translator, born at Rantzau, in Holstein. He entered the diplomatic service of Denmark in 1810, and became Secretary of Legation successively at Stockholm, Vienna, and Paris. In 1827 he settled at Dresden, where he collaborated with Tieck in his famous German translation of Shakespeare. The following plays were translated by Baudissin and were revised and annotated by Tieck: *Othello; King Lear; Much Ado About Nothing; Comedy of Errors; Taming of the Shrew; Measure for Measure; All's Well that Ends Well; Troilus and Cressida; Love's Labor's Lost; Merry Wives of Windsor; Titus Andronicus; Antony and Cleopatra.* Among Baudissin's other German translations are Hartmann's *Iwein* and the comedies of Molière (4 vols., 1865–67).

BAUDISSIN, WOLF WILHELM, GRAF VON (1847–). A German theologian, born at Sophienhof, Holstein. He studied at Berlin, Erlangen, Leipzig, and Kiel, and was professor at Strassburg from 1876 to 1881. From 1881 to 1900 he was professor at Marburg and in the latter year was called to Berlin. He published: *Translationis Antiquæ Arabicæ Libri Jobi quæ Supersunt* (1870); *Studien zur semitischen Religionsgeschichte* (1876–78); *Die Geschichte des alttestamentlichen Priesterthums untersucht* (1889); *August Dillmann* (1895); *Einleitung in die Bücher des Alten Testamentes* (1901); *Adonis und Esmun, eine Untersuchung zur Geschichte des Glaubens an Auferstehungsgötter und an Heilgötter* (1911).

BAUDRICK. See BALDRIC.

BAUDRILLART, bō'drē'yär', HENRI JOSEPH LÉON (1821–92). A French political economist and author. He was born in Paris, studied at the Collège Bourbon, and after 1855 was editor of the *Journal des Economistes.* In 1866 he was appointed professor of history and political economy in the Collège de France, in 1869 general inspector of libraries, and in 1881 a professor in the Ecole des Ponts et Chaussées. He published *Manuel d'économie politique* (1857), *Les populations agricoles de la France* (1880–88), and other works.

BAUDRY, bō'drē', PAUL JACQUES AIMÉ (1828–86). A French decorative, figure, and portrait painter. He was born at La Roche-sur-Yon, Vendée, and studied with Drölling in the Ecole des Beaux-Arts, Paris, whither he was sent with a stipend from his native city. Having won the Grand Prix in 1850, he studied in Rome, forming himself especially after the great Venetian masters. After his return he speedily rose to the front rank among contemporaneous artists, became a member of the Institute in 1870, and commander of the Legion of Honor in 1875. He first distinguished himself in figure and portrait painting. One of his most charming figure pieces is the "Pearl and the Wave," and he is represented in the Musée de Luxembourg by "Fate and the Child" and "Truth" and by canvases in several of the provincial museums of France. Among his sitters were many prominent representatives of art, literature, and finance and of the aristocracy of France, but he is most celebrated as a decorative painter, his works in the grand foyer of the Opera House in Paris (1866–74) ranking among the most brilliant creations of modern art. His masterpiece, however, is "The Glorification of the Law," adorning the ceiling in the Palace of Justice, which brought him the Medal of Honor in 1881. Consult Charles Ephrussi, *Paul Baudry, sa vie et son œuvre* (Paris, 1887).

BAUER, bou'ĕr, ADOLF (1855–). An Austrian classical scholar, born at Prague. He studied at the universities of Vienna, Berlin, and Bonn, and in 1891 was appointed professor of ancient history at the University of Gratz. The most important of his publications are: *Die Entstehung des herodotischen Geschichtswerkes* (1878); *Themistokles* (1881); *Die griechischen Kriegsalterthümer* (1886); *Litterarische und historische Forschungen zu Aristoteles' Ἀθηναίων Πολιτεία* (1891); *Die Forschungen zur griechischen Geschichte 1888–98* (1899); *Lehrbuch der Allgemeinen Geschichte* (1904); *Lehrbuch der Geschichte des Altertums* (1904); *Die Aufgabe des Gymnasiums* (1908); *Ursprung und Fortwirken der Christliche Weltchronik* (1910).

BAUER, ANTON (1772–1843). A German jurist and criminologist, born at Marburg. He was appointed professor at Göttingen in 1813. He is known as the originator of a theory of punishment according to which punishment finds its justification in the warning conveyed by the penalty. His works include: *Grundsätze des peinlichen Rechts* (1806), later published as *Lehrbuch des Strafprozesses* (1835), the first text-book of the science, and *Die Warnungstheorie* (1830).

BAUER, BRUNO (1809–82). A rationalistic German critic. He was born at Eisenberg, in the duchy of Saxe-Altenburg, on Sept. 6, 1809. He was the son of a porcelain painter and studied at the University of Berlin, where he became privat-docent in the theological faculty in 1834. He was transferred to the University of Bonn in 1839, but was deprived of his lectureship in 1842 on account of his rationalistic boldness. He then removed to Berlin and for many years devoted himself to the destructive criticism of the Scriptures until, having to his own satisfaction shown that they had no authority, he abandoned such studies and devoted himself chiefly to historical and critical publications. His writings are very numerous. All of them exhibit great learning, industry, research, and acumen, but are completely antagonistic to the received opinions in theology or to any form of evangelical religion. For instance, in his *Christus und die Cäsaren* (Berlin, 1877; 2d ed., 1879), he claims that Christianity was really founded by Seneca! He is generally admitted to be quicker in the discovery of error than of truth. He died at Rixdorf, a suburb of Berlin, April 15, 1882. Consult Lichtenberger, *German Theology in the Nineteenth Century* (Eng. trans.).

BAUER, EDGAR (1820–86). A German publicist, brother of Bruno Bauer, born at Charlottenburg. He studied theology and jurisprudence at Berlin and divided his time between travel, literary work, and conflicts with the law. He

served a term of imprisonment for having written *Der Streit der Kritik mit der Kirche und dem Staat*, which was confiscated by the Prussian authorities, but was afterward republished in Bern (1843). His other writings include *Die Rechte des Herzogtums Holstein* (1863); *Die Deutschen und ihre Nachbarn* (1870); *Das deutsche Reich in seiner geschichtlichen Gestalt* (1872); *Das Kapital und die Kapitalmacht* (1884, 1888).

BAUER, Georg. See Agricola.

BAUER, Harold (1873–). A celebrated pianist. He was born in London, April 28, 1873, of a German father and an English mother. His father taught him the violin and piano, on both of which instruments the boy made remarkable progress. When he was eight years of age, he was placed under Adolf Pollitzer to be trained as a violin virtuoso. After but two years of further study he made his first successful tour of England as a violinist, in 1883. For the next nine years he continued this career. In 1892 Paderewski heard him play the piano in Paris and predicted a great career for him, if he would devote himself entirely to that instrument. Bauer took the master's advice and became Paderewski's pupil for one year. In 1893 he made his first concert tour as a pianist, through Russia, and then returned to Paris to be heard and at once to become the lion of the hour. His enthusiastic reception from the French induced him to take up his permanent residence in Paris, but his fame quickly spread and soon he was a European celebrity. In 1900 he was heard for the first time in America, where he immediately was received as a prime favorite, so that he subsequently made several more tours of this country, always meeting with undiminished favor. In 1913 his New York recital was one of the most notable of the season. Bauer's wonderful velvety tone—capable of an infinite variety of nuances from the softest pianissimo to the most powerful fortissimo—and a technic exhibiting that limpid clearness which is the ideal of the French school, combined to bring him instant recognition, and the most remarkable thing about this master's exquisite art is the fact that it is to be considered practically the result of self study.

BAUER, Karoline (1807–77). A German actress. She was born at Heidelberg, made her début at Karlsruhe in 1822, and had achieved a brilliant success there and at Berlin in both comedy and tragedy, when in 1829 she married in London Prince Leopold of Coburg, afterward King of the Belgians. Their morganatic union was brief and unhappy. In 1831 she returned to the stage, which she quitted only upon her marriage to the Polish Count Ladislas de Broel Plater, in 1844. Thereafter she lived in Switzerland, where she died at Zürich. Her *Posthumous Memoirs*, translated into English (1884) with their denunciations of King Leopold and Baron Stockmar, offer a striking contrast to the two pleasing volumes of theatrical reminiscences that had preceded them in 1876 and 1877.

BAUER, Klara (known also by the pen name *Karl Detlef*) (1836–76). A German novelist, born at Swinemünde (Pomerania). She became a teacher of pianoforte at St. Petersburg, where for a time she resided in the house of Bismarck, then Minister to Russia. Her writings, distinguished by pure diction and skill in the delineation of character, include *Unlösliche Bande* (1869; 3d ed., 1877); *Musste es sein?* (2 vols., 1873; 2d ed., 1875); and her best work, *Ein Dokument* (1876; 4 vols., 2d ed., 1878).

BAUER, Louis A(gricola) (1865–). An American astronomer and magnetician, born in Cincinnati, Ohio. He graduated at the University of Cincinnati in 1888 and was appointed astronomical and magnetic computer of the United States Coast and Geodetic Survey. In 1895–96 he was instructor in mathematical physics at the University of Chicago, in 1896–97 instructor there in geophysics, and from 1897 to 1899 associate professor of mathematics and mathematical physics at the University of Cincinnati. He also served as chief of the territorial magnetism division of the United States Coast and Geodetic Survey from 1899 to 1906. He became editor of *Terrestrial Magnetism and Atmospheric Electricity* in 1896. In 1904 he was made director of terrestrial magnetism in the Carnegie Institute. His writings include: *Beiträge zur Kenntniss des Wesens der Säcularvariation des Erdmagnetismus* (1895); *Vertical Earth-Air Electric Currents* (1897); *United States Magnetic Tables and Magnetic Charts for 1905* (1908); *Land-Magnetic Observations, 1905–1910* (1913).

BAUERNFEIND, bou'ĕrn-fint, Karl Maximilian von (1818–94). A German engineer, born at Arzberg (Franconia). He studied at Nuremberg and Munich, and in 1846 was appointed professor of geodesy and engineering science in the School of Engineering at Munich. In 1868–74 and 1880–83 he was director of the Technical College of Munich, originally organized according to plans devised by him. He retired in 1890. He was the inventor of the prismatic cross, extensively used in surveying. His original investigations were very extensive. Among his numerous works are *Zur Brückenbaukunde* (1854; revised ed., 1878), and *Zur Wasserbaukunde* (1886).

BAUERNFELD, bou'ĕrn-fĕlt, Eduard von (1802–90). An Austrian playwright and poet, born in Vienna. After taking an important part in the exciting political events of 1848, he devoted himself to literature. He was a friend of Grillparzer and of Franz Schubert, for whose opera, *Der Graf von Gleichen*, he wrote the libretto. His works, which were varied, included political fiction, poetry, serious drama, and many very successful comedies. These last are marked by clever dialogue and skillful characterization, and include: *Bekenntnisse* (1834); *Bürgerlich und Romantisch* (1835); *Grossjährig* (1846); *Krisen* (1851); *Aus der Gesellschaft* (1866); *Moderne Jugend* (1868); *Der Landfrieden* (1869). He was less successful in serious drama. His *Gesammelten Schriften* were published in Vienna (12 vols., 1871–72), and *Ausgewählte Werke*, with a biographical and critical introduction by Emil Horner (1905). Consult A. Stern, *Bauernfeld, Ein Dichterporträt* (Leipzig, 1891).

BAUGÉ, bô'zhâ. The chief town of an arrondissement of the same name in the department of Maine-et-Loire, France, on the Couesnon, 22 miles northeast of Angers (Map: France, N., E 5). It contains a fine old castle of the fifteenth century, formerly the seat of the dukes of Anjou, and is notable as the scene of an English defeat in 1421, when their leader, the Duke of Clarence, was killed. Pop., 1901, 3325; 1906, 3199; 1911, 3235.

BAUHIN, bō'ăn', Gaspar or Kaspar (1560–1624). A Swiss botanist and anatomist. He was born in Basel and became professor of anatomy and botany there in 1588. In 1614 he was made professor of medicine. His most important work is the *Pinax Theatri Botanici* (1623). His work on anatomy, entitled *Theatrum Anatomicum* (1621), has considerable historical value.

BAUHIN, Jean (1541–1613). A Swiss botanist, brother of Gaspar Bauhin. He devoted his life to the study of botany and published many excellent works, the most important and best known of which is his *Historia Universalis Plantarum Nova et Absolutissima,* completed by others and published after his death (1650).

BAUHIN'IA (after the botanist Bauhin). A genus of plants of the family Leguminosæ. The species, of which there are about 150, are natives of the warmer regions of both hemispheres, and some of them are remarkable for the size and beauty of their flowers. Most of them are twining plants or lianas, stretching from tree to tree in the tropical forests; but some are small trees, as *Bauhinia porrecta,* the mountain ebony of Jamaica, so called from the color of its wood. The inner bark of the Maloo climber, *Bauhinia racemosa,* or *Bauhinia scandens,* and of *Bauhinia parviflora,* East Indian species, is employed for making ropes. *Bauhinia retusa* and *Bauhinia emarginata,* also East Indian, exude a brownish-colored mild gum; while the astringent bark of *Bauhinia variegata* is used in Malabar for tanning and dyeing leather, and also in medicine. The flower buds are often pickled. The leaves of various species are used in Brazil as demulcent medicines, having mucilaginous properties. *Bauhinia splendens,* known as chain creeper, is common in South America. Its stems are very flexible and are of great utility.

BAUM, boum, L(yman) Frank (1856–1919). An American author, best known as the creator of "The Wizard of Oz." He was born at Chittenango, N. Y. After having received an academic education at Syracuse, he entered newspaper work in 1880 and was editor of the *Dakota Pioneer* (1880–90) and of *The Show Window* in Chicago (1897–1902). Besides his writings for children, both in the way of books and in contributions to the magazines for 20 years, he is the author of a number of plays, of which *The Wizard of Oz,* a musical extravaganza (1902), had a long run in New York and Chicago. Among his other works may be mentioned: *Mother Goose in Prose* (1897); *Father Goose—His Book* (1899); *The Wonderful Wizard of Oz* (1900); *Baum's Fairy Tales* (1908); *Sky Island* (1912); *The Patchwork Girl of Oz* (1913); and the plays, *The Maid of Arran* (1881) and *The Queen of Killarney* (1885).

BAUMANN, bou'mân, Alexander (1814–57). An Austrian playwright and composer, born in Vienna. He first became distinguished through his songs and romances in the dialect of Lower Austria and afterward devoted himself to dramatic composition, his comedies being especially popular. They include: *Beiträge für das deutsche Theater* (1849), *Singspiele aus den österreichischen Bergen* (1850), among which the well-known *Das Versprechen hinterm Herd* has maintained its popularity; *Ehrenbuschn für d'Oesterreicher Armee in Italien* (1854); *Gebirgsbleameln* (8 books); *Aus der Heimat.*

BAUMANN, Oskar (1864–99). A German African traveler, born in Vienna. After study in Vienna and Leipzig, he accompanied Lenz (1885) on the latter's journey up the Congo River to Stanley Falls. In 1886 he explored Fernando Po, in 1888 accompanied an expedition to Kilimanjaro, and in 1890 was sent out by the German East African Society for the exploration of parts of East Africa. During 1892–93 he was the leader of an expedition to Victoria Nyanza, explored the region to the south and west of that lake, and ascertained that the Kagera River, which takes its rise in the Mountains of the Moon, is the lake's chief tributary. He wrote *Afrikanische Skizzen* (1900).

BAUMBACH, boum'bäg, Rudolf (1840–1905). A German poet and novelist. He was born at Kranichfeld, studied natural science at Würzburg and Leipzig, Freiburg and Heidelberg, and afterward lived in Austria till 1885, when he moved to Meiningen. He proved most successful in poetic tales based on popular legends of German and the Slavonic Alps: *Zlatorog* (1875), *Horand und Hilde* (1879), *Frau Holde* (1880), *Der Pate des Todes* (1884), *Kaiser Max und seine Jäger* (1888). He has published seven volumes of lyrics, of which *Lieder eines fahrenden Gesellen* (1878) and *Thüringer Lieder* (1891) are characteristic. His most noteworthy novel is *Trug-Gold* (1878), an historical romance of the seventeenth century. He also wrote the fairy stories, *Sommermärchen* (1881) and *Es war einmal* (1889).

BAUMÉ, bō'mā', Antoine (1728–1804). A French chemist, known for his discoveries in applied chemistry. He became professor in the college of pharmacy in Paris and founded a large establishment for the preparation of drugs. He published many papers on the application of scientific principles to useful purposes in the arts and manufactures. Among his inventions and improvements were processes for bleaching, purifying saltpetre, manufacturing sal-ammoniac, etc. Baumé's areometer is still in common use in laboratories and in manufacturing establishments. His publications include: *Eléments de pharmacie* (1762) and *Chimie expérimentale et raisonnée* (3 vols., 1773).

BAUMEISTER, bou'mi-stēr, Johann Wilhelm (1804–46). A German veterinarian, born at Augsburg. In his youth he received extensive training in animal painting and afterward studied and practiced veterinary medicine. In 1839 he was made professor at the School of Veterinary Medicine at Stuttgart. His published works include *Handbuch der landwirtschaftlichen Tierkunde und Tierzucht* (3 vols., 4th ed., 1863), a part of which, under the title *Anleitung zur Kenntnis des Aeussern des Pferdes,* passed through the seventh edition in 1891. Other parts, too, of the *Handbuch* have been published separately and have passed through several editions. The work was beautifully illustrated by the author.

BÄUMELER, boi'me-lēr, or **BIMELER,** bē'me-lēr, Joseph Michael (1778–1853). The leader of the German "Separatists," who founded the settlement of Zoar, Ohio, in 1817. He was born in Württemberg, Germany, received a good education, and soon identified himself with a group of mystics in his native state, who became known as the Society of Separatists. In 1817 he was chosen leader of the company of about 300 which emigrated to Amer-

ica and settled at Zoar, and until his death he exercised an almost autocratic control over them. Outside the community he was generally known as "King Bimeler," while his fellow Separatists were commonly called "Bimelers." He was at first opposed to the introduction of communism, but finally yielded to the wishes of his associates and was largely responsible for the successful working of the system. For 40 years he was both the spiritual and the temporal leader, and with his death the community began gradually to decline. A number of "discourses" delivered by him in 1832 were published under the title *Die wahre Separation, oder die Wiedergeburt, dargestellt in geistreichen und erbaulichen Versammlungs-Reden und Betrachtungen, besonders für das gegenwärtige Zeitalter anwendbar, gehalten in der Gemeinde in Zoar im Jahre 1832* (3 vols., Zoar, 1856), and subsequently formed the basis for a large part of the devotional exercises of the community, exercising an influence among them greater even than that of the Bible. See ZOAR COMMUNITY.

BAUMGARTEN, boum'gär-ten, ALEXANDER GOTTLIEB (1714–62). A German philosopher of the school of Wolff. He was born in Berlin and studied at Halle. In 1738 he became privatdocent at Halle, and in 1740 professor of philosophy at Frankfort-on-the-Oder, where he died. His text-books in philosophy were much used, and Kant made them for a while the basis of his own lectures. The cleverness of his style made him an important contributor to modern philosophical terminology. Among other philosophic subjects he contributed an interesting work on æsthetics, but the claim often made that he is the founder of modern æsthetic theory cannot be granted unqualifiedly. His most important works were: *Metaphysica* (1739), reissued by Eberhard (1789); *Ethica Philosophica* (1740); *Æsthetica* (2 vols., 1750–58; left unfinished); *Philosophia Generalis* (ed. by Förster, 1770). Consult G. Meyer, *Leibniz und Baumgarten als Begründer der deutschen Æsthetik* (Halle, 1874), and J. Schmidt, *Leibniz und Baumgarten* (Halle, 1875).

BAUMGARTEN, HERMANN (1825–93). A German historian, born at Lesse (Brunswick). In 1842–48 he studied at Jena, Halle, Leipzig, Bonn, and Göttingen, and later at Heidelberg and Munich. In 1861–72 he was professor of history and literature at the Polytechnikum at Karlsruhe and in 1872–89 at the University of Strassburg. His publications include: *Geschichte Spaniens zur Zeit der französischen Revolution* (1861); *Geschichte Spaniens vom Ausbruch der französischen Revolution bis auf unsere Tage* (3 vols., 1865–71); *Karl V und die deutsche Reformation* (1889).

BAUMGARTEN, MICHAEL (1812–89). A German theologian, born in Haseldorf (Holstein). He studied at the University of Kiel, in 1846 became pastor at Schleswig, and in 1850 professor of theology at Rostock. Although admittedly orthodox in his views, he strongly opposed the Lutheran hierarchy and was in 1856 removed from the board of theological examiners and in 1858 deprived of his professorship. In 1865 he assisted in founding the Protestantenverein. The more important of his works are his *Die Nachtgeschichte Sacharias* (1858); *Apostelgeschichte* (2 vols., 2d ed., 1859); *Die Geschichte Jesu* (1859); *Schleiermacher als Theolog* (1862); *Zwölf kirchengeschichtliche Vorträge zur Beleuchtung der kirchenlichen Gegenwart* (1869); *Kirchliche Zeitfragen in Vorträgen* (1873); *Doktor Martin Luther: ein Volksbuch* (1883). Consult his autobiography, edited by H. H. Studt (Kiel, 1891).

BAUMGARTEN-CRUSIUS, boum'gär-ten-krōō'zē-us, LUDWIG FRIEDRICH OTTO (1788–1843). A German theologian. He was born at Merseburg, July 31, 1788, and died at Jena, May 31, 1843. He studied theology at Leipzig and in 1810 became university preacher. In 1812 he was appointed professor extraordinary of theology at Jena, in 1817 full professor of theology, and always distinguished himself as a champion of religious liberty, on behalf of which he wrote various treatises. In 1820 appeared his *Introduction to the Study of Dogmatics* (Leipzig, 1820), a work of considerable originality and wealth of thought. More complete exhibitions of his opinions are to be found in his *Manual of Christian Ethics* (Leipzig, 1826), *Outlines of Biblical Theology* (Jena, 1828), and *Outlines of Protestant Dogmatics* (Jena, 1830). In 1831–32 he published a *Text-Book of the History of Doctrines;* in 1834, a work on *Schleiermacher, his Method of Thought and his Value;* and also *Considerations on Certain Writings of Lamennais.* After his death Kimmel published the whole of his exegetical prelections on the Gospels and Pauline Epistles, and H. Hase completed from his notes his *Compendium der christlichen Dogmengeschichte* (2 vols., Leipzig, 1840–46).

Baumgarten was conspicuous for the breadth and solidity of his learning, the originality of his spirit, and the acuteness of his understanding, but was nevertheless deficient in clear and vivid expression. He attached himself to no school, theological or philosophical. At an early period he had been greatly influenced by the metaphysics of Schelling, from which, however, he ultimately emancipated himself. His thinking was to a certain extent rationalistic, but was strongly modified by the influence of Schleiermacher.

BAUMGARTNER, boum'gärt-nĕr, ALEXANDER (1841–1910). A Swiss Jesuit writer, born at Saint-Gall. He entered the Jesuit order in 1860 and completed his theological studies at Münster, Maria-Laach, and Ditton (England). He then studied Scandinavian literature in Copenhagen and Stockholm. In several of his works he seeks to depreciate the German classicists. His writings of this character include *Goethe; sein Leben und seine Werke* (3 vols., 2d ed., 1885–86), *Goethe und Schiller* (1886), and *Der Alte von Weimar* (1886). He has also written a translation from the ancient Icelandic of Eystein Asgrimsson; a festival play on the Spanish poet, *Calderon* (1881); *Longfellow's Dichtungen* (1878); and *Geschichte der Weltlitteratur* (6 vols., 1897–1911).

BAUMGARTNER, ANDREAS, BARON VON (1793–1865). An Austrian statesman and scientist. He was born at Friedberg, in Bohemia, and studied at the University of Vienna, where in 1823 he became professor of physics. While filling this office, he gave popular lectures on Sundays upon mechanics for artisans and operatives, which met with much approbation. A result of these lectures was his *Mechanik in ihrer Anwendung auf Künste und Gewerbe* (2d ed., Vienna, 1823) and his *Naturlehre* (Vienna, 1823). Ill health forced him to resign his professorship, and he was appointed director of the Imperial porcelain manufactories, and after-

ward superintendent of the Austrian tobacco manufactories. In the year 1846 the establishment of the electric telegraph was committed to him, and in the following year he was placed in charge of the construction of the Austrian railways. In 1848 he became Minister of Public Works; in May, 1851, he was appointed Minister of Commerce and in December of the same year Minister of Finance. In 1855 he was appointed president of the Austrian Academy of Sciences, of which he had been vice-president for a number of years, and in 1861 he was called to the House of Peers of the Reichsrath. He published, in 1862, *Chemie und Geschichte der Himmelskörper nach der Spektralanalyse;* in 1864, *Die mechanische Theorie der Wärme.* Consult Schröter, *Freiherr von Baumgartner, Eine Lebensskizze* (Vienna, 1886).

BAUMGARTNER, Gallus Jakob (1797–1869). A Swiss statesman and historian, born at Altstätten (canton of Saint-Gall). He studied at Freiburg and Vienna and was prominent in the political affairs of his canton, the revision of whose constitution he promoted. As a member of various representative bodies of the canton and the Confederation, he was a leader of the Liberals until 1841, when he occasioned much surprise by his alliance with the Ultramontane party. In 1857–60 he represented his canton in the Council of Estates. He founded in 1842 the *Neue Schweizer Zeitung,* and published several historical works, of which the most extensive and important is *Die Schweiz in ihren Kämpfen und Umgestaltungen von 1830–50* (4 vols., 1853–66). Consult A. Baumgartner, *Gallus Jakob Baumgartner und die neuere Staatsentwicklung der Schweiz* (Freiburg-im-Breisgau, 1892).

BAUMSTARK, boum'stärk, Anton (1800–76). A German philologist, born at Sinzheim, Baden. He was professor of philology at the University of Freiburg from 1836 to 1871. He published an edition of Curtius Rufus (1829), of Cæsar (1832), and an important work entitled *Urdeutsche Staatsaltertümer* (1873). Some of his writings appeared under the pseudonym of Hermann vom Busche.

BAUMSTARK, Eduard (1807–89). A German political economist, brother of Anton. He was born at Sinzheim, Baden; was educated at the University of Heidelberg; became professor in an academy of agriculture and political science at Eldena in 1842, and in the following year was appointed its director. He was a delegate to the Prussian National Assembly of 1848, and in the following year was elected a member of the Upper House of that body. He was subsequently a Liberal member of the Prussian Upper House and of the North German Diet. His writings deal chiefly with political economy and include the following: *Kameralistische Encyklopädie* (1835); *Grundgesetze der Volkswirtschaft,* a translation of Ricardo's celebrated work (1837; 2d ed., 1877); *Zur Geschichte der arbeitenden Klasse* (1853).

BAUR, bour, Ferdinand Christian von (1792–1860). A German theologian. He was born at Schmiden, near Stuttgart, June 21, 1792; studied theology in the Blaubeuren theological seminary from 1805 to 1809 and in the University of Tübingen from 1809 to 1817. In 1817 he became professor in the Seminary of Blaubeuren, where he gave the first indications of his abilities by publishing his *Symbolik und Mythologie oder die Naturreligion des Altertums* (3 vols., Stuttgart, 1824–25), a work which indicates the influence of Schleiermacher over the author. In 1826 he was called to Tübingen, where he held the chair of Protestant theology. His whole life was consecrated to religious studies—the history of doctrines, the symbolism of the Church, and biblical exegesis. On account of the universality of his culture, the wonderful activity and fertility of his mind, his rare combination of speculative thought with solid knowledge, and that faculty of historic divination or insight which enabled him to draw decisive results from separate, obscure, and neglected data, he has been regarded by many in Germany as the most massive theological intellect since Schleiermacher. His method of investigating the progressive history of religious opinion was governed by the principles of Hegelian philosophy, and incurred the reproach of formalism. It was charged that he made dogmas develop themselves with a kind of abstract inevitable regularity from previous historical conditions, without allowing for immediate and extraordinary providences. His most important works in the history of doctrine are *Die christliche Gnosis oder die christliche Religionsphilosophie* (Tübingen, 1835), a work which makes the Christian Gnosis of the second and third centuries the starting point of a long series of religio-philosophical productions traceable uninterruptedly down through Middle-Age mysticism and theosophy to Schelling, Hegel, and Schleiermacher; *Die christliche Lehre von der Versöhnung* (Tübingen, 1838); and *Die christliche Lehr von der Dreieinigkeit und Menschwerdung Gottes* (Tübingen, 1841–43). In reply to Möhler, the celebrated Roman Catholic theologian, who had attacked the Protestant church, he wrote *Der Gegensatz des Katholicismus und Protestantismus* (Tübingen, 1836). Besides these works, based on a historical treatment of religion, to which class also belongs his *Lehrbuch der christlichen Dogmengeschichte* (Stuttgart, 1847), he published various critical treatises on parts of the New Testament; such as *Die Christuspartei in der korinthischen Gemeinde; der Gegensatz des Paulinischen und Petrinischen Christenthums;* and *Der Apostel Petrus in Rom* (1831)—a work in which the author endeavors to demonstrate the existence of deep-rooted differences in primitive Christianity, between a Petrine (Judaizing) and a Pauline (Gentile) party. His inquiries concerning the Gnosis led him to study minutely the pastoral epistles, the result of which study was *Die sogenannten Pastoralbriefe des Apostels Paulus* (Stuttgart, 1835), in which he combats the idea that St. Paul was their author, and refers them to the second century. Of a similar nature is his *Paulus, der Apostel Jesu Christi* (Stuttgart, 1845).

His work on the Gospel of John produced a startling effect, as up to Baur's time that Gospel had generally been held prior in date to the three synoptic Gospels, whereas Baur strove hard to show that it was of post-apostolic origin. In 1847 appeared his *Kritische Untersuchungen über die kanonischen Evangelien, ihr Verhältniss zu einander, ihren Ursprung und Charakter.* In 1851 he published *Das Markusevangelium nach seinem Ursprung und Charakter.* In this and other similar works Baur maintained that we must extend our notions of the time within which the canonical writings were composed to a period considerably post-apos-

tolic, which can only be determined approximately by a careful investigation of the motives which apparently actuated their authors. The chief characteristic, therefore, of the Tübingen school, as exhibited in the works of its founder, is the union of a subjective criticism with a strong conviction of the historic reality of the New Testament writings. He maintained that there were only four genuine Pauline epistles—Romans, 1 and 2 Corinthians, and Galatians. Baur died in Tübingen, Dec. 3, 1860. Of his writings there have appeared in English translation: *Paul, the Apostle of Jesus Christ* (2 vols., 1873–75); *The Church History of the First Three Centuries* (2 vols., London, 1878–79). For his biography, consult: *Worte der Erinnerung* (Tübingen, 1861); C. von Weizsäcker, *Ferdinand Christian Baur. Rede zur akademischen Feier seines 100. Geburtstages* (Stuttgart, 1892); also, in general, R. W. Mackay, *The Tübingen School and its Antecedents* (London, 1863); A. B. Bruce, *F. C. Baur and his Theory of the Origin of Christianity* (New York, 1886); Fraedrich, *Ferdinand Christian Baur* (Gotha, 1902).

BAUR, Gustav Adolf Ludwig (1816–89). A German evangelical theologian, born at Hammelbach (Odenwald). He studied at the University of Giessen, was appointed professor there in 1847, and in 1870 became professor at Leipzig. His publications include: *Grundzüge der Homiletik* (1848); *Boëtius und Dante* (1874); *Die vorchristliche Erziehung* (1884; vol. i, K. A. Schmid's *Geschichte der Erziehung*).

BAURE, bou'rā. A tribe of Arawakan stock living on the eastern slope of the Cordilleras, on the Rio de los Baures, a tributary of the Beni River, in the department of La Paz, Bolivia. About the year 1674 they were Christianized by Jesuit missionaries and gathered into mission villages, together with the Moxos (q.v.).

BAUSE, bou'ze, Johann Friedrich (1738–1814). A German engraver. He was born at Halle. He studied with J. J. Haid at Augsburg, and came under the influence of J. G. Wille, whom he took as his model. He became a member of the Leipzig Academy of Art in 1766 and spent the rest of his life in that city except the last year, when he was at Weimar in friendly relations with Goethe. His principal strength lay in portrait engraving, of which he was regarded as the leading exponent in Germany, although his technique is now regarded as somewhat mechanical. He made more than 200 portraits of contemporary notables, including reigning princes, theologians, merchants, scholars, poets, and actors. Among the prominent names in this valuable collection are the following: Joseph II (1762); Peter I and Peter III, Czars of Russia (1786 and 1762, respectively); Catharine II of Russia (1762); Frederick II, King of Prussia (1759); and the authors Gellert, Lessing, Mendelssohn, Leibnitz, Kant, Winckelmann, and Hagedorn. A catalogue raisonné of his works was published by Keil (Leipzig, 1849).

BAUSMAN, bous'man, Benjamin (1824–1909). An American Reformed (German) clergyman, born at Lancaster, Pa. He graduated at Marshall College (1851) and at the Theological Seminary, Mercersburg, Pa. (1852). He became pastor at Reading, Pa., in 1863. His books include: *Sinai and Zion*, travels (1860); *Wayside Gleanings in Europe* (1878); *Bible Characters* (1893); edition of *Harbaugh's Harfe, a Volume of Poems in the Pennsylvania German Dialect* (1870).

BAUTAIN, bō'tăN', Louis Eugène Marie (1796–1867). A French theologian and philosophic writer. He was born in Paris and studied at the Ecole Normale Supérieure. At the age of 20 he was made professor at the College of Strassburg, and later held a professorship at the university of that city, but was suspended from office in 1822 on charges of heterodoxy. In 1848, however, he was made vicar-general of the Diocese of Paris, and five years later professor of theology at the Sorbonne. His best-known writings include: *Art of Extempore Speaking* (1858–78); *De l'enseignement de la philosophie en France au XIX^e^ siècle* (1833); *Philosophie du christianisme*, edited by Bonnechose (1835); *Psychologie expérimentale* (1839; a second edition under the title *L'esprit humain et ses facultés*, 1859); *Philosophie morale* (1842); *La liberté et la religion* (1848); *La morale de l'évangile comparée aux divers systèmes de morale* (1855); *La philosophie des lois au point de vue chrétien* (1860). Bautain held that divine revelation is the only possible criterion of truth on ethical subjects.

BAUTZEN, bout'sen, or **BAUDISSIN,** bou'dē-sĕn (Wendish *Budyšin*, hut city, from Slav. *buda*, hut, tent, Eng. *booth*). The capital of the circle of the same name in the Kingdom of Saxony, situated on rising ground overlooking the river Spree, 35 miles by rail east-northeast of Dresden (Map: German Empire, F 3). Ancient walls and defenses are preserved and have been transformed into promenades. Among the religious edifices the most noteworthy is the cathedral of St. Peter, which is divided into two parts by a grating and is used by both Protestants and Roman Catholics. The castle of Ortenburg, often the residence of the kings of Bohemia, is now occupied by government offices. The city's affairs are administered by a municipal council of 24 members and an executive board of 7. (See Germany, *Local Government*.) There are numerous schools, three public libraries, several museums, and an art gallery. Manufacturing industries are flourishing and include the production of woolen and other textiles, leather, paper, beer, pottery, etc. There are also dye works, distilleries, and iron foundries, and an active trade. Bautzen is a place of considerable antiquity and was made a town under Otho I in the tenth century. It suffered greatly in the war with the Hussites and still more during the Thirty Years' War. It is celebrated as the place where Napoleon, with an army of 130,000 men, after an obstinate resistance, won a barren victory over 90,000 of the allied Russians and Prussians on May 20–21, 1813. The Allies lost in the two days 12,000 killed and wounded, in addition to 1500 taken prisoners. The French left 5000 dead upon the field and had over 15,000 wounded. Pop., 1900, 26,000; 1905, 29,371; 1910, 32,760.

BAUXITE, bōks'it (from *Baux;* see below). The most important ore of aluminum, a hydrate with a variable composition which may be represented by the formula $Al_2O_3.xH_2O$. It carries from 20 to 40 per cent aluminum and usually some iron and silica. The ore occurs in rounded grains, in pisolitic or clay-like masses. The grains usually show a concentric structure and a variable color from white to yellow, brown, or red. It is named from its occurrence at

Baux, in France, but it is also known from Styria and Carinthia, in Austria, and from Antrim, in Ireland. In the United States it occurs in a belt about 60 miles long, extending from northwestern Georgia into northeastern Alabama, and also in Arkansas, near Little Rock. The foreign deposits result from the chemical alteration of the aluminous silicates in igneous rocks; the American deposits are in part of the same origin and partly hot-spring formations. Those of Alabama and Georgia are basin shaped and are limited vertically to points between 900 and 950 feet above sea level. The composition of good-grade American ore is approximately as follows: Alumina, 57 to 62 per cent; ferric oxide, under 1 per cent; silica, 2.5 to 3 per cent; titanic acid, 3 to 4 per cent; water (combined), 20 to 30 per cent; moisture, retained mechanically, 2 to 4 per cent. While bauxite serves chiefly as an ore of aluminum, it is also employed in the manufacture of alum, in making alundum, and for lining basic converters and Siemens-Martin furnaces in the manufacture of steel. The principal production of bauxite is in Arkansas. The total output in the United States in 1911 was 155,618 long tons valued at $750,649. Consult: Hayes, "Bauxite," *Sixteenth Annual Report United States Geological Survey*, part iii (Washington, 1895); *Mineral Industry*, vol. ii (New York, 1893); Branner, "The Bauxite Deposits of Arkansas," *Journal of Geology*, vol. v (Chicago, 1897). See also ALUM; ALUMINIUM.

BAVARIA (Ger. *Bayern*). A kingdom and one of the constituent states of the German Empire, the largest in area and population next to Prussia. The Grand Duchy of Hesse divides Bavaria into two unequal parts. The eastern part is bounded by Austria on the east and south, Saxony, the Thuringian States, and Hesse-Nassau, on the north, and Württemberg, Baden, and Hesse on the west. The western portion, or Rhine Palatinate, is situated between Baden, Prussia, Alsace-Lorraine, and Hesse, and occupies only one-thirteenth part of the entire kingdom. The following table gives the area of Bavaria and its population in 1900 and at the census of Dec. 21, 1910:

Govt. districts	Sq. miles	Pop., 1900	Pop., 1910
Upper Bavaria	6,454	1,323,888	1,532,065
Lower Bavaria	4,148	678,192	724,331
Upper Palatinate	3,729	553,841	599,461
Upper Franconia	2,702	608,116	661,862
Middle Franconia	2,930	815,895	931,691
Lower Franconia	3,244	650,766	710,943
Swabia	3,797	713,681	789,853
Palatinate	2,289	831,678	937,085
Total	29,293	6,176,057	6,887,291

In 1816 the population was 3,607,000; in 1864, 4,775,000; in 1871, 4,863,450; in 1880, 5,284,778; in 1890, 5,594,982. The average annual increase from 1816 to 1864 was 0.58 per cent; from 1864 to 1910, 0.80 per cent; from 1900 to 1910, 1.09 per cent. At the 1911 census there were 3,379,580 males and 3,507,711 females, or 1038 females to each 1000 males. Of the total, Roman Catholics numbered 4,863,251 (70.61 per cent); evangelical Christians, 1,942,658 (28.21 per cent); other Christians, 13,963 (0.20 per cent); Jews, 55,065 (0.80 per cent). The larger cities are: Munich, the capital, with 596,467 inhabitants at the 1910 census; Nuremberg, 333,142; Augsburg, 102,487 (not including Pfersee, with 10,928 inhabitants, annexed Jan. 1, 1911); Würzburg, 84,496; Ludswigshafen-am-Rhein, 83,801; Fürth, 66,553; Kaiserslautern, 54,659; Regensburg (Ratisbon), 52,624; Bamberg, 48,063; Hof, 41,126; Pirmasens, 38,463; Bayreuth, 34,547.

Bavaria may be described as a true geographical unit, as almost all of its boundary lines are formed by mountain ranges which lie in a rectangle around its inner basin. On the south it takes in a part of the eastern Alps, which form the three mountain ranges of southern Bavaria; the Algäuer Alps; the Bavarian Alps, containing the highest summit of the German Empire, the Zugspitze (9725 feet); and the Salzburger Alps. Along the Bohemian frontier stretches the mountain range of Böhmerwald, with its offshoot, the Bayerischer Wald, running in a northwestern direction along the Danube. On the north rise the Fichtelgebirge, the Rhöngebirge, and in the northwest is the Spessart. The Franconian Jura traverses the west and centre. The interior of Bavaria is an elevated plateau, sloping toward the north, with a mean altitude of 1600 feet, and intersected in several directions by low hills. The largest mountain range in the Palatinate is the Hardt Mountains, which have an elevation of over 2200 feet.

Bavaria belongs mainly to the basin of the Danube, by which it is traversed through its entire width from west to east. The part of Bavaria south of the Danube is drained by the tributaries of that stream, the most important of which are the Iller, Lech, Isar, and Inn. The northern tributaries of the Danube in Bavaria are the Wörnitz, Altmühl, Naab, Regen, and Vils. The northwestern part of Bavaria is drained by the Main and its tributary the Regnitz. There are not a few lakes in the southern part of the kingdom, the most important of which are the Chiemsee, Starnbergersee, and Ammersee, besides several mountain lakes, the most famous of which is Königsee, noted for its beautiful scenery. The most important canal of Bavaria is the Ludwigskanal, which connects the Altmühl, a tributary of the Danube with the Main, a tributary of the Rhine, thereby serving as a connecting link between the North and the Black seas. Among the numerous mineral springs in Bavaria the most famous are those of Kissingen and Reichenhall.

Climate. The climate of Bavaria, although somewhat colder than that of the rest of Germany, is on the whole mild and salubrious. The average annual temperature ranges from about 49° F. in the valleys along the Danube, the Rhine, and the Main, to less than 44° F. in the mountainous regions, with very considerable fluctuations. The rainfall ranges from about 23.5 inches around the Hardt Mountains, in the centre of the Rhine Palatinate, to over 78 inches in the southern part of Bavaria proper.

Mineral Resources. The mineral deposits of Bavaria are of considerable variety, but not much mining is being done outside of coal and iron. The coal output in 1910 was 773,916 metric tons, valued at 9,556,000 marks; brown coal, 1,494,631 tons, 11,160,000 marks; iron ore, 305,335 tons, 2,596,000 marks; graphite, 7415 tons, 314,000 marks; rock salt, 1192 tons; common salt (from aqueous solution), 45,141 tons, 2,053,000 marks; other salt, 41,524 tons, 2,704,000 marks.

Agriculture. Agricultural production is of relatively greater importance in Bavaria than

in any other German state, and the soil has been brought to a degree of cultivation surpassed in only few countries. Threatened by the competition of new countries with a virgin soil and cheap land, the Bavarian landholder was compelled to adopt every available means in order to increase the productiveness of the soil. With this end in view numerous associations were formed in almost every department of agriculture. The buying of seeds and agricultural machinery, storing of grain, raising of domestic animals, marketing of agricultural products, insurance of farm buildings and crops, and numerous other operations are all carried on largely through coöperative societies. A considerable proportion of the landholders are in the habit of insuring their crops. In his struggle against foreign competition the Bavarian landholder has not been left entirely to his own efforts. The state has come to his assistance in offering him reduced rates on the transportation of agricultural products, machinery, and manure, in establishing agricultural banks, in improving the breed of domestic animals, and in opening agricultural schools. That all of these measures have helped to bring about a decided improvement in agricultural methods is shown by the enormous increase in the use of agricultural machinery in the last decades.

Of the total area in 1900, 3,047,300 hectares (or 40.2 per cent) were in cultivated field and garden; 1,296,700 hectares (17.1 per cent), meadow; 260,700 hectares (3.4 per cent), pasture; 24,900 hectares (0.3 per cent), vineyard; 2,466,600 hectares (32.5 per cent), forest; 490,900 hectares (6.5 per cent), roads, yards, water, etc. The areas devoted to leading crops in 1912 in hectares and the production in metric tons in 1912 and 1911 were as follows:

	Ha. 1912	Tons 1912	Tons 1911
Rye	567,189	929,644	764,852
Wheat	290,375	489,785	431,397
Winter spelt	61,653	89,503	89,594
Summer barley	361,376	668,780	671,269
Oats	506,955	744,661	741,151
Potatoes	370,806	4,708,746	2,510,811
Hay	1,283,615	6,338,750	4,628,076
Hops	17,625	11,509	4,800

Other crops of importance are sugar beets, tobacco, and rape seed. Vine growing is an important industry, but shows no progress; it is confined almost entirely to the Palatinate and Lower Franconia. The following figures relate to 1911 and 1912 respectively: Productive area under vines, 20,570 and 20,650 hectares (12,202 and 15,328 in the Palatinate); yield of must, 713,511 and 575,301 hectoliters; value of must, 40,600,000 and 25,900,000 marks.

In 1882 there were 681,521 farms, and in 1907 669,911. The following figures are for 1895 and 1907 respectively: farms under two hectares, 236,575 (4.1 per cent of total farm area) and 241,642 (4.0 per cent); between two and five hectares, 165,408 (12.7) and 162,431 (12.9); between five and 20, 216,999 (49.5) and 224,640 (52.1); between 20 and 100, 44,182 (31.1) and 40,663 (28.8); 100 hectares and over, 621 (2.6) and 535 (2.2); total farms, 663,785 in 1895, comprising 4,341,577 hectares, and 669,911 in 1907, comprising 4,239,237 hectares.

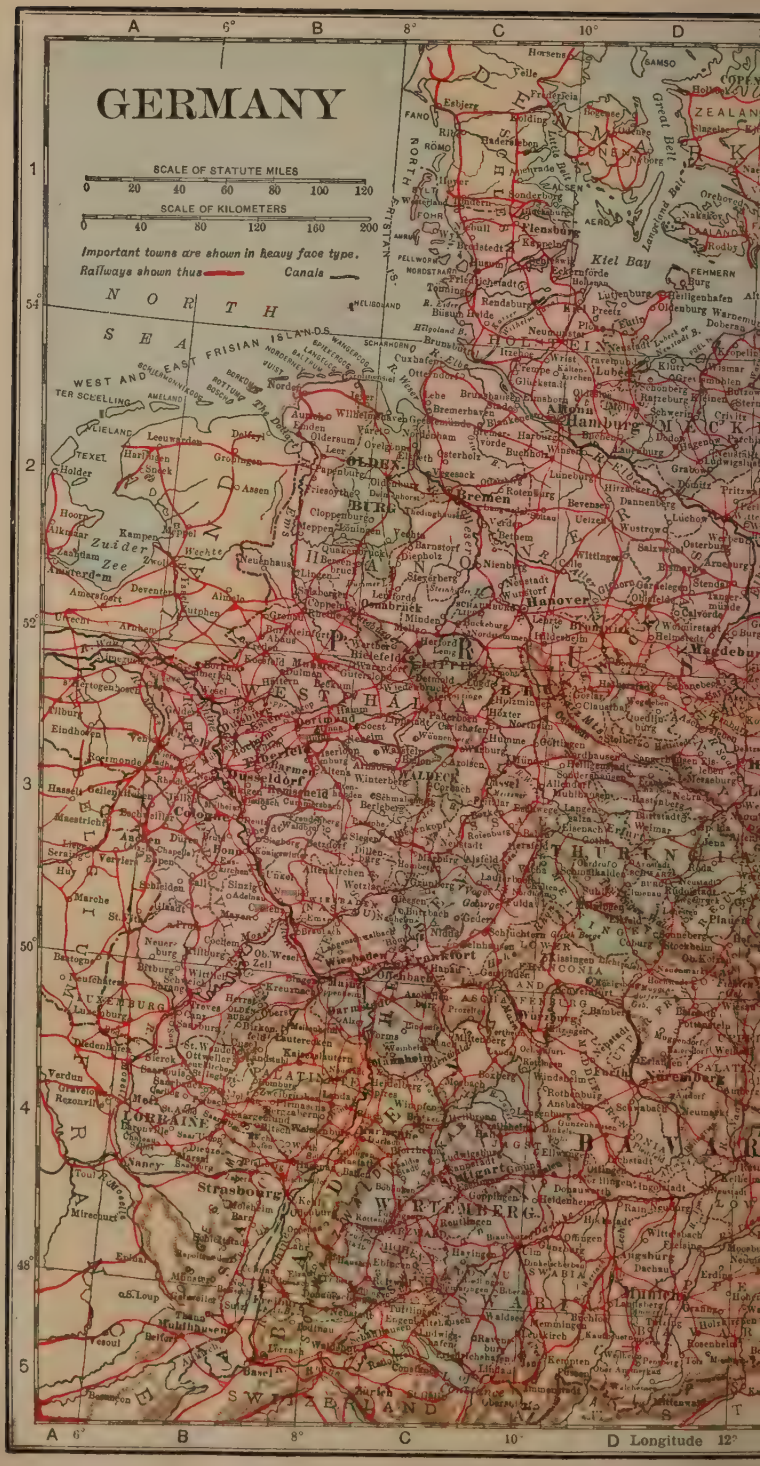
In number of live stock Prussia stands first and Bavaria second among the German states. Stock breeding is conducted with great care and intelligence, and state studs are maintained for improvement of the breed of horses. Live stock, December, 1912: horses, 400,300; mules and asses, 700; cattle, 3,554,000; sheep, 474,000; swine, 1,812,000; goats, 310,861; fowls, 10,319,000.

The woods and forests of Bavaria in 1900 covered an area of 2,466,600 hectares, or 32.5 per cent of the total area of the kingdom, of which 49 per cent belongs to private persons, 34 per cent to the state, and the remainder mostly to the communities. The annual income derived from the forests through the sale of timber and the rent of grazing land amounts to about $10,000,000.

Manufactures. Bavaria is the largest per-capita beer-producing country in the world, and its beer has a world-wide fame. In 1911 its per-capita production was 283 liters, as compared with 178 for Württemberg, 149 for Baden, 79 for Alsace-Lorraine, and about 107 for all Germany. Bavaria's total beer production is almost two-sevenths that of the Empire; in 1911 it was 19,642,000 hectoliters (as compared with about 70,353,000 hectoliters in the Empire); in 1910, 18,110,000; in 1907, 18,641,000. The textile and metal industries are developed to a considerable extent. There are also some large tobacco factories, tanneries, and chemical works. Among other important industries is the manufacture of earthenware, glass, agricultural implements, machinery, leather goods, and wooden articles. There are many establishments devoted to the polygraphic processes.

Commerce and Transportation. Bavaria's foreign commerce is included in that of the German Customs Union. Its chief export is beer. In 1911 Bavarian railways aggregated 8216.4 kilometers (5105.4 miles), of which 8060.6 kilometers broad gauge and 155.8 narrow gauge. Of broad-gauge railway there were 106.2 kilometers per thousand square kilometers of territory and 116.4 kilometers per 100,000 inhabitants. Of broad-gauge railway 7818.7 kilometers were state lines, and 241.9 kilometers private. Of the narrow gauge 115.5 kilometers were state, and 40.3 private. The navigation on the Danube, the Main, and the Lake of Constance is very active.

Government. Bavaria is a constitutional monarchy, the crown being hereditary by primogeniture in the male line or, if that fails, in the female line. The constitution of Bavaria bears date of May 26, 1818. It has been modified since. The kingdom, which entered the North German Confederation by treaty of Nov. 23, 1870, for the establishment of the German Empire, is independent in its internal affairs, having complete control of its army in time of peace, managing its own transportation and communication facilities, and collecting revenue for its separate budget. The executive power is vested in the King, who is assisted by a responsible ministry of seven members, and advised by a state council. The legislative power rests with the King and the Parliament (*Landtag*), which consists of two houses. The Upper House, or Chamber of Councilors of the Realm, consisted in 1913 of 18 princes of the royal family, 2 crown dignitaries, 2 archbishops, the heads of 17 noble families of the realm, 1 bishop, the president of the Protestant Chief Consistory, 32 hereditary members, and 18 persons appointed for life by the King; total, 91. The number of life members must not exceed one-third of the hereditary councilors. The president of the Upper House is


GERMANY
SCALE OF STATUTE MILES
0 20 40 60 80 100 120
SCALE OF KILOMETERS
0 40 80 120 160 200
Important towns are shown in heavy face type.
Railways shown thus
Canals
NORTH SEA
Kiel Bay
Hamburg
Bremen
Hannover
Berlin
Dresden
Leipzig
Frankfort
Munich
Nuremberg
Strasbourg
Cologne
Düsseldorf
Essen
Magdeburg
Brunswick
Mannheim
Stuttgart
Augsburg
Ingolstadt
Regensburg
Würzburg
Kassel
Aachen
Trier
Metz
Nancy
Verdun
Mulhouse
Basel
SWITZERLAND
HOLSTEIN
HANOVER
WESTPHALIA
HESSE
THURINGIA
BAVARIA
WURTEMBERG
ALSACE
LORRAINE
LUXEMBURG
A 6° B 8° C 10° D Longitude 12°

14° F 16° G 18° H 20° J 22° K
1 54° 2 52° 3 50° 4 48° 5
BALTIC SEA
ARTHOLME
BORNHOLM
Rönne
Ystad
Arcona C.
Trawemünde
Warnemünde
Rostock
Stettin
Swinemünde
Pomeranian Bay
R. Stolpe
Stolpmünde
Leba
Rixhoft
Brüster Ort
Gulf of Danzig
Hela
Pillau
Danzig
DANZIG
Neufahrwasser
Weichselmünde
Elbing
Frisches Haff
Königsberg
Memel
LITHUANIA
Tilsit
Insterburg
Eydtkuhnen
Pillkallen
Darkemen
Goldap
Angerburg
Lötzen
Lyck
Prostken
Pr. Eylau
Friedland
Bartenstein
Heilsberg
Rossel
Bowen
Olezko
Nikolaiken
Johannisburg
Fredrichshof
Ortelsburg
Willenberg
Neidenburg
Soldau
Mlava
Prasnysz
Ostrolenka
Luma
Ostrow
Makof
Ciechanof
Pultusk
Novy Dvor
Serotof
Wengrow
Kaluszyn
Siedlec
Garwolin
Zelchof
Lukow
Mszczonof
Grodjeo
Rava
Brzesc
Plock
Plonsk
Novo Georgievsk
Gombin
Sochaczef
Soch
Lowicz
Leczyca
Ozorkof
Kalisch
Pleschen
Biddebice
Zgierz
Zdunskavola
Pabianice
Pfirtsko
Tomasof
Radom
Opocno
Szydlovietz
Ostrovietz
Hrasnik
Konskie
Samsonf
Nowo Radomsk
Sandomierz
Opatow
Nisko
Dabrowa
Kalbuszowa
Tarnow
Jaroslaw
Krakow
Podgorze
Wieliczka
Myslenice
Wadowice
Plisno
Jaslo
Krosno
Grybow
Sanok
Lisko
Stryi
Drohobycz
Boryslaw
Stanislau
Kalusz
Halicz
Kolomea
Nadworna
Delatyn
Kuty
Kossow
Sniatin
Kuczurmare
Zabie
Kimpolung
Suczawa
Radautz
Storozynetz
Czernowitz
Beuthen
Kattowitz
Myslowitz
Konigshutte
Kybnik
Nikolai
Rybnik
Loslau
Pless
Jastrzemb
Bielitz
Teschen
Ostrau
Karwin
Orlau
Polnisch Ostrau
Oderberg
Troppau
Jagerndorf
Ratibor
Oderberg
Cosel
Gleiwitz
Beuthen
Tarnowitz
Lissa
Gostyn
Rawicz
Fraustadt
Bojanowo
Krotoschin
Ostrowo
Adelnau
Schildberg
Wilhelmsbrück
Kempen
Rawitsch
Trachenberg
Trebnitz
Militsch
Wohlau
Steinau
Raudten
Sprottau
Glogau
Sagan
Sorau
Guben
Forst
Spremberg
Cottbus
Luckau
Lübben
Lübbenau
Calau
Senftenberg
Hoyerswerda
Kamenz
Bautzen
Görlitz
Lauban
Löwenberg
Jauer
Liegnitz
Breslau
Neumarkt
Strehlen
Ohlau
Brieg
Oels
Namslau
Kreuzburg
Rosenberg
Oppeln
Neustadt
Kandrzin
Gr. Strehlitz
Kosel
Gleiwitz
Myslowitz
Konigshutte
Beuthen
Kattowitz

appointed by the King. The members of the Lower House, 163 in number, are elected for six years by direct vote. The voting franchise is restricted by a property qualification. The Chamber of Deputies elects its own president and vice president, and its sanction is necessary for almost every measure relating to the financial affairs of the realm. It enjoys the right of initiative to a considerable extent. In the Imperial *Bundesrat* Bavaria is represented by six members, and in the *Reichstag* by 48.

For purposes of local administration Bavaria is divided into eight government districts (*Regierungsbezirke*), subdivided into administrative districts. In every government district there is a *Landrat*, consisting of representatives of the districts, the towns, the landed nobility, the clergy, and the university, if there be one, all elected for six years.

The budget of Bavaria is fixed every two years. The budget for each of the years 1911 and 1912 balanced at 676,214,154 marks; for 1913, 691,930,633 marks; the latter figure shows that the budget doubled in 15 years. The revenue is derived mainly from public works, Imperial repayments, and indirect taxes. The public debt at the end of 1911 amounted to 2,427,281,578 marks, of which 1,913,315,200 marks, or about 79 per cent, was on account of the railways.

Education is free and compulsory, and provided for by the state in a generous manner. There are three universities (at Munich, Würzburg, and Erlangen) and a large number of secondary and special schools. In 1911 the public elementary schools numbered 7566, with 18,352 teachers (of whom 13,521 were male) and 1,041,676 pupils. There were 43 gymnasia, with 1146 teachers and 17,652 students. In the winter semester of 1912–13 the University of Munich had 7718 students; Würzburg, 1548; Erlangen, 1307.

History. The Celtic inhabitants of what now constitutes the southern part of Bavaria were conquered by the Romans about 15 B.C. The region was included partly in Vindelicia and partly in Noricum. The Romans founded the colonies of Augusta Vindelicorum, "Augusta of the Vindelici" (now Augsburg), Regina Castra (Regensburg or Ratisbon), and Castra Batava (Passau). At the time of the great migration of nations the Marcomanni, moving westward from their seats in Bohemia (Boiohæmum, so named from the Celtic Boii, whom the Marcomanni had conquered about the beginning of the Christian Era), settled in Bavaria, which took its name from the new occupants, who were known as Boiarii (possessors of the country of the Boii). Dukes of the Bavarians appear in history as early as the sixth century. The bishoprics of Salzburg, Passau, Freising, and Ratisbon were founded or restored in the eighth century. Before the close of that century Bavaria had been brought completely under the sway of the Franks. After the extinction of the Carlovingian dynasty, early in the tenth century, a new Duchy of Bavaria arose. In 1070 Bavaria passed into the possession of the Guelph (Welf) family. In 1180, when Henry the Lion was placed under the ban of the Empire by Frederick Barbarossa, his Bavarian territories were transferred to Otho, Count of Wittelsbach, whose descendant now occupies the royal throne. The Rhenish Palatinate was conferred on this family by the Emperor Frederick III in 1214. Louis of Bavaria was Emperor of Germany in 1314–47. At this time the Palatine was separated from Bavaria. (See PALATINATE.) Duke Maximilian, for his services to the Imperial cause in the Thirty Years' War (q.v.), was raised to the dignity of Imperial Elector in 1623, and in 1628 was invested with the Upper Palatinate. In the War of the Spanish Succession Bavaria supported France. The Elector Charles Albert was one of the princes who sought to dismember the Austrian dominions on the accession of Maria Theresa. (See AUSTRIAN SUCCESSION, WAR OF THE.) He was elected Emperor of Germany in 1742, and died in 1745. In 1777 the Wittelsbach line in the Electorate of Bavaria became extinct, and the Wittelsbach line in the Rhine Palatinate succeeded to the throne. In 1805 Bavaria was erected into a kingdom by Napoleon I. The King assisted Napoleon in his wars and received large additions of territory. In 1813, however, he cleverly contrived to change sides and thus managed to have confirmed to him, by the treaties of 1814–15, an extent of territory nearly as valuable as the possessions which the treaties of Pressburg and Vienna had given him and which he had now to restore to Austria.

In 1818 the new constitution came into existence, but, owing to various causes, it did not secure the measure of popular freedom that had been expected. In 1825 Louis I ascended the throne. He was a well-meaning and liberal monarch, but he lavished the wealth of the kingdom on the embellishment of the capital and on works of art, while he neglected works of practical value. The revolutionary wave of 1830 produced some disquiet in the country, but no serious disturbance. The Bavarian government, however, took alarm, and restricted the freedom of the press; and, though the restrictions were speedily repealed, dissatisfaction was created by the imposition of new taxes. The Jesuits obtained great influence with the King, which they used to the detriment of popular rights. The people were further aroused by the King's relations with the notorious Lola Montez (q.v.), who was looked upon as an agent of the Ultramontanes. In March, 1848, following the example of the French revolutionists, the people of Munich seized the arsenal and demanded reform and the expulsion of Lola Montez. The King had to consent, but in the same month he abdicated. His son, Maximilian II, ascended the throne. He died in 1864, and was succeeded by Louis II, a distinguished patron of Wagner, the great musician. After 1850 Bavaria showed itself hostile to the national movement toward German unity under the leadership of Prussia. In the War of 1866 it sided with Austria against the former power, suffered defeat, and was compelled to cede nearly 300 square miles to Prussia and to enter into an offensive and defensive alliance with the victor. The country was forced by the power of national sentiment to join in the war against France. Circumstances thereafter made its entrance into the new German Empire inevitable. In June, 1886, Louis II, who had become insane, committed suicide. His brother assumed the title of Otho I; but this prince being also mentally incapable of governing, the regency was taken over by an uncle, Prince Luitpold, who ruled in behalf of the demented monarch till Dec. 12, 1912, when he was succeeded in the regency by his son Prince Ludwig Leopold. On Nov. 9, 1913, the regent, consenting to widespread popular demand, accepted the crown as Louis III (1845–1921).

Bibliography. *Bavaria, Landes- und Volks-*

kunde des Königreichs Bayern (Munich, 1860–68); Geistbeck, *Das Königreich Bayern in geographisch-statistischer Beziehung* (ib., 1878); Wenz, *Volkskunde von Bayern* (Nuremberg, 1879–84); *Beiträge zur Landeskunde Bayerns* (Munich, 1884), containing a complete bibliography; Götz, *Geographisch-historisches Handbuch von Bayern* (Munich, 1895–98); Gümbel, *Geologie von Bayern* (Cassel, 1884–94); *Die Landwirtschaft in Bayerns* (Munich, 1890), a memorial prepared from official sources; Beck, *Bayerns Grossindustrie und Grosshandel* (Nuremberg, 1895); Piloty, *Die Verfassungskunde des Königreichs Bayerns* (Gotha, 1878–99); Heigel, *Die Wittelsbacher* (Munich, 1895); Riezler *Geschichte Bayern* (Munich, 1880); Brechler, *Darstellung der geschichtlichen Entwickelung des bayrischen Staatsgebiets* (Berlin, 1890). See GERMANY; WAR IN EUROPE.

BA'VIUS and MÆ'VIUS. Two Latin poetasters, who, otherwise unheard of, were made immortal bywords through their malevolence toward Horace and Vergil. Nothing further definite is authentically known of them, although they have unwarrantedly been credited with the *Antibucolica*, two pastoral parodies of the Vergilian *Eclogues*. By Vergil they are contemptuously dismissed with the well-known verse:

> "Qui Bavium non odit, amet tua carmina, Mævi."
> (*Ecl.* III, 90.)

Horace, however, in the Tenth Epode attacks Mævius in a tone of boisterous and half-burlesque exaggeration.

BAWBEE', or BABEE. The popular designation of a half-penny in Scotland, now dropping out of use. The origin of the term is obscure, but it is most probably a corruption of the French *bas billon* ("base bullion" or mixed metal), applicable to debased copper money. In the plural form the word is popularly used in Scotland to signify money generally.

BAX, ERNEST BELFORT (1854–). An English writer on Socialism, born at Leamington, England. Educated privately in London and in Germany, he made a special study of music, and later of philosophy, especially the German movement from Kant to Hegel. In 1880–81 he was engaged as a correspondent of English papers, but presently he decided to leave the Continent. Upon his return to England he became prominently identified with the early Socialist movement. In conjunction with William Morris (q.v.) he helped in 1885 to found the Socialist League, and for a time was editor, with Morris, of the weekly journal, *Commonweal*. Subsequently resigning from the league, he interested himself in the Social Democratic Federation, of whose organ, *Justice*, he was made editor. He attended various international congresses as a delegate from the federation. Among his journalistic activities is to be included the editing, for a period, of the Socialist monthlies, *Time* and *To-Day*. He wrote the following books on historical and economic subjects: *Jean-Paul Marat* (1878); *Handbook to the History of Philosophy* (1884); *Religion of Socialism* (1886); *French Revolution* (1890); *The Problem of Reality* (1893); *Socialism; Its Growth and Outcome, with William Morris* (1894); *Essays in Socialism, New and Old* (1906); *The Roots of Reality* (1907); *The Last Episode of the French Revolution* (1911); *Problems of Men, Mind, and Morals* (1912).

BAX'TER, JAMES PHINNEY (1831–1921). An American historian, born at Gorham, Me. He had an academic education and became a prominent merchant and manufacturer in Portland, Me., of which city he was six times elected mayor. He organized the Associated Charities and was its first president. He was chosen president of the Maine Historical Society, edited ten volumes of the *Documentary History of Maine*, and published: *The Trelawney Papers* (1884); *George Cleeve and His Times* (1885); *The British Invasion from the North* (1887); *Sir Ferdinando Gorges and his Province of Maine* (1890); *The Pioneers of New France in New England* (1894); *The Voyages of Jacques Cartier* (1906); and co-author of a *World Atlas of Christian Missions* (1911).

BAXTER, RICHARD (1615–91). An English Nonconformist divine, born Nov. 12, 1615, at Rowton, near Shrewsbury, Shropshire. He was privately and none too well educated and in 1633 went to court with an introduction to the master of the revels. A month convinced him that he was out of his element at Whitehall, and an illness after his return deepened the earnestness of his religious convictions. He studied theology, was ordained (1638), became master of the Dudley grammar school, and then assistant to a clergyman at Bridgnorth, and in 1640 was chosen parish clergyman of Kidderminster. There he established a reputation as one of the most remarkable preachers of his time and effected a wonderful improvement in the manners of the people. On the breaking out of the Civil War his position was peculiar. His religious sympathies were almost wholly with the Puritans, his political with the monarchy, and, though a Presbyterian in principle, he was far from admitting the unlawfulness of episcopacy. The open respect he showed to some leading Puritans exposed him to danger from the mob. He retired to Coventry, where he ministered for two years to the garrison and inhabitants. He afterward accepted the office of chaplain to Colonel Whalley's regiment and was even present at the sieges of Bridgewater, Exeter, Bristol, and Worcester. He was in the army hoping to modify the intolerance of partisanship, and to promote "the spirit of love and of a sound mind." When ill health forced him to leave the army, he returned to Kidderminster and continued to labor there for some time. At this time he wrote *Saints' Rest* and *Call to the Unconverted*. He never dissembled his sentiments with regard to the execution of the King and the usurpation of Cromwell, even in the presence of the Protector. On the return of Charles, Baxter was appointed one of his chaplains (1660) and took a leading part in the conference held at the Savoy to reconcile the contending church factions, a project defeated by the bigoted obstinacy of the bishops. The see of Hereford was offered to him but he declined and asked to be permitted to return to Kidderminster. His request was refused. The Act of Uniformity at length drove him out of the Anglican church, and in July, 1662, he retired to Acton, in Middlesex, where he spent the greater part of nine years, chiefly occupied in writing. The Act of Indulgence in 1672 permitted him to return to London. In 1685 Judge Jeffreys condemned him, for "sedition" in his *Paraphrase of the New Testament*, published in that year, to pay a fine of 500 marks, and in default, to the King's Bench Prison. The trial is described by Macaulay in his history. After 18 months Bax-

ter was released and the fine remitted. After this he preached frequently without molestation. He died in London on Dec. 8, 1691.

Baxter is said to have preached more sermons, engaged in more controversies, and written more books than any other Nonconformist of his age; and Dr. Isaac Barrow said that "his practical writings were never mended, and his controversial seldom confuted." The total number of his publications exceeded 160. By far the most popular are his *Saints' Everlasting Rest* (London, 1650), only read now in an abridgment of an abridgment; *Dying Thoughts* (1683), and *Call to the Unconverted* (1657)—20,000 copies of which were sold in a twelvemonth, and which was translated into all European languages. His important theological writings are *Methodus Theologiæ Christianæ* (1681) and *Catholic Theology* (1675), in which his peculiar system (see BAXTERIANS)—a compromise between Arminius and Calvin—is embodied. He had long controversies with John Owen (q.v.), a rigid Calvinist, and with William Penn—for all his breadth of vision he had no sympathy with the Quakers. Some of his devotional poems are still used in some hymnals. His autobiographical narrative is historically valuable; the review of his religious opinions Coleridge called one of the most remarkable pieces of writing in religious literature. His *Practical Works*, in 23 volumes, with a biography by Orme, were published (London, 1830), and reprinted in 2 volumes, with life, by L. Bacon (New Haven, 1844); also in 4 volumes, with an introductory essay by Rogers (London, 1868). Consult: biographies by Orme (London, 1830), J. Stalker (1882), Boylé (1883), J. H. Davies (1887); the autobiography, *Reliquiæ Baxterianæ*, edited by Sylvester (1696), and by Jayne (London, 1910); an essay by Sir James Stephen in the second volume of his collected *Essays* (new ed., New York, 1907); Currier, *Nine Great Preachers* (Boston, 1913).

BAXTER, ROBERT DUDLEY (1827–75). An English political economist, born at Doncaster, Yorkshire, and educated at Trinity College, Cambridge. He became a member of the Statistical Society of London in 1866, in which capacity he wrote the following valuable contributions to economic statistics: *Railway Extension and its Results* (1866); *National Income of the United Kingdom* (1868); *Taxation of the United Kingdom* (1869); *National Debts of the Various States of the World* (1871); *Political Progress of the Working Classes* (1871).

BAXTER, SYLVESTER (1850–). An American publicist and writer. He was born in West Yarmouth, Mass., and received his academic education at Leipzig and Berlin (1875–77). Upon his return from abroad he took up newspaper work in Boston, subsequently serving as editor of the *Mexican Financier* (1883–84) and of the *Outing Magazine* (1885–86). He acted as special correspondent for several newspapers and magazines, in Mexico in 1883–84 and in South America in 1906. He first suggested the organization of Greater Boston and of a metropolitan park system for that city, and subsequently he became closely identified with the carrying out of these projects. In addition to numerous short stories, poems, and essays in magazines, his writings include: *The Old New World: Statement of the Hemenway Southwestern Archæological Expedition* (1888); *Berlin: A Study in Municipal Government* (1890); *Cruise of a Land Yacht* (1891); *Greater Boston* (1891); *Spanish Colonial Architecture in Mexico* (1902); *Quest of the Holy Grail* (1904); *Old Marblehead* (1906).

BAXTERIANS. The term formerly applied to those who adhered to Richard Baxter's theological system, the peculiar doctrines of which were: first, that though Christ died in a special sense for the elect, yet he also died in a general sense for all; second, the rejection of the dogma of reprobation; third, that it is possible even for saints to fall away from saving grace. Baxter's views tended toward a liberal theology, but they are deficient in logical development. Like those of the "New England Theology" (q.v.), they occupied middle ground between what were considered the hard conclusions of Calvinism and the latitudinarian views of Arminianism. The two most eminent Baxterians were Dr. Isaac Watts and Dr. Philip Doddridge.

BAY (origin obscure; cf. LL. *basia*, bay). A term properly applied to an indentation of the sea into the land, with an opening wider than the depth. A gulf is understood to be deeper than a bay and has often a narrow opening. These terms are often loosely applied; Baffin Bay, e.g., is really a gulf. When the body of water is large, and the entrance narrow, it becomes a shut sea, as the Baltic, the Red Sea, etc. Hudson's Bay, the Persian Gulf, and the Gulf of Mexico might with propriety be termed seas.

BAY (OF. and Fr. *baie*, berry, from Lat. *baca*, berry). A name given to a number of trees and shrubs more or less resembling the laurel or victor's laurel (*Laurus nobilis*), which is also called sweet bay (see LAUREL), the name "bay," which was once exclusively applied to the fruit, having been extended to the whole plant. The common laurel or cherry laurel (*Prunus laurocerasus*) is sometimes called bay laurel. (See LAUREL.) The red bay of the Southern States of America is *Persea carolinensis*. The white bay, of sweet bay of America, is *Magnolia glauca* (see MAGNOLIA), and the loblolly bay of the same country is *Gordonia lasianthus*. (See GORDONIA.) The California bay tree is *Umbellularia californica*. Rosebay is a name sometimes applied to some of the evergreen rhododendrons. From early times bay leaves have been associated with popular superstitions and usages. Along with other evergreens, they have adorned houses and churches at Christmas; and in token of rejoicing or of some meritorious deed, sprigs of bay, as well as of laurel, have been worn in the hat or wreathed around the head. The leaves of some kinds of bay are employed for flavoring various articles of food.

BAY (OF. *bayer*, to gape, from ML. *badare*, to gape). In architecture, one division or unit in a structure, from top to bottom, including a main opening. In the interior of a Gothic church, for instance, a bay is a single pier arch of the nave or choir, with the corresponding part of triforium and clerestory above it; a section of the church bounded by two imaginary vertical lines from roof to pavement, passing through the centres of the supporting piers. A church has as many bays as it has pier arches. So in secular architecture, the voids being generally repeated over voids and solids over solids, a bay is a slice of the exterior (or interior) from top to bottom, from the centre of one solid to the centre of the next, taking in one window or opening in each story. A façade has as many

bays as there are of these vertical slices or repeats from end to end of the building.

BAYA, SPAR'ROW. bä'yȧ (native name), or An East Indian weaver bird (*Ploceus baya* or *philippina*), remarkable for its tubular hanging nest. In India and Malaya this bird is familiar about village houses, is often kept in confinement or even as a free pet, and is trained to do a variety of tricks and especially to find small articles, steal ornaments from the hair, carry notes to certain places, etc. See WEAVER BIRD.

BAYAD, bȧ-yȧd'. A large edible catfish (*Bagrus bayad*) of the Nile.

BAYADERE, BAYADEER (from the Port. *bailadeira*, through the Fr. *bayadère*, danseuse, dancing girl; cf. It. *ballettare*, to dance, Eng. *ballet*). A name frequently used by Europeans to denote the dancing girls and singers of India. The title is especially applied to the women connected with the temples of southern India as opposed to the Nautch girls of northern India. As ministrants at the temples the Indian dancing women correspond in general to the *ἱερόδουλοι*, or *hierodūli*, the girls in attendance upon the shine of Aphrodite or Venus, at Corinth, in ancient Greece. In southern India these dancing girls are known as *Deva-dāsis*, servants or slaves of the gods, and their office is to minister to the particular divinity to whom the temple may be sacred; to serve him and his priests at sacred festivals and solemn processions; to celebrate his glories and to weave the wreaths with which his image is decorated; to dance and sing twice a day before his idol at the shrine; and generally to perform subordinate duties in the temple, without participating in the celebration of certain of the most sacred rites, and to serve the priests in various ways. Although these dancing women are the servants of the gods, the public is said to call them by the more vulgar name of courtesans or prostitutes, whether they be for the enjoyment of the idols, or the Brahmans, or the benefactors of the sanctuaries. Hence, no doubt, comes the bad association connected with the designation "woman of the bayadere stripe." The ranks of the better class of these female ministrants at the temple are recruited, it is said, from the Vaiśya, or merchant caste; the inferior class from the families of Sudras, or working people. No strong social prejudice, however, is felt against their calling. A small but fixed salary is paid to them for their services in connection with the temple, and this stipend they supplement, it is understood, in various ways peculiar to their person and their profession. The higher class of bayaderes are often called in to perform at banquets, marriages, or at entertainments of the rich or the noble. Dancing in India is still confined to these professional girls, and is not considered respectable, although with the advance of female education women are now more generally taught to sing as well as to read. The special patroness or protectress of the Deva-dāsis is the goddess Rambhā, who belongs to the band of Apsarases, or heavenly nymphs, of Indra's paradise. Consult Dubois, *Hindu Manners, Customs, and Ceremonies* (Oxford, 1897). See NAUTCH.

BAYAMO, bȧ-yä'mō. An inland town in the province of Oriente, Cuba, 60 miles northwest of the city of Santiago (Map: Cuba, J 6). It is situated in a plain on the Rio Bayamo, an affluent of the Cauto, and is an agricultural and commercial centre, though formerly its importance was much greater. One of the oldest cities on the island, Bayamo, was founded in 1514 by Velasquez. It was prominent in the Republican uprising of 1868, and was one of the strongholds of the insurgents. Pop., 1899, 3022; 1907, 4102.

BAYAMON, bä'yȧ-mōn'. A town of Porto Rico, 6 miles (direct) southwest of San Juan (Map: Porto Rico, E 2). It is on the American Railroad and is an industrial centre, having sugar mills, match and tobacco factories, manufactories of ice and bricks, an iron foundry, and an oil refinery. The region abounds in grazing land, and sugar cane and fruit are grown. The town is well built and has a public school, a college, and several churches. Pop., 1899, town, 2218; municipality, 19,940; 1910, town, 5272; municipality, 29,986. Within the district of Bayamon are the ruins of Pueblo Viejo, the oldest Spanish settlement on the island. They are the remains of Caparra, a town reputed to have been founded in 1509 by Ponce de Leon.

BAYARD, bā'ērd, *Fr. pron.* bȧ'yär'. The horse of the four sons of Aymon, famous for his swiftness and for his power of adjusting the length of his body to one or several riders. He appears in *Orlando Innamorato*, *Orlando Furioso*, and Tasso's *Rinaldo*. On St. John's Eve, according to the legend, the clatter of his hoofs may still be heard over the hills of the Ardennes. The name "Bayard" is used to designate any spirited or fine horse.

BAYARD, bī'ērd, GEORGE DASHIELL (1835–62). An American soldier, born at Seneca Falls, N. Y. He graduated at West Point in 1856 and passed four years in garrison duty on the frontier. At the outbreak of the Civil War he was appointed colonel of the First Pennsylvania Cavalry Volunteers. He was soon promoted to be brigadier general, served in the campaigns of the Shenandoah and the Rappahannock, and was mortally wounded at Fredericksburg (Dec. 13, 1862).

BAYARD, JAMES ASHETON (1767–1815). An American statesman, born in Philadelphia, Pa. He graduated in 1784 at Princeton, began the practice of law in Delaware, and in 1796 was elected to the national House of Representatives, where he achieved a high reputation as an orator and a leader of the Federalists. When, after the indecisive presidential contest of 1800 between Jefferson and Burr, the duty of election devolved upon the House, Bayard was prominent in securing the choice of the former. From 1805 to 1813 he was a United States Senator. In 1814 he was a member of the commission which negotiated with Great Britain the Treaty of Ghent.

BAYARD, JAMES ASHETON (1799–1880). A distinguished American constitutional lawyer and statesman, son of James Asheton Bayard and father of Thomas F. Bayard (q.v.). He was born in Wilmington, Del., studied law, and attained considerable eminence at the bar. He served in the United States Senate as a Democrat during the years 1851–64 and 1867–69, for a considerable part of which time he was chairman of the judiciary committee.

BAYARD, bȧ'yär', JEAN FRANÇOIS ALFRED (1796–1853). A French dramatist. He was born at Charolles, Saône-et-Loire, and studied law, but in 1828 turned to dramatic composition. In collaboration with Scribe and others he wrote more than 200 plays, including *La perle des*

maris and *Le gamin de Paris*. His collected works appeared in 12 vols. (1855–59).

BAYARD, bī'ērd, JOHN (1738–1807). An American patriot, born at Bohemia Manor, Md. He became a prominent merchant of Philadelphia, was a member of the provincial congresses of 1774 and 1775; in 1776 was appointed by the Constitutional Convention a member of the Council of Safety, and in 1776–77 served in the American army as colonel of infantry. He was Speaker of the Pennsylvania House of Assembly in 1777 and 1778, and was elected in 1785 to the Continental Congress. During the Revolution he assisted in furnishing arms to Congress and in fitting out a privateer.

BAYARD, bä'yär', PIERRE DU TERRAIL (1476–1524). A French knight, the *chevalier sans peur et sans reproche*, without a rival the model of chivalric virtue, and one of the few mediæval knights whose virtues can stand the tests of modern culture. Though his activity was chiefly military, he cultivated all the gentler virtues, yet was equaled by none in courage and intrepidity. Three French kings profited by his loyal devotion—Charles VIII, Louis XII, and Francis I. Italians, Spaniards, and Englishmen on innumerable occasions suffered by his remarkable exploits, but they honored as much as they feared him. At the Garigliano (1503) Bayard defended the bridge alone, against a whole detachment of the victorious army of Gonsalvo de Cordova. At Guinegate, in the "Battle of the Spurs" (1513) he performed an equal feat of valor. At Marignano (1515) Bayard gained a brilliant victory over the Swiss auxiliaries of the Duke of Milan. Upon the battlefield, his elated King (Francis I) bowed to receive knighthood from the hero of this "Battle of the Giants." In 1521 Bayard defended Mézières against Charles V, prevented an invasion which France could hardly have resisted, and on his return to Paris was hailed as the savior of his country. He was given command, in his own name, of a company of 100 knights—an honor usually accorded only to princes of the royal blood. He fell in the battle of the Sesia, April 30, 1524. While dying he fell into the hands of the Spaniards, among whom was the Constable of Bourbon, his last utterance to whom has become famous: "My lord, I thank you; but pity is not for me, who die a true man, serving my King; pity is for you, who bear arms against your prince, your country, and your oath." The Spanish vied with the French in the honors paid to his remains and his memory. His life was written soon after by Symphorien Champier, his "loyal servant." Consult St. Alban, Berville, and others, *Le Chevalier Bayard*, trans. and ed. by E. Walford (London, 1867).

BAYARD, bī'ērd, THOMAS FRANCIS (1828–98). An American statesman and diplomatist. He was born on Oct. 9, 1828, in Wilmington, Del., attended a private school in Flushing, L. I., and for some time was a clerk in a New York commercial house, but returned to Wilmington (1848), studied law with his father (J. A. Bayard), and was admitted to the bar in 1851. In 1861 both he and his father, though strongly opposed to secession, were also opposed to coercion, and publicly denounced the war, in which neither took any part. In 1869 he succeeded his father as United States Senator, being the fifth member of the family to represent Delaware in this capacity, and served continuously until 1885, when he became Secretary of State under President Cleveland. In the Senate he took a leading position on the Democratic side; he was a member of the Electoral Commission in 1877, and was President pro tem. of the Senate in 1881. His name was often urged for the presidency, and in the Democratic national conventions of 1880 and 1884 he was the chief rival of the successful candidates. As Secretary of State he was called upon to deal with several important matters, such as the Bering Sea controversy and the British and Russian treaties. From 1893 to 1897 he was United States Ambassador to Great Britain, being the first to hold that diplomatic rank. While holding this office he was considered by some to have become too partial to English ways. For uttering some criticisms regarded as unfavorable to the United States the House of Representatives passed a vote of censure on him on Nov. 7, 1895. He received the degree of LL.D. from Harvard, and honorary degrees from both Oxford and Cambridge. Consult Edward Spencer, *Public Life and Services of Thomas F. Bayard* (New York, 1880).

BAYAZID, I. See BAJAZET.

BAYBAY, bī'bī'. A town of Leyte, Philippines, 40 miles from Tacloban, the capital of the province (Map: Philippine Islands, E 5). The town is a centre for coast trade and an important hemp port. Pop., 1903, 22,990.

BAY'BERRY. See CANDLEBERRY.

BAY CITY. A city and the county-seat of Bay Co., Mich., 108 miles north of Detroit on the Saginaw River, at the head of navigation, and on the Michigan Central, the Pere Marquette, the Detroit and Mackinac, the Detroit, Bay City, and Western, and the Grand Trunk railroads (Map: Michigan, F 5). It is connected also by boat with other lake ports. Several bridges cross the river at this place, and the city contains parks, two public libraries, a handsome Masonic Temple, a State Armory, and fine city hall. There is a large trade in lumber, salt, beet sugar, chicory, alcohol, coal, machinery, etc. Industries include shipbuilding and the manufacture of railroad wrecking cranes, etc. The distilling and fishing interests are also important. Settled in 1836, Bay City was incorporated as a village in 1859, and in 1865 was chartered as a city. In 1905 Bay City and West Bay City were consolidated. The water works and electric light plant are owned by the municipality. Pop., 1910, 45,166; 1920, 47,554.

BAY CITY. A town and the county-seat of Matagorda Co., Tex., about 25 miles from the Gulf of Mexico, 86 miles southwest of Houston, on the Colorado River, near the Intercoastal Canal; and on the Gulf, Colorado, and Santa Fe, the St. Louis, Brownsville, and Mexico, and the Galveston, Harrisburg, and San Antonio railroads (Map: Texas, E 5). The chief industries are cotton ginning, rice milling, and the manufacture of ice and dairy products. The city is in a rich agricultural region, producing cotton, corn, rice, sugar cane, and a great variety of fruit. Bay City was founded about 1895, at which time it was made the county-seat. Its growth has been rapid. Pop., 1900, 473; 1910, 3156.

BAYER, bī'ĕr, JOHANN (1572–1660). A German astronomer. He was a zealous Protestant pastor and obtained the cognomen *Os Protestan-*

tium ('the Mouth of Protestants'). He is now remembered chiefly for his *Uranometria* (1603), in which he gave 51 maps of the heavens, constructed from the observations of his predecessors, and followed by explanations in his *Explicatio Caracterum Æneis Tabulis Insculptorum* (1654). In the former work he outlined 60 constellations, including, in addition to the 48 ancient constellations known to Ptolemy, 12 situated in the Southern Hemisphere and due chiefly to Petrus Theodorus of Embden, who died in 1596. He introduced in his maps the plan of distinguishing the stars of a constellation by means of Greek and Latin characters designating the largest star of the constellation by the first letter of the alphabet, and the rest in order of their apparent brilliancy by the succeeding letters.

BAYER, Karl Robert Emmerich von (1835–1902). An Austrian novelist, whose pseudonym was Robert Byr; born at Bregenz and educated at the military academy of Wiener-Neustadt. He served as an officer of the General Staff in the Italian campaign in 1859, but resigned from the military service in 1862 and thenceforth devoted himself exclusively to the writing of fiction, especially novels of military life. Among his best productions are the following: *Der Kampf ums Dasein* (5 vols., 1869; 2d ed., 1872); *Gita* (4 vols., 1877); *Eine geheime Depesche* (1880); *Unversöhnlich* (1882); *Lydia* (1885); *Der Weg zum Glück* (1890); *Sternschnuppen* (1897).

BAYES, bāz. A caricature of Dryden in Buckingham's play, *The Rehearsal.* The character is a would-be literary man and was at first meant to satirize Sir Robert Howard. The drama abounds in ridiculous situations, and the laureate's mannerisms are excellently shown.

BAYEUX, bā'yē' (city of the Baiocasses; *Baioca* in the Middle Ages). An episcopal city of France, in the department of Calvados, Normandy. It stands in the fertile valley of the Aure, about 5 miles above its outlet in the English Channel (Map: France, N., E 3). This ancient, badly built town has a fine cathedral; its splendid portal and three towers are conspicuous features of the place. The public institutions are a seminary, a communal college, a library of 30,000 volumes, and a museum, whose most curious historic relic is the famous tapestry by Matilda, Queen of William the Conquerer, which depicts the invasion of England. The industries of Bayeux comprise the manufacture of porcelain, lace, leather goods, and cotton. There is a brisk trade in farm products. Pop., 1901, 7312; 1906, 7736; 1911, 7638. Bayeux occupies the site of that Roman Augustodurum which took the place of the ancient capital of the Gallis Baiocasses. The position exposed to all the storms which swept over France from the conquest of Rollo to the great Revolution, during which it remained loyal to the Bourbons. Consult: Masselin, *Le diocèse de Bayeux du Ier au XIe siècle* (Caen, 1898), and Hepworth, "Bayeux," in *The Artist,* No. xxii (New York, 1898).

BAYEUX TAPESTRY. The most remarkable and extensive remaining specimen of early mediæval embroidery (q.v.). It is a web of white canvas or linen cloth, 214 feet long by 20 inches wide, preserved in the public library at Bayeux, France (Normandy). Upon it is embroidered, in woolen thread of various colors, a representation of the invasion and conquest of England by the Normans in 1066. Tradition asserts it to be the work of Matilda, wife of William the Conquerer; but it was made for Odo, Bishop of Bayeux, for his cathedral, where it was used as a decorative hanging on feast days. It contains 1512 figures in 72 subjects, with Latin inscriptions giving the subjects and names. The heads and hands of the figures are crudely designed in "plumetis"; the rest is formed of parallel lines of woolen threads fastened down at intervals. A thread of a different shade gives the outlines. The border is of foliage, fantastic animals, and hunting scenes. The tapestry is most valuable for a representation of the costume, arms, and manners of the Normans before the Conquest, and does for this period what the columns of Trajan and Marcus Aurelius do for Roman military life in their age; giving also, as they do, more details of the events represented than are given in contemporary literature. It is, in fact, more than a history of the Conquest; for it gives the life of Harold, even during the lifetime of Edward the Confessor, the incidents of his journey to Normandy, his return and coronation, the Norman expedition, the battle of Hastings, and Harold's death. Reproductions in autotype have been edited by Fowke (London, 1875), and in color by Stothard, *Vetusta Monumenta,* vol. vi, part i. Consult Freeman, *History of the Norman Conquest* (London, 1875), vol. iv. Consult also the monographs by Fowke (ib., 1898) and Marignan (Paris, 1892).

BAYEZID. See Bajazet.

BAY LAU'REL. See Cherry Laurel.

BAYLE, bēl, Pierre (1647–1706). A French philosopher and critic. He was the author of a famous *Historical and Critical Dictionary* (*Dictionnaire historique et critique*), which passed through eight editions in 40 years (1697, 1702, 1715, 1720, 1730, 1734, 1738, 1740), and was twice translated into English (1710, 1734–37). He was born at Carla, near Foix, Nov. 18, 1647, of a Protestant family, studied at Puy-Laurens and Toulouse, and showed the critical balance of his mind by professing Catholicism in 1669 and Protestantism in 1670. He taught for a time in Geneva and in 1675 became professor of philosophy at the Protestant Academy of Sedan. On its suppression (1681) Bayle sought intellectual freedom in Holland and settled at Rotterdam, where he received a salary from the municipality as an unattached professor of philosophy. He now published his first important work, the sensational *Pensées sur la comète,* and a *Critique générale sur l'histoire du Calvinisme du Père Maimbourg* (1682), somewhat antiquated in style, but in thought a full generation in advance of his countrymen. In 1684 he began to publish a literary magazine, *Nouvelles de la république des lettres,* and greeted the revocation of the Edict of Nantes in two pamphlets, *Ce que c'est que la France toute catholique sous le règne de Louis le Grand,* and a *Commentaire philosophique sur le Compelle Intrare* (1686), which were denounced for "preaching the dogma of religious indifference and universal toleration," alike by Protestants and by Catholics, and were disavowed ironically by Bayle, who had the courage of his convictions but not of their consequences. Such tactics, afterward imitated by Voltaire, make his authorship

of *Avis aux réfugiés* (1690) dubious, but in any case it intensified the opposition of Protestants, who now accused him of atheism, with the result that Bayle was deprived (1693) of his municipal pension and authority to teach in Rotterdam. This act he chose to attribute to his Cartesian philosophy, the ministers being, he said, "obstinate admirers of Aristotle."

Bayle now devoted himself wholly to compiling his Dictionary, originally as a work of pure erudition, to trace and rectify error in other works, though it became in the course of its compilation a destructive criticism of received history and systems, and so an arsenal of rationalism for the eighteenth century. The Dictionary makes no pretense to completeness, but it acquires a kind of unity through its constant insinuation that the teachings of reason contradict the dogmas of religion, and that the rational man, in forming his morality, will consider only himself. In the articles of the Dictionary, and still more in the notes to them, Bayle's humor delights in daring impieties and Rabelaisian obscenities, after the manner of his time. It popularized his work, but gave a handle to his enemies, who grew in number and virulence. To justify himself, he wrote four dissertations—*On Atheists; On Manichæans; On Obscenities;* and *On Pyrrhonists;* but his last work—*Réponse aux questions d'un provincial* (1703) and *Continuation des pensées sur la comète* (1704)—showed that he still thought it, in his own words, "in no wise sure that the impressions of nature are to be accepted as the expressions of truth." He died at Rotterdam, Dec. 28, 1706. Bayle's private life was dignified and disinterested. His libertinism was wholly intellectual. His ideas and spirit penetrate like yeast the whole eighteenth century. Bayle's *Works* (4 folios, 1727–31, reprinted with additions, 1737) contains his interesting *Correspondence.* There is an annotated edition of the *Dictionnaire* in 16 vols. (Paris, 1820), and a *Selection of Unpublished Correspondence* (*Choix de la correspondance inédité*, Copenhagen, 1890). Consult Desmaizeaux, *La vie de Pierre Bayle* (The Hague, 1732), Feuerbach, *Pierre Bayle* (Leipzig, 1848), and also Brunetière, *Etudes critiques* (5th series, 1893); Renouvier, *Philosophie analytique de l'histoire,* vol. iii (1897); Perrens, *Les libertins en France au XVIIe siècle* (1896); and A. Cazes, *Pierre Bayle: sa vie, ses idées, son influence, son œuvre* (Paris, 1905).

BAYLEN, bī-lān'. See BAILÉN.

BAYLEY, bā'lī, JAMES ROOSEVELT (1814–77). An American prelate of the Roman Catholic church. He was born in New York, graduated at Washington (now Trinity) College, Hartford, was ordained a Protestant Episcopal clergyman, and for some time preached in New York. In 1842 he became a Roman Catholic, and two years later was ordained by Bishop Hughes. He served for a time as professor of belles-lettres and acting president of St. John's College, Fordham, N. Y., and was secretary to Bishop Hughes from 1846 to 1853, when he was consecrated Bishop of Newark, N. J. He founded Seton Hall College and many other institutions. In 1872 he was made Archbishop of Baltimore. He published a *History of the Roman Catholic Church on the Island of New York* (1853), *Pastorals for the People,* and the *Memoirs of Simon Gabriel Brute, First Bishop of Vincennes* (1860). He was much esteemed for his social as well as for his intellectual gifts.

BAYLEY, RICHARD (1745–1801). An American physician. He was born in Fairfield, Conn., studied in London hospitals, began to practice in New York in 1772, and in 1775–76 studied in England with Dr. John Hunter. Early in 1776 he returned to the United States as staff surgeon to Sir Guy Carleton. He lectured on surgery and published a work on croup, introducing a new and valuable method of treating that disease. In 1792 he became professor of anatomy and surgery in Columbia College. He was the first health officer of the port of New York and as such originated New York's quarantine laws.

BAYLEY, WILLIAM SHIRLEY (1861–). An American geologist, born in Baltimore, Md. He graduated from Johns Hopkins in 1883, was a fellow at that university for two years, and received the degree of Ph.D. in 1886. His earlier service was at Colby College, as professor of geology (1888–1904); his later, at the University of Illinois, first as assistant professor of geology (1907–09), and then as associate professor of mineralogy and economic geology (1909–). After acting for 21 years as assistant geologist in the United States Geological Survey he was made geologist in 1908. Several American and European scientific societies elected him to membership. Besides editing *The American Naturalist* (1886–1907), he contributed frequently to technical journals, prepared many geological reports, and wrote *Iron Mines and Mining in New Jersey* (1912).

BAY'LISS, SIR WYKE (1835–1906). An English painter and writer on art. He was born at Madeley, and studied in the schools of the Royal Academy. He is known as one of the most prominent advocates of the Neo-Gothic revival; but his interesting pictures, which usually treat of church interiors, are of no great technical merit. They have often been exhibited in America. The best include "La Sainte Chapelle" (Royal Academy, 1865); "St. Mark's, Venice" (Nottingham, 1880); "St. Peter's, Rome" (1888); "The Golden Duomo" (Pisa, 1892). He succeeded Whistler as president of the Royal Society of British Artists in 1888. He wrote: *The Witness of Art* (1876); *The Higher Life in Art* (1879); *The Elements of Aërial Perspective* (1885); *Rex Regum: A Painter's Study of the Likeness of Christ* (1898); *Five Great Painters of the Victorian Era* (1902); *Seven Angels of the Renaissance* (1905).

BAY'LOR, FRANCES COURTENAY (1848–). An American novelist, born at Fayetteville, Ark. In 1896 she married George S. Barnum. She first attracted attention by two short stories, *The Perfect Treasure* and *On This Side,* published together under the title *On Both Sides* (1886). Among her other novels are: *Claudia Hyde* (1894); *Nina Barrow* (1897); *The Ladder of Fortune* (1899); *A Georgian Bungalow* (1900). *Juan and Juanita* (1897) is a book for juvenile readers.

BAYLOR, ROBERT EMMET BLEDSOE (1793–1874). An American jurist, born in Lincoln Co., Ky. After serving in the War of 1812 he began the practice of law in Kentucky, but afterward removed to Alabama; was a member of Congress from that State from 1829 to 1831, and participated in the Creek War as commander of a volunteer regiment. He afterward removed to Texas, where he became one of the foremost advocates of the annexation of that republic to the United States, and was a member of the First Constitutional Convention. He

subsequently served as a district judge for 25 years. A Baptist college, chartered in 1845 by the Congress of Texas, received the name of Baylor University, in recognition of the liberal donation bestowed upon it by Judge Baylor.

BAYLOR UNIVERSITY. A Baptist educational institution. It was chartered in 1845 by the then Republic of Texas and was formerly situated at Independence, Tex., but removed to Waco in 1886. Its productive funds in 1913 amounted to $200,000, with $300,000 in notes in process of payment. Its library had 26,300 bound volumes. The faculty of the academy, college, and schools of fine arts, medicine, and pharmacy numbered 76, and the students of all departments 1531. President, S. P. Brooks.

BAYLY, bā'lĭ, Ada Ellen. See Lyall, Edna.

BAYLY, Lewis (–?1631). Bishop of Bangor, Wales. He was a native Welshman; was educated at Oxford, and enjoyed favor at court, but later lost it because of his puritan sympathies. He is now remembered only as the author of the *Practice of Piety*, the most popular religious book until Bunyan's work appeared. Bunyan attributed his first religious awakening to the reading of this book. Besides numerous editions of the original work, translations appeared in Welsh, French, German, Polish, and Romansch. John Eliot translated it into the Indian language as an aid in his mission work.

BAYLY, Thomas Haynes (1797–1839). An English poet. He was intended for holy orders and educated at Oxford. He inherited a large fortune, but lost it, and in 1831 began to write songs for music and, with Henry Bishop, published *Melodies of Various Nations*. Within a few years he wrote 36 dramatic pieces, a number of stories, and hundreds of songs. Some of the more popular were: "The Soldier's Tear"; "Why Don't the Men Propose?" "We met, 'Twas in a Crowd"; "I'd Be a Butterfly," etc. His best farce is *Perfection*. His fiction is represented by *The Aylmers*, a novel in 3 vols., and *Kindness in Women*, a collection of tales. Consult his *Works*, with memoir (London, 1844).

BAYNE, bān, Peter (1830–96). A Scottish author. He was educated in Marischal College, Aberdeen; studied theology at Edinburgh and philosophy under Sir William Hamilton. He wrote criticisms on Alison, De Quincey, Hugh Miller, and others. In 1855 he published *The Christian Life, Social and Individual*, which was follow in 1859 by *Essays, Bibliographical, Critical*, etc. He was editor of the Glasgow *Commonwealth*, Edinburgh *Witness*, and London *Dial*, and an associate editor of the *Christian World*. Among his other works are: *Testimony of Christ to Christianity* (1862); *The Days of Jezebel: An Historical Drama* (1872); *Life of Luther* (1887). He died in London, Feb. 10, 1896.

BAYNES, bānz, Thomas Spencer (1823–87). An English writer on philosophy. He was born at Wellington, Somerset; was educated at Bristol College and Edinburgh University and became assistant to Sir William Hamilton at the latter institution. He published an *Essay on the New Analytic of Logical Forms* (1852), an exposition of Hamilton's *Quantification of the Predicate*. From 1857 to 1863 he was one of the examiners for the University of London and assistant editor of the *Daily News*. In 1864 he became professor of logic, rhetoric, and metaphysics in the University of St. Andrews, where he remained till his death. He wrote much for the *Edinburgh* and other reviews and magazines, and was editor of the ninth edition of the *Encyclopœdia Britannica*.

BAY OF ISLANDS. 1. A bay on the northeast coast of North Island, New Zealand, in lat. 35° 14′ S., long. 174° 11′ E. (Map: New Zealand, N. I., B 1). 2. A bay on the west coast of Newfoundland, studded with many beautiful islands, with fisheries, timber, and deposits of marble and gypsum (Map: Newfoundland, B 3).

BAY OF NAPLES. See Naples, Bay of.

BAYOMBONG, bä'yōm-bōng'. The capital of the province of Nueva Vizcaya, on the island of Luzon, Philippines (Map: Philippine Islands, C 2). The town is situated on the Magat River, 134 miles north of Manila, and is the centre of a fertile district, producing rice and tobacco. Pop., 1903, 4039.

BAY'ONET (Fr. *baïonnette, bayonnette*, first made in Bayonne, France). A short dagger-like weapon of steel, constructed so that it may be fixed at the end of the rifle barrel, to which it is attached by a strong spring clasp, usually secured to the block of the foresight. When not so fixed, it is carried in a leather scabbard suspended from the waist belt on the left side of the body. The first bayonets, used in France in 1671, were known as *bayonets-à-manche* and had handles which fitted into the muzzles of the guns; the socket bayonets, or *bayonets-à-douille*, not being introduced until a later date. These latter permitted the piece to be fired without removing the bayonet. The dagger is said to have been the original bayonet; the musketeer of that day having utilized his dagger as a defense against charging cavalry by fitting the handle of his dagger into the muzzle of his musket. During the gradual evolution of the modern sword bayonet, which is now a weapon of offense rather than of defense, many experiments have been made in the attempt to introduce various forms of intrenching tools—knives, etc., constructed to serve also as bayonet; but such arrangements are nowhere in general use. Many authorities maintain that the bayonet, together with all other forms of the *arme blanche*, have become of very little, if comparatively any, importance in modern operations; while others, equally as positive, assert that it still retains decisive value. It is certainly true that long-range and rapid-fire rifles, together with smokeless powder, often seal the fate of a battle long before the bayonet can be brought into play; but there are still campaigns where the soldier armed with a bayonet has a considerable moral superiority over his opponents not so armed. The British-Egyptian campaigns of 1882–84 and 1886, the frontier expeditions in India, and the Boer War of 1899—1902 are cases in point. The best tactician in the world cannot always prevent, even with modern firearms, such things as surprises; and small bodies of men will still occasionally, under practically any conditions, be able to get unperceived into close quarters with their enemy. So long as night attacks are possible, just so long will the bayonet be of prime importance, for it is undoubtedly and invariably the weapon to be used. In every battle there are important positions which must be quickly taken by assault, and one of the principal lessons of the war in Manchuria is not to abandon the bayonet. See Tactics, Military; Infantry.

BAYONNE, bā-yōn', *Fr. pron.* bā'yōn' (Bay city, from Bisc. *baia, baiya*, harbor, Portug. *bahia*, Eng. *bay*). A cathedral town, and a for-

tress of the first class, in the department of the Basses-Pyrénées, France (Map: France, S., C 5). It stands 3½ miles from the Bay of Biscay, at the confluence of the Nive and Adour, which rivers divide the city into Great and Little Bayonne, with which the Faubourg Saint-Esprit is connected by a bridge. The city is cheerful and pleasant, and the valley in which it lies is backed by the foothills of the Pyrenees. The harbor of Bayonne is safe and commodious, and has three lighthouses at its entrance. The noteworthy institutions consist of a library, a theological seminary, a museum, a military hospital, barracks, and a naval school. The cathedral was begun in 1213, and its corbels bear the arms of English princes of the occupation period. The spires are modern (nineteenth century). Bayonne has an extensive trade with Spain, Portugal, and South America, and sends masts and ship timber to Brest and other French ports. Other exports include wine, tars and resins, minerals, grain, chocolate, and the famous Bayonne hams. Its industries comprise the making of brandy, cream of tartar, chocolate, leather, linen goods, and the refining of sugar. Glass works, anchor foundries, and shipyards are also in active operation at Bayonne. Pop., 1901, 32,722; 1906, 26,488; 1911, 27,886. Bayonne is the ancient Lapurdum, the capital of the Tarbelli, and as early as the third century A.D. was a fortress and a commercial centre. In the Middle Ages is was important because of its trade, its whaling fleet, and its manufacture of leather and arms. It has sustained several sieges, offering successful resistance to allied Spanish and British troops in 1814.

BAYONNE, bā-yōn′. A city in Hudson Co., N. J., on New York and Newark bays, and on the Central of New Jersey, and the Lehigh Valley railroads (Map: New Jersey, D 2). It contains the former villages of Centerville, Bergen Point, Bayonne, Constable Hook, and Salterville (Pamrapo), and is separated from Jersey City by the Morris Canal. The city has a large public library and is one of the most important manufacturing cities in the State. It contains large coal-shipping docks, chemical, boiler, refining and smelting works, motor boats, structural iron, insulated wire, and silk factories, and the largest plants of the American Radiator Company and of the Standard Oil Company, the refineries of which are connected by pipe lines with New York, Philadelphia, Baltimore, Pittsburgh, Baton Rouge, etc. The Hudson County Boulevard passes through the city. Bayonne was separated from Bergen as a township in 1861, was chartered as a city in 1869, and rechartered in 1872. It is governed by a mayor, elected biennially, who appoints the board of education, the board of health and library trustees, and, with the concurrence of the council, the police department and sinking-fund commissioners. Pop., 1900, 32,722; 1910, 55,545; 1920, 76,754.

BAYONNE DECREE′. A decree issued by Napoleon on April 17, 1808, under pretense of helping the United States to enforce the embargo of 1807, directing the seizure and sale of all vessels flying the American flag which should subsequently enter the ports of France, Spain, Italy, and the Hanse towns, on the ground that such vessels would either be sailing under false colors or would be violating the laws of the United States and indirectly serving the cause of England. In accordance with this decree it is estimated that France confiscated over 300 American vessels, which she sold for the benefit of her national treasury. See CONTINENTAL SYSTEM.

BAYOU, bī′o͞o (N. Am. Indian *bayuk*, like a canal). A stream not fed with springs, but running from one body of water to another. Tidal channels in the States on the Gulf of Mexico often bear this name.

BAYOU STATE. The name popularly given to the State of Mississippi, from the number of small creeks or bayous within its limits. See STATES, POPULAR NAMES OF.

BAY PSALM BOOK. The first book published in the American Colonies, the joint product of Richard Mather, founder of that distinguished family of New England divines, of Thomas Welde, and of John Eliot, the missionary to the Indians. It was printed by Stephen Daye, at Cambridge, in 1640, and after revision in 1647 remained in general use for many years. It is hard to realize how it can have ministered to edification, for it outdid Sternhold and Hopkins in harsh crudity of style, metre, and rhythm. Yet it was the product of university men. Mather had been a student at Oxford; John Eliot was a graduate of Cambridge. They must have served their apprenticeship there at Latin verse making, and it is incredible that they should not have been able to write better English verse. But they were determined that the Lord's praises should be sung according to His own will, and with their ideas of literal biblical inspiration they were willing to sacrifice every element of poetry to what they imagined was faithfulness to Hebrew originals. They tell us in their preface that they "attempted conciseness rather than elegance, fidelity rather than poetry." That they thought these qualities contradictory illustrates the fatal flaw in Puritan æsthetics. How numbing this moral discipline had been to the harmonies and amenities of life may be judged from the fact that few congregations knew more than five tunes, and but 10 are known to have been used in the first half-century of the *Bay Psalm Book's* existence. Consult Trent, *American Literature* (New York, 1903).

BAYREUTH, bī′roit, or **BAIREUTH** (Lat. *Baruthum*). The capital of the government district of Upper Franconia, Bavaria, formerly the capital of the principality of the same name, ruled by Margraves of the house of Hohenzollern (Map: German Empire, D 4). It is beautifully situated on the Red Main, 126 miles north of Munich. The streets are broad and well paved and its principal buildings are the Wagner Theatre; the old palace; the new palace, containing a gallery of paintings; the old opera house; a riding school; the infirmary; and the townhall. Among the interesting private houses are the Villa Wahnfried, the former residence of Richard Wagner, who is buried in its grounds, and the house of Jean Paul Richter. In the Central Cemetery are the graves of Jean Paul Richter and the composer Franz Liszt. Bayreuth has numerous educational and charitable institutions. There are manufactures of cotton and woolen goods, sewing machines, leather, earthenware, and agricultural and musical instruments. There are also breweries, distilleries, and brick kilns. Pop., 1900, 29,384; 1905, 31,861; 1910, 34,547. This town is popularly known as the mecca of the Wagnerites. In 1872, partly from funds collected from patrons and partly by the organization of so-called Wagner societies, there was begun the erection of a theatre for the production

of Wagner's works. It was opened in 1876, and since then music lovers have been attracted to Bayreuth from all over the world. The theatre occupies a site on a hill overlooking the town and is reached by a broad avenue of shade trees. In connection with the theatre is a school for the training of voices to participate in the Wagner festivals. Consult Meyer, *Das Stadtbuch von Baireuth* (München, 1896), and Jones, "Bayreuth and the Wagner Festival," in *Cassel's Magazine*, vol. xxvii (London, 1899); Bahr-Mildenburg and Bahr, *Bayreuth and the Wagner Theatre* (London, 1912).

BAYREUTH MUSICAL FESTIVAL. The Festival Theatre of Bayreuth has been described as the musical shrine of Richard Wagner. The building of the Festival Theatre had been the dream of Wagner's life, and eventually he was fortunate enough to secure the interest of the unhappy King Ludwig II of Bavaria, from whom and through whom he secured much financial assistance, which, with the subscriptions received from lovers of his music, enabled him to carry out his long-cherished scheme. The idea was first conceived in 1858, and the *Tetralogy of the Nibelungen* written, composed, and reserved until there should have been materialized the conditions and environments which its creator deemed necessary for its proper presentation. The situation of the theatre has been admirably chosen, with the town of Bayreuth in the foreground and the hills of Franconia for a background. Performances begin at 4 P.M. except when the *Rheingold* is given, when the hour is altered to 5 P.M. The artists, who invariably give their services, carry out as far as possible Wagner's directions and ideas. They never recognize the plaudits of the audience, and as far as possible discourage ebullitions of feeling on the part of their auditors. Originally the audience remained silent throughout every performance; but this rule is now seldom obeyed except in the solitary instance of *Parsifal*. In order to secure every possible artistic reinforcement, the orchestra is hidden away out of sight under the stage; and the auditorium itself is plunged into darkness before and after each act. On May 22, 1872, the foundation stone was laid, the event being marked by the performance of Beethoven's *Ninth Symphony*, with an orchestra of 500 instruments, comprising many of the greatest instrumentalists of the day, among whom were Wilhelmj (q.v.), playing a first-violin part, and Hans Richter, with the tympani. The theatre was opened in 1876 with *Der Ring des Nibelungen*, the festival continuing from August 13 to August 17. The next festival occurred in 1882, when *Parsifal* had its first presentation; since which event performances have been given almost every year. The festival of 1897 was especially remarkable as being the first time five complete works were given, the *Tetralogy* and *Parsifal*. To Frau Wagner and Siegfried Wagner, wife and son of the master, is mainly due the credit of maintaining intact, as far as possible, the traditions of the Bayreuth Festival. See MUSIC FESTIVAL.

BAYRHOFFER, bīr'hŏf'fĕr, KARL THEODOR (1812–88). A German-American philosopher and publicist, from 1838 to 1846 professor of philosophy in the University of Marburg. He became a member of the Diet of Hesse-Cassel in 1848, and in 1850 was President of the Chamber. After the defeat of his party (the Democratic) he came to America in 1853 and settled in Wisconsin as a farmer, though from 1866 he lived principally by his pen. In his early writings, notably in *Idea and History of Philosophy* (1838), he appears as a zealous disciple of Hegel. Afterward he became a champion of German Catholicism and wrote *Researches into the Essence, History, and Criticism of Religion* (1849).

BAY RUM. An aromatic liquid prepared by mixing oil of bay with alcohol and water and adding small quantities of oil of orange peel and oil of pimenta. Oil of bay is obtained by distilling the leaves of the *Myrcia acris*, a West Indian tree belonging to the natural order Myrtaceæ.

BAY SAINT LOU'IS, *Fr. Creole pron.* bā sĂN lōō'ē'. A city and the county-seat of Hancock Co., Miss., 53 miles by rail east by north of New Orleans, La.; on Mississippi Sound, the Jordan River, and on the Louisville and Nashville Railroad (Map: Mississippi, G 10). It is a popular watering place, a notable attraction being a fine shell road along the beach. The city contains St. Stanislaus College and the St. Joseph Convent. Its leading industries are fishing, oyster cultivation, and canning, fruit growing, and truck gardening. Pop., 1890, 1974; 1900, 2872; 1910, 3338.

BAY SALT. A name applied to common salt which is obtained from sea water by solar evaporation. Such salt is obtained from salt marshes which exist along the coast of France, on the shores of the Mediterranean, and in the West Indies. It is an inferior grade, useful for limited purposes.

BAY STATE. A popular name for the State of Massachusetts, given because previous to the adoption of the Federal Constitution it was called the Massachusetts Bay Colony. See STATES, POPULAR NAMES OF.

BAY WIN'DOW, or (corruptly) **BOW WINDOW.** A window first generally used in late civil Gothic architecture, so called because it forms a bay (q.v.) or projecting section of a room. Bay windows are, for the most part, either rectangular or polygonal in plan, the semicircular form from which the term *bow* was probably derived having been unknown before the latest form of Gothic. Bay windows generally reach to the floor, and are frequently supplied with a seat, which is called the "bay stall." There are many very beautiful examples in the colleges and halls of Oxford and Cambridge, as well as in the great feudal mansions. When used in upper stories and supported on corbels, such windows are called "Oriel windows" (q.v.).

BAZA, bä'thä (the *Basti* of the Romans). A town in Spain, situated near the river Baza, in the province of Granada, about 50 miles east-northeast of the city of that name (Map: Spain, D 4). It lies in a rich plain and is engaged in the production of wine, grain, fruit, oil, etc. There are manufactures of leather, fabrics, pottery, and sombreros, and flour and oil mills. Baza contains several fine churches, including the collegiate church of San Máximo. Pop., 1900, 12,770; 1910, 15,964. Under the Mohammedans Baza was a lively centre of trade and had 50,000 inhabitants. Isabella of Castile reduced the city after a seven-months siege in 1489. In 1810 the Spaniards were defeated here by the French under Marshal Soult.

BAZA. A wild negro people in upper Nubia; with neighboring tribes they are called Shangallas by the Abyssinians.